

Future Grid Forum outcomes and challenges for the FG Cluster

Future Grid Cluster Research-Industry Symposium

10 July 2014

ENERGY FLAGSHIP
www.csiro.au



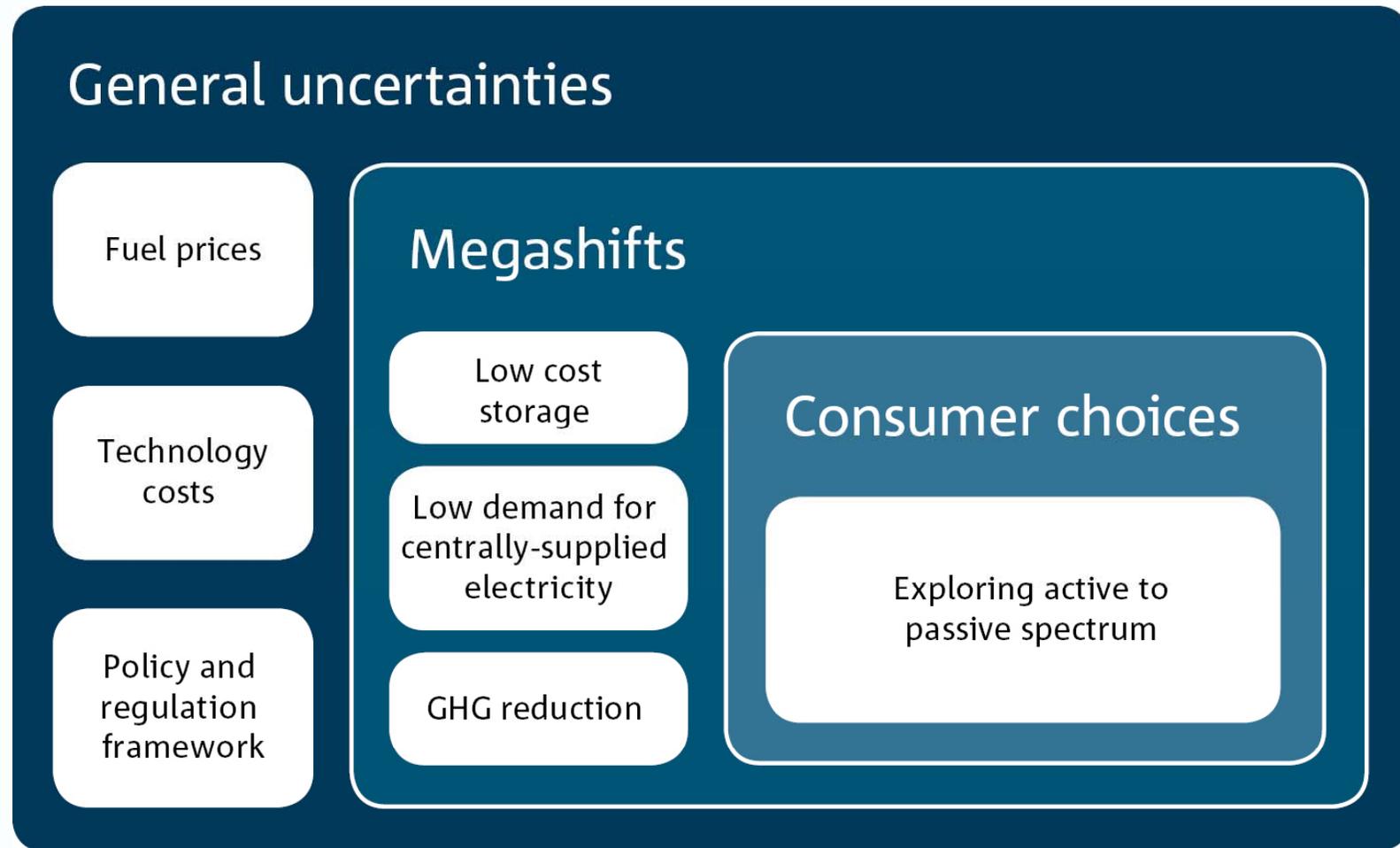
Australia's Future Grid Forum

- ***Long-term orientation to 2050*** to explore key policy and technology choices not constrained by near term electoral cycles
- ***Whole-of-system modelling*** to provide credible projections and quantitative analytics
- ***Industry-led*** to enable bold and informed discussion that examines benefits and drawbacks of different outlooks

