



# Lifestyle Choices Determine Australia's Future: Creating an Activity to Raise Awareness about the Importance of Sustainability

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Submitted by:

Stefano Berti  
Danielle Davis  
Daniel Zaleski

Submitted to:

Project Advisors:  
Prof. Seth Tuler, WPI  
Prof. Andrew Klein, WPI

Project Liaison:

Shane French, Excursions Manager – CERES Education

Team Alias:

[ceres-d14@wpi.edu](mailto:ceres-d14@wpi.edu)

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## **Abstract**

The Centre for Education and Research in Environmental Strategies (CERES) raises awareness about sustainability by educating visitors about how their actions have implications for the future. To assist CERES, we evaluated one of their visitor activities about sustainability, the Australia 2030 Trail, designed to promote awareness about the effects of current lifestyle choices. We found that the information, infrastructure and education methods needed to be updated in order to better educate visitors. We designed a new Australia 2050 Trail using information gained from a literature review interviews, focus groups and surveys to understand how to improve the 2030 Trail's content and design. Further recommendations are included to evaluate and improve our proposed Australia 2050 Trail.

## Executive Summary

Climate change and resource depletion have resulted from the effects of lifestyle choices. Overconsumption of the human population combined with unsustainable practices, such as non-renewable energy production methods, has led Australia's climate to be altered with sea level rises, extreme temperature rise, more brushfires and more droughts. To mitigate the effects of climate change, several steps in education need to be taken by the government and implemented by residents in order to reach a sustainable future.

Knowledge and awareness about sustainability can be raised using different teaching methods. On the local scale, the Centre for Education and Research in Environmental Strategies (CERES), aims to educate visitors about sustainable practices. They offer different types of programs such as incursions, where CERES teachers go out to local schools, and excursions, which are on-site activities that visitors participate in. Excursion programs allow students to have a hands-on and dynamic learning experience that cannot be found in a classroom activity. Among their sustainability excursion programs, CERES created the Australia 2030 Trail. This trail consists of giving students in grades 5-12 the opportunity to choose among various decisions that will generate a future scenario of Australia in the year 2030. The main goal of the trail is “identifying connections between lifestyle choices and social and environmental futures” (CERES, 2012).

Ideally, sustainability information should be presented with the latest trends and projections and in an engaging way in order to effectively educate students and visitors. However, due to the fact that the Australia 2030 Trail was created fifteen years ago, and has never been updated, information lacks accuracy for lifestyle decisions and future projections. Also, the infrastructure of the trail is worn down.

### **Goal, Objectives & Methods Used and Deliverables**

**The goal of this project was to reinvent the Australia 2030 Trail by updating information about how Australia will be in the year 2050, together with a new method of displaying this information.** To provide updated projections and an effective way to educate with the Australia 2050 Trail, a literature review about Australia was completed prior to our

arrival to Australia. We gathered information about future projections of Australia’s environment for the year 2050 and effective methods of education. In addition, field research was conducted upon arrival to identify deficiencies of the Australia 2030 Trail and how teachers and museums in Australia educate students. To accomplish our goal, we completed three objectives:

1. Assessed CERES' existing method of educating children in the Australia 2030 Trail.
2. Developed updated future scenarios with corresponding lifestyle choices that visitors can choose from that lead to different the futures for Australia in the year 2050.
3. Proposed a design for the Australia 2050 Trail to the CERES staff as a suggested method of teaching about sustainability.

By completing these three objectives we were able to provide CERES with two main deliverables:

1. Updated information for the Australia 2050 Trail, including the future scenarios and lifestyle choices leading to those scenarios.
2. Recommendations for displaying the new information and scenarios about the year 2050 in an educational, stimulating way.

A diagram of the three objectives taken in order to complete our goal is shown in Figure 1.

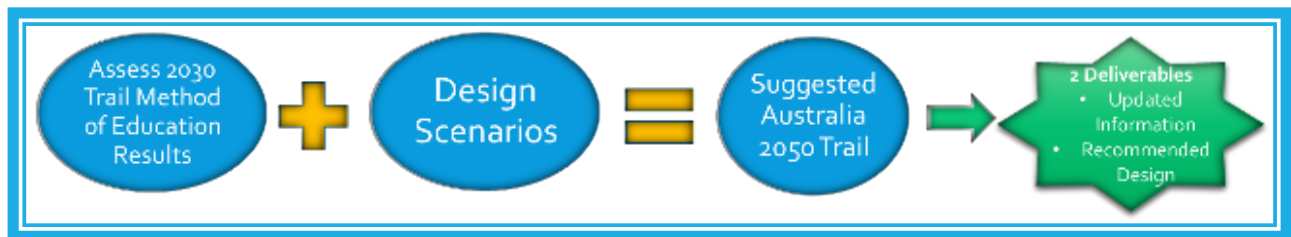


Figure 1. Methodology summary chart

### Objective 1: Assessed CERES' existing method of educating children in the Australia 2030 Trail

We performed a six-step process, to get a better understanding on what the current Australia 2030 Trail is lacking, and what can be improved for the implementation of the Australia 2050 Trail. These steps are:

Step 1: We identified the program objective. Our program objective consisted of finding positive and negative points of the current trail and how these could be changed for the reinvented trail.

Step 2: We designed an evaluation to assess the design of the 2030 Trail. To accomplish this we designed surveys, focus groups and interviews for teachers, students and CERES staff members.

Step 3: We collected qualitative data by finding common suggestions in the responses we received in the interviews, surveys and focus groups. To eliminate biasing and miss interpretations, we voice recorded all responses and transcribed them verbatim. We also visited the Melbourne Museum, Scienceworks Museum and Melbourne Zoo in order to get an understanding on how an educational exhibit can effectively be displayed.

Step 4: We analyzed the data with the purpose of learning about what the Australia 2030 Trail was lacking and new methods of education that could be implemented in the Australia 2050 Trail.

Step 5: We reported results of our findings as what needs to be addressed in the 2030 Trail:

- A. Outdated information
- B. Worn down and ineffective infrastructure

Step 6: We implemented our results by creating guidelines to follow while designing the 2050 Trail.

The outputs derived from completing this objective were:

- a) An understanding on what aspects can be improved upon in the Australia 2030 Trail.
- b) An understanding of effective methods of education used by teachers and museums in Australia, to engage students and visitors respectively.

## **Objective 2: Developed updated informational resources for Australia in the year 2050**

To develop the educational material to teach about sustainability, we proceeded to design decisions and future scenario projections. With the most current scientific projections for the year 2050, information was retrieved prior to our arrival to Australia in order to create decisions and future outcomes for the Australian community. We developed a best-case scenario, intermediate scenarios and a worst-case scenario.

After creating this educational material, we proceeded to evaluate the decisions and future scenarios with CERES staff in order to get feedback on the validity and clarity of the presented information. A final design of lifestyle decisions and future scenarios was created, which resulted in the first deliverable.

## **Objective 3: Proposed a design for the Australia 2050 Trail infrastructure and teaching aides to the CERES staff as a suggested method of educating about sustainability**

The design for the Australia 2050 Trail included four components:

1. Five different lifestyle decisions and five different future scenarios for the Australia 2050 Trail.
2. A decision sheet for participants to record each decision on, to get a future scenario.
3. A CERES teacher lesson plan.
4. A model layout of the Australia 2050 Trail in form of a diorama.

## **Findings**

### **Findings from the Assessment of the Australia 2030 Trail**

We discovered very similar perspectives among the trails' participants. We found that:

- The Australia 2030 Trail information was outdated and misinforming visitors about the environment.

- The Australia 2030 Trail lacked options regarding the mitigation of climate change.
- The Australia 2030 Trail lacked information regarding the major drivers of climate change, such as food and waste, and population was weighted too heavily in the scoring system.
- Many of the future scenarios were very similar and visitors had difficulties distinguishing the differences.
- The scoring and cross-referring system for identifying the scenario associated with lifestyle choices was hard to understand.

As part of the findings for the trail infrastructure, we discovered that:

- The Australia 2030 Trail has poor exhibit infrastructure.
- The lack of color on decisions and futures scenario posters made this exhibit unappealing and boring.
- The trail layout and utilization of space was not being used in an effective way. Students had to bundle together and look over each other in order to see all the decisions' examples.

When we inquired about the different age groups and way of moderating the Australia 2030 Trail, we found that:

- Late primary school students enjoy this exhibit the most.
- Students missed the overall point of the trail when choosing decisions because they would deliberately pick decisions with lower scores to end up with a better future scenario.
- The 2030 Trail needed to be explained in closer detail by a CERES teacher in order for students to understand the main concept.
- CERES teachers use different teaching methods and prefer having flexibility because they believe every group of visitors learns in a different way.

Finally schoolteachers and visitors mentioned:

- They would not come back to CERES to participate in the 2030 Trail again if it was not updated.

### Findings Regarding Infrastructure Display and Education Methods

When visiting the different museums and zoo, we found several ideas regarding how to display a sustainability exhibit in an effective way:

- At the Melbourne Museum, we found how visitors were drawn to realistic displays.
- At Scienceworks Museum we found that various interactive exhibits incorporated hands on learning (e.g., touch screens, buttons, cameras, mechanical pieces, and building blocks) in order to maintain visitors' attention.
- At the Melbourne Zoo we found that by incorporating a map at the entrance with clear instructions visitors do not get distracted or wander in an exhibit. Visitors were given clear instructions to where each animal was in order for them to go directly to the exhibit they felt more attracted to.

Regarding educational material and how educational methods are used by teachers, we found that:

- Steps and approaches taken by teachers when educating greatly impacts students' learning ability.
- Keeping visuals concise and realistic-looking helps students understand the information being presented and keeps the students engaged through an activity.
- Students are more engaged through hands-on experiences in activities.

Using the insights we obtained by complementing the objectives, we redesigned the excursion. Specific changes included:

- Incorporated more color in the displays.
- Used short, concise titles for each lifestyle decision.
- Included a map of the trail, a prelude and instructions to complete the trail.



- Implemented more hands-on features to the displays, such as 3-D elements that the participants can interact with.
- Designed the trail to have less futures that better engaged the visitors in their future scenario.
- The layout of the displays was developed to better represent a trail, not just a series of boards.

We then developed a lesson plan because students and teachers mentioned that more clarity was needed about how to participate in the trail.

### **The Final Australia 2050 Trail**

For the final proposed Australia 2050 Trail, we proposed a scoring scheme based on icons for the visitors not to associate more points with a worse future. This avoids mixing the preferable lifestyle choices with the probable lifestyle choices while choosing from each decision.

We constructed a diorama with key aspects such as an appealing entrance, a historical prelude, five different lifestyle decisions, and five possible future scenarios. We based the layout and design of each board based on the combination of all findings.

When visitors come to CERES and participate in the Australia 2050 Trail they will begin by entering through an archway that has instructions and a map of the trail posted on it. They will then proceed through a series of boards showing them the history of Australia's environment.

Once they have completed this prelude they will then come to the first decision they have to make about their future lifestyle, "Where will you live?" Here they are asked what kind of house they want to live in and where in Australia they will want to live, such as the countryside. For each choice there is a corresponding icon that the participant will circle on the decision sheet they are given. This decision will have limitations due to the fact that it is improbable to have a large house in the city.

The second lifestyle decision that the visitor will make is "What goods do you want?" The participant will make choices of what kinds of household goods, such as a refrigerator, and how

many of each they want to have in their home. Also they will choose what kinds of technological goods, such as mobile phones and how many of each they want to have. For both of these choices, each item will have an icon that the visitor will record on their decision sheet.

The third decision the visitor will walk to is, “How will you get around?” At this point the participant will choose their main mode of transportation, but there are constraints on the choices. For example, the participant cannot choose from public transportation if they chose to live in the countryside because trams and trains do not travel that far. Similar to the previous decisions, there will be corresponding icons that will later represent the scores of each choice the participant made.

The fourth decision the visitor will make is, “What kinds of foods do you plan to eat?” Here the participant will have two specific categories of questions to answer, one is, “How often do you plan to eat locally grown and/or packaged foods?” The participant will have to choose from a range of all locally grown to purely all packaged foods, with a middle range of some locally grown and some packaged. The second question will ask, “How often do you plan to eat animal-based products?” Again, the choices will be presented in a range of frequencies, from never (strictly vegan) to always. Each frequency choice will have an icon for the visitor to record on their decision sheet.

The final decision the participant will make is, “How will you power your life?” Based on the type of house the visitor chose, they will have to pick a certain number of renewable and non-renewable resources to power their homes. Each option has a corresponding number of light bulbs, so once the participant has chosen their power sources they will have to cross off the number of light bulbs on their decision sheet.

After going through each decision the visitor will then refer back to their decision sheet and add up the number of each icon they recorded. The point value of each icon will then be presented at the entrance to the future scenarios. Once the visitor has added up their final score they will denote what future scenario they ended up with based on what range their score falls in. Each scenario is given a range of scores; such as an overall score of 21-40 resulting in Future 2. The scenarios are projected futures of Australia’s environment for the year 2050, ranging from

good to bad. The message of the Australia 2050 Trail is to raise awareness about is how humans' lifestyle decisions can impact the future environment of Australia.

In order for the CERES teachers to have more effectiveness while moderating the proposed Australia 2050 Trail with the different student age groups and visitors, a lesson plan was created. This lesson plan goes into detail a digested way for a CERES teacher to the trail for each decision, scoring scheme and future scenarios in the trail.

## **Recommendations**

Based on our findings and the background research, we developed a set of recommendations for our sponsor, CERES Community Environment Park. We recommend that:

1. The proposed Australia 2050 Trail be evaluated further to validate the information and ensure the design works properly.
2. CERES investigate the use and maintenance of outdoor, interactive media in the Australia 2050 Trail design to further update the excursion.
3. CERES staff continue to update information for a prelude to the excursion.
4. CERES build the trail at CERES Community Park.
5. CERES test and implement two types of trails with different complexities of information being presented, to ensure a variety of age groups can participate in the excursion.
6. CERES use QR codes to further visitors' knowledge of sustainability.
7. CERES create a logbook for visitors to sign and acknowledge changes in their lifestyle decisions to ensure a sustainable future.

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# **1 Introduction**

Human overconsumption and negative actions towards the planet are increasing which has led to drastic negative environmental alterations, such as environmental degradation, resource depletion and climate change (Australian Government Department of the Environment, 2009). People's daily decisions have clear implications on the possibility of having a sustainable world in the future. The production of human related gases, such as carbon dioxide, has created a greenhouse effect on our planet. For example, the decision to drive a gas-guzzling automobile every day, releases excess amounts of exhaust gases into the atmosphere. However, driving a more fuel efficient car would have less of an impact on the environment (Sinnott-Armstrong, 2005). The widespread use of non-renewable resources (gasoline, coal, etc.) alone have contributed to more than three quarters of greenhouse gas emissions worldwide ("Fossil Fuels: How Do They Negatively Affect the Environment?," 2014). Greenhouse gasses are being released into the atmosphere much faster than plants and oceans can absorb, and even if such emissions were eliminated today, global warming will still continue (Cox, Betts, Jones, Spall, & Totterdell, 2000). These emissions have led to climate change, resulting in alterations in the environment such as increased intensity in cyclones and higher risk for droughts due to higher maximum temperatures, and increasing rates of natural disasters, like droughts and floods (Adger, Huq, Brown, Conway, & Hulme, 2003). The need for adaptation is greatly increasing, if more changes in climate, emission levels and water acidity occur it is projected to significantly impact water resources, coastal ecosystems, infrastructure, health, agriculture and biodiversity (UN IPCC 5th World Report, 2014).

In particular, Australia's population is being negatively affected by environmental changes and degradation. Australia's average temperature has increased by 0.9°C since 1910 (CSIRO and the Bureau of Meteorology, 2014). Heat waves such as the Victorian heat wave in 2009 which destroyed "over 2,000 buildings and [caused] 173 deaths; [leading to a] widespread drought in south-east Australia" (UN IPCC 5th World Report, 2014). This driver, of climate change has caused "one of the greatest challenges to Australia's environment and water resources" (Newton, 2009). The different environments of Australia (such as terrestrial, coastal,

oceanic, and freshwater) are vulnerable to climate changes, especially because Australia is the driest inhabited continent and has low productivity soils and oceans (Newton, 2009).

In order to mitigate the effects of climate change, etc., societies need to take sustainable actions, combining the economic, social, and environmental practices to maintain productive conditions and harmonious social living ("Sustainability," 2014). The Australian government has developed a number of policies to implement sustainable actions (The Treasury Australia, 2010). One example is the Zero Carbon Australia Stationary Energy Plan, which proposes strong ideas and technology regarding sustainability, resource depletion and environmental degradation and would ultimately position them to be a leader in renewable energy resources by 2020 (Wright & Hearps, 2010). Currently, however, residents of Australia do not implement sustainable actions in their lifestyle decisions in order to reach the goal by 2020 (UN IPCC 5th World Report, 2014). Thus, Australian government must educate its citizens about sustainability and increase awareness on how people's daily choices can affect the future of their nation.

National action is an extremely large step to take at once. However, there are small organizations that are taking the necessary steps to educate residents about sustainability. One of these organizations is the Centre for Education and Research in Environmental Strategies (CERES). This community environment park offers programs that educate visitors about sustainability in Australia (CERES, 2012). For example, local schools visit CERES to take part in their various interactive sustainability programs. These programs allow students to have a hands-on and dynamic learning experience that cannot be found in a classroom activity. Among their sustainability programs, CERES has created the Australia 2030 Trail, which is referred to as an excursion or an on-site activity that visitors participate in. This trail consists of giving students in grades five through twelve the opportunity to choose among various decisions that will generate a future scenario of Australia in the year 2030. The main goal of the trail is "identifying connections between lifestyle choices and social and environmental futures" (CERES, 2012).

The current Australia 2030 Trail is facing two types of problems, which hinder CERES' goal of educating visitors about sustainability. First, many aspects of the 2030 Trail (such as climate change, state of the planet, and pollution indexes) are grossly outdated because of the rapid changes the world has faced since it was created in 1999. The outdated information

misleads visitors about how their lifestyle decisions can affect future outcomes. For example, one future scenario states that there will only be ten years left for fossil fuel reserves in 2030. Also, the worst-case scenario states that fossil fuel reserves would be almost gone in 2030. However, today's projections say at the current rate of consumption, fossil fuels will begin to disappear by late 2050s ("Fossil Fuels: How Do They Negatively Affect the Environment?," 2014). Second, the 2030 Trail's infrastructure is worn-down and the education presentation method is obsolete to students and visitors. The way of displaying information by colorless drawings and wooden boards does not attract students and causes them to become bored easily. Third, as the trail was designed fifteen years ago, today's students might not learn the same way as the students did at the time of the excursion's initial implementation. For instance, students used to be more dependent on books because the internet was not as readily available as it is today (Ghose, Smith, & Telang, 2006).

The goal of our project was to reinvent the current Australia 2030 Trail by updating information about how Australia will be in the year 2050, along with a new method of displaying this information that would be compelling and stimulating to students now. We proposed a new trail called the Australia 2050 Trail using the most up-to-date projections related to climate change, resource consumption and how today's lifestyle decisions can affect them. To accomplish our goal, we completed three objectives. First, we assessed CERES' existing method of educating students in the current Australia 2030 Trail. Structured interviews were conducted with schoolteachers, CERES staff, CERES teachers and visitors of CERES. With the opinions gathered from these interviews, we obtained a better understanding of how CERES was presenting information about sustainability and what could be improved upon. Second, we developed updated scenarios with lifestyle choices, such as what kind of house they want, that visitors will choose from that lead to different futures for Australia in the year 2050. In order to reach this objective, we used the most current scientific information and obtained feedback from the CERES Excursion Manager to verify the feasibility of the presented information. We updated the kinds of choices that people are asked to make, including food, transportation, etc. Lastly, we proposed a design for the Australia 2050 Trail to the CERES staff from the information gathered as part of the two previous objectives. We proceeded to evaluate this proposal based by gathering feedback from staff. The feedback gathered allowed us to make additional modifications to the

new Australia 2050 Trail, which was later presented in a diorama to CERES. By completing this project, we expected that the new method presented as the Australia 2050 Trail would increase visitors' awareness about how their decisions today can have an impact on the future.

## **2 Background**

Unsustainable living will be inevitable for society if temperatures continue to rise, population consumption increases, and energy sources are not made eco-friendly (UN IPCC 5th World Report, 2014). In this chapter several topics are discussed in order to address and develop an understanding of the importance of sustainability in Australia. The topics covered include the challenges Australia faces environmentally with the implications of climate change and why these need to be addressed. Also, topics such as the effect of population changes and consumption and energy production methods in Australia are discussed. Lastly, current methods of educating about sustainability are described, as well as how to assess those education methods.

### **2.1 Climate change in Australia**

An increase in temperatures, caused mainly by the consequences of the decisions of humans, is a contributor to climate change. With temperatures increasing every decade, there is a high risk for these temperatures to negatively affect the environment, communities, and future generations, if nothing is done to change this trend (UN IPCC 5th World Report, 2014). The reason for the change in climate is attributable to what is called the “enhanced greenhouse effect” (Understanding Climate Change, 2013). Human activities such as the burning of fossil fuels, clearing of land, and exhaustive agriculture cause large amounts of emission of gases into the lower atmosphere. An increase in emissions leads to greenhouse gas concentration levels rising above what is considered ‘natural’, essentially thickening the “Earth’s blanket.” Since this layer of the atmosphere thickening, it is trapping excess heat, which in turn warms the Earth (Understanding the Science, 2013). The following sections will go into more detail about the specific environmental challenges caused by climate change in order to have a better understanding about potential risks.

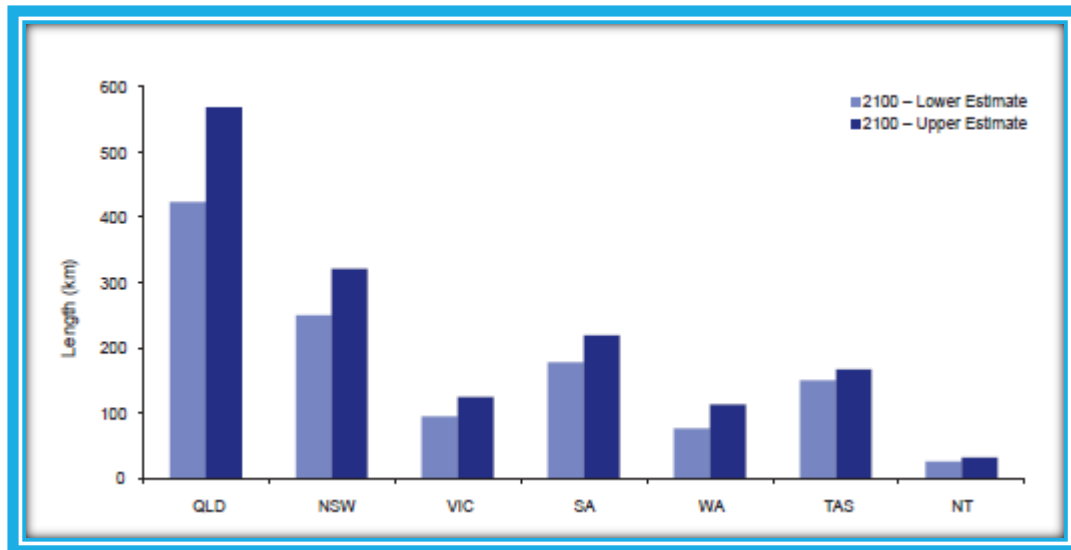
### 2.1.1 Earth's temperature change

While the Earth's temperature naturally fluctuates, it is the rate of increase that has scientists and environmentalists concerned (UN IPCC 5th World Report, 2014). "The global average surface temperature of the Earth has increased by  $0.6 \pm 0.2^{\circ}\text{C}$  since 1900 and it is likely that the rate and duration of the warming are greater than at any time in the past 1000 years" (Hughes, 2003). Narrowing the scope to Australia, average air temperatures have increased per decade  $0.09 \pm 0.03^{\circ}\text{C}$  since 1911 (UN IPCC 5th World Report, 2014). The effect of the temperatures reaching new highs puts emphasis on the critical future risks for the Australian community. These risks consist of rising sea levels, more droughts and increased chances of brushfires which have all caused the Australian community to be alert (Hannam, 2013).

### 2.1.2 Potential future scenarios regarding climate change

In order to make people aware of the possible outcomes for the future, different hypotheses were analyzed about the future scenarios for the year 2050 based on peoples actions. This analysis included worst-case, best-case, and intermediate scenarios for Australia. Worst-case scenario consisted of an inhabitable environment, where humans cannot sustain safe living conditions due to environmental alterations, such as increasing levels of temperature. Best-case scenario revealed the most suitable environment for a sustainable society, where people mitigate and adapt to change. In this case, if emissions were treated efficiently and greenhouse gases were to be minimalized, the climate will only increase from  $0.6^{\circ}\text{C}$  to  $1.5^{\circ}\text{C}$  by 2030 (UN IPCC 5th World Report, 2014). This could cause "an increase of mean sea level by 0.1m. [This] increases the frequency of an extreme sea level event by a factor of ... 2 ... over southeastern Australia depending on location" (UN IPCC 5th World Report, 2014). On the other hand, in the worst-case scenario, the temperatures will elevate by  $2.2 - 5.0^{\circ}\text{C}$  in the year 2070, resulting in an [increase] in the frequency of an extreme sea level event by a factor of ... ten ... over southeastern Australia depending on location" (Evans, Hicks, Fidelman, Tobin, & Perry, 2013; UN IPCC 5th World Report, 2014). If the sea level rose 1.1m there would be great economic loses in assets, such as residential and commercial buildings. According to the Department of Climate Change and Energy Efficiency this would total over (AUD) \$226 billion of assets (HCLNCN, 2010; UN IPCC 5th World Report, 2014). Public transport, as an example, will be affected by an increase

flooding, affecting road and rail transport to major shipping ports (Ishak, Rahman, Westra, Sharma, & Kuczera, 2013). Figure 2 shows kilometers of public transport affected by the year 2100 with high and low estimates do to sea level rise.



**Figure 2. Estimated length of existing rail and tramway infrastructure at risk from the combined impact of inundation and shoreline recession for a 1.1m sea level rise by state (Department of Climate Change and Energy Efficiency, 2011)**

With sea levels rising, rainfall will become more variable, and cyclones intensify, resulting in problems for the communities of Australia.

### **2.1.3 Environmental factors caused by climate change in Australia**

Australia is the warmest and driest continent in the world. This makes Australia vulnerable to brushfires and droughts (Soh, Roddick, & Leeuwen, 2008). With temperatures increasing, it is estimated that more evaporation will occur leading to more droughts, decreased rainfall and essentially more brushfires (Lucas, Hennessy, Mills, & Bathols, 2007). Rainfall is hard to predict for Australia, yet climate changes are suggesting that at higher latitudes there will be an increase in rainfall and at the mid to low latitudes there will be a decrease in rainfall (Jakob, Karoly, & Seed, 2011; Whetton, 2011). Annual precipitation trends have been tracked from 1951-2012, as seen in Figure 3.

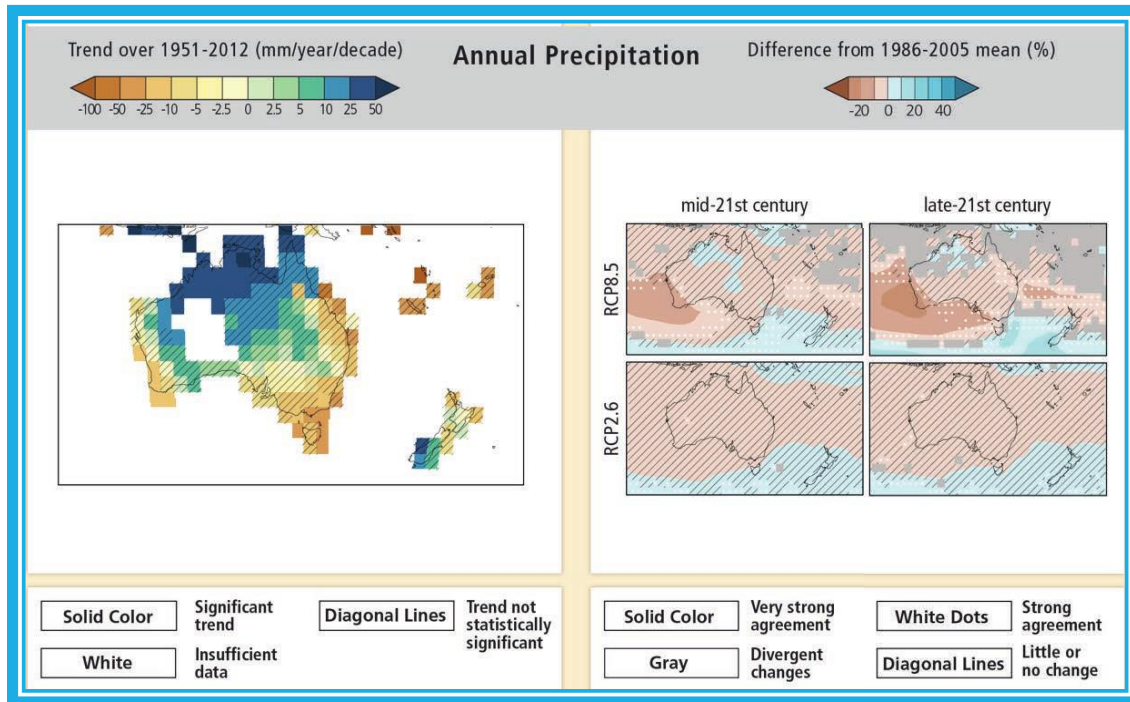


Figure 3. Annual precipitation trends over 1951-2012 and the difference in average % of precipitation from 1986-2005 (UN IPCC 5th World Report, 2014)

Two extreme scenarios that could occur regarding rainfall, due to the emissions of greenhouse gasses in the year 2050 are extrapolated in Table 1.

Table 1. Temperature and rainfall estimates based on 2030 emissions and 2070 emissions (Whetton, 2011)

Australia Major Cities	2050 Average (high emissions)	2050 Average (low emissions)
<b>No. Days over 35°C</b>	36.08	20.01
<b>Annual Rainfall (m)</b>	1.060	1.075

With high emissions, the annual rainfall would reach a low of 1.060m, compared to low emissions, in which rainfall would measure to be about 1.075m. Since the amount of rainfall is relatively low, experts believe it is the intensity in the events that is the main concern for environment (Lucas et al., 2007).



Even though the frequency of rainfall is expected to increase, bushfires in Australia will not be diminished. The time frames in which these fires are likely to occur are shown in Figure 4. Considering the entire continent has a fire season dedicated to at least one time of the year, brushfires are national problems that will be greatly impacted if global warming continues.

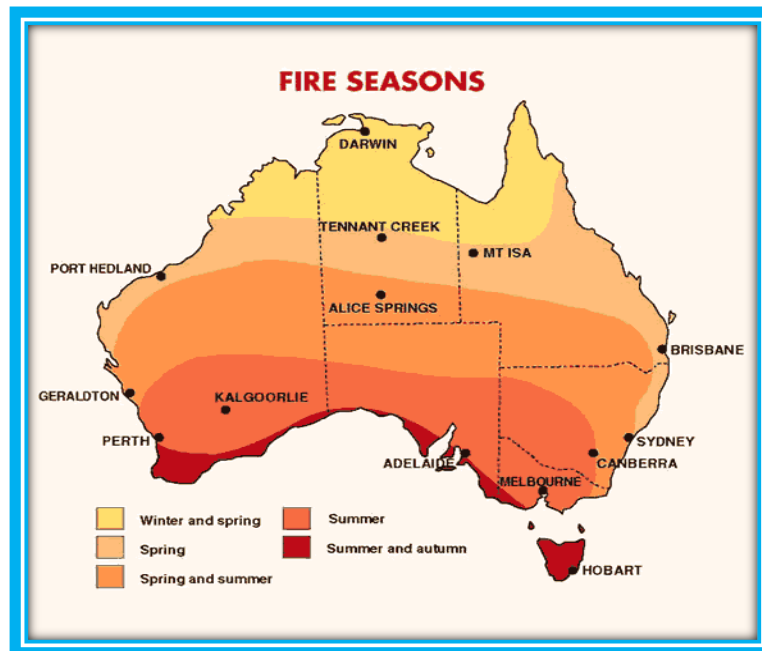


Figure 4. Australia's brushfire seasons ("Australia's bushfire seasons," 2013)

Projected brushfire trends for 2050 are concerning, for just about any case scenario. The continued frequency of dry conditions will result in extreme weather events in the year 2050 (Whetton, 2011). Simulations were performed by Commonwealth Scientific and Industrial Research Organization (CSIRO), and forecasted two scenarios for 2050: one, for the worst-case and two, for a gradual increase in temperature. The number of days with extreme fire danger ratings increases anywhere from 10% - 300% under high emissions, whereas days with high danger ratings range from 5% - 100% increase under low emissions (Whetton, 2011). Events like this cause heat waves such as the Victorian heat wave in 2009 which destroyed “over 2,000 buildings and [caused] 173 deaths; [leading to a] widespread drought in southeast Australia” (UN IPCC 5th World Report, 2014). As shown in Figure 5, projected changes in heat exposure are interpolated in orange for Australia by state for the year 2050. This graph shows person-days above 40°C in millions per state.

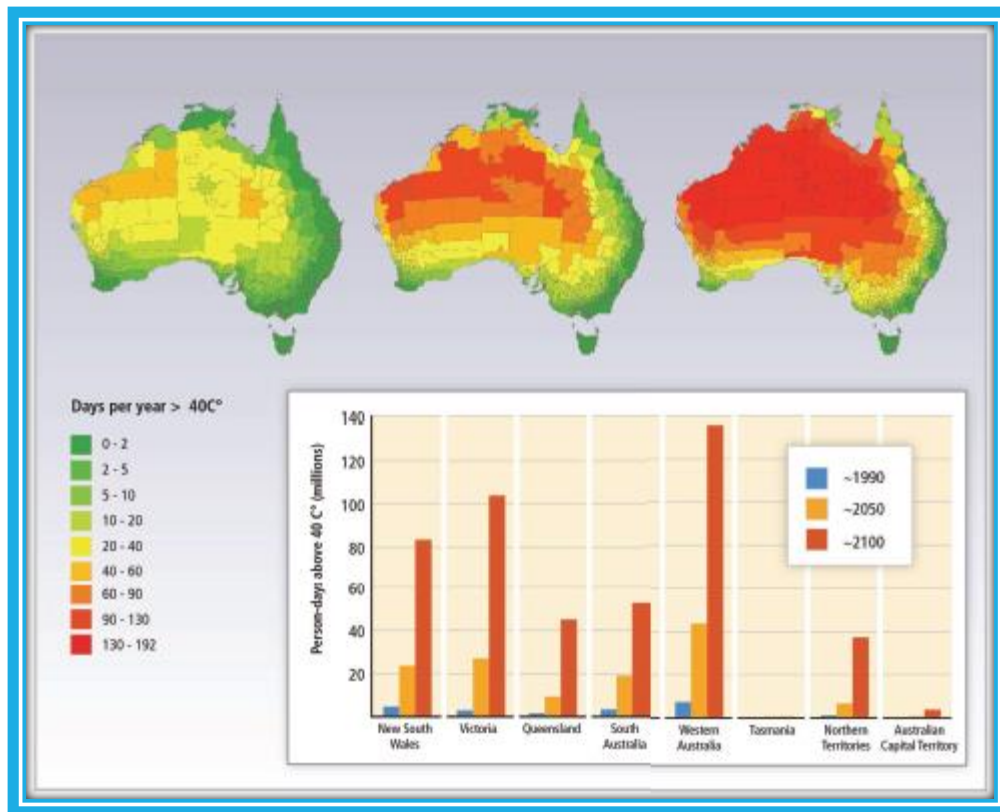


Figure 5. Projected changes in exposure to heat under a high emissions scenario (UN IPCC 5th World Report, 2014)

For decades, Australia has been forecasting climate changes and its impacts. Some of the various drivers of climate change are population rate increase and consumption, as well as energy production (Charles, Pamela, Joseph, & Richard, 2000). These two sets of drivers need to be addressed in order to educate people on how their decision now can have an impact on the future.

## 2.2 Drivers of climate change

Two important drivers of climate change are population growth and energy usage. The ways in which they affect climate change will be discussed in the next sections.

### 2.2.1 Population

Even though population is not a direct cause of climate change, rapid population growth carries important repercussions that bring new stresses to global climate. Greenhouse gases and the usage of natural resources are major elements that depend on the population size and

consumption. In the following sections, the world's population growth rate will be used to understand and analyze how Australia's population growth rate together with consumption, will have a large impact on greenhouse emissions by the year 2050. Next, world population growth scenarios as well as population consumption for Australia will be analyzed to demonstrate why these are major factors that contribute to global warming.

### 2.2.1.1 World population growth indirectly affects climate change in Australia by 2050

Worldwide, unsustainable population growth is overpowering efforts to control climate change (UN IPCC 5th World Report, 2014). Drivers such as consumption of natural resources and greenhouse gas effects are major causes of environmental stress. Even though population growth and consumption can be decoupled when analyzed, these two main factors contribute in a direct way to greenhouse gas emissions. According to the most recent world population projection done by the UN in June 2013, population is expected to reach 9.6 billion by the year 2050 (United Nations, 2013). The same projection was done by the IAP (The world's science academies) in 1994, where predictions stated that by 2050, the population would be around of 7.8 billion (IAP, 1994). However, in today's data projections, the previously mentioned IAP population estimates will be reached in the late 2020s. This shows us that population is growing rapidly worldwide as shown in Figure 6. Today's global population currently stands at 6.9 billion.

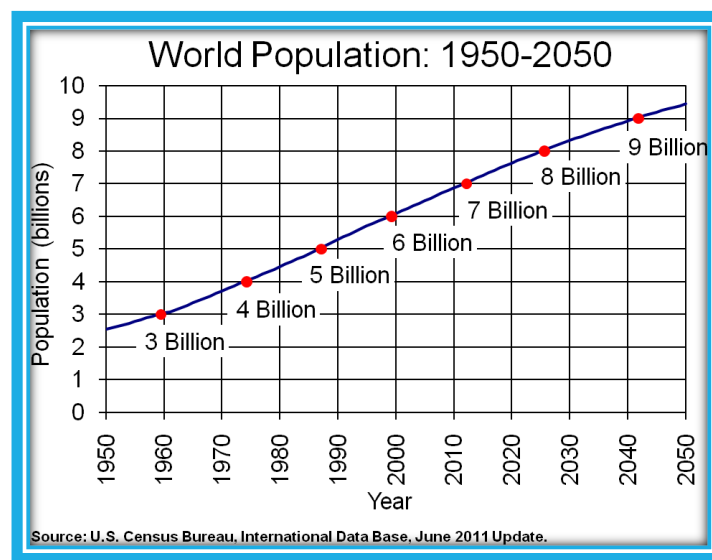


Figure 6. World population: 1950-2050 (United States Census Bureau, 2013)

As in contrast with world population, Australia's population is growing at a slower rate. With a 1.8% population growth rate and an estimate of 23,382,000 inhabitants, in 2013, Australia's population estimate towards 2050 is projected to reach 36 million (ABS, 2008, 2013; *"Population Clock"*, 2014). Factors such as fertility rate and high life expectancy have been major immediate contributors for population growth rate to increase in the recent years (ABS, 2012). Migration and low mortality rates, on the other hand, will be one of the main causes of a population increase in Australia in the long run (ABS, 2011-2012 and 2012-13). In order to get a more quantitative understanding of Australian population projections, refer to Appendix A2. The growing population in Australia is not a main factor that leads to climate change. An increase in migration in Australia could put more stress to climate change in the local scale. In the next section, effects of migration and population increase in Australia are addressed.

#### **2.2.1.2 Australia's migration and population increase contributes to greenhouse emission**

Among the developed countries, Australia faces an increase in the production domestic greenhouse gases due to migration. There are several possible scenarios that will determine the generation of greenhouse emissions for the next 40 years. If fertility rates and overseas migration remain low and if Australia had zero net immigration, the energy-related greenhouse gas emissions would become 16% higher than if the immigration trends remained the same (ABS, 2011-2012 and 2012-13, 2012; Birrell & Healy, 2009; Turton & Hamilton, 1999). Although net overseas migration to Australia will have a big impact on the domestic emissions, this will not be a big factor contributing to global climate change (Turton & Hamilton, 1999). Because of this, "existing studies suggest that trans-boundary effects, mediated mostly via trade but potentially also migration, can be of similar if not larger scale than direct domestic impacts of climate change for economically important sectors such as agriculture and tourism" (UN IPCC 5th World Report, 2014).

#### **2.2.1.3 Resource consumption and Australia population growth**

Population growth not only results in higher emissions, but is also an influential factor on consumption of resources. This consumption causes an indirect alteration to the world's climate. People are turning resources into waste much faster than waste is being turned into resources

(Moran, Wackernagel, Kitzes, Goldfinger, & Boutaud, 2008). As mentioned previously, 36 million people are expected to live in Australia by the year 2050 (ABS, 2008). Resources such as freshwater are on a critical scale and will become even more vital and challenging to preserve over the next years (Sivakumar, 2014). As people continue to migrate, the resources in different territories are going to be exploited. However, Australia's land is mainly desert, which forces new waterlines to be built in order to reach communities (Newton, 2009). As an indirect cause, the construction and investment of re-routing water resources in order to urbanize, could create issues, such as pollution for the local environments (Risbey, 2011). "Projected population growth and urbanization could further increase health risks indirectly via climate-related stress on housing, transport and energy infrastructure and water supplies" (UN IPCC 5th World Report, 2014).

Fresh water resources are not only used for household and hydration ways in Australia. For example, 50% - 70% of fresh water is used for agriculture (Rutherford & Finlayson, 2011). An increasing demand of water is caused by the excess use of the water supply. Additionally, the population will also demand an increase in resources such as food. "Australia's probably the leading [developed] country facing the challenge of not enough water, too many people . . . and increasing demand for food" (Rutherford & Finlayson, 2011). Even though Australia is a major exporter of certain goods, such as grains and cereal it depends on major food imports due to its infertile lands (Pimentel & Pimentel, 1999). With 2.66 people per square kilometer, low density population currently in Australia has little to no significance in internal production of food dependency (Sivakumar, 2014). As for 2050, the increase in migration, together with the case scenario where fertility rate increases in Australia, will cause more imports to be needed. Food imports can cause an increase on the rate of climate change due to two main factors. The first factor is as a byproduct of consumption (growing, storing, packing, and cooking). If people chose to cook with a more contaminating source of energy, for example, gas versus electric, greenhouse gases will be emitted at a higher rate into the air causing contamination and accelerating the greenhouse effect (Garnett, 2008). The second effect can be attributed to transport mediums of food, such as trucks, airplanes and ships, which will lead to more pollution. These two major factors represent over 30% of CO<sub>2</sub> emissions to the atmosphere (CERES, 2012).

“Predicted growth rates of consumption have grown beyond population growth” (Kates, 2000). Kates decouples population growth from resource use. For instance, in Australia, long distances between certain urban cities and the lack of public transport out of the metropolitan areas force the use of private cars (Schandl et al., 2008). This causes an increase on the usage of fossil fuels. Whether people choose to travel in groups or by themselves in many vehicles make a big impact on emissions. As an example, if people use more public transport, where one vehicle is used to transport a group of people, rather than a private car, less CO<sub>2</sub> gases to be released from fossil fuels that contribute to global warming (Andres et al., 2012). Together with consumption, high frequency travel will result in high internal migration, which will lead to more resource depletion (ABS, 2011-2012 and 2012-13).

