Federal Ministry for Economic Affairs and Energy

Federal Ministry of Education and Research

Australian Government
Department of the Environment and Energy

Australian Government
Department of Foreign Affairs and Trade

Energiewende Switch to the Future

Welcome to the

Australian-German Energy Symposium

18-19 September 2019

adelphi

ENERGY TRANSITION HUB an Australian-German innovation partnership

AHK Deutsch-Australische Industrie- und Handelskammer German-Australian Chamber of Industry and Commerce

#AU_DE_Energy2019

Market Design

Keynote: **Jochen Homann**
President, German Federal Network Agency

Moderator: **Dr. Marnie Shaw** *(no slides)*
Research Leader, Battery Storage and Grid Integration Program, Australian National University

David Swift *(no slides)*
Independent Adviser on Energy Market Development, Energy Security Board

Dr. Felix Matthes
Research Coordinator for Energy & Climate Policy, Ökoinstitut (Institute for Applied Ecology)

A/Prof. Tim Nelson
Executive General Manager, Strategy and Economic Analysis , Australian Energy Market Commission

Dr. Marco Nicolosi
Founding Partner, Connect Energy Economics

Rosemary Sinclair AM
CEO, Energy Consumers Australia

Bundesnetzagentur

Australian-German Energy Symposiu 2019

Jochen Homann, President of the Bundesnetzagentur Melbourne, September 2019

Bundesnetzagentur – what we do

Network access, balancing and tariff regulation (revenue cap); transmission infrastructure development, renewables auctions, and soon: hard coal phase-out auctions, market integrity and transparency, cybersecurity, consumer questions, cross-federal-state infrastructure approval procedures, etc. (not: generation adequacy)

Network access, balancing and tariff regulation, LNG access, transmission infrastructure development, market integrity and transparency, consumer questions, etc.

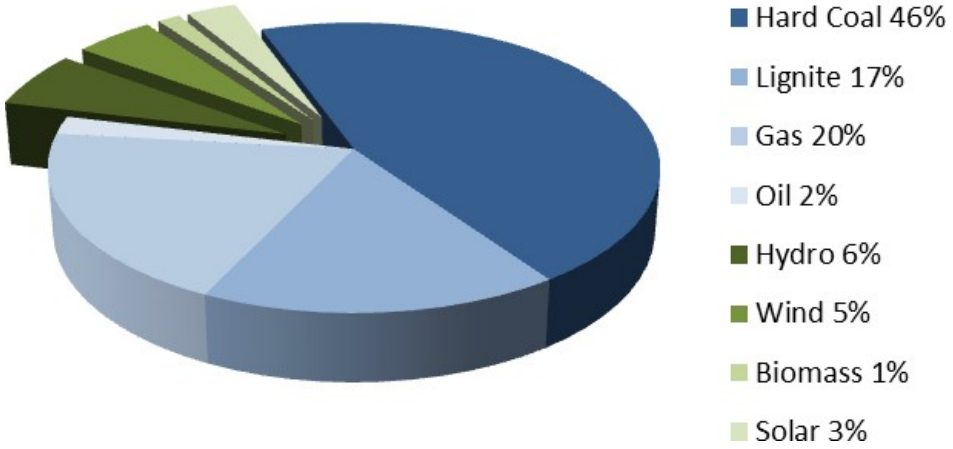
Wholesale broadband access and tariff regulation of incumbent and termination markets; spectrum auctions and frequency administration, electromagnetic compatibility, cybersecurity, consumer protection, universal service, etc.

Postage for letters (price cap system), access to infrastructure of incumbent, consumer protection and universal service, etc.

Railway and service infrastructure access and tariff regulation (TOTEX cap system), etc.

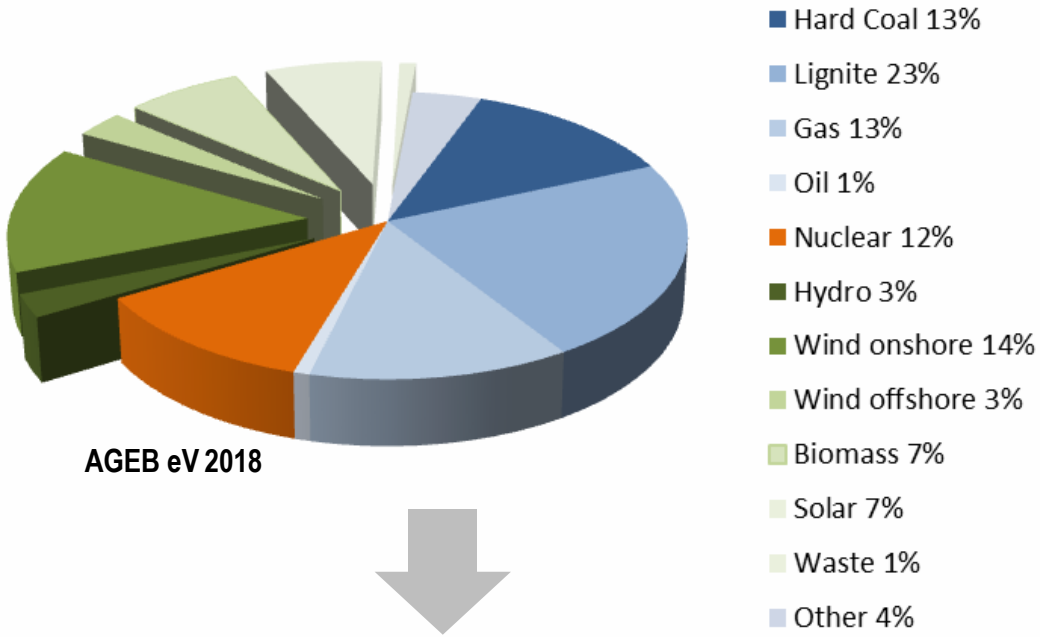
Electricity generation mix

Australia electricity generation by sources



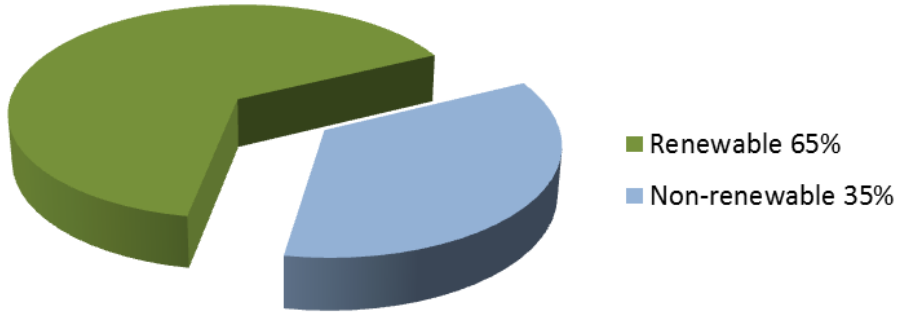
Australian Energy Update 2018

Germany electricity generation by sources



AGEB eV 2018

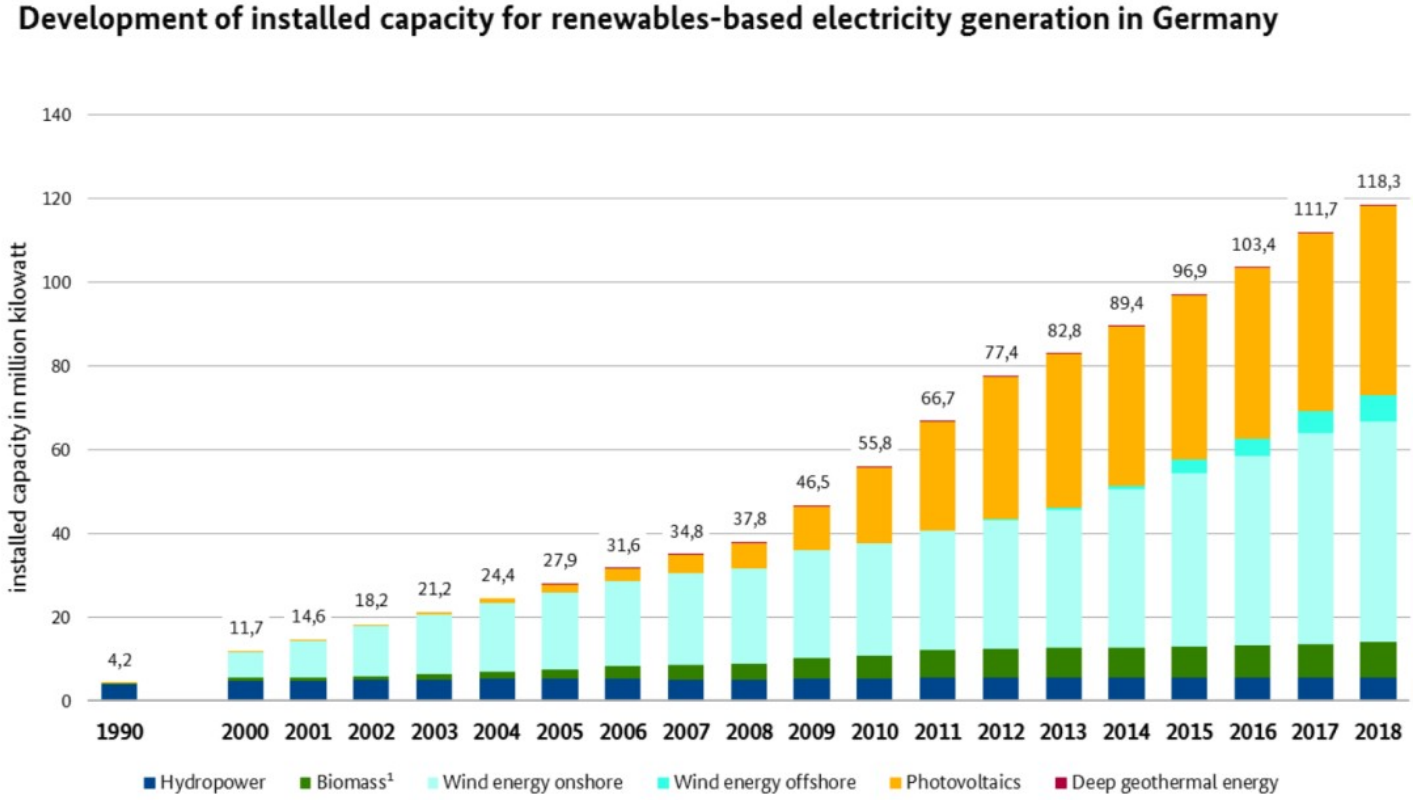
Germany target electricity generation 2030

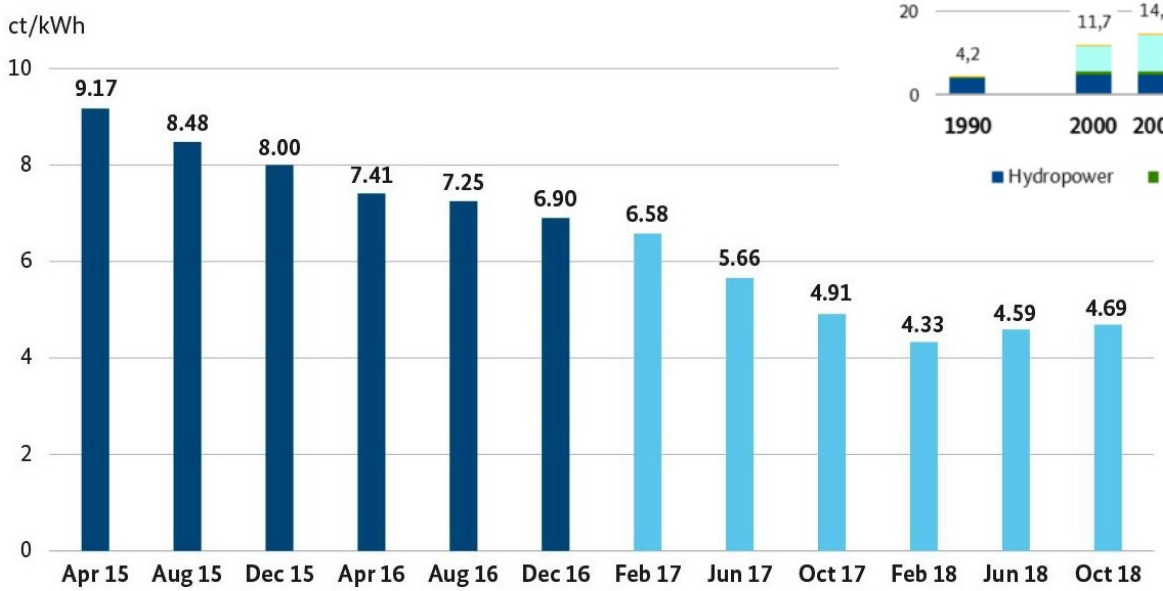


Renewables installation

Installed capacity increasing

(Acceptance and approval of onshore wind is an issue currently – demand is below auction volume)





Auctions for ground-mounted PV-installations decrease the average funding rate.