Participants

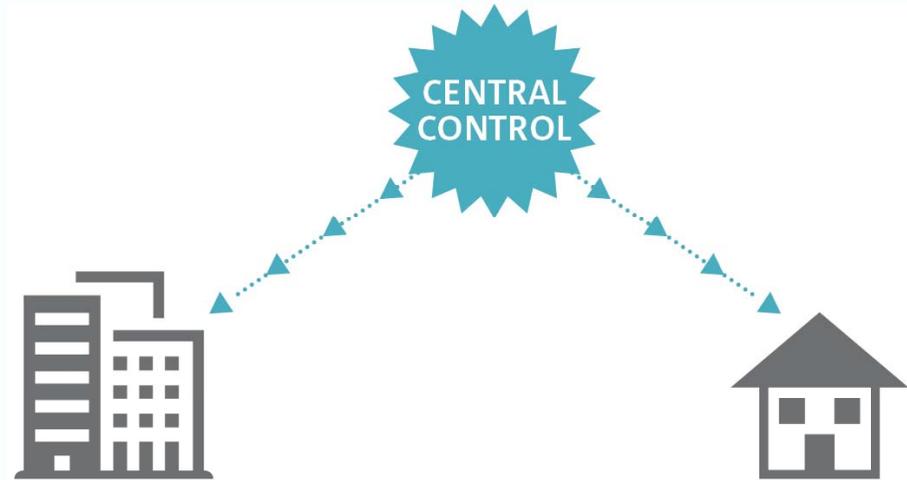


Scenario development considerations



Scenario 1: Set and forget

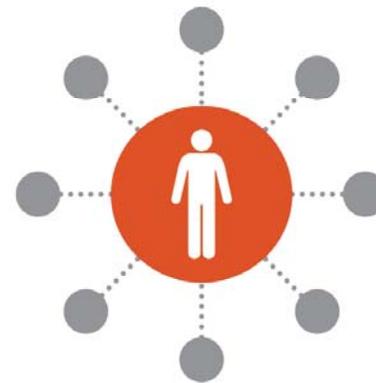
- Sustained high retail prices, heightened awareness about the issue of peak demand, and new business and technology opportunities lead residential, commercial and industrial customers to adopt peak demand management.
- The demand management systems are managed centrally and designed to be on a 'set and forget' basis after customers have decided which level of demand management suits them.



Scenario 2: Rise of the prosumer

- Continued falling costs of solar rooftop panels and other on-site generation technologies, sustained high retail prices, and increasingly innovative financing and product packaging from energy services companies leads to the widespread adoption of on-site generation with almost half of generation on-site.

- Residential consumers in particular are empowered by their choice to become more actively engaged in their electricity supply and call themselves 'prosumers'

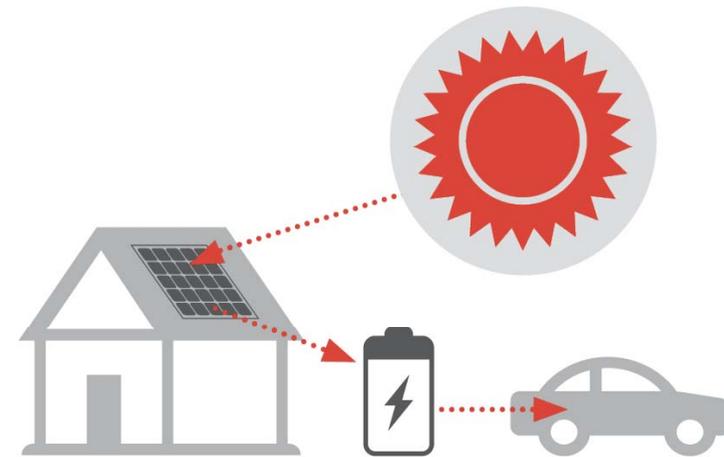


Customer-centric model

where customers consume, trade, generate and store electricity.

Scenario 3: Leaving the grid

- The continued dominance of volume-based pricing among residential and small commercial consumers encourages energy efficiency without accompanying reductions in peak demand growth. The subsequent declining network utilisation feeds increases in retail prices.
- New energy service companies sensing a market opportunity invite consumers to leave the grid, offering an initially higher-cost solution, but one that appeals to a sense of independence from the grid.
- By the late 2030s, with reduced storage costs, disconnection becomes a mainstream option with a third of consumption eventually being removed from the grid.



