

Smart Micro Grids

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Abstract

Smart microgrids represent a unique combination of power generation and distribution on a small scale, that, prior to the I.T. revolution has never been seen before. In the US healthcare cost is increasing, but with micro smart grid technology and already well proven co-generation technology energy and fuel usage can be reduced. These systems can lower the hospital's running cost and allow a hospital to more easily implement renewable technology while still ensuring power reliability.

Background

As defined a microgrid is a smaller self-contained part of the larger electricity network that incorporates small locally generated power systems into the interconnected electrical grid (Beliveau, 2010). They have already been deployed in a variety of locations including hospitals, high tech office parks and college campuses (Lund, 2009). There are a vast number of companies involved in developing smart grid technology including IBM which is focused on security and management (Ambrosio, R., 2009).

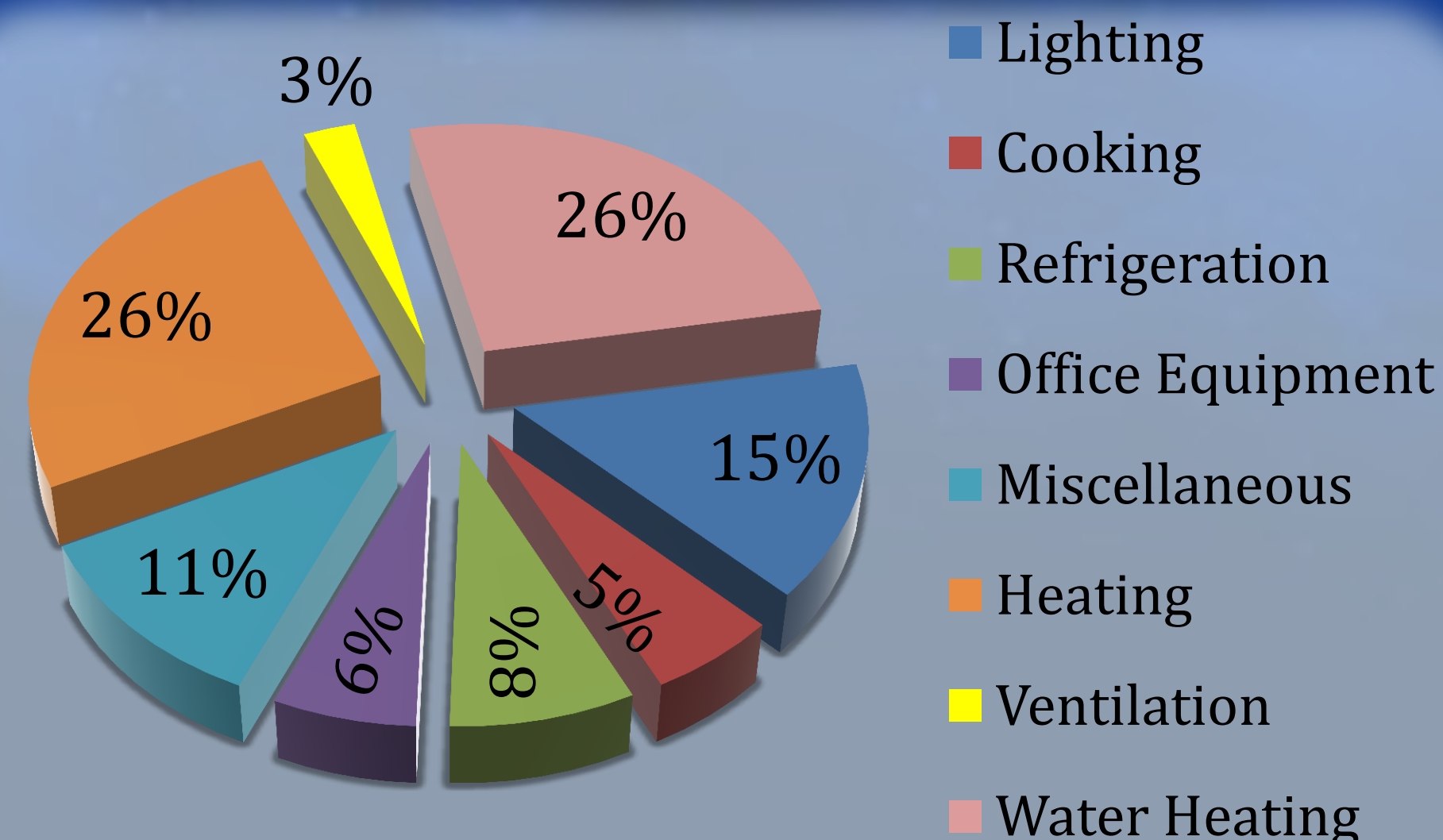


Figure 1. Hospital Energy usage

Project Goal

- Determine the demand in a hospital setting for energy cost reduction.
- Determine the feasibility and cost of a cogeneration based micro smart grid for a hospital complex.