Decreasing auction results for funding rates; example of PV solar

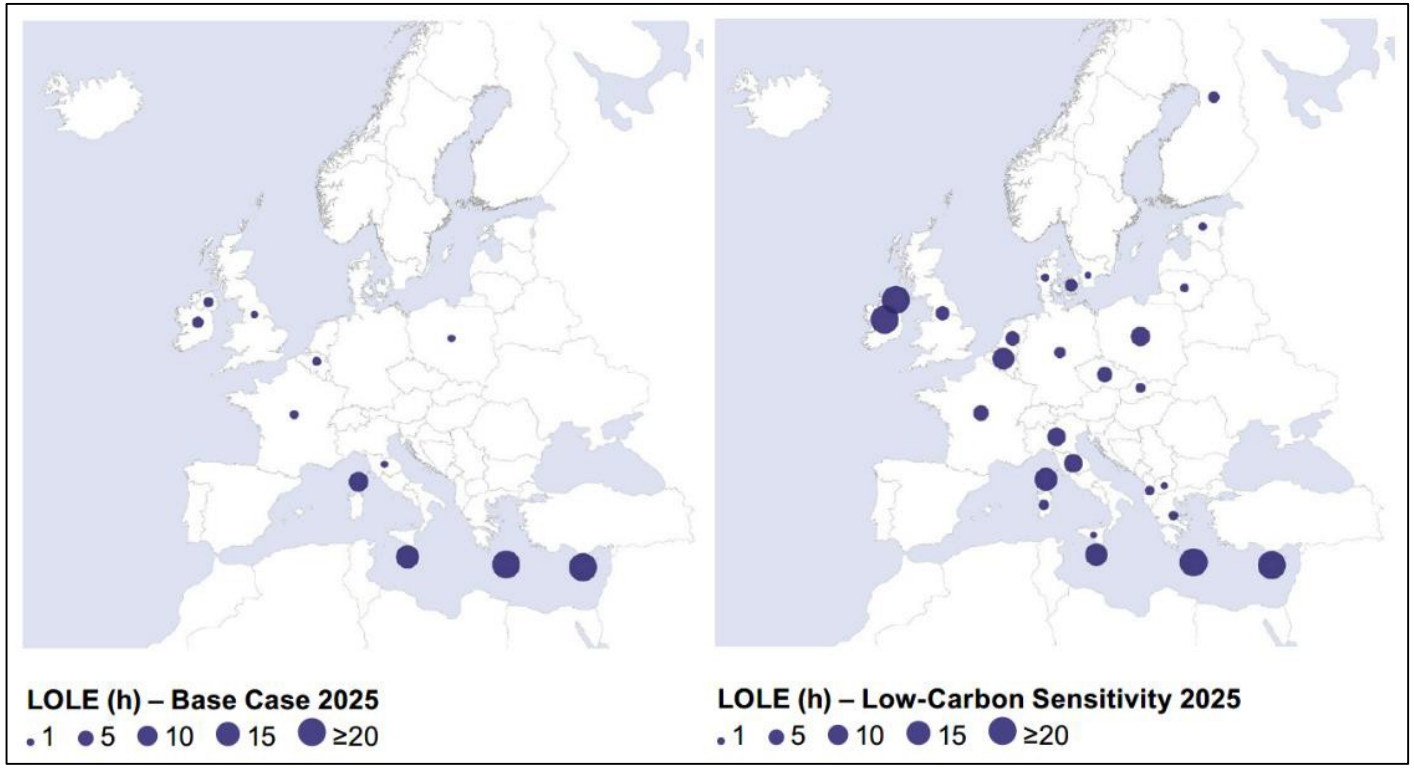
Offshore wind has even seen 0 ct/kwh for 2025 (excluding grid connection)

Generation adequacy/EU market

Germany: installed capacity approx. 214 GW, of which wind/solar approx. 98 GW; peak load assumed to be approx. 84 GW

Stress test for 2025 (ENTSO-E)

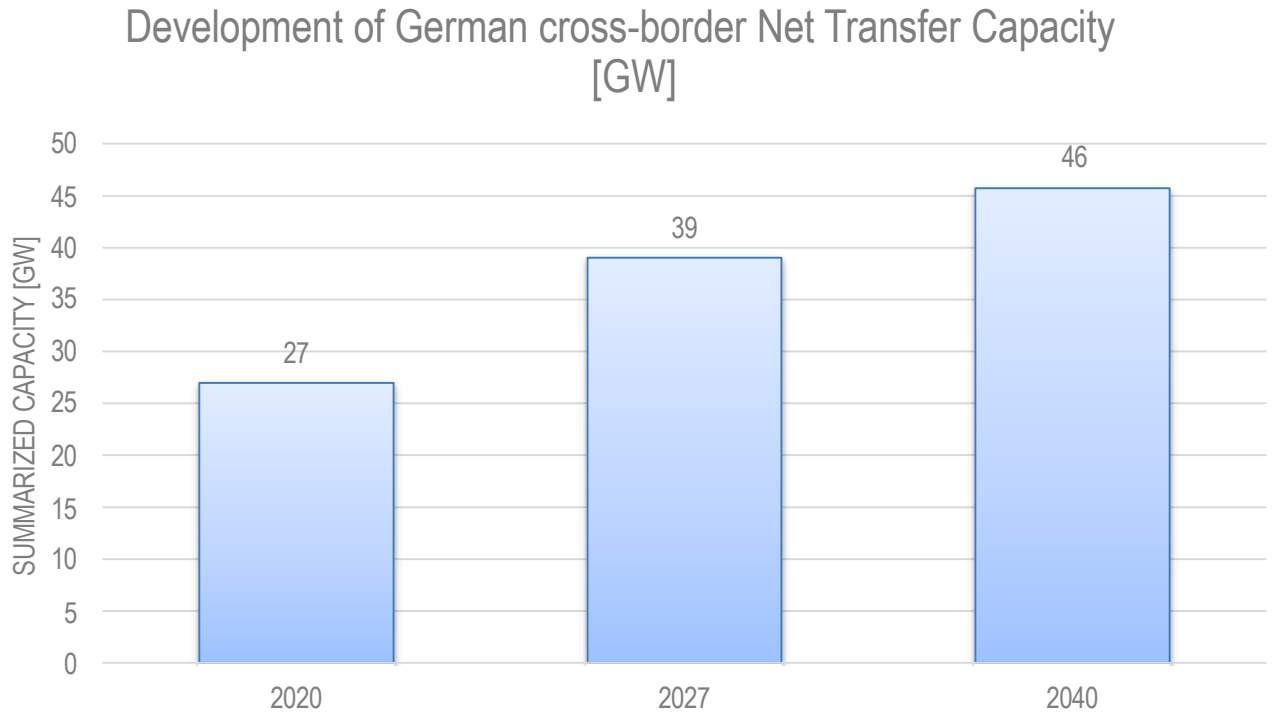
- Capacity reduction especially of coal-fired power plants
- No replacement for disabled power plants (= stress test)
- Limited generation overcapacity
- Hours of scarcity (Loss of Load Expectation=LOLE) increase, including in Germany, but EU-wide market accommodates them



Source: ENTSO-E (2018) Mid-term Adequacy Forecast 2018 – Executive Report

EU-wide electricity market enables additional generation capacity to be used for imports; logically, need for national generation capacity would be somewhat less – while maintaining the same level of security of electricity supply - but at the expense of greater interdependence.

Generation adequacy/network limitations



Challenge:

- In future, EU-wide market will become more important, which will result in increasing physical flows
- Network limitations are an issue within Germany because of cross-border flows and due to the fact that wind and solar power is largely generated in the north and east while load is located in the south and west

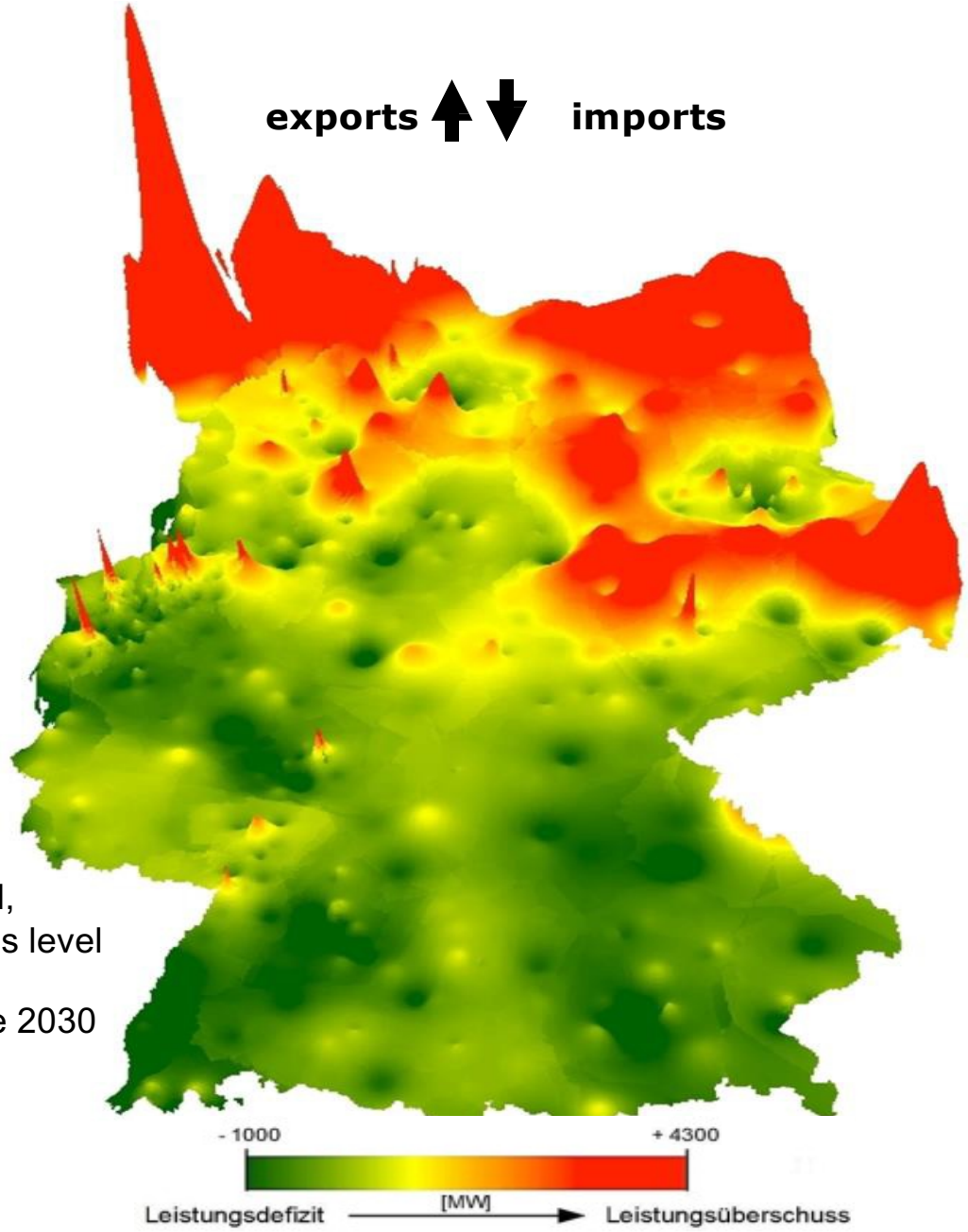
- **Most important: transmission system expansion and upgrade**

