CLEAN ENERGY COUNCIL FUTURE-PROOFING IN AUSTRALIA'S ELECTRICITY DISTRIBUTION INDUSTRY PROJECT

CLEAN ENERGY COUNCIL

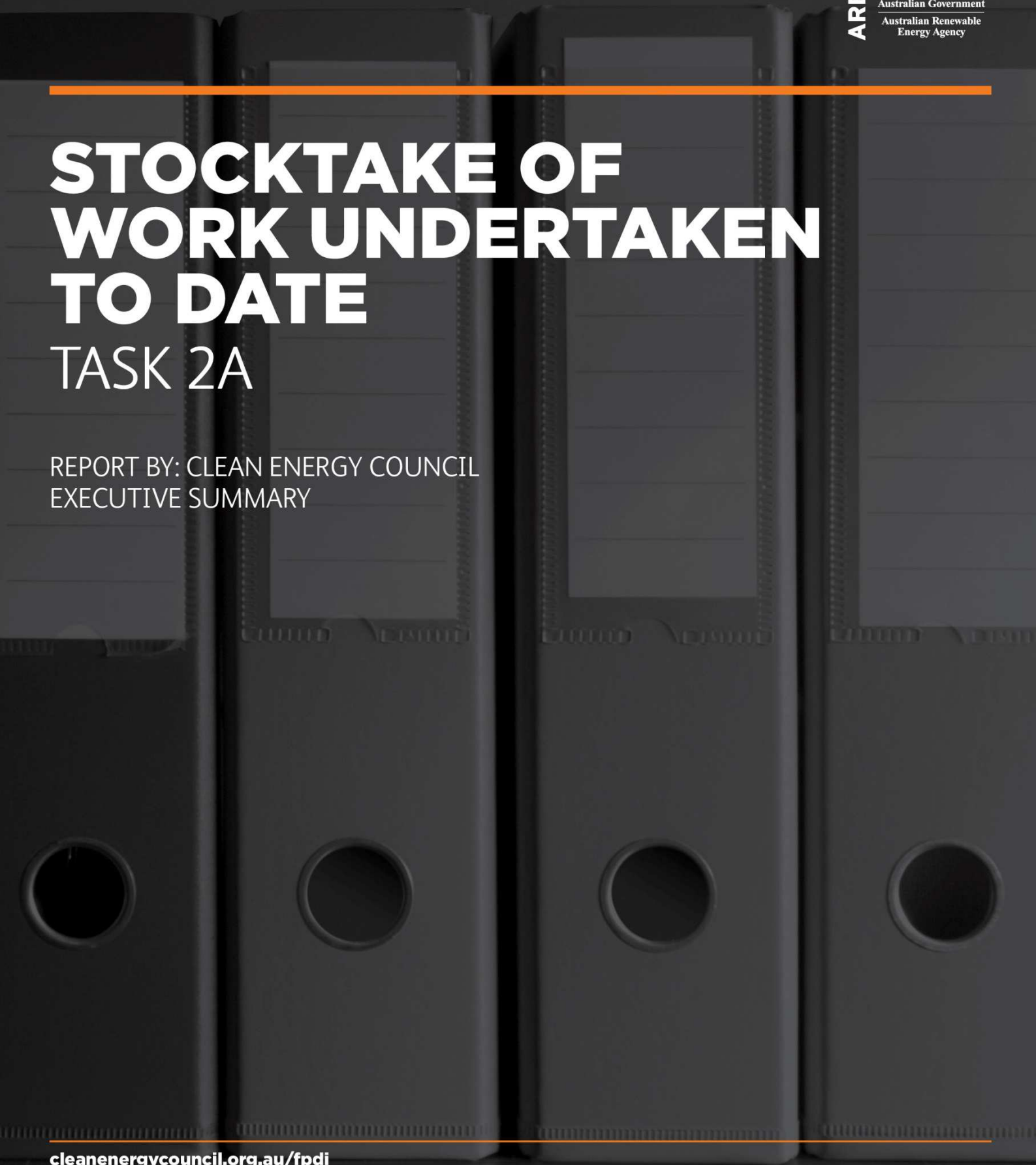
ARENA

Australian Government
Australian Renewable Energy Agency

STOCKTAKE OF WORK UNDERTAKEN TO DATE

TASK 2A

REPORT BY: CLEAN ENERGY COUNCIL
EXECUTIVE SUMMARY



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Executive Summary

Australia's electricity distribution industry is undergoing significant change. Although there are many factors influencing this change, increasing uptake of renewable and distributed generation is central to it. Adapting to such significant change is never easy for an incumbent industry. While electricity is no exception, its status as a key source of the economy's energy has led to much research and discussion.

Understandably, significant effort has been placed on research and reform regarding the integration of renewable energy, storage and demand management into Australia's distribution networks. Numerous stakeholders have been involved in this work. They include research institutions, government agencies, network operators and various independent stakeholders. Many have made strong contributions which are seen to be critical to the reform process.

The Stocktake Report has been created to capture the background and objectives of many of these reform activities. It is intended to summarise key information from considered studies or reports while directing the reader to them to obtain further information if desired. Importantly, it does not seek to critique these works but has been prepared to understand how they relate to the broad objectives of the FPDI project in order to ensure that this project builds on prior outcomes.

The report should be read alongside the Australian Renewable Energy Agency's (ARENA's) *Integrating Renewables into the Grid Stocktake Results.* The ARENA study looked specifically at works which "*address or inform one or more objectives that relate to integrating renewable energy into Australian distribution networks*"[1].

This Stocktake Report work does not duplicate that of ARENA and readers should also interrogate that report for further information. Energy Networks Association has been engaged by ARENA to continue the Stocktake project[2] to facilitate ongoing information sharing of experiences with the integration of renewable energy in Australian distribution networks.

Australia's electricity distribution industry includes a very broad mix of stakeholders and business models. A complex overlay of rules, regulations and performance criteria bounds the delivery of safe, reliable and affordable electricity to customers. Electricity is an essential input into almost all factors of production. The industry's performance against its goal is critical to the economic prosperity of the nation.

