

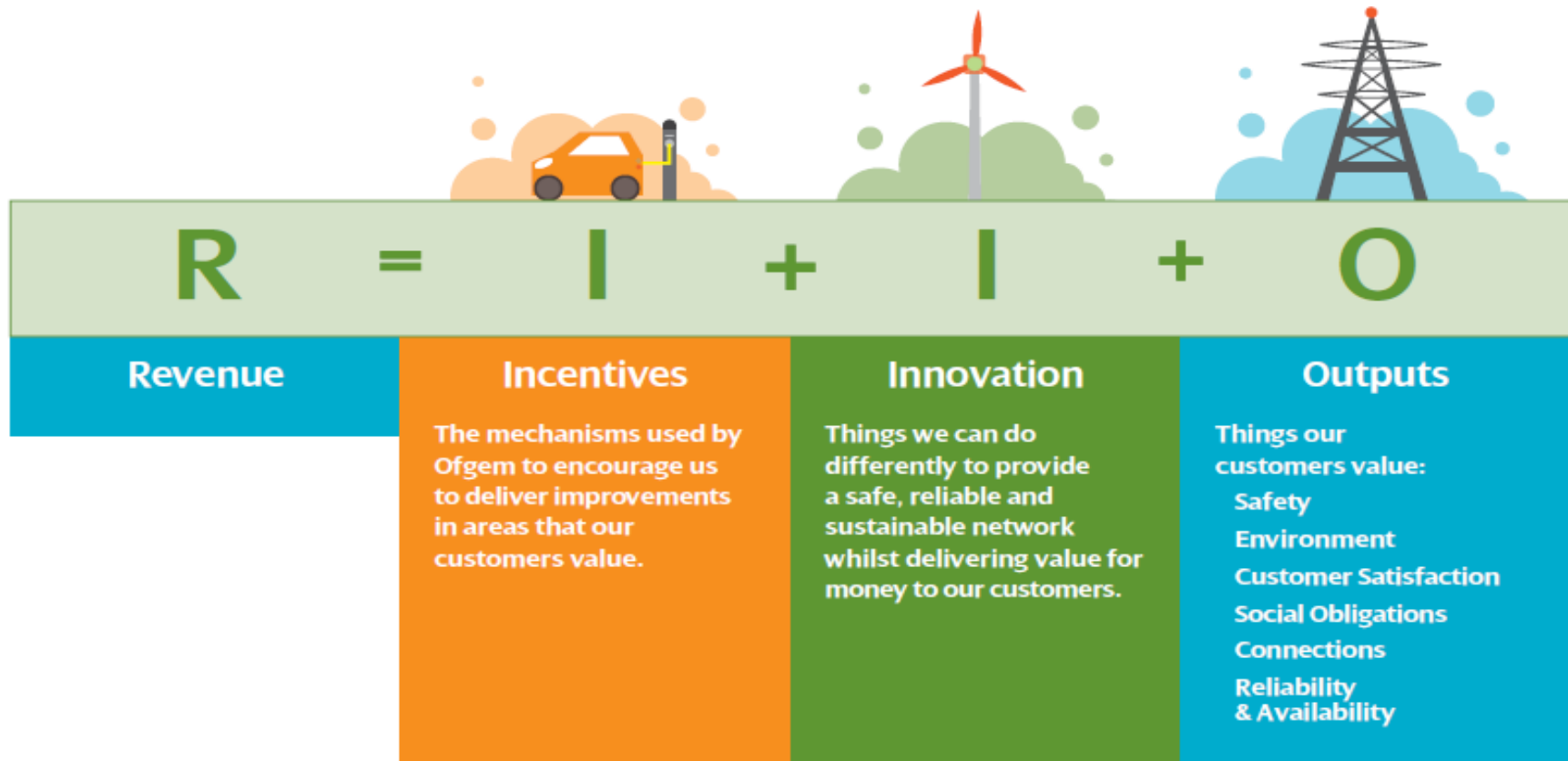
# RIIO-T2 Energy Scenarios

# RIIO-T2 Context

Jim Sutherland  
RIIO-T2 Project Director

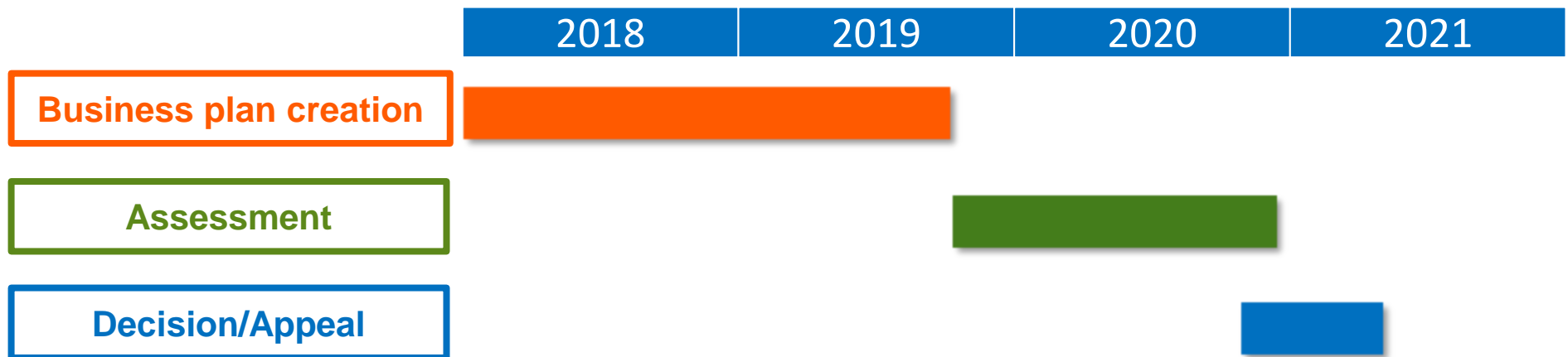
# The RIIO Framework

Ofgem's framework for setting price controls is called RIIO. It is undergoing a review at present and the next price reviews will be conducted under the revised RIIO-2 framework.



# RIIO-T2 Programme

The next transmission price control will cover the period 2021 to 2016. It is important that we get good stakeholder input in the year ahead to ensure that our plans reflect what users want.

