

The NEO-NEM

Electricity sector trends, regulations and adaptation to distributed energy resources

Craig Chambers

2016 Summer Study on Energy Productivity

AECOM

Agenda



Unpack the NEO



Interoperability Challenge

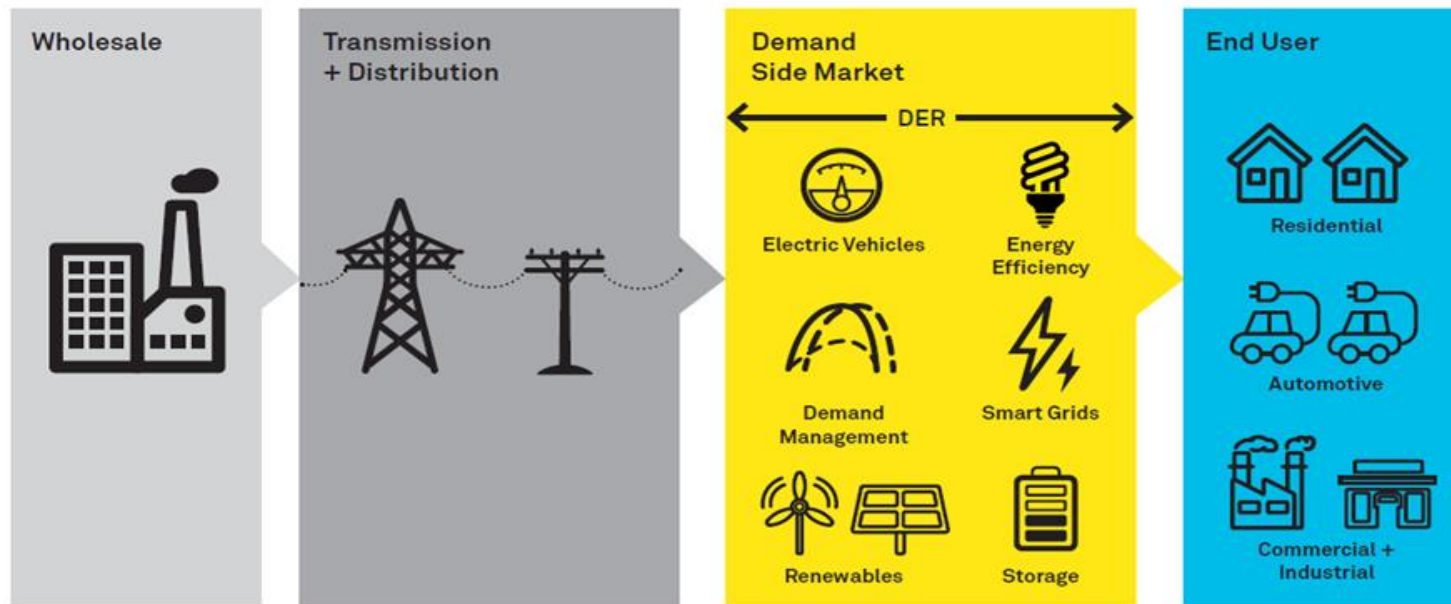


Insights into the future NEO – NEM



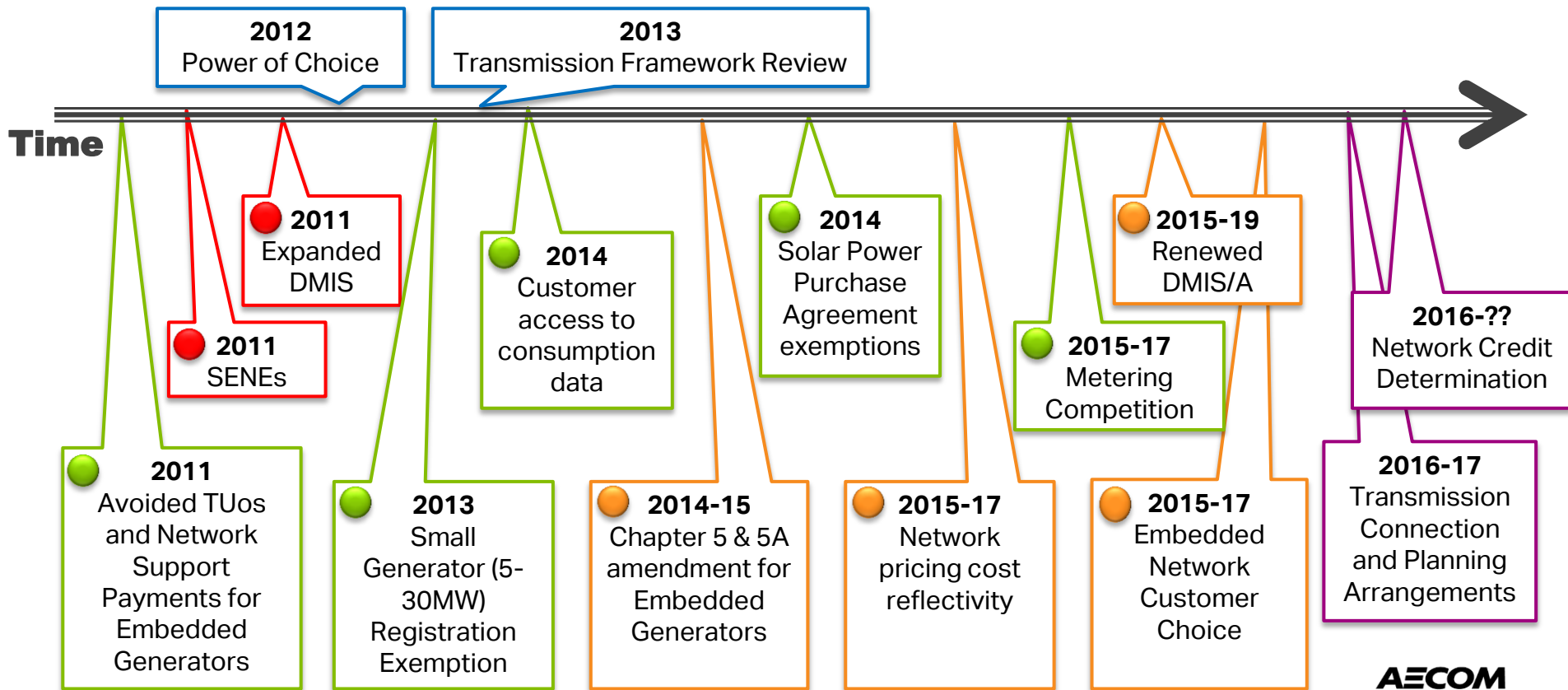
Global Insights

Definition of Distributed Energy Resources (DER)



Regulatory Evolution

Long term interests of consumers & efficient operation

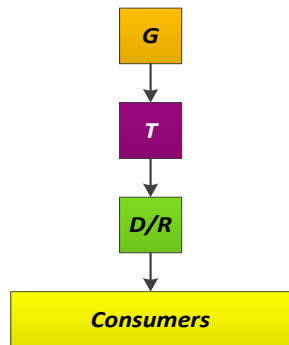


Market Evolution toward a “NEO-NEM”

