Dublin, Ireland

Smarter Cities Challenge executive summary

Introduction

The City of Dublin, Ireland, was one of 16 cities selected to receive a Smarter Cities Challenge® grant from IBM in 2014 as a part of the company's citizenship efforts to build a Smarter Planet®. During a three-week period in October of 2014, a team of four IBM experts and two HSBC client partners worked together to deliver recommendations on a key energy and sustainability challenge identified by Owen Keegan, Dublin's Chief Executive, and his senior leadership team.

Dublin has made some great strides towards sustainability, but the City is not yet in a position to address the European Energy Directive 2020 goals of receiving 16% of its energy from renewable resources. In Dublin, there are more than 430 municipally owned buildings along with hundreds of other assets, such as parks and street furniture, which generate high energy costs for the City. Dublin's Chief Executive, Owen Keegan, and Dublin City Council have asked for a recommendation on whether solar energy is a viable option to address the environmental and financial goals of the City's municipally owned and government buildings. A number of factors make the City a good candidate for solar energy, including the following:

- Solar energy is a proven technology that has decreased in cost in recent years.
- The economy in Ireland is improving.
- The landscape, such as available space, solar irradiance and weather, on-site experts and accessible leaders, makes the City's buildings promising assets.

The challenge

There is a significant amount of municipally owned urban space in Dublin that is unsuitable for wind energy but could potentially benefit from solar technologies, including photovoltaic (PV) and solar thermal energy (STE). The IBM Smarter Cities Challenge team was asked to address the following challenge:

Dublin City Council needs to understand the harvestable energy potential of the City's assets and how municipally owned, distributed solar energy could become economically viable and practically deployed.

Findings and recommendations

In order to build a deep understanding of the City's challenge and its available solution options, the team interviewed a number of stakeholders and experts in the solar energy and renewable energy fields from across Dublin and elsewhere. The team reviewed the available data, including statistical information about solar energy in the region, commercial pricing of solar technology and Dublin City Council's own statistics for energy usage. These findings are what form the basis of the team's recommendations.

IBM

The key findings are as follows:

- **Technology:** The price of solar power modules has declined significantly over the last decade, dropping from €1.5/kWp in 2010 to less than €0.6/kWp presently.[1, 2]
- **Risks:** Solar PV is a low-risk and low-maintenance technology that has demonstrated consistent performance. Other regions in Ireland, such as County Tipperary, as well as other parts of Europe that experience similar weather patterns have successfully implemented this technology.
- **Energy security:** Diversification of indigenous renewable energy sources is a strategic priority for Ireland, enabling the country to replace some imported energy with a balance of renewables that are not dependent on a single source.
- **Energy efficiency:** In addition to solar energy, the City also must consider energy efficiency and smart building approaches that will reduce overall energy consumption and increase the City's proportion of renewables as compared to non-renewable energy sources.
- **Local energy:** Distributed solar energy allows generation and consumption to occur in the same place. This approach reduces the cost of transmission, which can be an issue for other renewable energy sources.
- **Environmentally friendly:** Solar energy has low carbon dioxide and particulate emissions.
- **Leadership:** Dublin City Council is seeking to promote distributed solar energy on a larger scale. While a sound financial justification remains essential to supporting their plan, solar energy is not a purely financial decision. There is an opportunity for the City to demonstrate leadership in renewable resources initiatives by using solar energy to promote the long-term good of its community.
- **Community:** Residents have expressed positive reactions towards the adoption of solar energy in the city, but it is important to keep communities engaged and informed of the benefits and advantages that solar power will bring. Doing so will help keep residents engaged and their attitudes positive. And it could lead to innovative community funding arrangements.

One key variable the IBM Smarter Cities Challenge team examined was how suitable Dublin is for supporting solar energy. The team determined the following:

- Solar irradiance in Dublin (~1,000 kWh/m²/year)[3] is comparable to other cities that have implemented solar energy successfully, including many in northern Germany.
- Dublin has plenty of suitable space to implement solar technology. Among Dublin City Council assets, several buildings have high electric base loads and large roof areas. These buildings represent a valuable asset base as they could potentially offset their high electricity bills by generating solar PV electricity using the large rooftop space that's readily available.
- The city is home to a number of subject matter experts who will be vital in driving successful solar energy projects. Various members of local universities, business leaders and individuals on the Council itself have expertise in solar technology.
- Solar energy solutions present a financially sound investment for the City. Solar PV typically pays back its initial investment in 7 to 13 years if energy prices remain the same — the ROI would be shorter than that, though, if energy prices rise. PV technology is normally guaranteed for 25 years, and its lifespan is often longer in practice. In short, a favourable ROI is possible with low risk.

Based on its findings, the team made the following six recommendations to the City:

1. Install solar PV on prime municipal buildings
Dublin City Council should undertake a systematic process to evaluate the City's 430-plus municipal buildings to determine if roof-mounted solar installations could offset the buildings' energy base load. The price of PV systems has fallen over the years, and the cost of producing solar power in €/kWh over the lifetime of the PV system may be comparable to or lower than the utility price of electricity paid by Dublin City Council.

2. Move forward with solar installation on other municipal assets
Dublin City Council should build on the initial introduction of solar energy across municipally owned buildings and utilise solar power generation in housing complexes, leisure centres, parks, reservoirs and other open spaces. At this stage, there would be more scope to explore more diverse building types and solar power technologies, such as solar battery storage or solar thermal solutions.

3. Push for a solar renewable energy feed-in tariff (REFIT)
Dublin City Council should leverage its influence at the Department of Communications, Energy and Natural Resources' ongoing consultations over the current Green Paper on Energy Policy in Ireland. The Council should push for competitive solar REFITs that would benefit distributed solar energy and small-scale producers. This would help increase the prevalence of solar PV, generating many more use cases that demonstrate the technology's financial advantages.

4. Incorporate smarter buildings and micro-generation into the Dublin City Development Plan
Dublin City Council should build on Dublin's current City Development Plan, encouraging the adoption of smarter building technologies and distributed solar energy in the 2016 - 2022 plan. There is an opportunity for the new plan to incentivise solar energy use in building developments, which could lead to building code policies that support Ireland's renewable energy initiatives.

5. Develop leadership in solar funding
There are multiple funding options for Dublin City Council to consider. These could include direct finance from Dublin City Council's budget, asset-based lending, partial or full funding through an energy service company (ESCO) and community and crowdfunding efforts.

6. Build community awareness and engagement
Dublin City Council should embark on a proactive awareness campaign around the benefits of solar energy. A community that is more educated on and engaged in solar energy will be more inclined to join the City's renewable resources efforts. While this project is focused on municipally owned buildings, the Smarter Cities Challenge team hopes Dublin City Council will set the foundation for many others in the community to follow in later phases.

Conclusion
Each of these recommendations focuses on helping Dublin pursue the widespread implementation of solar energy solutions in a country accustomed to harnessing wind energy. Doing so will help the City achieve its 2020 renewable energy targets and drive long-term energy cost savings.

For more information
To learn more, send an email to ccca@us.ibm.com or visit smartercitieschallenge.org