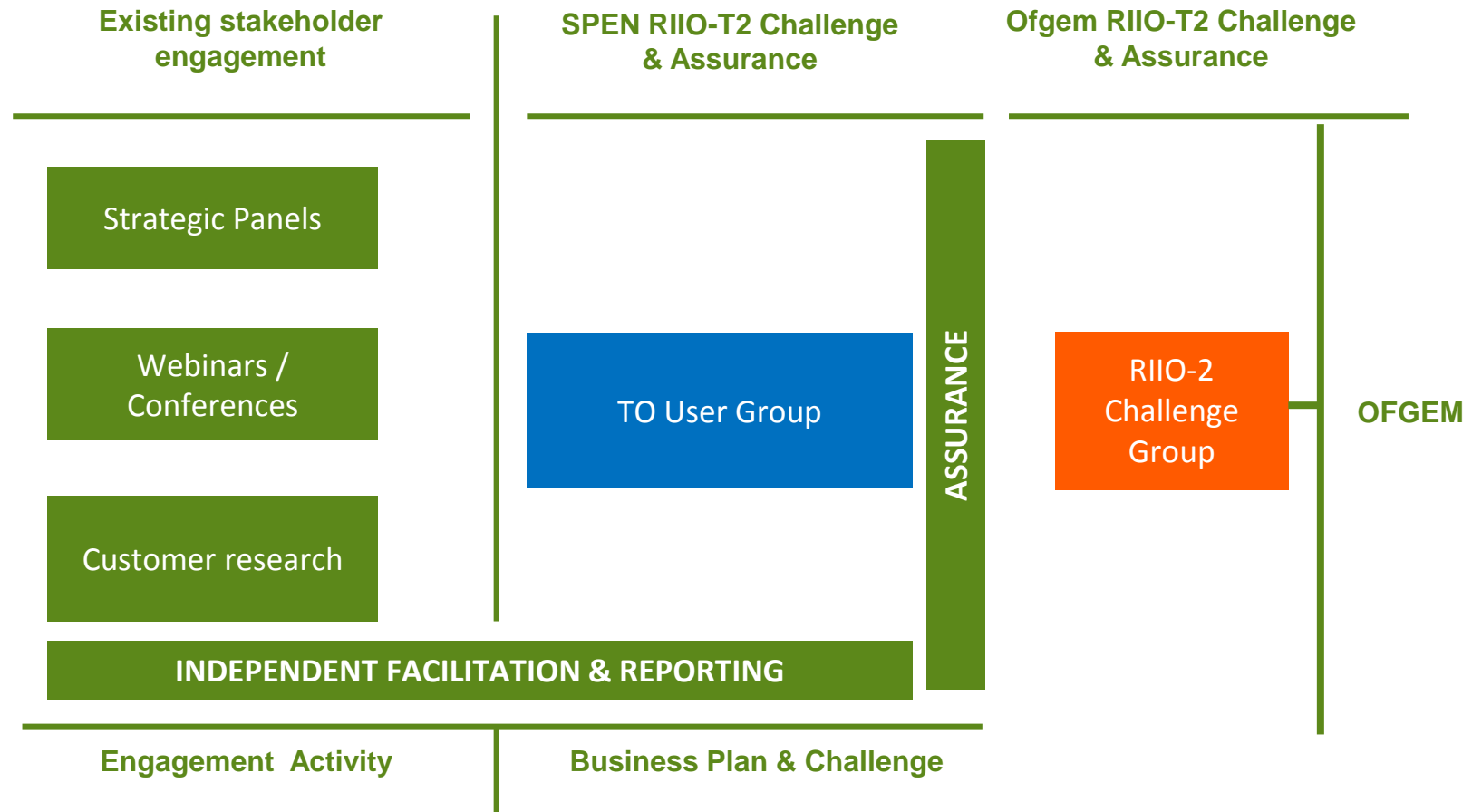


## Key dates

Dec 2018	Ofgem sector specific strategy consultation (Transmission)
Q4 2019	Submission of business plan
Dec 2020	Price control proposals
April 2021	New price control starts

# Stakeholder Engagement – Transmission model

In RIIO-2 we will enhance the stakeholder engagement model for price reviews. In addition to our existing stakeholder engagement we have established an independent TO User Group to help to shape our plan.

