

# Clean energy, meet smart energy

The role of flexible demand in the transition to clean energy

# What innovations in demand-side technology will help the transition to clean energy?



**Distributed  
energy**



**Flexible  
industry**



**Electric  
vehicles**



**Hydrogen**

## What we've learnt from the demand response RERT trials

### NSW

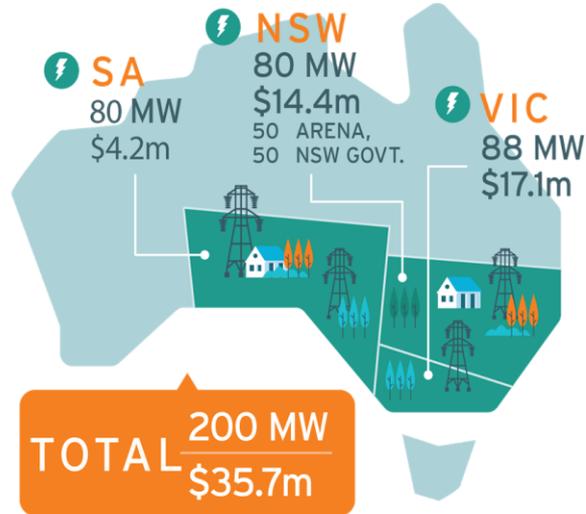
AGL EnergyAustralia Enel X Flow Power

### VIC

EnergyAustralia Powershop Australia Enel X United Energy

### SA

EnergyAustralia Intercast & Forge

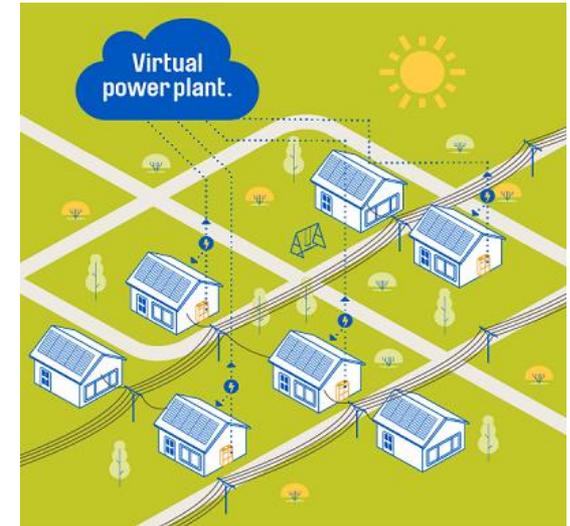


- ARENA invested **\$28.6 million** in the Demand Response RERT Trial to deliver ~200 MW of capacity by 2020
- Aimed to improve the **commercial and technical readiness** of Demand Response providers and technologies
- Year 1 delivered 164 MW of capacity
- Year 2 delivered 190 MW of capacity
- In the 2019 RERT event in Victoria, ARENA projects accounted for 36% of the reserve capacity activated on the first day

**Outcome:** The trials demonstrated that Demand Response is an effective source of reserve capacity during contingency events, especially in the commercial and industry portfolio

## Virtual Power Plants increasing flexibility

- Virtual Power Plants (VPP) harness the collective potential of consumer owned energy assets like rooftop solar, batteries, smart appliances and EV charging
- ARENA has committed **\$25.2 million** to VPP projects, including:
  - AGL: ARENA provided \$5 million funding for solar battery storage systems across 1000 premises in Adelaide, operating as a 5 MW VPP
  - Bruny Island CONSORT: ARENA provided \$2.9m funding for 34 solar plus storage residential installations across the island from 2016 to 2019



**Outcome:** VPPs help keep the grid stable, smoothing intermittent renewable energy generation, managing peaks in demand and allowing homes and businesses to provide these services

## Innovation in thermal storage and demand management systems



- Heating, Ventilation, Air Conditioning and Refrigeration (HVAC-R) industry consumes **~22% of all electricity and accounts for 50% of peak demand**
- ARENA has funded **\$2 million** to develop more energy efficient thermal energy storage technology by using smart demand management systems
- Glaciem demonstrates how to increase the flexibility of electricity loads in industrial customers
- This can change the way energy is supplied to HVAC-R and help industry make better use of solar energy

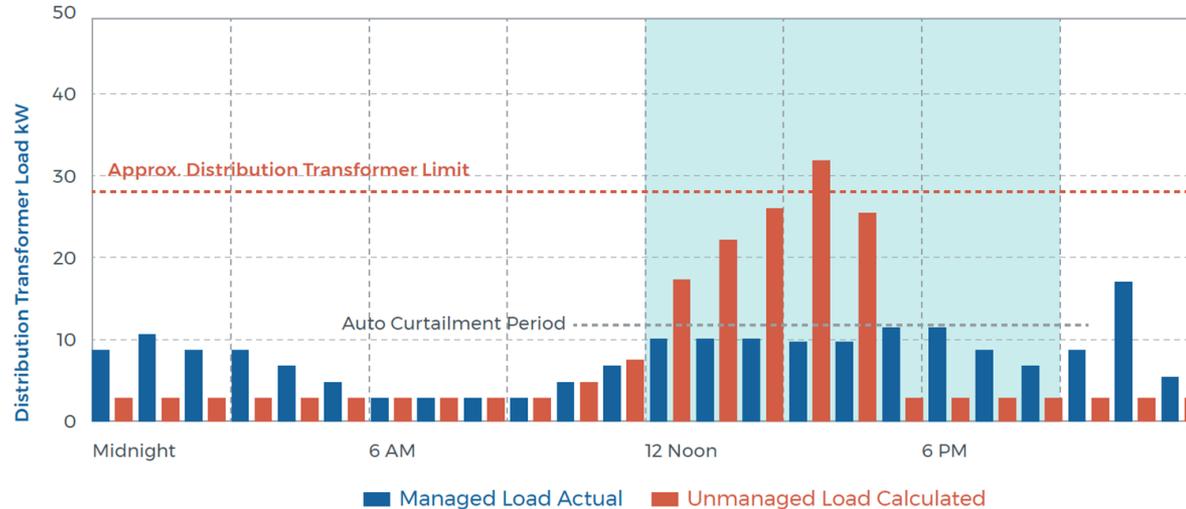
**Outcome:** This technology will enhance the ability of HVAC&R systems to use renewable energy and will enable customers to better manage peak energy demand