Efficient Operation of National Electricity System

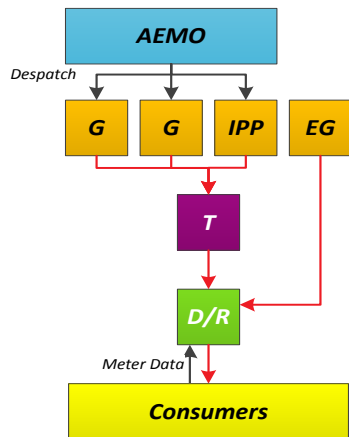
MONOPOLY

- No Competition
- No Choice
- Government Ownership



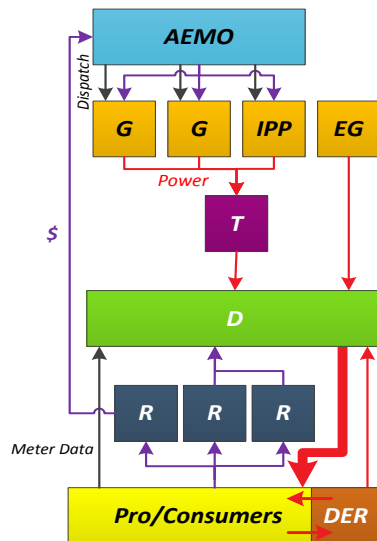
WHOLESALE COMPETITION

- Generator Competition
- Retailers have choice
- Market operator



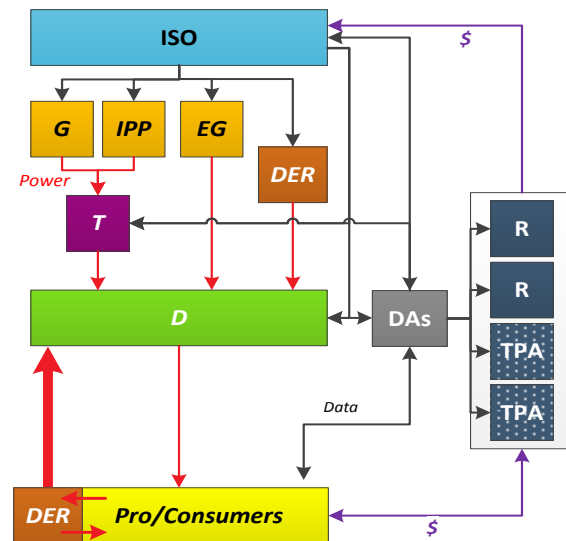
RETAIL COMPETITION

- Consumer retailer choice
- Wholesale market operator
- Open network access



FULL COMPETITION

- Independent system operator
- Data competition
- Cost / Revenue Reflectivity



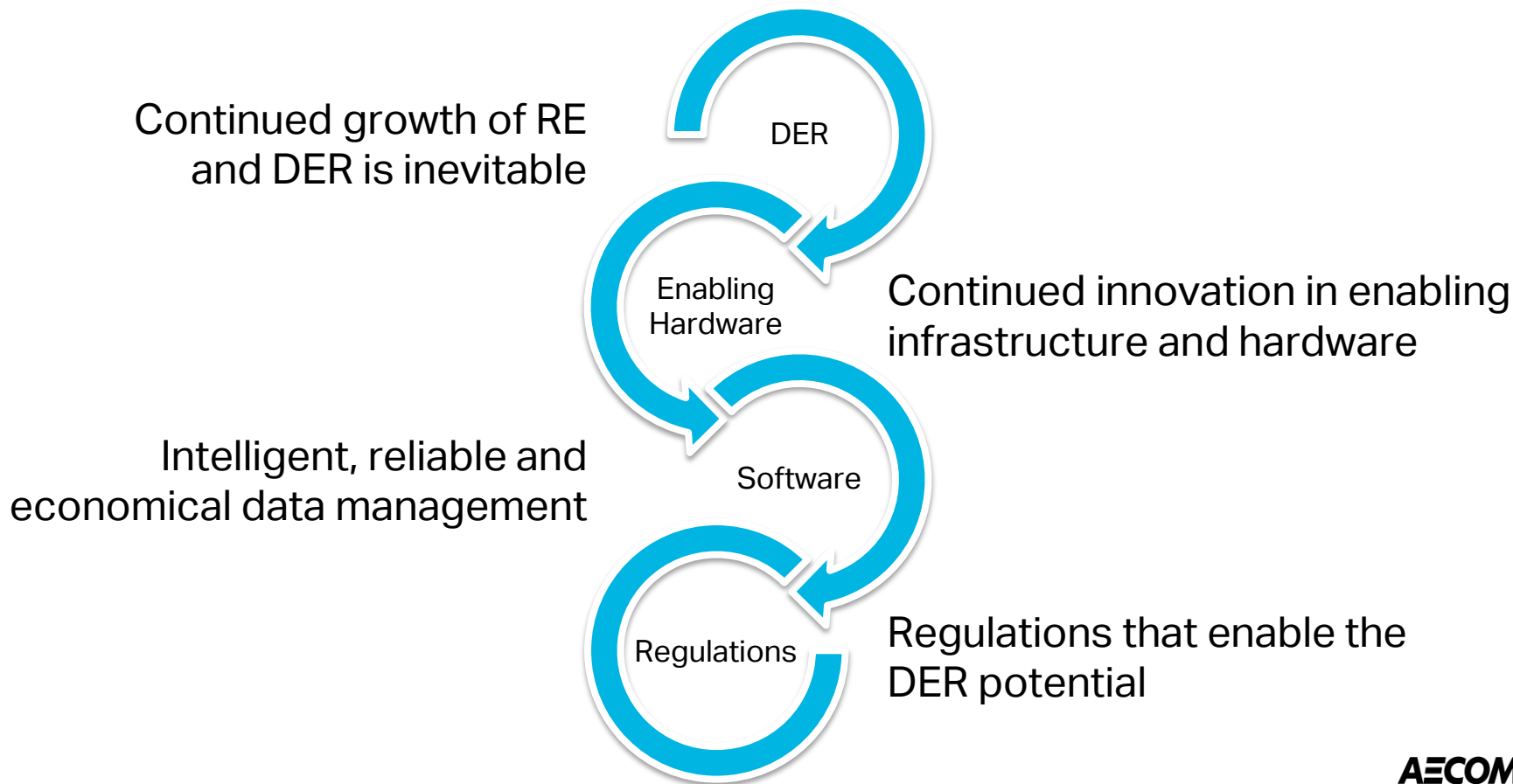
Legend

G – Generator
AEMO – Australian Energy Market Operator
ISO – Independent System Operator
IPP – Independent Power Producer

EG – Embedded Generator
T – Transmission Provider
D – Distribution Provider
R – Retailer

DAs – Data Agents
TPA – Third Party Aggregator
DER – Distributed Energy Resources

