RACE for 2030

RELIABLE
AFFORDABLE
CLEAN
ENERGY

Building a customer-friendly clean energy transition

Building a customer-friendly clean energy transition

Greg Morrison
Program Leader, RACE for Everyone

The rapidly evolving decentralisation of energy resources and the whole of energy system transition brings a need to reconsider the "customer". People in homes are now increasingly prosumers and it is the evolving relationship of people with energy efficient homes, EVs and flexible demand approaches which will be considered by RACE experts in this session.

Speakers

Declan Kuch
Visiting Research Fellow

UNSW AUSTRALIA

Karla Fox-Reynolds
Principal Innovation Projects

CLIMATE KIC AUSTRALIA

Amelia Thorpe
Associate Professor in Law

UNSW AUSTRALIA

Stephen White
Leader, Energy Efficiency Research

CSIRO

Why is trust important now?

Energy transition:

- Decarbonisation
- Decentralisation
- Democratisation

- Where is *power and control* moving to and how?
- How is this experienced by different parts of society?

Trust in the Energy Transitions

1. Trusting Customers
   - Racefor2030 Opportunity Assessment – Trust building for collaborative win-win solutions Roadmap Report

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2. Trusting technologies
   - User-Centred Energy Systems Technology Collaboration Program: *Social License to Automate*

User-Centred Energy Systems

Trust Opportunity Assessment Team

QUT

Overall project management and IRG liaison

Analysed 25+ sources of data

Critical literature review

UTS UNIVERSITY OF TECHNOLOGY SYDNEY

Analysed 135 articles +
- Academic literature
- Industry and policy reports

Empirical data analysis

CSIRO

UNSW SYDNEY

Recommendations and Roadmap

QUT

Final report and dissemination

Case study analysis

Curtin University

Analysed 48 articles +
- Academic literature
- Industry and policy reports

Overarching themes for understanding, measuring and building trust in the energy sector

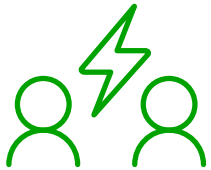
Trust consists of **authenticity, competence, responsibility, and openness.** Customer service especially crucial when things go wrong!

To create trust the energy system must serve the interests of all actors and stakeholders at all times

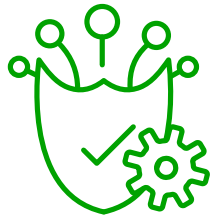
Customers need a single point of truth that proactively allocates tasks and responsibilities to relevant organisations not the customer

Data must be accessible to the right actor for the right task at the right time

Trust is **context-specific and multi-dimensional**



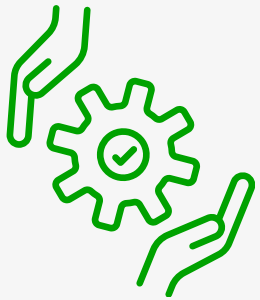
Value in the energy ecosystem is co-created through dialogue, access, risk assessment and transparency. Involve customers!



Tools and practices for trust-building should facilitate customer control of data and information, energy literacy, peace of mind, access to the best deal and energy services when and how they need it.

*Trust is the **confidence** that energy organisations, actors and system will meet positive expectations for a specific task under conditions of **unknown** outcomes.*

Definition and Components of trust



New RACE definition of trust in the energy sector*

Trust is the **confidence** that energy organisations, actors and system will meet positive expectations for a specific task under conditions of **unknown** outcomes. In the energy sector, key expectations are that organisations, actors and the system will act with competence, responsibility, openness and authenticity.

**This definition covers actors/organisations in supply AND demand side (customers).*

Mezger et al (2020), Robbins (2016) and Chen (2010)

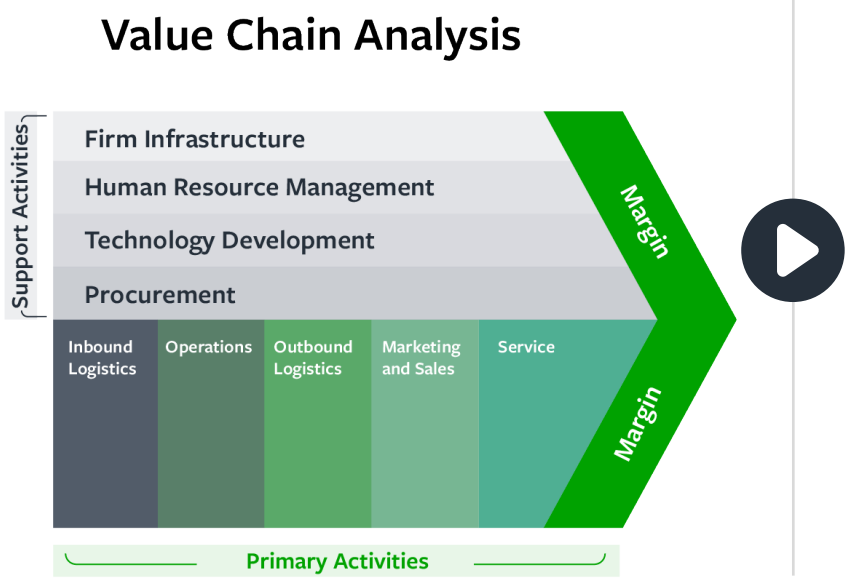
Trust

- **Competence**
  - Expert
  - Experienced
  - Knowledgeable
- **Responsibility**
  - Green
  - Ecologically worthwhile
  - Environmentally responsible
  - Sustainable
- **Openness**
  - Service oriented
  - Approachable
  - Accessible
  - Customer oriented
- **Authenticity**
  - Trustworthy
  - Honest
  - Reliable
  - Sincere