For many years consumers have been the focus of industry outcomes, rather than actively participating. However, consumers are now faced with more choice than ever before on how

[1] Marchment Hill Consulting, *Integrating Renewables into the Grid: Stocktake Results*, p. 2, available: http://www.ena.asn.au/publications/arena-stocktake-project/
[2] http://www.ena.asn.au/publications/arena-stocktake-project/

they consume and generate their own electricity. Consumer responses to steep electricity price increases, and ever-decreasing solar electricity costs have resulted in these choices having a heightened role.

Unsurprisingly, the industry is constantly being interrogated from technical, commercial and political perspectives. A large amount of policy reform and research activity has occurred and is expected to continue into the future.

The Stocktake Report summarises some of these works at a point in time and where they are relevant to the objectives of the FPDI project. It considers regulatory reviews, research reports, policy analysis and other analytical studies as agreed with the project Steering Committee.

While being informative in nature to meet the needs of the FPDI project, this work provides a consolidated understanding of recent activities of reform and opportunities for renewable energy, storage and demand management. It will potentially be a useful tool for government and regulators to assist in making informed decisions on policy and review processes. It will also provide a useful framework and evidence bank of the prevailing drivers and issues surrounding grid integration of renewable energy technologies, complementing ARENA's Integrating Renewables with the Grid (IRG) program[3].

The following table summarises each work considered and notes the main technical, economic and regulatory areas considered by each in order to inform with regards to the scope of the FPDI project.

To download the full FPDI Stocktake Report visit www.cleanenergycouncil.org.au/fpdi.

This report was produced with funding support from ARENA. ARENA was established by the Australian Government as an independent agency on 1 July 2012 to make renewable energy technologies more affordable and increase the amount of renewable energy used in Australia. ARENA invests in renewable energy projects, supports research and development activities, boosts job creation and industry development, and increases knowledge about renewable energy.