Interrelation required to unlock the market





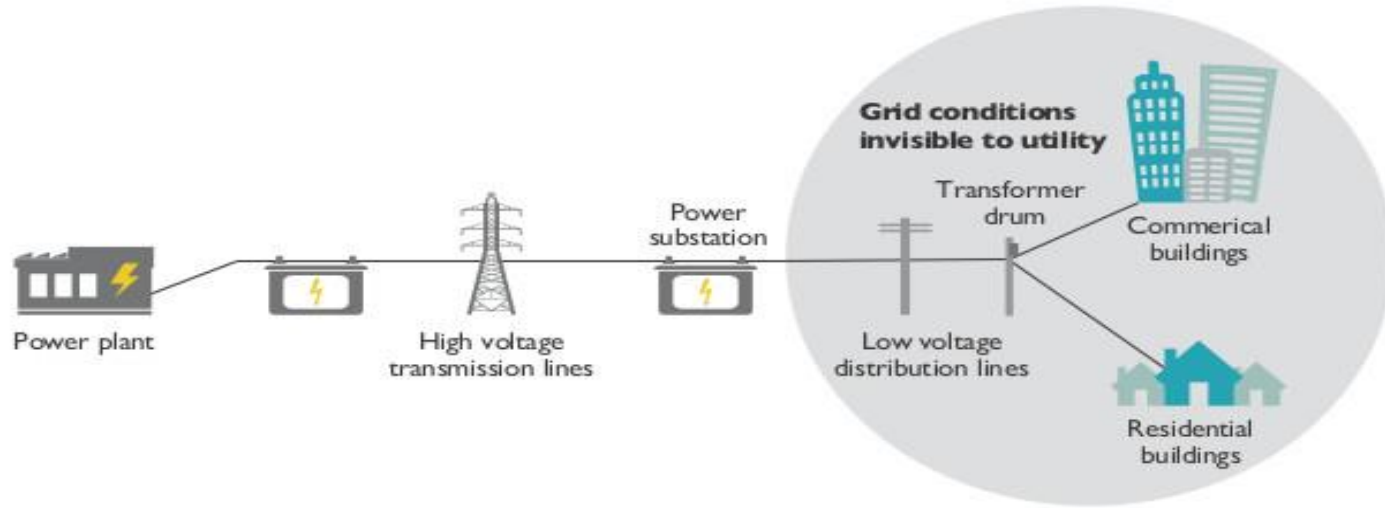
MIND THE GAP

Interoperability Challenge

AECOM

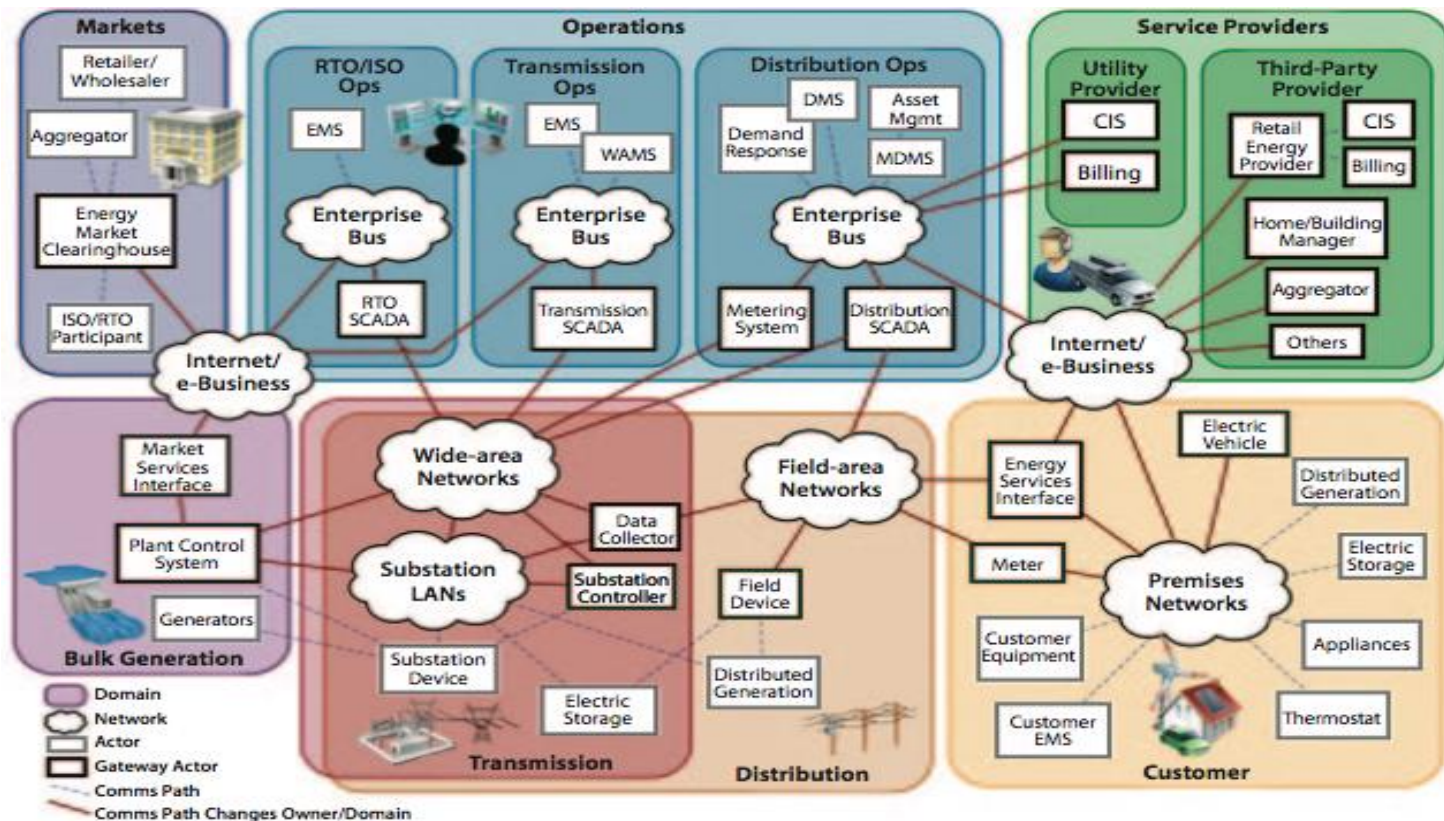
ICT and Market Challenge

We currently have disparate networks that are crudely interconnected, issues include:

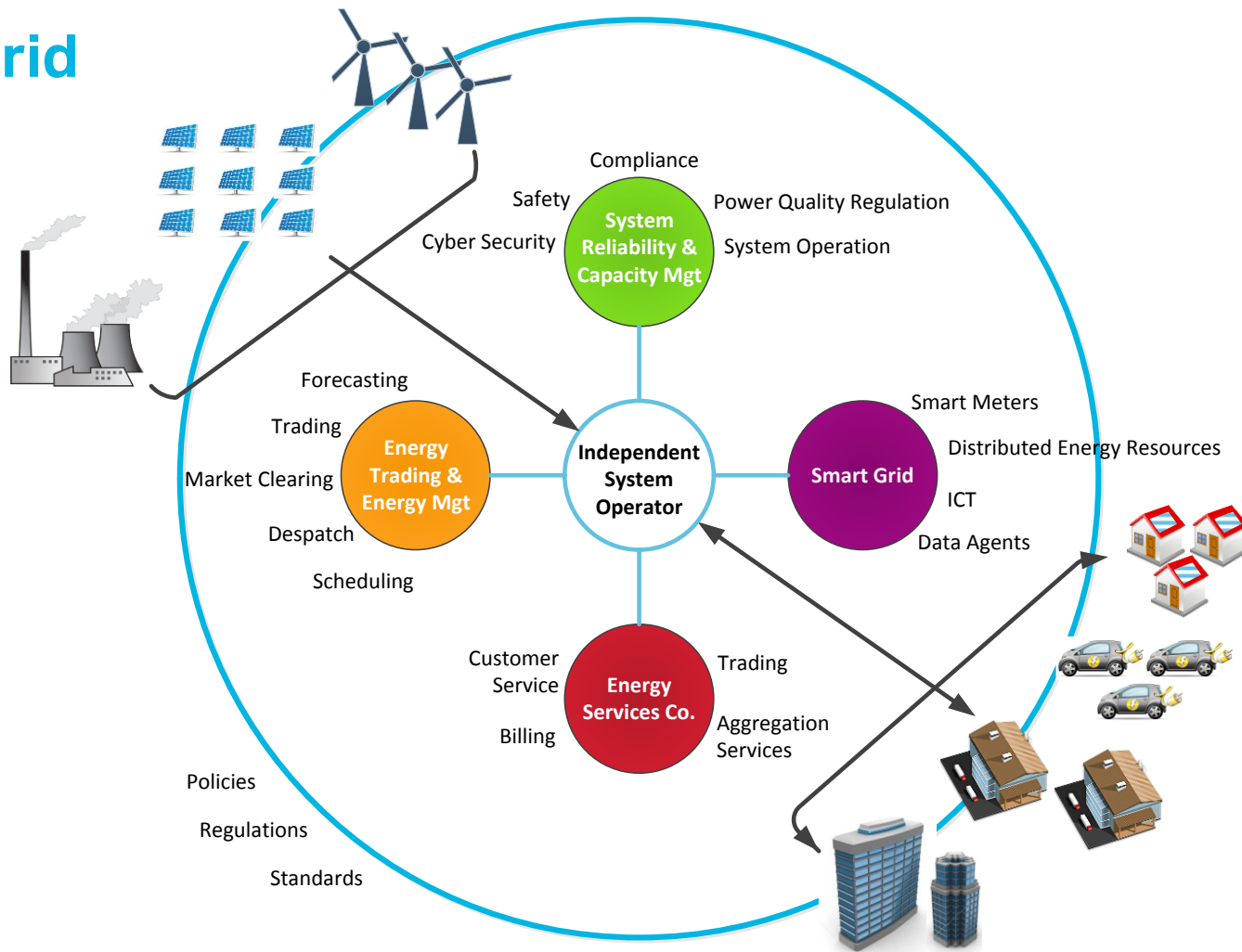


An agent may be capable of providing a service (or set of services) to the system but may lack the information required to do so effectively.