Source: Mezger et. al. 2020

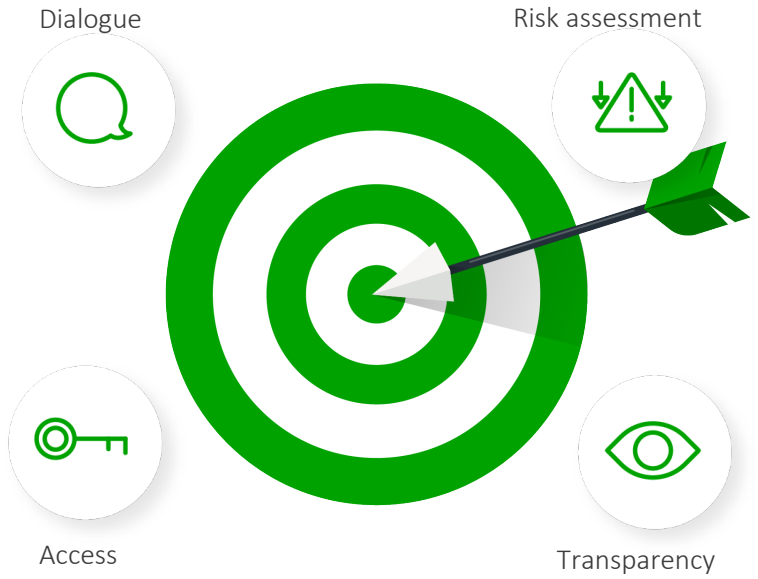
Creating value in the energy system: from value chains to ecosystems

1980s approach to creating value
- Value chain framework
- 4 primary activities and 5 support activities
- Value produced by the organisation
- Customer was passive recipient of value
- Power in the hands of the organisation



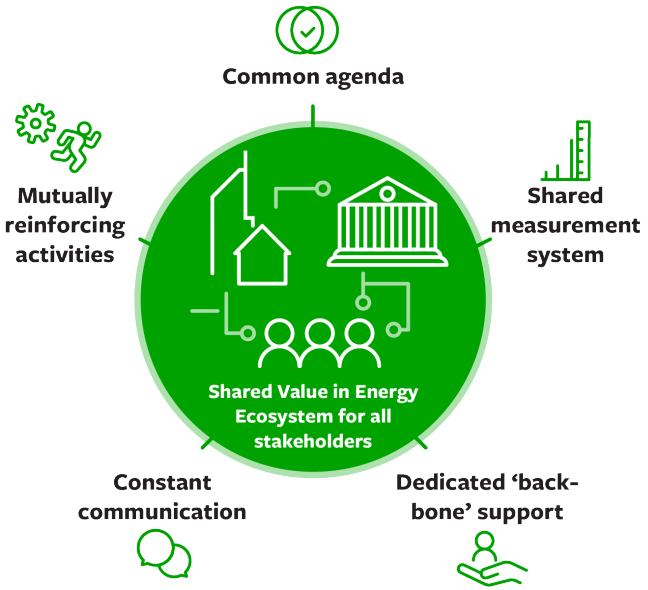
Porter, Harvard Business School 1985

Early 2000s approach to creating value
- Dot-com boom + Stakeholder approaches to firm and industry governance (Corporate Social Responsibility, Social License to Operate)
  - Co-creation of value; shared decision-making
  - **No trust without shared value**
- 4 'DART' components:



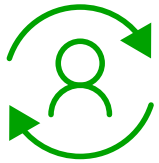
Prahalad & Ramaswamy Harvard Business School 2004

2010s approach to creating value
- Ecosystem of shared value framework
- 5 components
- Value co-created with organisation, customer and stakeholders
- Power is shared across all actors in the ecosystem

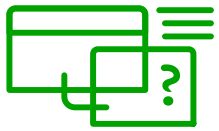


Kramer & Pfitzer 2016, Porter & Kramer 2011 Harvard Business School

‘Moments of Truth’ in the Customer Journey



The entire system is **reactive**, rather than proactive, requiring the customer to initiate all contact and navigate complexities.



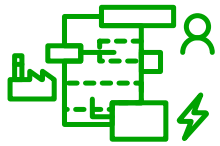
System is complicated and overlapping, with customers being **confused** as to *who to contact for what*, often leaving the retailer as the face of the entire energy system.

Customer is **constantly repeating themself**. Customers get ***bounced around*** within departments and don’t feel like their problems are effectively resolved - can lead to distrust.

Bill shock breaks trust, particularly when a customer’s estimated bill is incongruent with their real bill.

Estimates cause friction if it’s not what customers expect – Variation creates distrust.