[3] http://arena.gov.au/initiatives-and-programs/integrating-renewables-in-the-grid/

Author/ Owner	Title	Year	Status	Purpose	Relevance to FPDI	Outcomes
AEMC	Connecting Embedded Generation under Chapter 5A Final Rule Determination	2014	Closed	Rule Change	**Technical:** The change would require that DNSPs provide clear connection standards. **Regulatory:** The change would make changes to the NER in relation to the connection of some embedded generators. **Economic:** The change seeks to create the opportunities to maximise the efficiency of the connection process.	As of March 2015 the NER will be changed to allow non-registered embedded generators to be treated in the same way as larger generators if desired.
	Distribution Network Pricing Arrangements Draft Rule Determination	2014	Live	Rule change (stage 2)	**Technical:** Considers the existence and magnitude of cross-subsidies between customers. **Regulatory:** Creates the settings to allow more adaptable and consultative pricing arrangements. **Economic:** Seeks to create the framework to allow networks to be priced relative to costs of providing the services.	Rule change should enhance transparency and consultation in price setting, and lead to more cost-reflective tariffs. Rule change consultation is ongoing with the final to be published in November 2014.
	Power of Choice Review	2012	Live	Market review	**Technical:** Considers many of market mechanisms in the NEM and the technologies associated with demand side participation. **Regulatory:** Considers demand and supply-side options for system-wide efficiency by looking deeply at the options which enable consumers to change the way they consume electricity. **Economic:** Key reforms proposed based on an economic assessment considering the impact of reducing peak demand between 2012 and 2022.	Ongoing reform activities are coming out of the review's many recommendations.
APVI	PV Integration on Australian Distribution Networks	2013	Closed	Research survey	**Technical:** Literature review considering matters related to the integration of PV with the grid.	Finds that there are significant differences in practice and expectation of PV connection between states and distribution

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					Regulatory: Considers the available information on the connection process and relevant standards.	areas.
COAG	Reform of the Demand Management and Embedded Generation Connection Incentive Scheme – Rule change request	2013	Live	Rule Change	**Regulatory:** A rule change request to the AEMC's proposed Demand Management Incentive Scheme. **Economic**: The purpose of the rule is to provide an appropriate return to DNSPs to incentivise efficient demand management projects as well as improve clarity and certainty regarding how the scheme will be developed and implemented.	Should improve the effectiveness of the demand management incentive scheme. The AEMC will consider this proposal in line with its normal rule change process including opportunities for consultation with interested stakeholders
CME	Australia's Million Solar Roofs: Disruption on the fringes or the beginning of a new order?	2013	Closed	Research	**Economic:** Seeks to understand the impacts of cross-subsidies between customers. Quantifies solar subsidies and network expansion and seeks to balance to the two interests.	Concludes that the extent of the cross-subsidy between consumers with and without PV is unclear. Queries whether DNSPs should have a right to recover revenue lost to competitors from remaining customers.
CIGRE	Capacity of Distribution Feeders for Hosting Distributed Energy Resources (DER)	2014	Closed	Research	**Technical**: Considers issues that limit distribution network capacity globally and solutions for increasing capacity **Regulatory**: Looks at conditions for connection around the world and suggests a more straight forward rule of thumb method.	Distribution networks can increase their embedded generation hosting capacity through various technical means including network reinforcement or modification, or the use of generation units with lower fault current limits.
CSIRO	Change and Choice	2013	Closed	Research survey and modelling	Broad-reaching recommendations related to the technical, regulatory and economic implications of future scenarios of very high embedded generation penetration.	Concludes that the current market conditions will be required to change in the long term including removing barriers to networks investigating alterative network

