Improving Energy Systems at the Museum of Russian Icons

Creating a Framework for Green Buildings

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Abstract

The Museum of Russian Icons in Clinton, Massachusetts is a non-profit green museum striving to maximize the use and benefits of its solar panels and other energy systems. Our project addressed the Museum's concern regarding their solar panels, installed in 2006 and 2011, efficiency and proper registration. The project also looked into optimization of their HVAC and humidity systems. Our solution was to create a guide framework that outlines steps and breaks down each system into an easy instructional manual to ensure a reduction in their carbon footprint and allow the Museum to channel the benefit in time and money savings towards building the collection and serving the public.

2006
- Built-in roof solar panels are installed
- Museum installed HVAC Systems that they are currently using

2011
- Second set of solar panels are installed
- Signed a contract with Clean Asset Partners for the SREC Program

2016
- Museum renewed contract for SREC
- Deck Monitoring subscription expired

2018
- In first quarter, Museum sees a decrease in already-low rebates

	Cost	Benefit
Solar Panel Annual Maintenance	~ $1,150-$2,300 ($10-$20 per panel) inspection	Ensures panels are working properly to gain full rebates
Humidity System	~ $1,000 (per unit) (Installation fee $475-$700)	Humidity and HVAC systems won't be overworked (reduces annual heating bill by 5%)
HVAC Systems	~ $150-$500 for yearly temp. recalibration.	~ $300-$700 saved monthly with wider temp. range & recalibrated thermostat

Step 1
- Performed background research on energy systems, energy audits, and solar panels

Step 2
- Conducted site visits, interviews, and inspected energy systems at the Museum

Step 3
- Analyzed documents and energy audit to brainstorm recommendations

Step 4
- Interviewed companies the Museum contracted to obtain additional information

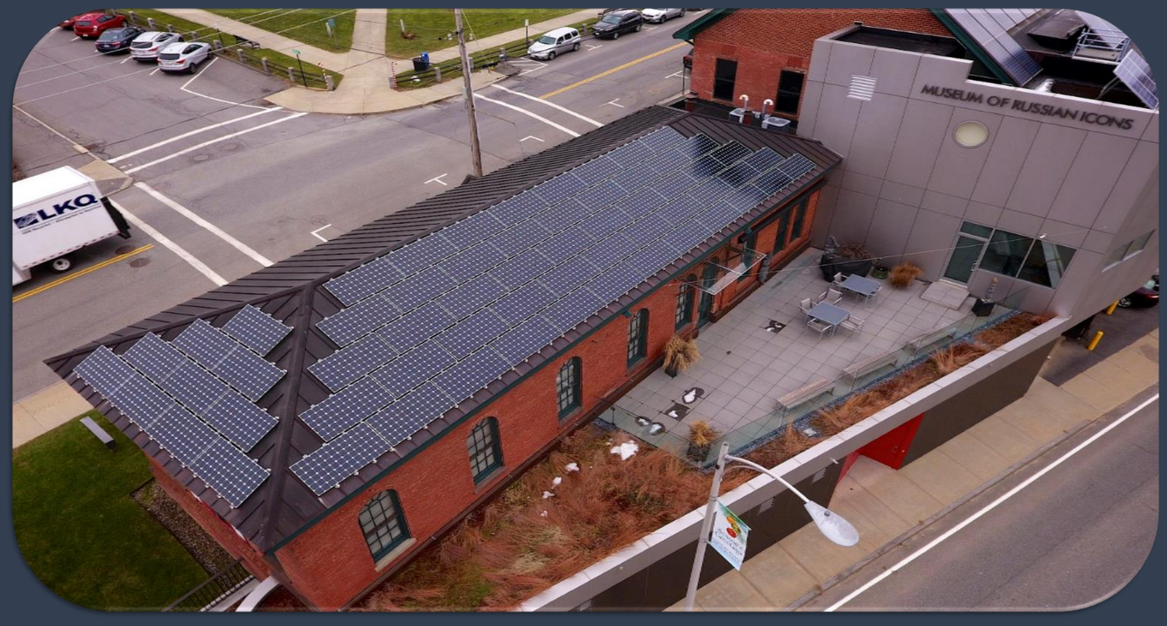
Step 5
- Created an instructional guide for the Museum and other green buildings to reference

Results

- Guide framework for green buildings
- Properly registered the museum's solar panels
- Can save ~$2,100 annually by implementing a one-time ~$3,600 recommended investment

Recommendations

- Update or recalibrate current HVAC systems
- Equalize humidity throughout museum



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Selected References

Solar Design Associates Inc., *Operations and Maintenace Manual for Rooftop Photovoltaic System,* 2010.

Solar Design Associates Inc., *Photovoltaic System Manual,* 2005

Harry Grodsky & Co. Inc., *Sensor Data Assessment*, 2018