ECONOMIC IMPACT ANALYSIS OF LOCAL GENERATION NETWORK CREDITS

Background

In July 2015, the City of Sydney, Total Environment Centre (TEC) and the Property Council of Australia submitted a rule change request to the Australian Energy Market Commission (AEMC) for the introduction of an LGNC (Local Generation Network Credit). Economic modelling undertaken by the Institute for Sustainable Futures (ISF) provides an analysis of the economic impact of an LGNC on overall network costs and consumer bills in the short, medium, and long term using New South Wales as an example. This work forms part of the *Facilitating Local Network Charges and Virtual Net Metering* research project, led by ISF and funded by the Australian Renewable Energy Agency (ARENA) and other partners.

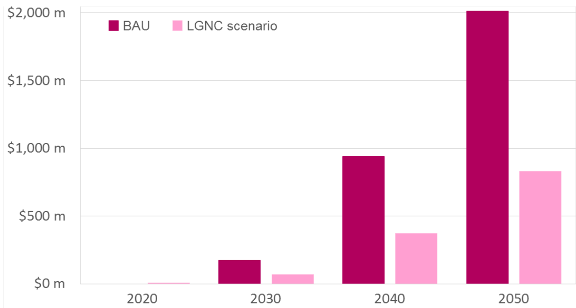
Economic impacts

This research examined different scenarios in order to understand the economic implications of introducing an LGNC payment to electricity generators, and estimates the economic costs and benefits of an LGNC scenario compared with BAU where no LGNC payments are made. The results from the modelling show that over the long term (2050) an LGNC scenario has an overall positive economic benefit of approximately $1.2 billion, nearly 60% lower than the cost of network expansion under BAU. Table 1 shows the net present value (NPV) of cumulative costs (network investments and LGNC payments) in each scenario. Because there is sufficient spare capacity on the network over the short term, the only costs incurred over this period are LGNC payments equating to annual economic cost of between $1m and $6m per year. By 2030 the LGNC scenario has an annual economic cost saving of $49m and by 2050 the annual economic cost saving is $97m.

Table 1: Cumulative economic impact of an LGNC payment (NPV)

	2020	2030	2040	2050
BAU				
Network investment	-	$172 m	$939 m	$2,012 m
LGNC payments	-	-	-	-
Total	-	$172 m	$939 m	$2,012 m
LGNC scenario				
Network investment	-	$16 m	$239 m	$598 m
LGNC payments	$6 m	$52 m	$132 m	$233 m
Total	$6 m	$69 m	$371 m	$832 m
Net Economic benefit	**-$6 m**	**$104 m**	**$567 m**	**$1,181 m**

Figure 1: Cumulative economic costs by scenario



Impact on customer bills

Over the short term (2020) there is no impact on the residential sector, and a modest increases of $2 - $25 per annum in the commercial sector. By 2030 all consumers are realising savings.

Table 2: Net impact of introducing an LGNC on customer bills [1,2]

Annual net difference to BAU	Average	2020	2030	2050
Residential	-$9 ▼	$0 ▲	-$7 ▼	-$20 ▼
Residential with PV	-$6 ▼	$0 ▲	-$4 ▼	-$13 ▼
Residential with PV + Battery	-$2 ▼	$0 ▲	-$1 ▼	-$4 ▼
Total Residential Customers	-$7 ▼	$0 ▲	-$6 ▼	-$15 ▼
Small Commercial	-$185 ▼	$4 ▲	-$139 ▼	-$422 ▼
Small Commercial with PV	-$127 ▼	$3 ▲	-$95 ▼	-$289 ▼
Small Commercial with PV (includes export)	-$211 ▼	-$102 ▼	-$184 ▼	-$348 ▼
Total Small Commercial Customers	-$191 ▼	$2 ▲	-$140 ▼	-$438 ▼
Large Commercial	-$367 ▼	$14 ▲	-$276 ▼	-$843 ▼
Large Commercial with cogen	-$1,239 ▼	-$335 ▼	-$1,019 ▼	-$2,374 ▼
Large Commercial with cogen (includes export)	-$3,050 ▼	-$2,414 ▼	-$2,889 ▼	-$3,869 ▼
Total Large Commercial	-$2,341 ▼	$25 ▲	-$1,693 ▼	-$5,440 ▼

- Small and large commercial customers see significant savings by 2030 relative to BAU, and by 2050 these average $440 and $5,440 per year respectively.
- The average effect on residential customers over the medium to long term remains small, with a projected saving of $6 at 2030 relative to BAU, rising to $15 by 2050.
- Residential and small commercial customers without PV systems receive the most benefit, as their import requirements from the network are highest.