Why do we need a transmission system expansion and upgrade?

offshore wind

5.4 GW (2017)
2030: additional
11.6 – 14.6 GW

exports ⇅ imports



generation minus load (surplus = red, deficit = green) at transmission nodes level

representative hour: 17:00 on 2 June 2030

onshore wind

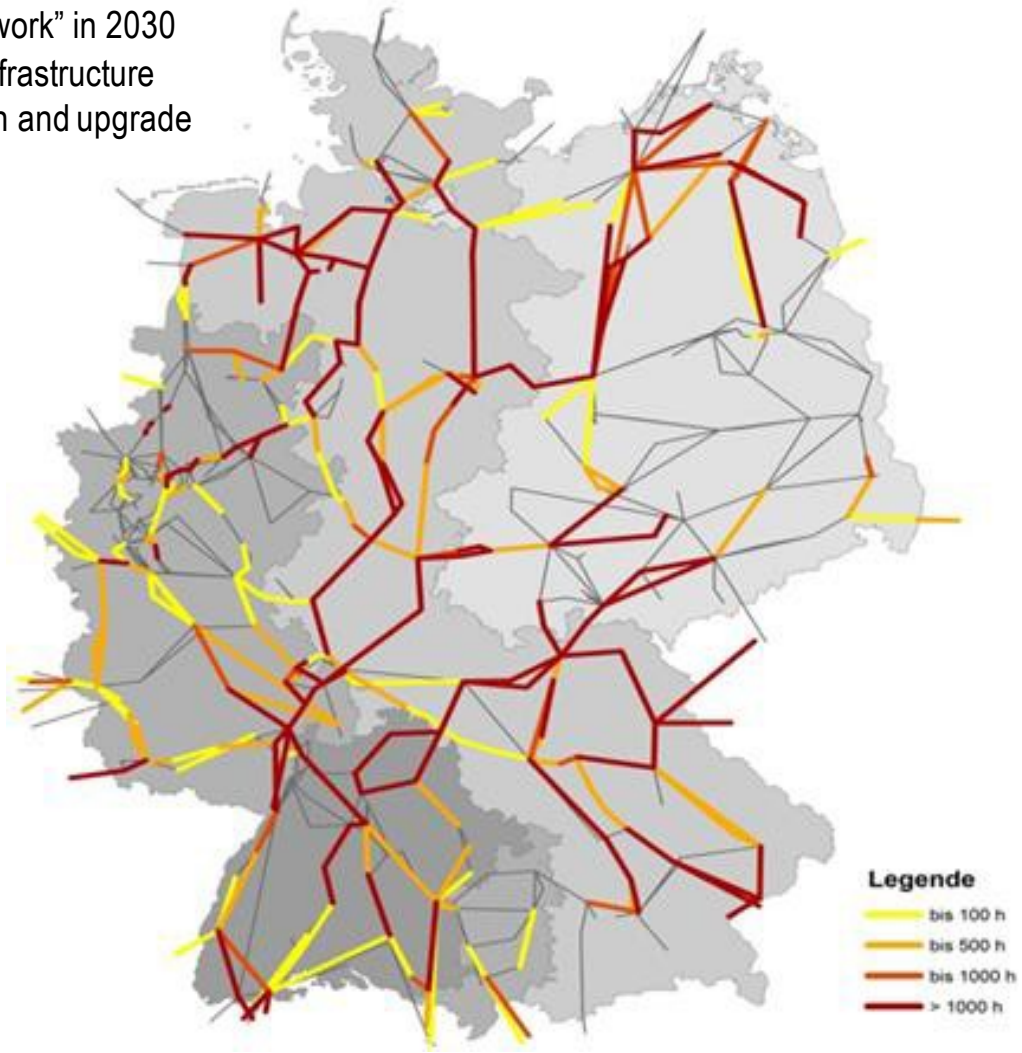
50.5 GW (2017)
2030: additional
23.8 – 35.0 GW

PV solar

42.4 GW (2017)
2030: additional
30.5 – 62.1 GW

Network development planning

Congested hours of the "start network" in 2030 without infrastructure expansion and upgrade



- Transmission expansion projects already confirmed: approx €40bn
  - inc. 8 GW in four HVDC north-south corridors
- Plus additional transmission expansion up to 2030: approx €20bn (operator estimate, not yet confirmed), inc. additional HVDC corridor
- Offshore transmission projects already confirmed: approx €16bn
- Plus additional transmission expansion up to 2030: approx €2bn (operator estimate, not yet confirmed)
- **Some acceptance issues, but planning and approval well underway**

Bundesnetzagentur

THANK YOU!

Jochen Homann
Bundesnetzagentur President

www.oeko.de

Öko-Institut e.V.
Institut für angewandte Ökologie
Institute for Applied Ecology

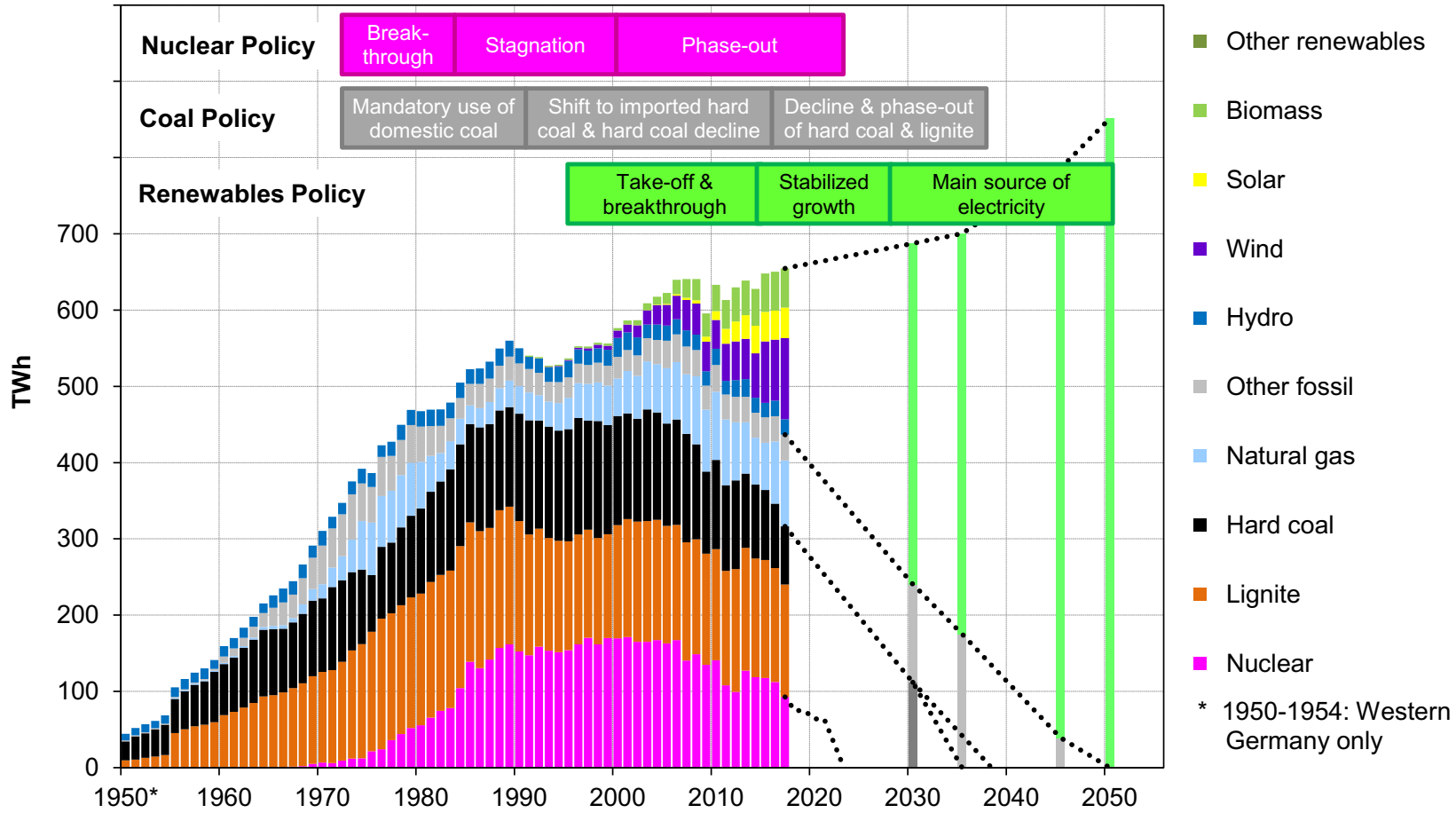
The Power Sector in Transition: How to secure Reliability, Emission Reduction and Affordability? Transforming the Market Design