People’s lifestyle decisions regarding consumption have a great impact on the future’s climate. An example of this is when deciding what to use as a transport medium. “With the more stringent regulations on emissions and fuel economy, global warming, and constraints on energy resources, the electric, hybrid, and fuel cell vehicles have attracted more and more attention by automakers, governments, and customers” (Chan, 2007). In contrast, if people choose to use bicycles, skates, their feet or any ‘non contaminating’ method, contribution to greenhouse effect gasses will be so few that they can be considered to have a negligible effect on climate (Schandl et al., 2008). If people prefer to travel with privately owned vehicles, contamination produced will depend on the efficiency and the method of energy production (renewable or non-renewable resource). The next section will go into more detail about energy production as a driver of climate change in Australia.

### **2.2.2 Energy production in Australia**

The fluctuation of Australia’s population has a direct relationship on how energy is made. In order to meet the population’s demand, different methods of energy production should be analyzed. Different plans are being implemented in Australia by the government such as the Zero Net Emission plan in order to reduce the emissions of greenhouse gases by the year 2020 (Wright & Hearps, 2010). This will allow for Australia’s future to become more sustainable.

### 2.2.2.1 Non-renewable resources led in the energy production of Australia

The current fuels that are used to produce energy in Australia are unsustainable and will eventually have a negative effect on the future of Australia (World Nuclear Association, 2013). Most of Australia's energy is generated with non-renewable resources. As seen in Figure 7, about 54% of the fuel for Australian electricity was black coal. Furthermore, brown coal and gas also make up other big pieces of this figure. Brown coal is used to power more than "92% of Victoria's electricity. This method produces more emissions than other energy sources such as natural gas" (City of Melbourne, 2014). Using brown and black coal to produce energy only emits a low amount of sulfur dioxide into the air, thus minimally soiling the atmosphere. However, the production of energy in Australia contributes to 35% of the nation's carbon dioxide emissions (World Nuclear Association, 2012). This means that even though the air is not becoming noticeably "dirty" from the coal, large amounts of carbon dioxide are still being released into the air, which affects the climate, as mentioned at the beginning of 2.2.2. In contrast, natural gas power plants, another non-renewable source of energy production, release less greenhouse gases, such as CO<sub>2</sub> (carbon dioxide), CH<sub>4</sub> (methane) and N<sub>2</sub>O (nitrogen oxides), into the atmosphere than coal-fired power plants (United States Environmental Protection Agency, 2013). The price of natural gas in Australia has been increasing. This has led power plants in Australia to switch back to coal in order to be more prosperous in current energy production markets (Wilkinson, 2014). Climate change campaigners such as the City of Melbourne in Australia, with projects like the Zero Net Emissions by 2020, consider this decision to be a backwards step since coal is worse for the environment in regards to greenhouse gas emission (City of Melbourne, 2014; Wilkinson, 2014).

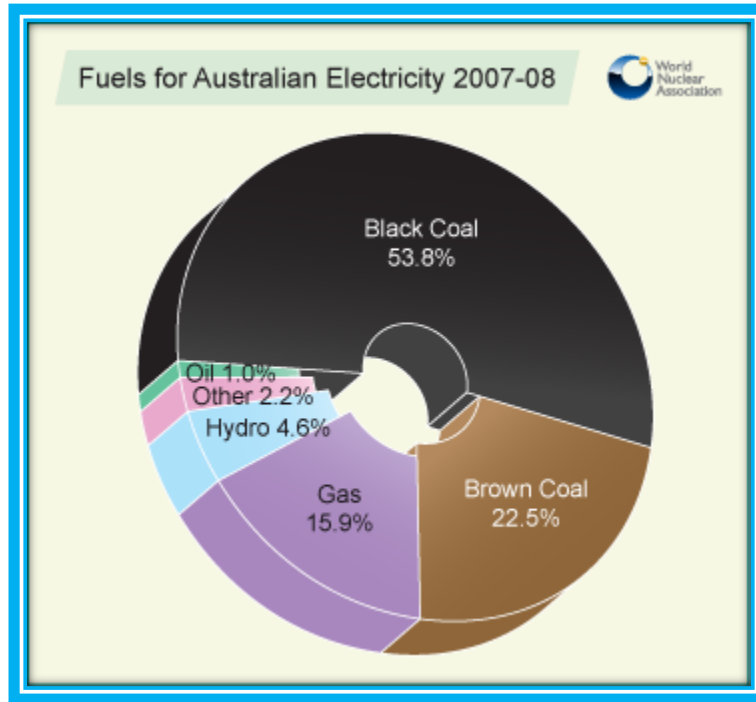


Figure 7. Fuels for Australian electricity 2007-08. (World Nuclear Association, n.d.)

### 2.2.2.2 The future of energy and energy production in Australia

To achieve a sustainable future, Australia must continue to enforce several strategies put in place that causes energy generation companies to consider how much they are polluting the air (City of Melbourne, 2014). The Carbon Pollution Reduction Scheme (CPRS), for example, establishes a set price on the carbon that a company releases in their emissions. The taxes are intended to make companies more conscious of how much they are polluting, in the hopes that the companies will reduce their emissions over time (The Treasury Australia, January 2010). Reducing the carbon emissions will cause the average temperature of the Earth to increase at a slower rate as mentioned in Chapter 2.1.2 under low emissions scenario. In addition, the Renewable Energy Target (RET) scheme has been implemented by the Australian Government which, by 2020, aims to have 20% of Australia’s electricity production to be renewable (The Treasury Australia, 2010). The way energy is produced will have to be modified and continue to be developed in order to make the RET reachable. One of the main strategies to reach this goal focuses on Zero Net Emissions by 2020, where the City of Melbourne wants to “become one of the world’s most sustainable cities” (City of Melbourne, 2014).



Non-renewable resources such as oil, gas, and coal, are being overused. They are considered non-renewable resources because it takes millions of years to replenish them at a sufficient rate for sustainable economic extraction in meaningful human time-frames (Science Learning, 2008). The use of fossil fuels to create energy grew by 28% between 2000 and 2010 and is likely to increase. A possible alternative method to create energy that has drawn some interest is nuclear power. However, it was noted, “Australia is one of the few developed countries not using nuclear power and the only G20 nation without it” (Krieg, 2014). Coal and gas are less expensive than nuclear, but energy experts state that if the emissions trading scheme or carbon tax is enforced, nuclear power will become more competitive in the Australian market (Krieg, 2014).

Continuing with sustainable practices, “The Australian Renewable Energy Agency (ARENA) was established by the Australian Government to make renewable energy solutions more affordable and increase the amount of renewable energy used in Australia” (“Australian Renewable Energy Agency,” 2014). Small businesses and homeowners are implementing many of these renewable energy methods. One example is CERES, where they use solar panels and biogas domes to generate electricity (CERES, 2012). CERES does not only contribute to Australia’s community by implementing sustainable practices, but they continuously devote efforts to educate visitors and the community on how to implement sustainable practices into their lives.

Population, consumption and energy production, affect climate change in many ways. Therefore, Australian citizens need to be educated about how quickly the climate is changing and how to mitigate and adapt making sustainable decisions as part of their lifestyle. In the next section, different methods of implementing sustainability education are presented.

### **2.3 Sustainability education**

Currently, Australia is moving toward being more sustainable, yet citizens still are using unsustainable practices in everyday life. For instance, not every resident in Victoria, Australia is aware of environmentally friendly technology as only 15% of the population is implementing sustainable practices (City of Melbourne, 2014). Those wasteful actions are direct contributors to

the drivers of climate change (Sinnott-Armstrong, 2005). The drivers, population fluctuations and energy production, mentioned previously, need to be monitored carefully in order to achieve a more sustainable environment. One way to influence the general public's sustainable practices is to educate them on how their decisions will impact the future outcome of Australia (CERES, 2012; City of Melbourne, 2014).

### **2.3.1 Proposed Australian government action plan to educate**

“It is widely agreed that education is the most effective means that society possesses for confronting the challenges of the future” (“Teaching and Learning for a Sustainable Future,” 2010). Specifically, people that live in Australia have begun to realize that social, economic and environmental issues need to be recognized and mitigated in order to change the predicted outcomes for future generations. Educating the public about sustainability means focusing on the unsustainable trends, enforcing universal change and providing information that will raise awareness of the importance of sustainability (Australian Government Department of the Environment, 2009).

According to Australia's National Action Plan, education of sustainability incorporates several principles:

- Transformation and change
- Education for all and lifelong learning
- Systems thinking
- Envisioning a better future
- Critical thinking and reflection
- Participation and partnerships for change (Australian Government Department of the Environment, 2009)

With this action plan, teaching about sustainability has become a challenge when coordinating all the aspects needed. Implementing change into curriculums requires leadership and coordination from the government, an increase in funding, training, availability of materials, and engaging the media to spread awareness and effective research programs. “The [Australia National Action] plan's mission is: To engage the community in sustainability through education

and lifelong learning” (Australian Government Department of the Environment, 2009). The Australian Government proposed this act in hopes that their methods are the most beneficial and best practices for educating the community. Their strategies to address the issues include, demonstrating government leadership, making education systems themselves sustainable, along with businesses and industries and finally projecting an environmentally friendly spirit throughout the community (Australian Government Department of the Environment, 2009).

Although the government was able to come up with an idea on which they believed to be the best practice for educating Australians, several issues still remain (Sinnott-Armstrong, 2005). First, people may challenge that no one can teach a subject that is constantly changing, like the environment (Sinnott-Armstrong, 2005). Second, even with scientific research that backs up the idea of global warming, some people believe that global warming is not the result of human activity, but is instead the Earth going through natural fluctuations (Sinnott-Armstrong, 2005). Lastly, education can only go as far as the classroom or workplace. The government cannot ensure that the entire country will live environmentally friendly and sustainable (Sinnott-Armstrong, 2005).

### **2.3.2 Techniques of teaching sustainability**

Along with sustainable action plans, there are various teaching techniques for sustainability education that can be implemented. According to United Nations Educational, Scientific and Cultural Organization, UNESCO, a suggested educational technique to engage society about sustainability is to use visual representations on how futures will turn out based on people’s decisions (UNESCO, 2010). Recognizing the future may cause students to experience shifts in their attitudes toward perceptions of the future (UNESCO, 2010). In other words, by showing the students “doomsday” images, they will be conscious of the changes they should make now, in lifestyle choices, to prevent those images from being fulfilled. For example, if consumers are unaware of what driving a gas-guzzling SUV will do to future gas emission levels, then how can they change their daily lifestyles? Some argue that just presenting the bad, leads to lots of fear, which leads people not to change. Presenting the negative effects is important, but also providing positive future scenarios, based on ecological choices, can have as much, if not more of an impact. UNESCO suggests a teaching method called, “Alternative

Futures: Probable and Preferable Futures.” This method allows students to investigate the social, economic and technological issues that will lead to two different scenarios (probable and preferable). An activity for students, such as the one shown in Figure 8, can act as an outline for how the future will be in the year 2050.

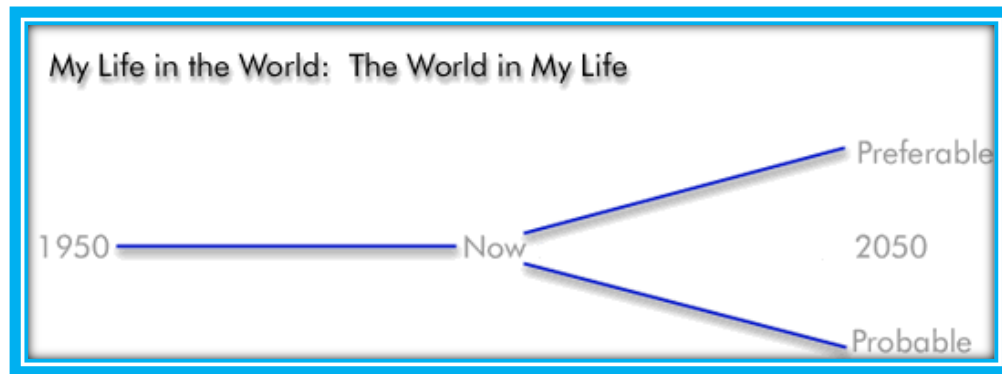


Figure 8. Global futures timeline  
(UNESCO, 1997, *Teaching and Learning for a Sustainable Future*)

The timeline can act as an introduction exercise, to get the students to understand that there is not one set future for the world, and there still is something they can do to control their futures. Raising awareness is the first step in working toward a sustainable future, without recognizing the issues, no action can be taken (Australian Government Department of the Environment, 2009).

Educating raises awareness and in order to convince people to make a change in their behavior, according to Stanford University educational material, the people must:

- Be made aware of the challenges they are going to face
- Contemplate the possible change in their lifestyle
- Prepare to meet the goals of sustainable living
- Follow through with the action to live environmentally friendly
- Performing maintenance to strengthen their previous actions taken (Jewett, 2011).

There are several challenges faced when trying to educate individuals about sustainability, one being the different views people have about sustainability. UNESCO, recognizes that the future could hold a mixture of these views. Therefore UNESCO recommends an activity that allows students to produce futures based on a variety of weighted factors. This

practice can be seen in Appendix A3. Students are exposed to what other people might think and are then asked to rank the importance they believe each factor would have in the future outcomes. Finally they are shown how sustainability is still a major issue even with varying visions. Educating students on the various possibilities will further their knowledge of what they can do to reach sustainability. Not only is UNESCO taking steps toward sustainable education, but other environmental industries have also begun taking different approaches teaching about sustainability. CERES Environmental Park, for example has been effectively educating thousands of people a year about sustainable living (CERES, 2012).

CERES tries to focus their educational programs based on experiential learning. Kolb's Experiential Learning Theory is a well-known model for education (David Kolb, 1984). As we can see in Figure 9, a diagram of Kolb's cycle of experiential learning presents a cycle of four elements; Concrete Experience, Reflective Observation, Abstract Conceptualization and Active Experimentation (David Kolb, 1984). "One step of Kolb's cycle is currently missing in CERES programs, the active experimentation phase" (Supplemental teaching materials for CERES community Environment Park, 2011). The current Australia 2030 Trail excursion, for example, just has one opportunity to be completed in the planned excursion time. Most of the students want to redo this trail and choose a better future and experiment further on how their decisions can affect the future.

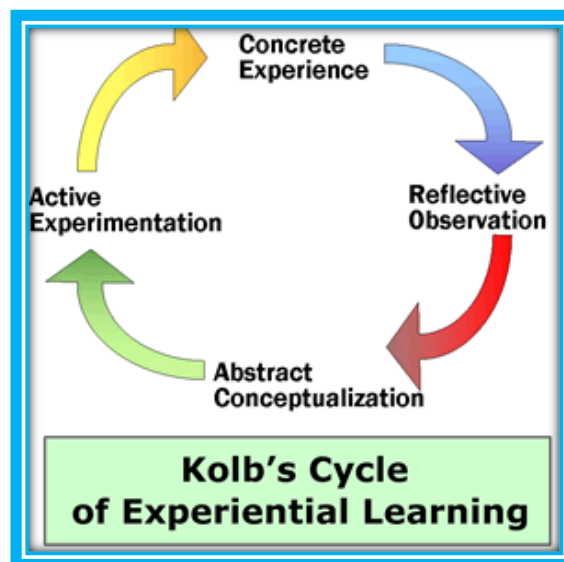


Figure 9. A diagram of Kolb's cycle of experiential learning  
Originally uploaded in Starting Point-Teaching Entry Level Geoscience: Experience-Based Environmental  
Projects. (Karin Kirk, 2010)

Through the Kolb's Cycle of Experiential Learning CERES strives to teach visitors about sustainable practices. The next section goes into more detail about how CERES implements the Kolb's Cycle in programs such as incursions and excursions.

### **2.3.3 CERES educate and teach about sustainable practices**

CERES Community Environment Park has attempted through the past 30 years to educate about the importance of environmental and urban sustainability issues affecting Australia through experiential learning (CERES, 2012). To address sustainability, CERES has come up with two main types of programs:

- *Incursions*, where CERES staff go to local schools and communities to educate in a close quarters (e.g. classroom), and
- *Excursions*, where teachers and students can take a trip to the CERES site and participate in educational activities such as the Australian 2030 Trail.

Over 60,000 students per year visit the CERES excursion programs from local schools across Victoria (CERES, 2012). Their experiential learning is a key method used in their five main themes (waste, land, water, energy, and culture). When visiting the park, teachers can select one of these themes and visit the corresponding trails for the excursion.

### **2.3.4 CERES excursions and incursions**

CERES excursions are categorized into eight different themes. The themes consist of energy, water, land, waste, sustainability, cultural, VCE, future spark and tertiary. The excursions are performed at CERES and are for all ages (CERES, 2012). Table 2, explains the main idea behind excursions and their importance.

**Table 2. CERES excursions**

<b>Excursion Theme</b>	<b>Description</b>	<b>Importance</b>
<b>Energy</b>	Current dependence on fossil fuels	The impacts on the environment Alternative solutions are given
<b>Water</b>	Water conservation	Suggests: -monitoring systems -aquatic alternative systems
<b>Land</b>	Natural processes	Raises awareness of human and animal interactions Explores sustainable agriculture
<b>Sustainability</b>	Overview of several programs	Explains significant sustainability issues

The incursions are brought to local schools and organizations to be taught. In Table 3, some examples of the types of incursions CERES provides are mentioned. There are a total of six incursions consisting of land, energy, waste, water, sustainability and early learning (CERES, 2012).

**Table 3. CERES incursions**

<b>Incursion Themes</b>	<b>Description</b>	<b>Importance</b>
<b>Land</b>	Investigate biodiversity	Help understand importance of ecosystems
<b>Energy</b>	Educates about protecting environment from unnecessary resource depletion	Reduce the carbon emissions
<b>Waste</b>	Explores different issues concerning waste	Tackles the problem of reducing waste
<b>Water</b>	How is can be conserved	Highlights the value of this resource

These excursions and incursions are offered by CERES in order to inspire and empower students to live sustainably and understand the cultures around them (CERES, 2012).

### **2.3.5 The Australia 2030 Trail**

The focus of this project is a CERES excursion called The Australia 2030 Trail. When students, grades five to twelve, participate in this trail they make decisions according to their wants and needs regarding population and resources. The sum of the points are cross-referenced, resulting in a predicted future scenario for the year 2030. The main objectives of this excursion are to raise awareness about topics such as “sustainable consumption, identifying connections between lifestyle choices and social and environmental futures, current impacts of climate change, interrelationships, change, and what [the students] can do” (CERES, 2012).

While called a “trail,” The Australia 2030 Trail is part of the environmental park where students walk to boards that display questions regarding lifestyle. As students follow a path led by a CERES teacher, they end up with a future scenario based on their decisions. Students go from board to board choosing among four decisions regarding resources and two decisions regarding population as seen on Figure 10. Some of the questions in the decisions cover topics such as:

- How many houses will they have?
- What will their house size be?
- How many cars will they own? Etc.

As they are walking through, each choice has a corresponding numerical value, which they record on the paper handed to them at the beginning of the excursion. In order to obtain a future scenario, students cross-reference the sum of the resource score and the sum of the population score. This cross-referencing gives them a future scenario letter ranging from A-L, being best to worse future scenario, respectively. A detailed explanation with pictures can be seen in Appendix B as to what the CERES teachers use as protocol to conduct this excursion.





Figure 10. Students Completing the Australia 2030 Trail

## 2.4 Summary

The information presented in this chapter for the future years of Australia were estimates based off of past data trending until the present as well as hypotheses of how future technologies, policies, and regulations would affect the upcoming years environmentally. This research was essential to update the current Australia 2030 Trail; otherwise the visitors would have continued to receive outdated data. Population fluctuations, consumption and energy production are key drivers to climate change and will always change, based on demands, availability and trends. Not using the most up-to-date information would likely deviate CERES from their goal to educate about sustainability accurately.

With the background information of future projections presented in this chapter, decisions and future scenarios were developed for the proposed Australia 2050 Trail. Also, methods of educating about sustainability addressed in this chapter, along with the following methodology section, provided us with a better understanding of how the current Australia 2030 Trail was being presented and how it could be improved. Without an effective method of educating, the visitors would not be aware of their implications on the future of Australia; this would in turn result in an unsustainable future.

### **3 Methodology**

The goal of our project was to reinvent the current Australia 2030 Trail by updating information about the state of Australia in the year 2050 and by proposing a new design of the trail. We created a new trail called the Australia 2050 Trail based on future scenarios and choices leading to those scenarios. We aimed to assist CERES in educating their visitors about sustainability and increasing the awareness about how the visitors' lifestyle decisions today can have an impact on the future. To accomplish our goal we completed three objectives:

1. We assessed CERES Australia 2030 Trail's existing method of educating students in order to gauge how effective the information was being presented.
2. We developed updated scenarios of Australia's environmental future for 2050. This involved constructing the choices with updated data, which the trail participants choose from, that could lead to the 2050 future scenarios.
3. We designed the Australia 2050 Trail, based on background research and the data we collected, and then presented it to CERES staff and received feedback to improve the design. This was then suggested as a new way of teaching about sustainability.

By completing these objectives we were able to present our deliverables to CERES. These deliverables were:

- Updated information for the Australia 2050 Trail, including the future scenarios and choices leading to those scenarios.
- Recommended a way to display the new information and scenarios about the year 2050 in an educational, stimulating way.

In Figure 11, a representation of all the objectives completed in order to provide CERES with our two deliverables, is shown.

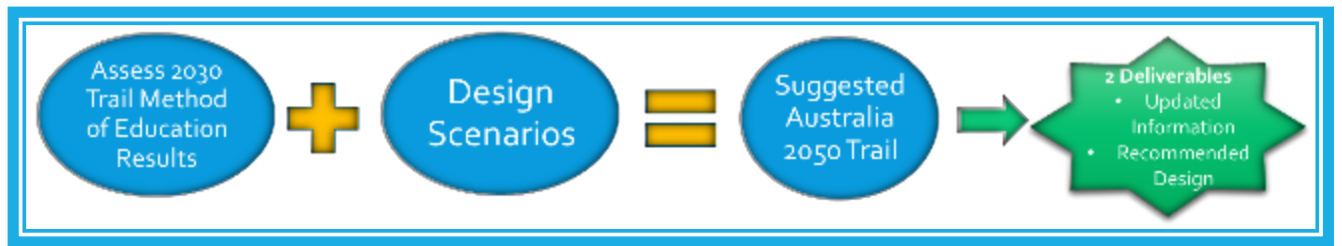


Figure 11. Methodology summary chart

In the following subsections the objectives are explained in greater detail with step-by-step procedures and difficulties encountered while completing them.

### 3.1 Assess CERES' Australia 2030 Trail existing method of educating trail participants

In order to assess CERES' current Australia 2030 Trail, we performed a six-step process, adapted from PASS (The Program of Assessment and Support Services) from James Madison University (n.d.), shown in Figure 12. This allowed us to understand what improvements needed to be implemented for the Australia 2050 Trail. The adaptation of the PASS process consists of the following six-steps:

Step 1: We identified the program objective. Our program objective consisted of finding positive and negative points of the current trail and how these could be changed for the reinvented trail.

Step 2: We designed an evaluation to assess the design of the 2030 Trail. To accomplish this we designed surveys, focus groups and interviews for teachers, students and CERES staff members.

Step 3: We collected qualitative data by finding common suggestions in the responses we received in the interviews, surveys and focus groups. To eliminate biasing and miss interpretations, we voice recorded all responses and transcribed them verbatim.

Step 4: We analyzed the data with the purpose of learning about what the current Australia 2030 Trail was lacking and new methods of education that could be implemented in the Australia 2050 Trail.

Step 5: We reported results of our findings as what needs to be addressed in the 2030 Trail:

A: Outdated information

B: Worn down and ineffective infrastructure

Step 6: We implemented our results by creating guidelines to follow while designing the 2050 Trail.

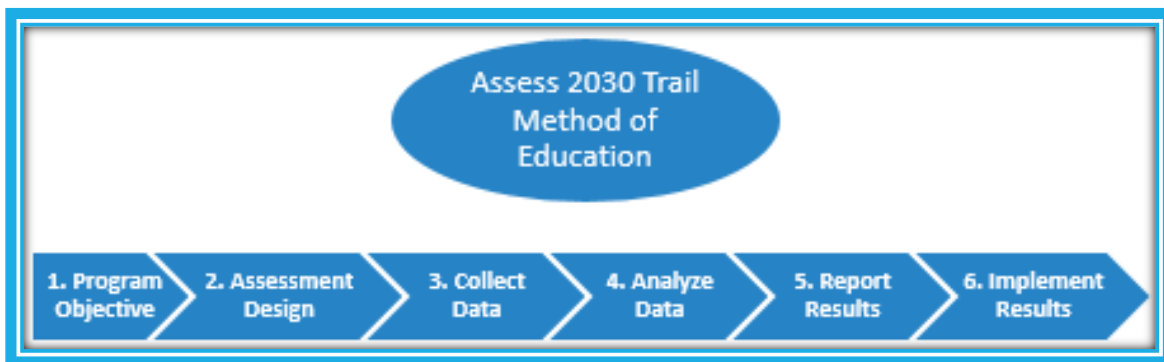


Figure 12. Method of assessing the 2030 Trail

In Step 1, Program Objective, we had to discuss what information we wanted obtain from our assessment of the 2030 Trail. We decided that in order to improve and reinvent the excursion we had to determine the positives and negative aspects of trail. To find the positives and negatives we designed our method of assessing the trail by creating surveys and interviews that would ask about visitors', and CERES staff's opinions of the 2030 Trail and any recommendations they would give to improve the trail. Then to collect the data we received, we recorded the responses by using a voice recorder and by writing down important details to ensure that we had every piece of information. When analyzing the data we decided to compile common trends under headings that corresponded to the questions asked. For example, one common trend dealt with updating the information of the trail, so all recommendations that suggested updating the statistics and data was compiled in this section. The results were then reported as what needed to be addressed in the 2030 Trail to make the 2050 Trail an effective teaching tool for CERES to use. Lastly, we implemented our results by creating guidelines to follow while designing the 2050 Trail.

### **3.1.1 Steps 1 & 2: Program objective and assessment design**

The first time we were able to see the 2030 Trail in person; we were able to understand the process a student goes through to complete the excursion. Also, taking the time to identify the positive and negatives of the trail assisted us in the steps that we would take to reinvent the trail. To further assess the design of the current trail, we created surveys and interviews to conduct with relevant parties, such as CERES teachers, participating students and schoolteachers. We felt that by conducting on-site interviews and online surveys, we would be able to get direct feedback from the visitors who had the most recent knowledge of the trail. The initial steps were taken to prepare for the collection of data; therefore we began our step-by-step processes with Step 3, collecting data.

### **3.1.2 Step 3: Collecting data for the assessment**

As a part of the assessment design and the collection of data in Australia, we participated in the current Australia 2030 Trail ourselves, interviewed schoolteachers, and conducted focus groups composed of students who completed the trail. We also sent out surveys to teachers and interviewed CERES staff members as well as Melbourne Museum, and Scienceworks Museum employees. We felt that gathering this information directly from Australian residents allowed us to consider their culture, various education methods and learning preferences of this country.

#### **3.1.2.1 Participate in the Australia 2030 Trail as “students”**

The purpose of the initial trail walkthroughs was to serve as guides to formulate the questions for the various parties that were interviewed afterwards to complete the assessment of the trail. Upon arriving at CERES for the first time, as a group, we participated in the existing Australia 2030 Trail alongside a group of students. We completed the excursion four times; three were led by a CERES teacher, which varied depending on the day, and one was completed by ourselves without a CERES teacher. The first time, the CERES teacher, Ian Culbard, led us through the excursion along with the students he was teaching. The first excursion lasted for approximately 50 minutes. As we were being led through the trail, we took notes of the various aspects that appeared worn and dated, making them relevant to our project of updating the Australia 2030 Trail. Then we walked through the trail without a guide to observe the finer

details of the trail in our own time.

The last two times we participated in the trail we were led by Nick Scott and then Adrian Whitehead (who are both CERES teachers). The reason behind participating in the last two excursions as students was to observe and record what students were saying and commenting on while doing the trail. We acted as students' peers and guided them in some aspects where they needed help or did not understand a part of the trail. The notes and observations we took identified positive and negative features of the current Australia 2030 Trail in order to make improvements for the upcoming design of the Australia 2050 Trail. We also wanted to gain the trust of the students in order to conduct later focus groups where they would interact more freely with us and share their opinions more comfortably. The details of these focus groups are discussed in section 3.1.1.4 of this chapter. We analyzed and formulated our results by recording qualitative data (the responses) and discussing common areas that require improvement. These various annotations can be found in Chapter 4.

### 3.1.2.2 Interview teachers

There were two primary purposes for interviewing teachers: a) to gain a better understanding of the different educational methods teachers use in class that seem to catch the attention of the students the most and b) to find what areas need improvement in the current Australia 2030 Trail. Learning the different education methods the teachers use in class helped us obtain an understanding of how to modify the current education methods of the Australia 2030 Trail. The data was analyzed, to complete the trail design assessment, by organizing common teaching methods into categories, by importance and by popularity within the group of interviewed schoolteachers.

Listening to the teachers' opinions about the current Australia 2030 Trail and their thoughts on what can be improved assisted us in gathering ideas on how we could modify the layout for the 2050 Trail. The teachers' responses provided input on how to make the new trail more appealing and stimulating for students. We gathered the data by taking notes and observing, as well as by voice recording the entire interview. By recording the interviews, our intention was to eliminate biased interpretations and to make sure that we did not miss anything

significant that was said. Interview responses were typed in order to have written documentation for the analysis and results. The ten minute structured interviews, named “Interview Guide for Teachers about Method of Educating” and “Interview Guide for Teachers about 2030 Trail Design”, can be found in Appendix C1 and C2, respectively.

Three interviews were conducted with year nine teachers from St. Leonard’s College located in Brighton, Victoria. The first interview was conducted with Luisa Ingram, the coordinator for the program called Community Urban and Environment (CUE) for year nine students at their school. The second and third interviews were conducted with Annabel Savey, a math teacher and Tim Barlow, a teacher for years. Due to lack of bookings, we had personal on-site interviews with these teachers because we knew that this could be our only chance. The teachers also qualified to be interviewed, because they were from a school that annually visits CERES. Luisa and Tim said they come three times a year to do the trail with different groups of students as part of their CUE sustainability program. Finally, all of the teachers have been teaching for at least five years, which makes them experienced professionals in the educational field. This allowed them to provide valuable feedback during the interviews.

Another difficulty we encountered was that we were only able to interview year nine teachers at CERES. The data gathered from these teachers could have been considered biased representations of how only year nine students learn, portraying an inaccurate sample of Australia’s population. This would result in the new 2050 Trail to not appeal to a wide range of ages and levels of education. In order to get a broader representation of the population and not receive biased interpretations about the trail, we sent out surveys to teachers who recently visited CERES with their class.

### **3.1.2.3 Email survey to teachers**

The purpose of emailing surveys to teachers, who recently visited CERES with their students, was to compliment the findings in the interviews with the year nine teachers. This reduced biasing and gave us a wider range of opinions. CERES provided us with a list of teachers and their respective emails who participated in the current Australia 2030 Trail within the last two months. Surveys consisted of similar questions that we asked the teachers during the

on-site interviews. Using SurveyMonkey, a free online survey designer, allowed us to gather data quickly. We emailed surveys to four school program coordinators for them to distribute to the teachers that accompanied them at CERES. We hoped that more than 30% would respond. Receiving feedback from 30% of the emailed teachers, according to Shane French, Excursion Manager at CERES, represents a sufficient response %. From the responses we got back, we analyzed the qualitative data by finding similarities between them. This gave us suggestions of a variety of education methods from different age groups. These responses also gave us a better insight of the current education methods used in the 2030 Trail.

The emails sent to the teachers contained two separate links to the two parts of the survey. Each part of the survey required one question, which was the teacher's name. We created two parts to the survey since SurveyMonkey only allowed nine questions per survey and we wanted to ask the teachers more than nine questions. The names of the teachers were kept confidential and were only used to link the two parts of the survey to the same teacher. The first link to the survey contained questions addressing the teachers' current methods of educating. The second part of the survey asked for opinions and suggestions about the current Australia 2030 Trail. The two parts of the survey were designed to only take ten minutes in total. The emails began by introducing ourselves and stated the purpose of contacting the teachers. The email also informed the teachers that their responses would be kept confidential. In the survey we also introduced ourselves and stated the purpose of the survey in regards to our project. The main purpose was to collect various methods of educating students, along with feedback on the Australia 2030 Trail, which they had recently participated in. The questions used for the survey are found in Appendices C3 and C4. First, in Appendix C3, Part 1 of the survey, asks schoolteachers' opinions and recommendations of the 2030 Trail. Then in Appendix C4, Part 2 of the survey, asks about current teaching methods schoolteachers use in their classroom.

#### **3.1.2.4 Post-excursion focus groups with students**

The primary purpose of conducting focus groups with students was to gather their opinions about how the trail was presenting information, considering they were the ones who took part in the trail. This minimized a biased 2050 Trail design that could have been based on only teachers' preferences. In order to conduct and get the most out of our focus groups, we



followed the guidelines presented in the document *Guidelines for Conducting a Focus Group* (Eliot and Associates, 2005).

The groups of students that participated in the existing Australia 2030 Trail were ideal candidates to question. The focus group questions were about features that they liked and disliked about the trail. The target audience for these focus groups was students from grades five to twelve, since those are the grades that can complete the trail when visiting CERES. However, due to the lack of bookings at CERES, only year nine students participated in the focus groups. Students, with their respective class, had several aspects of the trail fresh in their minds, so their feedback was detailed and insightful.

At the end of each Australia 2030 Trail excursion, a CERES teacher included a final discussion about the scenarios and what the students experienced while completing the trail. Due to time constraints in the students' schedule at CERES, we had to ask the CERES teachers to include the focus groups as a part of their wrap-up of the excursion. The CERES teachers acted as the moderators for the focus groups, while we assisted by asking additional questions throughout the discussion. We voice recorded the focus group and documented all discussions in order to reduce bias and to ensure that we did not miss anything important that was said. As the guidelines previously mentioned, focus groups are typically conducted for 45 to 90 minutes (Eliot and Associates, 2005). Overall the focus groups that we conducted lasted an average of twelve minutes due to time constraints mentioned previously. Our initial plan was to get one focus group from each grade that visited the excursion. However, we were not able to accomplish this due to the lack of bookings CERES had during the project period. The focus groups that we were able to conduct contained three, year nine classes from St. Leonard's College located in Brighton, Victoria. Each focus group contained twenty students. This discussion allowed us to obtain a better understanding on what to implement in the Australia 2050 Trail.

We felt that conducting focus groups with students would be more effective than getting individual opinions because they were able to actively discuss their thoughts with one another. The focus groups created a more enriching discussion that allowed us to better understand areas for improvement. Individually, the students could have gotten nervous during interviews, which might have caused them to be shy and reserved with their opinions about the existing trail. Since

we only conducted focus groups with year nine students, we felt that their responses were centered on only their age group.

With a shortage of students, we reached out to the same teachers we emailed out the survey to, asking if we could visit their classes and conduct in-class focus groups. The in-class focus groups, we felt would allow us to resolve the issue of only having year nine student opinions about the current Australia 2030 Trail. Unfortunately, due to school holidays, we were unable to schedule a time with the teachers that we could visit. These school visits would have covered a broader range of age groups, which would have reduced the biased representation of students' opinions. Also, in order to gather more opinions to help CERES expand the current Australia 2030 Trail to appeal to all visitors, we conducted interviews with the general public who walked through the trail voluntarily, discussed in the next section.

#### **3.1.2.5 Interview general public**

Since CERES wants schools, as well as the general public to participate in the Australia 2050 Trail, we had to consider a wide range of ages. The motive behind interviewing members of the public, who visited CERES, was to serve as another source of ideas on how to redesign the current Australia 2030 Trail. As only one age group of visitors participated in our on-site focus groups, we were unable to gather more opinions of people who had recently completed the trail. We asked visitors to volunteer to participate in the trail, followed by a short interview. The post-excursion interviews lasted approximately ten minutes and the questions were aimed towards visitors' experience on the Australia 2030 Trail. These questions can be found in Appendix C5. These interviews took less time to conduct than the student focus groups yet they contained similar questions. We planned to have at least eight volunteers for this interview section consisting of: two male adults, two female adults and four students ranging from grade five to year twelve. However, due to lack of time and volunteers, we were only able to interview five members of the public. We voice recorded the interviews and later recorded our findings in a document in order to minimize bias.

CERES had markets during the week that attracted more visitors than usual, so we decided on these days we would be able to ask visitors to volunteer. Some problematic issues

that we experienced with the interviews were: the public's unwillingness to participate, the lack of time, and the visitors' limited knowledge about sustainability. Without specific knowledge of sustainability, the members of the public who we interviewed were not able to provide us with the most feasible feedback of improvements that could be made for the Australia 2050 Trail. Considering the teachers, students and visitors of CERES did not interact with the trail regularly; in the next section we discuss the interviews with the CERES teachers that led people through the trail.

### 3.1.2.6 Interview CERES staff members

CERES' teachers that assisted the groups of students throughout the Australia 2030 Trail were informative candidates to interview. These excursion guides experienced the trail more than anyone on a daily basis. They were able to provide us with more detailed opinions, than CERES visitors, about the current layout of the trail, the features, and strengths and areas of improvement. We conducted structured interviews with CERES' staff that worked as teachers for the trail. We conducted five interviews: two male teachers, two female teachers, and excursion manager, Shane French. The teachers we interviewed were Ian Culbard, Alex Hoffman, Arwen Birch, and Nick Scott. Similar questions that were asked to the schoolteachers were addressed to conduct these interviews, found in Appendix C6. We voice recorded the interviews and reported our findings in a document in order to eliminate bias.

From the CERES teacher interviews, we organized the data into two subsections. In the first section we gathered qualitative observations and comments that the staff commonly received from visiting students. In the second section we gathered qualitative personal opinions from the staff on how the trail needs improvement and what areas needed the most emphasis when changing.

We gathered qualitative data and tried to find similarities that staff addressed in order to find common areas for improvement. Having the CERES teachers' positive and negative opinions about the trail, combined with the teachers' and students' opinions about the trail enabled us to acquire feedback towards the type of material to include in the new design. Collecting this feedback aided in the completion of Step 3 of PASS.

### **3.1.2.7 Interview Melbourne Museum staff and Scienceworks Museum staff**

The purpose for visiting the Melbourne Museum and Scienceworks Museum was to get different opinions on how to educate students, as well as how to educate people about sustainability. Visiting the Melbourne Museum and Scienceworks Museum provided us with examples of how to present various types of information to a wide range of ages. At the Melbourne Museum, located in Melbourne, Victoria we conducted two semi-structured interviews with staff members. At Scienceworks Museum, located in Spotswood, Victoria, we conducted the same type of interviews. Semi-structured interviews allowed us to have flexibility in our approach. The four staff members gave us broader opinions on how to educate through excursions based on their experiences in the museums. These responses allowed us to get a better understanding on how to create a more attractive sustainability excursion. All interviews were voice-recorded and transcribed verbatim afterwards. The purpose for voice recording the interviews was to reduce biased interpretations. Each interview lasted for about fifteen minutes.

While interviewing the museum staff at both institutions, we tried to find out about the museums' methods of education related to students and sustainability. These questions can be found in Appendix C7. When we were at Scienceworks, we also observed their exhibits' methods of presenting educational material to students to see how we could implement ideas to make the 2050 Trail an engaging, and stimulating excursion. We gathered as many ideas as possible on how to present information adequately and attractively. We collected qualitative observations based on comments the staff provided us and tried to find common aspects used among attractions (e.g. colors, interactive, additive, etc.).

### **3.1.3 Step 4: Analyzing data and findings**

Once we gathered all the data from the different interviews mentioned previously, we found similarities within each interview and grouped common factors as described in earlier chapters. The information that we gathered is summarized in Table 4.

**Table 4. Summary of information gathered**

Type	Party	Information Gathered
Interviews	School Teachers	1. Methods of Education/Presentation 2. Australia 2030 Experience
Interviews	CERES Staff	1. Methods of Education/Presentation 2. Australia 2030 Experience
Interviews	Museum Staff	1. Methods of Education/Presentation 2. Australia 2030 Experience
Interviews	General Public	1. Australia 2030 Experience
Focus Group	Students	1. Australia 2030 Experience
Survey	School Teachers	1. Methods of Education/Presentation 2. Australia 2030 Experience

Once this grouping was preformed, we cross-linked each group of people interviewed to find similarities regarding effective methods of education. With the full type-outs of the interviews, focus groups and emailed back surveys, we took each question and highlighted significant terms that corresponded to suggestions. For example, “more color in the trail” was a reoccurring response, so every person’s response that involved color was copied into a document. This process of copying responses left us with our categorized findings. Our common results led us to conclude with these questions:

1. How can information be displayed effectively and attractively?
2. How can the excursion be fun with an educational purpose?
3. How can we attract visitors’ attention efficiently and effectively?

The answers to these three questions led us to our findings and recommendations. For example, to display information effectively and attractively, we got recommendations of adding more color in the drawings, integrating more hands-on elements and display the future scenarios on larger boards. Our findings then gave us a better idea on how to have effective and stimulating ways to engage visitors, in order to apply them in the updated 2050 Trail design.

### **3.2 Develop updated future scenarios and decisions for Australia in the year 2050**

Climate change is the prevailing topic of the 2030 Trail. Therefore the majority of Chapter 2 contains the information about the drivers of climate change, energy production,

consumption and population in Australia and the impact those topics will have on the future of Australia. This information was used to develop our updated future scenarios and the decisions for Australia in 2050. In Figure 13, a description of the process on how we developed and evaluated the future scenarios is illustrated.

1. We conducted background research on the various environmental drivers that would affect the future of Australia for the year 2050. This included climate change, population, consumption, and energy production.
2. We compiled the data and formed various future scenarios and the decisions leading to those futures. We organized these possible futures into best-case scenario, worst-case scenario and three intermediate case scenarios.
3. We took these suggested scenarios and presented them to Shane French, the CERES Excursion Manager, to ask if they were realistic and achievable to validate our choices.

We went through this process to develop and evaluate each scenario and decision. The evaluation of the designed scenario and decision consisted of getting feedback from Shane French, pertaining to the practicality and accuracy of each. After receiving suggestions from him we made the necessary changes to obtain the best future scenarios and decisions to lead to those futures.

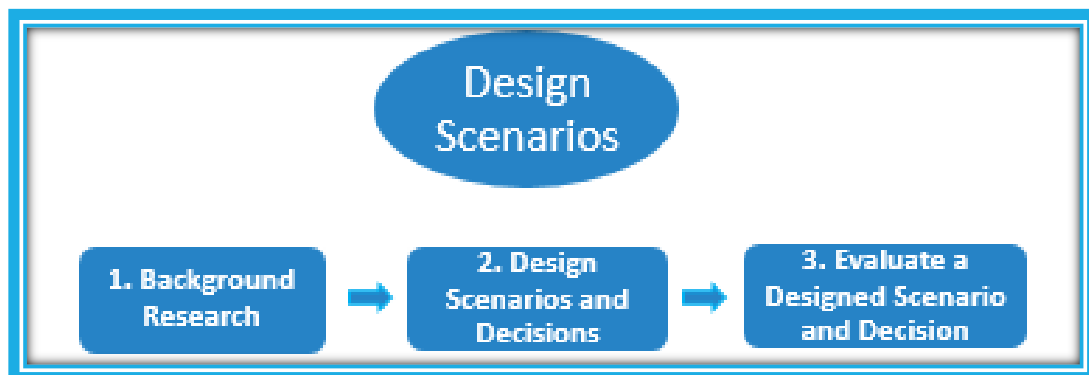


Figure 13. Design scenarios

We began by first designing the future scenarios and then worked backwards in order to decide on the decisions that could lead to those scenarios. When we developed the future scenarios, we distributed them into three main categories (best-case, intermediate cases, and worst-case). The data presented in the different scenarios are based off of the Intergovernmental

Panel on Climate Change's (IPCC) 5<sup>th</sup> Assessment Report and the literature review presented in Chapter 2. In the IPCC Report the data given was ranges of possible emission scenarios of the future. These emission scenarios were labeled: A1, A2, B1 and B2; A1 showed the storyline that describes a world with rapid growth and ultimately high emissions and B2 describing a world that focuses on sustainable solutions (UN IPCC 5th World Report, 2014). The data for these scenarios was given for the year 2030 and 2070, with respect to the emission levels. Therefore, to get the data presented in the future scenarios for 2050, we took the averages of 2030 and 2070 data, along with the background research of drivers of climate change. Listed below are descriptions and examples of how we developed the categories of future scenarios:

- For the best-case scenario, we developed futures that were based on the IPCC's 5<sup>th</sup> Assessment Report on Climate Change low emissions, scenario 2030 B1 and 2070 B1. Australian's daily decisions are based on sustainable practices:
  - For example, it was projected that temperatures will rise 0.6-1.5°C by 2030 and 1.0-2.5°C by 2070 (UN IPCC 5th World Report, 2014). So, for 2050 we took the averages and used those for the range of temperature change in the best future scenario.
- For the intermediate trend scenarios, we developed futures based on data that was averaged from the IPCC's worst projections and best projections. The projections of Australia in the year 2050 where current sustainable actions are neither improved nor stopped.
  - For instance, we averaged scenarios A1 and B1 for 2070 and 2030, and then averaged those to get the middle temperature rise of 2050, 2.325°C (UN IPCC 5th World Report, 2014).
- Lastly, for the worst-case scenario, we developed futures of the IPCC's highest emission projection scenarios, where great population and technological growth is occurring.
  - As an example, based on scenarios categorized under A1, temperature rise, averaged from 2030 and 2070 projections, will be about 3.25°C (UN IPCC 5th World Report, 2014).

