DS3 Advisory Council

Belfast

19th September 2017

EIRGRID SONI

Agenda

Topic	Time	Speaker
Introduction & Welcome	10.30	Robin McCormick - SONI (5 mins)
Industry Perspective	10:35	Presentation: Jag Basi - (15 mins) Discussion: All (10 mins)
DS3 Programme Status Update	11:00	Presentation: Doireann Barry - EirGrid (15mins) Discussion: All (10 mins)
Rate of Change of Frequency (RoCoF)	11:25	Update: Jon O'Sullivan - EirGrid (10 mins) Update: Rodney Ballentine - NIE Networks (10 mins) Update: Tony Hearne - ESB Networks (10 mins) Discussion: All (10 mins)
Beyond 2020 Discussion	12:05	Presentation: Noel Cunniffe (15 mins) Discussion: (10 mins)
SysFlex	12:30	Presentation: John Young (15 mins) Discussion: (10 mins)
Lunch & Networking (13:10 – 14:00)		
System Services (General Update)	14:00	Presentation: UR or CER - (10 mins) Presentation: Ian Connaughton - (10 mins) Discussion: All (10 mins)
Future Interconnection studies	14:30	Presentation: Noel Cunniffe- EirGrid (15 mins) Discussion: (5 mins)
Closing Remarks and Actions	14:50	Robin McCormick (SONI)
Session Closed / Networking (15:00)		