The outage experience can create or destroy trust. Consumers can be left in the dark both figuratively and literally, with minimal communication and updates



No single source of truth about the energy sector for the customer to access

Conceptual Pillars for E1 program

There are seven conceptual pillars that must underpin all E1 project proposals

Define trust as multi-faceted: Trust is created through practices that demonstrate competence, responsibility, openness and authenticity

Triangulate trust data sources: Measurement of trust must include multiple data of sources

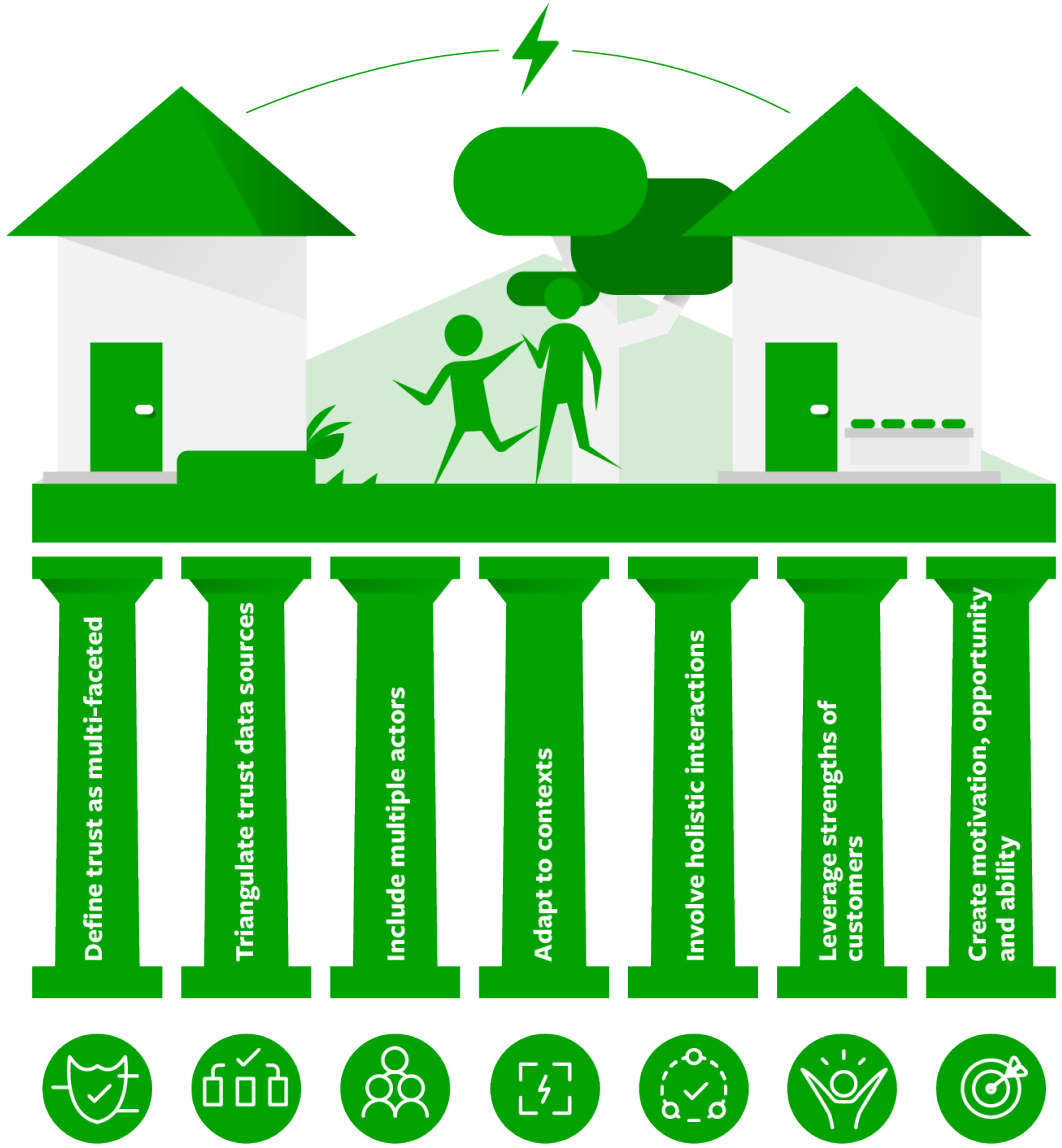
Include multiple actors: Trust involves interactions with multiple actors (organisations and people)

Adapt to contexts: Trust is specific to different tasks and different situations.

Involve holistic interactions: Trust results from multiple interactions and touchpoints in the customer journey which need to interact seamlessly.

Leverage strengths of customers: Vulnerability is a state not a trait, permanent or temporary, potential or actual hardship. Customers (eg. Those experiencing vulnerability) have strengths to be leveraged not deficits to be filled. They should be supported to participate in product/service design and decision-making.

Create motivation, opportunity and ability: Trust-building must go beyond information and communication to motivate, must include tools and practices to create ability (energy literacy) and opportunity.



Designing for Vulnerability?

