ATSE

Australian Academy of Technological Sciences and Engineering (ATSE)

International Workshop

ELECTRICITY GENERATION: ACCELERATING TECHNOLOGICAL CHANGE

April, Melbourne

Communiqué

The Australian Academy for Technological Sciences and Engineering (ATSE) organized a three day International Workshop in Melbourne from 31 March to 2 April 2009 that focused on the major challenges in accelerating technological change in electricity generation. ATSE invited to the Workshop representatives from four engineering academies; namely: Japan, Germany, South Africa and the United Kingdom. Representatives from these Academies joined an invited group of Australian delegates who are experts in their fields to contribute to the Workshop and to develop the Workshop Communiqué that follows.

- **Energy Security**

  - *Energy security is a real issue for Australia.* Energy security for Australia requires a major increase in base load electric power generation capacity to meet the expected growth in demand. This growth is independent of climate change and will still occur even with a much greater focus made on energy efficiency and conservation measures. Rationing and blackouts are inevitable in future once economic growth picks up. Governments must establish the necessary long term, stable policy settings to ensure large scale investments are made in new generating capacity.

    The provision of base load power is limited to a portfolio of a few technologies, all with problems. Carbon pricing uncertainty makes new coal, oil or gas capacity problematic; the technology is not ready for either CCS or geothermal, adequate resource is not available for hydro expansion and government policy prohibits consideration of nuclear. Intermittent renewables provide no short term solution to base load power security because of their intrinsic variability. In the longer term, storage solutions may help overcome some of the variability of intermittent renewables.

- **Accelerating Energy Technology Deployment**

  - *Urgency of intervention.* There is a high level of urgency to accelerate the introduction of new low emission technologies to meet the GHG targets and timelines established by governments. Moving new technologies from demonstration to full scale commercial deployment can take ten years or more.

  - *Technology Risk.* Considerable technological and financial risks attach to power generating technologies currently under development. Furthermore, they remain uneconomic compared with current base load coal generation plants.

  - *Carbon price.* The expected CPRS price of carbon is not sufficient to encourage investment of the magnitude required in new technologies to demonstrate commercial viability in the time scales expected. Novel solutions are needed to reduce capital investment and risk.

  - *Public suppo*rt. While significant funds have already been committed for RD&D, they are insufficient for the challenges ahead. Investment in low emission and reduction technologies will generate public good (CO2 reduction) as well as private return. This justifies additional public support at the R&D stages through to acceptable commercial investment viability.

  - *Long term policy stability.* It is imperative that large scale investments have long term certainty in planning, regulation, and financial conditions. This demands clarity in the relative roles of governments, markets and regulators.

  - *A strategic focus on technologies.* New technologies need both large scale demonstration and back up R&D. Given their strategic importance, Australia must take a leadership role in major demonstrations of the following technologies: carbon capture and storage (CCS), geothermal, solar thermal/ PV and brown coal drying. With other technologies, Australia must cooperate internationally with large scale demonstrations.

- **Other Issues**

Other issues requiring urgent attention include:

  - *Grid expansion and stability.* Electricity grid planning must provide for the long term demands imposed by a diversity of technologies supplying power, both base load and intermittent renewables, distributed and remote locations for some power generation and the need for system stability under varying supply and demand situations. There is a need to introduce consideration of the "national interest" when planning future expansion of the grid.

  - *Need for a fundamental analysis of options.* There is a need for a bottom up approach to analyse the likely scenarios of the technology mix that will be deployed to supply the required generation capacity. This analysis must consider matters such as energy efficiency and conservation, generating technology risk and financial risk, resource availability, price of electricity supplied and government and industry support. With appropriate support ATSE could undertake this project.

- *Support skills.* Serious doubt exist that the existing and forecast skills base is adequate to support the massive scale of new generating technologies. Education and training policies must ensure skills shortages do not impede accelerating the necessary investments.

- *Community awareness and support.* The introduction of new technologies requires that there be community awareness and support. This should not be a matter solely for government. Many organisations have a role to play in this matter, including the Academy in providing an independent source of factual information.

- *Nuclear energy.* International contributors to the Workshop indicated that nuclear energy will need to be part of their future base load energy portfolio if deep cuts in greenhouse gas emissions are realistically to be achieved. By excluding this option in Australia considerable reliance is placed on the as yet unproven technological and financial viability of carbon capture and storage and geothermal energy. It is prudent that further work be undertaken to address the reduction or removal of the technological, regulatory and other risks, as well as community values, that currently shape government policy on nuclear energy.