Energy for generations

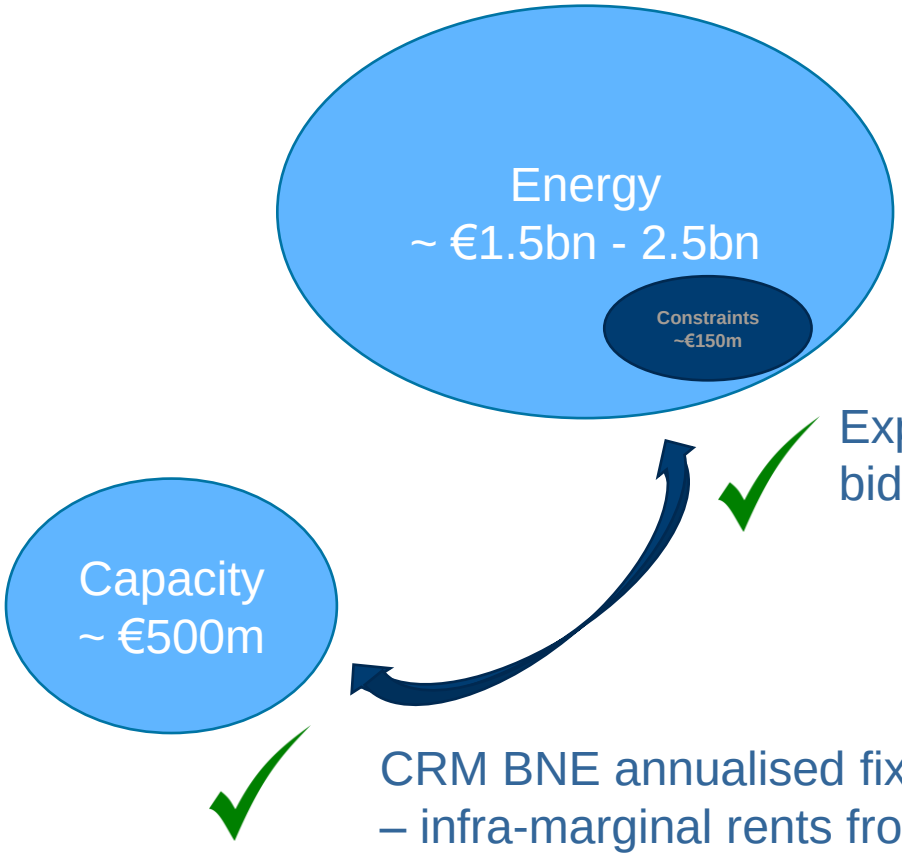
DS3 Advisory Council

September 2017

Agenda

1. SEM interactions between markets
2. ISEM interactions between markets
3. Incentive alignment

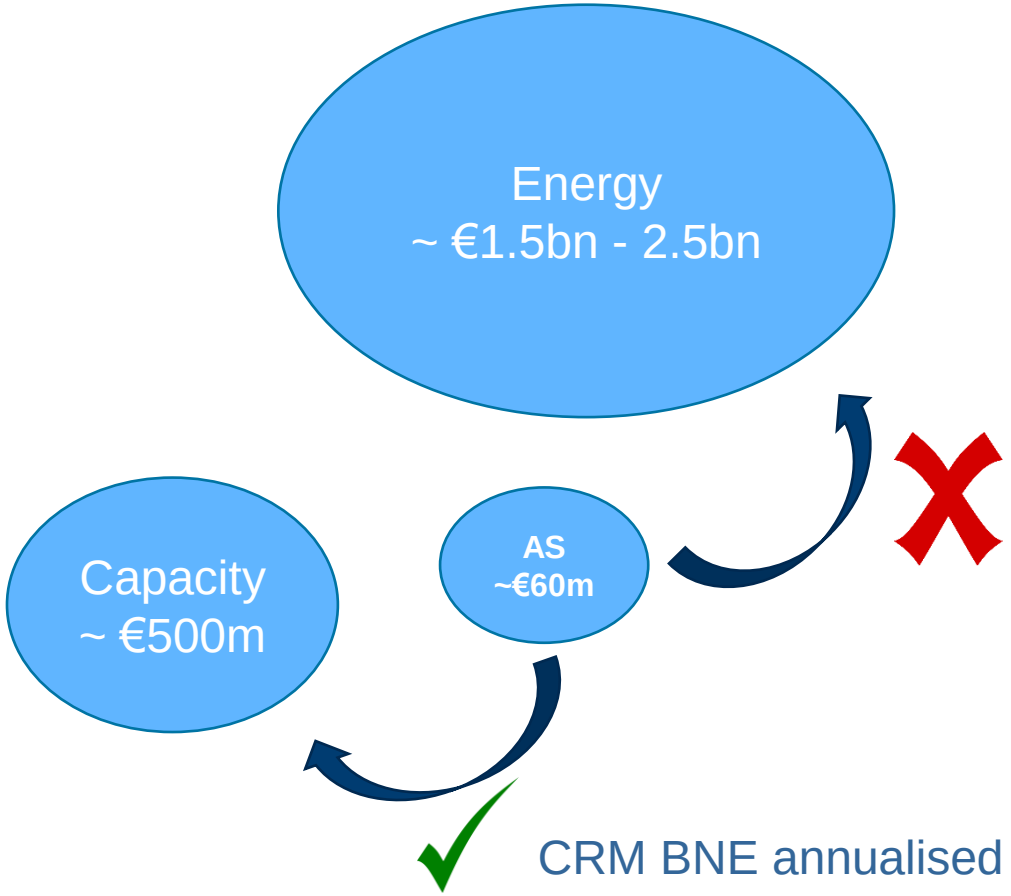
SEM interactions between markets



Explicit CRM allows requirement for SRMC bidding as set out in BCOP

CRM BNE annualised fixed cost calculation – infra-marginal rents from energy market

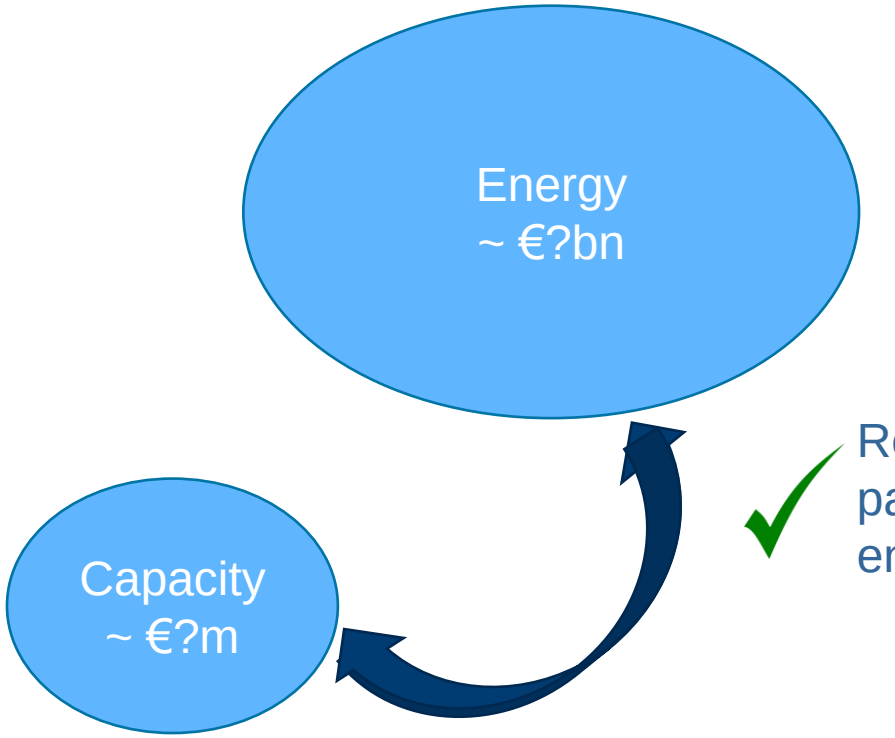
SEM interactions between markets



*SEM 11-055 BCOP Clarification on Commercial Offer Data - "**must not** deduct or refer to Ancillary Service benefits "*

CRM BNE annualised fixed cost calculation – AS revenue included into CRM BNE calculation

ISEM interactions between markets

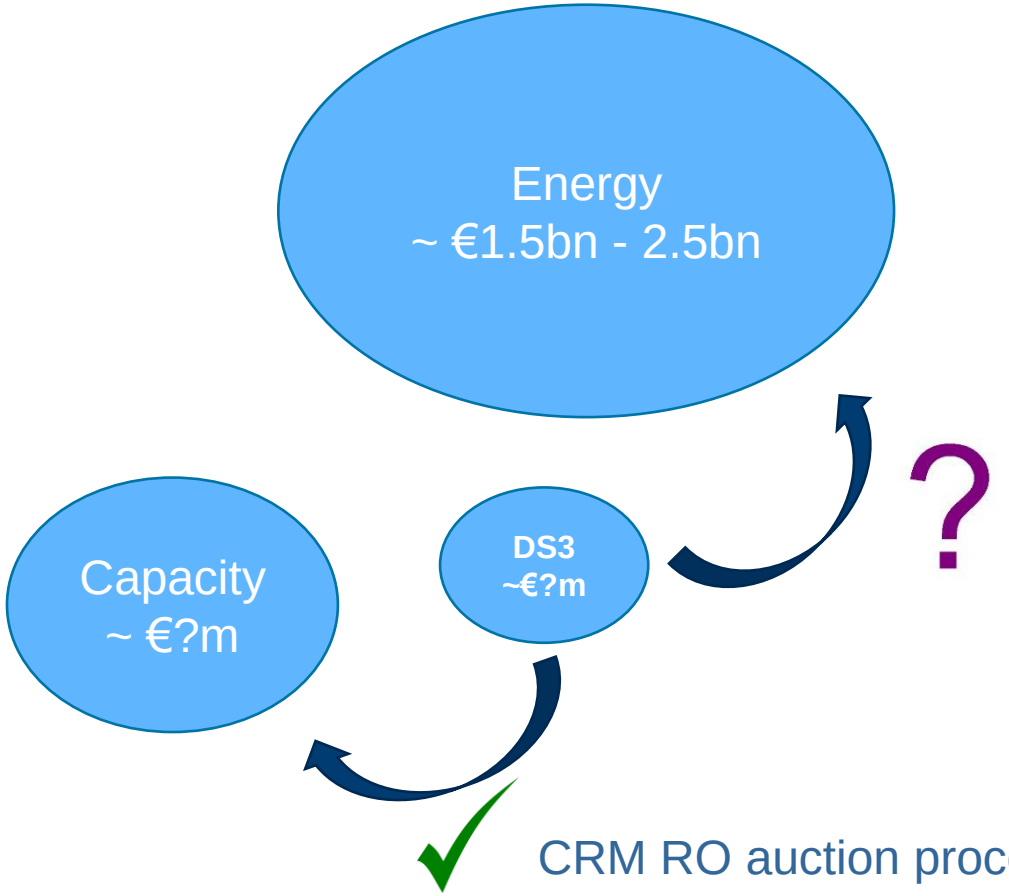


✓ Referencing of the RO difference payments across the energy markets ties energy bids to CRM position