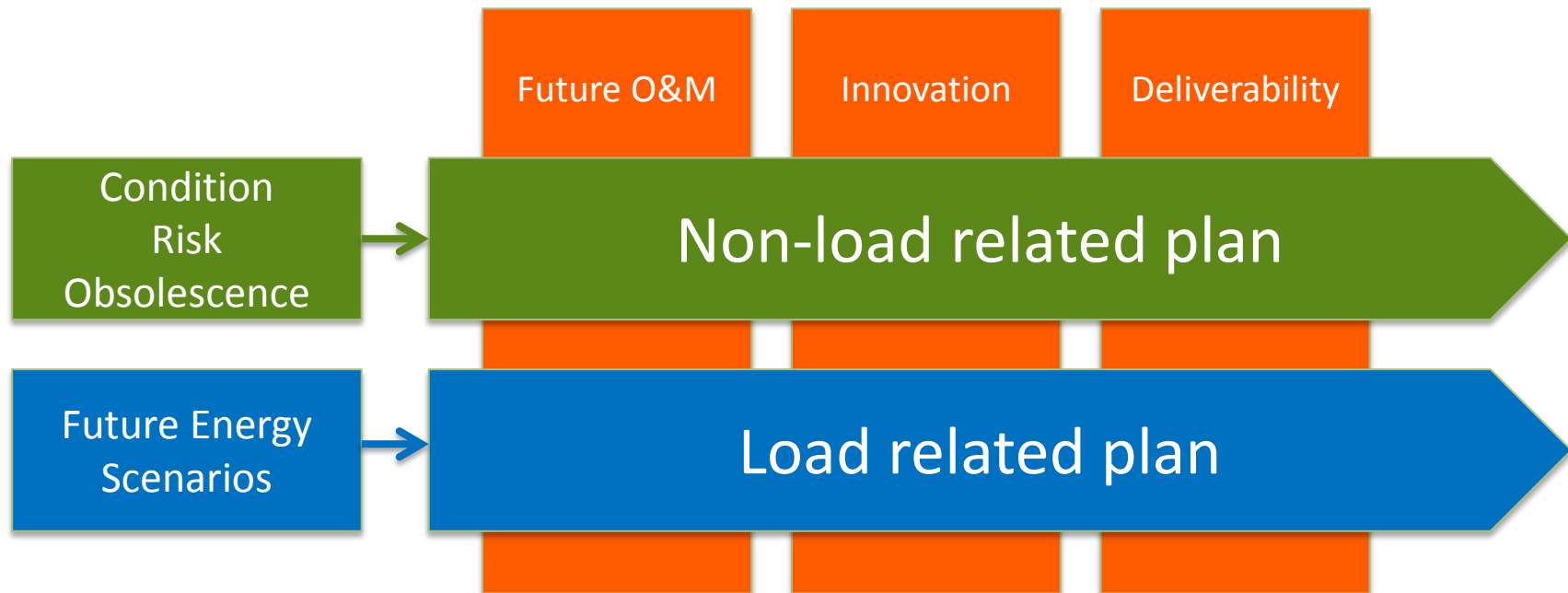


## RIIO-T2 – Investment Plans

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Our investment plans are driven by a variety of factors. Future energy scenarios are a critical input to help predict what users of the transmission system will need in future.

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# Future Role of the Transmission Network

Jim Sutherland  
RIIO-T2 Project Director

# Future Role of the Transmission Network

- The transmission network makes it possible to transfer power on the scale of 1000's of MW
- Power transmission at very high voltages is cost effective, efficient and reliable

**The transmission network exports excess power from Scottish renewable generation and imports power when the wind is not blowing**





# Future Role of the Transmission Network

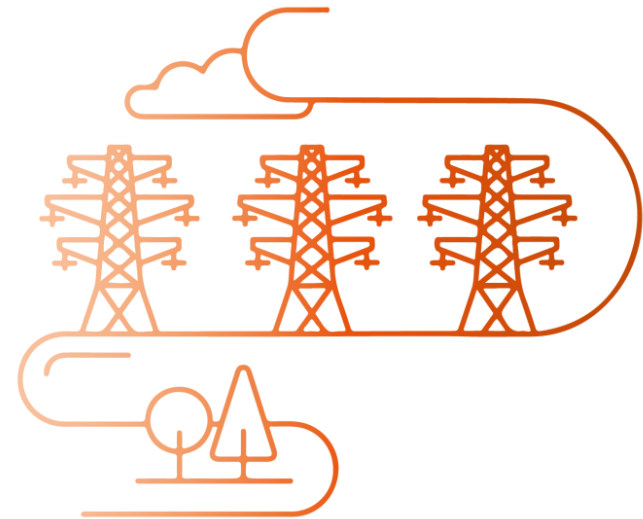