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						development and asset management strategies.
ENA	Enabling Embedded Generation	2014	Closed	Research	**Technical:** Identifies challenges with forecasting, voltage, losses, power quality, and safety which need to be addressed. **Regulatory:** Considers the benefits to the grid of embedded generation. **Economic:** Aims to demonstrate that embedded generation provides a benefit to the grid, while the generator also derives a benefit from the grid.	Concludes that there are benefits and costs resulting from the integration of embedded generation which need to be managed through improved information and tariff reform (for example).
	Value of Grid Connection to Distributed Generation Customers	2014	Closed	Research	**Economic:** Considers the value of network connection to solar customers, and the value of solar customers to the network.	Concludes that customers with rooftop PV systems pay less than other customers for the services they receive from the grid. Encourages tariff reform to correct this and avoid cross subsidisation between different grid customers.
ESAA	Residential Electricity Tariff Review	2014	Closed	Market review	**Technical:** Considers scenarios with increased PV, electric vehicle and smart appliance uptake. **Economic:** Considered a range of different tariff designs, consumption and generation patterns and equity, efficiency and transparency outcomes.	Concludes that there is no single tariff that produces ideal outcomes but that the outcomes depended on factors like metering and the nature of the market in each state.
Grattan Institute	Shock to the System: dealing with falling electricity demand	2013	Closed	Market review	**Technical:** The report details electricity use trends in Australia since the 1960s. **Regulatory:** Considers the monopoly nature of network businesses, their spending patterns and the impact of peak demand on costs.	Urges for change to network business regulation as the reasons for costs increasing are structural.

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	Fair pricing for Power	2014	Closed	Market review	**Economic:** Suggests tariff reforms including capacity charges for networks and peak demand pricing where that measure would reduce investment in the network.	The report finds that a capacity based network charge would better reflect the cost of building and running the network. It also recommends a new peak time of use tariff in areas where infrastructure upgrades are required to meet peak demand.
TEC / ISF	Calculating the network value of local generation and consumption	2014	Closed	Research	**Regulatory:** Considers how options for valuing distributed generation could be implemented. **Economic:** Considers options for valuing distributed generation.	It identifies that VNM is technically feasible and would provide a cost-reflective method of pricing. Recommends further investigation into methodologies for valuing distributed generation.
	Restoring Power: Cutting bills & carbon emissions with Demand Management	2013	Closed	Research	**Technical:** This report considers methods for DM that will assist customers to reduce electricity demand. **Regulatory:** This report seeks to provide a practical agenda for reform to tap into benefits from DM.	The report recommends five key measures for cleaner, more affordable electricity. TEC have submitted a rule change to adjust the DMIS settings.
	Virtual Net Metering in Australia: Opportunities and Barriers	2013	Closed	Research	**Technical:** Looks at types of VNM, the features of the different types, barriers to VNM, and provides recommendations to progress this type of metering. **Regulatory:** Outlines VNM and its benefits in the Australian context. **Economic:** Considers the options for wheeling charges.	Finds that there is no regulatory barrier to VNM. However, it is unlikely to progress without a Rule change to specifically allow it.
ISF / SV	Decentralised energy: costs and opportunities for Victoria	2011	Closed	Research	**Technical:** Maps opportunities for decentralised energy against planned network expenditure. **Regulatory:** Identifies a range of	Found that there is substantial untapped cost-effective potential of DE in Victoria. Generated a mapping tool to

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					barriers/challenges needed to be addressed to access the estimated benefits. **Economic:** looks at drivers of network investment, and ways to calculate and locate avoidable network investment.	identify the locations for embedded generation or demand management which could tap into this benefit.
TEC	Demand Management Incentive Scheme Rule Change Request	2013	Live	Rule change (stage 0)	**Regulatory:** Rule change proposal aimed at greater utilisation of demand management, including energy efficiency, peak load management and distributed generation. **Economic:** In the long term the aim is to reduce unnecessary network investment and to reduce greenhouse gas emissions.	The proposed rule change does not mandate networks to undertaken demand management activities. The main incentive scheme proposal will be more than offset by lower investment in current and future regulatory periods