✓ CRM RO auction process - Participants likely to factor energy market revenue into the formation of their RO bid

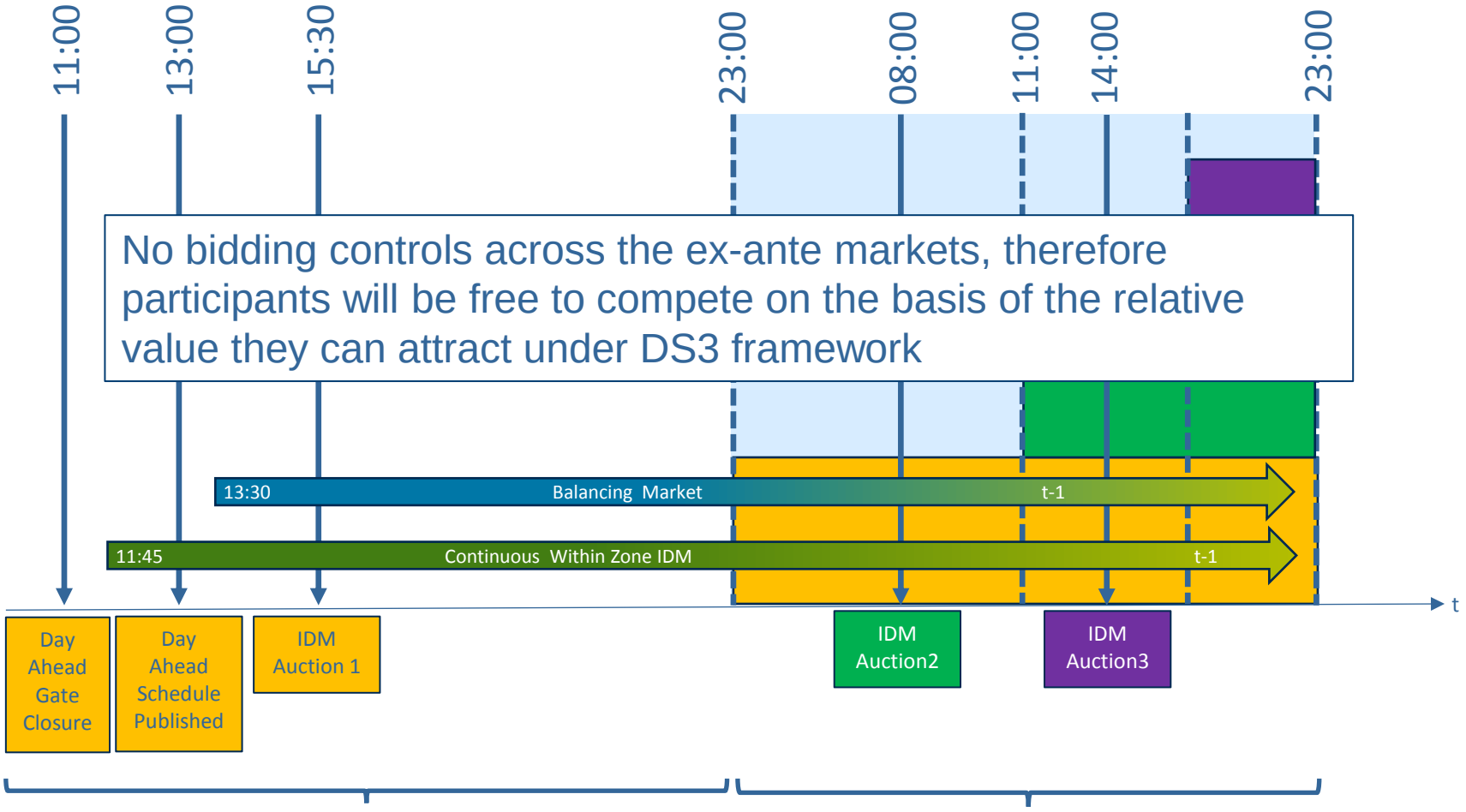
Interaction between energy and capacity likely to be much stronger and dynamic in ISEM