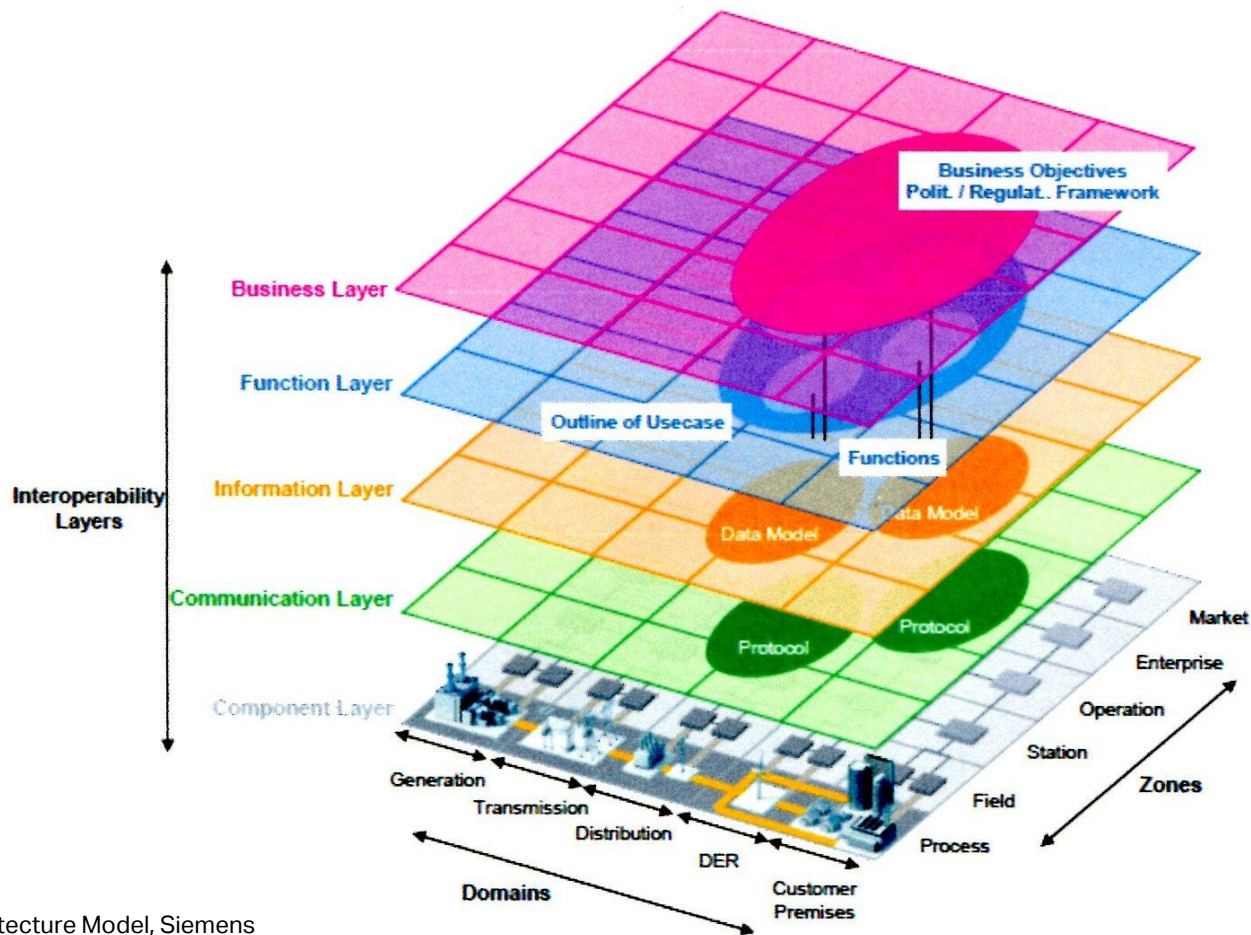
Future network ICT topology



Open Grid



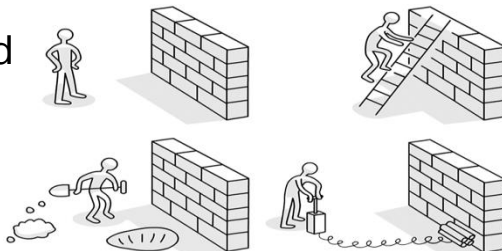
Interoperability Challenge



Key Considerations and Challenges

Today

- Policy and regulatory framework
- Unclear business case
- Different system operation layers
- Legacy systems integration, information gaps and diverse and numerous data types
- Focus has historically been on automation and protection.
- No standard or common information model