Australian-German Energy Symposium 2019

Dr. Felix Chr. Matthes

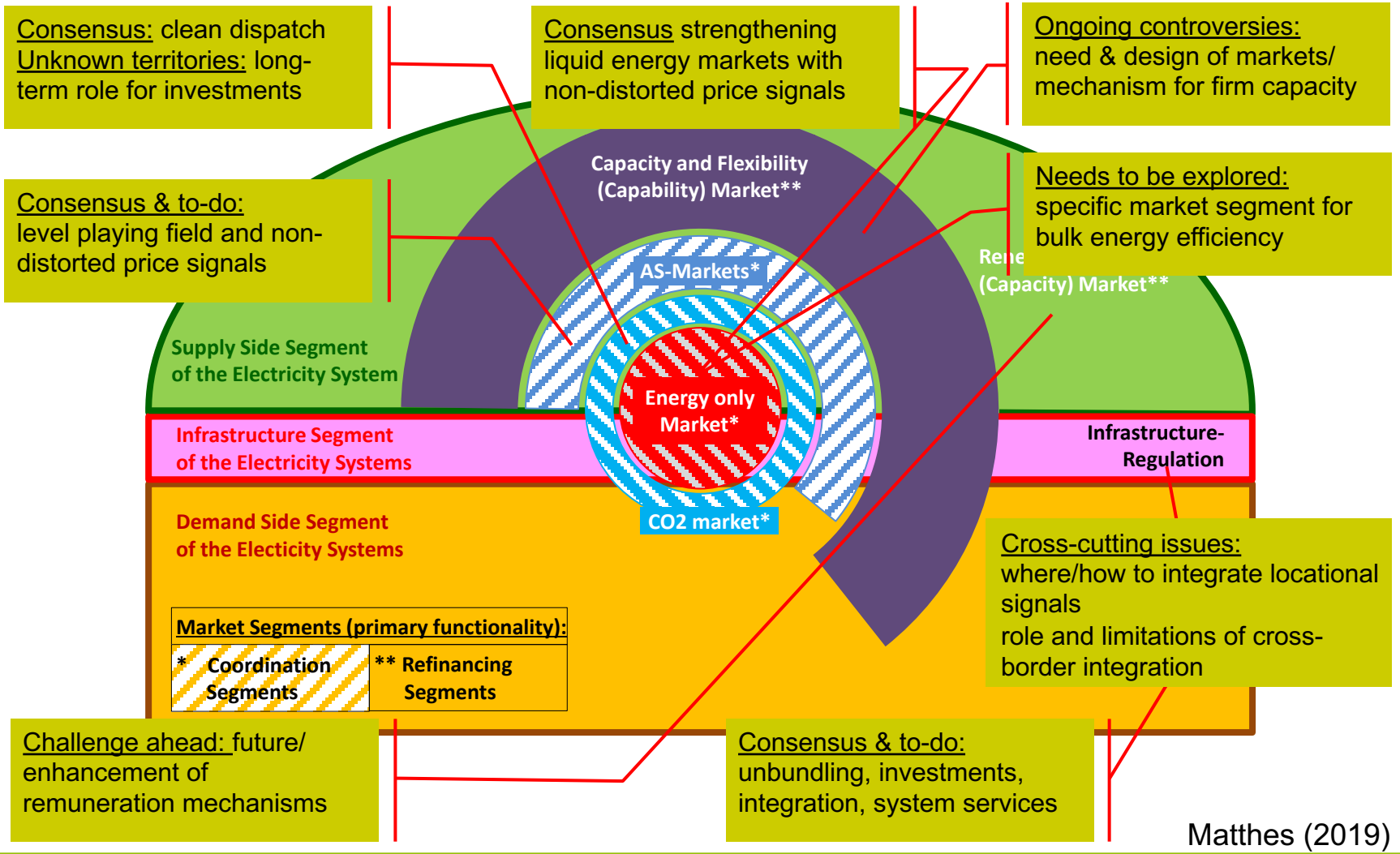
Melbourne, 18th September 2019

Market design
The bigger context for Germany



Matthes (2019)

Market design = sustainable economic basis for the (new) system
Enable coordination and pay back for investments



Matthes (2019)

Thank you very much

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AUSTRALIA'S CHANGING ENERGY MARKETS

TIM NELSON, EGM STRATEGY AND ECONOMIC ANALYSIS
SEPTEMBER 2019

AEMC

Significant reform implemented between 1995 and 2010

- **Generation**
  - Gross, energy-only pool market created allocative efficiency
  - Derivative market evolved to facilitate risk management
    - Provides an explicit price for the value of capacity, reliability proportionally rewarded and penalised
- **Retail**
  - Full retail competition introduced gradually from 2002
  - Price deregulation occurred when competition was deemed effective by the AEMC under the AEMA
- **Networks**
  - Economically regulated where competition is prevented by monopolistic characteristics
- Overarching principle was to allocate economic risks to those best placed to manage them (i.e. market participants, not consumers)

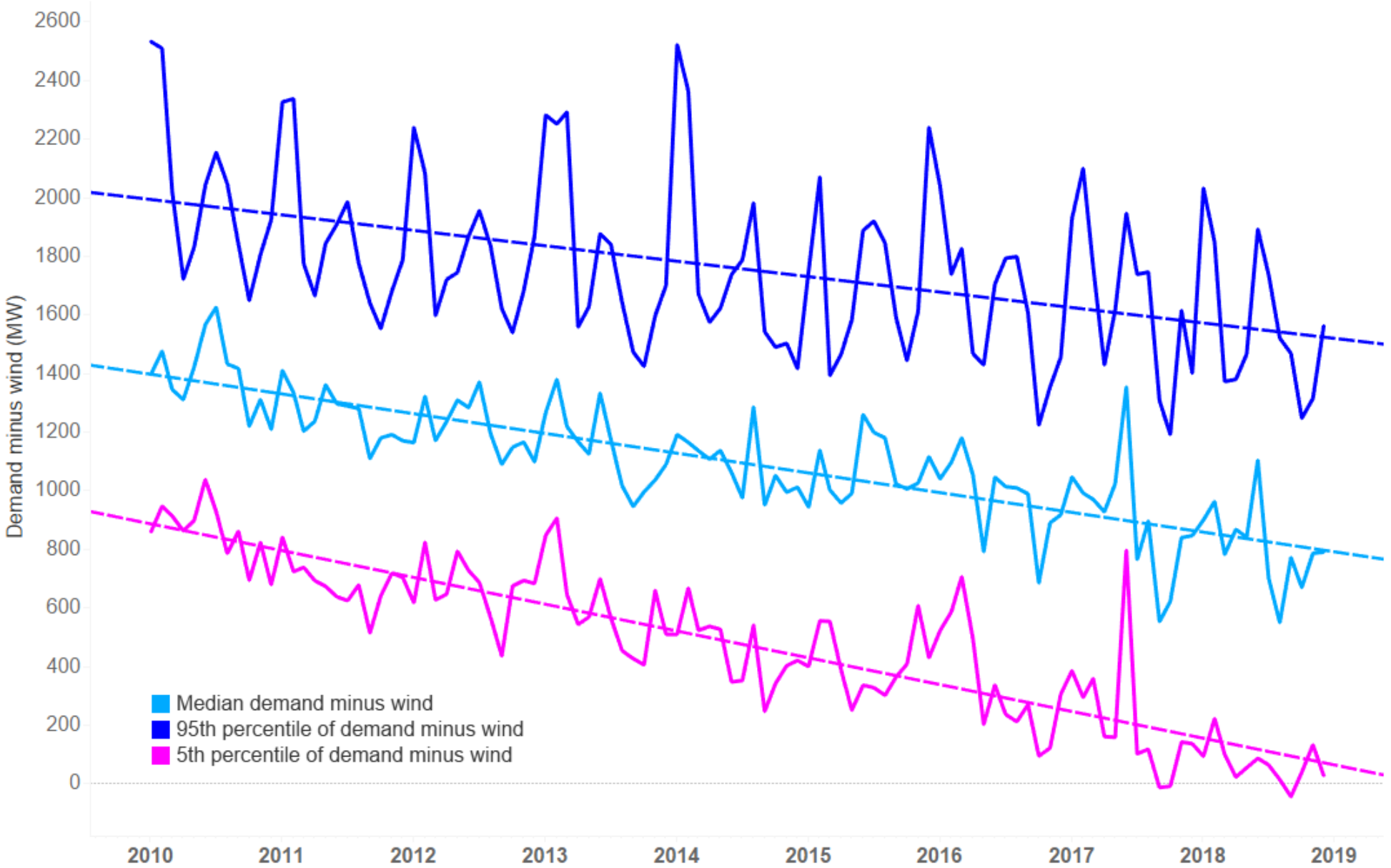
Map of existing coordination mechanisms

In day	Day ahead	Week ahead	Months	1 year	2 years	3 years	4-10 years
Dispatch*							
Pre-dispatch schedules (30 minute and 5 minute)							
		STPASA					
			Medium term PASA				
			ASX electricity futures				
				Electricity statement of opportunities (ESOO)			
				RRO/MLO		RRO/MLO	
						Notice of closure	

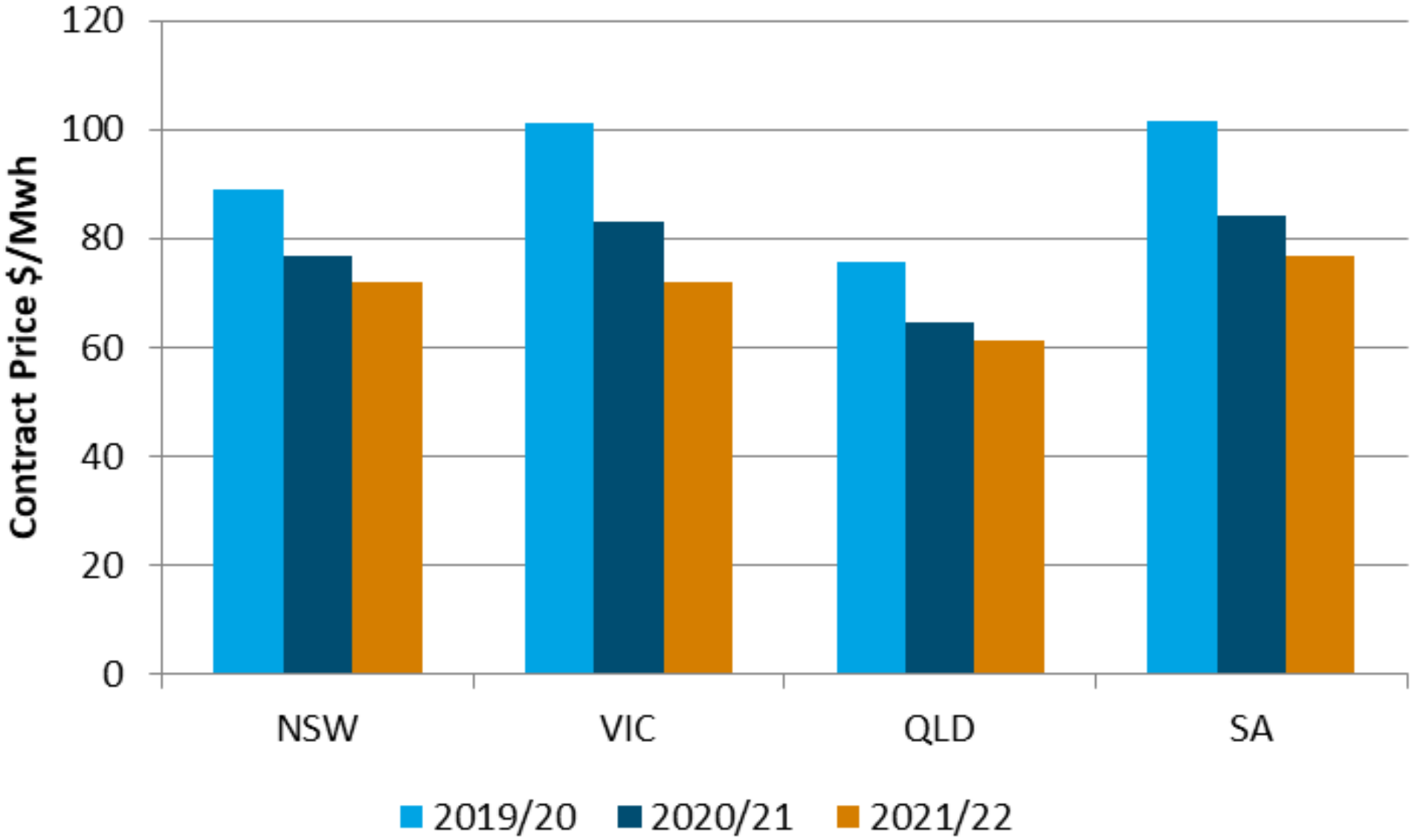
* Includes instructions ahead of time (eg fast start inflexibility profile, RERT, system strength)