Vulnerability:
potential for loss

- Disasters
  - Pandemic, fire, flood, cyclones etc
- Employment precarity
- Tech-enabled domestic abuse

Trusted automation

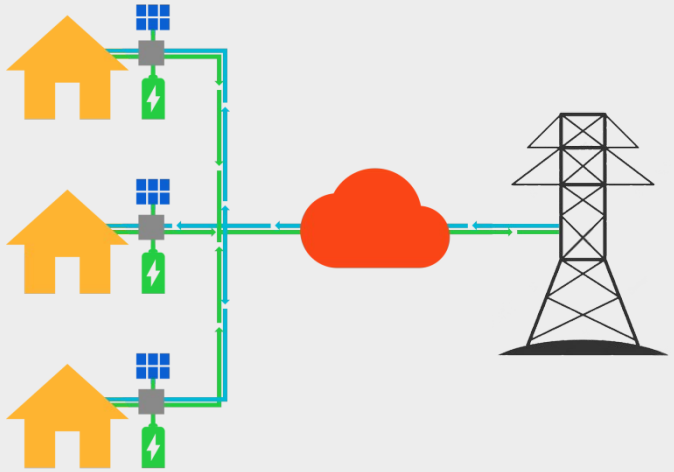
UsersTCP | Social License to Automate

UsersTCP | Social License to Automate

International Energy Agency Collaboration: Australia, Sweden, Norway, Austria, Switzerland, Netherlands and the United States.

- **9 case study trial projects with 2300 participants**
- Australian Gov + Community + Industry partners

In a nutshell:



- Build **trust** between consumers and energy companies
- Help build **community** capacity
- More **stable** energy under changing climate
- Society **ave** on $100bn supply costs

UsersTCP | Social License to Automate

Social License to Automate

ELSEVIER

Energy Research & Social Science

Volume 80, October 2021, 102210

Review

Social license to automate: A critical review of emerging approaches to electricity demand management

Sophie Adams [a], Declan Kuch [b], Lisa Diamond [c], Peter Fröhlich [c], Ida Marie Henriksen [d], Cecilia Katzeff [e], Marianne Ryghaug [d], Selin Yilmaz [f]

Show more

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https://doi.org/10.1016/j.erss.2021.102210

UsersTCP | Social License to Automate

Social License to Automate

Hypotheses:

1. Trust in institutions highly correlated with social license ie. allowing someone to see your energy data, and control your devices
   - Rich, well educating people more trusting
2. High flexibility with when a household uses electricity = likely to grant control. (more likely with wealth)
3. Exposure to blackouts = see the need for automated control, more likely to grant it.
4. These factors interact

UsersTCP | Social License to Automate

Social License to Automate: Energy Consumers Australia Survey data

1. **Trust:**
   - Most **trusting** have the highest incomes, however there is a precarious middle who express doubts about their trust in energy + other industries
   - Those with trade/TAFE diploma have lowest levels of trust
   - Those with higher trust were significantly more willing to share their energy data.
2. **Flexibility Capital** = higher reported ability to act on energy information very strongly predicts willingness to share energy data, - however income does not.
3. **Grid sensitivity:** Experiencing of an outage = significantly more willing to share data

UsersTCP | Social License to Automate

Outstanding Issues

1. Trust as fundamentally social
2. Social gap in technology development
   - Piloting tech with trusting middle-aged male engineers
   - Energy as site of social policy → Cost management technologies for low income?
3. Trust as essential
   - *3.6m+ Australians food insecure; skipping meals to pay power bills*

User-Centred Energy Systems

ARENA
Australian Government
Australian Renewable Energy Agency

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Thanks!

d.kuch@unsw.edu.au

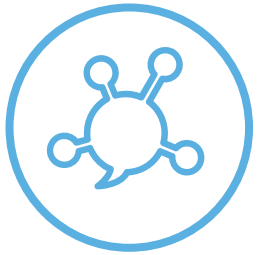
Reports available October:
https://userstcp.org/
https://www.racefor2030.com.au/

UNSW DIGITAL GRID Futures Institute

solar analytics

SYSTEMIC CHANGE THROUGH INNOVATION

Climate-KIC Australia is an **independent, not-for-profit** working to accelerate Australia's transformation to a net-zero, climate resilient and thriving economy.



As a **broker of collective action**, we convene the most effective groups across industry, government, research, entrepreneurs, NGOs, and investors.

Together we **develop and deploy transformative innovation initiatives**

We are **modelled on, and closely linked to**, EIT Climate-KIC, which is **the world's largest climate public private partnership.**

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IN COLLABORATION WITH

eit Climate-KIC

Climate-KIC is supported by the EIT, a body of the European Union

RACE for 2030 Fast Track Project
Pathways to Scale: Barriers to, Opportunities from, and Impacts of Retrofitting One Million+ Homes

The overarching aim of this research project was to fill knowledge gaps and build capability to implement home retrofits, for the purpose of thermal and energy efficiency, in over one million homes, through public-private partnership.

It answers critical scheme design and scheme development questions, analyses the barriers, opportunities and impacts of large-scale home retrofits with public-private finance whilst considering the current activity and market for home retrofits.

NSW GOVERNMENT

VICTORIA State Government

Curtin University

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UTS Institute for Sustainable Futures

elexsys CLEAN ENERGY, UNLEASHED

RACE for 2030 Fast Track Project
Pathways to Scale: Barriers to, Opportunities from, and Impacts of Retrofitting One Million+ Homes

There are up to ten million existing homes in Australia

- NCC Class 1a single dwellings that are owner occupied (up to 6.0 million homes)
- NCC Class 1a single dwellings that are tenanted (up to 2.6 million homes)
- NCC Class 2 apartments that are tenanted (up to 0.8 million homes)
- NCC Class 2 apartments that are owner occupied (up to 0.4 million homes)
- Social housing (up to 0.4 million homes)

What are the key drivers for a large scale home retrofit scheme?