- Lack of harmonisation protocols and standards
- Validation of approaches
- Vendor momentum



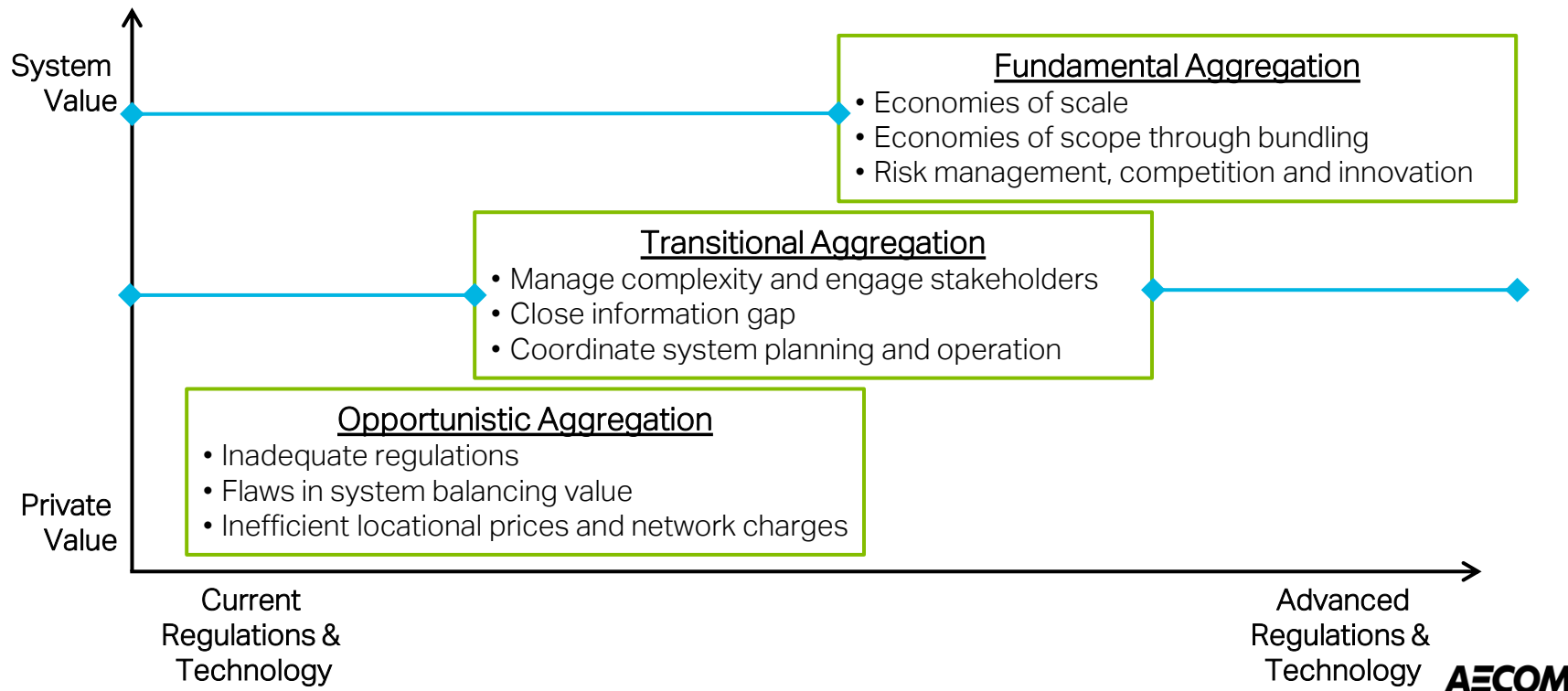
Tomorrow

- Who is the data custodian and system operator?
- Development and prioritising an overarching architecture
- Privacy and cyber security
- Financial commitments
- Institutional resistance
- Testing and validation of approaches and codes
- Redefine critical infrastructure protection and reliability requirement
- Ability to perform the dynamic state estimation in real time