# How could smart charging be used to improve network utilisation?

## Toronto Smart Charging Project by FleetCarma

- Over 85% of EV load could be shifted to other times without user impact
- Peak loads were reliably reduced by 50%
- 97% of owners had a positive or neutral view
- Pricing incentives trialed

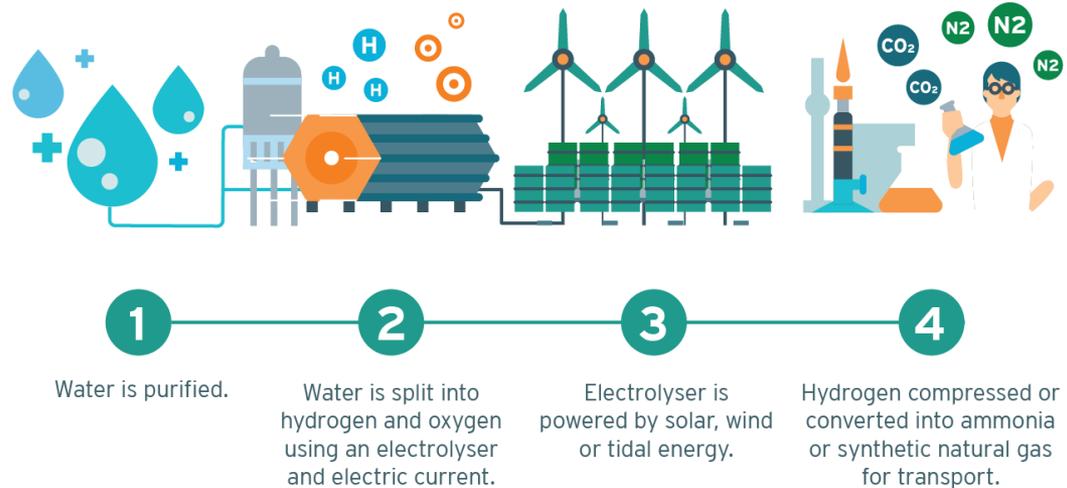
### Comparison of Throttled to Predicted Charging



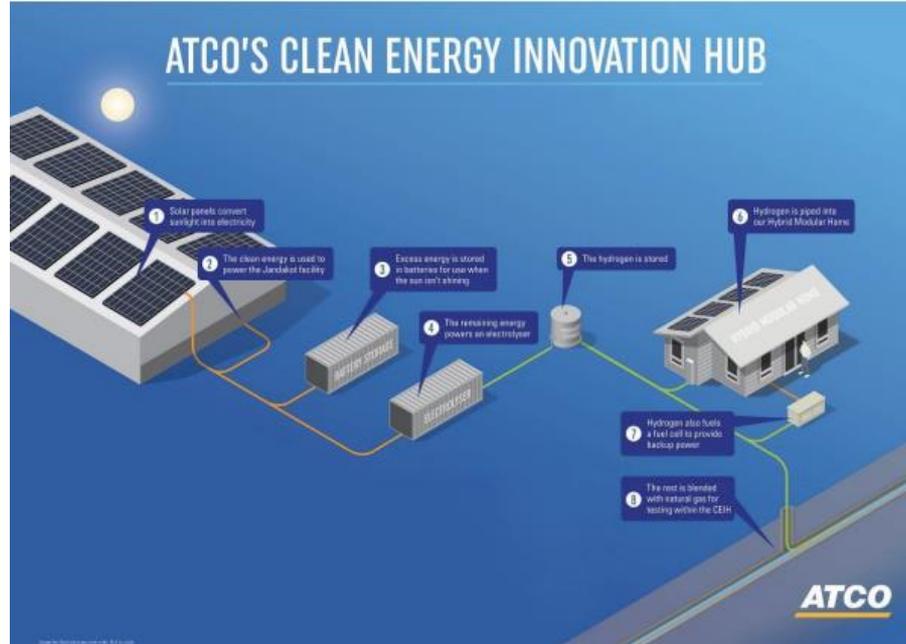
Source: Fleet Carma - Residential Smart Charging Pilot in Toronto: Results of a Utility Controlled Charging Pilot

## Hydrogen as a highly flexible load

- Hydrogen can be fuel for transport or heating, a way to store electricity, or a raw material in industry
- ARENA has committed **\$44 million** to hydrogen projects to date, including
  - \$22m to research & development
  - Pilot and demonstration projects
  - Feasibility studies for deployment
- ARENA intends to commit **\$70 million** to kick-start electrolyser projects



## ATCO's Clean Energy Innovation Hub - Integrating green hydrogen into a commercial hybrid energy microgrid



- ATCO's \$3.3m Clean Energy Innovation Hub integrates 'green' hydrogen into a microgrid system at Jandakot, WA
- Green hydrogen is produced by water electrolysis using on-site solar PV to separate hydrogen from water - and injected into the micro-grid
- The hydrogen can be stored or injected into the micro-grid for testing as a direct fuel or blended with natural gas

**Outcome:** The project demonstrates how renewable hydrogen can be used as storage for electricity and direct gas use