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Title: Initiating Best Practice Guidelines for Urban Wind Systems

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There has been growing interest in rooftop wind systems in recent years driven by novel turbine designs and the fact that they are a lower cost option than other forms of distributed generation such as photovoltaic systems. Europe has seen the greatest number of rooftop wind installations, promoted by schemes such as the UK-based ‘Clear Skies’ renewable energy grants programme. In Australia, the first rooftop wind systems were installed by the Capital City Committee Adelaide in 2006. Other government agencies are currently assessing the possibility of rooftop wind projects including Sustainability Victoria and the City of Melville in Western Australia.

There is a concern that environmentally conscious local government bodies or other organizations will install rooftop wind systems as a part of their efforts to increase the sustainability of their operations and to send a visible signal to the public of their support for sustainability, but may do so without adequate consideration of safety, structural building integrity or turbine performance. The potential consequence of such rushed decisions would be twofold. Firstly, the failure of the project due to technical issues, such as underperforming turbines, noise and vibration. Secondly, the impact of project failures on the reputation of the wind energy industry and the renewable energy industry in general. To prevent this there is a need to conduct detailed feasibility studies including wind resource assessments, and to examine structural related noise & vibration issues in order to develop best practice guidelines for the installation of rooftop wind systems.

This paper gives an overview of a project that was showcased at the Western Australian Sustainable Energy Development Office’s (SEDO) Funding Announcement in June 2007. The study uses computational models to predict the wind resource on the rooftop of the City of Melville’s Civic Centre building. These predictions are compared with data from a monitoring campaign conducted on the rooftop. The computations involve meso-scale modelling of regional flow effects, wind atlas modelling of local terrain and roughness effects, and CFD modelling of the effects of the building. The monitoring campaign captures the highly turbulent micro-climate on the rooftops using ultrasonic 3D anemometers. The study gives insight into the best siting for a rooftop wind system by avoiding areas where there is likely to be increased turbine fatigue due to turbulence on the rooftop and highlighting those areas where there is additional power available due to the speed up of air over regions of separated flow.

The project is a feasibility study of rooftop wind systems for the City of Melville but also aims to kick-start best practice guidelines for rooftop wind systems where the issues of performance and safety as well as noise and vibration need to be addressed. The project goal is to establish a network of interested parties, including the Capital City Committee of Adelaide, Sustainability Victoria and the City of Melville in Western Australia that can develop a set of national best practice guidelines for the installation of rooftop wind systems.

Biography of the Author:

Dr. Jonathan Whale - Dr. Whale has worked in the area of wind energy in the UK, USA and Australia over the last 15 years including periods working on projects with the International Energy Agency (IEA) and the US National Renewable Energy Laboratory (NREL). Dr. Whale is currently a Lecturer in Energy Studies at Murdoch University in Perth and also coordinates the Program in Testing and Standards of Small Wind Turbines at the Research Institute of Sustainable Energy (RISE).