SEM interactions between markets

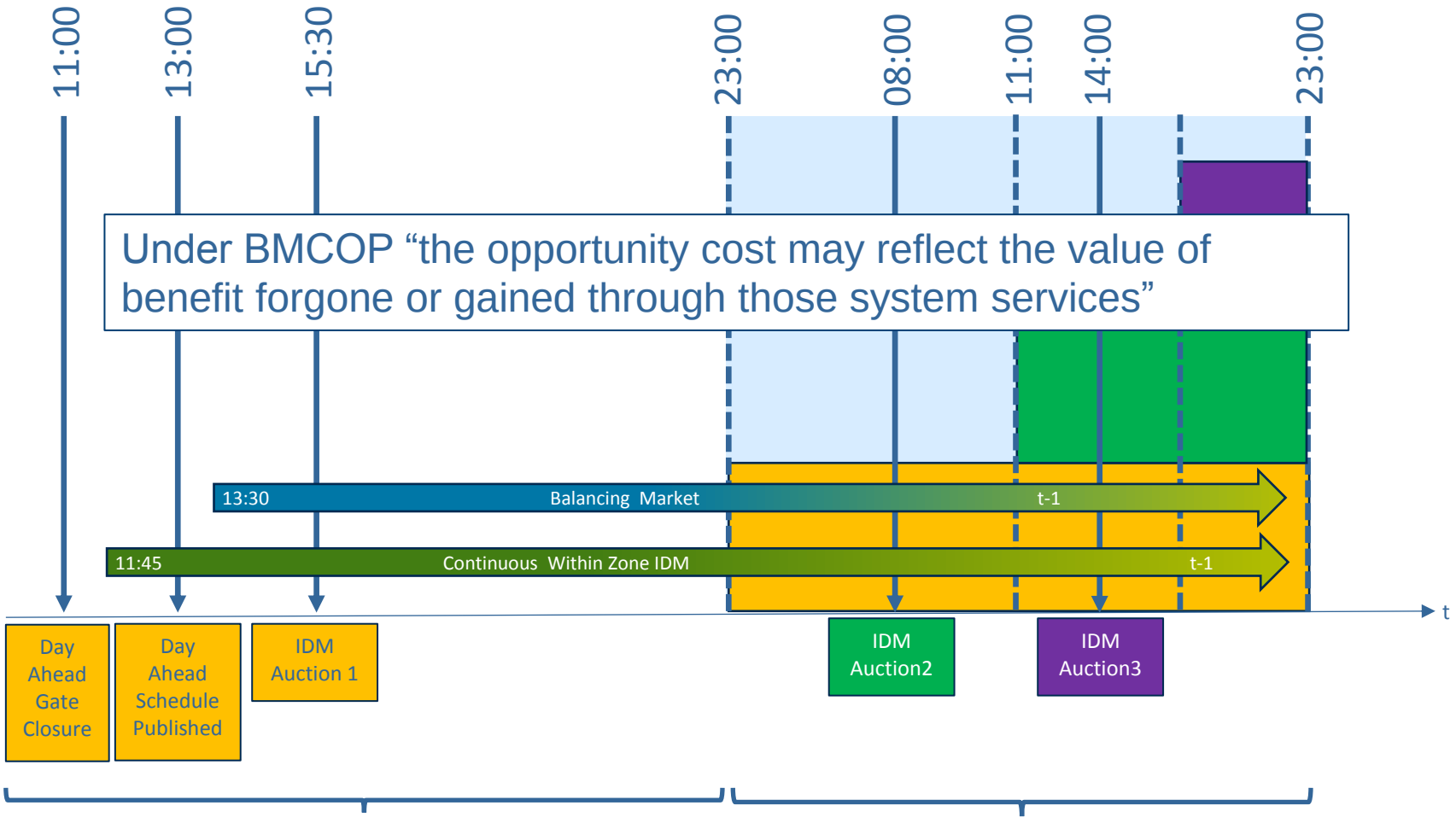


CRM RO auction process - Participants likely to factor energy market revenue into the formation of their RO bid

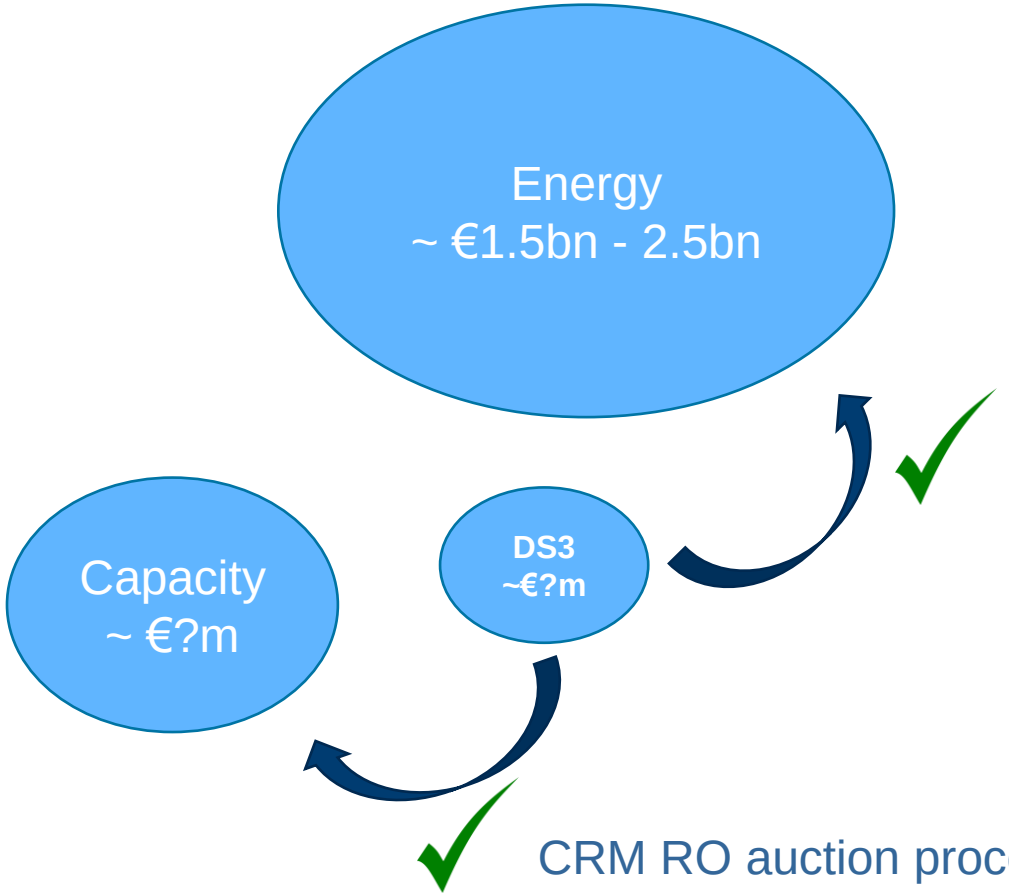
ISEM interactions between markets



ISEM interactions between markets



ISEM interactions between markets



DS3 value can be reflected in energy market bids

CRM RO auction process - Participants likely to factor energy market revenue into the formation of their RO bid

Interaction between Energy and DS3 creates a new competitive dynamic under ISEM

Incentive Alignment under ISEM

SEMC 2014 HLD stated DS3 basis of payment would be availability to provide services.