Based on these three types of futures, we developed the decisions visitors can choose in

the 2050 Trail. These decisions were developed using the background research of drivers of climate change. Early on in our project, we created these scenarios with the corresponding decisions that led to the scenarios. Our developed scenarios could not be implemented immediately into the new trail without a review and analysis of the feasibility of the data. To evaluate the proposed scenarios and decisions, we presented the initial 2050 Trail data to Shane French. He provided us with feedback that we were able to consider when finalizing the design.

We voice recorded this discussion with Shane French and transcribed his suggestions to refer back to when we continued to design the trail. We analyzed this discussion by accepting practical details or rejecting details in the scenarios and decisions. We integrated the accepted feasible choices and future scenarios into the development of the Australia 2050 Trail design. The implementation of the finalized scenarios and choices contributed to the second part of Objective 3.

### **3.3 The proposed Australia 2050 Trail design**

The assessment of the current Australia 2030 Trail served as a guide in order to develop the Australia 2050 Trail. The creation of the new future scenarios and corresponding decisions that were based on the information presented in Chapter 2 and the IPCC 5<sup>th</sup> Report, was the new information presented in the trail (Deliverable 1). To assess the new trail design, we followed the six-step process, PASS, as previously described. First we established what we wanted the new trail to portray to visitors, the program objective. Then asking relevant parties, like CERES staff, their opinions and thoughts of the new design, we completed the assessment design. Once we conducted interviews assessing the design, we collected our data (responses from interviews) and analyzed the data, as we did in the assessment of the Australia 2030 Trail. Finally, we completed steps five and six, reporting results and implementing results by reporting what needed improving and integrating into the final design of the Australia 2050 Trail.

Using the PASS process, we were able to combine our first two objectives to reach our third objective: Design the Australia 2050 Trail and then present it to CERES as a suggested way of teaching about sustainability. The design consisted of a new way to present the information to students as well as a fun and stimulating implementation of the new future



scenarios and choices that led to those scenarios (Deliverable 2). Our deliverables helped CERES educate about sustainability and increase visitors' awareness about how their decisions today will have an impact on the future.

## **4 Results and Analysis**

This chapter begins with a description of Step 4 of the PASS method, Analyze Data, in order to assess the Australia 2030 Trail. We used information gathered from our walkthroughs, surveys, interviews and focus groups to evaluate the 2030 Trail's educational impact and areas for improvement what could be improved upon. We then created the new future scenarios and lifestyle decisions that lead to those scenarios based on the information presented in Chapter 2 and feedback from the environmental experts to validate the feasibility of our futures and decisions.

### **4.1 Findings from the assessment of the Australia 2030 Trail**

As part of Step 4 for the PASS assessment for the current Australia 2030 Trail, we analyzed common trends found in the walkthroughs, surveys, interviews and focus groups, and organized them into seven main findings. The findings described below identify important areas that need improvement and options for improvement for the Australia 2030 Trail. The findings also allowed us to identify educational methods and key aspects that exhibits have to engage visitors in a fun and effective way. All of the findings informed us about the key concepts to include when designing the new trail, as well as developing the new future scenarios and decisions.

#### **4.1.1 Australia 2030 Trail concept is useful to teach about how lifestyle choices affect the future**

We found that the overall concept of the trail was engaging and useful, and it encouraged people to reflect on how their choices today are affecting the future outcomes. Regarding the 2030 Trail, Ian Culbard said,

“Overall I quite like it. I think it's a good exercise, when I first did it I was quite impressed the way it actually made me think about the future.”

Also, regarding the concept of the trail, Henrieta Tornyán, a CERES visitor, stated in an interview:

“Well, I like the whole concept, it definitely drew me in. I wanted to know what could be the possibilities of my future when making a decision.

#### **4.1.2 Australia 2030 Trail excursion information is outdated**

Through our initial walkthroughs, surveys, interviews and focus groups, we found that information in the Australia 2030 Trail was grossly outdated. Arwen Birch, a CERES teacher said in her interview:

“I like the potential it has but at the moment I feel a bit awkward running it because it is so outdated and that there are ways it can be improved, but I love the concept of it.”

Shane French, CERES Excursion Manager, gave ideas along the same line:

“The trail needs to be less outlandish. Some of the information on the current trail might happen by 2100, but not by 2030. Be more lighthearted and show more of the positives in the futures. Have more relevant future details about lifestyle choices.”

Therefore, a literature review was conducted in order to update the information for the redesigned trial. This literature review contained the updated the information with the most current projections for Australia and the world by 2050.

#### **4.1.3 There is not a clear connection between the lifestyle decisions and the future scenarios in the Australia 2030 Trail**

We found that the information presented in the decisions and scenarios was lacking a connection of why a certain decision affects the outcome in a future scenario. Some of the common, recurring recommendations from the walkthroughs, school and CERES teachers, students, and general public were to make a connection between the choices and how those choices will impact the environment. For example, the effect of temperature rise is not explained sufficiently. In the future scenarios, the students are just shown how much the temperature will rise by 2030, not specifically why or the effect it will have. Also, some students, teachers, and general public wondered how the social conditions in the future scenarios were determined just

based on environmental factors. Maxim Shvefsov, one of the general public visitors that participated in the 2030 Trail said,

“Well, questions are kind of different, but, after you go to the results, it does not relate why you got to that future. It just gives you a straight answer, it does not relate to the decision or explain why or how you got there, no connection in some future scenarios.”

#### **4.1.4 The Australia 2030 Trail lacked options regarding the mitigation of climate change**

Another finding was the 2030 Trail was lacking information of major drivers of climate change. The 2030 Trail did not have any choices aimed at mitigating the effects climate change. When conducting focus groups, some of the common opinions we found addressed how the 2030 Trail lacks choices regarding environmentally friendly technology. Technology, such as hybrid cars and using wind turbines to create energy, would help mitigate the effects of climate change by reducing greenhouse gas emissions. A student from the focus groups mentioned,

“A decision should take the energy or electricity production method into account.”

This sparked a discussion, among the students, of different ways to power their lives such as coal, solar panels, or green power. Also, the students said they would like to see “extremely negative scenarios” to have more of an impact, because the extreme scenarios would make them more likely to take sustainable actions. Nick Scott, a CERES teacher, also acknowledged that there should be choices like hydrogen cars, fuel cell cars, or electric cars because those are feasible options for people today.

#### **4.1.5 The Australia 2030 Trail lacked information regarding the major drivers of climate change, such as food and waste, and population is weighted too heavily in the scoring system**

It was brought to our attention in an interview with Arwen, a CERES teacher, that population growth in Australia is not a major driver of climate change locally. We found that the way population was addressed in the current Australia 2030 Trail was weighted too heavily in the scoring system. One of our group members, Stefano Berti, asked a panel of lead authors at

the 5th IPCC report forum, organized by Melbourne University, “How much of a driver of climate change is population growth, or the is the true driver population consumption?”

Professor Roger Jones, of Victoria University, answered,

“Some of the indicators say that reproduction, among the women in society, are dropping faster, but even so, population is increasing, therefore this remains uncertain...but what we do know is that consumption patterns are going up much faster than that [population growth].”

In the Australia 2030 Trail, a decision about population was reduced to two decisions: “What is your ideal family size?” and “Immigration – choose a policy.” From an interview conducted with Nick Scott, we found that immigration policies are too confusing for visitors, and especially young students, to choose. He stated,

“I think the Australian immigration part is really confusing because the number of people in Australia isn’t going to really affect the global situation...but in terms of immigration policies I just don’t see how that fits into the big picture. I mean it’s an interesting one from a political point of view but not in terms of how kids will decide to choose, because a lot of this has to do with global issues.”

Along with more choices about the major changes of climate change, Ian Culbard, a CERES teacher, mentioned in an interview the importance of incorporating choices regarding food and waste:

“Goods and services is obviously a big one, food is a big one and that would then tie into ecological foot-printing to some extent. And waste, there is nothing there about waste. I’d like to have something about waste because waste is big and that then ties into the idea of food waste: recycling plastics, metal and glasses and the stuff you put out into the environment and the impacts of your waste. Pretty much everything that comes into our life, we use it to what’s considered a useful period and then it becomes waste. So I think waste it a big one that we haven’t touched upon. Food and waste.”

#### 4.1.6 Many of the future scenarios in the Australia 2030 Trail are very similar and visitors had difficulties distinguishing the differences

When interviewing the general public we observed that many felt that the future scenarios are very similar and they had difficulties distinguishing the differences. Nick Scott also mentioned in the interview that the drawings of the scenarios could be simplified and made more powerful. This would enable the visitors to recognize the most important details, not just, for example, how much money they would have in 2030. Dunken Francis, a public visitor who we interviewed regarding the 2030 Trail, said,

“The final outcome posters need to be more common and simple in a way. The information presented in these ones have too many overlapping drawings and data that makes it confusing and very similar one to the other.”

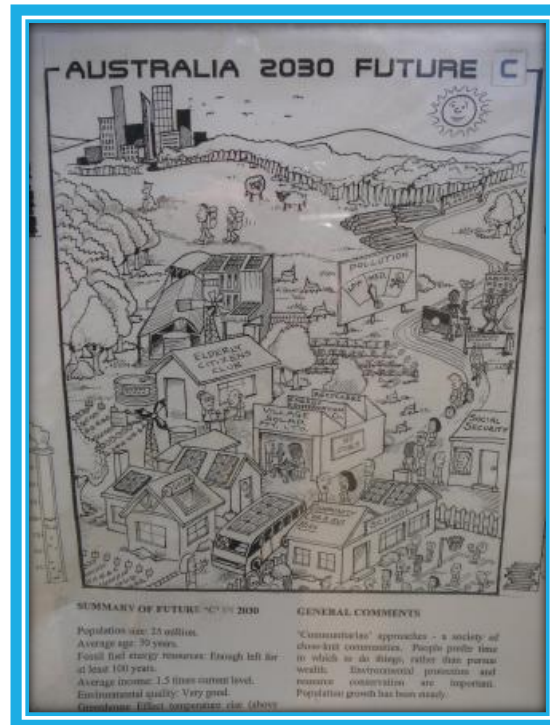
#### 4.1.7 Australia 2030 Trail has poor exhibit infrastructure

We also found that the infrastructure of the trail is really deteriorated and not appealing. We noticed that the students that were participating in the trail did not have an adequate writing surface. They had to write their number corresponding to their decision on a piece of paper, but they had to use the decision boards, themselves, or other students as a surface to write on, as shown in Figure 14.



Figure 14. Students trying to find a writing surface on the 2030 Trail

While we were completing the 2030 Trail, we found that the black and white pictures were not enticing enough to keep us fully engaged. The hand-drawn cartoons are clever, but they are very cramped for the amount of detail that is on them, as shown in Figure 15.



**Figure 15. Cramped future scenario**

Luisa Ingram commented on the future scenario drawings and said,

“The actual pictures of each world could be much bigger, and therefore your trail could be longer. Maybe, more spread out because the kids tend to clump and more often than not, there will be three kinds of worlds or grades that are most in common, so the kids end up clumping around that and perhaps not taking in all of the detail about that specific world that was their result.”

#### **4.1.8 The lack of color on the Australia 2030 Trail is unappealing**

The most common opinion we obtained from the interviews, surveys, and focus groups was that the 2030 Trail is lacking color. About 80% of the responses mentioned adding more color would make the trail more appealing. When visiting the Scienceworks Museum and Melbourne Museum, we found that every exhibit had colorful elements that caught the visitors’

attention. For example, Figure 16 shows a comparison of an exhibit board at Scienceworks and the 2030 Trail's display boards for a future scenario.



**Figure 16. Scienceworks display compared to the CERES 2030 Trail display**

After completing the 2030 Trail excursion with her class, Annabel Savey, a teacher at St. Leonard's College, said

“...I found it really hard to just look at my future in just black and white. I think color would've made it a lot easier to interpret, because it was just a lot of black and white lines for me, and I didn't have enough time to look at it in enough detail.”

From the feedback we received from the majority of the interviews, focus groups, and surveys and the observations we made, we discovered that color is a crucial detail in trying to engage an audience in an exhibit.

#### **4.1.9 The exhibit layout and utilization of space are important factors in order to attract visitors**

We found a common sentiment among interviewees, survey respondents and focus group participants that there should be better utilization of the space at CERES for the layout of the



trail. When visitors take part in the excursion, having the boards laid out as they are in the 2030 Trail, made people cramp together, making it very difficult to see the boards. An example of the crowded 2030 Trail is shown in Figure 17.



**Figure 17. Crowded 2030 Trail**

Attention can easily be dispersed if an exhibit or activity is not engaging and does not have a clear “walk-through.” We found that many interviewees thought that it would be a good idea to have the trail set up as a backbone through the other exhibits at CERES. Dunken Francis said,

“Personally, rather than having all enclosed in a circle, I would bring it around the perimeter or through the middle and convert it into a sort of backbone through the exhibits. This will allow them not to wonder out and they would see, “oh there is a cool thing here” “there is a cool thing there”.

#### **4.1.10 Late primary school students enjoy the 2030 Trail the most**

In order to educate a wide range of ages in the 2030 Trail about sustainability, we asked in our surveys and interviews, what age group enjoyed participating in the trail the most. We found that late primary school students (grades six to eight) were the most engaged and excited to complete the trail. While the CERES teachers said that grades six enjoyed the trail the most, they also observed that this group of students struggled with the scoring system the most, (e.g., the cross-referencing task to find their future scenario).

For example, Arwen commented,

“Yeah, sometimes five and sixes struggle with the grid bit at the end. Working out their letter at the end for some reason they find that challenging, working out their number and everything.”

This led us to find that the interest level of students also depended on their educational background. Our interviews, surveys and focus groups revealed that any age group, year five to twelve, could show engagement and excitement, it just depends on their level of education about sustainability and their interest of the topic. Nick Scott said,

“They [the students] all come out for different reasons and different knowledge about issues and stuff like that. I don't think there is a particular level of education that finds it better... What age groups seems to struggle the most? Depending on the interest, I would say probably the primary. But it depends on the level of interest.”

#### **4.1.11 The 2030 Trail is better understood when led by a CERES teacher**

As a part of the assessment of the 2030 Trail, we asked schoolteachers, CERES teachers and the students themselves, about the way the excursion is moderated and led by the CERES teachers. We found, from CERES teachers' responses, that the trail is typically never completed by students without guidance from a CERES staff member. Arwen stated in her interview,

“Well I've never done it without assistance, every time I have taught it there has been a lot of assistance. Because you always give them an introduction, help them with the first one to get it going, but then they are okay when you let them go.”

From the surveys and focus groups we conducted, we found that the trail would be difficult to participate in without any assistance because of the lack of instructions. A quote from a year nine student in the focus group illustrates this point. He stated that he

“Felt that there should be a clearer path for which decision to go to next... There is no clear path or direction.”

All of the general public visitors at CERES that were interviewed mentioned that the scoring system was not clear and it took them a long time to understand how to find their future. They did not understand why the scores were given to certain choices and how those scores were justified. They did not have a guide when going through the trail, therefore had a different experience and found it much more confusing. The general public also mentioned that there were no instructions for the trail, but they were able to figure it out as they walked through the trail. On the other hand, schoolteachers said that the instructions were not difficult to follow at all and that the students grasped the concept of the trail well. Annabel Savey stated,

“The only problem with the instructions was that it was unclear to me whether you completed the task with what you would like, with what you think you would choose. Whether you choose your options regardless of the environment, or choose your options based on dreamed wealth, or you choose your options based on what you realistically think you will choose.”

Overall we found that due to the lack of instructions throughout the trail, there needs to be a CERES teacher guiding the visitors through the trail in order for them to completely understand the excursion.

#### **4.1.12 CERES teachers prefer to have flexibility when moderating the Australia 2030 Trail**

We found, through interviews with CERES teachers, that when teaching, flexibility in teaching methods is important. Different groups of students go through the trail at different paces so CERES teachers said that they would change their procedures to best suit the group they were bringing through the trail. Nick Scott said,

“Occasionally I’ll get people to go through a second time. So, we sit down and discuss their choices, and what impact that had, and what sort of future they came up with.”

Another reason they change their teaching procedures is because they need to be able to teach to all different education levels. For example, Arwen mentioned,

“You always have to teach to the particular group that you’ve got and you need to have flexibility in teaching because sometimes you’ve got a grade six group who is quite not advanced... and they haven’t done a lot of environment... Then you’ve got other groups, who are the exact same age ... and they have already done a lot of thinking about it and then you would do more advanced concepts about it.”

The education level varies for different aged students. Hence, the CERES teachers believed it would be more efficient to have the decision and choices on both sides of the board to fully utilize the amount of space available. Relating to the idea of having double sided decision boards, Arwen mentioned in her interview that because the education level varies, it would make the most sense to have two trails. To better appeal to the different age groups she said,

“Yeah, I think it would be good to have one that was directed at younger and one that was directed at older students... You have a flip sort of screen or something.”

Having only one trail for a wide range of ages has its limitations. Since older students can understand more than the younger students, the trail’s information needs to be presented in such a way so it is educational for all ages.

#### **4.1.13 Sometimes students would deliberately pick decisions with lower scores to end up with a better future scenarios, thus causing the students to miss the overall point of the excursion**

Students admitted in the focus groups that they would deliberately pick decisions with lower scores to end up with a better future scenario. Due to the lack of structure in moderating by the CERES teachers, the students chose “preferable” rather than??? “Possible” futures. As shown in Figure 18, the larger house and larger car have higher resource scores because they are worse for the environment than the smaller options.

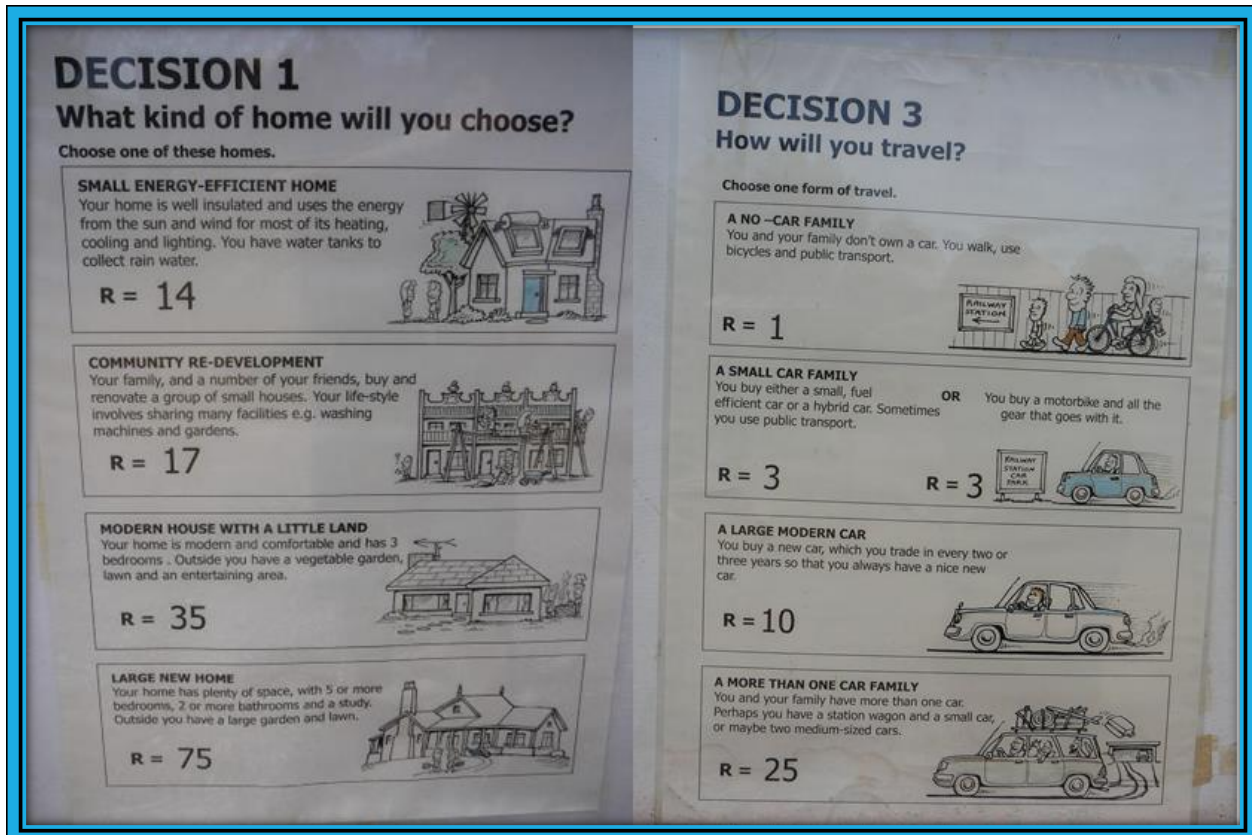


Figure 18. Decision 1 and Decision 3 showing that a larger "R" number is directly proportional to options that are worse for the environment

Some students picked up on this trend in scoring and did not complete the 2030 Trail honestly. Instead of choosing what they really want in life, they chose what they think would be better for the environment. This skews results of the 2030 Trail during the wrap-up discussion conducted at the end of the 2030 Trail. These students were missing the point of the excursion, which is to make the decisions they want in life to see how their future will be in the year 2030.

#### 4.1.14 Students that participated in the 2030 Trail liked the pen, paper, and recording sheets method of reaching their futures as opposed to a more technological method

When asked about technological implementations for the new trail in the focus groups, we thought students would want to add screens and iPads or more technological devices. It was quite astonishing what we found. Almost all students, with the exception of three out of the sixty students sampled in the focus groups agreed that they liked the pen, paper, and recording sheets because it allowed them to be actively engaged with each decision. The pen and paper are more physical than a touch screen device is, resulting in the students grasping the idea of sustainability

more effectively. Some students thought it would be a good idea to have an iPad for the scenarios, so that they could interact with their future virtually. Also, the students mentioned if the futures were narrated after the push of a button (i.e., a voice told the students what their future would be like while they looked at the picture of the future) they would be more engaged.

#### **4.1.15 Schoolteachers would not come back to CERES to participate in the 2030 Trail again, with a different group of students, if it were not updated**

The schoolteachers in general, surveyed and interviewed, said that they would not come back to CERES to participate in the 2030 Trail if it were not updated. Luisa Ingram stated,

“Particularly teaching kids in this day and age they’ve got such great access to information that if we present them situations or issues or data, from even five years ago, let alone ten, fifteen years ago, there’s no point because it changes so quickly.”

Therefore, if CERES does not update the 2030 Trail, these teachers will likely choose other excursions for their students to participate in. Luisa also expressed her opinion if the trail were not updated,

“If it didn’t get updated, even this year we had a discussion about doing this activity over the other activities that CERES offer, and I spoke with the learning department about... it’s a little tired and it’s lacking in up-to-date information as well.”

In order for CERES to raise awareness about sustainability they must be able to teach their visitors, but not having these schools revisit will greatly impact this process.

## **4.2 The Melbourne Museum, Scienceworks Museum, and Melbourne Zoo findings**

After visiting the Melbourne Zoo, Scienceworks Museum and Melbourne Museum we were more knowledgeable about how to engage visitors in exhibits. The following findings were about how exhibits are designed to catch visitors’ attention and how tactile objects are used in exhibits to attract visitors. These findings are the results from our observations and interviews at these various attractions.



#### 4.2.1 The Melbourne Museum, Scienceworks Museum, and Melbourne Zoo have exhibits that are designed to catch and keep the attention of the visitors

Visiting three educational attractions in Melbourne led us to find out how important the infrastructure of an exhibit is when communicating an important message. In the Melbourne Zoo, one of the most useful findings came at the entrance of the zoo, where a map with arrows directed visitors where to go and how to navigate around. Visitors are given clear instructions to where each animal is and how to follow the paths in a logical sequence to see all the exhibitions. This map is shown in Figure 18.

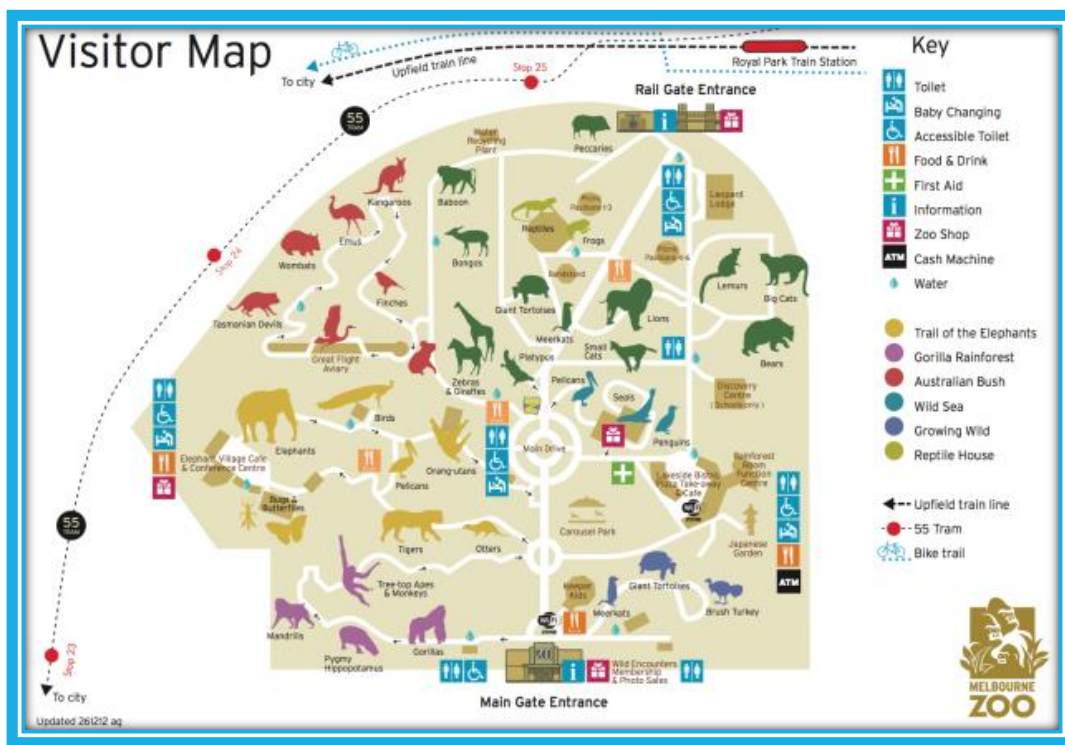


Figure 19. Map of Melbourne Zoo (Melbourne Zoo, 2014)

In the Scienceworks Museum, the *think ahead* exhibit is aimed at allowing students and students to think more deeply about the future, by incorporating intriguing displays of possible outcomes and ways to imagine what their future might be. We found various interactive exhibits (e.g., touch screens, buttons, cameras, mechanical pieces, and building blocks) are great ways to maintain visitors' attention. Regarding interactive exhibits, Hayley Townsend, a museum curator in the Digital Systems Department for Museum Victoria, said

“If it’s a nice big plush screen with clear instructions that what you do next, then people will engage with it. If there is a very clear button to press, people are quite happy to do that. And sometimes you need to guide people a bit more.”

Another important finding came from the modern pathways that effectively led the visitors around the *think ahead* exhibit. During our visit we observed that visitors were intrigued by the futuristic design of the displays and only revealing part of an exhibit sparked curiosity, causing them to want to go to that attraction.

For example, as shown in Figure 20, we observed little inlets in the walls of the exhibit (hexagonal shaped) that caused the visitors to want to walk up and see what was further back in the inlets.



Figure 20. Hexagonal exhibit inlets at Scienceworks

In the Melbourne Museum, exhibits such as the aboriginal and first people in Australia, shown in Figure 21, emphasized parts of an exhibit by making certain objects project in an angle



in 3-D towards the visitor. We learned how key facts or important details can be displayed with much more effectiveness in an exhibition.



Figure 21. Angled 3-D displays used at Melbourne Museum

Figure 22 shows how one of the Melbourne Museum's exhibits incorporated audiovisual interaction buttons for another 3-D display method. The exhibition for this involved touching a button that triggered a greeting in different aboriginal languages depending on the section of the map visitors touched. The method of display, combined with sensory interaction, makes an exhibition engaging, fun and purposeful at the same time.



Figure 22. 3-D audiovisual exhibit at the Melbourne Museum

With the same idea, at Scienceworks Museum, we found that exhibits with mechanical interactions were more appealing to younger ages. David Perkins, the Digital Education and Outreach Manager for Museum Victoria, said

“It really depends on the students, but like younger ones are more mechanical, but in *think ahead*, the transport one [activity] is really popular, and it’s sort of along the lines of what you are talking about, of making those choices and ending up with a product.”

We observed how the visitors of the Melbourne Museum were drawn to realistic displays of animals, in the museum’s WILD: Amazing Animals in a Changing World exhibit, seen in Figure 23. Regarding the WILD exhibit, Kate Phillips, a Senior Curator in Science Communication at Museum Victoria said,

“...they [the younger students] still also like, the specimens up there, the things to look at, if they are familiar, if they have some connection with them. So the stuffed animal is good because they might have seen a lizard or a bird, so that they have a connection with those already. With slightly older kids, the interaction might be different. Obviously if there is a computer screen and there is some sort of challenge or a game element to it, then that’s something that should be attractive. Obviously big, impressive things work for all visitors, like the shark. You often see kids looking at it like, “Is it real,” with the shark or the dinosaurs. So I guess we all respond to something that is a big scale or has some impressive features already.”

We were able to observe how visitors looked amazed and intrigued towards animals that were once alive. We found that including realistic objects significantly spiked visitors’ attention.



**Figure 23. Lifelike displays of animals at the Melbourne Museum**

Another nature-related display allowed us to find that simple material can be used to create a realistic scenario. In Figure 24, an eel-trapping exhibit at the Melbourne Museum, for example, had two glass tanks with a piece of plastic in between them to blur the image when looking from the top, just as water would, effectively creating a realistic water-display.



**Figure 24. Water effect of eel-trapping exhibit at Melbourne Museum**

We found that the titles to exhibits also play a key role in attracting visitors. Kate Phillips said,

“...maybe it’s the title that helps draw you in, it’s got to be very clear, so not to be confusing, and to be easy to read. Yet still rewarding and interesting.”

Having a short and concise title, followed by a small descriptive subtitle, varying in sizes, color, and style, effectively intrigues the visitors, making them want to participate in the exhibit. The title is the first part of the exhibit that the visitors notice, so it can play a large role in the number of people that visit the exhibit. Figure 25 shows an example of how the Melbourne Zoo used images combined with short words in the title of the tiger exhibit to engage visitors before an attraction.

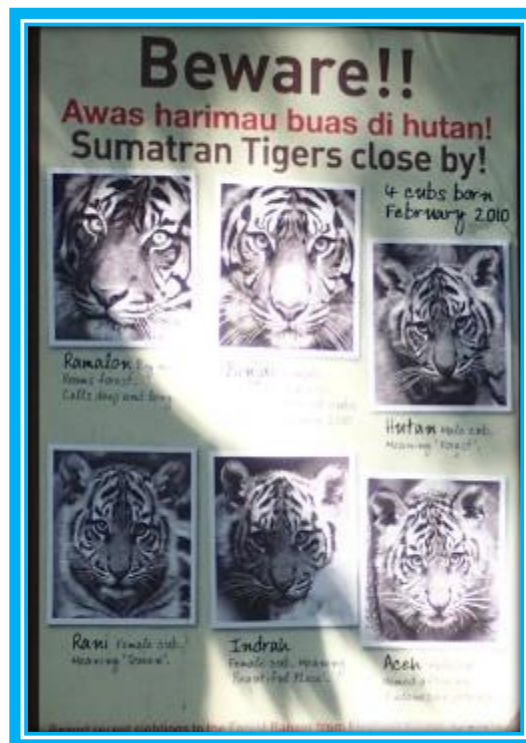


Figure 25. Combining images and appealing titles for tiger exhibit at Melbourne Zoo

Also, in Figures 26 and 27 short-worded titles are used by the Melbourne Museum and the Scienceworks Museum, respectively to attract visitors. If the titles are not attractive, short and concise, visitors lose interest easily and never enter the exhibit.

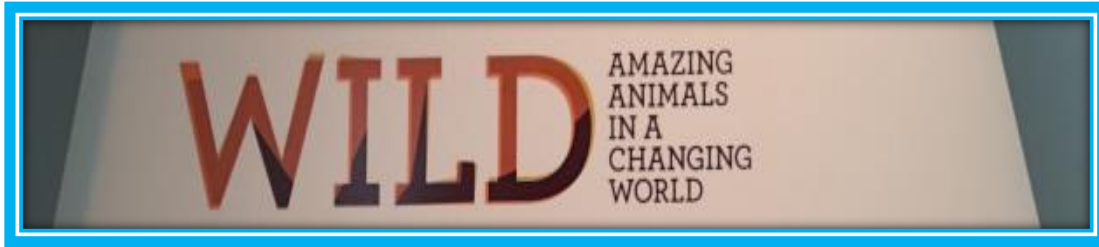


Figure 26. Melbourne Museum's use of a short, yet intriguing title for their WILD exhibit



Figure 27. Scienceworks Museum incorporating a short, thought provoking title for their *think ahead* exhibit

Following the importance of the display method for exhibit titles, we found that having a “mini-exhibit” with preceding information, such as a prelude, allow the visitors to fully understand the main exhibit’s purpose.

#### 4.2.2 Museums use tactile objects in their exhibits to provide visitors with an engaging experience

Among our observations at Scienceworks Museum, we found how important hands-on and sensory appealing experiences are while performing an activity and designing an exhibit. Making tactile objects also attracted visitors’ attention. Figure 28, as an example, shows how different types of sports balls are mounted to a wall and visitors could have felt the different grips of each ball. Scienceworks’ mission of hands-on attractions led visitors to not only have visual interactions with the exhibit, but also have a tactile stimulus.





**Figure 28. Tactile sports balls exhibit board at Scienceworks Museum**

During our visit we observed that visitors constantly want to touch, feel, grasp, hear, look around, and even taste and smell in order to experience an interaction. At Scienceworks Museum, rewarding stimuli with auditory responses are incorporated into exhibits in order to attract and maintain visitors' attention. The visitors are made aware of what they accomplished, by hearing a pleasant chime sound, or failed at, by hearing a low "thump" noise, thus rewarding or reminding them about something specific. In the interview with Michael De Zilva, the Educational Program Coordinator for Scienceworks, we found that

"Exhibitions at Scienceworks are based on hands on experience for kids."

This allows students to have a direct interaction with the exhibit infrastructure, while having a fun and rewarding experience during their time at the museum.

### **4.3 Findings Regarding Education Methods**

As part of the assessment of the current Australia 2030 Trail, we identified effective methods of education currently being used by teachers in Australia. Surveys and interviews conducted with schoolteachers that recently visited the 2030 Trail resulted in the following

findings. These findings suggested several aspects that guided us in the design for the new Australia 2050 Trail's method of presenting information.

#### **4.3.1 The steps and approaches taken by teachers when educating greatly impacts students' learning ability**

First, there were several opinions when schoolteachers were asked about how students learned in the most effective way, either completing work in groups or individually. In the interviews, all three teachers from St. Leonard's College teaching grade nine students agreed that one is not more effective than the other. Luisa Ingram, a teacher for more than nine years said,

“I believe that if you provide opportunities for students to work individually and in groups are best practices approach. This particular age group, fifteen year olds, do need some kind of engaging discussion.”

She also gave valuable examples of how these methods could be applied to the new trail. In her interview she suggested:

“For example; in the trail, you could get them to fill out some of the answers to the questions independently, so that they can reflect on resources. Once they have worked out their final score, open it up to a group discussion. Then, if they find out that 6 or 7 that go to similar trends, group them up, get them to identify what they have in common, and also what are the differences they have from other groups”.

We also found through the interviews with the schoolteachers that since there is not a set way to approach teaching students, you must first identify the type of learners you have. Tim Barlow, another St. Leonard's College grade nine teacher, stated that

“First, you need to identify unique; visual learners, learners that like or prefer independent work versus group work. Then you can find a balance to offer the best way for everybody to learn productively.”

A weakness of the results gathered from the interviews with the school teachers was that the interviews were only conducted with year nine teachers. This slightly skewed the findings

related more towards how year nine students learn. However, the 2030 Trail was designed to be used by year five through twelve, and year nine students are in the middle of this age range. This data from year nine teachers may be slightly biased, but the data would be even more biased if only data was gathered at the two extreme age ranges, either year five or year twelve, since year nine is the average age that participated in the trail.

The surveys contained results from schoolteachers that were not year nine teachers, thus giving us more of a representation of students' learning style. In the surveys we found that group work is better, but only when the students work in small groups, usually no more than four per group, according to the responses. One teacher commented,

“This allows them to actively participate while staying on topic.”

If there are larger groups of students, teachers found that the students would get distracted and discuss unrelated topics.

When asked about methods of engaging students in an educational activity, schoolteachers responded in the surveys and interviews that the activity must relate directly to the students. Other methods of engaging the students includes having them complete kinesthetic tasks, watching short videos or having group discussions to maintain their enthusiasm. Annabel Savey stated that she prefers to have a

“Mix of activities [in her class]... [Trying to get] discussion happening, especially in the younger years. I do try and get kids up to demonstrate...If they can't see why they are doing it or when they will need it, then I think you lose their interest.”

One of the survey responses also indicated that,

“All students process input differently and a wide range of stimulus must be used. Students like demonstration and doing the most.”

Therefore, by adding different stimuli to an educational activity, students would pay attention and better understand the concepts being presented.



### **4.3.2 Keeping visuals concise and realistic-looking helps students understand the information being presented and keeps the students engaged**

In our survey and interviews, we found that teachers thought keeping visuals and concepts concise and realistic helps the information to be easily digested by the students. Also, one of the interviewed schoolteachers suggested that “thought provoking questions” are essential to enrich a discussion and to engage students, when kept simple. In the way of displaying material, a survey respondent mentioned that making less cluttered posters, and graphs to

“display the information... [helps students]... stay focused.”

One schoolteacher mentioned that they had to point out the important details in the future scenarios, otherwise the students would not have seen them. If too much text and information was cramped into a small presentation, like a poster, students only looked at the information that initially caught their attention.

The methods schoolteachers use when educating students helped us find how we could implement visuals, teaching tactics and student oriented activities into the new trail.

### **4.3.3 Students are more engaged through hands-on experiences**

We found that students learn best and are more engaged in learning activities when they work hands-on. The interviewed and surveyed teachers agreed that the majority of students are tactile learners, especially at a younger age. Louisa Ingram mentioned, to better engage the students, the trail would be better if the students could

“...stick things on and off, like adding more trees to this, little Velcro trees or something,.. Trying to think a bit more simple now, magnets or sticky Velcro things is another that kids can pull on and off”.

Surveyed teachers rated senses on how effective they are for learning. According to the teachers, they ranked each sense (e.g. auditory, tactile, visual, smell, taste) with one being the least useful and five the most useful. With the results gathered, we found teachers think students learn best by tactile sense, with a score of 4.5 out of five. This was followed by visual, with a

four out of five and then by auditory, with a 3.5 out of five. Lastly, smell and taste ranked the lowest with a two out of five meaning they are the two senses teachers think are the least preferred ways of learning. These results are shown in Figure 29.

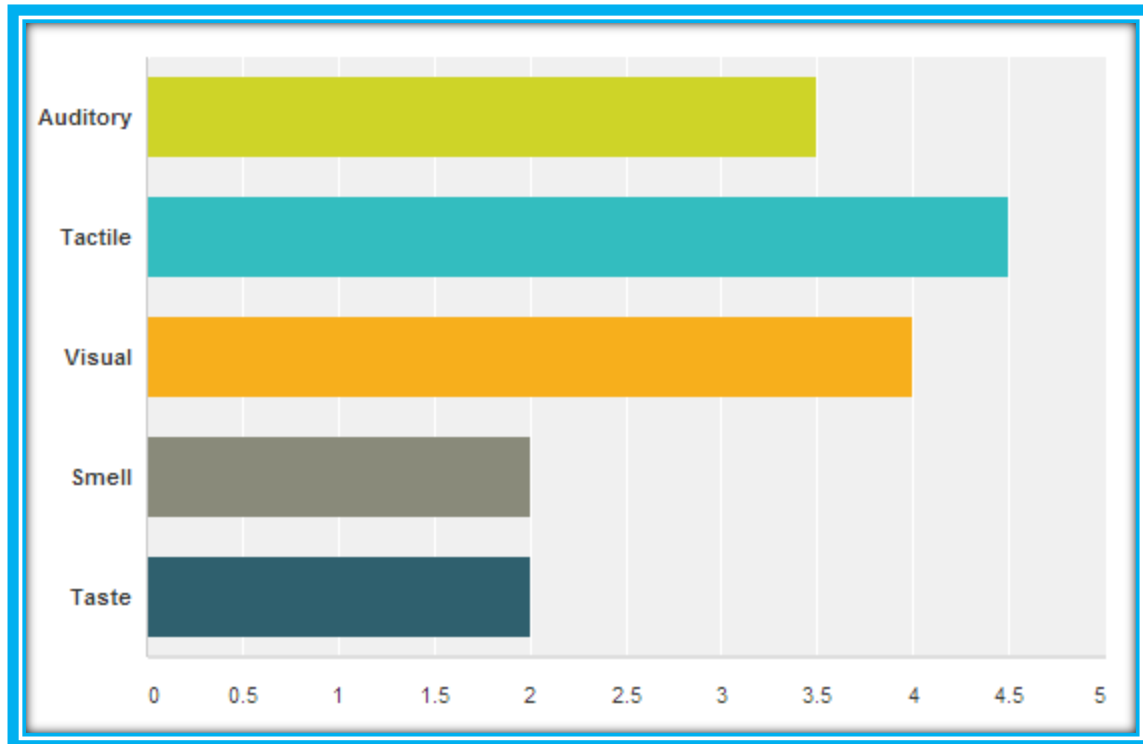


Figure 29. Results for survey question 8 “Do students learn better with specific senses (e.g. auditory, tactile, visual, smell, taste)? Rank them in order being 1 the least useful and 5 the most useful”

## **5 Final Updated Decisions and Future Scenarios**

When visitors come to CERES and participate in the Australia 2050 Trail they will begin by entering through an archway that has instructions and a map of the trail posted on it. They will then proceed through a series of boards showing them the history of Australia's environment. Once they have completed this prelude they will then come to the first decision they have to make about their future lifestyle, "Where will you live?" Here they are asked what kind of house they want to live in and where in Australia they will want to live, such as the countryside. For each choice there is a corresponding icon that the participant will circle on the decision sheet they are given. This decision will have limitations due to the fact that it is improbable to have a large house in the city. The next lifestyle decision that the visitor will make is "What goods do you want?" The participant will make choices of what kinds of household goods, such as refrigerator, and how many of each they want to have in their home. Also they will choose what kinds of technological goods, such as mobile phones and how many of each they want to have. For both of these choices, each item will have an icon that the visitor will record on their sheet.