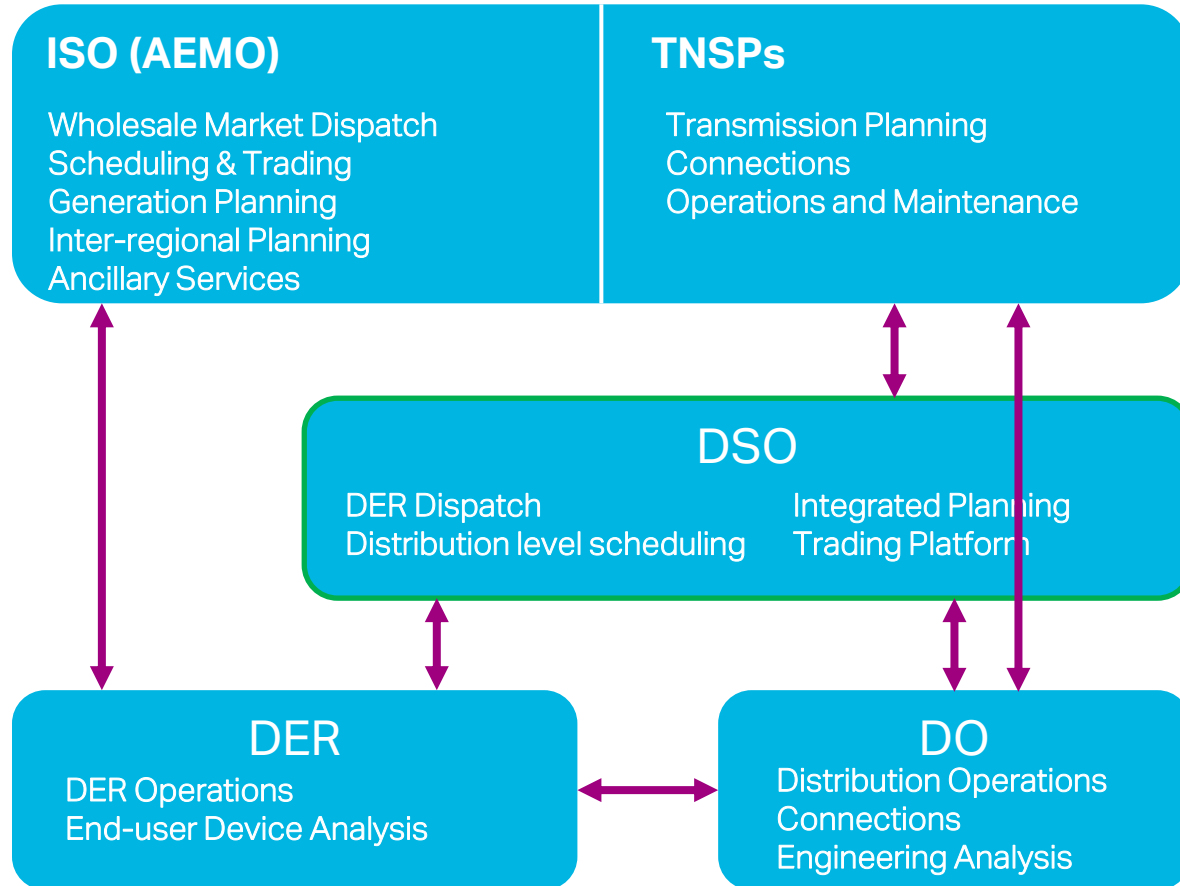
Insights into the NEO-NEM

Role of Aggregator/Operators

Many claim a need for aggregators without clearly delineating how exactly the aggregators are or will create value. The ultimate question is will the model be a DSO, ISO or intermediate levels of aggregation from separate parties.

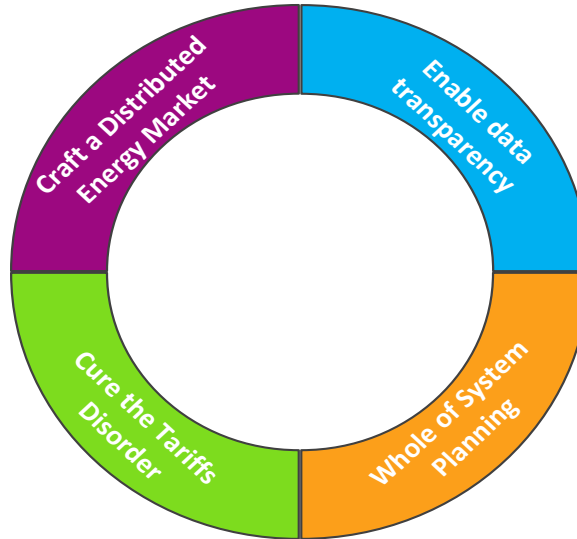


Possible Future Market Framework



Adaptation Considerations

- Measure and monetise the locational and diurnal value (+/-) of DER in the system at new nodes.
- Align tariffs to efficient outcomes for both consumer and industry



- Data transparency will inform better decisions
- Redefine the NEM to remove the inefficient biases toward greater interoperability

Global Insights



Global Insights

UK

Vodafone has won a £75m contract with Scottish Power Energy Networks to run performance monitoring and fault identification systems for more than 30,000 substations and over 110,000 kilometres of lines.

USA - California

Being the national leader of installed PV capacity California DER uptake is spurred by renewable targets and they are pursuing mandates to ensure DNSPs better integrate DER onto the grid. See California ISO aggregator plan

USA – New York

Fears of repeated power outages caused by natural disasters such as Hurricane Sandy are the drive behind NY states Reforming the Energy Vision (REV) program.

