ELECTRICITY NETWORK TRANSFORMATION ROADMAP

2015-25

3rd December 2015

Key finding from the Electricity Network Transformation Roadmap – Interim Program Report

1. Four, very diverse scenarios to 2050 are presented - reflecting the key fact **that investment decision making is being transferred from the hands of a few utility companies to millions of end users.**
    - Depending on the scenario, between 23% and 41% of all electricity system expenditure ($224 bn to $469 bn) is made directly by consumers or their agents.
    - The purpose of the forthcoming Roadmap is to position the electricity system to be **resilient to diverse futures** – including how key factors play out, such as the amount of centralised/decentralised energy, the extent of carbon abatement or technology cost trends.
2. **Solar and storage costs have become more competitive since 2013**
    - Solar panels and battery storage costs are already around 20 percent cheaper than it was expected they would be in 2013.
    - Battery storage costs are expected to fall by approximately two-thirds (60%) in the next 10 years, while solar panel costs are expected to fall by around one-third (35%) over the same time frame.
    - This sees stronger incentives to take up solar but also creates the potential for increased cross-subsidies among customers if cost-reflectivity of tariffs is not addressed;
    - Falling storage costs can improve the competitiveness of grid-delivered electricity, contributing to lower bills for grid-connected customers by enabling peak demand reduction and more efficient operation of electricity networks. This will require enabling policy and regulatory frameworks.
3. **Distributed Energy Resource create opportunities for better grid management, as well as a range of technical and operational challenges** to ensuring power quality, reliability, security of supply for all customers.

    The opportunities can be realised but will require changes to regulatory frameworks, industry standards and technology.
4. **As in the 2013, forecasts, each of the four plausible 2050 scenarios anticipates the need for enabling electricity networks with all scenarios within 10% of $315 billion.** However:
    - The technologies and role of the network could vary significantly in an increasingly 'two-way' network, with some scenarios seeing up to 45% of electricity from onsite generation.
    - The level of network expenditure varies (from $282 bn to $336 bn) to meet system requirements, a similar order of magnitude to what customers are expected to spend on their own system-requirements
    - The business model of the network could evolve fundamentally to a '**platform provider'** enabling new energy services and uses, rather than the conventional 'poles and wires' service.