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The transmission network will continue to play a vital role in connecting supply to demand, even in a more decentralised system.

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- A transmission network with low constraints facilitates an open electricity market, reducing cost for consumers
- Secure, reliable supply
- Connecting large generators and interconnectors
- Vital in the unlikely event of a Black Start

**Our challenge is to provide the right network capacity at the right time**



# Scenario Methodology and Results



**elementenergy**

Luke Humphry  
Baringa Partners

# Creating the Scenarios

Holistic consideration of supply and demand in SPT's area from 2017 to 2040

- **Inputs**

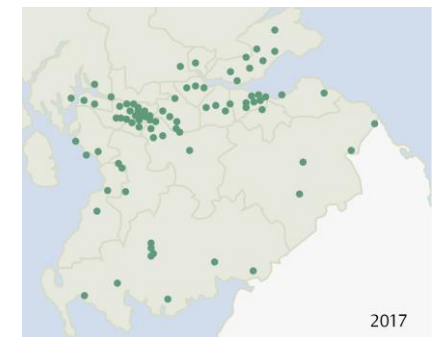
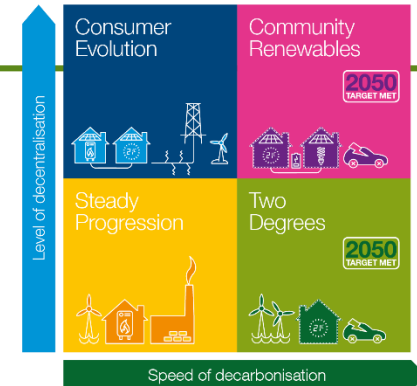
- Data from SPT/D and other sources to reflect local conditions
- Extensive stakeholder engagement
- Scenarios aligned at high level with National Grid's 2018 FES