India

Focus is on using DER, renewables and smart technologies to achieve their goal of electricity supply to 100% of the population by 2027.

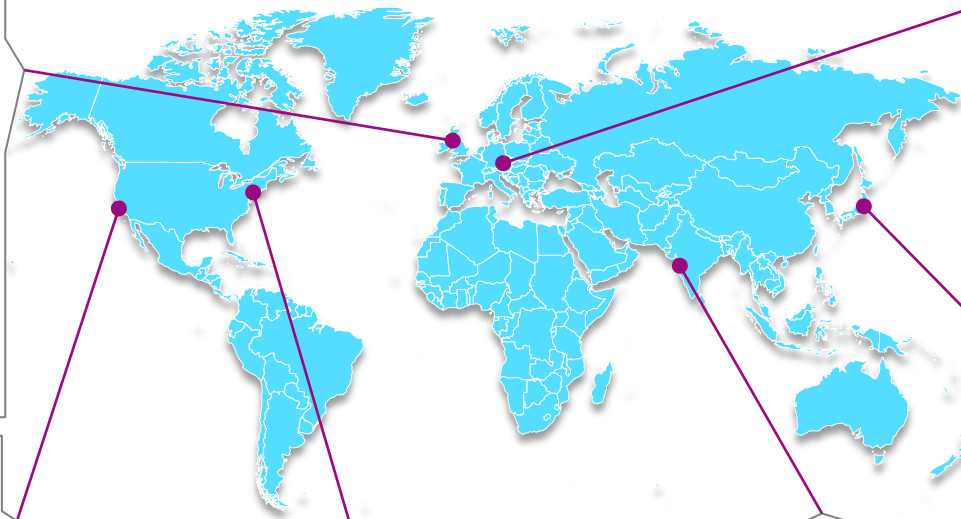
Europe

Smart Grid Task Force is focused on:

1. Standards
2. Cyber Security, data protection and privacy
3. Regulatory Frameworks
4. Infrastructure
5. Project Implementation

Japan

Rising power prices and a consumer focus on self-sufficiency post the Fukushima nuclear disasters has led to greater uptake of DER and micro-grids.

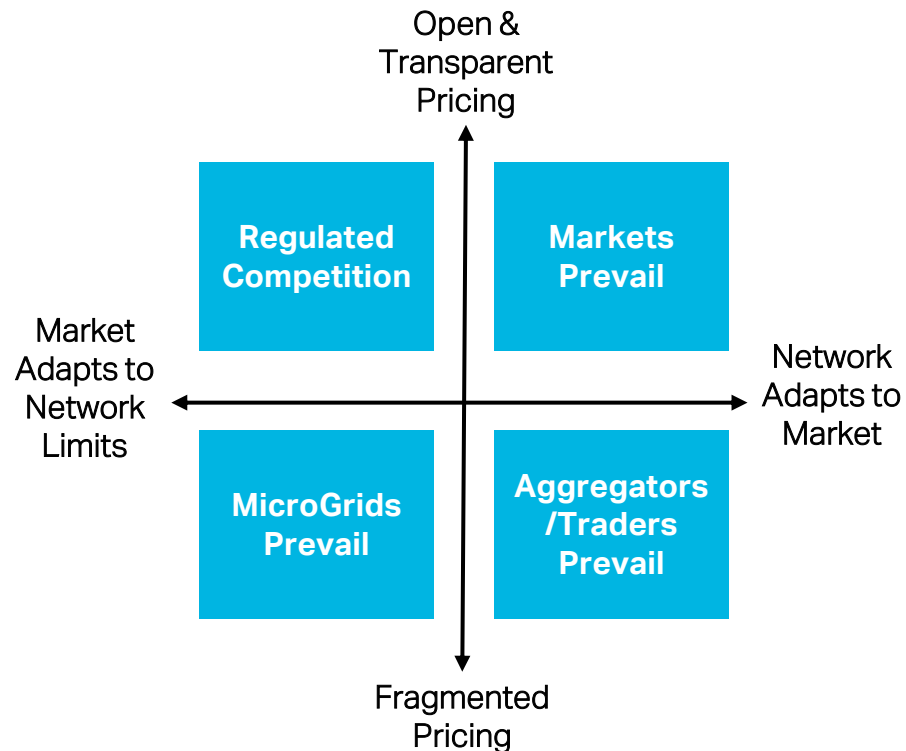


Conclusion

Future Scenarios

Where to start?

- Define the cost benefit of change
- Redefine the future utility and market frameworks/rules
- Close the ICT gap & strive for greater interoperability
- Craft the distributed energy market and transaction platform by developing standard system operating procedures
- Create standards and/or adopt others such as NIST, IEC, ISO ZigBee, IEEE, HomePlug, OpenADR etc.



Concluding takeaways

- NEO – NEM Vision *“an ICT enabled free market, where customer devices and grid systems can efficiently trade and operate.”*
- Key considerations:
 - The faster technology changes the slower regulations may adapt.
 - Outcomes need to be service orientated and ICT is critical to this transformation
 - Market design must remain technology agnostic yet prescriptively safe, reliable and connected.
 - We need a long term strategy, not just project by project thinking which only supports the development of proprietary features.
 - By increases transparency and access to information, while protecting proprietary information and privacy in a DER management architecture the distributed energy market will evolve.

Thank You

Craig Chambers

craig.chambers@aeacom.com