Max of (Schedule, Dispatch) -> DS3 service availability

Enduring tariff consultation clarifies under basis on payment under ISME will be calculated as

Max of (FPN, Dispatch) -> DS3 service availability

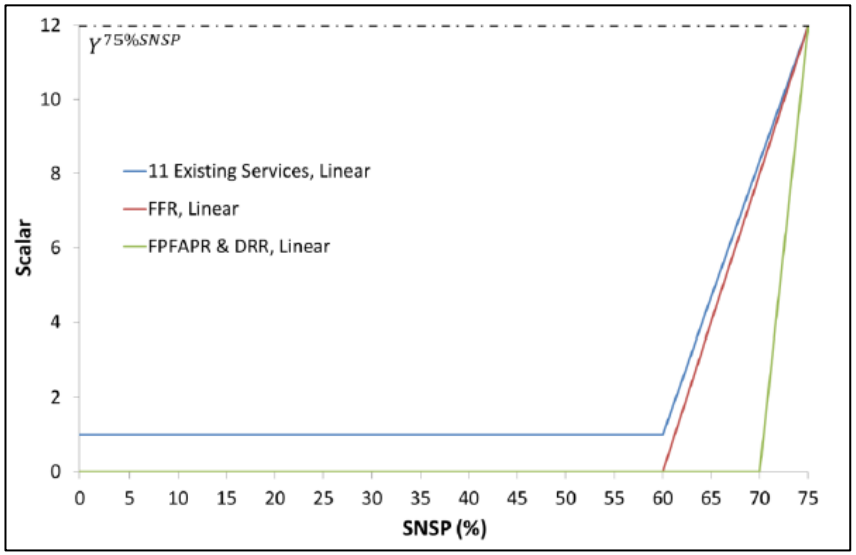
But proposed to delay implementation for 12 months post ISEM go-live (May'19?).

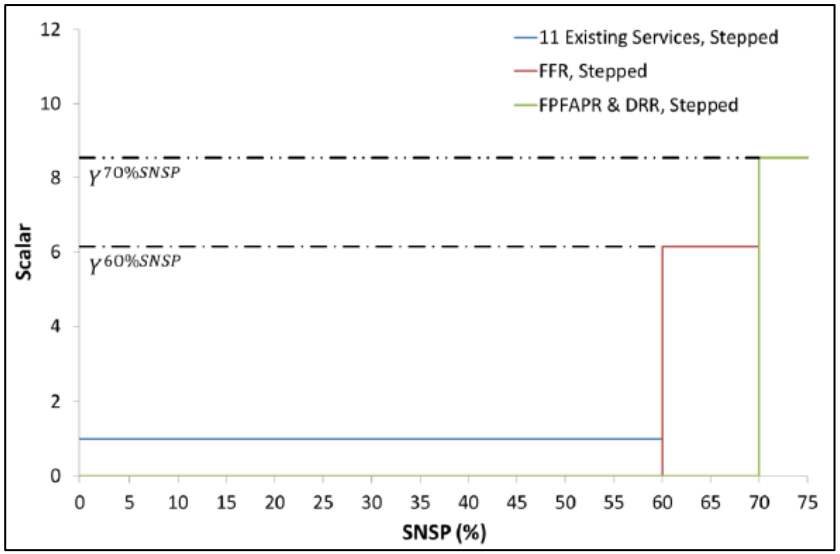
A delay will not unwind the incentive to compete on DS3 value but will complicate and confuse the signals. Participates will likely compete to establish an ex-ante position, then reflect the DS3 value of this position in their BM bids.

As such a delay will not reduce the risk of over expenditure only transfer this risk to the Balancing Market

Incentive Alignment under ISEM

Proposed that as SNSP increases a scarcity scalar will be applied to increase the effect services rates which will increase to a maximum of 12 when the SNSP reaches 75%





Linking the effective services rates to their relative scarcity is a good analogue for what would be seen under a competitive procurement process

Incentive Alignment under ISEM

Under the proposed stepped scalar, the services rates would increase by a factor of ~6 when the SNSP is > 60%.

FOR unit providing a MW of existing online response services:

Before Scarity Scalar	
Service	Tariff Rate (€/MWh)
POR	3.09
SOR	1.87
TOR1	1.48
TOR2	1.18
RRS	0.24
Total	7.86

After Scarity Scalar	
Service	Tariff Rate (€/MWh)
POR	18.54
SOR	11.22
TOR1	8.88
TOR2	7.08
RRS	1.44
Total	47.16

Strong signal to prioritise service provision over energy during these periods.

To be an effective signal a reasonable ability to forecast high SNSP periods is required

Incentive Alignment under ISEM

$$\%SNSP = \frac{\text{Wind + Imports}}{\text{Demand + Exports}}$$

Potential of IC flows to be revised throughout trading day by coupled intra-day auctions which may change the incentives faced by participants.

Will the TSO's have the ability to counter trade across the interconnectors in place under ISME after the final coupled intra-day auction?

What will the TSO's objective be:

To minimise wind curtailment?

To minimise balancing costs?

To minimise system service expenditure?

Understanding the TSO's ability to counter trade on IC and their objectives are important to allow the signals being created to be effective

DS3 Programme Status Update – September 2017

Doireann Barry, DS3 & Innovation Programme Manager

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DS3 Overall Status - Summary

- The plan for transitioning to 65% SNSP is underway
- Over 50% of conventional generation on the island is now compliant with the new RoCoF standard, however challenges exist in relation to generation in Northern Ireland.
- Transition to the higher RoCoF standard is a key enabler for operation above 65% SNSP and is dependent on industry compliance.
- Delays to compliance will lead to delay in overall programme timelines
- 2018 will be complex for all participants with ISEM and System Services procurement

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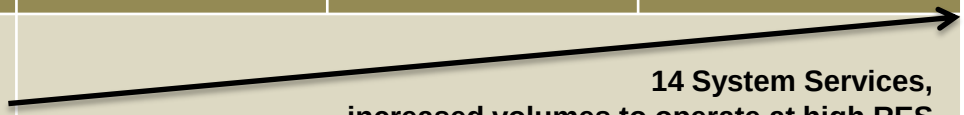
Key Enablers for DS3

	2017-2018	2018-2019	2019-2020
Operational Change	***SNSP 65%***	***SNSP 70%***	***SNSP 75%***
RoCoF transition to 1Hz/s		Y	Y
Implement OFGS enduring			Y
Minimum Sets/ Inertia Floors		Y	Y
Control Centre Tools	***SNSP 65%***	***SNSP 70%***	***SNSP 75%***
Robust WSAT	Y	Y	Y
Ramping		Y	Y
Look Ahead WSAT		Y	Y
SNSP & Inertia Metrics display			Y
Voltage Trajectory Tool		Y	Y
System Services			
New Service Providers connecting & displacing Conventional Service Providers			