Mentimeter

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We know that retrofitting an Australian home with roof, wall, and/or floor insulation, pipe lagging, and draught proofing can save between 17% and 31% of a home's energy use

Benefits from International large-scale home retrofit programs are found to be wide ranging and generally positive.
Claims of benefits include:

- Investment stimulated
- Energy saved
- CO2 emissions reduced
- Employment and local business activity increased (or safeguarded)
- Good return on investment of public money (1:4+)
- Health benefits for occupants
- Property values increased

Building envelope improvements, for the purposes of thermal and energy efficiency, should be coupled with home electrification to increase occupant comfort and decrease energy use, emissions and operational costs of the home whilst supporting the grid transition to 100% renewables

The large-scale home retrofit scheme will aim to create future ready homes. Future ready homes means existing homes that are comfortable as well highly thermal and energy efficient. Comfortable homes that can improve or at least support an occupant's health and without the need to excessively heat or cool rooms.

“Energy efficiency isn’t sexy”


SOFT!
Super-soft handling
Made using recycled
Reduces energy

“…decisions will be made across the kitchen table, not the boardroom table”

Dr Saul Griffiths

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Whenever my wife says,
”I was thinking”
It means I’m going to
have to paint, do,
or buy something

Thank you

Karla Fox-Reynolds

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Associate Professor Amelia Thorpe

Faculty of Law and Justice, UNSW

UNSW SYDNEY

N1: Electric Vehicles and the Grid

RACE for 2030 CRC Opportunity Assessment

MONASH – RMIT – CURTIN – CSIRO – UNSW


ELECTRIC VEHICLE PARKING
ELECTRIC VEHICLE CHARGING STATION
DRIVING TOWARDS A LOW CARBON FUTURE
CAC·00Y

We've met the RET, now it's time for an electric vehicle target

SEPTEMBER 14, 2021 · 0 COMMENTS · 4 MINUTE READ · BENNETT SCHNEIDER

THE HIGHLANDER KONA ELECTRIC. SOURCE: HYUNDAI

Australians love solar power: the country has the highest penetration of rooftop solar photovoltaics (PV) in the world. In stark contrast, Australia is lagging behind other developed nations in electric vehicle (EV) uptake.

Accounting for 17.6 per cent of national emissions, transport is Australia's third most energy-intensive sector, behind electricity at 33.6 per cent and stationary energy at 20.4 per cent. EVs cannot be ignored if net-zero emissions are to be achieved by 2050.

"Electrification of public transport as well as personal transport is considered in the EV forecasts. AEMO is not aware of any evidence to support an assumption of a strong push towards public transport and away from private vehicle ownership but is open to considering this if it can be satisfactorily proven to be a feasible future outcome. The battery projections consider a range of different uptake trajectories depending on the scenario, including considering the potential for low future uptake"

Australian Energy Market Operator, 2021 IASR Consultation Report


NRMA
2P
ALL OTHER TIMES
P30
1P
6 - 7
CHARGING STATION VEHICLES ONLY
NRMA
OUTLANDER


3P
6AM-6PM
ELECTRIC VEHICLES EXCEPTED ONLY WHILE CHARGING


EV
ELECTRIC
VEHICLE
PARKING
ONLY WHILE
CHA GING
ELECTRIC
VEHICLES
EXCEPTED
ONLY WHILE
CHARGING
NO
STOPPING

Crowne Plaza® installs Tesla Destination Chargers across Australasia hotel network

Crowne Plaza is the first hotel network to install Tesla Destination Chargers at all of their properties across Australasia, connecting 12 properties with cutting-edge technology for a growing customer segment.

World Economic Forum
@wef

Electric bike sales are up 145% in the US.

