

Australian Government Support for Renewable Energy and the Advanced Electricity Storage Technologies Programme

Denis Smedley (Australian Greenhouse Office; Canberra, Australia); denis.smedley@deh.gov.au

Introduction

The Australian Government is committed to maintaining a strong and internationally competitive economy with a lower greenhouse signature. It has committed almost \$1.78 billion to fund a range of climate change measures across the energy, transportation, and agriculture sectors. The Government has adopted a comprehensive approach to addressing the greenhouse challenges associated with the production and use of energy through the national energy policy described in the white paper *Securing Australia's Energy Future*, announced by the Australian Prime Minister, the Hon John Howard MP on 15 June 2004. This energy white paper (www.pmc.gov.au/energy_future) outlines a comprehensive and integrated approach to meeting the Australian Government's objective of ensuring that Australians have reliable access to competitively priced energy, the value of energy resources is optimised, and environmental issues are well managed.

The national energy policy includes a suite of approaches focused primarily on reducing the cost to the economy of meeting future greenhouse constraints. It includes new initiatives supporting renewable energy and low-emissions technologies. The **Low Emission Technology Demonstration Fund** will provide \$500 million to support industry-led demonstration projects of technologies that are capable of producing large-scale emission reductions in the long term. The \$500 million in government funding is expected to leverage \$1 billion in industry funding. The goal of the demonstrations is to build long-term capacity for low-emission technologies, not to subsidise their penetration in the short-term. A further \$100 million (over 7 years) has been provided under the **Renewable Energy Development Initiative**. This initiative will focus on research and development activities, proof-of-concept, and early-stage commercialisation of renewable technologies (renewable energy storage projects are eligible for funding under this initiative). Options to remove barriers to the adoption of renewable energy will also be examined under a \$75 million **Solar Cities** trials programme, aimed at demonstrating how technology and efficient markets can combine for a sustainable energy future. The Solar Cities trials will be conducted in at least four cities and are designed to determine the impact that a combination of (1) cost-reflective pricing, (2) clustered solar generation, (3) energy efficiency, (4) smart metering technologies, and (5) effective planning has on electricity supply and demand profiles. The ability of energy storage to 'time-shift' generation to match peak-demand may be included as part of the Solar Cities trials. Finally, a \$20.4 million programme to support the development of **Advanced Electricity Storage Technologies** (AEST) and a \$14 million **Wind Energy Forecasting Capability Programme**, which aims to provide a wind-energy forecasting system for Australian conditions to address barriers to the more widespread use of wind power on Australia's electricity grid, are also funded under the new energy policy.

Earlier Government Support for Renewable Energy

The new initiatives described in the energy white paper build on earlier Australian Government renewable energy support initiatives such as the Photovoltaic Rebate Programme, the Renewable Remote Power Generation Programme, the Renewable Energy Equity Fund, the Renewable Energy Commercialisation Programme, Renewable Energy Industry Development Programme, and the Renewable Energy Showcase. Each of these programmes is described briefly below. These programmes were announced by Prime Minister Howard under *Safeguarding the Future: Australia's Response to Climate Change* in 1997 and supplemented in the *Measures for a Better Environment (MBE)* package in 1999. Overall, these programmes have provided funding of more than \$300 million for grant, equity, and rebate programmes to boost the uptake of renewable energy and help the Australia's domestic energy industry to grow.

The **Photovoltaic Rebate Programme** (www.greenhouse.gov.au/renewable/pv) was initiated on 01 January 2000 to provide cash rebates to householders and owners of community use buildings (*e.g.*, schools) who install grid-connected or stand-alone photovoltaic systems. The **Renewable Remote Power Generation Programme** (www.greenhouse.gov.au/renewable/rpgrp) provides financial support to increase the use of renewable generation technologies in remote parts of Australia that presently rely on fossil fuel (especially diesel) for electricity generation. This programme provides up to 50% of the cost of renewable energy generation equipment to reduce the reliance on diesel fuel in areas with no access to the electricity grid. The majority of the projects in this program are wind/diesel hybrids and solar. The **Renewable Energy Equity Fund**

(www.greenhouse.gov.au/renewable/reef) provides venture capital for small innovative renewable energy companies.