- **Approach**

- Considers all demand, generators and storage
- “Behind the meter”, distribution and transmission level
- Disaggregated to SPT's 90 Grid Supply Points

- **Output**

- Word report and supporting spreadsheet of results
- Informs SPT's wider analysis as part of RIIO-T2 price control



# Overview of electricity demand

Flexibility of new electric vehicle and heat pump load is a key driver of peak demand

- **Winter peak**

- Limited change in expected peak demand
- Efficiency improvements in domestic sector
- Material sources of new load from EVs/HPs
- But this demand is expected to be flexible

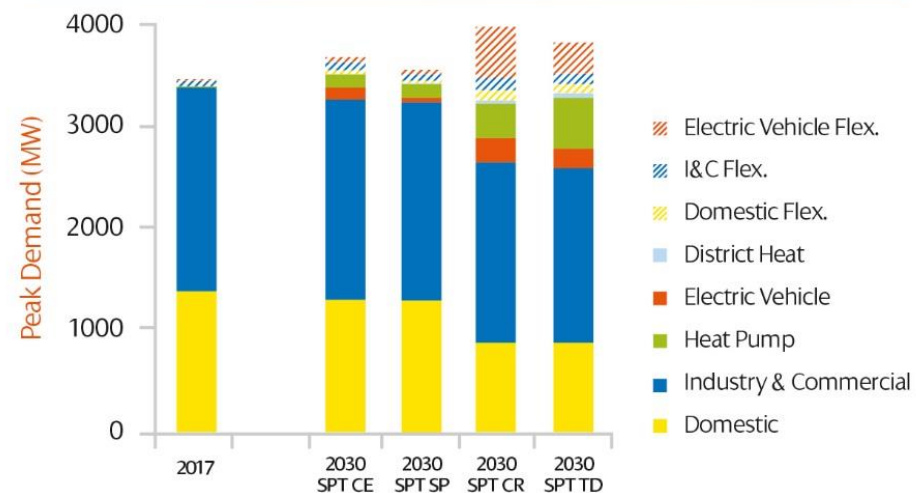
- **Summer minimum**

- Potential for voltage issues with low load
- Expected change far smaller than for winter peak

- **Grid Supply Points**

- Aggregate trends mask greater variation by GSP
- Swings of +10% to -15% in demand could be seen

Breakdown of expected winter peak demand



# New Demand: Electric Vehicles and Heat Pumps

Potential for rapid growth by 2030 but heat pumps expected to lag behind EVs

- **Electric vehicles**

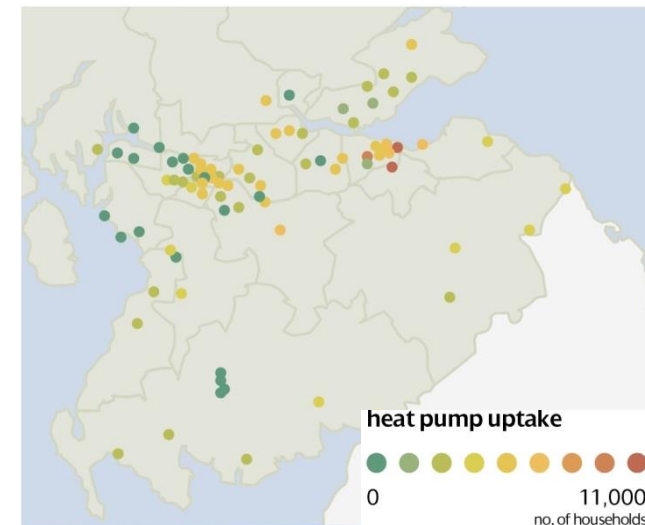
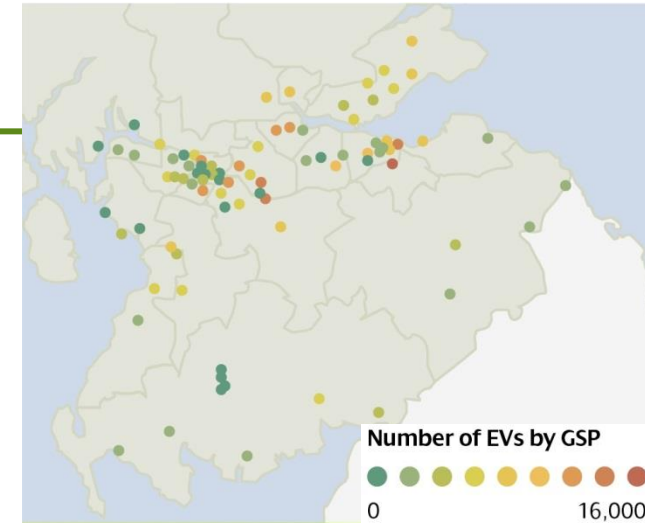
- Could reach 4% - 20% of stock by 2030
- Upper end more closely aligned with stakeholder views
- Potential for load clustering offset by expected charging flexibility