🔎 Learn more about electric transportation: buff.ly/3cfCH0f

6:00 AM · Mar 10, 2021

173 15 Copy link to Tweet

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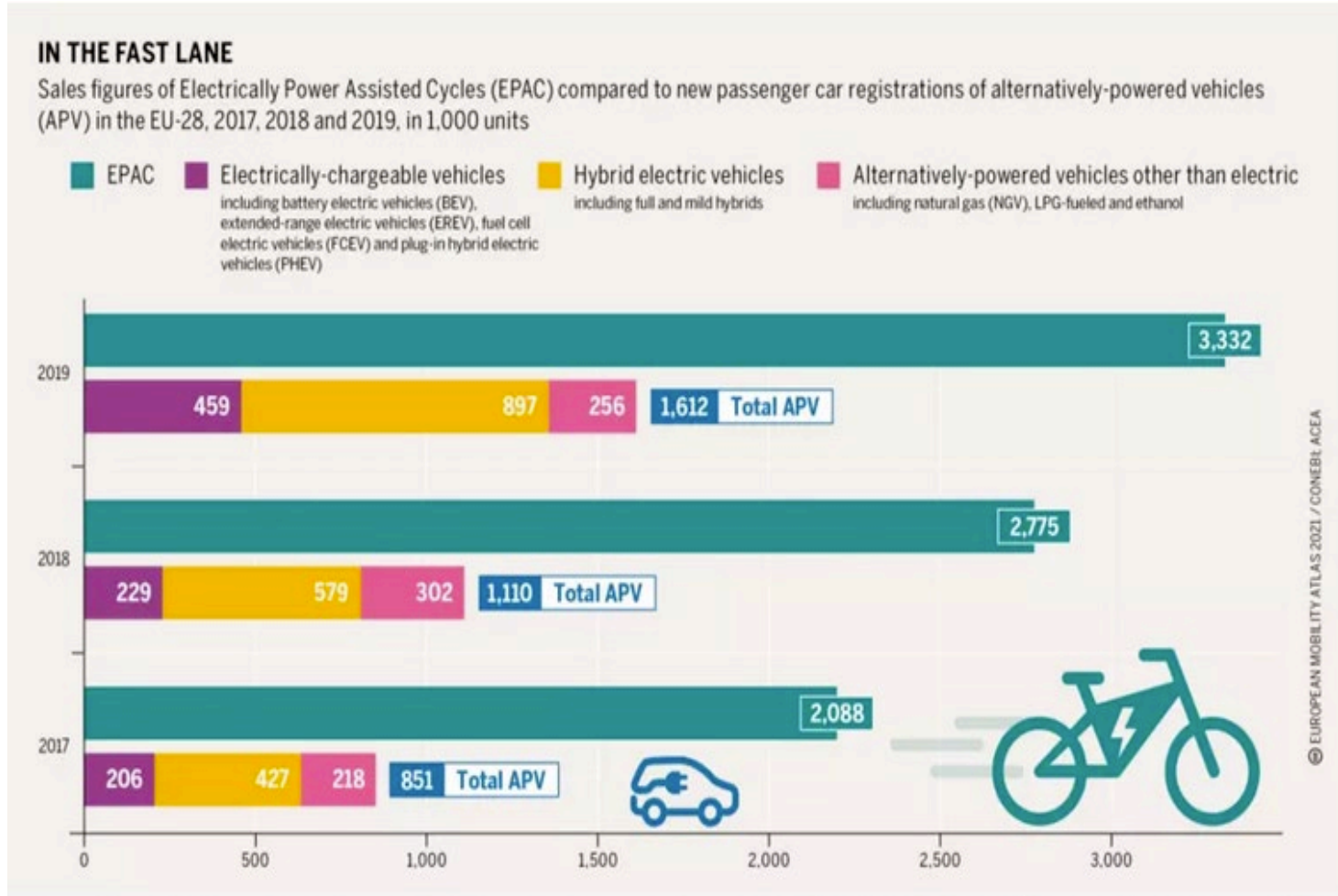


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www.unsw.edu.au

“Moving to a more flexible use of kerb space is not a trivial thing. It will imply design changes, engineering and construction costs (including knock-on congestion costs), revisiting the regulatory treatment of different transport modes and their access to public space (including anti-competition oversight), modifying or designing new revenue-collecting mechanisms, accounting for changes in peoples’ travel behaviours and integrating a wide range of sometimes conflicting stakeholder concerns.”

International Transport Forum, 2018. ‘The Shared-Use City: Managing the Curb.’

April 12, 2021
5:20 AM AEST
Last Updated 6 months ago

Technology

Trading clunkers for electric bikes: France moves to offer financial incentive

1 minute read

Reuters

A woman rides an electric bike in Paris, France, June 14, 2020. REUTERS/Benoit Tessier/File Photo

PARIS, April 11 (Reuters) - France is offering the owners of old, exhaust-belching cars the opportunity to hand over their vehicles for scrap in return for a 2,500 euro ($2,975.00) grant to buy an electric bicycle.

Lawmakers in the National Assembly have just approved the measure in a

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RACE for 2030 BUSINESS

Flexible Demand Sellers

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CSIRO

energy efficiency COUNCIL

AUSTRALIAN ALLIANCE FOR ENERGY PRODUCTIVITY

RMIT UNIVERSITY

UTS

AGL
Ausgrid
ENZEN
Flow Power
FOHAT
GreenSync
Monash University
NSW DPIE
Powerlink
QUT
Sydney Water
Vic DELWP
Western Power

September 2021

What is Flexible Demand (FD) and Where Does it Fit?

	Wholesale Market & Grid scale Renewable Support	Network Investment Savings	Contingency & Emergency Reserve	Distribution Network Support	Frequency Control Ancillary Services
Shift	H	MH	L	ML	NA
Shape	MH	MH	L	ML	NA
Shed	ML	H	H	L	ML (Lower only)
Shimmy	NA	NA	NA	H	H