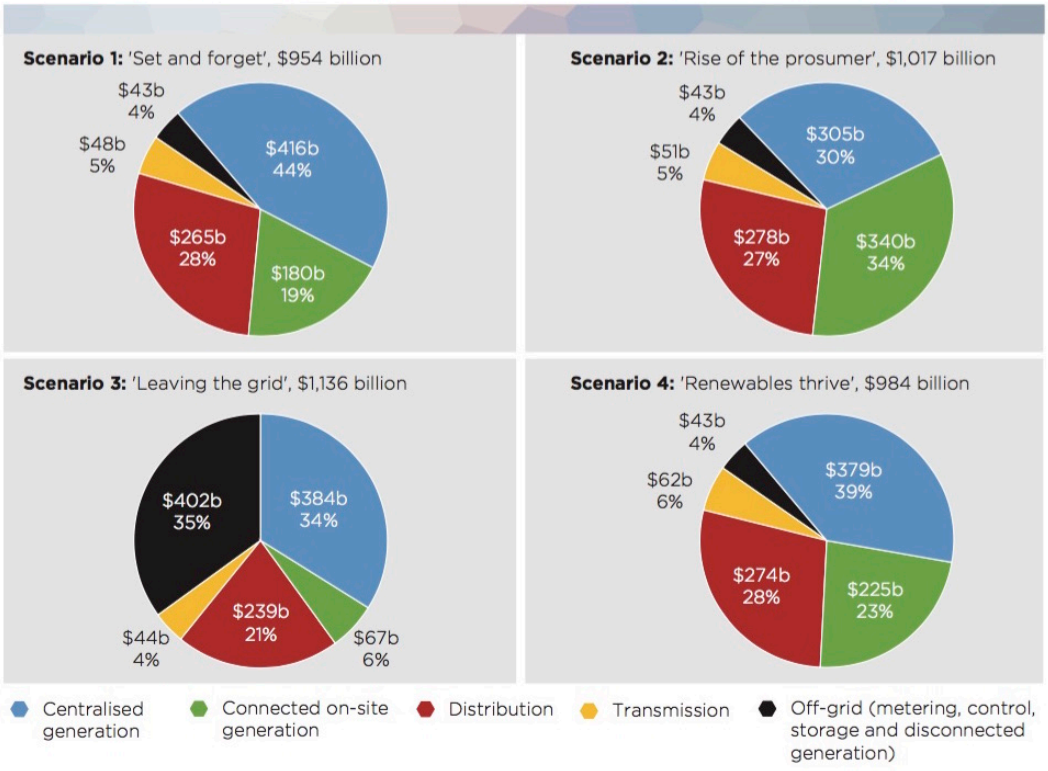
ena energy networks association

CSIRO

A partnership between the ENA and CSIRO

5. **The updated analysis confirms the electricity sector could play a significant role in national efforts to reduce greenhouse gas emissions.**
   - By 2030 the four scenarios project electricity sector abatement of 29% to 51% by 2030 compared to 2005.
   - In one scenario the electricity sector approached near zero emission with projected abatement of 99 percent by 2050. This scenario relies on distributed and large-scale renewables and the use of storage to support the reliability of renewables. The connection of significant dispersed large scale renewables sees the need for more network infrastructure than other scenarios with about 73% of electricity is provided from central generation in 2050.
6. **All four scenarios see significant expenditure between $954 billion and $1,136 billion, whether by large utilities or small customers and their agents.** The scale of expenditure highlights the benefits of incentives for efficient investment by all market participants, assistance for customers and robust policy and regulatory frameworks.
7. **The outlook for long-term electricity customer bills has improved since the 2013 Future Grid Forum Modelling.**
   - Residential customer bills have generally fallen on average since the 2013 forecast;
   - Falling solar and storage costs will put downward pressure on average bill, but increase the risk of cross-subsidies between customers under existing network tariffs.
   - CSIRO forecasts that electricity retail bill increases will be smaller than previously forecast and are expected to remain the same share of average household expenditure, approximately 2-3 % as they are today. .

Figure 2.16: Projected cumulative electricity sector investment and operating expenditure to 2050 (including percentage contribution of each supply chain component), by scenario



Key Figures Snapshot

	Scenario 1 Set and forget		**Scenario 2** Rise of the prosumer		**Scenario 3** Leaving the grid		**Scenario 4** Renewables thrive	
	Previous (2013)	**Update (2015)**	**Previous (2013)**	**Update (2015)**	**Previous (2013)**	**Update (2015)**	**Previous (2013)**	**Update (2015)**
Proportion of electricity sourced from central generation in 2050	81%	75%	54%	55%	69%	69%	74%	73%
Proportion of electricity sourced from onsite or off grid generation in 2050	19%	25%	46%	45%	31%	31%	26%	27%
Annual residential electricity bill (2013 and 2015)	$1,776	$1,583	$1,776	$1,583	$1,776	$1,583	$1,776	$1,583
Annual residential electricity bill 2030	$2,051	$1,828	$1,924	$1,888	$1,807	$1,867	$1,981	$1,957
Annual residential electricity bill 2050	$2,308	$1,992	$2,793	$2,327	$2,213	$2,185	$2,502	$2,376
Share of income spent on residential electricity bills 2013 and 2015	2.5%	2.0%	2.5%	2.0%	2.5%	2.0%	2.5%	2.0%
Share of income spent on residential electricity bills 2030	2.5%	2.0%	2.3%	2.1%	2.2%	2.1%	2.4%	2.2%
Share of income spent on residential electricity bills 2050	2.4%	1.9%	2.9%	2.2%	2.3%	2.1%	2.6%	2.3%
Level of investment and running costs required to realise this scenario by 2050	$856 B	$954B	$950 B	$1017 B	$1042 B	$1136 B	$936 B	$984 B
Level of on-site and off-grid expenditure	$215 bn	$224 bn	$377 bn	$383 bn	$531 bn	$469 bn	$301 bn	$268 bn
Level of network expenditure	$310 bn	$313 bn	$314 bn	$329 bn	$302 bn	$282 bn	$349 bn	$336 bn
Electricity Emissions abatement Outcome (% below 2005 levels by 2030)	17	31	30	51	29	29	24	35
Electricity Emissions abatement Outcome (% below 2005 levels by 2050)	60	85	61	91	73	82	90	99