14 System Services, increased volumes to operate at high RES

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Key Operational Milestones

	2017	2018	2019	2020
SNSP	60% -> 65%	65% -> 70%	70% -> 75%	75%
RoCoF	0.5 Hz/s	*0.5 -> 1 Hz/s*	1 Hz/s	1 Hz/s
Inertia	23,000 MW.s	20,000 MW.s	17,500 MW.s	17,500 MW.s
Min Sets	8	8	7	7
Exports	300 -> 500 MW (interim)	500 MW (interim)	500 MW (interim -> enduring)	500 MW (enduring)
System Services	Current providers, 11 Services			New providers, 14 Services, increased volumes to operate at high RES

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Voltage Control

- Progress with the development and deployment of the Nodal Controller is ongoing in both jurisdictions.
- Nodal Controllers, if successfully trialed, enable Type B windfarms to provide reactive power support.

Ireland

- ESB N is progressing with algorithm design
- Wind farms at the Cauteen node at various stages of connection or commissioning
- Expectation nodal controller will be testing in early 2018

Northern Ireland

- NIE N progressing Magherakeel Cluster nodal controller
- Focus on installing hardware (to be located in NIEN control centre in Craigavon)
- Work will be completed Q4 2107
- Q1 2018 focus will shift to algorithm design

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Control Centre Tools

Wind Dispatch Tool (WDT)

- Upgrade successfully deployed on Tuesday 13 June
- Communications were sent out to all impacted wind farms to inform them of the change.

SNSP Calculation

- SNSP calculation was updated on 23rd August 2017 to include large scale PV in NI
- Further engagement with IS ongoing to include a proxy for small scale renewables in the calculation to more accurately reflect SNSP

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Key DS3 Milestones to end 2018

	Key Milestones	Q2 17	Q3 17	Q4 17	Q1 18	Q2 18	Q3 18	Q4 18	Q1 19	Q2 19	Q3 19	Q4 19	Q1 20	Q2 20	Q3 20	Q4 20
Industry Changes	Agreement with DSOs on RoCoF implementation															
	EWIC 500MW export trials															
	Complete RoCoF/ resolve Large Gens issues															
	RoCoF transition 0.5 → 1Hz/s															
	Develop plan for Enduring OFGS															
	Implementation of Enduring OFGS															
	Implementation of UFLS															
TSO Chnages	RoCoF Policy															
	Ramping Policy															
	Minimum Sets Policy															
	Inertia Floor Policy															
	Robust WSAT															
	Ramping Tool															
	Look Ahead WSAT															
	SNSP & Inertia Metrics display															
	Voltage Trajectory Tool															

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Key Risks to DS3: RoCoF transition to 1Hz/s

- **Risk:** *Cannot operate to the 1Hz/s standard, due to either generator non-compliance or DSO failing to implement required changes*

- **Mitigating steps**
  - ✓ Resolution of large generators' issues with plant owners/OEMs
  - ✓ Completion of analysis by NIEN and decision on SSG for NI
  - ✓ Completion of implementation of settings for LSG by NIEN for NI
  - ✓ Completion of RoCoF settings on embedded wind/ non wind by ESB N
  - ✓ Delay to phased transition to operating at 1Hz/s over 500ms

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Key Risks to DS3 - Control Centre Changes

- **Risk:** *pace & scale of change required in the Control Centre associated with ISEM will impact the capability to deploy DS3-specifc tools*

- **Mitigating steps**
  - ✓ Co-ordination with I-SEM on operational changes required and timeline associated with such changes
  - ✓ Develop transition plan including training and engagement with Control Centre operators.
  - ✓ Management of “ISEM freeze” in Control Centres

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Key Risks to DS3: Increasing SNSP alone

- **Risk:** *increasing SNSP without delivery of other operational measures such as minimum number of sets and inertia floor results in increased curtailment and undermines DS3*

- **Mitigating steps**
  - ✓ Agreement on RoCoF transition plan
  - ✓ Breakdown requirements to increase SNSP steps & other operational parameters
  - ✓ Internal plan and stakeholder buy-in, including early engagement with Control Centre

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Key Risks to DS3: Lack of Investment

- **Risk**: *lack in investment in new System Service-providing technologies results in the volume of new System Services required to operate the system with high levels of RES penetration being unavailable*

- **Mitigating steps**
  - ✓ Joint TSO-DSO QTP for new Services/ Service Providers, including new technologies and novel technology applications, in 2018 & 2019
  - ✓ Work with CER on transitional connection policy

Key Risks to DS3: System Event

- **Risk**: *a system issue, such as a major System Event including frequency, voltage, oscillations and/or unsuccessful adoption of a range of policies, could halt progress of DS3 into revised operational policies and tools*

- **Mitigating steps**
  - ✓ Engagement with Control Centre on operational policy changes and transition plan
  - ✓ Engagement with industry on operational changes – through Advisory Council
  - ✓ Engage consultants for further analysis on experience with oscillations to date