~1.4GW already participating

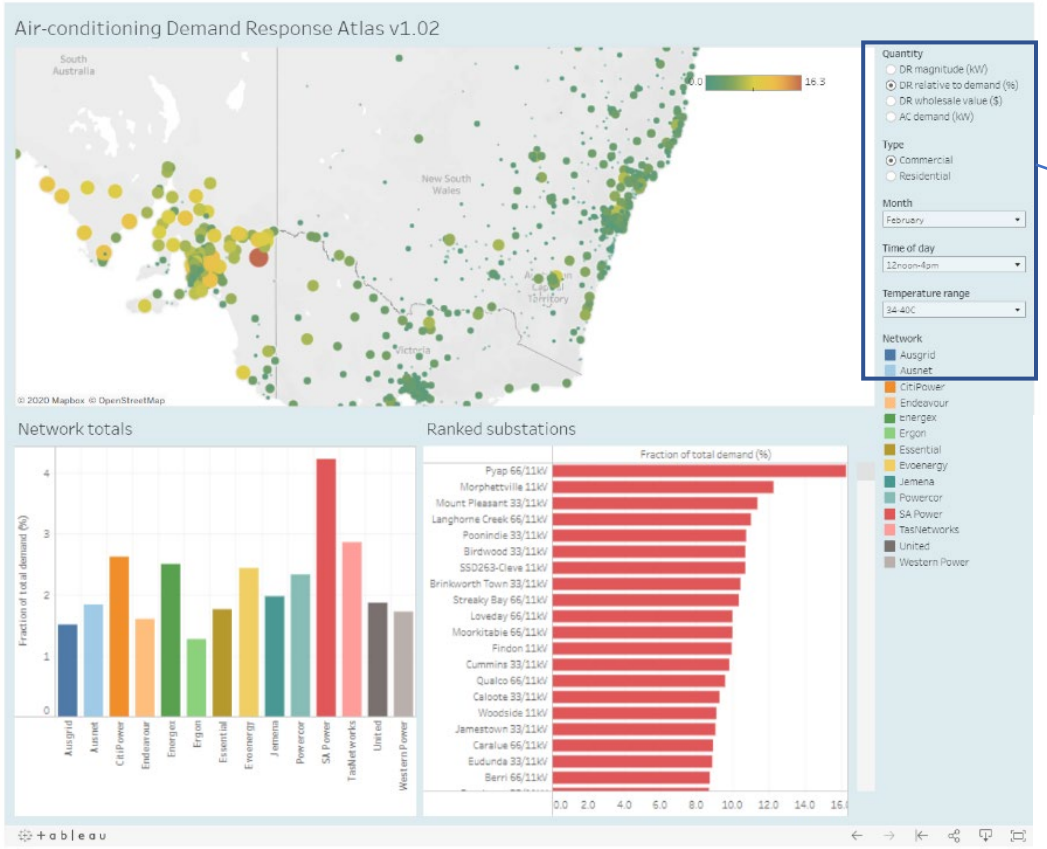
- FD is its own 'thing' with its own characteristics
- FD straddles many services and is not easily squeezed into existing industry/market structures
  - Value, Value-stacking
  - Registration/ reliability/ dispatch
- FD is probably best treated as a capacity product ('last GW'). But limiting this to 'emergency reserve' is wasting significant value *and* adversely impacting on firmness

RACE for 2030

Built Environment Resource Assessment

- Commercial and Residential Airconditioning
  - Switch it off in emergency (Shed)
  - Nudge thermostats (Shift) *(or DREDS)*

- Residential Hot Water (and Swimming Pool Pumps) and diversity
  - Solar soaking > peak demand management
  - Return to service spike > flexible demand



https://public.tableau.com/profile/mark.goldsworthy#!/

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Flexible Demand Resource Estimates

	Peak Demand		Minimum Demand
Source	**Emergency**	**Market DR**	**Callable Load**
Residential hot water and swimming pool pumps	0.6 GW	0.6 GW	5.4 GW maybe
Airconditioning	8.4 GW	1.2 GW	1.2 GW maybe
Industrial (including some of gensets?)	1.4 GW known	1.5 GW maybe	Switching off cogen
Standby Gensets	2 GW	2 GW	na

What else is competing for 'The Last GW' ?
(out of 35GW)

Should we be chasing it?
(Energy Queensland Case-Study)

‘Broad-Based’ program @ $244/kVA (~$30/kW/yr)
‘Targeted’ program @ $80/kVA (~$10/kW/yr)

- *Not including program management*
- *Not including IT/comms infrastructure*
- *No feedback/M&V/settlement mechanism*

These low FD costs benefit from other sectoral activity

↳ We should be looking at sectoral integration rather than operating in an electricity industry silo

Comparing with supply side solutions

- Batteries 2 hrs (~$145/kW/yr + charge)
- Open Cycle Gas Turbine (~$125/kW/yr + fuel)
- NEM (~$460/kW/yr, assuming no fuel cost, including redundancy)

Valuing 1 GW (~3% of peak) FD for Managing Extreme Events

Source	Value
Wholesale (Shift and shed)	~$290m/yr ($290/kW/yr)
Network (Shed, shift and shape)	~$100m/yr ($100/kVA/yr)
RERT (Shed)	~$35m/yr
FCAS (Shimmy)	~$30m/yr
	$455m/yr ($455/kW/yr)

Conservative compared with other more detailed studies

- The NSW Peak Demand Scheme
  - $4.30/MWh wholesale price reduction from 7.5% FD capacity. (~$840m/year across the NEM)
- US DoE Grid Integrated Efficient Buildings Roadmap
  - ~$790m/year (scaled to Australia)
- Customers are currently charged ~$387/kVA/yr for network services

Even if we paid FD providers $155/kVA/yr, this would leave $300m/yr in bill savings for electricity consumers