Variable generation changing nature of residual demand

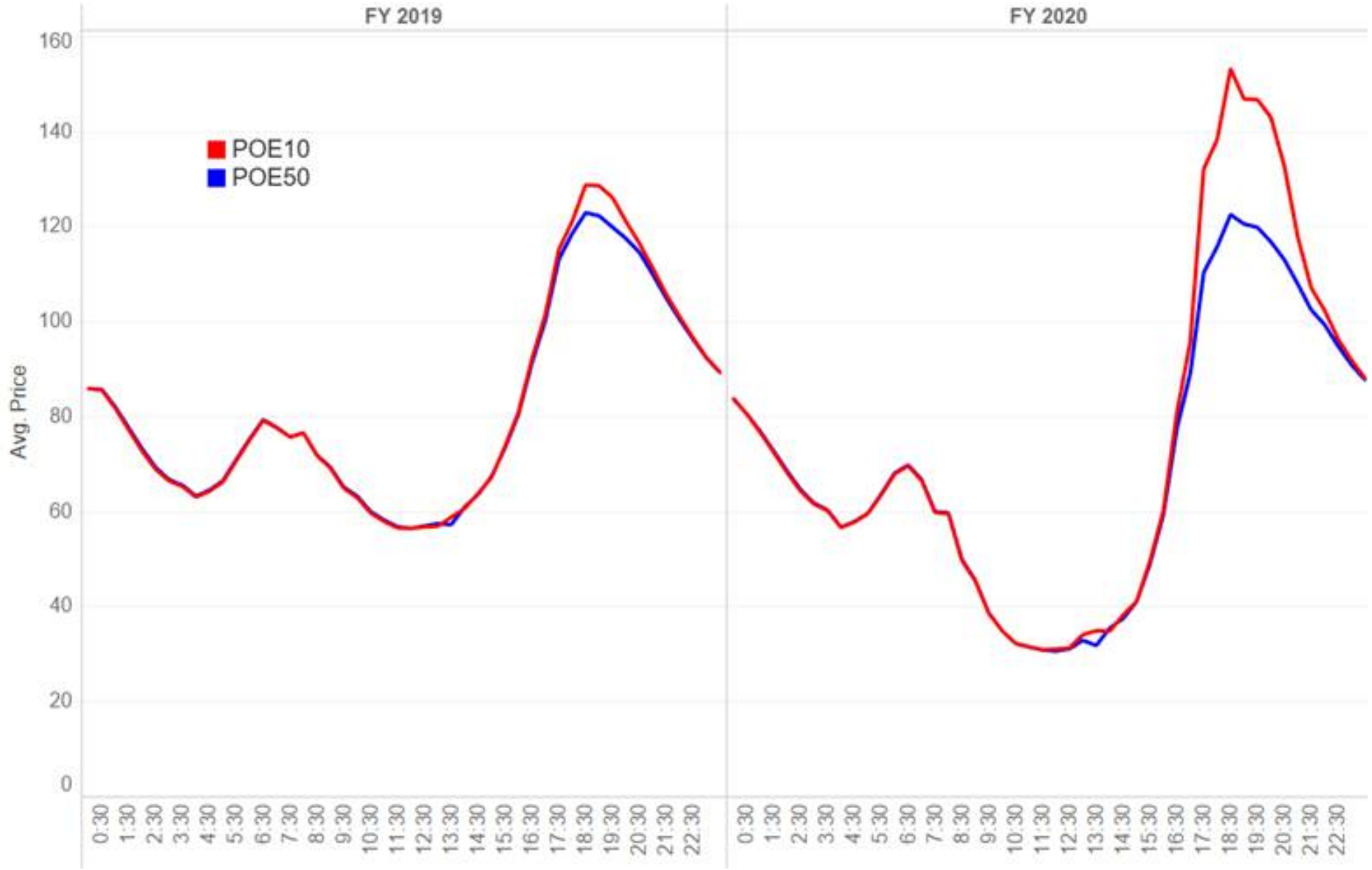
Median, 95th percentile, and 5th percentile of demand minus wind, SA, 2010-2018



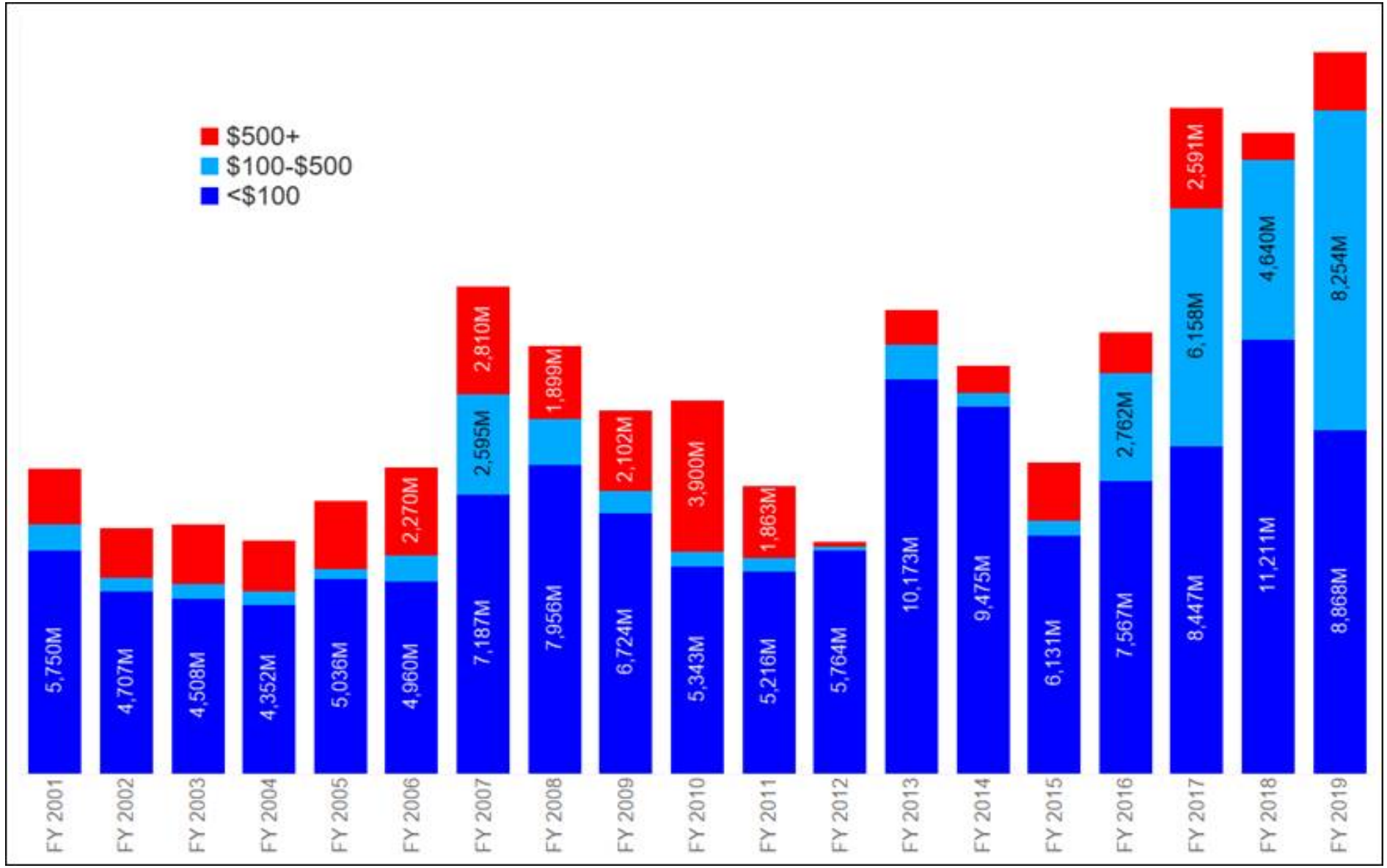
8 GW of new projects at financial close or under construction – additional supply reflected in forward curves



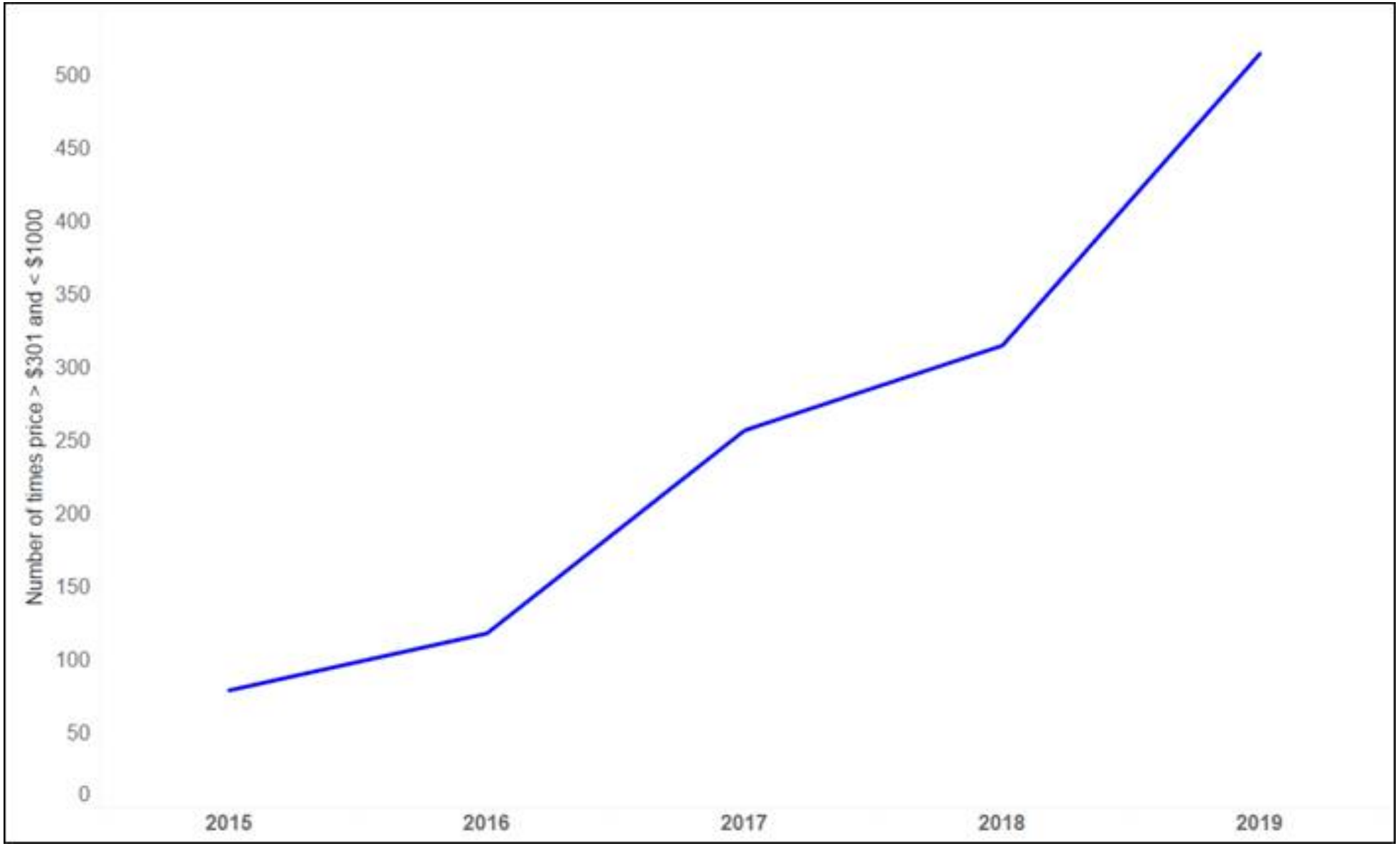
Change in shape of price curve is an outcome of calibrating models to the forward curve