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Rate of Change of Frequency

Jon O’Sullivan

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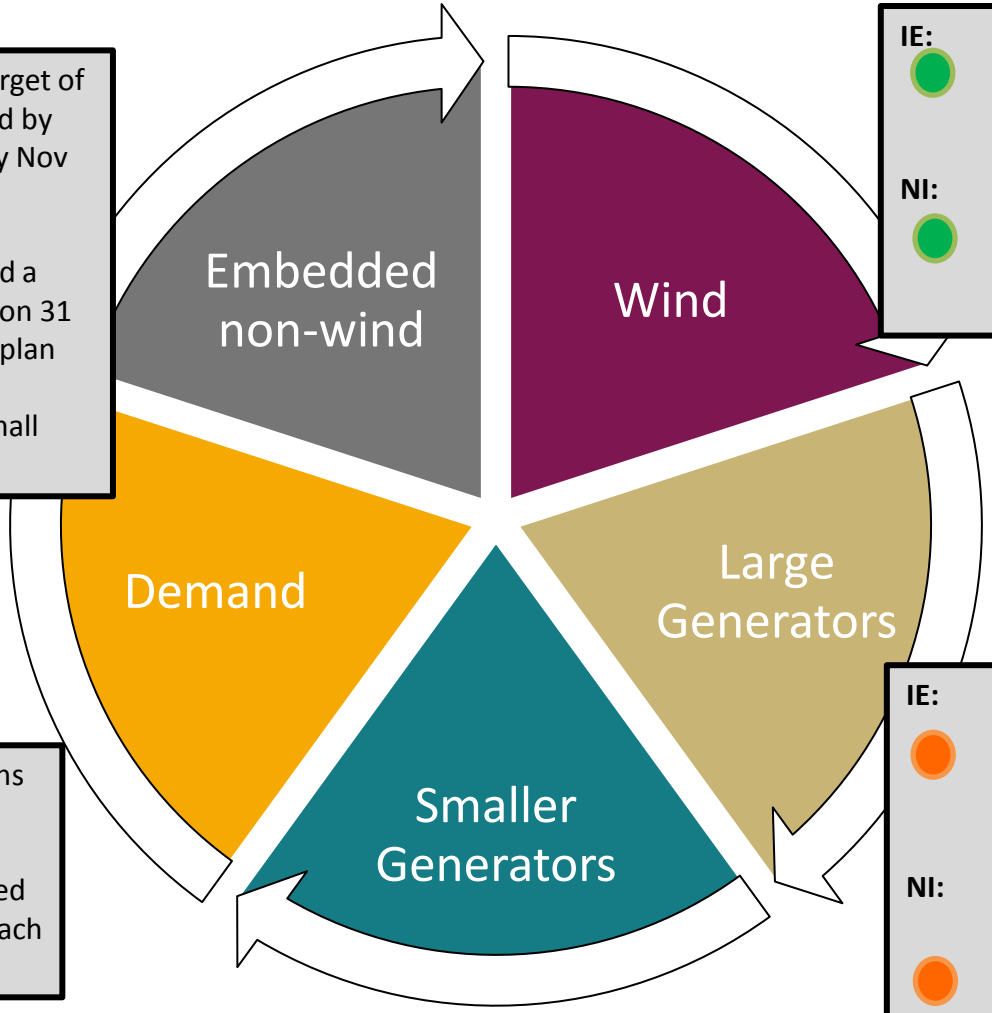
RoCoF Status – Sept 2017



IE: ESB confirmed that target of 110MW to be changed by YE/ 80% completed by Nov 18 is still on track

NI: SONI and NIE attended a meeting of the SEMC on 31 August to outline the plan for progressing RoCoF setting changes for small scale generation

IE: ~93% of settings changed; expectation wind project will be closed out by end of 2017

NI: NIEN are recommending changes in Loss of Mains protection settings for Large Scale Generation (LSG)

IE: ESB N have no concerns

NI: NIE & SONI have agreed overall prudent approach to risk to demand

IE: Number of units have progressed this month with limited number of Cat 1/2 still in study and testing phase.

NI: Some issues ongoing with both studies and testing – now discussing with generator owners / OEMs necessary measure to enable repeat testing. Clarifications being sought for other generators' studies

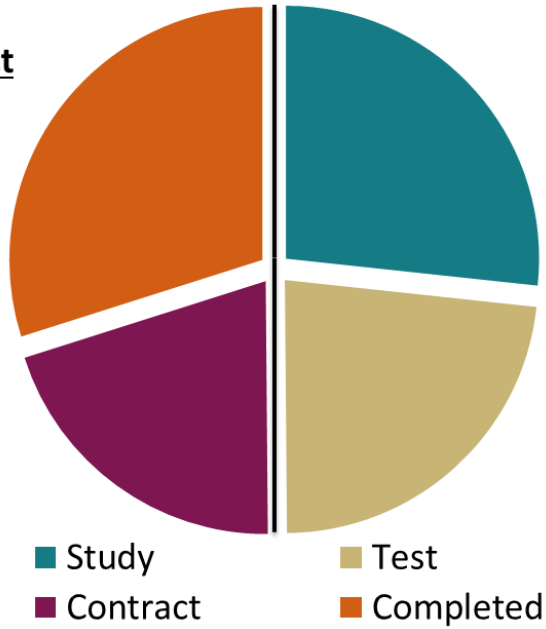
IE: Studies underway; testing scheduled into 2018, as per plan

NI: n/a – NIE considering all SSG (<5MW) together

Conventional Generators - Update

Total RoCoF Contract & Compliant:

- 24 units
- 4,334 MW



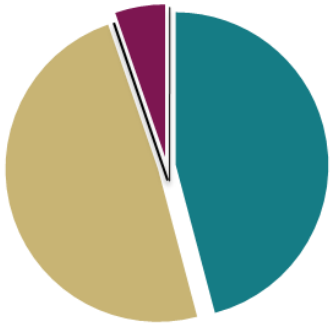
Total RoCoF Testing & Studies

- 41 units
- 4,311 MW

IRE Summary

Testing & studies: 2581 MW
Compliant: 4237 MW

NI Summary



Testing & studies: 1730 MW
Compliant: 97 MW

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DS3 – NIE NETWORKS GENERATOR INTERFACE PROTECTION AMENDMENT PROJECT

DS3 ADVISORY COUNCIL – 19/09/17

NIE Networks' Current Position

Large Scale Generation

- The proposed settings are on the boundary between the HSENI's "broadly acceptable region" and the "ALARP" region.
- Transferring Vector Shift to RoCoF protection has a negligible impact on the risk figures.
- NIE Networks have consulted on the amendment of G59 settings which will exclude the use of Vector Shift.
- NIE Networks, as recommended by HSENI, request generators review and update relevant risk assessments to ensure ongoing compliance with health and safety requirements. NIE Networks recommend that generators place particular emphasis on the risk of out-of-phase reclosure.

Small Scale Generation

- Current risk of electrocution resides well within the ALARP region.
- No further increase in risk can be justified.
- Changing from Vector Shift protection to RoCoF protection will have a negligible impact on risk.
- Current protection settings will remain; however, vector shift for new connectees will be banned.
- NIE Networks will investigate methods of reducing the underlying risk.