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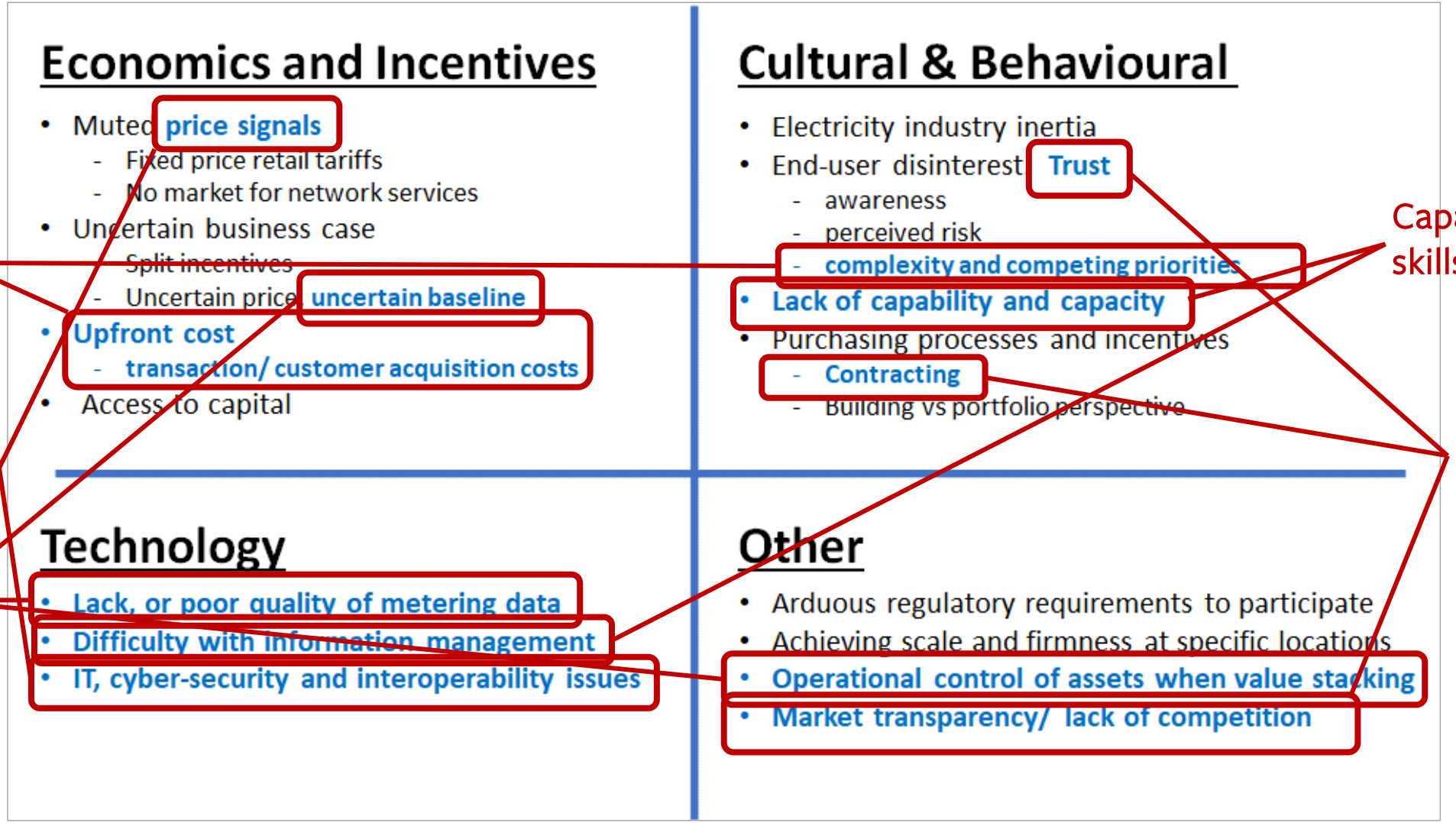
FD Provider Barriers/Industry 4.0 Potential



Scale/ bespoke solutions

Capability and skills gaps

Vendor lock-in/ Choice

Settlement

What would really make a difference ....?

"For many, greater uptake of electricity load shifting doesn't require a stronger business case, it requires integration into the business model and strategy"

"Value (cost v benefit) and risk are constant lenses through which the viability of load shifting is considered"

- **Make it easy and trustworthy**
- **Make it relevant**
- **Make it financially visible and viable**

? Does FD need to mirror complex 'cost-reflective' supply industry pricing

? Does FD need to plug in as a drop-in replacement to existing supply industry structures, procedures and constraints

? Does FD need complex registration, metering and settlement procedures

? What attributes/narrative would make FD 'a thing' (worthy of attention) to the board/minister

Conclusion

- Flexible demand (FD) could provide valuable services to the electricity industry at *very* low cost
  - But market structures are a poor fit for the characteristics of FD
- There's plenty of FD resource available to alleviate the worst effects of extreme events
  - But awareness, cultural and skills barriers will make it difficult to access
- Simplification and aggregation are essential
  - Settlement
  - Technology packaging

RACE for 2030 BUSINESS

Thank You

Dr Stephen White

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Q & A


Thank you
RACE for 2030
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ENERGY
Australian Government
Department of Industry, Science, Energy and Resources
AusIndustry
Cooperative Research Centres Program