The third decision the visitor will walk to is, "How will you get around?" At this point the participant will choose their main mode of transportation, but like mentioned before there are limitations for the choices. For example, the participant cannot choose from public transportation if they chose to live in the countryside because trams and trains don't travel that far out. Similar to the previous decisions, there will be corresponding icons that will later represent the scores of each choice the participant made. The fourth decision the visitor will make is, "What kinds of foods do you plan to eat?" Here the participant will have two specific categories of questions to answer, one is, "How often do you plan to eat locally grown and/or packaged foods?" The participant will have to choose from a range of all locally grown to purely all packaged foods, with a middle range of some locally grown and some packaged. The second question will ask, "How often do you plan to eat animal-based products?" Again, the choices will be presented in a range of frequencies, never (strictly vegan) to always. Each frequency choice will have an icon for the visitor to record on their decision sheet. The final decision the participant will make is, "How will you power your life?" Based on the type of house the visitor chose, they will have to pick a certain number of renewable and non-renewable resources to power their homes. Each

option has a corresponding number of light bulbs, so once the participant has chosen their power sources they will have to cross off the number of light bulbs on their decision sheet.

After going through each decision the visitor will then refer back to their decision sheet and add up the number of each icon they recorded. The point value of each icon will then be presented at the entrance to the future scenarios. Once the visitor has added up their final score they will denote what future scenario they ended up with based on what range their score falls in. Each scenario is given a range of scores; such as an overall score of 21-40. The scenarios are projected futures of Australia's environment for the year 2050, based off of the choices the participants made throughout the trail. The message the Australia 2050 Trail is raise awareness about is how humans' lifestyle decisions can impact the future environment of Australia.

## **5.1 Decisions**

We decided to design the 2050 Trail to have five main decisions:

1. Where will you live?
2. What goods do you want?
3. How will you get around?
4. What kinds of foods do you plan to eat?
5. How will you power your life?








The participants in the 2050 Trail will make choices about lifestyle decision types that are explained in more detail in the subsections below.

### **5.1.1 How to get the future? (Scoring system)**

One of the findings mentioned in the Chapter 4 was that sometimes the students were able to notice that a larger number corresponded to a worse option for the environment throughout the decisions in the 2030 Trail. In order to address this issue, we designed the Australia 2050 Trail to use icons as a point scheme. These icons were chosen so they would not

be favored by a group of participants (e.g., no animals were used so people would not pick a choice because it would have their favorite animal in it). We decided to use seven icons in order to keep the addition of points easier in the end for the people to find their future. After the 2050 Trail participants finished making choices on all five decisions, the CERES teacher would reveal how much each icon is worth (i.e., a number zero through six). Table 5 shows these icons and the point associated with each icon.

**Table 5. Points Associated with each Icon**

POINT	FIGURE
<b>0</b>	 Water
<b>1</b>	
<b>2</b>	 VCE
<b>3</b>	 Waste
<b>4</b>	 Cultural
<b>5</b>	 Land
<b>6</b>	 Leadership

The participant would then sum up all of the points and the resulting number would give them their future. The futures corresponding to the different point ranges are described in section 5.2.

### 5.1.2 Decision 1: House-Where will you live?

The decision about where one will live is the first decision that the 2050 Trail participants will come across. The participants will have to choose where they want their house to be located:

- City
- Inner-Suburb
- Outer-Suburb
- Countryside

On the decision board as well there will be the description of the different types of houses and location of the houses, so the guessing what a big house is, for example, is eliminated. Table 6 shows the description of the types of houses.

**Table 6. Description of the Types of Houses for Decision 1**

Type of House	Space (m <sup>2</sup> )	Bedrooms	Goods per Room	kW/day	kW/year
<b>Big House</b>	466-MORE	5 or more	A lot	23.1	8437
<b>Medium House</b>	186-465	3 to 5	Large Amount	18.1	6617
<b>Small House</b>	185-LESS	2 to 3	Medium Amount	15.6	5707
<b>Apartment</b>	40-100	1 to 3	Medium Amount	13.1	4796
<b>Terrace</b>	200-LESS	2 to 4	Large-Medium Amount	15.6	6617
<b>Mobile Home</b>	50-LESS	1	Small Amount	10.6 + Combustion	3887 + Combustion
NOTE: Based on number average per bedroom which represents 1 person per bed					



















The type of house is defined by the space it had (in square meters), the number of bedrooms, the goods per room (e.g. furniture, technology, etc.), the average kw/day, and the average kw/year.

After receiving feedback, from Excursion Manager Shane French, we found that our design for Decision 1 was missing some information regarding the houses. He was confused what we meant by a big house or small house. A big house could have different definitions for different people (e.g., is a big house defined by room size, number of rooms, etc.). Shane French was worried that the people who would participate in the 2050 Trail would be confused by this decision due to the lack of detail. Also, the locations of the houses were not adequately described. Shane French said that including information and an example of a town in Australia for each location would not cause the participants in the 2050 Trail to be confused as to what we meant by the different locations. For example, Shane French informed us that there are two types of suburbs that Australians consider: an inner-suburb and outer-suburb. Found in Appendix II is the description of the different areas where the houses can be located.

Shane French also wanted us to include information about how the choices made here can dictate the choices later. He said that this would allow the students to actively think about the decisions they make. Therefore, depending on the chosen location, the participants will have a designated color; City is blue, Inner-Suburb is orange, Outer-Suburb is yellow, and Countryside is green. These colors will limit the choices they will be able to make later on in the trail. For example, it is unfeasible to have a large house and medium house in the city due to the amount of space they take up.

Table 7 shows the available options for types of houses and locations. The areas where there are black boxes represent unavailable choices.

**Table 7. Decision 1's Options for Houses in Certain Locations**

<i>Decision 1- Where will you live?</i>				
Type/Location	City ★	Inner-Suburb ★	Outer-Suburb ★	Countryside ★
Big House			 Leadership	 Land
Medium House		 Leadership	 Land	 Cultural
Small House	 Leadership	 Land	 Cultural	 Waste
Apartment	 Waste			
Terrace	 Land	 Cultural	 Waste	 VCE
Mobile Home	 VCE	 VCE	 Waste	 Waste

The different icons located in the various spots in Table 7 represent a certain point value that is explained in the previous section.

### 5.1.3 Decision 2: What goods will you buy?

The next decision the participants come to Decision 2. In this decision, they choose what household appliances and pieces of technology they would want in their house in 2050. There are again icons that correspond to the different items. These icons represent a number that was based on the number of Watts (W) that particular item uses. Table 8 shows how the points were distributed based on the number of Watts for that item. The 1pt, 2pt, etc. were replaced with the corresponding icon in the decision's chart, shown in Table 9, in order to make visitors not associate higher numbers with more power-hungry items.


















**Table 8. Point Regime for Decision 2**







<b>Point Regime</b>
<b>1W-1000W = 1pt</b>
<b>1001W-2000W = 2pt</b>
<b>2001W-3000W = 3pt</b>
<b>3001W-4000W = 4pt</b>
<b>4001W-5000W = 5pt</b>
<b>5001W-more = 6pt</b>

If the trail participant would like to have more than one of those items in their house, then all they have to do is add another icon that corresponds to that item, to their total icon count for that specific icon. For example, if the participant wanted two TV's then their light bulb count would be two total, just for TV's. In this decision we decided to add an "other" choice for both the household appliances and the technology part. This "other" section covers any other technologies that may be developed in the upcoming years that we do not mention explicitly in this decision. This is something the 2030 Trail is lacking, which aided in it becoming out-of-date easily. Table 9 shows the main Decision 2 components with all of the items, wattages, and icons. The wattages will not be part of the actual decision board that the participants will see, because we feel this information could confuse the younger students. The wattages are there as a reference for us and CERES to validate where that icon value come from.

Initially, from feedback from Shane French, we found that there were some words in our Decision 2 that Australians would not understand. For example, he suggested changing the words "cell phone" to "mobile phone" and "hot water heater" to "hot water service." Shane said that this would confuse less trail participants since we will be including words that are familiar to the visitors of CERES.

**Table 9. Decision 2's Items, Wattages, and Icons**

<i>Decision 2- What goods will you buy?</i>			
<b>Consumption</b>	<b>Item</b>	<b>Wattage</b>	<b>Icon</b>
<b>Household Appliances</b>	Dish Washer	2400	
	Washer	500	
	Dryer	5000	
	Refrigerator	2200	
	Central Air Conditioner	6000	
	Heater	2000	
	Microwave	1100	
	Stove/Oven	5000	
	Pool	7000	
	Hot Water Service	5500	
	Other	1835	
<b>Technology</b>	Computer	150	
	TV	150	
	Game Console	150	
	Tablet	20	

	Mobile Phone	12	
	Camera	15	
	Cable	55	
	DVD/Blu-Ray	40	
	Electronic Toys/Entertainment	10	
	Other	33	

**5.1.4 Decision 3: How will you get around?**













This decision was a major upgrade from the 2030 Trail because this includes more modern types of transportation (e.g., hybrids and solar powered cars).

When discussing our decisions with Shane French for the first time, he brought to our attention that there were no limiting factors for transportation method based on the participant’s house location. He said that the different living locations definitely have their limitations for the mode of transportation that is available to the participant. For example, if the visitor lives in an outer suburb, the public transportation is no longer available. They have to choose a car, which would have different implications on the environmental or economic factors in the participant’s resulting futures. Shane wanted it to be clearly known in the 2050 Trail that people’s decisions all have consequences that can affect other aspects of their life.

Therefore, we implemented a limiting factor in Decision 3, which depended on the location the participant chose to have a house in. The participant will have to look at their color star that corresponds to the location of their house, and pick one main method of transportation. City and Inner-Suburbs can have public transportation, self-powered, and car as their main way of getting around, but Outer-Suburb and Countryside are limited only to car. Within the main





method of transportation there are several types that the participant can choose from based on a small description, the estimated price, and emissions the different types of transportation produce. They then pick the icon in the same row for the method of transportation they desire for 2050. Table 10 shows the primary decision aspects for Decision 3's main method of transportation.

**Table 10. Decision 3's Options with the Point Regime**

<b>Decision 3- How will you get around?</b>					
<b>Transport - MAIN Method Of Transportation</b>	<b>Type</b>	<b>Icon</b>	<b>Description</b>	<b>Price</b>	<b>Emissions</b>
<b>Public</b> 	Bus	 Cultural	Shared	\$	emissions
	Train	 VCE	Shared	\$	no emission
	Tram	 VCE	Shared	\$	no emission
<b>Self</b> 	Foot	 Water	Takes Time	-	no emission
	Bicycle	 Water	Takes Time	-	no emission
	Other (skate, scooter, etc.)	 Water	Takes Time	-	no emission
<b>Car</b> 	Eco (solar, hydro, electric)	 VCE	MEDIUM speed/ short life energy	\$\$\$\$\$	no emission
	Semi-Eco (hybrid)	 Waste	FAST speed/ far travel distance	\$\$\$\$	emissions
	Non-Eco (petrol)	 Leadership	FASTEST speed/ medium travel distance	\$\$\$	high emissions





As a reminder of the house location color for the participants, a key, shown in Table 11 will be displayed at the Decision 3 board in the 2050 Trail.

**Table 11. Key to Remind Participants which Color Corresponds to the Location of the House**

<b>Key (depending on where you chose to live)</b>	
<b>City</b>	
<b>Inner-Suburb</b>	
<b>Outer-Suburb</b>	
<b>Countryside</b>	

Also as a part of Decision 3, we included another question regarding how the participant plans on traveling for holidays. After talking with Shane French, we found the travel methods people choose when going on vacation have a large effect on the environment. We then made Table 12 another part of Decision 3. The participant just needs to circle whichever icon corresponds to how they would like to travel for holidays in the year 2050, on their decision sheet.

**Table 12. Second Part to Decision 3 Regarding Method of Travelling for Holidays**

<b>How Do you Plan on Travelling for Holidays?</b>	<b>Icon</b>
<b>Plane</b>	 Cultural
<b>Boat</b>	 Waste
<b>Car</b>	 VCE
<b>No Travelling</b>	 Water

### 5.1.5 Decision 4: Food and waste

When talking with Ian Culbard, he suggested adding an aspect about food and waste to the 2050 Trail because it is something that the 2030 Trail is missing. Consumption is a main focus of the 2050 Trail we include the decision about food that people will eat, which determines how much waste they will produce. Decision 4 is all about the direct consumption of the trail participant. Shane French suggested making this decision like a mini-ecological footprint activity. CERES currently offers an ecological footprint exercise on their website and Shane French said to base this decision off something similar to that exercise. The participant first answers the question “What type of food do you plan to eat? Packaged or Locally Grown (up to 300km away).” This question can be seen in Table 13 and the choices progressively go from all locally grown, on the left, to all packaged/ take-away, on the right.

**Table 13. Decision 4 - Food and Waste Question 1**

Decision 4 - Food and Waste						
What type of food do you plan to eat? Packaged 🛒 or Locally Grown 🌱 (up to 300km away)						
All Locally Grown						All Packaged/Take-away

The first question implicitly takes the waste aspect into account without having to ask odd questions like “will you recycle or throw your trash away?” The second question in Decision 4 shown in Table 14 asks “How often are you going to eat animal based products?” This question is also valuable for consumption because the more often someone eats animal based products, more shipping, packaging, and storage of those products would need to occur, thus causing more damage to the environment from pollution and waste.

**Table 14. Decision 4 - Food and Waste Question 2**

How often are you going to eat animal based products?						
NONE (Strictly Vegan)	INFREQUENTLY (Lacto-Vegetarian)	ALMOST INFREQUENTLY (Vegetarian)	OCCASIONALLY	OFTEN	VERY OFTEN	ALWAYS
refrain from consuming animal products, not only meat but also eggs, dairy products, and other animal-derived substances	consume dairy products but not eggs, or any type of animal-derived substances	do not eat meat, fish or poultry but tend to consume dairy products and eggs	eat meat few times a week (about 4 times a week) together with dairy products	eat meat often (between 5-6 times a week) together with dairy products	eat meat very often (at least 7-12 meals a week) together with dairy products	eat meat always (about twice a day) together with dairy products

### 5.1.6 Decision 5: Energy production –Power your life

Another major topic that the Australia 2030 Trail is missing is choices regarding energy usage and energy production methods. When the 2030 Trail was created, renewable energy resources such as solar and wind, were not as popular as they are today. Our Decision 5 for the 2050 Trail design incorporates various power production methods.

After discussing Decision 5 with Shane French, we found that our design needed to include more light bulbs for less environmentally friendly options and saying students had to use a certain amount of dollar signs on energy production methods was very confusing. Shane said that there were limited combinations for the different energy production methods which would limit the choices the students would be able to make when completing the trail. Shane French stated that it would be good to have an economic aspect in this decision, but it most likely cannot be done without making this decision really complex. He also said the students need to realize that they need to make sacrifices if they do not want the environment to be too negatively affected in the future. For example, a student should not be able to pick a large house and have it use 100% renewable energy because it is unrealistic and unfeasible due to the amount of resources used when building the house and filling the house with many goods.

Therefore, depending on the type of house the trail participant chose, we added a designated number of choices they must make for power production methods. There are restrictions that apply when choosing, however, and descriptions as to why restrictions may apply to that type of house. For example, if they picked a large house, they are given four choices. However they are restricted to only pick a maximum of two sources from Renewable section and two from the Non-Renewable section. The reason is because it is unfeasible to power a large, five bedroom house, with only renewable energy due to the amount of resources it took to make the house as well as the number of appliances and other goods in the house. Table 15 shows the number of choices per house type, the restrictions, and a brief reasoning behind the restrictions.











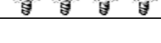
**Table 15. Decision 5's Number of Power Production Choices, Restrictions, and Reasoning**

<b>Choose the correct number of Power Production Methods to be used to power you life for the type of house you will have</b>			
<b>Type of house</b>	<b>Number of Power Production Method Choices</b>	<b>Restrictions</b>	<b>Description/ Reasoning</b>
Large house	4	You can only pick a maximum of 2 Sources from the Renewable and 2 Sources from Non-Renewable sections	If you have a large or medium house, it is unfeasible to have it powered just on renewables, due to the amount of resources a large or medium house takes to be made and filled with furniture, appliances, etc.
Medium House	3	You can only pick a maximum of 2 Sources from the Renewable or Non-Renewable sections	
Small House	2	None	Due to the small living area, it is possible to power the small house and terrace with all renewables, if desired
Terrace	2	None	
Apartment	2	You can only pick a maximum of 1 Source from the Renewable or Non-Renewable sections	Since apartment buildings house many residents, it is unfeasible to have a whole apartment building powered by renewable energy
Mobile Home	2	None	You need one Power Production Method source to move the mobile home and one to power the appliances within it



Table 16 shows the options for the power production methods, the efficiency of each method, some negatives about the methods, and the amount of light bulbs that correspond to each method.

**Table 16. Power your life- Power Production Methods, Efficiency, Negatives, and Corresponding Light Bulbs**

Power your life	Power Production Method	Efficiency (a higher efficiency means the cost per peak kilowatt will be lower)	Negatives	Light bulbs Corresponding to each Power Production Method
	Solar	15%	On cloudy and rainy days, power is limited	
	Hydro	90%	Floods countryside during construction and reduces water amount to parts of the river after the dam	
	Wind	35%	If there is not enough wind to move the turbine, power will be limited	
	Geothermal	15%	Can run out of steam, may release harmful gases that would need to be contained	
	Biomass	35%	The biomass combustion process produces emissions. The emissions must constantly controlled and monitored	
	Coal	45%	Produces pollution of greenhouse gases (for example carbon dioxide) and other substances that enter the atmosphere, increasing the rate of climate change and global warming	
	Natural Gas	39%		
	Petrol Oil	44%		
	Nuclear	36%	Produce radioactive waste (dangerous and not biodegradable)	

When making this decision, the participants are able to see that a higher efficiency means a lower cost per peak kilowatt, which adds a small economic piece to this choice. The negatives that are presented for each method could also sway the participant’s decision to choose an option other than what they thought they initially wanted. Once they choose the correct amount of power production methods, they cross off the corresponding number of light bulbs for each method, on their decision sheet, found in Appendix I2, and write down the number of light bulbs they crossed off. During the trail, a CERES guide, as well as a written instruction on the decision board, will state that the participants cannot pick the same power production method more than once.

## 5.2 Future scenarios

The facts from Chapter 2 as well as other information from the IPCC 5<sup>th</sup> Report allowed us to create future scenarios based on the most recent projections for climate change (IPCC 5<sup>th</sup> Report for 2030 and 2070). We estimated future projections for the year 2050 and have a range of five futures, from best-case to worst-case scenario. The futures are numbered one to five, with one being the best-case scenario and five being the worst-case scenario. Visual representations of the data for each future can be seen in Table 17.

Shane French commented on our initial proposed scenarios that the row we had in the table regarding the life expectancy for people in the year 2050 was confusing to understand. Life expectancy for a year has various definitions. For example in 2050, you would have a different life expectancy if you were 20 years old in 2050, 80 years old in 2050, or born in 2050. Instead, Shane suggested adding in aspects regarding the estimated population size and waste produced (in tonnes per year) for each of the scenarios. He felt that those two concepts would appeal more towards the participants in the 2050 Trail.

Therefore, after talking with Shane French, the five topics we chose to directly incorporate into the futures were:

- Energy Resources
- Temperature Rise
- Population
- Sea-Level Rise
- Waste (tonnes/ year)

**Table 17. Future Scenarios Corresponding Facts and Visuals**

Futures →	1 (20 or less)	2 (21-40)	3 (41-60)	4 (61-80)	5 (81 or more)
Topics ↓					
<b>Energy Resources</b>	80% Renewable  20% Non-Renewable	70% Renewable  30% Non-Renewable	60% Renewable  40% Non-Renewable	40% Renewable  60% Non-Renewable	20% Renewable  80% Non-Renewable
<b>Temperature Rise</b>	 1.4°C	 1.8625°C	 2.325°C	 2.7875°C	 3.25°C
<b>Population</b>	31 Million	34 Million	37 Million	40 Million	43 Million
<b>Sea-Level Rise</b>	 0.385m	 0.4773m	 0.5695m	 0.668m	 0.754m
<b>Waste (tonnes/year)</b>	23.1 Million	26.9 Million	30.9 Million	35.3 Million	40 Million

If the participants add up all of their scores after converting the icons to points, as described by the CERES teacher, and end up at the following ranges, then that is the future they obtained:

- Score of 20 or less is Future 1
- Score of 21-40 is Future 2
- Score of 41-60 is Future 3
- Score of 61-80 is Future 4
- Score of 81 or more is Future 5

Along with detailed drawings of the future scenarios there are scenario descriptions that are factual details of the environment based off of the rise in temperature for each case. In the description table, found in Appendix I3, there is also a “Population Description” column and a “Sea Level Rise Overall Impacts” column that give details regarding population changes in Australia and the effects of increased water levels, respectively.

The next chapter will go into more detail about the lesson plan that CERES teachers should refer to and the actual infrastructure design for the 2050 Trail, based on feedback, recommendations, and findings from Chapter 4 and literature review from Chapter 2.

## **6 Final Australia 2050 Trail Design**

After finalizing the decisions and the future scenarios, we renovated the layout of the Australia 2030 Trail for the Australia 2050 Trail and proposed it to CERES. Along with a new trail design we created a lesson plan that CERES teachers can follow while moderating the excursion. The new layout and lesson plan are further discussed in the following sections.

### **6.1 Lesson plan for CERES teachers to moderate the Australia 2050 Trail**

In order for the CERES teachers to have more effectiveness while moderating the Australia 2050 trail with the different student's age groups and visitors, a lesson plan was created. This lesson plan consists of a number of suggested steps in order to moderate the trail in a direct, engaging, and entertaining way. As mentioned previously in our findings in Chapter 4, in section 4.1.11, CERES teachers preferred not to have a structured step-by-step procedure to follow. This lesson plan is a suggested guide in order for all students to grasp the same idea of lifestyle decisions and their importance in the future, but is not a mandatory guide to moderate the trail. This suggested way was created based on the importance and the need for a CERES teacher to moderate the trail, especially with late primary schools students (Finding 4.1.11).

The lesson plan includes details that the teachers can follow to outline how they will teach the excursion. First it explains the key messages that the trail is trying to convey to visitors, such as sustainable consumption. Then it includes the specific details about the materials the participants will need to complete the trail. The rest of the guidelines include details and topics the teachers should cover for each part of the trail (i.e. the prelude, Decision 1, Decision 2, etc.) Then it concludes with questions the CERES teacher can leave the visitors with to allow them to reflect on how sustainable their lives are and will be. The lesson plan can be found in Appendix I2.

### **6.2 General layout of the trail**

Our design of the general trail layout was informed by our findings to ensure we were developing the most effective trail. Some findings were regarding how to make the trail more interactive and others, how to display data in the best way using all of CERES' features. From

specific findings were we able to construct a more effective and educational layout for the Australia 2050 Trail. This section will describe the design of the 2050 Trail. In order to come up with the best space usage, we concluded that it would be a good idea to have the trail like a backbone of CERES (Finding 4.1.9). Together with the literature review addressed in Chapter 2, we designed the trail incorporating the Kolb's Experience Learning Cycle where concrete experience, reflective observation, abstract conceptualization and active experimentation are put into practice in the prelude, decisions and futures. We created a diorama of the Australia 2050 Trail with very similar dimensions as for the space the trail is suggested to be located, shown in Figure 30.



Figure 30. Trail layout

### 6.2.1 Entrance and Prelude

At the beginning of the trail, we incorporated a colorful and appealing entrance combined with a short title followed by a “catchy” descriptive subtitle (Findings 4.1.8 and 4.2.1). We incorporated a detailed map and instructions in order to help visitors be self-guided in the excursion (Finding 4.2.1). Before visitors start making decisions and taking part of the trail, we found that incorporating the idea of a prelude gave the visitors a reference point for the future. The prelude will address key important facts on how the world was before present day and how has it led to where we are now to put environmental change into perspective.

Decisions 1 through 5 were displayed in the most interactive and educational way possible in order to engage students and visitors in the excursion, as explained in the following subsections.

### 6.2.1.1 Prelude layout

For the prelude design, there are three different boards displayed in a zigzag pattern before the decisions boards. Following this layout will allow students to observe, in detail, background information rather than just beginning with the decisions of the trail. Each board will address different aspects and information about the past, beginning in the year 1930, going to 1960, then 1990, followed by 2000, and ending up in the present day. Colorful, bullet point, graphic data, and charts will display information about Australia's environments and its history with the purpose of communicating and informing the changes in society and the environment throughout the years. We decided to include visual aid information in this section because we want students and visitors to have a quick peek of the historical information, but not spend too much time on the details. People get bored with wordy long data (Finding 4.3.2), so we aimed to capture the attention of the public by limiting words and incorporating key aspect such as population, sea level rise, waste etc. The layout of the three boards of the prelude is shown in Figure 31.



Figure 31. Layout of prelude boards

### 6.2.1.2 Decision 1 layout

In order to show Decision 1, “Where will you live?” a four-sided standing board was designed to display the options. This board showed them the four areas of the country they might choose and the type of house they will want to live in. Each side of the standing board has a drawing of a place (such as the city) and the different types of houses they are able to find there. On the bottom of the board we designed the scoring scheme of icons attributed to the different type of homes in order for visitors to write on their decision sheet. We included lots of colors in the drawings of the different place scenarios because students, teachers, and the public mentioned the lack of color made the 2030 Trail vague and uninteresting (Finding 4.1.8). We also decided to incorporate a legend on the back of the four sides, where we described the type of houses and places in order for visitors not to be confused. For example, the visitors might wonder, “What is a big house?” We had to make this description explicit due to the fact that the parameters for a big or small house might vary among people. We took this into consideration after the first evaluation of the decisions when we presented them to Shane French. The proposed layout for Decision 1 is shown in Figure 32.



Figure 32. Decision board 1

### 6.2.1.3 Decision 2 layout

For Decision 2, “What goods will you buy?” we decided to implement a three-sided board with a collage of choices. After finding that students learn best by hands on experience (Findings 4.2.2 and 4.3.3), we displayed goods and technologies in such a way that students can



actually feel each object in the model. For the full-sized trail, old appliances such as microwave oven doors, unusable TVs screens and old cellphones can be stuck onto the boards using cement. On the three-sided decision board and below each appliance we attributed an icon together with a kWh number that each appliance consumes on average. If appliances were not displayed, we tried to include colorful drawings of real size appliance so everything will be proportioned. We tried to incorporate as much of a realistic effect because visitors feel more attracted to real objects (Finding 4.2.1). The design on Decision 2 also considered the importance of 3-D objects. This is because institutions such as the museums try to show emphasis and importance of an object through 3-D display (Findings 4.2.1 and 4.2.2). The proposed layout for Decision 2 is shown in Figure 33.



Figure 33. Decision board 2

#### 6.2.1.4 Decision 3 layout

To display Decision 3, “How will you get around?” we combined the approaches from Decisions 1 and 2. We incorporated a collage of different transport mediums sticking out of the three-sided board from a city scene. On the left hand side, a description legend was included in order to show limitations of transport medium due to the location of the house. On the two other sides, pieces of the medium of transport stuck out while they were displayed in a city scenario atmosphere. The collage with 3-D and tactile items approach was implemented into the trail according to Findings 4.1.8, 4.2.1 and 4.2.2. Each method of transport has a corresponding



bubble with the scoring icon attributed in the collage. This icon can also be found in the legend. The proposed layout for Decision 3 is shown in Figure 34.

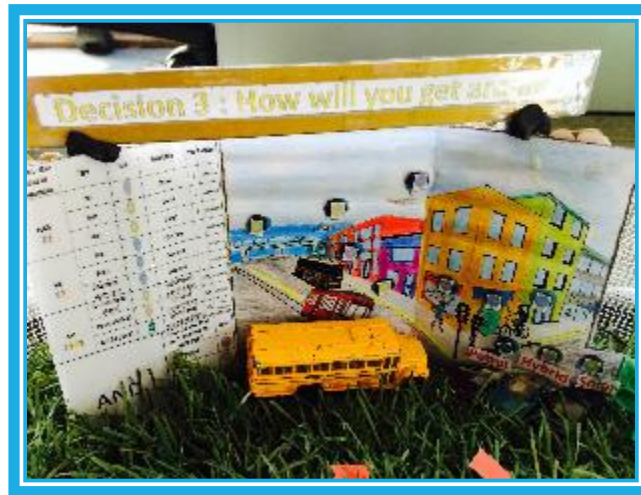


Figure 34. Decision board 3

#### 6.2.1.5 Decision 4 layout

For the display of Decision 4, “What foods do you plan to eat?” we referred to Finding 4.2.1. Since infrastructure plays a key role on engaging visitors, we designed this decision board in the form of a basket. The intention was to simulate visitors with visual content of realistic features (Findings 4.1.6 and 4.2.1). The main design consisted of making students “walk into a basket of groceries” as if they were a “product.” Then they would pick how much packaged or locally produced food they will buy and how much animal derived products they will eat. We incorporated pictures of oversized packages and locally produced groceries for our diorama. Then we decreased or increased the pictures in size in order to have it as a scale where students could pick all locally produced products on the left, five different ranges in the middle, and all packaged products all the way on the right side. To visualize animal derived products, we incorporated colorful drawings with different amounts of animal based products in an ascending order from left to right. We also labeled them from never eating animal based products, to always eating animal based products, categorizing them into seven different values. On both decisions, below each object, an icon was placed with a description of the drawing or grocery basket and what each choice represents. The proposed layout for Decision 4 is shown in Figure 35.



Figure 35. Decision board 4

#### 6.2.1.6 Decision 5 layout

Incorporating economic, social, and environmental practices into Decision 5, “How will you power your life?” made this decision’s design the most difficult part of the layout of this model. To address the importance of renewable vs. non-renewable resources of energy production, we designed a four-sided board. One of the middle boards displayed the energy types with corresponding icons. On the right side of the board, as shown in Figure 36, non-renewable methods of energy production were displayed. In order to spike the visitor’s curiosity, we included a title, *Look at your energy*. This title informed the visitors that there were tangible materials of the types of energy they can choose, such as coal. This allowed students to feel, play and engage in a hands-on experience. We then designed the other middle board, renewable energy resources, with the same title, *Look at your energy*, and three different viewing scopes based on Findings 4.2.1 and 4.2.2. Here we wanted to utilize CERES’ current infrastructure such as the solar panels, biogas house and wind turbine to show visitors different methods of energy production in action by looking through these scopes. We found in our results that students learn best with hands-on experiences (Finding 4.3.3) and from the literature review in Chapter 2. The proposed layout for Decision 5 is shown in Figure 36.



Figure 36. Decision board 5

## 6.2.2 Futures Scenarios

The updated future scenarios were created based on the literature review from Chapter 2 and the IPCC's 5<sup>th</sup> Report. The five future scenario drawings all consist of the same landscape scene, but differ in the amount of trash, the population, types of energy resources being used and animal habitation. The scenarios also include detailed charts and statistics of the future environment for the visitor to read about. Finally, on the back of the future boards we included a detailed description of the environment in the particular future. We limited the number of scenarios to five because 2030 Trail participants thought that there were too many similar futures (Finding 4.1.6).

The layout of the futures was designed so that the participant has to walk into the future that is determined by their series of lifestyle decisions. The future scenario boards are laid out in a circle shape, with each future displayed on a curved board, as seen in Figure 37. This layout allows for the participant to be surrounded by their future environment and engaged in what it would feel like to live there.

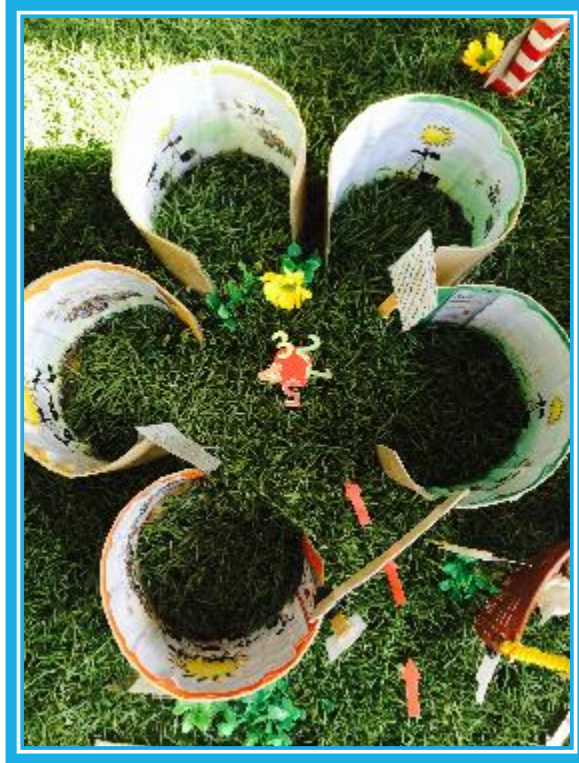


Figure 37. Future scenario layout

## **7 Recommendations and Conclusions**

This chapter provides recommendations to continue the implementation of the Australia 2050 Trail and further validate the design and information of the new excursion. Due to time constraints, budget limitations and insufficient resources, we were unable to implement all of the desired improvements for the Australia 2050 Trail design. We believe that the suggestions for improvements in our results are feasible to incorporate into the design in the near future. The recommendations will help CERES raise awareness about the impacts of people's lifestyle choices on the future environment.

### **7.1 Recommendations about the layout and implementation of the Australia 2050 Trail**

**We recommend that the Australia 2050 Trail be evaluated to validate the information and ensure the design works properly.**

The current Australia 2030 Trail's information is grossly out-of-date and the trail's layout is dated as well. For this reason, we conducted background research and interviewed numerous relative parties to get updated information for the year 2050 and find out how to implement current teaching techniques. Most of the updated information that we included in our decisions and future scenarios came from the IPCC 5<sup>th</sup> Assessment Report and related environmental sources. Yet, due to time limitation, we were only able to assess the accuracy of the information by asking one CERES staff member. Also because of time constraints, minimal budget, and few resources, we were unable to test our renovated trail design.

Thus, the information used in the design of the 2050 trail should be further validated. Finding 4.1.2 stated that in order for the trail to be an effective teaching tool for sustainability in the future, the information must be updated. This finding was addressed and the trail was improved to the best of our knowledge, but we were unable to go back to the visitors who stated the information was out-of-date and ask them their opinions on the new information. This analysis can be completed by conducting focus groups with students and teachers who have previously participated in the Australia 2030 Trail and after the Australia 2050 Trail has been

presented to them. Also conducting interviews with schoolteachers, general public visitors and CERES teachers and asking for them to compare the new trail from the old will provide future researchers with a feasibility check.

Since the decisions and future scenarios based on the IPCC 5<sup>th</sup> Assessment Report, and most of the information was for the years 2030 and 2070, we had to average the ranges. Therefore, by contacting the lead authors of Chapter 25: Australasia in the IPCC 5<sup>th</sup> Report and asking for their feedback on the validity of the information, CERES can stand by the Australia 2050 Trail with confidence of having the most up-to-date, accurate data.

The 2030 Trail has poor exhibit infrastructure (Finding 4.1.7). We found that integrating the layout of the trail throughout the park by including other park exhibits in the trail would engage visitors with real life sustainable practices. Yet this new design had not been tested; therefore visitors should be presented with the new trail and asked to participate in it to ensure that it works properly.

**We recommend that CERES test two types of trails with different complexities of information being presented to ensure a variety of age groups can participate in the excursion.**

In addition to recommending that future researchers validate the new information and analysis the design of the new trail, we would also like to suggest the Australia 2050 Trail have two sets of information that is to be displayed on flip boards. CERES wants the trail to appeal to a wide range of ages, so having just one set of information might be too complex for some yet too simple for other visitors. Displaying two levels of complexity in data would engage a wider range of ages and make sure that everyone who participates is educated to the fullest.

CERES teachers use flexibility in their presentation of the trail and do not always use the same procedure because different groups of students require different teaching methods (Finding 4.1.12). This supports the idea of providing the CERES teachers with two types of information to use. Findings 4.1.7 and 4.1.12, stated the idea of having a trail with boards that have the ability to be turned, revealing either more complex or simpler information, depending on the participating group. We are confident that with additional research on how to simplify educational material,

future researchers would be able to easily add another set of decisions and future scenarios to the backside of a rotating bulletin board.

Late primary students enjoyed the Australia 2030 Trail the most (Finding 4.1.10); therefore our focus for updating information was to pertain to the education level of year eight and nine students. However, CERES ultimately wants the Australia 2050 Trail to be able to be completed by anyone who visits the community environment park. So, if future researchers invested time in researching the implementation of rotating bulletin boards and separated information into two different education levels, this goal could be achieved.

Because only one CERES teacher suggested this method of expanding the information complexity, this method of flip boards poses a limitation to this recommendation. There could be another way to implement the layout design of information for younger visitors and information for older visitors. Therefore this limitation can be addressed with an alternative recommendation that includes research into how to present information to a variety of education and age levels.

**We recommend that CERES build the Australia 2050 Trail as soon as evaluations are performed and changes are made.**

Along with recommending that there be a type of trail with dual flip-boards, we would also recommend that the researchers begin to build the Australia 2050 Trail at the community park, as soon as evaluations are performed and changes are made. Every day that the new trail is not put into action, is another day where visitors are learning about information that will not enable them to live sustainable lives.

As previously mentioned in Chapter 2, section 2.3.2, Stanford University states that to raise awareness and convince people to make lifestyles changes, they must be presented with the future challenges they are going to face (Jewett, 2011). If CERES wants to continue their overall goal of raising visitors' awareness of sustainability, future researchers must implement updated scenarios that the visitors will face. We recommend building the new excursion in a timely manner to ensure the return of schools and visitors.



A glaring limitation that could pose a setback for this recommendation would be insufficient funds for supplies to build the Australia 2050 Trail. Because a majority of the background research and information that would be used is already complete, time would not necessarily be a limitation. However time could be a limitation if there are any setbacks in the analysis of information and design.

## **7.2 Recommendations about further research and adding features to the trail**

### **We recommend that CERES update information included in the excursion prelude.**

Visitors who participate in the 2030 Trail, mainly students, are first introduced to the excursion by the CERES teachers with thought provoking questions and discussions about what their lives will be like in the year 2030. This helps the participants understand what the trail is going to show them, but it does not put in perspective the environmental changes that have occurred in the past to cause the need for change in lifestyles. Therefore, in the Australia 2050 Trail design, we have included a prelude to the trail that the visitors would walk through. In this prelude there would be information about environmental changes, such as the average temperature in the 1930s, 1960s, 1990s, 2000s, and now.

For this reason, we are strongly recommending that future IQP projects involve researching data of the environment in Australia from the 1930s to present day. They should research historical data that shows the rapid changes in the environment up until present day. Finding 4.2.1 presented ways in which museums attract visitors' attention at exhibits. Although museums typically present historical information throughout their exhibits, we believed that a prelude would give the visitors a perspective of how rapid the environment is changing.

The layout of the prelude is included in our final design of the trail in Chapter 6. Yet due to time limitations we were unable to complete additional research in the literature review of historical environmental changes. If this research is completed, CERES can implement the prelude into the Australia 2050 Trail and replace the introduction from the CERES teachers with it. Our background research also suggests that because of recent human activity, the environment is changing more rapidly and if people are not made aware of the significance, our environment will be unsustainable by 2050.



**We recommend that CERES investigate the use and maintenance of outdoor, interactive media in the Australia 2050 Trail.**

Not only do we recommend further research of information that should be added to the trail, but we would also like to recommend researching the use and maintenance of outdoor, interactive media. Because the Australia 2050 Trail is an outdoor excursion, the use of interactive media in the trail must be able to withstand the weather conditions.

Finding 4.2.1 supported that more interactive media, like speakers, need to be implemented in order to engage visitors throughout the trail. It describes that students learn best through auditory and tactile senses. This background knowledge provided us with the basis for implementing sounds into the future scenarios so that the visitors can get a better idea of what their future will be like. Also Finding 4.2.1 is an overview of how museums incorporate tactile buttons to trigger sound effects that makes the exhibit engaging and fun. In the Melbourne Museum, an exhibit used sounds of aboriginal languages to engage passing visitors and to add fun and interest to the exhibit. So to retain visitors' attention throughout the trail, we recommend adding outdoor, interactive media to narrate and give examples of what would be heard in the future environment.

In the section 2.3 Sustainability Education, sources explain that one of the best ways to educate is through envisioning the futures. By adding sounds to the trail, visitors will be able to better understand the environmental conditions of their future scenarios.

However, implementing speakers into an outdoor excursion requires further research into what kinds of speakers need to be used. Also, since CERES is a small organization with little funding, the maintenance of this interactive media needs to be minimal and inexpensive. Therefore we recommend investigating what kinds of speakers are available on the market and what would be feasible for CERES to invest in for the Australia 2050 Trail.

As previously mentioned, budget constraints are always a factor when trying to implement additional technological features into the excursion. Therefore, implementing the speakers into the trail poses a limitation on our recommendation of further research into outdoor, interactive media.

**We recommend that CERES use QR codes to further visitors' knowledge of sustainability.**

Along with interactive media research to implement into the Australia 2050 Trail, we also recommend that future researchers implement the use of a BlogSpot page for QR codes to enhance the visitors' knowledge of sustainability. The 2050 Trail is intended to take a visitor about 50 minutes to complete; therefore most of the information displayed is generalized and just a brief overview of sustainability. Hence, we recommend adding a supplementary source for more in depth details about sustainability and sustainable practices.

From working at CERES for seven weeks, we have come to realize that most people who visit the community park are dedicated environmentalists and are serious about raising awareness about sustainability. This supports our understanding that it is visitors like these who would want extra information about what they could do to help the future environment.

Finding 4.1.3 presented the feedback from the focus groups with students, which discusses how students would like to see more options for lifestyle decisions. Because of time constraints and the endless possibilities of everything that could be added, we recommend adding the QR code system to further the students' knowledge of all the possibilities of leading a sustainable life. This also goes with Finding 4.3.3, which stated that students learn better through hands-on experience. In this finding, we presented the feedback we got from focus groups with year nine students where they suggested adding touch screen devices to interact with their future. This poses a limitation because CERES is an environmental park and does not focus on technological advancements. For that reason, we recommend adding a BlogSpot for students to visit through a QR code scan to continue their interaction with their future scenario.

Through our research, we found that students do not learn the same as they did fifteen years ago. Also, technology is being used more and more to attract students and retain their engagement in educational activities. Our recommendation is a simple addition to the trail that does not require building or additional technology devices for CERES to invest in. The students' mobile devices can support this QR code implementation and the only addition would be a BlogSpot, which future researchers could create for CERES.

**We recommend that CERES create a logbook for visitors to sign and acknowledge their intent to change lifestyle choices after completing the excursion.**

Actions speak louder than words and for the most part, after participating in the current 2030 Trail, people are made aware of their unsustainable practices. We would like to see CERES cause people to make changes to their lifestyles and come back to reflect on those changes. This leads us to our final recommendation of creating a logbook for visitors to sign and write what they will change in their lifestyles to help create a sustainable future. By writing down what they pledge to do differently, CERES would be creating accountability for visitors to hold. This logbook also allows for returning visitors to reflect on what they wrote and if they have followed their sustainability pledge.

Although this recommendation does not relate directly to updating and implementing the Australia 2050 Trail further, we feel it is necessary to work towards CERES overall goal. This overall goal is about raising visitors' awareness about how their lifestyle decisions today effect Australia's future environment. We feel that the lack of follow-up and accountability with visitors is hindering CERES' opportunity to ensure they are helping to create a sustainable future for Australia.

