

# Institutional adaptability to redress electricity infrastructure vulnerability due to climate change: A non-technical summary for policy makers

February 2012

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This interim report is published by the University of Queensland. This report has not been peer-reviewed by NCCARF, but the final report for this project will be peer-reviewed and published by NCCARF, and will be available at [www.nccarf.edu.au](http://www.nccarf.edu.au).

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**Please cite this report as:**

Foster, J, et al. 2012, *Institutional adaptability to redress electricity infrastructure vulnerability due to climate change: A non-technical summary for policy makers*, The University of Queensland, Brisbane, Australia.

Version 9

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This non-technical summary along with five interim reports, that are the literature review report and four research reports, will be compiled and published by NCCARF in a final report titled 'Analysis of Institutional adaptability to redress electricity infrastructure vulnerability due to climate change' expected publication date mid-2013.

## **Acknowledgements**

This work was carried out with financial support from the Australian Government (Department of Climate Change and Energy Efficiency) and the National Climate Change Adaptation Research Facility. The views expressed herein are not necessarily the views of the Commonwealth, and the Commonwealth does not accept responsibility for any information or advice contained herein.

We thank Prof. John Clarke and Dr. Leanne Webb of the Tailored Project Services of the CSIRO Division of Marine and Atmospheric Research for the global climate projections developed specifically for the National Electricity Market region.

We thank UniQuest for the coordination of the project amongst NCARFF, UQ and UTS.

## **A non-technical summary for policy makers**

This non technical summary presents the findings and recommendations from the first of five reports within a project called '*Analysis of institutional adaptability to redress electricity infrastructure vulnerability due to climate change*'. The first report provides an extensive literature review to inform the project's four forthcoming reports:

1. the impact of climate change on electricity demand;
2. the impact of climate change on electricity generation capacity and transmission networks;
3. the effects of changes in water availability on electricity demand-supply; and
4. assessing the current institutional arrangements for the development of electricity infrastructure to inform more flexible arrangements for effective adaptation.

The objectives of the project are to examine the adaptive capacity of existing institutional arrangements in the National Electricity Market (NEM) to existing and predicted climate change conditions. Specifically the project aims to:

- identify climate change adaptation issues in the NEM;
- analyse climate change impacts on reliability in the NEM under alternative climate change scenarios to 2030, particularly what adaptation strategies the power generation and supply network infrastructure will need; and
- assess the robustness of the institutional arrangements that supports effective adaptation.

The first report finds that four factors are hindering or required for adaptation to climate change:

1. fragmentation of the NEM both politically and economically;
2. accelerated deterioration of the transmission and distribution infrastructure due to climate change requiring the deployment of technology to defer investment in transmission and distribution;
3. lacking mechanisms to develop a diversified portfolio of generation technology and energy sources to reduce supply risk; and
4. failure to model and to treat the NEM as a node based entity rather than state based.

These four factors will be addressed in more detail in the project's forthcoming reports.

The first report's findings are primarily to address climate change issues but if these four factors are addressed, the resilience of the NEM is improved to handle other adverse contingences. For instance, the two factors driving the largest increases in electricity prices are investment in transmission and distribution and fossil fuel prices. Peak demand drives the investment in transmission and distribution but peak demand is only for a relative short period. Shifting demand to outside peak periods provides one method to defer investment in transmission and distribution. Recommendation 2 addresses investment deferral.

The commodity boom has increased both price and price volatility of fossil fuels where the lack of diversity in generation makes electricity prices very sensitive to fossil fuel prices and disruptions in supply. A diversified portfolio of generation would ameliorate the price sensitivity and supply disruptions. Furthermore long term electricity price rises are likely to ensue as the fossil fuels become depleted. A diversified portfolio of generators would also ready the NEM for this contingency. Recommendation 3 addresses diversified portfolios.

The first report makes four inter-related recommendations to address the four factors.

***Recommendation 1 Institutional fragmentation both economically and politically***

The transmission and distribution lines of the NEM be placed in one company and the state governments in the NEM cede legislative power over all matters electrical to the federal government. The governments retain a controlling interest in the lines monopoly company and manage the electricity market with the existing Australian Energy Market Commission, Australian Energy Market Operator and Australian Energy Regulator. Progressively privatise the remaining state generation and retail to reduce conflict of interest over grid access.

***Recommendation 2 Distorted transmission and distribution investment deferment mechanisms***

Mechanisms to defer investment include energy efficiency, smart meters and modified feed-in tariffs. Recommendation 1 addresses co-ordination problems to allow NEM wide deployments and to enable monopoly buying power for smart meters.

Implement a NEM wide deployment of smart meters equipped with in-house-displays followed by deregulation of retail prices to allow dynamic pricing. This will provide customers with the incentive and feedback to reduce electricity consumption during peak time.

Establish a sustainable NEM wide gross feed-in tariff without a solar bonus. Where the transmission and distribution cost are itemised on retail electricity invoices, customers are only charged for transmission and distribution cost for electricity taken from the grid to provide a price signal for transmission and distribution investment deferment. Additionally, customers will be paid for their gross contribution to the grid based on the nodal price to provide a further price signal or incentive for solar PV installation.

There is a requirement for interest free loans for energy efficiency equipment and solar PV to address equity concerns and investment myopia for households and small business. This action will provide transmission investment deferment. Prioritising loans to nodes that import electricity would make the policy more cost effective.

***Recommendation 3 Lacking mechanisms to develop a diversified energy portfolio***

Introduce renewable energy targets for specific generation technologies as they become ready for commercialisation. An adjunct or alternative approach is the feed-in tariff reverse auction planned by the ACT Minister for the Environment and Sustainable Development for two large scale solar PV plants.

***Recommendation 4 Failure to model and to treat the NEM as a node based entity rather than state based***

The demand at each node responds to changes in temperature differently and the population growth, climate change and weather at each node differ. Failing to acknowledge the differences between nodes could misinform policy. Additionally, node based price signals would promote more appropriate investment decisions required in recommendation 2. Recommendation 1 would help transform the state focus of the NEM to a more NEM wide and node based focus.