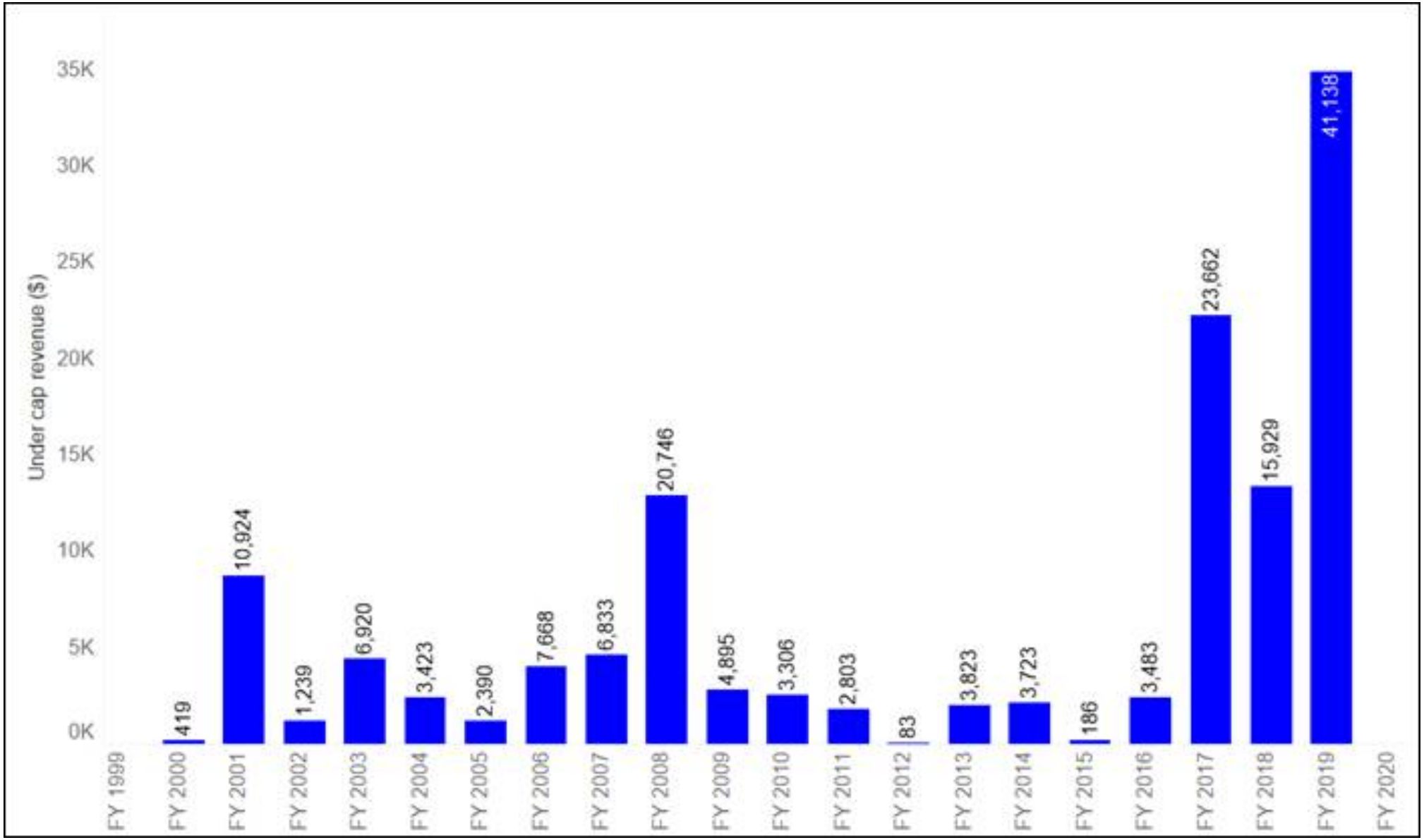
Significant uplift in value traded through the pool – particularly in $100-$500 price bands



Significant increase in frequency of pricing events above $300 but below $1,000 per MWh in Victoria



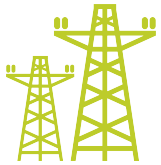
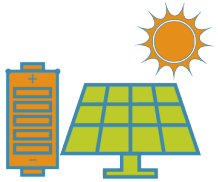
Significant growth in undercap revenue for fast-start flexible plant (e.g. gas-fired OCGT)

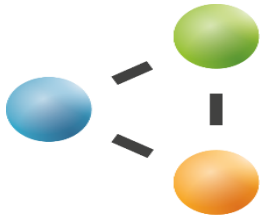


Implied cap value of $9.85 is well below current forward cap prices - is investment being impacted by technology (and price deflation) risk, and/or market design?

Assumption	Parameter
Capital Cost	$1 million per MW
Real WACC	10 per cent
Operating life	20 years
Fixed costs	$10,000 per MW
SRMC	$150 per MWh
Implied cap value	$9.85

A work program for the future

1.	**Generator access and transmission pricing**		Shift from large geographically concentrated to small geographically dispersed generation
2.	**System security**		Services previously provided for free not necessarily provided by new generation
3.	**Integrating distributed energy resources**		Increased adoption of small-scale solar and energy storage technologies
4.	**Digitalisation of energy supply**		Increased adoption of digital technologies
5.	**Aligning financial incentives with the physical needs**		More variable demand and supply creating volatility



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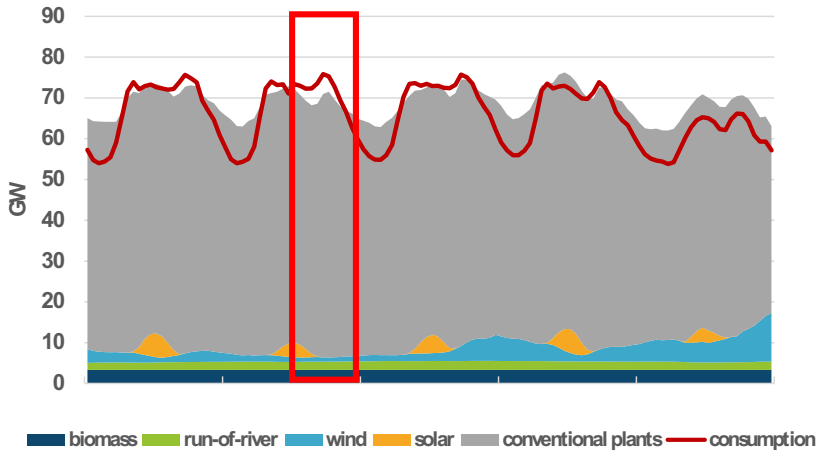
Flexibility as enabler of robust and efficient power markets

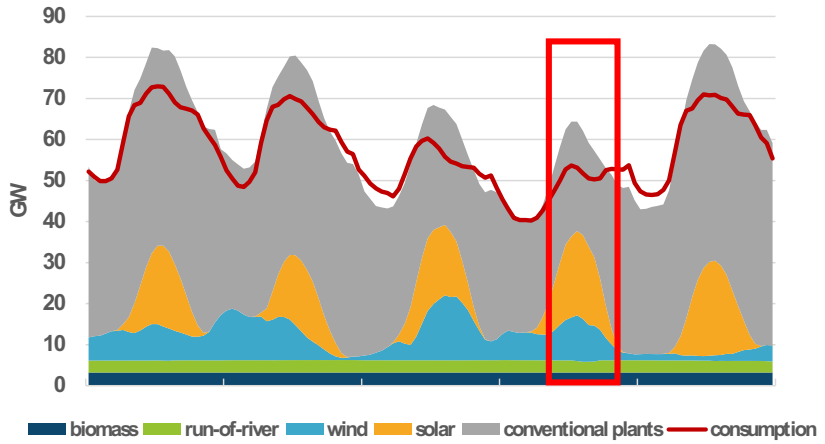
Dr. Marco Nicolosi

Melbourne, 18 September 2019

Two sides of the challenge

Prices should reflect the fundamental situation





High residual load, high prices

Windless, cold winter evening:
Low RES, high load

Low residual load, low prices

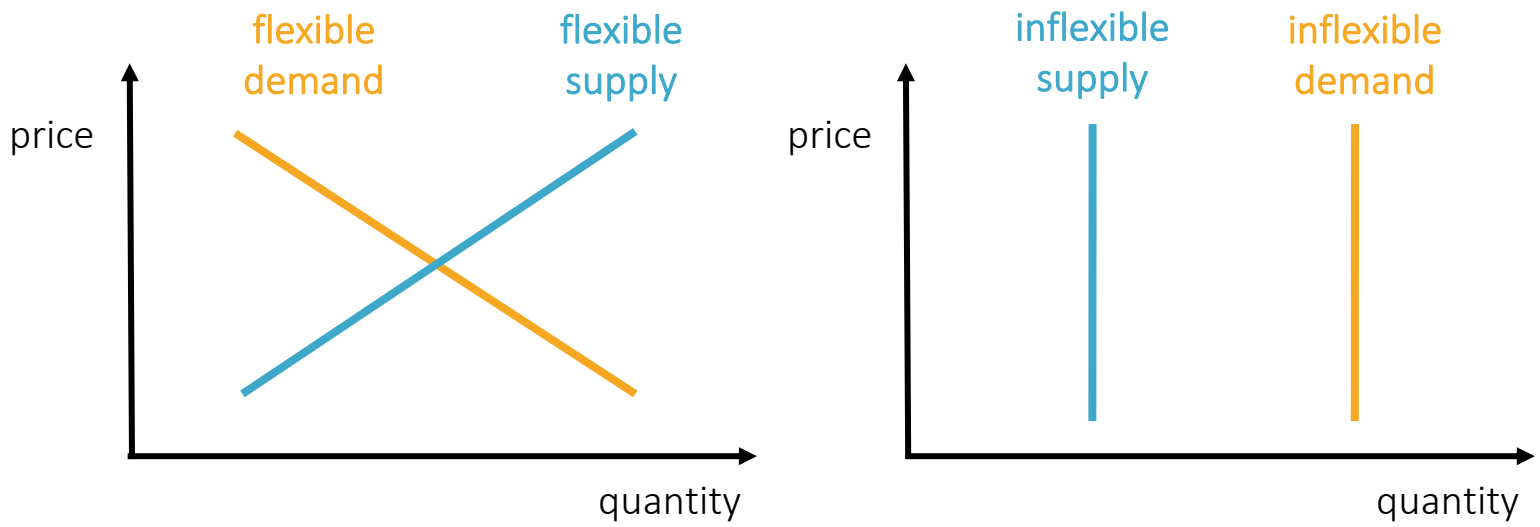
Windy, sunny Sunday noon:
High RES, low load

Both situations are also relevant without RES (but less extreme)