### **7.3 Final remarks**

This project addressed the issue of raising awareness about how people's lifestyles decisions effect the future environment of Australia. CERES, Centre for Education and Research in Environmental Strategies, is a community environment park that offers programs to educate visitors about sustainability. The current Australia 2030 Trail is just one sustainability excursion at CERES, and it is grossly out-of-date for today's visitors and is in desperate need for reinventing. To address this issue, CERES asked us to update the information from the current Australia 2030 Trail and renovate the trail to develop a design for an Australia 2050 Trail.

We worked to update the information from the current Australia 2030 Trail for an Australia 2050 Trail, along with redesigning the trail's layout to engage and educate visitors more effectively. A literature review of drivers of climate change and sustainability education was conducted to determine what information would be used in the reinvented trail and what

new education methods should be added to features for a more effective experience. We developed interview, focus group and survey protocols to gather opinions of the current Australia 2030 Trail and suggestions for current methods of teaching. By conducting focus groups and interviews, and sending out surveys, we were able to assess the 2030 Trail and reinvent it into the Australia 2050 Trail.

The final deliverable produced assisted CERES in raising awareness about the effect of the implications our decisions we make today have on the future environment. Although it is important to present CERES visitors with the possibly frightening projections of Australia's future, we chose to emphasize that a sustainable future is about the choices we make. By raising awareness about sustainability, we hope people will embrace the power to create a sustainable environment and make changes in their lives. We hope that by leaving CERES visitors with this message, they will take actions to mitigate climate change and take the steps towards living more sustainably.

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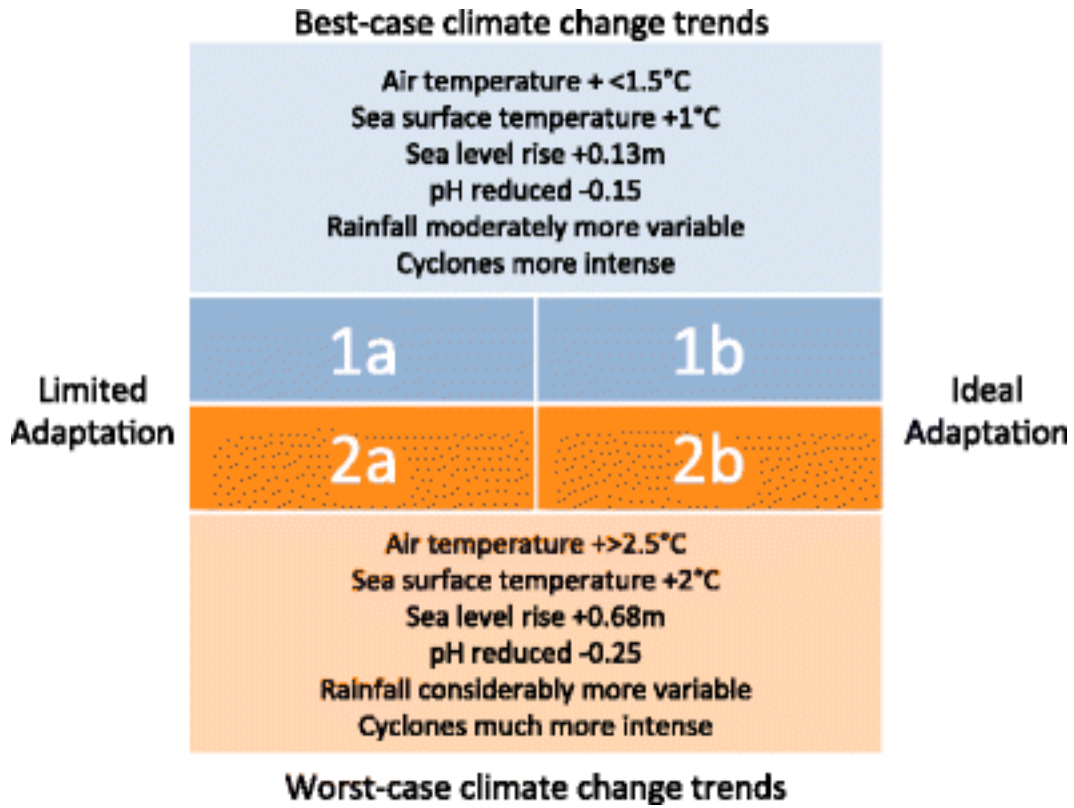
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**Appendix A- Background Research**

<b>A1</b>	Climate Change Trends
<b>A2</b>	Australian Demographic Statistics
<b>A3</b>	Commonly Held Visions of the Future



## A1- Climate Change Trends



A1 Climate change Trends



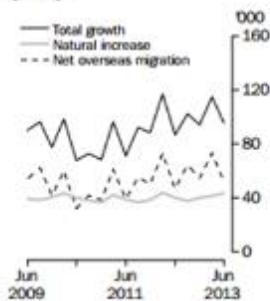
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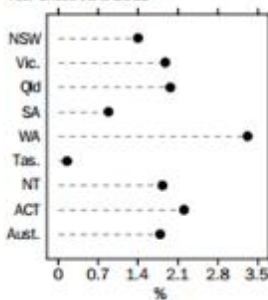
# AUSTRALIAN DEMOGRAPHIC STATISTICS

EMBARGO: 11.30AM (CANBERRA TIME) TUES 17 DEC 2013

**Population growth**  
Quarterly



**Population Growth Rate**  
Year ended June 2013



## INQUIRIES

For further information about these and related statistics, contact the National Information and Referral Service on 1300 135 070 or Michael Giampietro on Canberra (02) 6252 5640.

[www.abs.gov.au](http://www.abs.gov.au)

## KEY FIGURES

### PRELIMINARY DATA

	Population at end Jun qtr 2013 '000	Change over previous year '000	Change over previous year %
New South Wales	7 407.7	102.2	1.4
Victoria	5 737.6	106.0	1.9
Queensland	4 658.6	89.9	2.0
South Australia	1 670.8	14.6	0.9
Western Australia	2 517.2	81.0	3.3
Tasmania	513.0	0.8	0.2
Northern Territory	239.5	4.3	1.8
Australian Capital Territory	383.4	8.3	2.2
<b>Australia(a)</b>	<b>23 130.9</b>	<b>407.0</b>	<b>1.8</b>

(a) Includes Other Territories comprising Jervis Bay Territory, Christmas Island and the Cocos (Keeling) Islands.

## KEY POINTS

### ESTIMATED RESIDENT POPULATION

- The preliminary estimated resident population (ERP) of Australia at 30 June 2013 was 23,130,900 people. This reflects an increase of 407,000 people since 30 June 2012 and 95,700 people since 31 March 2013.
- The preliminary estimates of natural increase recorded for the year ended 30 June 2013 (162,700 people) was 2.4%, or 3,800 people, higher than the natural increase recorded for the year ended 30 June 2012 (158,800 people).
- The preliminary estimates of net overseas migration (NOM) recorded for the year ended 30 June 2013 (244,400 people) was 8.6%, or 19,300 people, higher than the net overseas migration recorded for the year ended 30 June 2012 (225,100 people).

### POPULATION GROWTH RATES

- Australia's population grew by 1.8% during the year ended 30 June 2013.
- Natural increase and net overseas migration contributed 40% and 60% respectively to total population growth for the year ended 30 June 2013.
- All states and territories recorded positive population growth in the year ended 30 June 2013. Western Australia continued to record the fastest growth rate of all states and territories at 3.3%. Tasmania recorded the slowest growth rate at 0.2%.

### **A3- Commonly Held Visions of the Future**

## **FIVE SKETCHES – COMMONLY HELD VISIONS OF THE FUTURE(UNESCO, 2010)**

### **Business as usual**

This vision is held by those who argue that the future will be very much like today. In other words, there will be the usual alarms and excursions, but nothing that cannot be effectively dealt with. The main problems in the future will be similar to those of today and solvable in similar ways; in short, the world will go on much as it has done before.

### **Edge of disaster**

This vision is held by those who believe that we are on the verge of one or more major catastrophes, the signs which are already clearly evident. They range from accidental nuclear war, major famine and poverty, breakdown of law and order, to environmental pollution and global warming. Life as we know it is on the verge of breakdown and when various elements collapse it will never be the same again.

### **Authoritarian control**

This vision is held by those who feel that the risk of disaster is so great that the best solution is imposition of some form of strict external authority. Only this will be able to prevent major disorder by controlling, for example, population growth or the use of increasingly scarce resources. In this way chaos and confrontation, whether national or international, can be avoided.

### **Technological miracles**

This vision is held by those who believe that the answer to most problems lies in the accelerated growth of science and technology. Thus, nuclear energy, computerisation, genetic engineering, lunar colonisation, are all seen as offering dramatic rewards, especially for business.

### **Sustainable society**

This vision is held by those who believe that the future must involve a major change in direction, away from a mechanistic and fragmented view of the world to a more holistic and ecological one. It requires a major shift away from the technical and economic goals towards a more humane, and sustainable society.

## ANALYSING YOUR FUTURES

What elements of the five visions of the future are in your Probable and Preferable Futures?

- Look at the trends you marked on your Probable Futures Timeline. Identify ('guess-timate') the % of each vision in your Probable Future. Type these %s in the Probable Futures column in the table below, making sure that the total across the five visions adds up to 100%.
- Repeat this exercise for your Preferable Future.

<b>Visions of the Future for &lt;your name&gt;</b>	
<b>My Probable Future</b>	<b>My Preferable Future</b>
1. Business as Usual%	1. Business as Usual%
2. Edge of Disaster%	2. Edge of Disaster%
3. Authoritarian Control%	3. Authoritarian Control %
4. Technological Miracles%	4. Technological Miracles%
5. Sustainable Society%	5. Sustainable Society%

## Appendix B- Australia 2030 Trail

### Australia 2030 Trail (YEARS 7 - 10)

#### Program(s) & focus:

- Sustainability Program
- Global Warming Program

#### Key messages:

- Sustainable consumption
- Identifying connections between lifestyle choices and social and environmental futures
- Current impacts of climate change
- Interrelationships, change
- What can you do

#### Equipment:

- 2030 Trail Sheets for 7-12 **\*Students should have copies, please use these where possible\***
- Spare sheets can be found in the energy classroom filing cabinet. Please let the energy senior teacher or coordinator know if you use these so they can be re-printed.
- Spare pens/pencils (sharpen pencils for set-up)

#### Process / Content:

##### **Part 1: Introduction**

- **A)** We are going into the future to the year 2030. How old will you be in 2030?
- **B)** Some kind of guided visualisation into the future, Techniques vary, e.g. asking students to close their eyes and imagine themselves at the age of \_\_ , in the year 2030. What will you be doing at that age?

- C) Students share their thoughts on their lives/jobs/houses/families etc. Use these responses to link into an introduction the idea of resource use. What do we mean by ‘resources’? Fossil Fuels, materials for living, etc, where do we get our resources and what are some of the impacts or using them?

## Part 2: Doing the Trail

- **Explain trail & handout**, using Decision 1 as an example. Read out each option etc. tell students you will meet them all at Decision 4. \*\*If you do not think your group cannot handle this freedom, do all decisions as a group.
- **Decision 4:** With your whole group, clearly explain the multiple options and check that students are adding as many choices as they like, and adding them together. This board is a good opportunity to compare bikes and rally cars –how are more resources used etc., link between resource use and higher points.

**You could do the 1<sup>st</sup> population question here** (how many children?) if you are short for time or have a rowdy group.

- **Decision 6:** Do this decision as a group. The assumption here is that people who immigrate to Australia adopt the ‘Australian’ lifestyle. It’s important to **explain the immigration question** as a group. Start with a definition of ‘immigration’. Ask the students if they know anyone who has immigrated e.g. parents, grandparents (all of us have immigration in our family unless we have Aboriginal heritage). An example of policy 1 could be the Australian govt. immigration policy in the 1950’s where European/English immigrants were paid to come to Australia to boost our post-war workforce. **A definition of ‘refugees’ is also important – people seeking refuge. Why would they leave their country?** Can extend this by discussing: - Responsibilities as global citizens -Environmental refugees affected by climate change. -Population growth and effects on economy etc.
- **Future letter board: A)** Draw students’ attention to the Summary on their sheets and **what you expect them to write/think about for the discussion**. A good tactic is standing in front of the future letter table while pointing out the questions at the bottom of the sheet! They could look at some of the other futures when they have completed their questions to compare.
- **B)** Explain how to obtain their Future Letter. Could choose a student to use their total scores as an example.

## Part 3: Discussion

There are many ways to facilitate this discussion and the focus will vary depending on the group, what you want to focus on and the program being undertaken (sustainability, energy, etc). Try to focus on 2 or 3 key points first, and then you can build a more developed discussion. Some Suggestions:

- Bring students back to the circle & begin discussion by summarising the different futures of the class – this can be done by asking students to stand in a ‘human graph’ showing a progression of who got what future, or just by a show of hands as the teacher calls out each future.
- Ask students to sit on one side of the circle if they mostly liked their future, and on the other side if they did not.

Many discussion topics may stem from this:

Topic	Questions	Discussion pointers	Connections
Sustainability	<p>What does ‘sustainable’ mean?</p> <p>Why is sustainability important for our future?</p> <p>Did you think your future was sustainable?</p> <p>What choices could you change to ensure a sustainable future?</p>	<p><b>-Define sustainability</b> – How we live now so that our planet and people have a healthy future.</p> <p>-Embodied Energy of products</p>	
<p>Wealth/Poverty</p> <p>Distribution of resources</p> <p>Crime</p> <p>Stress Levels</p>	<p>How long was the social security line in your future? If average income increased, how do we work out an average? Does that mean you will definitely earn a lot of money?</p> <p>How does money guarantee happiness?</p> <p>How much crime was there?</p> <p>Why would crime rates increase?</p> <p>How might these things be Related to your decisions?</p>	<p><b>-Currently 80% of the world’s resources consumed by 20% of the population</b> – you can ‘divide up the chocolate cake’ among the class to illustrate this stat</p> <p>-May have money, but life may be more expensive with so many enviro problems.</p>	<p>Link between resource distribution/availability and social issues - <b>what happens when there are not enough resources to go around?</b></p> <p>Conflict, health issues, environmental issues</p>

	What are the most important things in life?		
Population	<p>When does population increase/decrease?</p> <p>How might population levels affect our community, pollution, wealth/poverty, and crime?</p>	<p>-How many children you choose to have – 2=replacement, 3+ = growth</p> <p>-Not enough people, no population growth</p> <p>-Importance of Immigration</p>	<p>-More people living unsustainably = more need for resources = less resources to go around... this links back to social issues</p>
Environment	<p>What did the environment look like in your future?</p> <p>Sea level rises? Atmosphere? Ozone Layer? Global warming?</p> <p><b>How did your decisions affect the environment?</b></p>	<p>Deforestation, loss of natural diversity, water availability, global warming</p> <p><b>-Use questions from boards/sheet to link resource use with environmental impacts</b></p>	<p>Who chose a really big house and did not have a healthy environment in your future?</p> <p>What is the connection here?</p>
Pollution	<p>What is pollution caused by?</p> <p>How is pollution related to population?</p> <p>Will your big house be any good to you if there's no clean air to breathe?</p>	<p>Solutions: -Green Power, Renewable energies, changing energy use</p>	<p>Who chose a big car, or three cars, or a sports car and also had lots of pollution in your future?</p> <p>What is the connection here?</p>

NB: Many students seem to confuse 'average age' with 'life expectancy' so this may need clarifying

Australia 2030 Trail (YEARS 7 - 10) cont.

Wrap Up:



Many of these decisions they made on the 2030 Trail are decisions they will make in the future, therefore it's important that you 'bring it back to their level' and **leave students with take-home messages** that they can begin doing immediately. Reiterate key points you focused on/students discussed. This can be done with key questions\*.

Suggestions:

- **Do we know for sure how the future will turn out?**
- **What are the connections between our choices and our future?**
- **How can we change our decisions to achieve a better future?**
- **What can we do today/this week to achieve a more positive future? e.g:**

Transport – e.g. small car/no car, riding bikes/walking, public transport, car pooling

Housing – e.g. Switch to 'green energy', use less energy at home, shorter showers (can link with EcoHouse activities)

Energy & resources use – e.g. 4 R's, sustainable consumption, buying local products

... and recap the connections between these changes and better or more sustainable futures

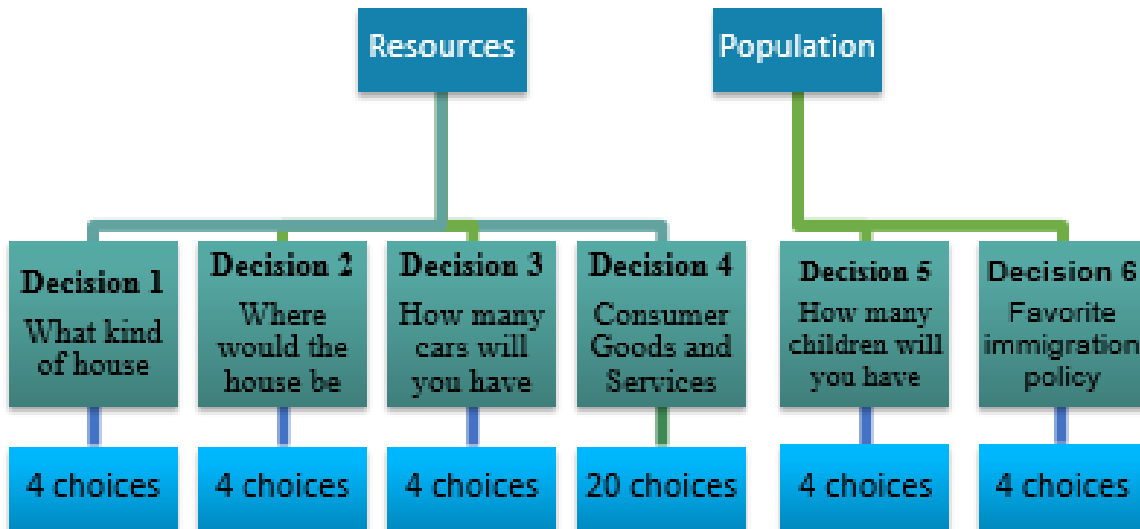
- **Why is it important to think carefully before we make decisions?**
- **Why is it important to think about the impact of our choices before we make them?**
- **What things in our life make it hard to make different decisions to everyone else? Eg. media messages, peer pressure, consuming 'stuff' –iPods, changing fashions etc.**

\*If students are not forthcoming in a whole-class discussion, encourage small group discussion of key questions and ask the group to share their ideas eg. students' discuss in pairs what they could do TODAY to impact more positively on the future, then go around the group and get one idea from each pair.

Extension: If you have an hour session, after completing your discussion, send your group through the trail again to see the changes to their future with different decisions.

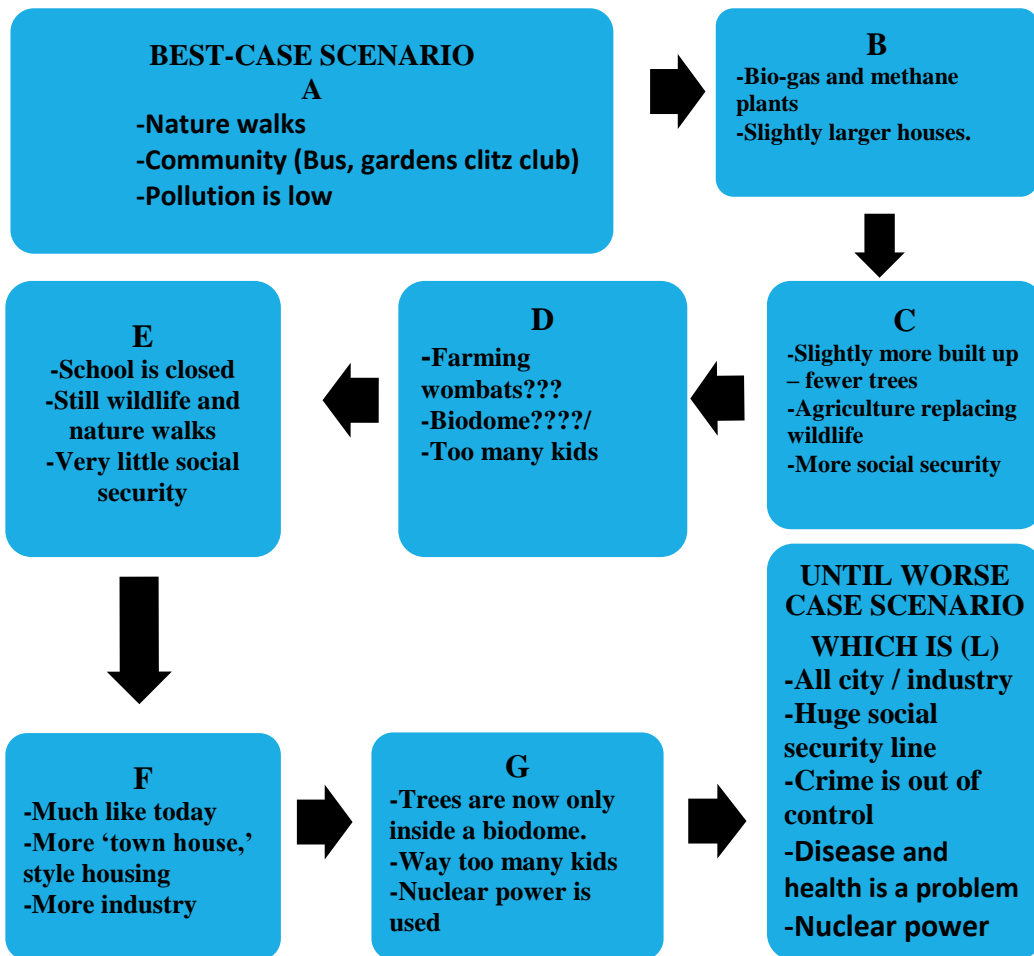
## Breakdown of CERES Decisions and Choices

### Cross-Referencing Scores



### Future Scenario Ordering

POPULATION					
RESOURCES		0-1	2-3	4-5	6 OR MORE
	65 or less	A	B	C	D
	66-129	E	F	G	H
	130 or more	I	J	K	L



## **Appendix C- Interview and Survey Protocol**

C1	Interview Protocol for Schoolteachers About Method of Educating
C2	Interview Protocol for Schoolteachers About 2030 Trail Design
C3	Survey Protocol for Schoolteachers Part 1
C4	Survey Protocol for Schoolteachers Part 2
C5	Interview Protocol for CERES Visitors
C6	Interview Protocol for CERES Staff
C7	Interview Protocol for Melbourne Museum and Scienceworks Museum Staff

# C1- Interview Protocol for Schoolteachers About Method of Educating

## Interview Guide for Teachers about Method of Educating

Name:

School/Grade of Students Teaching:

Number of years teaching:

The following set of questions will serve as guides for the redesign of the Australia 2030 Trail to a 2050 Trail. These questions will be divided into two parts:

In this first part of the interview, the goal is to find resourceful and effective ways of education to help in the implementation and design of the coming Australia 2050 Trail. We would like to ask you some questions in order for us to get a better understanding on what works better when educating students. We are reaching out to you because we believe that your experience and expertise level in the educational field will provide us with a better understanding on how to effectively teach students in an excursion. We will very much appreciate your input about education and what current plans of teaching you are implementing when you teach your students.

1. Do you think students working in groups, or by themselves is the most effective way for them to understand the information? Why?
2. What are some steps or methods that you use when creating an activity in order to engage students in class (e.g. active discussions, writing on board in front of class, group activities, etc.)?
3. What are some strategies you use to keep students' focus and keep up their enthusiasm in an activity in class (e.g. small interactive activities, including playful sarcasm in class discussions, competitions, etc.)?
4. What materials around your classroom seem to catch most students' attention (e.g. colorful posters, informational facts listed in bullets, charts and data)?
5. Do students learn better with specific senses (e.g. auditory, tactile, visual, smell, taste)? If so, what are they and why?

## C2- Interview Protocol for Schoolteachers About 2030 Trail Design

### Interview Guide for Teachers about 2030 Trail Design

In this interview, the goal is to find out how we can better the 2030 Trail to make it an effective educational experience for students, while making it fun and engaging. We would like to ask you some questions in order for us to get a better understanding of how you think we can change the trail when making the new 2050 Trail. We are reaching out to you because you have recently participated in the 2030 Trail, and we believe your feedback will provide us with a better understanding on whether the trail is as effective as it can be. We will very much appreciate your input about the 2030 Trail and what we can do to better the presentation of the decisions and scenarios.

1. What are your opinions on how the material in the CERES 2030 Trail is being presented?
2. Are the trail instructions difficult to follow?
3. Do you think the students are able to grasp the idea of sustainability?
4. What would you change to make the trail more stimulating or engaging for your students?
5. What is the trail currently doing well that you think your students enjoy or find helpful?
6. Would you come back to CERES to participate in the 2030 Trail again with a different group of students next year if the 2030 Trail does not change?

# C3- Survey Protocol for Schoolteachers Part 1

Teacher Questionnaire for CERES Australia 2050 Trail (Part 1) <http://teacheratryke.ceres.org.au/wp-content/uploads/2013/03/13-CERES-Excursion-Booklet.pdf>

1.

\* 1. What is your first and last name?

\* 2. School and Grade/Year of students you came to the 2030 Trail with:

\* 3. Number of years teaching?  
 1 or less  2-5  6 or more

The following set of questions will serve as guides for the redesign of the Australia 2030 Trail to a 2050 Trail. These questions will be divided into two parts.

In this first part of the survey, the goal is to find effective ways of education to implement in the design of the coming Australia 2050 Trail. We would like to ask you some questions in order for us to get a better understanding on what works best when educating students. We believe that your experience and expertise level in the educational field will provide us with a better understanding on how to effectively teach students in an excursion. We will very much appreciate your input.

\* 4. Do you think students working in groups, or by themselves is the most effective way for them to understand the information? Why?

5. What are some steps or methods that you use when creating an activity in order to engage students in class (e.g. active discussions, writing on board in front of class, group activities, etc.)?

6. What are some strategies you use to keep students' focus and keep up their enthusiasm in an activity in class (e.g. small interactive activities, including playful sarcasm in class discussions, competitions, etc.)?

7. What materials around your classroom seem to catch most students' attention (e.g. colorful posters, informational facts listed in bullets, charts and data)?

8. Do students learn better with specific senses (e.g. auditory, tactile, visual, smell, taste)? Rank them in order being 1 the most useful and 5 the least useful

<input type="text" value="Auditory"/>
<input type="text" value="Tactile"/>
<input type="text" value="Visual"/>
<input type="text" value="Smell"/>
<input type="text" value="Taste"/>

9. Please provide a quick response on why did you chose this order

Next

## C4- Survey Protocol for Schoolteachers Part 2

Teacher Questionnaire for CERES Australia 2050 Trail (Part 2)

file:///C:/Users/2375771/CERES%20Australia%20Trail%20Part%202%20Teacher%20.pdf

1

\* 1. What is your first and last name?

The following set of questions will serve as guides for the redesign of the Australia 2030 Trail to a 2050 Trail. These questions will be divided into two parts.

In this second part of the survey, the goal is to find out how we can better the design of 2030 Trail to make it an effective educational experience for students, while making it fun and engaging. We would like to ask you some questions in order for us to get a better understanding of how you think we can change the trail when making the new 2050 Trail. We are asking you because you have recently participated in the 2030 Trail, and believe your feedback will provide us with a better understanding of the effectiveness of the trail. We will very much appreciate your input.

\* 2. What are your opinions on how the material in the CERES 2030 Trail is being presented?

3. Are the trail instructions difficult to follow?

4. Do you think the students are able to grasp the idea of sustainability?

5. What would you change to make the trail more stimulating or engaging for your students?

6. What is the trail currently doing well that you think your students enjoy or find helpful?

7. Would you come back to CERES to participate in the 2030 Trail again with a different group of students next year if the 2030 Trail does not change?

8. Do you have any other comments?

Next



## C5- Interview Protocol for CERES Visitors

### Interview with CERES visitors about the 2030 Trail Layout

Name: ☐

Age: ☐

Date: ☐

CERES, Centre for Education and Research in Environmental Strategies, offers programs that educate visitors about sustainability in Australia (CERES, 2012). Their interactive excursions attract schools locally because they allow children to learn outside of the classroom about sustainability. Among their excursion programs, CERES has created the Australia 2030 Trail. This trail consists of giving students in grades 5 through 12 the opportunity to choose among various decisions regarding resources and population. Due to the large amount of people that visit this attraction, most of the infrastructure has worn down. Outdated information causes children to be misled about how their decisions can affect future outcomes. In order to improve the information in the Australia 2030 Trail; data will be updated with the most current projections for the year 2050. In addition, to have more effectiveness in the teaching method, the way the information is presented currently, needs to be modified. ☐

Therefore, our goal is to find effective ways of education to implement in the design of the coming Australia 2050 Trail. We would like to ask you some questions after you complete the trail in order for us to get a better understanding on what needs to be modified in the current layout of the trail. Both positive and negative feedback is encouraged. At times the negative comments can be the most helpful. We will be tape-recording this interview in order to eliminate bias. ☐

☐

1. What are your opinions on how the questions and answers in the CERES 2030 Trail are being presented? (decisions, futures, in the boards and paper) ☐
2. Is the scoring system understandable? ☐
3. Are the trail instructions difficult to follow? ☐
4. What would you change to make the trail more interesting and fun? Give any suggestions. ☐
5. Can you tell me at least one positive and one negative feature of the 2030 Trail? ☐

☐

## C6- Interview Protocol for CERES Staff

### CERES Staff Member Interview

☐

Name:

☐

Number of years working at CERES:

☐

Department: ☐

☐

This interview serves as a way for us to get an understanding of how the 2030 Trail works and in what ways it can be altered to make it a better educational excursion for students. We are coming to you with these questions because we believe with your experience and knowledge of the 2030 Trail you have the best understanding of its effectiveness and any room for improvements. Your answers will help us to improve the design of the coming 2050 Trail. ☐

☐

☐

1. What are your overall opinions of the 2030 Trail? ☐

☐

2. Which age group seems to enjoy the trail the most?☐

☐

3. Do students find that the trail is difficult to complete without your assistance? If so which age groups seem to struggle the most?☐

☐

4. Do you have any recommendations on how to improve the trail (e.g. presentation of the future scenarios) to better appeal to the different age groups?☐

☐

5. Have you received any recommendations regarding the trail in order to make it better or more enjoyable? Are there recurring suggestions? If so, what are they?☐

☐

6. Do you use the same procedure every time you moderate the 2030 Trail, or do you change your method of completing the trail from time to time? If you could change it, why? ☐

☐

7. Have you considered having a set procedure that all 2030 Trail excursion guides must follow in order to verify that every group obtains the same information? Do you think this would be more effective?☐

☐

☐

☐

## **C7- Interview Protocol for Melbourne Museum and Scienceworks Museum Staff**

### **Interview with Melbourne Museum and Scienceworks Museum Staff in Melbourne about methods of display educational material**

Name:

Age:

Date:

CERES, Centre for Education and Research in Environmental Strategies, offers programs that educate visitors about sustainability in Australia (CERES, 2012). Their interactive excursions attract schools locally because they allow children to learn outside of the classroom about sustainability. Among their excursion programs, CERES has created the Australia 2030 Trail. This trail consists of giving students in grades 5 through 12 the opportunity to choose among various decisions regarding resources and population. Due to the large amount of people that visit this attraction, most of the infrastructure has worn down. Outdated information causes children to be misled about how their decisions can affect future outcomes. In order improve the information in the Australia 2030 Trail; data will be updated with the most current projections for the year 2050. In addition, to have more effectiveness in the teaching method, the way the information is presented currently, needs to be modified.

Therefore, our goal is to find effective ways of education to implement in the design of the coming Australia 2050 Trail. We would like to ask you some questions in order for us to get a better understanding on what works best when educating students. We believe that your experience and constant exposure to educational displays can provide us with a better understanding on how to effectively display information to students and the public. These interviews will be tape recorded with your permission in order to eliminate as much bias as possible. We will very much appreciate your input and opinions in regards to make the best improvements for the Australia 2050 Trail.

1. What do students more often get attracted to in their visit? Why do you think this is?
2. What are some key features about exhibits that generally are effective to attract the public?
3. What exhibits do they have about sustainability? How are they displayed? (visual, auditive etc)
4. How do you perceive kids learn the most? By hands on or by listening to explanations?
5. What will you do in order to make an attraction be fun but at the same time have an educational purpose?

## Appendix D- Transcribed Interviews

D1	Interview with Schoolteacher Luisa Ingram Part 1
D2	Interview with Schoolteacher Luisa Ingram Part 2
D3	Interview with Schoolteacher Annabel Savey Part 1
D4	Interview with Schoolteacher Annabel Savey Part 2
D5	Interview with Schoolteacher Tim Barlow Part 1
D6	Interview with Schoolteacher Tim Barlow Part 2

## D1- Interview with Schoolteacher Luisa Ingram Part 1

### **Interview for Teachers About Methods of Educating**

Name: Luisa Ingram

School/Grade of Students Teaching: St. Leonard's College Year 9

Number of years teaching: 13 years

Date: March 19, 2014

The following set of questions will serve as guides for the redesign of the Australia 2030 Trail to a 2050 Trail. These questions will be divided into two parts:

In this first part of the interview, the goal is to find resourceful and effective ways of education to help in the implementation and design of the coming Australia 2050 Trail. We would like to ask you some questions in order for us to get a better understanding on what works better when educating students. We are reaching out to you because we believe that your experience and expertise level in the educational field will provide us with a better understanding on how to effectively teach students in an excursion. We will very much appreciate your input about education and what current plans of teaching you are implementing when you teach your students.

#### **1. Do you think students working in groups, or by themselves is the most effective way for them to understand the information? Why?**

I don't think one or the other is necessary the best way on their own. I believe that if you provide opportunities for students to work individually and in groups are best practices approach. This particular age group, 15 years old, do need some kind of engaging discussion, especially with concepts which are not white or black. They need a little bit more of reasoning behind it that suits more group oriented activity. I believe no one learns the same way, so because they are different learners, the best practice will be providing opportunities for those that like working in groups, as well for those who prefer individual working. Finding that balance I think it is essential when teaching. For example, in the trail, you could get them to fill out some of the answers to the questions independently, so that they can reflect on resources. Once they have worked out their final score, open it up to group discussions. Then, if they find out that 6 or 7 that go to similar trends, group them up, get them to identify what they have in common, and also what are the differences they have from other groups. If there was to be any content related to read in boards, I find especially in this age group that they need some sort of technology. If there were ways to get interactive boards up or things that they could move around or press screens, that could be a good way to do group work or individual depending on how you set it up.

#### **2. What are some steps or methods that you use when creating an activity in order to engage students in class (e.g. active discussions, writing on board in front of class, group activities, etc.)?**

It depends on how the kids in your class learn. First, you need to identify unique; visual learners, learners that like or prefer independent work vs. group work. Then you can find a balance to offer the best way for everybody to learn productively. For an activity like this you would have to offer a bit of everything in order to cater to mixed abilities and the mixed learning styles of your group. Something that works to engage them is always having hands-on activities or where they move around. Or where they have discussions where they engage with each other not just you standing in front of them as a teacher telling them how it is. More and more inquiry prompts

instead of straight away giving the content you want them to learn over. You've got to peak their curiosity first or hook them in first. Almost get them to inquiry into the content and then go and find the content out. You can't get away from using technology in the classrooms. Our schools involve iPads, so it involves them accessing YouTube or something on the Internet or creating a mini movie or doing something technology is always very helpful or keep them engaged. Discussion and games and things like that is always a good way to engage them at the beginning, get some energy out and then focus on the more content driven, more boring stuff. And I think, one of the really important factors is learning has to be more student centered. So that they own what they want to learn and they are engaged in what they want to learn rather than them being told. "This is the way it is", rather, they need to come to conclusions and assumptions themselves so that it is more relevant and more meaningful.

**3. What are some strategies you use to keep students' focus and keep up their enthusiasm in an activity in class (e.g. small interactive activities, including playful sarcasm in class discussions, competitions, etc.)?**

To kind of engage students, case studies or real life situations you can use as stimulants. For an activity such as this, all of our kids have done their own ecological footprint before they came, on the day. So that they have something to relate to, "Well if you live like me, you will need three earths of resources to use," it will get them thinking about their practices prior to coming on the day. Some other hooks are things like big questions. We call them big questions, provoking the thinking before they come and look at any content. So, as I mentioned our big questions are, is my life sustainable? So you set up the inquiry and do some research, get some content and it's where we go from there. Well what are we going to do about it? What do I need to change? What do I need to get a message out there about? Some other hooks could be some sorts of visual stimulants. So before this day we show our kids a little video on the Pacific Soup. Which is the massive island of plastic between Japan and Hawaii. They get an idea of how our behavior has an impact on the natural environment, because there is just tons of plastic out there. Or things like, having a picture, of say a sea bird that's dead and has been opened up and is displaying a whole lot of rubbish in its gut. That kind of thing and setting up a See, Think, Wonder, where you get the kids to think a binary thought. What do you see? And all they can describe are things on the page, so I see a bird; I see rubbish, its dead. So they have to be factual, black and white things. What do you think? So then they start making assumptions. I think this bird died because of poisons from the plastic. I think that this is a bad thing. And then the third higher order thinking is what do you wonder. And they get to have conversations about; I wonder why this bird ate all the plastic. It's plastic, how can they not decipher it from food? I wonder who found this bird. I wonder what type of bird this is and why it's dead. I wonder what anyone is doing about it. I wonder how we can avoid this. So that's a short type of thinking routine that you can just use a pretty strong confronting visual image to hook them. Stories of people, seeing things in real life, making it tangible rather than in a book. Song lyrics can sometimes even be a bit of a hook, or if you are dealing with a topic like gay marriage you can use the song from Macklemore to hook kids into thinking about some of the issues being involved. Whatever you can kind of grab I reckon.

**4. What materials around your classroom seem to catch most students' attention (e.g. colorful posters, informational facts listed in bullets, charts and data)?**

So with an activity like this, 2030, if you were going to keep it outside, in a natural space kind of activity, then you're limited to using interactive technologies and things like that. It does need to

be visually appealing but having too much content or written word on it, the kids will lose interest or get distracted from it. So bullet pointing things, drawings, graphics, and things like charts, instead of putting it all into a paragraph of words, doing in an appealing way. So the way that the art is done depends on whom you're pitching at, if you are pitching at younger kids it could be cartoon like. If you are pitching at teenagers, it could be graffiti like or popular culture art. Or it could be, computer generated art as well. But as far as actual words and stuff on the page, less is more. And, I think making it visually appealing, if it could be interactive somehow, then that's even better. So if you could, perhaps turn a wheel and reveal different things about your world. Something that gives them a chance to have a play with it or be interactive is also a good thing. But, what you've got currently, is pictures, all the worlds are mostly visual in pictures that is fine.

## D2- Interview with Schoolteacher Luisa Ingram Part 2

### **Interview Guide for Teachers About 2030 Trail Design**

Name: Luisa Ingram

School/Grade of Students Teaching: St. Leonard's College Year 9

Number of years teaching: 13 years

Date: March 19, 2014

In this interview, the goal is to find out how we can better the 2030 Trail to make it an effective educational experience for students, while making it fun and engaging. We would like to ask you some questions in order for us to get a better understanding of how you think we can change the trail when making the new 2050 Trail. We are reaching out to you because you have recently participated in the 2030 Trail, and we believe your feedback will provide us with a better understanding on whether the trail is as effective as it can be. We will very much appreciate your input about the 2030 Trail and what we can do to better the presentation of the decisions and scenarios.

#### **1. What are your opinions on how the material in the CERES 2030 Trail is being presented?**

I think it's good. Other than being outdated, the needing a bit of tszujing up and making it a little bit more visually appealing, I think the way it's laid out as in the kids walk around a trail is good. It could, as far as the setting it's in goes, that's fine. I mean it could always be in a little forest kind of trail or something like that if you had the resources, but its fine as it is. The different color boards identify the questions versus the worlds that are a good idea too. The actual pictures of each world could be much bigger, and therefore your trail could be longer, maybe, more spread out because the kids tend to clump and more often than not, there will be three kinds of worlds or grades that are most in common, so the kids end up clumping around that and perhaps not taking in all of the detail about that specific world that was their result.

#### **2. Are the trail instructions difficult to follow?**

No, not at all.

Stefano: Do you think they got the concept well?

For this age group it is completely fine.

#### **3. Do you think the students are able to grasp the idea of sustainability?**

Our kids definitely do because it's a part of a bigger unit of work where we cover sustainability and human impact, and, you know, the use of resources and stuff like that, so I can only probably really add to that specifically with our group in mind, and our college in mind, because we come from an area in Melbourne that is quite affluent, so these kids have a lot of access to great education, great nutrition, and great recreational things around them. They are from a demographic that makes life a lot easier and a little bit, you know, they need to be stimulated and challenged because they don't have much drama in their life, like a lower demographic area would. Our college is a private school, so we have a lot of access to resources to help them learn. We're lucky enough to have the financial backing to do great things. I mean, these guys all go overseas in term four, as a part of this program to apply what they learned, in an underdeveloped country. There is certainly not a lack of funding or resources from the school we're at, and



therefore, the concept is a lot more realistic for them to live sustainably, than it would be for someone from a lower demographic, because they got the means to make decisions to live more sustainably.

#### **4. What would you change to make the trail more stimulating or engaging for your students?**

It could be creating things like creating switches or panels where they can open and close, move a thing along where the panel might move across and down or up or down, or putting different color lenses over things to get them to match up, say a red lens with a red world. You know, just sort of thinking on the spot here. Obviously if you have the ability to build in screens with touch buttons and things like that, that gives them the opportunity to maybe take their world a little bit further, might show an indication of what would happen in another twenty years, or something like that. Being able to add some things to their world and then seeing a result. So say for example if they lived in a world where, and there wasn't a water source or water was really scarce or something like that, they could add things on the roofs of buildings that catch water and then see how much of a difference that might make. Yeah, it's a difficult question because of the way the structure currently is. You'd have to make major changes, both in building and planting and the actual drawings or whatever you ended up using. Having the ability to stick things on and off, like adding more trees to this, little Velcro trees or something, and then having a result that that might do, or magnets. Trying to think a bit more simple now, magnets or sticky Velcro things is another that kids can pull on and off. The only problem with that is that you might be regenerating those every now and then because some will get broken or lost or whatever. So it's not as simple. The longevity of having tactile boards would be less than having sort of the simple structure you got up there at the moment.

#### **5. What is the trail currently doing well that you think your students enjoy or find helpful?**

I think it's thought provoking, which is what I really like about it. It forces the kids to assess their wants particularly, not just their needs, but their wants, and how their wants can affect others and that's clear. As how currently the trail is set up, and thinking about a lot of kids in this particular age group, they're so egocentric, that they don't kind of think how this resource turns into this product and then I use this product and this happens. So they do need, they do need to be made aware of that. We, in the program that we run, we try and do activities that are experiential, so rather than getting up in front of a class and telling them greenhouse gases are bad, or this habit is bad or that habit, we want them to learn through doing.

Stefano: Hands on experience.

Yeah. And so as far as the trail is right now, it could be more experiential and more interactive, or on a bigger scale so that it has a bigger impact.

Danielle: So are you saying worldwide? Or not just for Australia?

Well, it could be. Yeah, worldwide.

Danielle: Like their future affects the world?

Yeah, and you can have a look at how we in Australia live as some of the top contributing consumers, what impact that has on the rest of the world, absolutely. If you had longer boards to kind of, or bigger boards of where you could spin off and say well, if everyone lives like this, this is what would happen to the rest of the world. Particularly for us in our program, because we do take it from here, locally, to a global perspective, some schools may not be so interested in that. But as far as what it does well, it gets our kids thinking, it takes them through a process like

the survey type working out, that style, and then it presents them with a situation to face and then they have to think about how they feel about that.