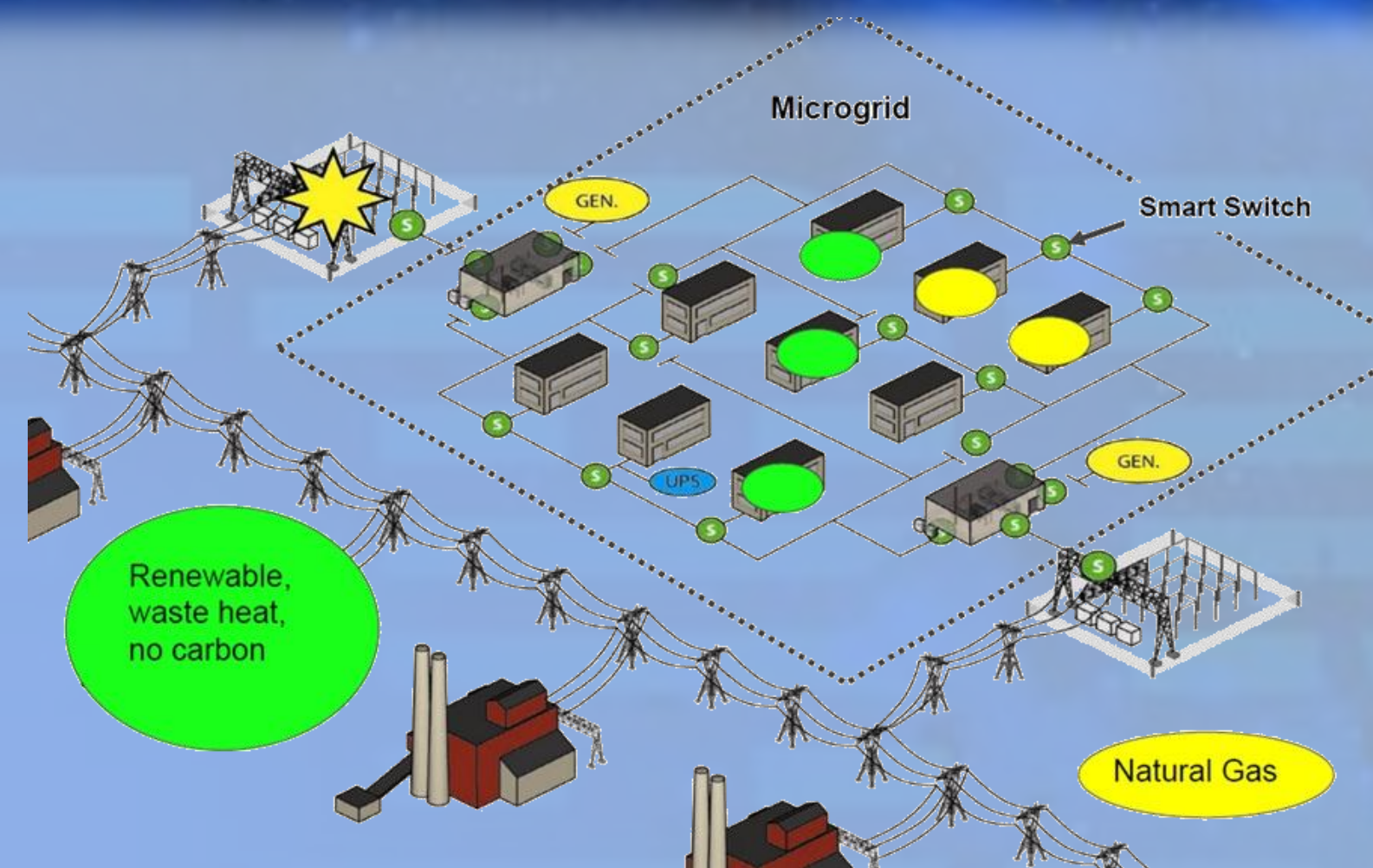


Figure 2. Layout of a smart micro grid

Methods

- Current existing micro grids were analyzed in order to determine pros, cons and what makes this technology desirable to consumers, in this case, hospitals.
- Ron Ambrosio, researcher at IBM Watson Research Center, was interviewed to provide current and future plans from IBM regarding the Smart Grid and to provide a scenario of the development of this new technology.
- Paul Lipke, Senior Advisor, Energy & Buildings for *Health Care Without Harm*, answered questions on this topic.
- We created a case study of an individual hospital comparable to the scale of the medical center at the University of Massachusetts.
- The payback time for a micro smart grid was calculated.

Results

- Hospitals use more energy per square foot than any other building type, with the exception of retail food services, therefore they are very motivated to reduce energy use and cost.
- Smart grid technology could offset \$80 billion in the US alone.
- A smart micro grid has an approximate return time of 9 to 11 years.
- Green energy can be integrated into the system while increasing reliability.

Conclusions

- Micro grids are part of the answer to how to make grid more resilient to electrical and communication interruption and take advantage of distributed generation and storage in addition to distributed demand response (Ron Ambrosio).
- Smart microgrids represent a great opportunity for hospitals, however the technology is young and the exact amount of savings is questionable and they are still considered to be 5 to 10 years off.

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