Definition of flexibility

Flexibility enables market solutions

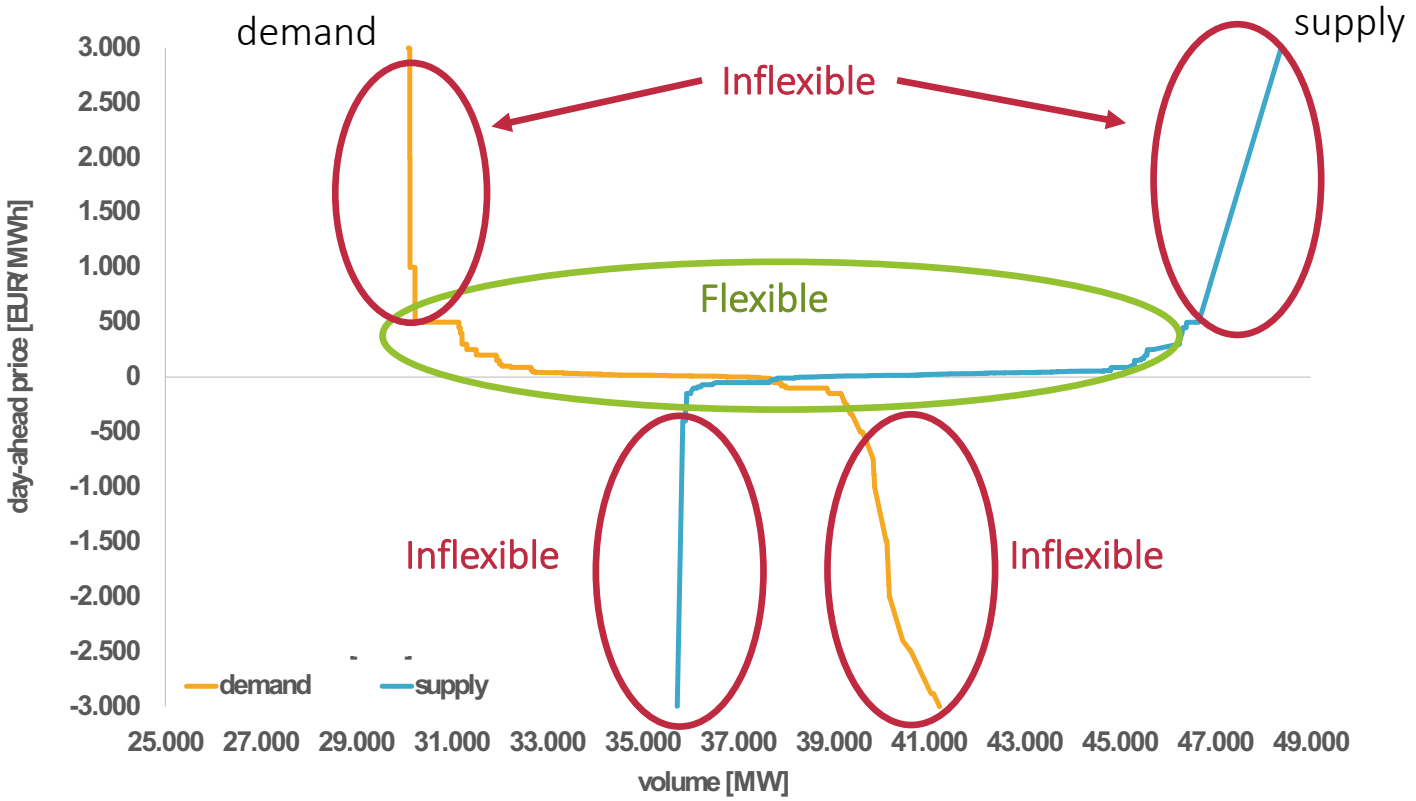
Security of supply (SoS): finding a match between demand and supply



Sufficient flexibility in relevant areas of the supply and demand curve guarantees security of supply

Flexibility supports SoS and RES integration

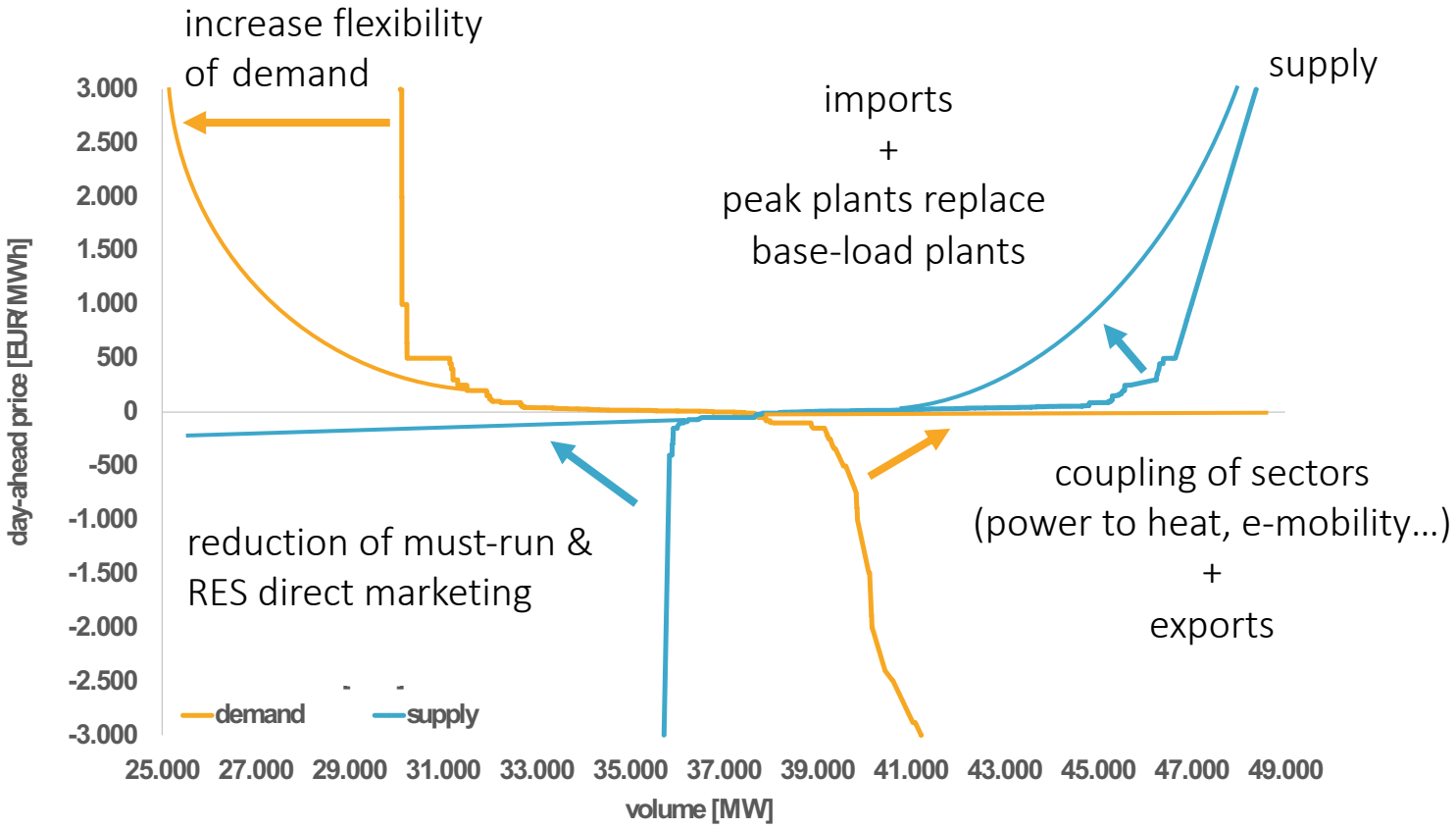
Often, explicit and implicit barriers block flex-options



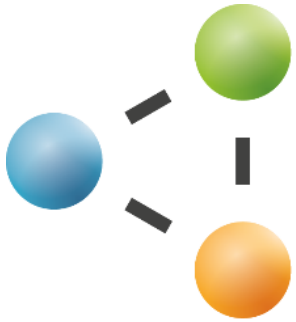
Some areas of the supply and demand curve are inflexible.
Inflexible areas could (theoretically) lead to a mismatch.

Flexibility supports SoS and RES integration

Increasing flexibility by removing barriers and price distortions



An increase in flexibility leads to SoS and more meaningful price signals.
More flexibility options are available than the energy transition requires.
Remove barriers and price distortions instead of supporting indiv. techs.



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Market Design Australian-German Energy Symposium