**6. Would you come back to CERES to participate in the 2030 Trail again with a different group of students next year if the 2030 Trail does not change?**

No, ha-ha. If it didn't get updated, even this year we had a discussion about doing this activity over the other activities that CERES offer, and I spoke with the learning department about, is it going to get updated before we made the decision to do it, because, yeah, it's a little tired and it's lacking in up-to-date information as well. Particularly teaching kids in this day and age they've got such great access to information that if we present them if situations or issues or data, from even five years ago, let alone ten, fifteen years ago, there's no point because it changes so quickly. Our job, our responsibility is to give them the latest and greatest education so we need that recent knowledge. So, yes we would come back, and we've come back because it's being updated and that kind of thing because we do this as a yearlong program. Ideally, if it had been updated already, we'd be more excited about it, but this group is going to go through the old one, and then we've got two more groups coming throughout the year that will get a chance, a look at the new one. Now if it wasn't updated at all for this year, we may have chosen to do another workshop.

## D3- Interview with Schoolteacher Annabel Savey Part 1

### **Interview Guide for Teachers About Methods of Educating**

Name: Annabel Savey

School/Grade of Students Teaching: St. Leonard's College/Year 9

Number of years teaching: 5 years

Date: March 19, 2014

The following set of questions will serve as guides for the redesign of the Australia 2030 Trail to a 2050 Trail. These questions will be divided into two parts:

In this first part of the interview, the goal is to find resourceful and effective ways of education to help in the implementation and design of the coming Australia 2050 Trail. We would like to ask you some questions in order for us to get a better understanding on what works better when educating students. We are reaching out to you because we believe that your experience and expertise level in the educational field will provide us with a better understanding on how to effectively teach students in an excursion. We will very much appreciate your input about education and what current plans of teaching you are implementing when you teach your students.

#### **1. Do you think students working in groups, or by themselves is the most effective way for them to understand the information? Why?**

Obviously I think there is room for both, but I am a fan of group work, small group work. Because I think they do discuss and sometimes teachers think, "Oh they are working in groups, they are just going to chat about other stuff" but actually if you do listen, they do genuinely, more often than not, they are genuinely discussing the ideas. And I think when they are working with people their own age, they have to work harder to convince each other of why they are right or why they are wrong. Whereas when a teacher is giving them knowledge or they are just reading it, they don't have to think, they just take that to be the truth, they trust you because you are the expert. But when you are trying to convince, if it's a peer trying to convince another peer of their opinion, then they have to work harder to justify and the other person is going to be more skeptical so they will question more and I think you will get a better interaction.

#### **2. What are some steps or methods that you use when creating an activity in order to engage students in class (e.g. active discussions, writing on board in front of class, group activities, etc.)?**

Mix of activities. So I teach math, so I try to get a lot of discussion happening, especially in the younger years. I do try and get kids up to demonstrate, they have to do some quite work. I think to engage them it needs to be relevant. If they can't see why they are doing it or when they will need, then I think you lose their interest.

#### **3. What are some strategies you use to keep students' focus and keep up their enthusiasm in an activity in class (e.g. small interactive activities, including playful sarcasm in class discussions, competitions, etc.)?**

I don't use competition. If I use sarcasm it is very rare, I guess I prefer not to. I think they are engaged if they are thinking. So I think that any activities that get them thinking, I'll use. I'm not going to try to do roles plays in the math's classroom; it has to serve a purpose. When they are talking with each other and discussing ideas, they participate, for me I see interest. As long as

they are not just working by themselves, they are interacting with either their friends, or me then I think they stay engaged.

**4. What materials around your classroom seem to catch most students' attention (e.g. colorful posters, informational facts listed in bullets, charts and data)?**

Oh that's hard. Like they use their iPads a lot, and information gets posted onto their diaries or they get emails. I think they need to be able to see it. Like posters they absorb, but not if they are fine print, so pictures or just really simple messages. But I don't think texts really belong on posters, effectively. Graphs, yeah. Visual is more effective.

**5. Do students learn better with specific senses (e.g. auditory, tactile, visual, smell, taste)? If so, what are they and why?**

Tactile, doing, because they are experiencing it. They are having to do it and I think they will remember it. Definitely not listening, seeing is fine, like demonstration is good but if they are doing it themselves they are actively involved.

## **D4- Interview with Schoolteacher Annabel Savey Part 2**

### **Interview Guide for Teachers About 2030 Trail Design**

Name: Annabel Savey

School/Grade of Students Teaching: St. Leonards College/Year 9

Number of years teaching: 5 years

Date: March 19, 2014

In this interview, the goal is to find out how we can better the 2030 Trail to make it an effective educational experience for students, while making it fun and engaging. We would like to ask you some questions in order for us to get a better understanding of how you think we can change the trail when making the new 2050 Trail. We are reaching out to you because you have recently participated in the 2030 Trail, and we believe your feedback will provide us with a better understanding on whether the trail is as effective as it can be. We will very much appreciate your input about the 2030 Trail and what we can do to better the presentation of the decisions and scenarios.

#### **1. What are your opinions on how the material in the CERES 2030 Trail is being presented?**

I think the initial, like when they are answering the questions, those bullets were really clear, but I found it really hard to just look at my future in just black and white. I think color would've made it a lot easier to interpret, because it was just a lot of black and white lines for me, and I didn't have enough time to look at it in enough detail. I read the list, but it would be better if those things, it could be better if they were incorporated into the drawing. But, I mean, some facts and figures is good, yeah.

#### **2. Are the trail instructions difficult to follow?**

No. The only with the instructions was that it was unclear to me whether you completed the task with what you would like, with what you think you would choose. Whether you choose your options regardless of the environment, or choose your options based on dreamed wealth, or you choose your options based on what you realistically think you will choose.

Stefano: So it's what you would have versus what you would like?

Yeah.

Stefano: So what is probable versus what is possible?

Yep, yeah.

#### **3. Do you think the students are able to grasp the idea of sustainability?**

No. I didn't there was a huge sustainability focus.

#### **4. What would you change to make the trail more stimulating or engaging for your students?**

Again, I know I've already said this, but for me the end result, the pictures were dull to me.

#### **5. What is the trail currently doing well that you think your students enjoy or find helpful?**

I like the decisions they make, if everybody is making those decisions, you can have a look at the impact, and if they see something they don't like, I think they work back and go well how could

I get the future I do like and there are the decisions I'm going to have to change. I think it helps them realize the whole action-consequence thing.

Stefano: That being said, do you think having something instead of numbers relating to more value of points leading you to a worse scenario, have tricky stuff like, let's say for instance bees, trees or butterflies, and then at the end show them what each value has, and then make an addition which would associate that idea thinking of more value would give me a better or worse scenario?

Yes.

Stefano: Because you can interpret like that?

Yeah, definitely. You realize, I mean you can see a pattern in the low numbers generally coincide or high numbers coincide with good or bad, so even if you switched around the values so that the low score was bad, you still realize that certain choices, you know what you're good choices are and what your bad choices are and you work out the pattern. So, if it was just a picture then that might be less likely to happen.

**6. Would you come back to CERES to participate in the 2030 Trail again with a different group of students next year if the 2030 Trail does not change?**

The kids seem to enjoy it. It seemed a bit short, and I think it would benefit from renovation.

## D5- Interview with Schoolteacher Tim Barlow Part 1

### **Interview Guide for Teachers About Methods of Educating**

Name: Tim Barlow

School/Grade of Students Teaching: St. Leonard's College/Year 9

Number of years teaching: 10 years

Date: March 19, 2014

The following set of questions will serve as guides for the redesign of the Australia 2030 Trail to a 2050 Trail. These questions will be divided into two parts:

In this first part of the interview, the goal is to find resourceful and effective ways of education to help in the implementation and design of the coming Australia 2050 Trail. We would like to ask you some questions in order for us to get a better understanding on what works better when educating students. We are reaching out to you because we believe that your experience and expertise level in the educational field will provide us with a better understanding on how to effectively teach students in an excursion. We will very much appreciate your input about education and what current plans of teaching you are implementing when you teach your students.

#### **1. Do you think students working in groups, or by themselves is the most effective way for them to understand the information? Why?**

If you can get kids engaged in a group activity then often they will get more skills out of it, they will still get the content you require, but I suppose they will also develop other important life skills. Often more hands on task require a group activity. So if you are consuming traditional classroom, consuming content, is often based around individual tasks but more modern pedagogy I suppose and project based learning and things like that, you do need more people to contribute to outcomes.

#### **2. What are some steps or methods that you use when creating an activity in order to engage students in class (e.g. active discussions, writing on board in front of class, group activities, etc.)?**

A variation, the thing that makes a brain be engaged is something different. So it's easier for kids to do different things, but that's kind of the core of it. And so where are you doing it, doing something different, getting them out of their local environment, getting them out of their comfort zone, and challenging them with different activities and ideas, that's a great way to engage.

#### **3. What are some strategies you use to keep students' focus and keep up their enthusiasm in an activity in class (e.g. small interactive activities, including playful sarcasm in class discussions, competitions, etc.)?**

Yeah, that's all about how to motivate the adolescent. It's all those kinds of things, emotions are contagious, and so if you are happy and excited then they are more likely to be happy and excited. I think that is just human nature, just to be influenced by those around them. But things like games in your classroom and adding little like stars, levels and rewards and those kinds of things. If you can do all those kinds of things then that will help increase motivation and engagement too.

**4. What materials around your classroom seem to catch most students' attention (e.g. colorful posters, informational facts listed in bullets, charts and data)?**

Things that they can get their hands on, basically. I think more tactile but that does include technology, so I think you more touched base computer platforms these days, which were considered ten, twenty years ago hyper interactive, which are always quite engaging. But also things they can touch and manipulate seem to engage more than just your static things.

**5. Do students learn better with specific senses (e.g. auditory, tactile, visual, smell, taste)? If so, what are they and why?**

Yeah, on that, the fear of multiple intelligence, I'm not aware of any scientific proof. But I am aware of that kind of multiple intelligence, so I am aware that people learn best visually or auditory or kinesthetically or whatever it is. My understanding of the research I've read on it is people will learn equally depending on the delivery method, but they will have a preference. They will have a personal preference. The amount they learn won't change but they will enjoy it more. So I suppose, like you said, relating more to engagement and motivation of students. Which is a massively key thing, as you look at education going forward because if you want to learn anything right now you can do it because if you have the Internet and computer you are done. It's really about getting things that are to keep kids engaged and motivated in the learning task.



## **D6- Interview with Schoolteacher Tim Barlow Part 2**

### **Interview Guide for Teachers About 2030 Trail Design**

Name: Tim Barlow

School/Grade of Students Teaching: St. Leonard's College/Year 9

Number of years teaching: 10 years

Date: March 19, 2014

In this interview, the goal is to find out how we can better the 2030 Trail to make it an effective educational experience for students, while making it fun and engaging. We would like to ask you some questions in order for us to get a better understanding of how you think we can change the trail when making the new 2050 Trail. We are reaching out to you because you have recently participated in the 2030 Trail, and we believe your feedback will provide us with a better understanding on whether the trail is as effective as it can be. We will very much appreciate your input about the 2030 Trail and what we can do to better the presentation of the decisions and scenarios.

#### **1. What are your opinions on how the material in the CERES 2030 Trail is being presented?**

It's a bit bland, a little bit lacking of color, I mean, it's just kind of reading stuff. So, in an ideal world you'd see more student participation. It's good that they get to do the activity themselves, that is student centered and its constructivist in a way, but if there were more visually appealing stuff and more things to interact with it would be better.

#### **2. Are the trail instructions difficult to follow?**

No, I think they got them all. I mean, it was just adding up a bunch of numbers, and they all seemed to get it, as about as well as you would always expect. There is always going to be one to two kids who zone out in any instructions. I mean, they're humans and their brain will zone out. Stefano: Saying that and having more for like each value being worse, do you think kids tend to choose their decisions in order not to get like a worse scenario?

Do they rig it?

Stefano: Yeah. Do you think changing that concept towards the association of numbers and making for instance having a bee, butterflies, trees, or whatever object and then at the end would explain to them a bee is 1 point. The association, would that help?

I think so. I don't think those kids gamed it. So are you talking about are they trying to game the system to get a score?

Stefano: Yeah

I didn't see much of that today, but I could totally imagine it happening quite a bit, so I would agree, that that would be of assistance.

#### **3. Do you think the students are able to grasp the idea of sustainability?**

Yeah. I mean, I suppose the end result was just presented in a little bit of text, so if that could be presented in some more interactive engaging way to really illustrate the difference then that would be better.

**4. What would you change to make the trail more stimulating or engaging for your students?**

Ideally, you would have video elements and interactive elements. Ideally they'd all be touch screens, but you can have walk-in, thinking really big picture, 3-D immersion rooms of the end result. So imagine that, you put on the 3-D goggles, you walk into a room, and it presents you like a fly-through of a city that that is the way it is going to be. Really, it could be really impactful, as opposed to just a little bit of black and white text. That'll be cool ha-ha.

**5. What is the trail currently doing well that you think your students enjoy or find helpful?**

I think getting people to think and think ahead is a valuable thing. So you really want to see kids in the world that are able to think independently and also think about how their decisions will affect their and other's futures. So I think it does encourage that.

**6. Would you come back to CERES to participate in the 2030 Trail again with a different group of students next year if the 2030 Trail does not change?**

Yeah. We came last year. Everything you do is under review. It's okay. Today's okay. We do a couple of other things at CERES, and a couple of other things are a little bit more interactive, which is good, and I think we will come back next year, because we do like kind of whole package. We do get quite a lot of different aspects of sustainability given to the kids, but I'll tell you what, if those 3-D rooms come, woo! We will be coming back every year guaranteed.

## **Appendix E- Transcribed Interviews with General Public Visitors**

E1	Interview with Maxim Shvefsov
E2	Interview with Henrieta Tornyan
E3	Interview with Rama Cronin and Kayo Okamoto
E4	Interview with Dunken Francis

## **E1- Interview with Maxim Shvefsov**

### **Interview with CERES Visitors About the 2030 Trail Layout**

Name: Maxim Shvefsov

Age: 27

Date: March 24, 2014

CERES, Centre for Education and Research in Environmental Strategies, offers programs that educate visitors about sustainability in Australia (CERES, 2012). Their interactive excursions attract schools locally because they allow children to learn outside of the classroom about sustainability. Among their excursion programs, CERES has created the Australia 2030 Trail. This trail consists of giving students in grades 5 through 12 the opportunity to choose among various decisions regarding resources and population. Due to the large amount of people that visit this attraction, most of the infrastructure has worn down. Outdated information causes children to be misled about how their decisions can affect future outcomes. In order to improve the information in the Australia 2030 Trail, data will be updated with the most current projections for the year 2050. In addition, to have more effectiveness in the teaching method, the way the information is presented currently, needs to be modified.

Therefore, as part of our goal is to find effective ways of education to implement in the design of the coming Australia 2050 Trail. We would like to ask you some questions after you complete the trail in order for us to get a better understanding on what needs to be modified in the current layout of the trail. Both positive and negative feedback is encouraged. At times the negative comments can be the most helpful. We will be tape recording this interview in order to eliminate bias.

#### **1. What are your opinions on how the questions and answers in the CERES 2030 Trail are being presented? (Decisions, futures, in the boards and paper)**

Well, Questions are kind of different, but, after you go to the results, it doesn't relate why you got to that future. It just gives you a straight answer, it doesn't relate to the decision or explain why or how you got there, no connection in some future scenarios. Couple of the scenarios presented, you can link them because we are currently living in those scenarios right now. It is pretty old, and some scenarios are really applicable to what is happening now. Without the link on why the decision leads to the scenarios is quite ambiguous how we got them.

#### **2. Is the scoring system understandable?**

No, it is not clear at all.

#### **3. Are the trail instructions difficult to follow?**

It is easy to follow in terms of pictures, answers, and (school material). You can relate them and you get the final score. But as I said previously, it doesn't explain why, why is this really happening or how do my decisions impact the future. Why a 3-bedroom house has a score of this many points and a 5-bedroom house has a score of this other many points.

**4. What would you change to make the trail more interesting and fun? Give any suggestions.**

It depends what is the target audiences, make it more entertaining and that illustrates what is actually happening. Like for example flashing lights, or how heat is contained and energy is being generated. How you preserve energy and where does cold air go if we are having global warming. These illustrations can make it more understandable to the public. How you can make a close circle and waste less but generating more, or for instance reusing or recycling and the effects of these ones. Make it more didactic, entertaining and self-explanatory not only static pictures.

**5. Can you tell me at least one positive and one negative feature of the 2030 Trail?**

Positive: it's good to introduce how we are currently leaving, with new technologies. And also being smarter about energy, wasting and accumulating

Negative: it is probably what you are trying to do which is the update information because this one is very old and outdated.

## **E2- Interview with Henrieta Tornyan**

### **Interview with CERES Visitors About the 2030 Trail Layout**

Name: Henrieta Tornyan

Age: 26

Date: March 24, 2014

CERES, Centre for Education and Research in Environmental Strategies, offers programs that educate visitors about sustainability in Australia (CERES, 2012). Their interactive excursions attract schools locally because they allow children to learn outside of the classroom about sustainability. Among their excursion programs, CERES has created the Australia 2030 Trail. This trail consists of giving students in grades 5 through 12 the opportunity to choose among various decisions regarding resources and population. Due to the large amount of people that visit this attraction, most of the infrastructure has worn down. Outdated information causes children to be misled about how their decisions can affect future outcomes. In order to improve the information in the Australia 2030 Trail, data will be updated with the most current projections for the year 2050. In addition, to have more effectiveness in the teaching method, the way the information is presented currently, needs to be modified.

Therefore, as part of our goal is to find effective ways of education to implement in the design of the coming Australia 2050 Trail. We would like to ask you some questions after you complete the trail in order for us to get a better understanding on what needs to be modified in the current layout of the trail. Both positive and negative feedback is encouraged. At times the negative comments can be the most helpful. We will be tape recording this interview in order to eliminate bias.

#### **1. What are your opinions on how the questions and answers in the CERES 2030 Trail are being presented? (Decisions, futures, in the boards and paper)**

Well, I like the whole concept, it definitely drew me in. I wanted to know what could be the possibilities of my future when making a decision. It was a little hard to follow and specially to figure out why a particular score was attributed to a particular decision. For example lifestyle choice. The scoring system did not help, but I like the illustrations. It engaged me the whole time, but I was left with questions that I would want more details about, for example why a particular future will come out from a decision.

#### **2. Is the scoring system understandable?**

Yes. I suppose I did not spend too much time looking at it and just jumped ahead. Maybe not numbers but some kind of color based. That you don't associate quantity with the decisions. Numbers can be tricky in having a decision because that's like weighing it out, giving it a quantity. This creates a surrealistic result. Maybe having something like color based or "if this is a positive thing to the environment". Something that can explain how things lead one another and relate, as opposed than just numbers.

#### **3. Are the trail instructions difficult to follow?**

No, fairly clear, just went around in a circle and you just went from one sign to the other.

**4. What would you change to make the trail more interesting and fun? Give any suggestions.**

Colors I think, there is not many colors at all. Pictures are lacking of colors and they are not appealing. Just color.

**5. Can you tell me at least one positive and one negative feature of the 2030 Trail?**

Positive: I like the illustrations. It draws you in and makes you look at the emotional content, rather than just information that is just to read. Illustrations give you that immediate idea or feeling of the future and the big picture is.

Negative: Maybe, there should be something that states this is the starting point and this is the direction you should take. Because some persons can come into the wrong side and they won't be sure of what was going on or how to proceed in the trail.

## **E3- Interview with Rama Cronin and Kayo Okamoto**

### **Interview with CERES Visitors About the 2030 Trail Layout**

Name: Rama Cronin and Kayo Okamoto

Age: 42 and 49

Date: March 24, 2014

CERES, Centre for Education and Research in Environmental Strategies, offers programs that educate visitors about sustainability in Australia (CERES, 2012). Their interactive excursions attract schools locally because they allow children to learn outside of the classroom about sustainability. Among their excursion programs, CERES has created the Australia 2030 Trail. This trail consists of giving students in grades 5 through 12 the opportunity to choose among various decisions regarding resources and population. Due to the large amount of people that visit this attraction, most of the infrastructure has worn down. Outdated information causes children to be misled about how their decisions can affect future outcomes. In order to improve the information in the Australia 2030 Trail, data will be updated with the most current projections for the year 2050. In addition, to have more effectiveness in the teaching method, the way the information is presented currently, needs to be modified.

Therefore, as part of our goal is to find effective ways of education to implement in the design of the coming Australia 2050 Trail. We would like to ask you some questions after you complete the trail in order for us to get a better understanding on what needs to be modified in the current layout of the trail. Both positive and negative feedback is encouraged. At times the negative comments can be the most helpful. We will be tape recording this interview in order to eliminate bias.

#### **1. What are your opinions on how the questions and answers in the CERES 2030 Trail are being presented? (Decisions, futures, in the boards and paper)**

I think they are good but they need a little more of explanation of what the process is and what the end result is. I had to walk in and browse around before I understood what I needed to do. I thought it was good, not too many choices and also they were very clear.

#### **2. Is the scoring system understandable?**

No, because I didn't really know where was I going from the start. It seems a little confusing. At the end I understood what the scoring system was for, but it's a bit subjective. There are no attributions why each score is given to a decision.

#### **3. Are the trail instructions difficult to follow?**

Not difficult but vague I would say. Quite confusing because there is really no explanation on what is the process to follow from the trail. I didn't get the score system as said previously, until I reached the end of the trail.

#### **4. What would you change to make the trail more interesting and fun? Give any suggestions.**

I would add an explanation at the start of what is the process. Also at the end, when you have the different futures, they seemed a little grouped. Little groups had very similar pictures so made



the seemed very similar with almost no distinction. What I mean by this is the drawing of the pictures, and how this are very bundled up in each scenario made them seem the same.

**5. Can you tell me at least one positive and one negative feature of the 2030 Trail?**

Positive: It's good that it makes you think what is going to happen in the future and the various possibilities. I believe it's very thought provoking which I think is good

Negative: Looks very old and it needs updating. But it looks good overall.

## **E4- Interview with Dunken Francis**

### **Interview with CERES Visitors About the 2030 Trail Layout**

Name: Dunken Francis

Age: 49

Date: March 24 2014

CERES, Centre for Education and Research in Environmental Strategies, offers programs that educate visitors about sustainability in Australia (CERES, 2012). Their interactive excursions attract schools locally because they allow children to learn outside of the classroom about sustainability. Among their excursion programs, CERES has created the Australia 2030 Trail. This trail consists of giving students in grades 5 through 12 the opportunity to choose among various decisions regarding resources and population. Due to the large amount of people that visit this attraction, most of the infrastructure has worn down. Outdated information causes children to be misled about how their decisions can affect future outcomes. In order improve the information in the Australia 2030 Trail, data will be updated with the most current projections for the year 2050. In addition, to have more effectiveness in the teaching method, the way the information is presented currently, needs to be modified.

Therefore, as part of our goal is to find effective ways of education to implement in the design of the coming Australia 2050 Trail. We would like to ask you some questions after you complete the trail in order for us to get a better understanding on what needs to be modified in the current layout of the trail. Both positive and negative feedback is encouraged. At times the negative comments can be the most helpful. We will be tape recording this interview in order to eliminate bias.

#### **1. What are your opinions on how the questions and answers in the CERES 2030 Trail are being presented? (Decisions, futures, in the boards and paper)**

Assuming that its primary audience is school age kids, I think how is being presented is overcomplicated. I think there are too many choices and too many criteria with in it. This took me a while to understand quite what was going on so I had to backtrack midway in order to understand what was going on and the process. It took me a while to get the big picture of it because there are too many decisions and too many scenarios. Perhaps simplifying the amount of outcomes a little bit. Maybe breaking them into little groups. The numbering system is slightly vague, because there is no clear attributions as why a number is given to a house or choice. So if you were going to do that you got to justify why the linkage between scoring and decision. Perhaps simplifying this somehow will make this easier. The final outcome posters need to be more common and simple in a way. The information presented in these ones have too many overlapping drawings and data that makes it confusing and very similar one to the other. Kids are not able to read each little graphic or iconic description, which makes it for them harder to get the big picture. Another thing is how are kids able to choose their average spend, average income, things like that with the decisions? This is quite vague. This could be better displayed in a more of a graphical way, where you can clearly see distinctions among them and where the emphasis is. With this, I believe, you will connect better the choices with the respective outcomes. Basically simplifying it a bit.

## **2. Is the scoring system understandable?**

Yes, there is not much of a justification of why and how is each value given to a choice. You can make assumptions of why this would be, more points, the worse it is. But no clear connection between how the points are assigned and why. For instance, why a 5-bedroom house has more points than a 3, if the house of 5 is being utilized more efficiently by 5 people, rather 1 person utilizing the 3-bedroom house.

## **3. Are the trail instructions difficult to follow?**

To be honest, there are no instructions to follow. Therefore, it will be good to hang up some instructions in order not to wonder around and get to the main idea faster. Also, the path of the boards, like an explanation how to follow them.

## **4. What would you change to make the trail more interesting and fun? Give any suggestions.**

Personally, rather than having all enclosed in a circle, I would bring it around the perimeter or through the middle and convert it into a sort of backbone through the exhibits. This will allow them not to wonder out and they would see, “oh there is a cool thing here” “there is a cool thing there”. Add more visual and “hands on” will also make it more appealing to all ages. I suspect some of the people that come here miss some of the stuff, like the biogas house because they just come in go in a circle and go out. So perhaps integrating all the features of at least this segment of the park will help gain a better understanding on what CERES wants to teach about. Lead them through a particular route.

## **5. Can you tell me at least one positive and one negative feature of the 2030 Trail?**

Positive: That is actually here, something that makes you think about the future and how can you impact it.

Negative: That is very outdated. There is no connection between scenarios and decisions that explain why you get them.

## **Appendix F- Transcribed Interviews with Melbourne Museum and Scienceworks Staff Members**

F1	Interview with Hayley Townsend, David Perkins and Michael De Zilva
F2	Interview with Kate Phillips and Matthew Navarretti

## **F1- Interview with Hayley Townsend, David Perkins and Michael De Zilva**

### **Interview with Melbourne Museum and Scienceworks Museum Staff in Melbourne About Methods of Displaying Educational Material**

Name/Department: Hayley Townsend (Digital Systems Department for Museum Victoria)  
David Perkins (Digital Education & Outreach Manager)  
Michael De Zilva (Program Coordinator - Museum Victoria)

Date: April 2, 2014

CERES, Centre for Education and Research in Environmental Strategies, offers programs that educate visitors about sustainability in Australia (CERES, 2012). Their interactive excursions attract schools locally because they allow children to learn outside of the classroom about sustainability. Among their excursion programs, CERES has created the Australia 2030 Trail. This trail consists of giving students in grades 5 through 12 the opportunity to choose among various decisions regarding resources and population. Due to the large amount of people that visit this attraction, most of the infrastructure has worn down. Outdated information causes children to be misled about how their decisions can affect future outcomes. In order to improve the information in the Australia 2030 Trail, data will be updated with the most current projections for the year 2050. In addition, to have more effectiveness in the teaching method, the way the information is presented currently, needs to be modified.

Therefore, as part of our goal is to find effective ways of education to implement in the design of the coming Australia 2050 Trail. We would like to ask you some questions in order for us to get a better understanding on what works best when educating students. We believe that your experience and constant exposure to educational displays can provide us with a better understanding on how to effectively display information to students and the public. These interviews will be tape recorded with your permission in order to eliminate as much bias as possible. We will very much appreciate your input and opinions in regards to make the best improvements for the Australia 2050 Trail.

#### **1. What do students more often get attracted to in their visit? Why do you think this is?**

Hayley: What kind of age group are you looking at for this project? Is there a specific age group for the trail and then for the general public as a layer on top of that? So are we talking primary school, high school? Well obviously here at the museum, in terms of interactivity its very screen based and physical interactive based. So everything from touch screen to play video, all the way through to an interactive we made out of capacity buttons, etc. So it's all very sight driven, but we do find that students do love, well the younger kids do like a button to push. Older kids it's hard to say, there are so many levels of ways of interpreting information these days from the very physical ones, but they are through things like apps. Sort of the using of mobile devices to guide as well, which you probably know more about than I would (referring to Dave).

Dave: It really depends on the students, but like younger ones is more mechanical, but in *think ahead*, you've been to Scienceworks and have had a look around at *think ahead*? That transport one is really popular, and it's sort of along the lines of what you are talking about, of making those choices and ending up with a product. What they are doing is making a car, they choose

what kind of repulsion, what type of wheels, what type of body, what type of material it will be built out of and each one has an eco-friendly rating attached to it. In the end they get to see their car and this sort of billboard showing it, kind of thing. And I think they are really attracted to the idea of having some kind of input into the decisions and being able to have some choices. Like when you put, sit down in our children's gallery, which is for much younger children, we took away the color once and there was an outrage, like why are you doing this? It's because it was something they could manage, something they had choices, something they expected to have them. Like coloring it in, there's no constructive, but you know, you're like it's choice-based learning and it's like product that they get to construct themselves. Next to that, there are all the building blocks and that's old habit, like why do we do that? But then you sit there and constantly watch children build things and knock them down, so I guess it's like knock on effect from that is why is that the most popular one, why is my craft so popular? So, you know, you are limiting what they can do, why don't they just go get some nails and wood and build something. But what you are doing is by giving them a manageable way of constructing something, like it allows them to have a greater degree of success. So by giving them blocks that click together you can quickly come to something, that they might not be able to do otherwise. So we, in *think ahead*, we looked for all experiences where they would get to have that moment of putting something together. So at the end of the timelines, because it was about the future, we do like timelines, like the way running shoes had been developed and at the end we had to be like, well yeah of course if say running shoes in five years will be like this, they would be outdated and they would be wrong. So what we did was give them a bunch of choices and say hey, quick make the last shoe in the timeline, you've got to sort of figure out what you think will be the shoes of the future, will they have rockets in them, will they have GPS. So there is a mixture of silly and realistic are options, to keep it sort of playful as well. The other thing, so in the evaluation that we did in *think ahead* there was a lot of worries, from the older children, like 12 year old, 11 year olds, thinking that future was, sort of in dire straits and there was really nothing we could do about it. When we asked them to draw pictures of what the future might look like, one of them drew a big pile of rubbish on fire, and was like oh that's not ideal. So we sort of always make sure we present options, and present choices, rather than saying, definitely your city is going to be flooded in X amount of years or definitely the future is going to run out in this amount of time or definitely the air quality will become so bad people are going to die. Trying not to make those sorts of ultimatums. For the younger children, in the evaluation, what we found was they struggled to discern reality from fiction, so their ideas of the future were like, well it's going to be flying cars and people tubes and teleportation. They didn't really have sense of; it was like a set destination that they are going and like go to Hollywood or something. They thought it was a place that was already constructed that one day we would get to. And so a lot of the picking was to remove the fiction from the possible and sort of do a bit of explaining, what is fiction what is possible. And for the interaction for them, you know we had, so Scienceworks was suffering from being the Sciencecenter, not suffering, but so Science centers are basically like full hands-on, mechanical, lots of whack a button, move to the next thing, whack a button move to the next thing. Kids like it, they enjoy it but the learning is fast furious and the exhibits get tired very quickly. It doesn't have that deeper engagement, so for *think ahead* we tried to bring that deeper engagement of, okay we will have the mechanical, we will have things you can whack or build or do things with, but we also wanted where you have to stop and make some choices or decisions and go through a bit process. Like the super future you that has to go through thing with the connect and sort of decide parts of the body they want to modify and why

they want to modify them. We also want those moments of reflection as well, so we put lots of multi-media and objects with a bit of context to each thing. So while they might be there writing the name in binary or something, they are surrounded by these objects that tell them the stories of how storage, media might have changed over the years. They might not be like oh yes I can see this and I can see this but it's in their periphery and it's there, and one day they might be like, mom what that is. That would be great, that would ideal.

## **2. What are some key features about exhibits that generally are effective to attract the public?**

Hayley: Oh the general public. It's hard, well actually I probably shouldn't be answering that from a hardware perspective because our stuff is just there, and I don't think it is particularly attractive. I mean, a nice big screen is always attractive. Something slightly differently, even though it's quite difficult to produce for the general public because you are sometimes sort of worried about the levels of comprehension people have of actual multimedia hardware. So increasingly people are becoming aware of things like smartphones, touch screens, iPads, you know that newer way of interacting with technology and then the old way of interacting with technology. We have sort of, again, a range of ways in for people, which you can never quite guarantee, you never quite work out exactly how they are going to interact. So some people are going to be quite happy going up to a screen and touch it, some people feel a bit resistant to do so and that comes down to, a lot of the time, how the content is created. If it's a nice big plush screen with clear instructions that what you do next, then people will engage with it. If there is a very clear button to press, people are quite happy to do that. And sometimes you need to guide people a bit more. So I suppose the digital labels in First People's is a good example. The upgrade in our indigenous gallery, so our big challenge there was huge showcases of objects, but we do want to put labels in the showcases, so how do we interpret those objects and give people some control over the way in which they engage with the objects in the case. So what we did was we created what refer to as digital labels. So you walk up to the showcase, it has a screen, the screen has the image of what the showcase looks like, you touch an object, it gives you the basic object information and then you can drill down into layers to get to the information of who made that object, maybe there is a video, a series of photos, things like that. So in doing something like that, particularly with the general public, you need the interface to be quite simple, quite easy to work out. But also in the design, you have to think, okay well some people are really familiar with, you see a screen you know you can swipe it to move through content. Some people will get that straight away. Some people will like to see a scroll bar, so they know, that actually gives them a clue and very clear directions, if you scroll up you've got arrows pointing down, you know you've got information below that point. So actually that was a really interesting process to create those in a way, we thought, the broadest audience could relate to. But also, a lot of considerations of how big do the screens need to be, how high do they sit, how many do we put out there, what runs behind them? That's more of a consideration from a system's, the point of view of the crew that has to look out for them. But I think those are really big considerations when it comes to casting a wide net when it comes to interactivity.

Dave: I had an invitation to participate, it's really hard to make clear, because if you are working to make the best software with someone, you'll be working on it for six months so you know when you press that, this will happen or when you press that this will happen. Then when you have someone new, and that's for the general public it's got to be from like three years old now, to 80 years old, I guess. They've all got to understand that, so whether it's a three year old who is

use to a touch phone and will just know to swipe every screen it sees. Or an to an 80 year old who sees screens as a form of television, might stand there and wait for something to happen. So you've got to build in all that little tells of like sometimes a little animations of a hand pointing at a button or to push this.

Hayley: Or even the old fashion information symbol, push that, push the information button, here's how you use the interactivity. I'm pretty sure we've got those down there. Just to add that extra layer.

Dave: So you have to add in all these sort of instructional, text bits, to be like hey press the screen or move the screen or touch the screen to do something.

Hayley: But I think it needs to be pretty obvious still. It's always interesting you know. And the other thing is it's good to go through all these audience testing because sometimes you think you know how it works but then you put it out to someone who has never seen it before and then all of a sudden they are like well what do I do now.

Dave: When you are doing that, you've heard the WP actions. When you are doing these exhibitions, it's almost expected that there is a level of digital and interactive demo. If you made an exhibition without any multimedia, I don't know actually, maybe we should try that. You just don't get away without doing some kind of touch screens and whatever touch-screens we have will be outdated in five years. So it's hard to maintain the currency and consistency as well. So you might have ten different companies working on your exhibition and half the battle is making them use all the same font, the same color, making them all use the same design to get into. For programing for families, it's quite difficult to say what the family wants. Usually when you are talking about family, the answers are guided by the child. But what you can do is give the opportunity is for the adult to own that information so in the children's gallery we have information panels, when the children read them, they can barely read. If they do read them, they read them to their parents and what's more likely to happen is the parent will go, hey did you about the Mesopotamian Pyramids. And they will be like oh dad you're so great, you know all this stuff. So you are still aiming at the child, so it's hard to get away from them, even the child. So you're aware of your content, you have it completely accessible and then you have more and more content. With digital screens it makes it much easier to do that. You always have the adults who complain that there's no enough information here. Or, but if you put too much information its label unsuitable for children, and then that's it you're out.

Hayley: And the other consideration is things like subtitling, accessibility, hearing loops, things like that.

Dave: Even the height.

Hayley: So there's another whole layer as well. Length of video clips, we know for experience or from testing and statistics, that people won't stand in front of a screen for more than a minute or if you're lucky. So you've really got to temper your videos particularly are. I remember doing First People's and sort of looking at their six minute videos and going I don't know who is going to stand in front of this for six minutes. If you haven't got your point across in the first 30 seconds or your interactivity method across in the first 30 seconds people tend to walk away, sometimes. If it doesn't do something understandable then you call us. You press it harder and then I come and kick it.

### **3. What exhibits do they have about sustainability?**

Hayley: I think we just got rid of a couple.



Dave: *think ahead* is pretty, it sort of has, it is at Scienceworks, and it has large sustainable themes all through it. It's hard to talk about the future without talking about the continuing future, which is sustainability. How do we continue to live in a way, which is manageable?

#### **4. How are they displayed? (Visual, auditive, etc.)**

Dave: I think you have to do a bit of everything really. Like, so, you can kind of get away with no sound, but then it's sort of eerie and ideally you'll have something visually attractive to pull them in. When they do something they will get some sort of visual or auditory recognition. Bing, Click! Your phones do it all the time; they are amazing because they pull you in with like, oh I've done something, that's working you need to acknowledge that they are doing something. It has to be sort of visually inviting and pull them into; the news is probably the best the best to look at how to structure information. You start with your headline, it might like, and Sustainability Exhibition or What will the World Look like with Risen Water Levels? How much do you weigh in gold? So it's like, hmm, I wonder how much I do weigh in gold, so they go up and then it's like, well the price of gold changes all the time, blah blah, blah, standard the scales to see how much you weigh in gold. Be aware of information that is bold and a bit of an outline and then a bit more detail. That's how you get people in, if you put too much information it scares people off, people don't like to read them. If you have a block of text, people are like oh I can't wait to get into that. It just doesn't happen, it's unfortunate. Video and audio are great for pulling people in as well, but it's got to be a bit of a platter. The problems with video and images are copyright information, it's a pain. So you're going to have to take your own video or your own images, use things that are cleared to be used in that way.

Hayley: I think in terms of sustainability, one of the attractions I can think of is, where we had here, was about water smart, which was about water use in the home and it was actually a huge mechanical interaction. It has a massive footprint, it had a sort of water sculpture in it and it has screens scattered around. So it had three smaller screens that had the information about saving water, what people are doing and then the main screen, which was to control, it had very mechanical ways of interacting with it. So basically what you did is you went through a series of choices, if you had this or this or this kind of showerhead what does it do and the water would fill up and give you a visual representation of what was happening. At the end the sculpture would run and then the reward at the end was sort of a fanfare, if you did well or if you didn't, well sorry try again. I think there was a round of applause too, that was always fun. That's a very large-scale way of doing it.

Dave: They loved moving water from one place to another. At Scienceworks, the younger kids exhibitions upstairs. As part of it, it is like a full construction scene where they move these foam blocks onto a conveyer belt and wind them up the conveyer belt, and then they move them all in a line where a crane takes them and boosts them down. Then they start all over again, eventually. They love that, just moving stuff around, having that physical ability to change whatever they are doing or to contribute to it.

#### **5. How do you perceive kids learn the most? By hands on or by listening to explanations?**

Dave: Depends on the learning preference. I tend towards talking about; obviously not all of the information can be delivered in that way but hands on is the preference I think.

Michael: Yeah I was going to jump in and say, if you are talking about an individual, you can hone in on to what they respond to best. But in general you want to be multimodal, so you want to have pictures, you to have video, you want to have audio, you want to have that hands-on. So

you want to have that healthy mix of all those in order to successfully get the message across to, what is going to be effectively a broad range of background and ability.

Dave: We know that early learners learn with playing with things, and moving things around with their hands because they are still trying to figure out what their hands are. They will put things in their mouth to see what they taste like. They will climb over them to see how they are, pick them up and drop them to see if they smash. That's all the learning that they do. But also, three, four, five will love story time to death, you will get to the end of the story and they will be like read it again. But you just read it, you know what happens but they want to do that, that listening activity. The interaction between an adult and a child, they enjoy that. So it depends on what the information is, but if it's like, I think if you want them to get a sense of it have them draw a picture themselves or to do something with it. It's completely difficult to talk around the theoretical because it depends on what you are doing but with dinosaur fossils get them to dig something up or construct something, to learn about fossilization or how things are figured out, how these things are put together.

Hayley: Yeah we find that the highly physical interactive are the most popular. Say in First People's, you know there are lots of screens, people talking about their experience or choose a video to watch. But the things that are most engaging are things like the language map, which is 40+ language groups, it's like a physical interaction. It's a map of Victoria, there is a bunch of sticks that represent the different language groups, you press it people absolutely adore that mainly because kids can swipe all triggers at once. So they swipe their hand over it and they are going to get the call from it. Which is the whole point. Or you look at something like the creations that's got the kinetics sculpture of the bird, this map it's projected on, that's very focused, very engaging sort of space, which some avi, requires you to take people out of the space and sit somewhere quietly and engage that way. So that's very much, that is very much listening, watching, but it's very very very engaging because of the nature of it. So that's another way, but that's for older learners I'd say. Kids might look at the motion but in the end it's all audio that does the teaching.

## **6. What will you do in order to make an attraction be fun but at the same time have an educational purpose?**

Hayley and Dave: That's the ultimate question.

Hayley: Then you start to ask, how much money do you have, where is it going to go? That's where it starts to get a bit more difficult because it does come down to all of those sorts of factors. What you are doing, where you are doing it? For here it's different modes for different topics within an exhibition space. Where is our building, with the entire infrastructure that we could possibly need, whereas it sounds like with this project it is outside, considerations for that are going to be really really challenging.

Dave: Will there be staff, will there be a person there to help activate it, will they have to figure it out on their own, will it be outside, how much money do you have, what are your key messages? I think you start with what your key messages are, you develop a brief for how you want it to look and then it ends up somewhere over here. It will probably have your key messages in it but it won't always be the bang thing that you thought was going to happen because it is very hard to develop interactive, if it was easy we would all be computer game developers. It's a very difficult set of skills to be like oh we will make this interaction that will teach you about this, this and this. That's why educational games very rarely take off because it's hard to make them fun and educational. So stick to your key message for each thing, don't try to

put too much in, maybe do a series of things that might teach you various ways things work, rather than trying to build a whole into one you can sort of unpick it a little bit. Yeah it's a very difficult thing to figure out but it's a fun thing to figure out because you sit down and say okay this trail is going to be about sustainability so we are going to start by talking about what is sustainability. Probably define the language first, it's like how can you talk about that, well if you talk about it in a discussion or give them some options or examples of sustainable living maybe it's a model about how sustainable future is versus an unsustainable future. And then sort of work through the steps of how you are going to build your trail or how are people going to work through your trail and what are your messages at each stage. Then from that start to figure out the interaction might happen and then start to think about okay, well where is this, how is that interaction going to fit in that space? Then compromise make it work.

Hayley: One thing that we haven't touched upon, of course, is mobile technologies, apps, which sound more like, when you have something in a public space people usually create apps, as opposed to anything physical. Few people do art outside. Certainly there are a lot of companies in England that actually produce mirrors of, produce hardware that is tough enough for outside and doesn't have to be maintained quite as much and things like that. That when you sort of hear the word trail, that's what I think, nothing particularly physical, maybe some sign postage but then all the interpretation and sometimes all done on apps.

Michael: Yeah I was going to say, one area you should look at is things like bus stop advertising and things like that. Where advertisers and markets actually go for that reality sort of, where they might use QR codes or some sort of recognizes an image, I'm trying to think about, there is an app that I was recently looking at, but I can't think of it. It actually recognizes an image like a painting or something like that and then does an overlay. Look at that sort of area, because those are outdoors, unlike the museum here, those might be more towards what you are doing with the trail. Something worth looking into, seeing how those guys go about it.