- **Heat pumps**

- Could reach 2% - 12% of buildings by 2030
- Mid-range viewed as more realistic by stakeholders
- Deployment focused in new build and off-gas grid areas

- **Alignment with Scottish Government targets by 2030**

- 20% share of electric vehicles is broadly aligned
- 35% share of low carbon heat is more challenging



# Overview of electricity supply

Significant expansion of renewables expected across the network, particularly wind

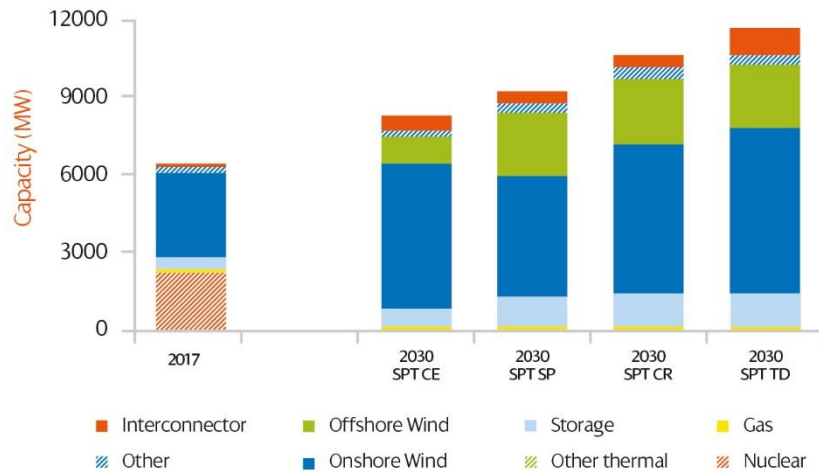
- **Transmission**

- Significant uncertainty over scale of new wind
- Thermal/nuclear changes are clearer
- Greater expected flows across SPT network

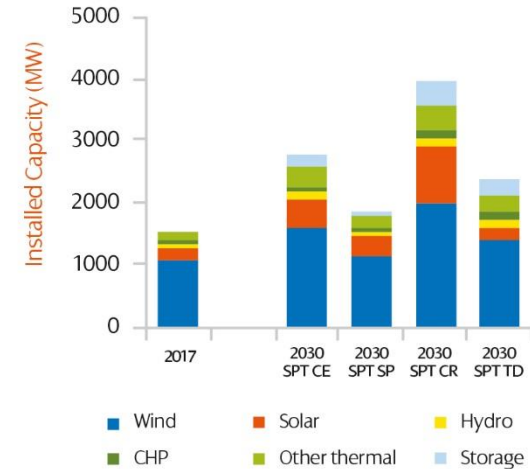
- **Distribution and “behind the meter”**

- Modest increase from known projects
- But by 2030 supply could more than double
- Majority from wind, solar, biomass, storage

Installed transmission and large embedded generation capacity by type



Installed distribution (<30MW) and “Behind the Meter” generation capacity by type