18 September 2019

Rosemary Sinclair AM

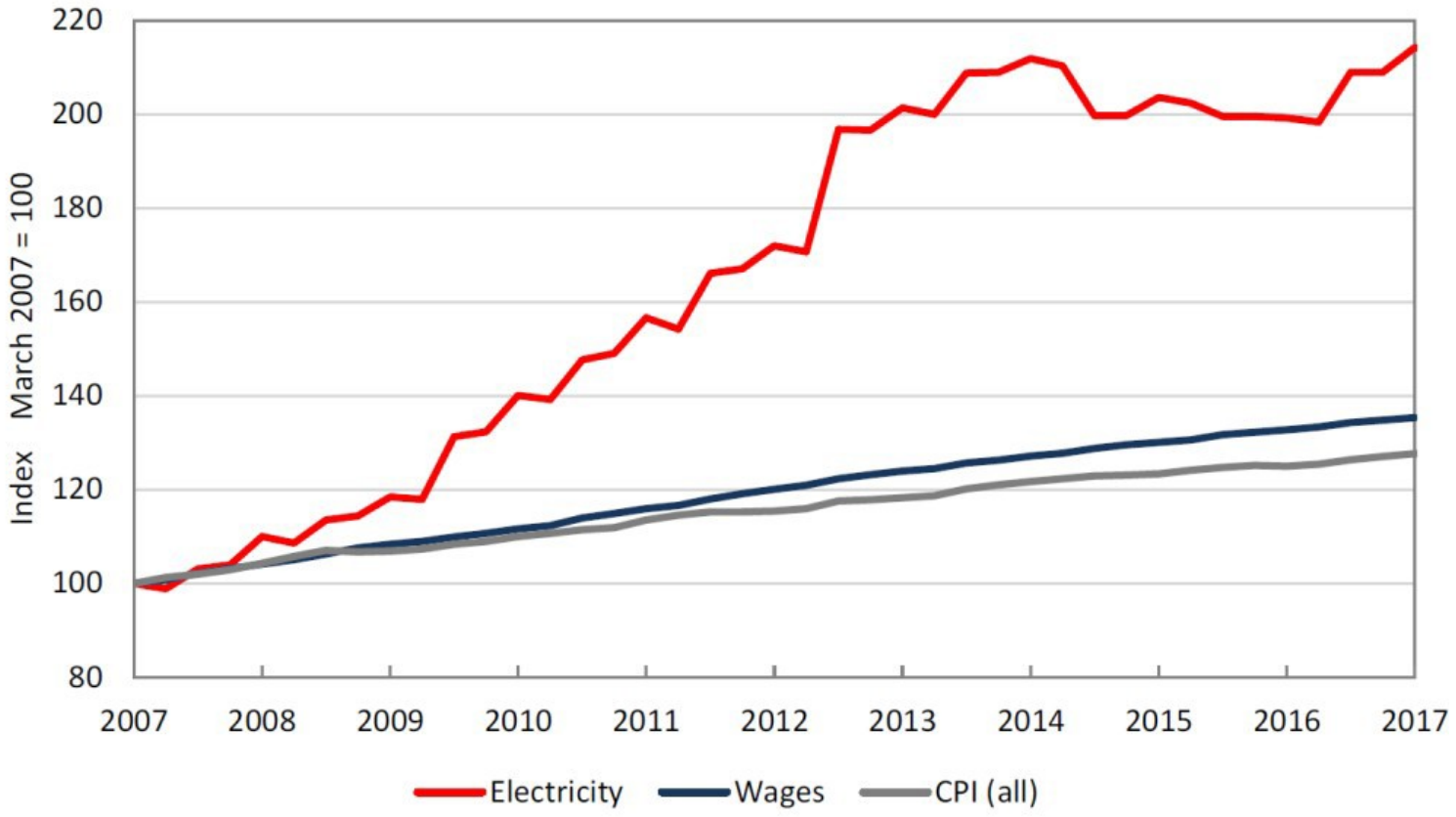
Chief Executive Officer

ENERGY CONSUMERS AUSTRALIA

Community dissatisfaction is well founded

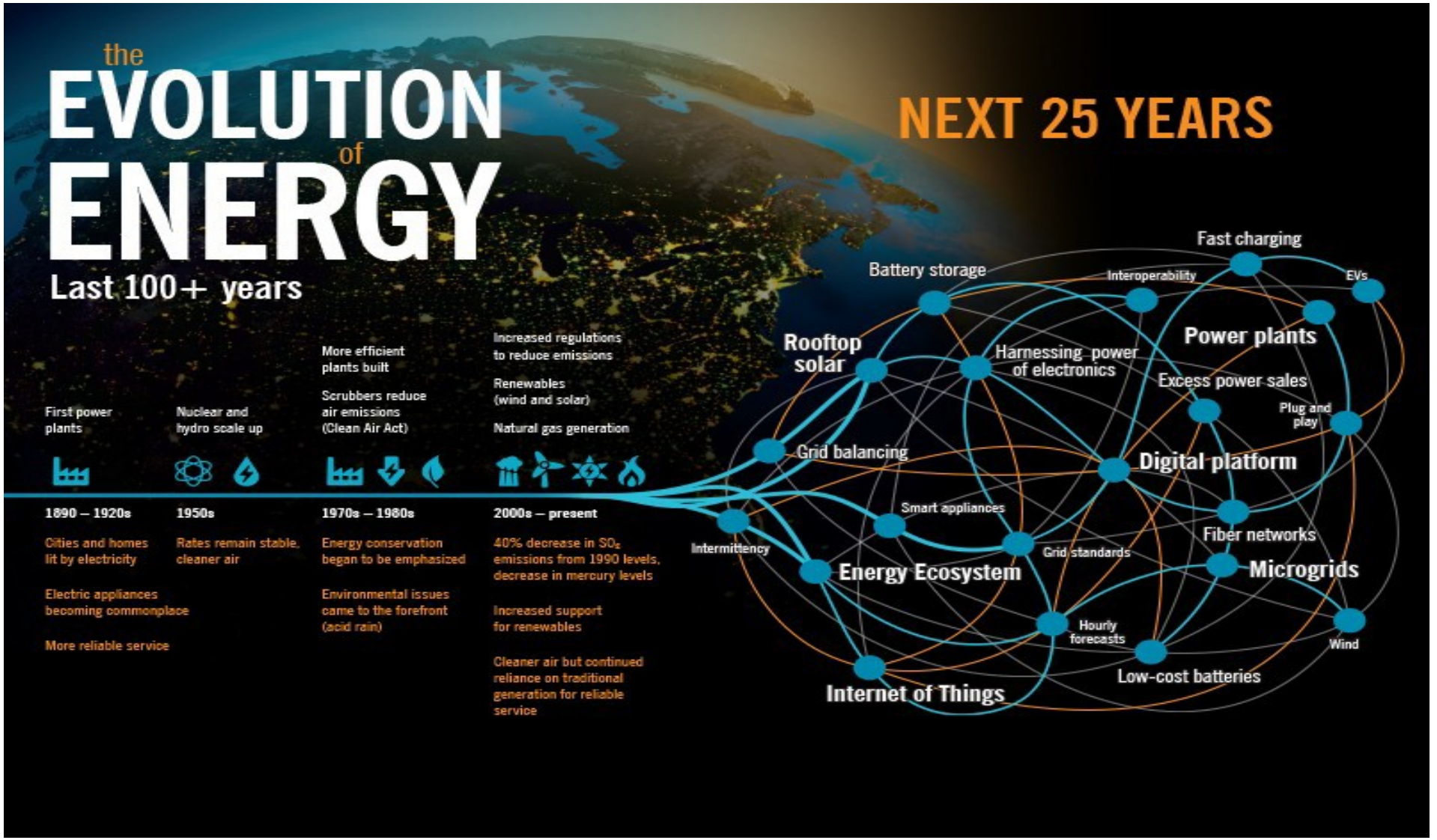
Source: ACCC Retail Electricity Pricing Inquiry Preliminary Report

Figure 1.3: CPI for electricity compared with other sectors and wage growth



Source: ABS, Consumer Price Index 6401.0 and ABS, Wages Price index 6345.0, Australia.

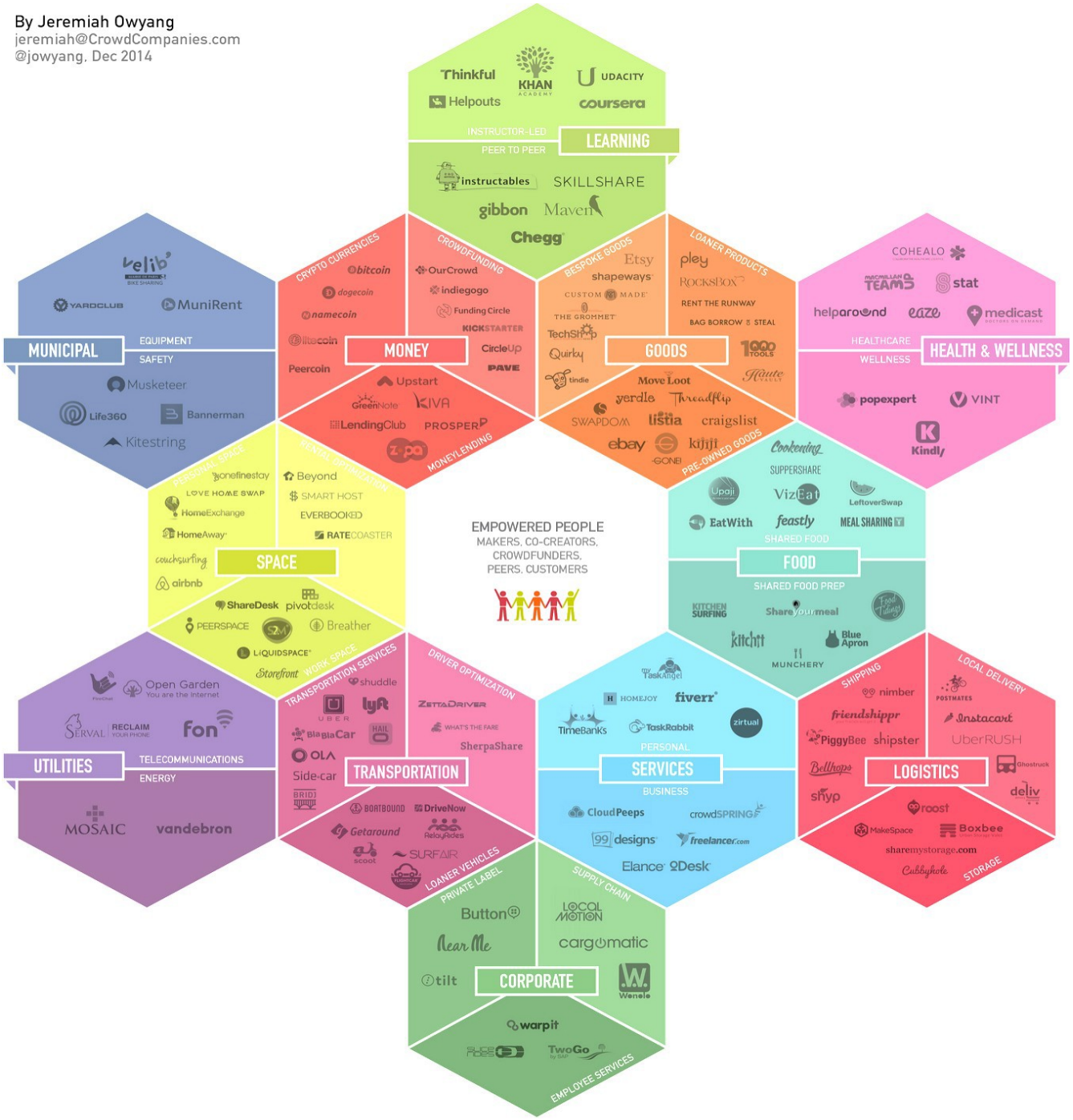
Evolution of Energy



Consumers driving change

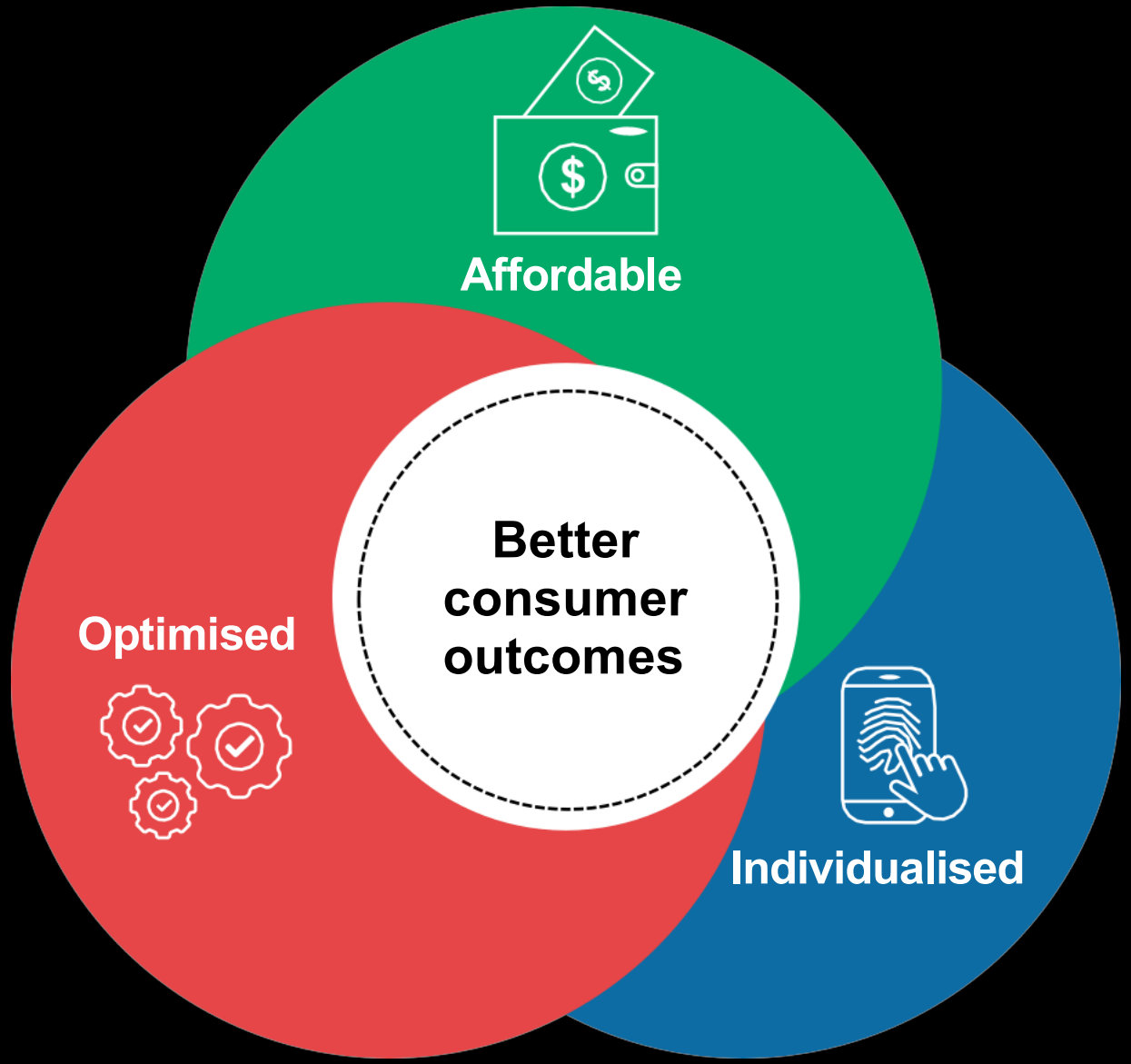
“I would prefer my six cents of power, sorry my units of power, which aren’t six cents, to go into my community. I get six cents from [energy retailer], but if I get 25 cents because I gave it to you because you have fallen on hard times, well I’m delighted.”

Attendee, ECA Regional Listening Tour April-June 2016



Our vision for the market

ECA promotes these three advocacy principles as the basis for better consumer outcomes.



Moving beyond the ‘trilemma’ – three parts to consumerfocused outcomes

Industry Dimension	Consumer Attribute
Affordable **The industry can only regain trust by addressing prices**	**Satisfied** Paying no more than they need to forthe service they want
Individualised Information and services to meet consumers where they are	**Engaged** Consumers can engage on their terms
Optimised System decisions include consumers and their assets, rewards, prices and decisions	**Confident** That the markets/systems are working in their interests

Thank you

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