Hayley: Many of the aspects we have been talking about, light levels of information, what type of information and video, all that sort of thing as well. We do a little bit of that here, I think education use mobile technology to, and we try.

Dave: Timelines is quite useful, interactive scavenger hunt. You get to an object, you solve a riddle, but ideally it would be like you get to an object, you have to fit it into a frame, once it recognized the object and start, which would be amusing. But we trust you to be there, we don't use these educational devices.

Hayley: Another there is another level again, you look at Mona. Their interpretations for all of the art, is portable device, and that's sort of triangulated Wi-Fi. Then I'm in front of this painting, I hold this device up, even though it's right where I am it shows me that information of what's around me, it will even do over IP, so you don't even have to have speakers in the gallery. That's a really high; we haven't seen that done particularly, because that was to build and amazing system. It's such a different way of experiencing it in a space like that. But I can imagine that sort of technology, that's growing. There are things that are more simplified like QR codes, which you can make in 30 seconds as long as you know what you are pitching to and all that sort of thing but then that's having service somewhere and hosting, and all those sorts of considerations. Is the content going to be outdated, which is going to do it? It's quite different from doing something physical.

## **7. What are some steps you take in order to make an exhibition possible?**

Hayley: Well, most exhibitions, we are going to start with the big idea, obviously. Then, it takes a village, so you get together a team of people so an exhibition has so many elements to it. It's curatorial, it's 2-D, 3-D design, it's education, its multimedia, through the lighting, and there are so many people involved. You start with the idea and you narrow it down, you compromise it down to a point where it can actually be achieved, within budget, the physicality of the space, or have

Dave: Time scale as well. You might something that is budgetable but it will take you three years and you've got six months.

Hayley: Yeah having that in mind is incredibly important.

Dave: Start with your, do a plan, start working at it, be prepared to modify it by various steps.

Hayley: And test it, test it as you go. Evaluation, feasibility on that side and of course, on our side it's prototyping. I've built so many prototypes of things, to just then go; no I don't think that works. Or if I do this, I modify it; it will be a bit better. My design isn't working the way I thought it would; damn I need a programmer, that sort of thing. So you can start to see. It's absolutely vital because and it's good for other people to see, you go; okay we got the prototype up. To the rest of the team come and see it, how do you feel about it, how do you feel about interacting with it? Do you understand it, is this how you thought it would work? Very important.

**8. How do you portray something in a positive way that is actually negative? (E.g. climate change)**

Dave: The way we talk about it is behaviors, we don't tell them, well of course climate change it bad but it's actually. And the fact that behavior. So what we do is like unless we change our behavior, unless we change what we consume, these trends are going to continue to happen. And these things you talk about are how incredibly adaptable humans are and how we will inevitable find a way. But I ideally we change so we don't destroy the planet and have to live in that, it would be nice to live in a nicer way. So rather than blaming the child or blaming the people, we definitely always make it about this is what may happen if these behaviors continue.

## **F2- Interview with Kate Phillips and Matthew Navarretti**

### **Interview with Melbourne Museum and Scienceworks Museum Staff in Melbourne About Methods of Displaying Educational Material**

Name/Department: Kate Phillips (Senior Curator, Science Communication - Museum Victoria)  
Matthew Navarretti (Outreach Program Manager MV Discovery Program-Melbourne Museum)

Date: April 1, 2014

CERES, Centre for Education and Research in Environmental Strategies, offers programs that educate visitors about sustainability in Australia (CERES, 2012). Their interactive excursions attract schools locally because they allow children to learn outside of the classroom about sustainability. Among their excursion programs, CERES has created the Australia 2030 Trail. This trail consists of giving students in grades 5 through 12 the opportunity to choose among various decisions regarding resources and population. Due to the large amount of people that visit this attraction, most of the infrastructure has worn down. Outdated information causes children to be misled about how their decisions can affect future outcomes. In order to improve the information in the Australia 2030 Trail, data will be updated with the most current projections for the year 2050. In addition, to have more effectiveness in the teaching method, the way the information is presented currently, needs to be modified.

Therefore, as part of our goal is to find effective ways of education to implement in the design of the coming Australia 2050 Trail. We would like to ask you some questions in order for us to get a better understanding on what works best when educating students. We believe that your experience and constant exposure to educational displays can provide us with a better understanding on how to effectively display information to students and the public. These interviews will be tape recorded with your permission in order to eliminate as much bias as possible. We will very much appreciate your input and opinions in regards to make the best improvements for the Australia 2050 Trail.

#### **1. What do students more often get attracted to in their visit? Why do you think this is?**

Well, obviously it is something they can interact with. So whatever that means. For younger children it's very much things they can touch, or things that involve their whole bodies. So, we have an exhibit up in the Wild Exhibition, which is about animals and there is this moving projection on the floor. There is this lizard that runs across the floor. And any child under about four loves that because they can run after it like this. So for littlies, it's got to be something full body, something that is interactive. But they still also like, the specimens up there, the things to look at, if they are familiar, if they have some connection with them. So the stuffed animal is good because they might have seen a lizard or a bird, so that they have a connection with those already. With slightly older kids, the interaction might be different. Obviously if there is a computer screen and there is some sort of challenge or a game element to it, then that's something that should be attractive. Obviously big, impressive things work for all visitors, like the shark. You often see kids looking at it like, "Is it real," with the shark or the dinosaurs? So I guess we all respond to something that is a big scale or has some impressive features already. And I guess, it's about, again, personal interest as well. Again some kids come in and they are already really interested in dinosaurs, or they might have visited before and have something they

learned before and really came to see it again. We've got that horse up there, Phar Lap, which is this famous racing horse, that some people know about that is stuffed in the museum. So if there is some sort of history and they already know about something, then they might want to go back to that. So yeah, those are some of the things.

## **2. What are some key features about exhibits that generally are effective to attract the public?**

In an exhibition we have a very integrated approach to writing text. And by that I mean, we think about it as a whole thing, the whole exhibition. So we think, exhibition title, what's that first thing you're going to see, what's that label that's going to clearly tell you what the exhibition is going to be about and hopefully be interesting or attractive. And does it have something else with it, a graphic or something. Then we are thinking about, what are the exhibition themes? What are the main areas within the exhibition? So we can go and have a look at those, but it might be that you're doing a journey through time and you are starting with something further back in past. And that is your journey through the exhibition. Or it might be that there are subsections, and so we think of those themes. So you have to make it clear, I guess, what the different parts of experience are. So that's kind of like the organization of it. But then, okay what's going to attract to you that particular thing. I guess it's going to be, well what's the heading and what is it doing, what is the function of this label, why would I bother looking at it? Well it's got to have something, which is, maybe it's the title that helps draw you in, it's got to be very clear, so not to be confusing, to be easy to read. Yet still rewarding and interesting. There is no secret formula, other than, you've got to remember that those labels are not like when you are sitting down reading a book or when you're looking at something on your iPad, or whatever. You're standing on your feet, you're moving around, it's busy, it's noisy. So they actually have to be very clear and quite short, so that they are actually, they facing up to a lot of distractions I guess.

## **3. What exhibits do they have about sustainability?**

Kate: Yes, we can go and have a look at them. There is one section in particular, in the Wild exhibition that looks at human population and its impact on natural systems. And then in the detail of some of those exhibits it talks about particular animals and how they are going and what factors are influencing them.

Matthew: At first we had a bit of a look at First People's. It was a bit of a look at sustainability and changes in animals over time.

Kate: Those are the two that spring to my mind. I'm sure there are other places as well.

## **4. How are they displayed? (Visual, auditive, etc.)**

Kate: Well the one that shows human population as a visual, I think over time, showing how human population has increased. So that's just a very, what I called a dynamic graphic in a way. So it's doing what we do here, which is using multimedia to show something very visually. But I'll show you because it is a combination of a screen and a map.

## **5. How do you perceive kids learn the most? By hands on or by listening to explanations?**

Kate: I think it depends on the child. I would have a variety of approaches; I would try to use all of those. I mean, you've got to, if people are bored and they're just looking at something else, then you've lost them. So I think it's got to be something that's interesting and engaging. So it might be, with kids, it might be using the senses first. So you might give them something to hold,

or touch, or look at, to get them in first. And then do a bit of talking or something written. I guess it's, you would know this from the classroom, it's pacing of how you, the structure.

Matthew: And the structure too, sometimes is really useful. Even if it's a repeated structure can be quite useful. Even with the younger children because they know a pattern is emerging, I think. And also, something for me that really engages me and I think everyone is that sense of story too. If there is a sort of story about something. Or even just a personal story. I know particularly useful, in a classroom, you know, I could talk about animals that live in the forest, it could be very active. But if I said, to the students, well actually on the weekend I went up and saw these and this is what we did, it's a whole other level of interest.

Kate: It's an eyewitness account.

Matthew: It just brings people in. But you are right; I think it's using all of those different sorts of approaches as much as possible because children and people are all different, and different ways that they take in information. But I think what you are saying there, the structure and the themes are really important and that it is clear. I think that that's the way, not here of course, but I think you go into, I go into places and don't know where to begin, don't know where to start. So that is sometimes the intention. That sometimes, I think particularly for children, it's good that they are a bit familiar with things and that they can sort of find things they are familiar with and by comparison, you know that old sort of thing, is you know, looking at things that are new and that sort of thing. And that's where I think just going back with 2030, the way I use to remember it, is that it did start about them and their thoughts and their thinking, I think that seems a good way to start. It engages them immediately, when they start, particularly adolescence, when they start thinking about themselves, which is not that hard to get them to do, often.

## **6. What will you do in order to make an attraction be fun but at the same time have an educational purpose?**

Yes, well we put together a document, which is like our concept document. And sometime the different things feed into that. Sometimes it might be that we are using a very strong collection area within the museum. And that that is the most important. So for example, with the dinosaur display, we had ten skeletons of dinosaurs and four skeletons of mega fauna, those are the big mammals and birds that were more recent than the dinosaurs. So we had, like that was our starting point, we had those collection objects. So then we were thinking, well we need to put an umbrella over the top of them, what's the idea that draws them all together? And so, then you kind of draw that into a story about dinosaurs. But other ones, they might be something more, I guess the *think ahead* exhibition, which was about, had the umbrella idea of imaging the future and advances in science and technology now that might be influential in the future. So then we, with that umbrella, we had a look and saw what we had in our collections, we talked to people about, we talked to kids, we got them to draw their ideas. We talked to the staff, so we gathered ideas from whole lot of different places. We also thought about, well what's actually going to make an interesting exhibit? What can we think of that will engage people? So it was, it's kind of a messy process. It's not like you suddenly know, that's what it is going to be. Well there are keys steps. I guess, you gather together the different pieces to the puzzle. So it's like, do I have a main idea here, is there a main umbrella, under which things fall? Who's my audience? So you think very careful, who's my audience, in that case, in *think ahead*, we decided it was 8-12 year old children and their families and their schools. So one of the first things we did is, we got a group of 40 kids and we talked with them quite intensively about their ideas about the future. So

we asked them, what do they think is cool now? What do they think might be cool in the future? What do they enjoy doing for pleasure? What do they like doing? So we asked them a whole range of things and then drew out what they thought about the future. And then we got them to write or draw their ideas on a piece of paper and then explain them to us. So that in a way, made sure that we were on the same wavelength as them. And also showed us, that within that group, age 12 year olds, there is a big age range. Because the 8 year olds are still kind of little, quite young kids and they've got their quirky, very individualistic. They start to think about the world and get exposed to ideas about the environment or ideas about different countries. And then, the 11 and 12 year olds, some of them were really quite concerned about climate change; they were quite worried about it. There was one girl, in particular, who was really gloomy and she said basically the world is going to heat up and we are all going to die. And it was like wow, poor thing.

Matthew: Yeah they said that has become quite common. And that's something that has often been a criticism of 2030, so yeah; you've probably heard that.

Kate: When I saw this girl, she was only 11, I thought, that's really unfair that an 11 year old should be worry about, we are all going to burn up and die. She should just be getting on and learning and developing her own skills. I felt to me as if it was like a burden that was put on her. And I thought, well you could wait until you're at least a bit older before you have to start worry about it. I thought we have to give hope, was my kind of take on it. Even if, personally you think there are huge issues to overcome, even if you are concerned personally, I didn't think an audience of age 12 year olds, that we should be showing them visions of, like dark visions of danger and disaster. That to me felt unfair.

Matthew: No that's true, from what I remember, particularly for younger children, there is a lot people showing devastating images of marine life choking on plastic and that sort of thing. But I think we are starting to see, particularly for younger children, it's just not helpful because it's just negative and they know that, they hear those stories. You can talk about it. You don't have to show them the images; you talk about the hope and the positives scenes. They are already doing, chances are and that sort of thing.

Kate: So one thing that we can take out of that is that thinking about the audience is thinking about what they know and what they are interested in. But it's also about their development and where they are emotionally and their maturity and what is appropriate for that age of person. I don't know what the audience is for the trail.

## **7. How do you portray something in a positive way that is actually negative? (E.g. climate change)**

Kate: That is the big question. Well because, I don't know if you saw, we did a couple of exhibits in *think ahead*.

Stefano: There was no explanation for why those bad things would happen if the population grew too big.

Kate: Well I think it's because those issues are quite complex and it's hard to do it in a simple format and I guess you guys will be working on that.

Matthew: Especially for that age group too.

Kate: There was also the ones that, the icicles, you press the thing and the icicles pop up. That was about how we know the climate is changing. That was, not too far from, the population one. There was also a turning thing, where you saw the parts per million of carbon dioxide. Anyway, that exhibit, I'm not that happy with, we had a different design and it got changed right at the



end. But that one, the idea was just in a way to say climate change is a fact and here how we know basically. And so that one has the parts per million changing, I think it's every 10 ten years or 20 years, I'm not sure, I think it might be every decade. You just see it going up like that. And then and then icicles one, again is another way we know about past climates, is the through the bubbles trapped in the icicles. So that was again, the aim was to show the scientific, some of the scientific basis on which we know about. So I guess that wasn't taking you the next step and well okay this thing is changing and what do we do about it. There was quite a lot in there about energy use and the problem with a lot of the energy here in Victoria is that electricity is generating a lot by burning brown coal, which is probably the most polluting of all options and that although we have wind power and solar power, whether we can get enough energy from those sources, quickly enough, I think is the question.

Matthew: And from what I saw, it did demonstrate those too, like in the models too, I have the wind power as part of the sort of the food system. So there is a lot of those, just putting in as the positive future, this is what we've done. And even in the car design, there are lots of low energy, sustainable, is it bamboo, body shapes and all of that. And also for me, when you say climate change, I thought well a terrarium is an almost, sort of an illustration, without being negative, it's a positive. This is how the world functions, this is how it's in balance. Rather than saying, well it can be affected but this is what the ideal maybe is.

Kate: That was the idea, that there was an analogy for the biosphere. What we did, is when we talked with kids, we originally had an area that we called animals and plants, so that was an area within the *think ahead* exhibition, was just going to be animals and plants. So when we asked them about that, they started talking about pets, zoo animals and parks, things like that. But we were really thinking, oh, that actually misses the point, but they are thinking about them as individual. You know, here's my cat and I'll go visit the zoo and they were like. Whereas, what we were really talking about was, kind of natural systems or the environment, so it was the connections between a whole landscape of trees and the atmosphere and the ocean. Trying to do that kind of planetary science. So that was what informed that area and that's why we had those globes, you know those different scenarios, the good or the bad. Was this idea that everything was connected and that the biosphere was sort of, the starting point, we have this finite planet and everything is connected into that. So that also came out, talking with kids and finding that if you just said animals and plants, they tend to think of individual, like a pet, which is nice, we like pets and everything, there's nothing wrong with pets. But it wasn't then linking up to things like the atmosphere and pollution.

### **8. Where do you limit, for example an exhibition to be worldwide or just in Australia?**

Look, I think we try to do a bit of both, when we go and have a look at the Wild exhibition, you'll see, we've tried, obviously you want to include things relevant to people here, but I always think it's important to put the global context. We are all connected and even more so today. So, I think we tend to do a bit of both, for example, in that exhibition we had the central bit that had international stories and then we had a bit off to the side all about local stories. So we kind of had two different areas within one exhibition: one looking at what was going on at a global scale and one looking at what was happening locally. And sometimes they are the same issues, in fact in that case very much the same issues but the example, either Victoria, what was happening right here, or what's happening in the world. I would say with population, a lot of environment problems happening here, have to do with population. Yes, those two, there's consumption, very much so and that you can't separate out the two, you have to have

consumption and population. In Australia, I think the message about consumption is more important because we do consume an awful lot, per capita and basically you can kind of draw the graph that you impact of the environment and pretty much directly a relation of how much income you have. The richer you are the more you have an impact on the environment. So, I think you have to; looking just at population is too simple. Sometimes you have to focus on one angle. But it's that consumption vs. population, consumption and population growth all the time.

## **Appendix G- Transcribed Interviews with CERES Staff**

G1	Interview with Shane French
G2	Interview with Ian Culbard
G3	Interview with Nick Scott
G4	Interview with Arwen Birch
G5	Interview with Alex Hoffman

## **G1- Interview with Shane French**

### **CERES Staff Member Interview**

Name: Shane French

Number of years working at CERES:

Department: Excursion Manager

This interview serves as a way for us to get an understanding of how the 2030 Trail works and in what ways it can be altered to make it a better educational excursion for students. We are coming to you with these questions because we believe with your experience and knowledge of the 2030 Trail you have the best understanding of its effectiveness and any room for improvements. Your answers will help us to improve the design of the coming 2050 Trail.

#### **1. What are you overall opinions of the 2030 Trail?**

I love it, I think it's fantastic, I think it's a fantastic learning tool. I really like the way different age groups can interact with different parts of the trail and different parts of the signage. Younger kids tend to look a lot at the pictures and we can encourage the older kids to delve into the information, like fossil fuel use and all that kind of thing. I think it's a nice learning tool for thinking outside everyday actions and thinking about the now and actually starting to think about the impact that those choices have on the future and future generations. It's really important and it kind of is the reason our society is now is because of the decisions we made in the past. So it is interesting thinking about decisions that will affect the future. So there are some of the reasons I really enjoy it.

#### **2. Which age group seems to enjoy the trail the most?**

My personal experience, it's probably late primary school, probably grade 5 and 6 and early secondary school, year 7 and 8. I've had older groups that get right into it and I've had adult groups that get right into it. I'd say primarily from grade 5 to year 8 in my experience.

#### **3. Do students find that the trail is difficult to complete without your assistance? If so which age groups seem to struggle the most?**

I tend to have it, to run the trail, I will with grades 5 and 6 stop at each board and will quickly go through each board and I will get the students to write down their results as I read them out, to get them to write down the value after each time. I find that it goes more quickly that way because the primary students can get distracted by the pictures and things, which is fine but to get to the futures I will read through them, the boards with them as a group. Once they get to secondary school I tend to go through the first board, the housing board, and explain to them how it works and some of thoughts behind some of the choices they might make and then I get them to split up. I will get people to go to board four and work backwards, some to go to immigration and work backwards and I find that we can get through it in ten minutes that way. And I often hang around choice 4 where there are twenty or so choices because I find that that is where some confusion lies. And sometimes I will get groups together at the immigration board because I don't think it's very good. I think that it's very open to interpretation and it's very open to misconceptions about what is a refugee and stuff like that, especially in the current political climate.

**4. Do you have any recommendations on how to improve the trail (e.g. presentation of the future scenarios) to better appeal to the different age groups?**

I think some of the problems, at the moment, are that we know the trail is the kind of the vibe of the thing; you can't honestly predict what the year 2030 will look like. We don't know what technological changes will happen in the next kind of 15 years. But I think some of the stuff is fairly outlandish. I think when you get into some of the later futures and you start looking at bank robbers holding up police and there is other stuff about how many people will be unemployed and we've already run out of fossil fuels, which is technically impossible in 15 years. I think some of that stuff plants the wrong seeds and the wrong ideas and it might be to be a little light hearted but I think in some ways it can actually scare people too much. But I like the vibe of it, so it's an interesting mix between this might be outlandish but by 2100 it might happen. So it's finding that balance between not being overly serious and a real downer to not being outlandish and unrealistic. That's always the challenge I have found with it. I like the presentation in its lighthearted cartoony way; I think that's important. Or a way of doing it that doesn't make it so serious and dramatic and I think that's what they were trying to do with the pictures and I think it could be colorful. I think it could be less wordy in some of it and I think the futures could pair back some of that information. I think some of that's probably not important. I guess, I don't know, I'm not sure average income is that important and I do find that the younger kids get very distracted with how much money they have. They talk about, "Oh yeah but we are all rich." And we start getting in these conversation of well you might be rich but we start to use the examples of when welfare starts to disappear and stuff that you've got a few wealthy but mostly poor people. But in some ways that distracts from the key messages of lifestyle choice, especially for the average Australian kid who's not struggling. Some people are, but really in Australia we are not. I think there are good and bad points of it but I think there needs to be a balance between some of the, this is outlandish and silly information and this is really serious.

**5. Have you received any recommendations regarding the trail in order to make it better or more enjoyable? Are there recurring suggestions? If so, what are they?**

Climate change scenarios, wildly out-of-date now. Ocean level rise, I think now its 80 cm or something, we've already had 6 cm. Like worst-case scenario now they are looking at 14 meters, 40 feet ocean level rise. That's all of Melbourne CBD underwater kind of thing. So a lot of that stuff is really out-of-date and people comment on it and go average temperature rise, fossil fuel use. Social conditions often get commented on, how do we know, how do we actually know that this is what the school system will look like? In the boards there is dull cues, there are unhappy teachers, there's no schools. It's all very arbitrary so some of that stuff is the most common recurring things. Where did you get that information and climate change?

**6. Do you use the same procedure every time you moderate the 2030 Trail, or do you change your method of completing the trail from time to time? If you change it, why?**

I change it, sometimes because I get bored of doing the same thing over and over again. Mostly I change it because of time constraints, what a group might want, I often talk to the teacher first to see what they are after and also you do have to adapt it for different age groups, based on how much you can get through and based on what's important. I really like to do a part of the start now, that's taken from a part of the school called Future Studies. The basic idea is that you get students, where you can get anyone to draw or write their own personal future. So we are using 2030 but in the future we would use 2050. What would you be doing in the year 2030? How old

will you be, will you be married? How many cars do you want to have, will you be rich and famous? Whatever it might be, and we share some and some people want to be world famous soccer players and others just want to be a doctor and live in the city. Essentially everyone is happy, they have all pictured healthy, happy, successful lifestyle, they've all got money, and everything is great. Then I go okay, draw what you think the world will look like in the year 2030. And Over 60% of people will draw pollution is worse, crime is worse, there is no whales left, the environment is a complete disaster. So most people tend to think, it's a very interesting psychology that in the future they are going to have fantastic lives and they are going to be successful and happy but the world is going to be stuffed. And I will often talk about well how will you balance those two. If the world is stuffed how can you be happy because you rely on everything around you, you rely on other people's happiness around you. And if the whole of Melbourne is poverty-stricken and the environment is completely routed, you're not going to have the house in the bubble; you are going to be affected by that. So that kind of frames the way we start going through the trail, so start thinking beyond yourself. I find there is more impact with younger kids, with doing that than the some of the older kids. Some of the older kids aren't really interested in doing it they think it's a bit silly. But then I find with adults that they get right into it. So again there is that kind of lag between the year 8 and the year 10, where you've really got to do a lot of the driving and the talking yourself and just drive the whole thing. But the younger kids and the older adults and stuff will drive it themselves. There are the adaptations we will make based on the age group.

**7. Have you considered having a set procedure that all 2030 Trail excursion guides must follow in order to verify that every group obtains the same information? Do you think this would be more effective?**

I think the trail itself should probably be the same every time. But I think individual teachers will be able to pull out of the trail what they want to pull out of the trail based on the group. I think that with every CERES activity and I know there is criticism about the 2030 Trail with it being too negative and stuff like that. But I think that's what you make of it. I think that you can draw a lot of positives out of the trail as well based on your own personal interpretation of what the trail is. So I think as far as the boards and the choices and the futures that maybe it needs to stay the same but then you have different interpretation based on the flexibility of the class, of their knowledge base, of the teacher's knowledge base and ultimately what the school wants to get out of it. And I think we need to keep that flexibility at CERES. It's very much based on, we want people to talk with their passions, and you can tell a fake. If someone comes to CERES and there is a CERES educator who doesn't really know what they are talking about or doesn't really believe what they are talking about, the kids won't believe it either. So we need to have that flexibility in the delivery but the boards need to be consistent.

**8. What are some recommendations you would give for the 2050 Trail?**

I think the choices need to be categorized more clearly and I think that's where you are kind of heading anyways with the energy, how will you power your lifestyle, those kinds of things. I think some of the choices are probably not needed. I think in Goods and Services there are too many choices, they could be bundled together, I think you need to have the ability to get through the choices more quickly to get to the futures with the idea that maybe we have the chance to go back and change our choices. So I think we need to make the trail a bit quicker, maybe by having less choices or combining more together. And then giving students time to sit with their futures

and I think giving less futures will allow that too. I think we are all heading down that path, kind of A through to D are all similar, you could bundle them. How we do that I don't know. But I think there needs to be scope for more ability to go through and go jeez I don't really like that, let's have a chat about it and go back and make some difference choices or do it as a class, or whatever. That's where I'd like to see it go and I'd like to see it being able to be done without the sheets. I think the sheets are important that kids enjoy the tactical experience of recording as they go because it's their own personal thing, but I think someone needs to be able to just come and do it themselves, quite simply. And I really like the idea you were talking about yesterday, you kind of having the pre-now boards to kind of give a bit of background to how things have changed and choices we have made that have gotten to where we are. Because it's what I deliver anyways, it's very esoteric, thinking about the choice you make today on the kind of house or renovation you do or phone you buy, can have an impact in the future. That's a very big concept. I think displaying that from the past would be really quite important and quite valuable.

### **9. What are your thoughts about the number of choices and futures currently presented?**

#### **Too many, too few?**

I think there is probably the right amount of choices in that there are six boards. There are not too many boards to choose from, but there is an entire board on cars and I think that, and then you get a choice in day where you get to picture another car. There's all these kind of, I think there is waste in there, so you choose your house, you choose where your house will be and then you randomly choose how many cars you might have. I think maybe that needs to be a transport board. Actually we need frame it a little bit more because I often find myself explaining well if you chose a house in the city do you need four cars or will you use public transport? I think we need to make those links more explicit. That if you do live in Brunswick you probably won't have room for four cars and if you do live in the inner city you will probably have a smaller house and you will probably rely more on public transport because that's just what we do in the inner city. So I think we need to make those links more explicit between your choices and how that affects each other. Don't waste a whole board on cars when we could really hone in on really important stuff like where do you get your electricity from, where do you get your energy from? They have a much bigger impact than; I am a two-car family. Maybe in the 90s that was more important but we are beyond that now because everyone is a two car family, pretty much.

### **10. Comments**

I am really excited about the idea of making it more tactile like Scienceworks and the Museum and having things that people can touch and look at. Even just those in the futures. I really like the idea of going in and you kind of walk into a space and that is your future and you can touch it and see it and feel it. I think that's pretty exciting.

## **G2- Interview with Ian Culbard**

### **CERES Staff Member Interview**

Name: Ian Culbard

Number of years working at CERES: 7 years

Department: Excursions, Incursions, Training, Site

This interview serves as a way for us to get an understanding of how the 2030 Trail works and in what ways it can be altered to make it a better educational excursion for students. We are coming to you with these questions because we believe with your experience and knowledge of the 2030 Trail you have the best understanding of its effectiveness and any room for improvements. Your answers will help us to improve the design of the coming 2050 Trail.

#### **1. What are you overall opinions of the 2030 Trail?**

Overall I quite like it. I think it's a good exercise, when I first did it I was quite impressed the way it actually made me think about the future and consider the things that I wanted. I think it's a good exercise.

#### **2. Which age group seems to enjoy the trail the most?**

To be honest, probably the upper primary school. Actually most of them tend to get into it. I think it depends on the group of course and the dynamic of the group, what they have done beforehand, how it fits in with what they have been doing. Some of the more enthusiastic ones are the younger ones, I suppose.

#### **3. Do students find that the trail is difficult to complete without your assistance? If so which age groups seem to struggle the most?**

Again, it's probably the younger ones that struggle the most. And once it's started with decision-making they find it reasonably straightforward, they get a bit confused on decision four when there are multiple decisions. They get a bit confused on the idea of total everything up to get you a resource score and a population score and not all combined into one. And there's almost an eternal confusion about how to get your future from the scores you've got. That needs to be described to every group and in a fair amount of detail to a least half of every group, including the older group.

#### **4. Do you have any recommendations on how to improve the trail (e.g. presentation of the future scenarios) to better appeal to the different age groups?**

I think maybe less futures, clearer in their presentation would help, and there is a lot of detail, a lot of information in them. And in the short amount of time they get it can be quite overwhelming. With so much information they can also get distracted by elements within the future, a lot people comment on the sun. Huge amounts of people come and tell me, "I had a happy sun or I had a sad sun or an angry sun." As opposed to, I suppose what we are trying to get them to think about is how much resource there is and what are the social impacts of their decisions. So maybe there is information that doesn't need to be in there that draws the attention away.



**5. Have you received any recommendations regarding the trail in order to make it better or more enjoyable? Are there recurring suggestions? If so, what are they?**

Not really. Nothing comes to mind. Primarily because most of the teachers who are coming here are seeing it for the first time, and I think it's difficult to say, this would be better or that would be better on your first viewing. But after, on consequent viewings. Personally I think they could be bigger. Bigger, more colorful, more attractive, generally. The use of color would be good, we tried to enhance that, we redid the decisions about three or four years ago but not the futures. We actually just added a few subtleties into it like turning the VCR into the DVD player and adding electric cars into the car choices but we didn't modify much else. Actually we just changed some of the wording actually to what we thought was a bit clearer. But still how you get to your future wasn't changed much. It's still confusing.

**6. Do you use the same procedure every time you moderate the 2030 Trail, or do you change your method of completing the trail from time to time? If you change it, why?**

Changing the method a little bit. But the basic format is the same, as doing an introduction, a bit of visioning of the future, go to the trail, do the trail, encourage the students to look at their futures. Usually I encourage them to make changes and see how that affects the future as well, to get a better picture. And then we go back and summarize it and I usually finish it with the students trying to create a positive vision. And now drawing what they want to see in the future. That has evolved over the last few years. It used to be just talk first, which I don't think was that effective. Somehow having an interactive component towards the end. I like the drawing, they respond better to it, I believe.

**7. Have you considered having a set procedure that all 2030 Trail excursion guides must follow in order to verify that every group obtains the same information? Do you think this would be more effective?**

I tend to think not. I tend to think we have the same resource but allow the teachers to explore their own strengths within that resource. I think the resource itself will enable us to get the outcomes we are wanting, which is to get the students to think about their choices and how they affect the future. I think it's designed, at this stage, well enough to get that across almost regardless of the presentation. I believe that you've seen what teachers, and I have in the past, do it. With the lesson plan, we have a basic lesson plan that they can follow and that lesson plan that something we all base it on. And we have two or three key points that they have to address. And at the end of the session, whatever you have done, however you have presented it, as long as you have addressed those three points, the teachers that have booked that session to cover, that's kind of, in some ways up to the presenter. And we provide them the resources, such as the trail, to refer back to get those points across.

**8. What are some recommendations you would give for the 2050 Trail?**

Make it attractive. Color, add some color to it, make it look new, the one at the moment looks old. It looks very basic but that's not necessarily the problem. I'd like, the instructions to be clear, it is very wordy at the moment. I don't know if it could be made simpler. I don't know about the format, this seems to work. I'm not sure if, that it seems to be effective in its format in the last 20 or so years. So, not that long ago, 15, 16 years? The main thing is that it works, that it actually works and people think about the future and how their decisions affect the future. So I believe the key aspects of this don't change, it's just the presentation of it that may change. But those same three points we have in 2030 about decisions, about resources, about relations, about

human impact, I don't think that's going to change a lot. I think this revision is about how we present it in a way that is more up-to-date and realistic maybe.

**9. What are your thoughts about the number of choices and futures in the current trail?**

I think in some ways there are too many futures and not enough choices.

Stefano: Why do you think there are not enough choices, what would you include or leave out? I think it's a bit excessive, having things like rally cars, some people will do it but to present it in such a way, it's as if everyone wants to do it, I think it's probably a bit much. It doesn't, the biggest question that comes up and a lot of people say is that, I want to have the big eco-friendly house. And somehow to segregate the idea the house size and what you fit it with. So if you choose your house size and then you choose how you fit it out can be separate. So you can have your small how with solar panels or you can have your big house covered in solar panels with your veggie garden and you composite worms. So we can encourage them to think about how size is very relevant, yes, but then you can still fit it out with all the sustainability features. I'd like to segregate that. I do believe they are separate but in the current format they are not. They are not independent. The way you want to live, that's fair, though one of them does talk about working for a large agricultural company, which I think is an interesting thing to highlight in a decision, for an eight year old or a ten year old, maybe. "What are they talking about." So maybe relooking at how, The Way You Want to Live is expressed as well, to be honest. To maybe looking into how that can be separated into maybe your next two, so you have, the sort of house you want, how you want to fit your house out, where you want your house to be. I suppose in the city, you're not going to have a mansion in the city. Some people may, but not everyone can do that. So it is working out how to have these subtleties, like where you're going to have your house, how are you going to fit it, that is possible realistic. And just because you work for a big agricultural company doesn't mean you're evil, it means you've got a job. So you can still have your little house in the country with all your fit out stuff. And all the sixteen decisions, I wonder if those sixteen decisions could possibly be condensed into a set of groupings where can you choose a few things within a group, like things to do with holidays and travel. Like traveling overseas a lot. Perhaps all of that could be grouped into a question, as opposed to having fifteen choices maybe you have a group to do with travel and transport, which may be tied in somehow with a car. Goods and services is obviously a big one, food is a big one and that would then tie into ecological foot printing to some extent. And waste, there is nothing there about waste, I'd like to have something about waste because waste is big and that then ties into the idea of food waste: recycling plastics, metal and glasses and the stuff you put out into the environment and the impacts of your waste. Pretty much everything that comes into our life, we use it to what's considered a useful period and then it becomes waste. So I think waste is a big one that we haven't touched upon. Food and waste.

## **G3- Interview with Nick Scott**

### **CERES Staff Member Interview**

Name: Nick Scott

Number of years working at CERES: 6 years

Department: Excursion Education, Incursions, Adult Training on-site

This interview serves as a way for us to get an understanding of how the 2030 Trail works and in what ways it can be altered to make it a better educational excursion for students. We are coming to you with these questions because we believe with your experience and knowledge of the 2030 Trail you have the best understanding of its effectiveness and any room for improvements. Your answers will help us to improve the design of the coming 2050 Trail.

#### **1. What are you overall opinions of the 2030 Trail?**

I think the concept is great, but it's now really needing an update. Make it more relevant. I think, it would be great if there could be some sort of stronger visual impact or effective on what outcomes are. I mean one of the things that came up to me was maybe having some sort of visual on sea level rise, what that actually means to Melbourne, like it's one meter, two meter, three meter, whatever, how that will really impact Melbourne. Whether that is an interactive one, or sort of computer drawings or whatever.

#### **2. Which age group seems to enjoy the trail the most?**

It depends on the group. I teach across primary and secondary, I think it really depends on the individual groups, so yeah it's hard to say. I don't think there is a direct relation. They all come out for different reasons and different knowledge about issues and stuff like that. I don't think there is a particular level of education that finds it better.

#### **3. Do students find that the trail is difficult to complete without your assistance? If so which age groups seem to struggle the most?**

Well, I have never let a group wander through it without any instructions whatsoever so I'm not really able to answer that question fully. What age groups seem to struggle the most? Depending on the interest, I would say probably the primary. But it depends on the level of interest, I guess. And what do you mean by struggle? Well I would just have to say primary on that one. Stefano: "Do you think it's because of the complexity of how the drawings are and the difficulty? Or do you just think it's just because it's not aimed only to primary but to all ages? Yeah both of those.

#### **4. Do you have any recommendations on how to improve the trail (e.g. presentation of the future scenarios) to better appeal to the different age groups?**

I think, yeah, the panels definitely need upgrading; some of the questions need upgrading. Modernizing, especially some of the drawings and things like that. So, you know, for instance, when we are talking about transport, I mean we need to include, maybe hydrogen cars, fuel cell cars, electric cars, things like that. And have the appropriate, sort of photos with that. But the actual choices, I think, I mean it's now required in our program, I think, there needs to be, perhaps, less focus on ozone depletion and more focus on carbon and greenhouse gases. The

drawings are quite complicated but I think, you know, there is stuff in there that the kids really get. You know, the sun with smiley face or the sad face is just like, you know, that's really quite simple but powerful, sort of things. Then you've got things like pollution meter, and stuff like that, cues, unemployment cues, stuff like that I think people see things like, "Oh this is great, money, I'm getting so much more money," and then they look at all the other things like the rubbers and replacement and stuff like that. So they don't focus on the social service cues and the crime and the pollution. They are going, "Oh money." But that is an interesting perspective, though.

**5. Have you received any recommendations regarding the trail in order to make it better or more enjoyable? Are there recurring suggestions? If so, what are they?**

I don't recall any. I mean I think of them myself and talk to other teachers here. But I don't recall any visiting schoolteachers making recommendations or students. But yeah, that's something we talk about on-site as excursion team educators.

**6. Do you use the same procedure every time you moderate the 2030 Trail, or do you change your method of completing the trail from time to time? If you change it, why?**

Change it from time to time. Occasionally I'll get people to go through a second time. So, we sit down and discuss their choices, and what impact that had, and what sort of future they came up with. And then say, "Okay, go through it again, what would you choose differently," occasionally I'll do that. Usually there's not enough time, but sometimes I'll just get them to think about, when we are sitting down, "Okay, if you went through it a second time, what would you choose differently?" Because basically it's all about choices and our impact on choices. I think the Australian immigration part is really confusing because the number of people in Australia isn't going to really affect the global situation. So I think that's kind of confusing, I can understand choice of children, the population, what that's going to do. But in terms of immigration policies I just don't see how that fits into the big picture. I mean it's an interesting one from a political point of view but in terms of how kids will decide to choose, because a lot of this has to do with global issues. Okay, yes you do have, you will have an impact on things like average age and employment and stuff like that. But I don't know, I think it needs to be more global rather than immigration policy to Australia. Yeah I don't know.

Stefano: Consumption maybe?

Well, consumption is all about resources, so that's all in the resources. I just don't know how to look at population aspect of it apart from how many children you are going to have.

**7. Have you considered having a set procedure that all 2030 Trail excursion guides must follow in order to verify that every group obtains the same information? Do you think this would be more effective?**

The way we tend to run things here is we all have a guide, it's always up to the individual to work on the areas that they are really confident in. And to fit that within the different students that come. I mean each group, from the same school, had two really, really, well three different groups, but one of those three was incredibly different from the other two. So, just to sit down and do a complete repetitive approach the whole time, there would be a lot of issues. I think it's really important to be able to tailor, for the individual CERES teacher, be able to put a lot of their individual understanding into it. You have a base structure of things that need to be covering and looking at. But to allow the different teachers with different backgrounds, to give off different areas. But what I think what probably would be good is maybe having some sort of information

folder that people can add to, the changes that are relevant to the 2050 Trail. For me, each group has different abilities, different needs, and interests and so there is a real need for flexibility for teaching here. You've only got them for a short time, it's not like you can get to know them really well and stuff, so that flexibility is a big part of it.

### **8. What are some recommendations you would give for the 2050 Trail?**

I wouldn't like to see any more choices or decisions. I think the current number is fine, there could be less but it's kind of good because you there are two main things, you've got resources and population and they will give you different combinations, different impacts. So it depends on, I guess, how it's restructured depends on how many future possibilities there are. I think the number works. Because what I tend to do, which is what I think what most teachers tend to do, is go, "Okay, go and have a really good look at your own future letter and then write down, make some notes." But I think sometimes, it's really hard, for instance, for a kid to grasp what two or three degrees rise is. And the wording is really confusing because it says, above mid-20th century. So it's like, maybe, that needs to change as well. It's like we need to set a base, okay beginning of Industrial Revolution 1800, 1850 or whatever it is, because you actually see. It seems to me, that you are combining two different, when we talk about global warming, it's basically we are looking at since 1850. And yet the sheet, I think, it says, refers to temperature rise above mid-20th century. So it's actually two confusing time frames there, what that actually means. It's pretty abstract, one degree, two degree, and three degree. I just think that needs to be tightened up so there's not that vagueness and what really are the implications. But yeah, I mean of course you have to be careful not to over complicate it. What I'm actually trying to do is simplify it, saying that it can be a confusing thing, not so obvious. And maybe somewhere along, I mean we don't use, I hardly ever look at the back. I couldn't even tell you what's on the back of the board. Maybe there needs to be updated statistics of what's actually happening. Like okay, what are the world's current population, what is Australia's current population, what is the average global warming, now, in 2014, 2015, and stuff like that? Because if you want, particularly like self, they would be able to go through that and at all different levels. So that background, sort of information, if that was perhaps a bit more available. If you are talking about the future, you've got to have a really clear picture, what the present is. And to understand the present, it's probably good to have an understanding of the past. I mean, you know we've got the most carbon in the atmosphere for maybe 500 years. So I think, we definitely need to be able to clarify what the present is so that people understand what that actually means. Okay, two degrees, two degrees, what does that actually mean? What happens to the permafrost in Alaska and Siberia, that kind of thing? But not necessarily directly in amongst all the futures, but there, somewhere available for people to have a look at. And certainly part of the delivery of the program, part of the background information for teachers. Because otherwise, two or three degrees, hey it would be great if Melbourne was two or three degrees warmer. You know, you could grow bananas, but what does that actually mean, it means a whole more than a couple of degrees. It's just understanding what the big picture is at that level. We've got tipping points, all sorts of things like that. A lot of people, a lot of kids, have no idea how much the Earth's average temperature has increased over the past 150 years. They will be guessing its 5, 10, 20, 30, 40 degrees. You tell them it's 0.8 and they go wow. So it kind of gives a little more sense as to what a two, three, four-degree rise might mean. Yeah I think that needs to be spelt out a whole lot more. But the other thing is, I think it's really important that kids recognize it's just a game, it's all just about choices and that's not their future. And that they don't need to go slit their wrists; it's really just saying every choice we make is so important, if we shape our future. So I think the

beginning of it is asking them what sort of future would they like? But I think that kind of needs to be said in a way, a bit bigger. If you don't have a vision, of what sort of future you would like, then it is sort of like, it loses its power. But if you have some sort of great vision of what you would like to see, okay then how do we get there, what are the things we actually need to do to get there? So I think that really needs to be emphasizes, as to what people would really like to have as a future. Not, what the future is going to be if you do this and this but okay, what sort of future would you really like? What do you really want in the future? Maybe some of you are going to have kids, maybe not. On average, the chances are you are going to have children, at least and grandchildren and great grandchildren, what do you want for them? What are the things that you value? What are the things that you think are going to be really important?

## **G4- Interview with Arwen Birch**

### **CERES Staff Member Interview**

Name: Arwen Birch

Number of years working at CERES: 3 years

Department: Environmental Education

This interview serves as a way for us to get an understanding of how the 2030 Trail works and in what ways it can be altered to make it a better educational excursion for students. We are coming to you with these questions because we believe with your experience and knowledge of the 2030 Trail you have the best understanding of its effectiveness and any room for improvements. Your answers will help us to improve the design of the coming 2050 Trail.

#### **1. What are you overall opinions of the 2030 Trail?**

I really like it, I like the potential it has but at the moment I feel a bit awkward running it because it is so outdated and that there are ways it can be improved, but I love the concept of it.