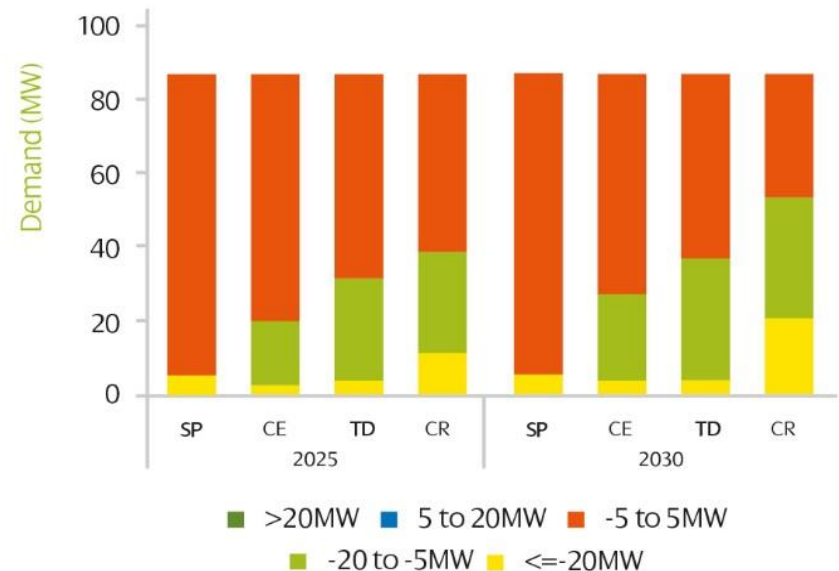


# Integrating Supply and Demand

Important to understand the implications for future reinforcement

- **SP Transmission area**
  - Net demand is expected to drop by between 3% and 35% by 2030
  - Significant drops in scenarios with more decentralised supply
- **By Grid Supply Point**
  - Greater variation seen across each GSPs
  - In some cases increased supply may exceed a GSP's capacity for generation
  - Conversely, if new load is less flexible some GSPs may become rapidly demand constrained

Change in expected net peak demand per grid supply point from 2017

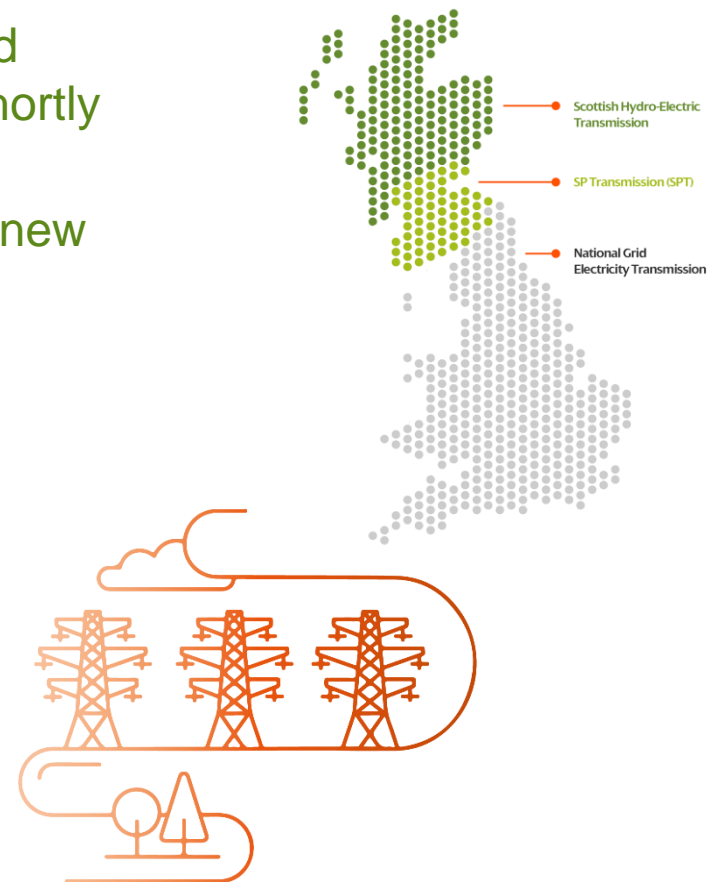


**Note:** In 2017 all grid supply points would be in the -5 to 5MW category as this represents the starting position against which to measure and positive or negative change in net demand.

## Summary of Key Insights

Network planning needs to accommodate changes across RIIO-T2 and shortly thereafter.