The **Renewable Energy Commercialisation Programme** (www.greenhouse.gov.au/renewable/recp) and the **Renewable Energy Industry Development Programme** (www.greenhouse.gov.au/renewable/reid) were competitive grants programmes, designed to achieve greenhouse gas abatement by assisting the commercialisation of renewable energy technology and furthering the development of the renewable energy industry in Australia. All funding under these programmes is fully committed, although some projects are yet to be completed. Projects were chosen for their strong commercial potential, contribution to the diversification of the renewable energy industry, and reduction of greenhouse gas emissions. The RECP included a \$265K grant to ZBB Technologies, Inc. for commercialisation of its zinc/bromine battery system and a \$600K grant to Pinnacle VRB, Ltd. for a development and integration of a vanadium redox battery system in a wind-diesel mini grid. The **Renewable Energy Showcase Programme**, which is now complete, funded a small number of leading-edge and strategically important renewable energy projects that had strong commercial potential, were considered to be technically proven, and that could demonstrate the potential for large-scale widespread application. Under this programme, a \$1 million grant was awarded to Western Power to develop flywheel energy storage for a wind-diesel hybrid system. Because of technical issues, the flywheel portion of the system was never commissioned, but the project led to the development of world-leading, low-load diesel technology. This system allows the diesels to run under very-low-load conditions without causing any maintenance issues and to take up sudden loads quickly, thus maximising the benefits of wind in small wind-diesel systems.

These earlier programmes are complemented by the innovative, world-first **Mandatory Renewable Energy Target** (commenced on 1 April 2001), which is expected to leverage more than \$2 billion of additional investment in new renewable energy generation by 2010. The target places a legal liability on electricity retailers and other liable parties to source an additional 9.5 million MWh per year of electricity from renewable sources by 2010. In practice, it enables new renewable energy generators to earn renewable energy certificates for the electricity they produce, which can then be traded on the open market, helping to make renewable energy systems more competitive.

The Advanced Electricity Storage Technologies Programme

The 5-year, \$20.4 million AEST Programme included in the measures announced in the energy white paper is designed to complement the range of related renewable energy and industry support programmes and to strategically identify and promote storage technologies that will increase the attractiveness of intermittent electricity generation sources such as wind and solar and their ability to contribute to the electricity system. Advanced electricity storage technologies could include, but are not limited to, conventional and advanced batteries, electro-mechanical and chemical storage technologies, supercapacitors, superconducting magnetic energy storage (SMES), flywheels, and compressed air energy storage (CAES), in either on-grid applications, or off-grid applications that could lead to on-grid use.

In the Australian context, this programme was initiated to help address an emerging issue where additional spinning reserve may be needed to manage the intermittency of electricity supply when wind becomes a large component of the electricity network. Electricity storage will also assist the commercial potential of solar photovoltaics as a peak-load generation technology. It is likely that many of the technologies will be technically and commercially proven in niche applications, such as remote locations, research institutions or markets where the cost of electricity delivered is higher than in on-grid applications. It has only been in remote situations in Australia, where fossil fuels are expensive to supply, that the reduction of fuel costs caused by increased penetration of renewable resources has offset the cost of implementing a storage solution.

The programme provides matching funds for demonstration projects that represent 'step-change' technology solutions and will focus on the following three priority applications:

- Grid-connected, MW-scale storage for large wind farms or solar power stations
- Grid-connected, kW-scale storage for residential solar
- Stand-alone storage for remote area power supply (RAPS) systems

Some research or development activities that are expected to lead to demonstrations may also be funded under the programme. The Statement of Challenges & Opportunities and Programme Guidelines were released in

October 2005. Expressions of Interest for project funding will be requested and will close on 13 April 2006. For additional information see www.greenhouse.gov.au/ago/funding/index.html. The programme will follow a staged approach that provides opportunity for feedback on proposed projects and a focussing of priorities as the programme develops to ensure that the projects selected for funding will achieve the programme objective. There is no maximum value of funding for any project, but it is anticipated that projects that have the best chance of meeting the programme's objectives will tend to be large-scale projects that represent a significant 'step-change' progression in electricity storage technologies. This will most likely result in a relatively small number of projects being awarded funding. Overseas companies will not be eligible for funding, but may apply through an Australian affiliate or partner.

Conclusion

Despite having developed some promising technologies, Australia has not been a major player in the worldwide electricity storage industry. Australia could become a more significant player as a result of:

- Australian firms developing storage systems based on Australian-developed technologies;
- Growth of local renewable energy firms that incorporate these storage technologies into their projects; and
- A significant increase in the deployment of renewable generation in the Australian electricity supply system.

Collaboration with development programmes similar to the AEST Programme, overseas companies, and research organisations will be encouraged to maximise the value of the Australian programme and to ensure that optimum solutions are developed and implemented. Participation in EESAT 2005 is seen as an important first step in facilitating such collaboration.