Scenario 4: Renewables thrive

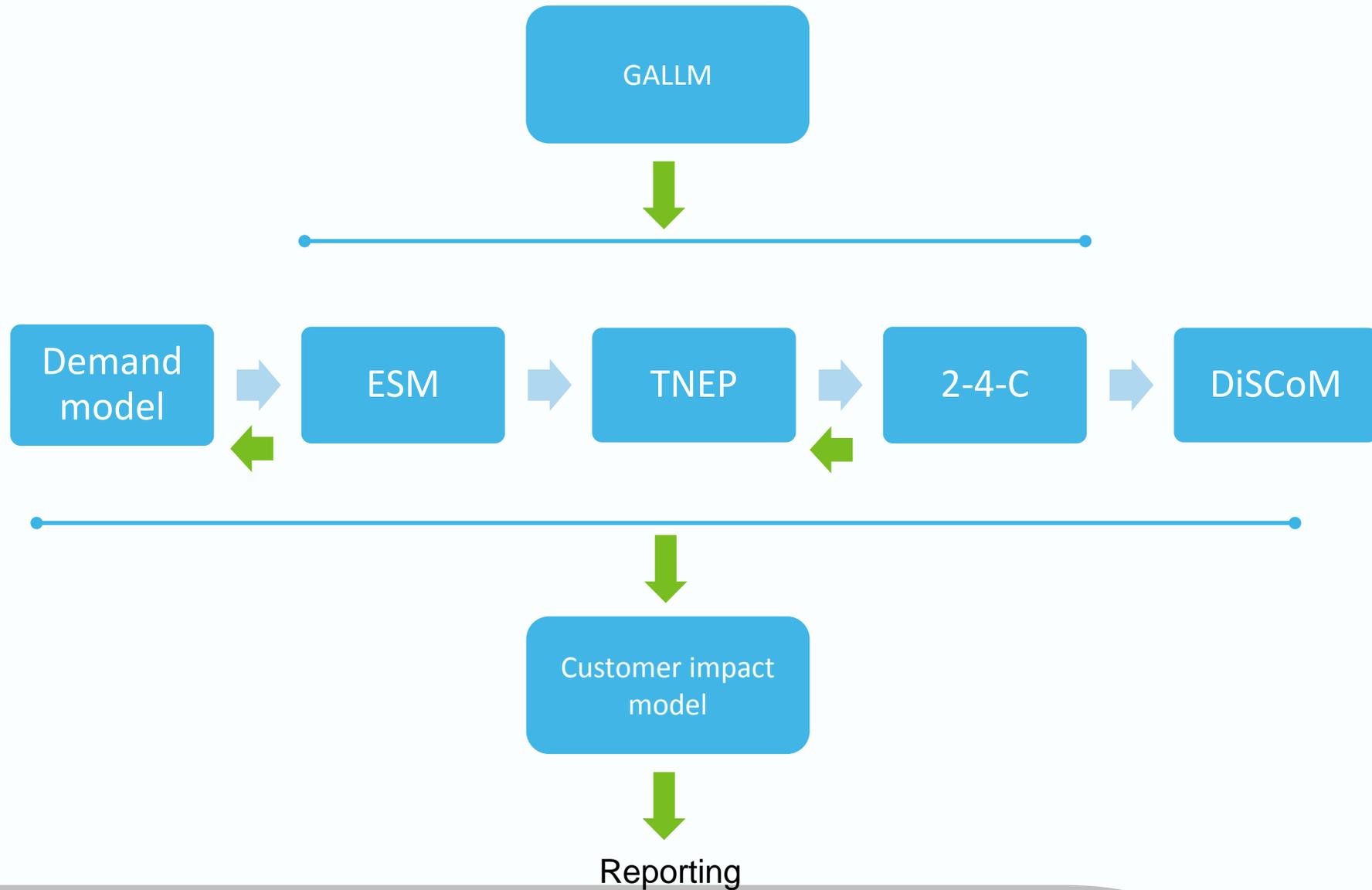
- Confidence in the improving costs of renewable and storage technologies, achieved by combined efforts from government and industry around the world, results in the introduction of a linearly phased 100 per cent renewable target by 2050 for centralised electricity generation.
- Some customers maintain fossil based on-site power so that overall, the renewable share, taken as a share of both centralised and on-site generation, is 86 per cent by 2050.



Highlighted issues from the scenarios

- Demand and network utilisation uncertainty will be ongoing due to on-site generation potential
- We have a challenge ahead in achieving cost-reflective pricing
- There may be a role of storage in different parts of the supply and end-use chain
- The *long term* direction for wholesale and retail prices is up. But lots of scope for limiting the scale of that increase
 - + Gas prices / abatement action / return of NEM to LRMC prices
 - - policy certainty / efficient price signals / technological change / demand management for efficient network utilisation

Modelling framework



Modelling framework lessons

- You don't know exactly where to direct your effort until the scenarios are final
- Multiple model interactions are costly, use only the models needed for each task
- Some model interactions could be combined / automated, for others it may never be possible
- The key constraints are:
 - The need to model at different temporal resolutions
 - The need to model at different spatial resolutions
 - That there are at least two distinct markets which influence each other – wholesale and retail electricity. Transport is arguably a third
- However, modelling them separately (or treating one as a input constant) is looking like an increasingly less defensible approach

Similarities: Forum & Cluster

- Seeking to understand how we can achieve better outcomes for the grid
- Multi-scale energy modelling
- Teams working on individual models with goal of linking them together
- Scenario approach

Differences: Forum & Cluster

- Greater focus on transmission system
- Power system implications
- Co-optimisation of electricity and gas
- Updated data sets: AETA, AEMO demand, etc
- Rigorous policy analysis

Key FGF-FG Cluster linkages

- Use FGF scenarios as a core scenario group to be investigated:
 - With other sensitivities and scenarios to be explored, as needed
- ‘Set and forget’ / ‘Rise of the prosumer’ / ‘Leaving the grid’:
 - Fundamentally about understanding how changes in prices, demand & demand management impact the supply chain
 - Technology costs and gas prices
- ‘Renewables thrive’
 - FG Cluster to provide deeper exploration of grid impacts and most efficient ways of managing variability (e.g. storage, transmission network development)

Thank you

Energy Flagship
Luke Reedman

t +61 2 4960 6057
e luke.reedman@csiro.au
w www.csiro.au/energy

Energy Flagship
Paul Graham

t +61 2 4960 6061
e paul.graham@csiro.au
w www.csiro.au/energy

ENERGY FLAGSHIP
www.csiro.au