#### **2. Which age group seems to enjoy the trail the most?**

Probably grade 6

#### **3. Do students find that the trail is difficult to complete without your assistance? If so which age groups seem to struggle the most?**

Well I've never done it without assistance, every time I have taught it there has been a lot of assistance. Because you always give them an introduction, help them with the first one to get it going, but then they are okay when you let them go, I guess. At the moment is it run with grades 3 and 4? Or is it just 5, 6 and above? Yeah, sometimes five and sixes struggle with the grid bit at the end. Working out their letter at the end for some reason they find that challenging, working out their number and everything.

#### **4. Do you have any recommendations on how to improve the trail (e.g. presentation of the future scenarios) to better appeal to the different age groups?**

Yeah, I think it would be good to have one that was directed at younger and one that was directed at older, might be good. You have a flip sort of screen or something. If you've got the younger ones you can flip it and it's ready for them, it's much more simpler information and simpler pictures. Then if you were with the high school kids you could flip it and it would be more advanced concepts. It's one of those ones where it is very different depending on who you are teaching. Some of the concepts are too difficult at the moment for grades fives and sixes. There is too much information and they focus on more getting confused on which one but then if you made it too simple then it might not engage the older ones. It might be too obvious or something. I think it does have to be simplified for the younger ones at the moment.

#### **5. Have you received any recommendations regarding the trail in order to make it better or more enjoyable? Are there recurring suggestions? If so, what are they?**

No. In terms of students and teachers I haven't got anything, nothing recurring that I can recall.

**6. Do you use the same procedure every time you moderate the 2030 Trail, or do you change your method of completing the trail from time to time? If you change it, why?**

I pretty much do the same thing every time, depending on time. Like sometimes at the end if there is time I might get them, if someone has finished early I might say, "Well did you like your future, go back and try to make different decisions and get a different one." There is often not enough time to do that, in the lesson, at the moment. But sometimes the real quick finishers can do it twice.

**7. Have you considered having a set procedure that all 2030 Trail excursion guides must follow in order to verify that every group obtains the same information? Do you think this would be more effective?**

Yeah I think it is that at the moment, isn't it? You always have to teach to the particular group that you've got and you need to have flexibility in teaching because sometimes you've got a grade 6 group who is quite not advanced and they know nothing and they haven't done a lot of environment. And then you have to really base it, dumb it down a bit and make it quite basic for them. Then you've got other groups, who are the exact same age but from a different school or whatever and they have already done a lot of thinking about it and then you would do more advanced concepts about it. So you've always got to gauge at the beginning what their base knowledge is and build on that. You always have to be teaching in kid's zone, of what's called Zone of Proximal Development. Yeah that, you can work that out pretty quickly by asking a few questions and seeing what they know. So I think there needs to be a bit of flexibility in it instead of completely structured and every group has exactly the same.

**8. What are some recommendations you would give for the 2050 Trail?**

Yeah, well I just thought, because at the moment Australia is not actually struggling with, in my opinion we are not having too many babies and us personally as a culture and a civilization, we're not having too many babies. And so, and the factor that is most important for how many babies a woman decides to have or a couple decides to have is the status of the women in that society. The women in society have a good status, they tend to always be producing just on the birth rate or 1.8 or 2 or whatever. They don't have ten babies each or eight babies each if the status is high. And I think it's high in Australia, not as high as it should be, but it's pretty high, it's pretty good. So that's in terms of babies, in terms of immigration, I think it's too complex an issue for even adults, let alone kids, and I think there is a worry trying to deal with it in such a short space of time, that you might be planting anti-phobic thoughts or a fear of foreigners coming and there being too many people and making Australia a horrible place. So I think overall consumption is our major issue, we are consuming far, far too much and that is so much more important than population. And given the difficulties of population and that the trail is a little bit too complicated and you want to try and fit in everything, that it would be easier if we just got rid of population and just focused on consumption. I do believe that population is a global problem and that, I'm not saying population's not important but just in terms of this trail and visiting Australia and school groups that it might be easy if the focus was just on consumption. Because that is more relevant to the kids as well. They are a long way from deciding about having babies but they are already consumers. So they can already relate it to their lives. And they probably won't ever be immigration ministers. I think some, well obviously updating all the facts and things like the sea level rises and if you could get really accurate, as accurate predictions as you can on current sea levels predictions and updating that. And making it more visual, I guess. So instead of just having sea level rise and number, have an actual picture



of the sea with different, I don't know, different heights of sea, depending on whether you're, like making it color as well. I think would help if there was bigger color images, but were still very simple. And removing some of the things that are not very, the one thing that always confuses them and then you waste time on it, is that it says Average Age. And all the kids think, "Oh, I'm going to die when I am 32!" because they think that's life expectancy, not average age. And it takes a long time to explain Average Age and it wastes the lesson, so I would just remove that as well. It depends, I guess, in a really polluted world, life expectancy would drop, if you could find figures like that. Yeah and if they are interesting, but I think it needs to be kept simple and I'm not sure at the moment, I would have to see towards the end whether there would be room and if life expectancy is relevant, you can decide when you get to that. Is there life expectancy at the moment? I think the current generation at the moment, they are the ones predicted to, the first generation of people to have a lower life expectancy than their parents. The kids that are around at the moment, because they are eating so much junk and are not exercising enough and have their heads in screens all the time. So they're predicted to get more of these diseases. So yeah, I don't know if that's relevant to you.

## **G5- Interview with Alex Hoffman**

### **CERES Staff Member Interview**

Name: Alex Hoffman

Number of years working at CERES: 5 years

Department: Education and Site Gardening

This interview serves as a way for us to get an understanding of how the 2030 Trail works and in what ways it can be altered to make it a better educational excursion for students. We are coming to you with these questions because we believe with your experience and knowledge of the 2030 Trail you have the best understanding of its effectiveness and any room for improvements. Your answers will help us to improve the design of the coming 2050 Trail.

#### **1. What are you overall opinions of the 2030 Trail?**

I've only seen it once and then when Shane asked me to teach it I had a bit of a problem with it because basically it is very, very negative it is in a format that reminds me a lot about quizzes that fall into a kind of paradigm that you see in magazines and things like that, it's kind of like choose your options and I don't think that's interactive or meaningful enough. And I think that the outcome is sort of, you go to these boards and on one hand you kind of, they are like comics, and so they are a bit of a joke. SO on one hand you are diminishing the seriousness of it but on the other hand it's also very serious and it's also very negative because it is so serious, it is like catastrophe, but then it's also like well isn't that funny. There's desensitization to it. And I don't think it really promotes the alternatives and what actually is working out there. I think there is enough doom and gloom out there that the kids absorb one way or another and not enough of what actually there are a lot of difference systems and doing things that work that are around these wonderful lifestyles. It's the only lesson that I haven't wanted to teach.

#### **2. Which age group seems to enjoy the trail the most?**

I'm not sure. I think it is really, really problematic for high school kids, like just having taught year eights today, I think it just sort of reinforces a kind of apathy and attitude that they probably, like I said their age but also maybe to do with what they have absorbed systems and problems. I think that there is apathy out there and the reason for it is a kind of desensitization to something that actually is kind of horrific and serious with what's going on and you don't really absorb what it means when, for example NASA recently brought out their findings that we aren't going to survive the way that it's going and that is really full on. There is that information out there and there are these descriptions of the great garbage patch out in the Pacific Ocean that is twice the size of Texas. That is really full on and yet we are not really absorbing it, we are able to because it's too full on. So I think people are desensitized and think something like this just plays into it like any other thing, it's not really trying do something in terms of connecting people, not really so much with a problem but an alternative. That isn't just about saving the environment but it's about having a happier like within the environment.

#### **3. Do you have any recommendations on how to improve the trail (e.g. presentation of the future scenarios) to better appeal to the different age groups?**

I think the one thing that we could do, I think it could be used in other programs too, is trying to show people insights into other things that are going. Like visually it might be pictures, it might be a collage of alternative societies or cities that are doing things really differently. So they know

there is a precedent, like this isn't just imaginary, there are different ways of living and they are attractive, they are beautiful, people are happy, it might be more communal, it might be environment and systems that work to reduce the pollution. Like you've got wetland, sewage systems, just things like that, just a few snippets of things that kids can access it. Like, in terms of a sustainable future there is an image and vision for it and that it is somewhat real and tangible rather than comic book style. Which is also mixed in with humor, which is making fun of the fact that it actually is a problem. So, I think it could be more realistic, it's almost like you go in and maybe experience different possibilities and what would work here and what people are drawn to and why. Making it creative, making it about innovation and creative design. How people can be involved and how we reimagining we could live. It's not this really stale, we've got this problem, we need to reduce energy and this is what it will mean. It's like appeal to all people, get to the creative side of things, around what materials we use for example can be really beautiful, not just practical. I think there has to be an emotional connection to it, ideally. It has to be a bit more student-directed; I think they have to take an interest in it. I'm not sure how it goes in terms of, maybe the introduction; there are things around population growth and the real concrete facts there. Okay, we've got the scenarios and this much energy, what do we do to change it, how could it look? And instead of going, or we could go completely horrible; go look at how it could work.

**4. Have you received any recommendations regarding the trail in order to make it better or more enjoyable? Are there recurring suggestions? If so, what are they?**

Not so much about suggestions to fix it but there have been some really, a few quite heated conversations about it, for sure. There are quite a few people who work here, actually some who have come from the incursions team that don't work here anymore but potentially they might talk to you. They have come, they really look at learning in terms of it being transformative and creative and they see it as really problematic in that sense, it is really didactic. So I don't know what their suggestions would be but there certainly has been a lot of conversation around whether it works or not and generally I think people are like no.

**5. Do you use the same procedure every time you moderate the 2030 Trail, or do you change your method of completing the trail from time to time? If you change it, why?**

I've watched it to train in it but then when I was asked to teach it I said no.

**6. Have you considered having a set procedure that all 2030 Trail excursion guides must follow in order to verify that every group obtains the same information? Do you think this would be more effective?**

Well it depends on how it was renovated among messages. I think most things, attitude would be that you could make it your own and it's really how you teach it and present it that counts. That's really important so I think that can be really rich that it's open so much that people can take it how they want. But in that case there probably also has to be some training around it so people have some consistency with it. At the moment I think it is really problematic because it comes down to how someone teaches it. It can be, I don't think the trail itself supports it being good. So it depends on what you create I guess.

**7. What are some recommendations you would give for the 2050 Trail?**

I would like to sort of think about it because I haven't thought about it in a while. I mean I know you guys have been mentioning having an interview. I could definitely go off and think about it

but yeah definitely having those really snippets into those beautiful alternatives that are quite exciting or stimulating or getting people going how does that work or how could that work. It would be really good having a collage, something beautiful and visual and real environmental places where people are doing things differently. Maybe something really interactive too, like there isn't enough of kids just doing something and there is a kind of approach in teaching called Inquiry. Where you don't explicitly tell the kids what's happening but you have a set of materials or a stimulus image or something and then they have to discuss and figure out what to do with it. Or maybe they have to make something, I'm not sure how that fits into 2050 but maybe it's about, maybe it would be a magnet board with different pictures on it and they create the world they want to see after a kind of appropriate introduction. And then they get given whole of images and they get to actually create the world they want to live in. Just something that is a bit more interactive and you just leave them to do it. And then they present it and you can discuss it. Leave it open.

**8. What do you think about the number of choices and future scenarios currently presented?**

I'm just not sure we should be presenting scenarios of end of the world, especially to primary, but I just think that there is already a lot of pressure on kids. I hear it from the teachers even, in primary schools where they go kids this is why you guys are responsible, you have to be creating and inventing these new technologies and thinking about these things. I think it's really inappropriate because it is actually everyone's responsibility and I don't think that pressure should be on them. So I don't think that, I think it's about nurturing certain qualities and ethics and morality, in terms of what do you value, how should you treat people, how should you treat the environment, how could we do this better. Rather than this is what's going to happen if we don't change.

## Appendix H- Transcribed Feedback About Australia 2050 Trail

### From Shane French

#### Experts Feedback on Decisions and Future Scenarios

Name: Shane French

Date: April 16, 2014

Profession: Excursion Manager at CERES

#### Decision 1: What kind of house will you have?

Shane:

1. What do you classify as a big house, have you worked out those? Have you done it by dimension or bedroom? Because people will say what's a big house? That's a similar thing to, you ask people what kind of car they've got now and they go, oh a medium car, but when I was growing up what they call a medium car was a huge tank. Like a medium car was a thing. So our ideas over changed on what's big and what's small. So I am just interested to look at that.
2. So you are going with numbers? (Referring to scoring system)
3. I'm wondering if you, you might have traveled around Melbourne a bit, there is two layers of suburbs. There is certainly in America. There is inner suburbs and there is outer suburbs. And when you live in the outer suburbs, most of the time you drive to work. But have you considered in your choices have inner and outer, why did you just keep it suburb. So what do you classify as city? I was just wondering and this is for the CERES teachers as well, so they will actually say this is what this questions means because we will get asked, do you classify city as 10 km into the CBD? I pretty live on the 10 km line and I'm classified as inner. And after 10, I think 10-25 is outer and then there is, you know. So do you actually say the city is within 10 km and for example that's up to the tram line here, maybe, Brunswick you can still see the city. Suburbs is out to wherever and maybe have a guide so at least CERES teachers can go, oh that would be like if you lived in Forkner or Campbell Field, which is an outer suburb, you can have a big mansion there because they've got big blocks of land. I've ever been to America but I'm trying to think of a city where you've got your CBD and then you've got your suburbs where you've got your inner suburbs that are sort of still metropolitan, you've got your public transport, trains, trams. Then you get to this point where your public transport disappears and you've got sprawls, the urban sprawls and they are the outer suburbs. So your urban sprawls would be where you public train lines end, where the buses stop. They are still suburbs and they keep sprawling throughout their paddocks and farms but there no public transport and people drive everywhere and that's totally affects your footprint. Because you start relying on your car, so if you have that distinction you can go, well okay chose an outer suburb so you are going to have to have cars. Because there is no public transport because we don't do public transport in the outer suburbs. If you choose the big house it actually limits where you can go. If you want to choose you've got to go bad and make another choice at the start. I like that. So if you choose the outer suburb with the big

house or the country with the big house, then yeah you are stuck you are going to have to have a car. Maybe you recommend that, are you still having this as a guided thing with a CERES teacher? That might be part of the start of it, the teacher says remember the choices you make here can actually start to dictate your choices later on. You can't have everything. Would it be worth defining big, small and I don't know if a real estate website would classify that, is it a meter/inch thing? What are the dimensions of a big house, what does the industry classify as a big house, a medium house, a small house? That would be interesting because we don't know either. It could be how many bedrooms, four is big, and three is medium. Find some kind of way for us to frame that and then every CERES teacher would say, this is what a big house is, this is what a medium house is. Define it.

### **Decision 2: Consumption**

Shane:

1. What do you mean shared, if there is one T.V in the house? How have you chosen what to put in and what not to put in? Like in household appliances there's not too much. Is there one where they could put, I don't know how you would contribute points to it, but if someone goes, oh, but Shane I've got some piece of technology that isn't listed. What have you attributed other to? You put that in appliances but not technology. I reckon that would take care of the problem that in five years something will be invented that we don't know about yet. So electronic toys and entertainment you would say is DVD, Blu-ray. Mobile phones? You mean hot water service? We say mobile phones, yeah. All the kids would know hot water service.

### **Decision 3: Transport**

Add color-coding, so it restricts what they can choose

Shane:

1. So that's how you are going to limit the choices, going you can only choose from these. Almost like what they have on the thing, on the back of battery packs, they've got the dots for the devices you can use it for. What's the price thing? So there's less money you are going to spend on a petrol car but you are going to cause more damage. [Should we add the details of price and damage for the cars, as notes] Yeah I think it is valuable because it's that limiting choices and it's that if, that if you go for the car, its business as usual it will be cheaper now but it won't be cheaper in the long run.

### **Decision 4: Food and Waste**

Shane:

1. That's interesting because everyone will just pick the three R's. What if you do a mix for food? What if you go I grow a little bit myself but I mostly get it from the supermarket, do you just add 4 to 1? But what if you get, so self-produce is 100% of all food you grow yourself? This one is tricky I reckon because I try to grow as much food as possible but I'll often find myself I have to go to the supermarket or the market. So how do I go, well I go to the supermarket less, can you minus? So how do you do a combination, what if they say I want to do a combination because I don't only go to the market. The other ones I can see the clear reasoning behind the choices and why you are attributing the waiting factors and stuff. This one's really interesting. I think that's going to be confusing. And

take away food isn't in there either. I'm wondering if you redo decision 4 a little bit and go through our ecological foot printing questions, there are a whole bunch of food questions. I'm wondering if you lift part of the foot printing it's already got the weighting factor, if you eat a lot of takeaway it's already got 6 points. So in the future do you think you'll have a balance of takeaway and grow your own? I'm wondering if you could almost rewrite a little bit, like the eco-footprint. A mini eco-footprint that's in there and you just allocate points. I just can see you getting to here and getting confused and going well I do some takeaway, probably 80% supermarket, I eat takeaway on Fridays but in the winter I like to grow my own beans. Where what you should be doing is if you self-produce, maybe you minus it, I don't know. Nothing is minus. How would you feed your family, and maybe you just get rid of that chicken, beef, white meat, red meat and you just go takeaway, buy fresh produce, buy packed meals and give an allocated score. And that's just what you get, like pick your mix. Instead of having sometimes, usually and rarely, have a little bit of takeaway or once a week, between once and four times a week and have them circle them. That will end up being their score, oh we will probably have takeaway twice a week and they circle it and that's the score they get. It slightly changes decisions 1, 2 and 3 with the patterns, but with decision four you go okay we are going to think about it slightly differently. And then from that is allocates the waste from that. If you eat takeaway you are going to have more waste, that gives you the weighting factor, your score goes up. So you get rid of waste and it get involved in those questions. Part of our explanation of the trail is, well the more takeaway you eat the more waste you produce. Or there is more waste in supermarket than is in market or grow your own. Food is massive; it's one of the biggest impacts there is. Hijack that ecological foot printing part, you reword it, tweak it and use that for your decision 4.

### **Decision 5: How you are going to power your life?**

Shane:

1. And you can't choose a combination. You can't go I'm going to have three dollars I'm going to spend on solar. Solar has come down a lot in the past few years, if you got it from 2010. There needs to be constraints. What this is currently saying is that you can't generate base load power off renewables, it's impossible. It is possible but it's not possible based on your lifestyle choices. Where this gets really tricky. If you live in a small, sustainable house and you've chosen things like local foods and you've chosen a more sustainable life you can live off base load renewables. If you chose a mansion out in the suburbs, at the moment you're not going to be able to generate enough power from renewables to do that. So it's about community making sacrifice to generate base load power from renewables. So maybe you do have to allocate a red dot green dot. This is a really tricky one, I understand where you are going and it's a very tricky one to do, I like the thinking behind it, there are complexities in there. Because we don't want to say to kids, yeah you have to have fossil fuels in the mix because there has to be a way for us to generate base load power off renewables because if we can't we are stuffed. If we can't find a way to get off fossil fuels, then essentially we are stuffed; we are not going to solve the problem. If you have a mansion, you can't generate all the power off solar panels, it's not possible. That's what you're trying to do here. So have you found out a way to incorporate their choices from before, red dot green dot kind of thing, this limits your choices. But then is it a choice by the end, do they get to here and go oh I'm stuck; I can't

do renewables because I chose a house that stopped that. Does this trail allow them to go back and change or is it they do the trail once and then they go back and do it again to change what they chose? It would be an interesting lesson to have them have to go back and change their lifestyle choices that would be quite valuable. I like the way you have started to add those constraints. It's what you do in your actions that makes the difference. There needs to be changes in the community, but what you are saying that these choices are too constrained. I'd bring solar down because it has gotten cheaper over the years. It is about \$2000 cheaper than four years ago. If you've picked a large house, these are your light bulbs and you have to fill them up. You've got to constrain it, you can't just go solar, hydro, wind and thermal, we are not going to be able to generate enough power for everyone to have a large house. That's where the color-coding would come in. This links it directly back to how much power you will need.

### **Images:**

#### **Shane:**

1. Where you are going to have an issue with that is having 25 kids standing around trying to do that. So maybe on the back of the page, you have a light bulb, and a little box for how many and the CERES teachers goes a light bulb is worth XX. As long as it's simple and we aren't counting into the hundreds. If they have a grid at the back with those things and a little column next to that that says, how many did you get in total and at the end the CERES says a light bulb is worth 2 points, a VHS cassette is worth 3 points. That's a grid on the back, that won't tell them what's it worth, it's just a place where they add up. So maybe at the end of the trail we do it differently. At the end of the trail they make their choices, we all come back together as a class, we add up our futures and then go on and have a look. So it's actually a break, you can almost go, okay you've made your choices who's feeling confident, who's feeling excited about their future. I wonder what you'll get and you get a chance to kind of talk about it. And then go off and visit them, so it's almost like a break before you get your future. You go, okay who chose the big house, okay let's go find out. They don't just run off and do it. Or instead of circling the parts, just have hearts and how many. It's worth four hearts. And then the CERES teacher would say, so at the end they just go I got a total amount of hearts, a total amount of whatever and then the CERES teacher goes okay this is what each one of these is worth.

### **Futures**

**Shane:** Make it clear that there is no connection between each factor in the futures.

1. Life expectancy: that's fairly impactful (life expectancy would go down 7.6 years by every degree) It's interesting. I don't know about life expectancy, I would almost take that out. Let's not even talk about it, they are kids, we don't need to talk about when you are going to die. I don't think it's not relevant, I think it is relevant, I think for the trail it's probably not, it's not a key, we don't want kids walking away saying oh I'm going to die at 57. We want them to think about other stuff. I'd be happy to get rid of life expectancy. This would take away, kids would be saying, oh that's scary. They can worry about that later when they read the newspaper. Take away it being personal, of saying you will be 65 when you die.
2. Sea Level Rise: this is by 2050 though, so .75m by 2050? That's not overall because it can rise a lot more than that. The IPCC is looking forward now. You do a middle ground for those? What I like about that is we've already locked in at 1.4m, as the best-case scenario.



3. I am just wondering if there is somewhere you could have habitat in here. I think it would be important to look at species extinction, bring this out as key stuff.
4. Waste- tons of waste: I think that would be great, it's important to add that kind of stuff. It's better.
5. Population: You could put in population. Overall population. But not life expectancy.
6. Minimizing damage. I know Ian was talking about one where we improve stuff, I don't know. I think that would be going backwards. What does that mean?
7. That's how the original 2030 was done anyway. It was taking a bunch of reports and going oh yeah this is the middle ground. It goes back to consumption.

## **Appendix I- The Australia 2050 Trail**

I1	Decision 1 Location Description
I2	Australia 2050 Trail Decision Sheet
I3	Future Scenario Descriptions
I4	Australia 2050 Trail Lesson Plan

## I1- Decision 1 Location Description

Location	Description
<b>City</b>	<p>Diverse region of the metropolitan area that included residential, retail, commercial, universities, entertainment, government, financial institutions, medical centres and shopping malls. One can now find, in addition to housing, mega-malls, theatres, museums, stadiums, and culture. The experts of the city are often located at workplaces or institutions in the CBD – lawyers, doctors, academics, government officials and bureaucrats, entertainers, directors and financiers. Your neighbours will be very close to you.</p> <p>(EXAMPLE: NEAR MELBOURNE CENTRAL STATION)</p>
<b>Inner-Suburb</b>	<p>You will have close neighbours. You are able to get to your house by using public transportation or taking a long time walking or biking.</p> <p>Located on the outside of the CBD or city.</p> <p>(EXAMPLE: EAST BRUNSWICK (CERES))</p>
<b>Outer-Suburb</b>	<p>The most common type of housing in Australia (Kelly et al. 2011), making up 70%. Increasingly located away from existing public transport networks, which causes you to buy a car. You will have distant neighbours. Population in the suburbs - low developments in relation to the city and they mostly depend on the city for support services and employment, although; many of them have started developing industries to reduce their dependency on the city.</p>
<b>Countryside</b>	<p>Characteristics of a rural community are; animals, farm, grass lands and almost no contamination or noise. Very large amount of open space and almost no neighbours close by. Have a long distance to travel therefore you need to buy a car as a medium of transport.</p>

# The Australia 2050 Trail

## How will your future be?

Name: \_\_\_\_\_ Year/Grade \_\_\_\_\_ School \_\_\_\_\_

### Decision 1: House- Where Will you Live?

Where is your house?

Circle one: City  Inner-Suburb  Outer-Suburb  Countryside 

What Type of House do you have?

Circle one: Big House      Medium House      Small House  
Apartment      Terrace      Mobile Home

Which Icon Corresponds to your Type of house and Location of House?

Circle one:     

### Decision 2: What goods do you want?

Write down the number of each icon for all of the goods that you want. If you want more than 1 of that item, just multiply out the icons for how many you want and include that new number in that icon count.

For example: if I want **3**TV's, **1** Computer, and **2** Microwaves in my house I would do....

 X **3** +  X **1** = **4**  and  X **2** = **2** 

# of Each Icon:

\_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_ 

### Decision 3: Transportation- How will you get around?

Based on the color corresponding to where you chose your house to be (e.g., city is blue, inner-suburb is orange, outer-suburb is yellow, and countryside is green), choose a mode of Transportation that has your color star in the box.

Circle the icon that corresponds to your mode of transportation:



Circle the icon that corresponds to how you plan to travel for holidays.



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### Decision 4: Food and Waste

Circle the icon that corresponds to what type of food you plan to eat.



Circle the icon that corresponds to how often you are going to eat animal based products.




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### Decision 5: Energy Production – How will you Power Your Life?

Choose the correct number and Power Production Methods to be used to power your life for the type of house you will have. Cross out the amount of light bulbs corresponding to the energy method, then sum them up and right the total amount.








For example: You cannot choose the same power production method more than once. If you picked a large house, you must make 4 choices for the sources of Power Production Method you want to power your life. For a large house, you are limited to 2 choices in renewable and 2 choices in non-renewable. So an example of a choice is solar, hydro, coal, and oil. Or wind, solar, oil, nuclear. After you make your choices, write down the number of light bulbs for each Power Production Method source you chose (e.g. solar is 2 light bulbs, coal is 5 light bulbs, etc.)



# of Light bulbs total: \_\_\_\_\_ 

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### SUM IT UP

TOTAL:	_____ 	_____ 	_____ 	_____ 	_____ 	_____ 	_____ 
	X	X	X	X	X	X	X
VALUE:	_____	_____	_____	_____	_____	_____	_____
SUM:	_____ +	_____ +	_____ +	_____ +	_____ +	_____ +	_____

**TOTAL SCORE: \_\_\_\_\_**

### I3- Future Scenario Descriptions

Future and Descriptions		
1	2	3
<p>Temp Rise of 1.4 degrees</p> <ul style="list-style-type: none"> <li>▪ Cyclones will likely be more severe</li> <li>▪ Small islands states will be abandoned as seas rise</li> <li>▪ Ice sheets around the world be suffering severe losses               <ul style="list-style-type: none"> <li>▪ The Great Barrier Reef                   <ul style="list-style-type: none"> <li>o Unprecedented rates of bleaching</li> </ul> </li> </ul> </li> <li>o Considerable losses of species associated with coral communities               <ul style="list-style-type: none"> <li>▪ High altitude ecosystems                   <ul style="list-style-type: none"> <li>o Induced reductions in winter snow cover</li> </ul> </li> </ul> </li> <li>o The highland rainforests of northern Australia are projected to decrease by 50%               <ul style="list-style-type: none"> <li>▪ Stress livestock                   <ul style="list-style-type: none"> <li>o Leading to reductions in milk production                       <ul style="list-style-type: none"> <li>▪ Decreases in precipitation</li> <li>o Lower the quality of pasture land</li> </ul> </li> </ul> </li> </ul> </li> <li>▪ Resulting in reduced productivity of pastureland for grazing livestock.</li> <li>▪ Pests such as ticks may reduce cattle productivity.               <ul style="list-style-type: none"> <li>▪ 12% chance of decreased wheat production</li> <li>▪ 3-11% decrease in Melbourne's water supply</li> </ul> </li> <li>▪ 1185-1385 more deaths in 65-year age group in temperate Australian cities</li> <li>▪ Increase peak demand in Adelaide and Brisbane, and reduce transmission efficiency</li> <li>▪ Both drought and extreme rainfall in NSW increase substantially               <ul style="list-style-type: none"> <li>o 35-70% change in droughts</li> </ul> </li> <li>o 10-20% increase in intensity of extreme daily rainfall in NSW               <ul style="list-style-type: none"> <li>o 6% decrease in extreme daily rainfall in VIC</li> </ul> </li> <li>▪ 18% increase in annual days above 35 degree               <ul style="list-style-type: none"> <li>▪ 10-25% increase in species extinction risk</li> </ul> </li> </ul>	<p>Temp Rise of 1.8 degree</p> <ul style="list-style-type: none"> <li>▪ 40% of core habitat lost for total Eucalyptus species numbers               <ul style="list-style-type: none"> <li>▪ 31% reduction in pasture growth</li> <li>▪ 5-23% decrease in Melbourne's water supply</li> <li>▪ 100% increase in number of people exposed to flooding in Australia</li> </ul> </li> <li>▪ Climate modelling has suggested that storm winds,               <ul style="list-style-type: none"> <li>o Those associated with tropical cyclones</li> </ul> </li> <li>▪ 100 year storm surge height around Cairns increases 22%               <ul style="list-style-type: none"> <li>▪ Area flooded doubles</li> </ul> </li> <li>▪ 15-35% increase in species extinction risk</li> </ul>	<p>Temp Rise of 2.325 degrees</p> <ul style="list-style-type: none"> <li>▪ 7-35% decrease in Melbourne's water supply</li> <li>▪ Further southward spread of malaria receptive zones</li> <li>▪ Temperature related mortality among people 65+ years in Australian capital cities increase by 89-123%               <ul style="list-style-type: none"> <li>▪ Increase maintenance costs for transportation infrastructure.                   <ul style="list-style-type: none"> <li>o 17% increase in road maintenance costs over most of Australia</li> </ul> </li> <li>▪ Increase in severity of cyclones                   <ul style="list-style-type: none"> <li>o 5-10% increase in tropical cyclone wind speeds</li> <li>o 20-30% increase in tropical cyclone rainfall                       <ul style="list-style-type: none"> <li>▪ Increase in Forest Fires</li> </ul> </li> </ul> </li> <li>o More than 10% increase in forest fire danger index                   <ul style="list-style-type: none"> <li>▪ 20-40% increase in species extinction risk</li> </ul> </li> </ul> </li> </ul>

4	5	Population Descriptions	Sea Level Rise Overall Impacts
<ul style="list-style-type: none"> <li>▪ Temperature related deaths increase 144-200%</li> <li>▪ Oceania experiences net loss of GDP               <ul style="list-style-type: none"> <li>▪ 30% increase in 100-year storm tides</li> <li>▪ 25% increase in extreme rainfall</li> </ul> </li> <li>▪ 173% increase in annual days above 35 degree</li> <li>▪ 30-55% increase in species extinction risk (45-75%)</li> </ul>	<ul style="list-style-type: none"> <li>▪ 45-75% increase in species extinction risk</li> <li>▪ Agricultural trade is projected to drop by 10-80% due to a drop in output.</li> <li>▪ “Tipping point” where global warming could run out of control, leaving us powerless to intervene as planetary temperatures soar.</li> <li>▪ Drought intensity in Australia could triple, according to the CSIRO, which also predicts days in NSW above 35 degrees will increase 2 to 7 times.               <ul style="list-style-type: none"> <li>▪ Area with at least 30 days cover annually projected to decline 93%</li> </ul> </li> <li>▪ Under expected future settlement patterns, exposure of the Australian road and rail network will increase significantly once sea level rises above about 0.5 m</li> <li>▪ An increase of mean sea level by 0.1m increases the frequency of an extreme sea level event by a factor of between 2 and 10 over south-eastern Australia depending on location</li> <li>Transportation               <ul style="list-style-type: none"> <li>▪ Transport infrastructure is vulnerable to extreme heat and flooding</li> </ul> </li> </ul>	<p>Since there is no direct correlation between temp rise and population health scenarios, there are overall conclusions</p> <ul style="list-style-type: none"> <li>▪ There will be more older Australians on average               <ul style="list-style-type: none"> <li>o They will make greater demands on the health system</li> </ul> </li> <li>▪ Australian families will be smaller as a result of ageing               <ul style="list-style-type: none"> <li>▪ Greater ethnic diversity</li> </ul> </li> <li>▪ Concerns for income distribution, social inclusion and poverty</li> <li>▪ More engagement from excluded labour groups like Aboriginal population</li> <li>▪ Net growth of jobs of between 0.9 and 2.5% per annum</li> <li>▪ Only a 0.5% growth in labour force (without migration)               <ul style="list-style-type: none"> <li>▪ Increase in retirement of the baby boomers= increase in number of retirees living outside of cities</li> </ul> </li> <li>▪ Increasing costs of continued growth of major metro areas</li> <li>▪ People living outside of the city will have a difficult time accessing healthcare facilities</li> </ul>	<ul style="list-style-type: none"> <li>▪ Higher projected storm surge and inundation levels</li> <li>▪ Salt water intrusion and landward advance of tidal limits within estuaries               <ul style="list-style-type: none"> <li>o Implications in the medium-long term for freshwater and saltwater ecosystems and development margins, particularly building structures and foundation systems within close proximity to the shoreline</li> </ul> </li> </ul>



## I4- Australia 2050 Trail Lesson Plan

### Australia 2050 Trail Lesson Plan

Program(s) & focus:

- Sustainability Program
- Global Warming Program
- How can lifestyle choices impact the future

Key messages:

- Sustainable consumption
- Identifying connections between lifestyle choices and social and environmental futures
- Current impacts of climate change
- Why is climate change changing so fast
- Adaptation and Mitigation
- Interrelationships, change
- What lifestyle choices can you make to have a better future?

Equipment:

- 2050 Trail Sheets for 7-12 **\*Students and visitors should have copies of decision sheets in order to fill out while taking the excursion, please use these where possible\***
- Spare sheets can be found in the energy classroom filing cabinet. Please let the energy senior teacher or coordinator know if you use these so they can be re-printed.
- Sheets consist on 5 decisions, and a total score where points are attributed to signs and added up
- Spare pens/pencils (sharpen pencils for set-up)

Process / Content:

### **Part 1: Introduction**

- **A)** We are going into the future to the year 2050. How old will you be in 2050?
- **B)** Some kind of guided visualization into the future, techniques vary, e.g. asking students to close their eyes and imagine themselves at the age of \_\_, in the year 2050. What will you be doing at that age?
- **C)** As students start to share their thoughts about how they envision lives/jobs/houses/families etc. Use these responses to link into an introduction the idea of resource use and how usage of resources in the past have led to what we have now a days
- **D)** What do we mean by ‘resources’? Fossil fuels, materials for living, etc., where do we get our resources and what are some of the impacts or using them?
- **E)** Start to connect past and how the rapid development of society has led us to be where we are now. This will be explained on the prelude for the trail

## **Part 2: The Prelude**

- **A)** Begin addressing what climate change is and how this can have negative effects on the world (species, food, resources)
- **B)** Start explaining how the world/Australia looked 80 years ago. Mention: typical house, how cities looked in Australia, what was the most modern goods/technology that people had access to, population size, resources and energy reserves (fossil fuels, coal...etc.), types of transportation, temperature average, sea level, average tons of waste per year
- **C)** Go to next board and explain how the world/Australia looked 50 years ago. Mention: typical house, how cities looked in Australia, what was the most modern goods/technology that people had access to, population size, resources and reserves energy (fossil fuels, coal...etc.), types of transportation, temperature average, sea level, average tons of waste per year
- **D)** Go to next board and explain how the world/Australia looked 30 years ago. Mention: typical house, how cities looked in Australia, what was the most modern goods/technology that people had access to, population size, resources and reserves energy (fossil fuels, coal...etc.), types of transportation, temperature average, sea level, average tons of waste per year

- **E)** Go to next board and explain how the world/Australia looked 15 years ago (this period of time try to link it as when the time they were born). Mention: typical house, how cities looked in Australia, what was the most modern goods/technology that people had access to, population size, resources and reserves energy (fossil fuels, coal...etc.), types of transportation, temperature average, sea level, average tons of waste per year

### **Part 3: Doing the Trail**

- **Explain trail & handout**, at the end of the prelude, gather all students/visitors in a group and hand them the decisions sheet. Using Decision 1 as an example, read out each possible place they can pick from together with the type of house they want to choose. Explain how stars mean each option and how to count/circle each icon so they can be added at the end. Tell students you will meet them all at Decision 3. **\*\*If you do not think your group cannot handle this freedom, do all decisions as a group.**
- **Decision 2:** If the group seems to be struggling with the concept of the trail, continue as a group to Decision 2. With your whole group, clearly explain the multiple options they have to choose from the different goods and technological appliances. Then explain that whatever is not listed as an option and they will like to have they can still select the option (OTHER). Explain how they can select as many goods/technological artifacts they will like. Ex. If they want 4 TVs, they will multiply the icon sign by the number 4 and that will give them the total amount of icons. The addition of all of them will be written down as the total for the score. Check that students are adding as many choices as they like, and adding them together. This board is a good opportunity to compare how different artifacts can use a lot or few energy, and that is not only the artifact itself, but it is how many what really matters –how are more resources used etc., link between resource use and higher points.
- **Decision 3:** Mention briefly how choosing the place you want your house to be has an impact on the way you manage yourself around, explain the stars and constraints each type might have. It is important to mention that they have to select **their main medium of transport, not a combination; in other words, what will they spend the most time on while getting to and from a place.** Then ask the visitors or students what they imagine

doing on vacation, and how they plan to get there. Let them circle the icon attributed to the decision and move on.

- **Decision 4:** If the group is able to do this on their own let them go through it and then meet at Decision 5. If they are not able to complete it on their own then have them wait for you here. This decision is about food and waste. They have to choose how often they plan to eat animal based food as their main diet. The choices range from never to always with increasing amounts of animal based foods compared to an all-vegetarian diet. Then the second part of this decision has to do with packaged versus naturally grown food. So explain to the participants that they have a choice between buying all packaged foods or take-away foods and food grown from local farms. Explain while they are choosing that packaged foods will create more waste, which will show up in their futures.
- **Decision 5:** Do this decision as a group. Explain the importance of renewable and non-renewable energy briefly. Mention the option each one has together with the efficiency. Explain how in order to power your life; we need to make some sacrifices among renewable and nonrenewable sources of energy. For instance, if you picked a large house, you must make 4 choices for the sources of power production method you want to power your life. For a large house, you are limited to 2 choices in renewable and 2 choices in non-renewable. So an example of some choices includes solar, hydro, coal, and oil. Or wind, solar, oil, nuclear. After you make your choices, cross out the number of light bulbs for each power production method source you chose in the decision sheet (e.g. solar is 2 light bulbs, coal is 5 light bulbs, etc.)

#### **Part 4: Future Scenario**

- **A)** Explain how to add each icon to obtain the total for each one. Then explain how each icon has a value and make them write this one down in the decision sheet.
- **B)** After this, explain the students and visitors how to multiply each score with the number of icons gotten, in order to have a total value for each icon. Make them write up the total by adding up all the icon value totals to have a **TOTAL FUTURE SCORE**.
- **C)** Direct them to the future scenarios and explain how the **TOTAL FUTURE SCORE** obtained will allocate them different futures. Give an example, for instance: If you got a score of 46, you will get future number 3 (because the range is from 41-60)

- **D)** Let the students go to the different enclosed future scenarios and tell them to walk in and observe the details of each. Tell them to read the facts and to write down two aspects that really impressed them about their future.

**Part 5: The Wrap up**

There are many ways to facilitate this discussion and the focus will vary depending on the group, what you want to focus on and the program being undertaken (sustainability, energy, etc.). Try to focus on two or three key points first, and then you can build a more developed discussion. Some Suggestions:

- Bring students back to the circle & begin discussion by summarizing the different futures of the class – this can be done by asking students to stand in a ‘human graph’ showing a progression of who got what future, or just by a show of hands as the teacher calls out each future.
- Ask students to share what they thought was the most shocking/intriguing thing about their future and why?
- Continue leading the discussion with key topics such as the ones below

**Some discussion topics may stem from this:**

<b>Topic</b>	Sustainability	Place where you will live	Transportation Methods	Type of house and goods
<b>Questions</b>	-What does ‘sustainable’ mean? - <b>Why is sustainability important for our future?</b> -Did you think your future was sustainable? What choices could you change to ensure a sustainable future?	-How might these things be related to your decisions?	-What transport method did you choose or was available in your future?	-What are the most important things in life? -How does living in a city differ from a suburb or the country side

<b>Discussion pointers</b>	<b>-Define sustainability</b> – How we live now so that our planet and people have a healthy future. -Combining the economic, social and environmental practices to maintain productive conditions in a harmonious social living. -Embodied Energy of products		<b>-Currently 80% of the world’s resources consumed by 20% of the population</b> – you can ‘divide up the chocolate cake’ among the class to illustrate this stat			
<b>Connections</b>	-Mitigation and adaptation, the plan The City of Melbourne has with the project Zero Net Emission by 2020.		<b>-Link between resource distribution/availability and social issues</b> <b>what happens when there are not enough resources to go around?</b> Conflict, health issues, environmental issues			
Place where you will live	Transportation Methods	Type of house and goods	Population Growth vs Consumption	Environment	Waste	Energy
How might these things be related to your decisions?	What transport method did you choose or was available in your future?	What are the most important things in life?	When does population increase/decrease and due to what? condition?	What did the environment look like in your future?	What was the amount of tons per year in your future? to residues.	How will you power your life?
Currently 80% of the world’s resources consumed by 20% of the population	Too many people cause stress in the environment, resources, pollution, jobs, economic aspects etc.	Use questions from boards/sheet to link resource use with environmental impacts	Solutions: -Green Power, Renewable energies, changing energy use	<b>Renewable vs Non-Renewable</b> Talk about the efficiency of each method and costs that this might have in 2050		
Link between resource distribution/a availability and social issues -	More people living unsustainably = more need for resources = less resources to go around... this links back to social issues	Who chose a really big house and did not have a healthy environment in your future?	Who chose a big car, or three cars, or a sports car and also had lots of pollution in your future?	Link to the importance of using renewable energy production methods, which pollute lot less than non-renewable.		

Many of these decisions they made on the 2050 trail are decisions they will make in the future, therefore it is important that you ‘bring it back to their level’ and **leave students with take-home messages** that they can begin doing immediately. Reiterate key points you focused on/students discussed. This can be done with thought provoking questions\*\*Suggestions:

- **Do we know for sure how the future will turn out?**
- **What are the connections between our choices and our future?**
- **How can we change our decisions to achieve a better future?**
- **Do we need everything in the world to be happy or satisfy our needs?**
- **What can we do today/this week to achieve a more positive future? e.g.:**

Transport – e.g. small car/no car, riding bikes/walking, public transport, car pooling

Housing – e.g. switch to ‘green energy’, use less energy at home, shorter showers (can link with Eco House activities)

Energy & resources use – e.g. 4 R’s, sustainable consumption, buying local products

### **Recap the connections between these changes and better or more sustainable futures**

- **Why is it important to think carefully before we make decisions?**
- **Why is it important to think about the impact of our choices before we make them?**
- **What things in our life make it hard to make different decisions to everyone else? E.g. Media messages, peer pressure, consuming ‘stuff’ –iPods, changing fashions etc.**

### **Part 6: The Book (What will I change from what I do now to have a better future?)**

- At the end of the wrap-up, pass around “The Book” which is a Notebook where students will right one thing that they will change from their daily living in order to have a better future. Tell the students that this book is going to be kept in CERES and whenever they came back they could check what they wrote. Tell them to fill out their name, school, year, date and what would they change in their daily living in order to have a sustainable Australia in the future.

\*If students are not forthcoming in a whole-class discussion, encourage small group discussion of key questions and ask the group to share their ideas (e.g., Students’ discuss in pairs what they could do TODAY to impact more positively on the future, then go around the group and get one idea from each pair).

\*\*\*Extension: If you have an hour session, after completing your discussion, send your group through the trail again to see the changes to their future with different decisions.