[1] Negative numbers represent reduced bills, positive numbers increased bills relative to business as usual
[2] Average values represent the average reduction per annual bill for that customer category

- Small commercial customers who export electricity receive benefits between $184 and $348 in 2030 and 2050 respectively.
- Large commercial customers with generation benefit the most, with savings of approximately $2,900 in 2030 and $3,900 by 2050 relative to BAU.

LGNC payments are not a cross-subsidy

The LGNC scenario represents a system wide economic saving to all consumers, and therefore does not represent a cross-subsidy between different consumers. LGNC payments are estimated from avoided future network expansion costs. A predetermined proportion of these future costs (initially set at an 80% benefit share) is then provided to those agents who install technology which may reduce future network expansion costs. The majority of the value generated by the LGNC scenario is given to those customers who interact with the network (e.g. consumers and exporters to the grid). Although equity and income distributional effects were outside the scope of this research, it is clear from the proposed structure of LGNC payments that consumers of electricity who either import, export or both import and export electricity to the grid are set to benefit the most from the LGNC scenario.

It is worth noting that in a scenario of zero or declining peak demand, augmentation costs will tend to zero, and LRMC values will consequently tend to zero. As LGNC values are calculated directly from LRMC values, LGNC payments will also tend to zero. Therefore, in the situation of zero growth in peak demand both LRMC and LGNC will tend to zero, so the net economic effect of the LGNC payment and the effect on customer bills will tend to zero as the growth in peak demand on the network tends to zero.

Peak demand and network utilisation

Peak demand on the network is shown to increase more slowly under the LGNC scenario due to the increased uptake of distributed generation. The largest reductions in peak demand growth are on the transmission and high voltage networks where peak demand is predicted to increase by 22-23% by 2050 under BAU but by only 8-11% under the LGNC scenario. This represents reductions in peak demand of over 50% in the LGNC scenario. The smallest reduction is on the low voltage network where peak demand is only 35% lower in the LGNC scenario by 2050. Furthermore, we show that network utilisation[3] is greater in the LGNC scenario by 1.3% and 1.9% in the high voltage and transmission network respectively. Our research suggests that the utilisation of the network is highly sensitive to the uptake of batteries, where high battery penetration leads to significant increases in network utilization. However, this is highly dependent on the discharge strategy employed by the operator and the level of exports back into the grid.

Table 3: Peak demand on network

Network	2015 (MW)	BAU	LGNC	BAU	LGNC	Peak Saving
		2050 (MW)		% Increase		MW (%)
Transmission	11,354	13,883	12,284	22%	8%	1,599 (63%)
High Voltage	11,426	14,093	12,661	23%	11%	1,432 (54%)
Low Voltage	8,299	10,412	9,676	25%	17%	736 (35%)

Sensitivity testing and recommendations for the LGNC

We undertook sensitivity analysis on a number of assumptions embedded in the model, including limiting LGNC payments to new systems, and to systems larger than 10kW. This allowed us to examine how the LGNC could be implemented to maximise its efficacy for networks and consumers. We additionally tested greater growth in distributed generation, and reduced growth in peak demand.

We recommend that:

- **Firstly, an LGNC should not be paid to existing generators, while retaining a network option of making payments to existing dispatchable generators for exports at peak times.**
- **Secondly, that LGNC payments are not made to systems under 10kW, this therefore excludes all residential solar PV and a significant proportion of commercial PV. Our results show that excluding units under 10kW maximises the benefits for all consumers on the network.**
- **Thirdly, this analysis shows that all consumers' benefit from the LGNC scenario and this was robust to a range of sensitivity tests. We therefore recommend the implementation of LGNC payments.**

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[3] Network utilisation is calculated as actual network load over the maximum possible load on the network $Utilisation = \frac{Actual\ Load\ (MWh)}{8760 \times Peak\ Load\ (MW)}$