- High uncertainty around wind, distributed supply and electric vehicles, but more rapid changes happen shortly after RIIO-T2
- Greater flows expected across SPT network due to new wind
- Heat electrification not expected to be significant in timeframe
- SPT area changes mask more significant variation across GSPs with potential reinforcement driven by
  - Significant new decentralized supply
  - Challenges managing flexibility of new load





# Use of Scenarios in RIIO-T2 Plan

Kirsten McIver  
Scenarios Analyst

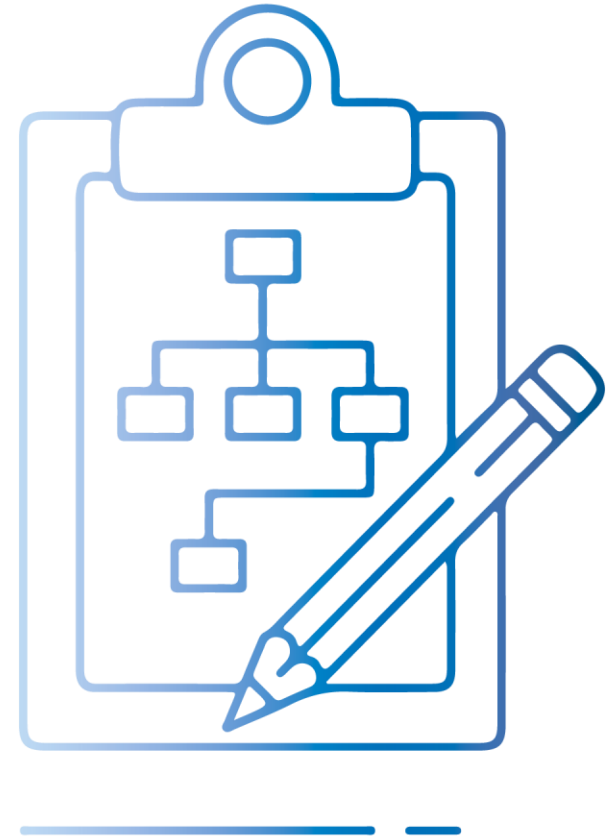
## How will SPT use these scenarios?

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Previously price reviews have only had a macro view of the network on which to base plans, new scenarios give a much more granular view of the transmission network of the future.

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- Built from NGET FES, an industry wide-recognised, independent view on the system, but with a geographical breakdown and additional local knowledge
- Future uncertain, but provides envelope with upper and lower limits, to allow flexibility in our business plan
- Developed in conjunction with SPD, allows whole system approach



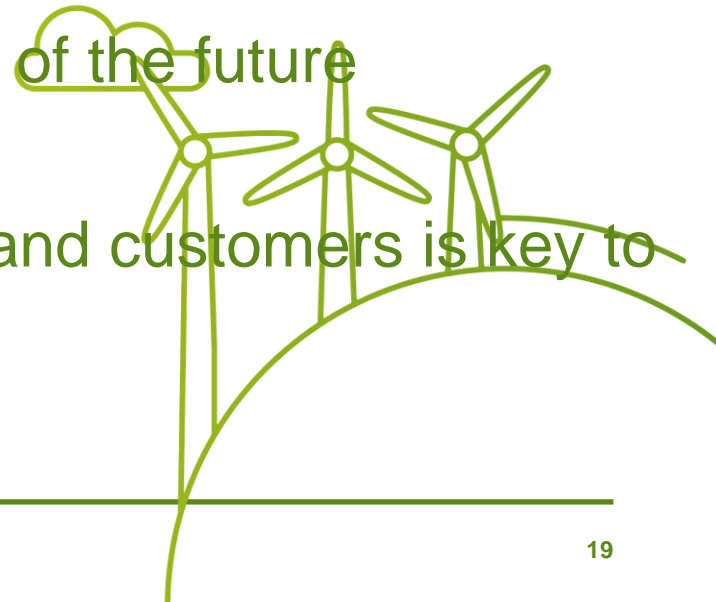
# Conclusions

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Ahead of full system analysis to determine in impact on each GSP, we already have the following key conclusions:

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- Strong ongoing requirement for transmission network
- Uncertainty is high – scenarios look to give a range of this
- Aggregate trends can mask spatial changes
- Uptake of EVs are unlikely to affect the transmission network in the short term, if DSO vision is realised
- Flexibility is key to managing the network of the future
- Looking beyond T2 is important
- Careful coordination with the ESO, SPD and customers is key to delivering a whole system approach



**RIO-T2 Load**

20<sup>th</sup> September 2018

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# **RIO-T2 Energy Scenarios**

**Contact us:**

[RIO\\_T2@spenergynetworks.co.uk](mailto:RIO_T2@spenergynetworks.co.uk)

**Visit Document:**

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