Next Steps

Large Scale Generation

Activity	Due Date
Review responses to Consultation	August 17
Submission of NIE Networks' recommendation paper to UR for approval	Sept 17 (w/c 18/09/17)
UR approval	Sept 17
LSG* commence interface protection amendments	Oct 17
LSG interface protection amendments complete	Dec 17

* Currently c56 LSG sites
c930MW

Small Scale Generation

Activity	Due Date
Review responses to Consultation	August 17
Consider further the risk of SSG# RoCoF Changes and consideration of alternative measures	Sept 17
Final decision on whether or not there is a quantum of SSG that can be amended	Nov 17
Update to SEM Committee	Dec 17
Potential implementation of SSG RoCoF changes including consultation	Dec 18

Currently c1000 SSG sites, excluding micro generation
c420MW, including micro generation

QUESTIONS?

DSO RoCoF Update
DS3 Advisory Council
19/09/17

Tony Hearne

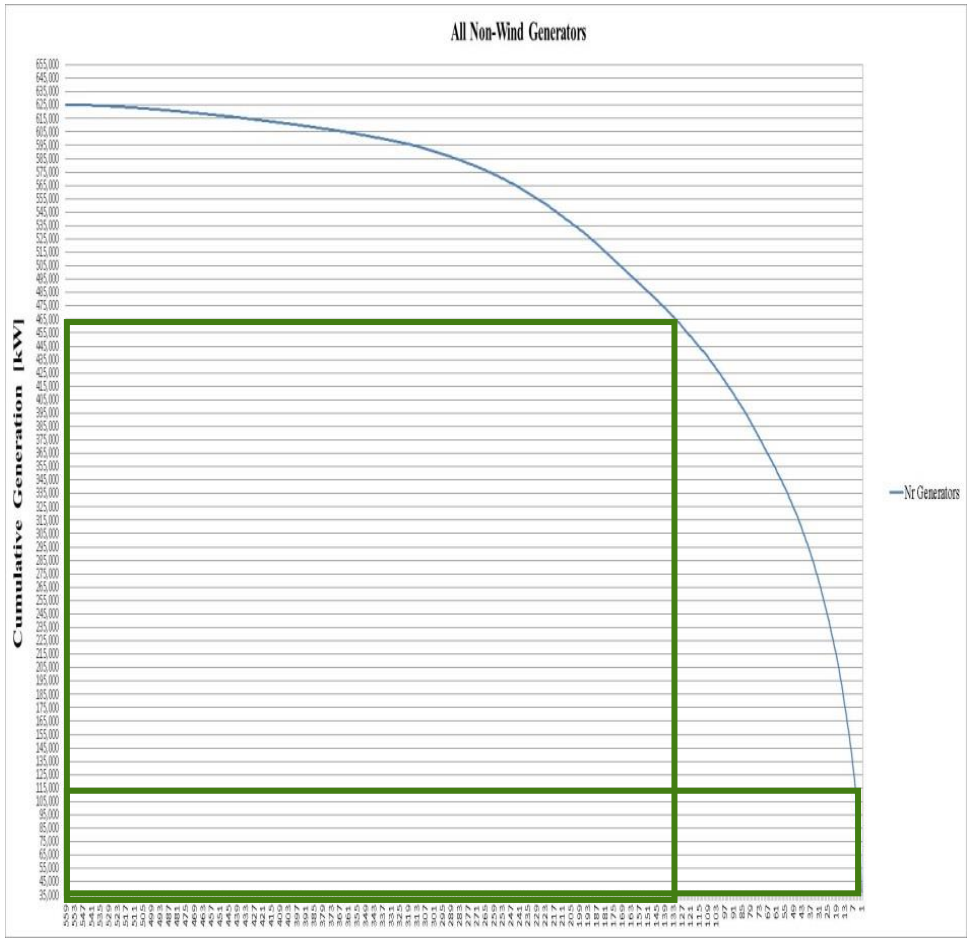
Manager, Future Networks

DSO RoCoF Project Wind Breakdown

Wind Figures Breakdown	%
Confirmed Returns	91.1%
Various stages of progress	5.4%
Likely to request a Derogation	3.5%

Expect to have all wind [Except any derogated] changed by end 2017

Non Wind

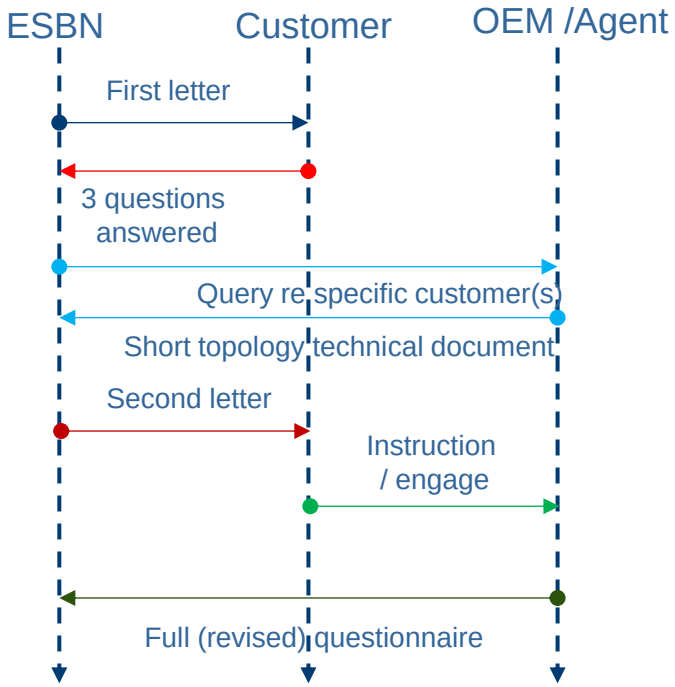


ESBN committed to:

- 110MW to be completed[1] by end 2017
- 75-80% if the total MW installed completed1 by November 2018

Five step process to coordinate the upgrade of non-wind DSO connected generators

- **Devised to manage the relationship and information exchange between:**
  - ESBN
  - Generator OEMS
  - Customers / Plant Managers

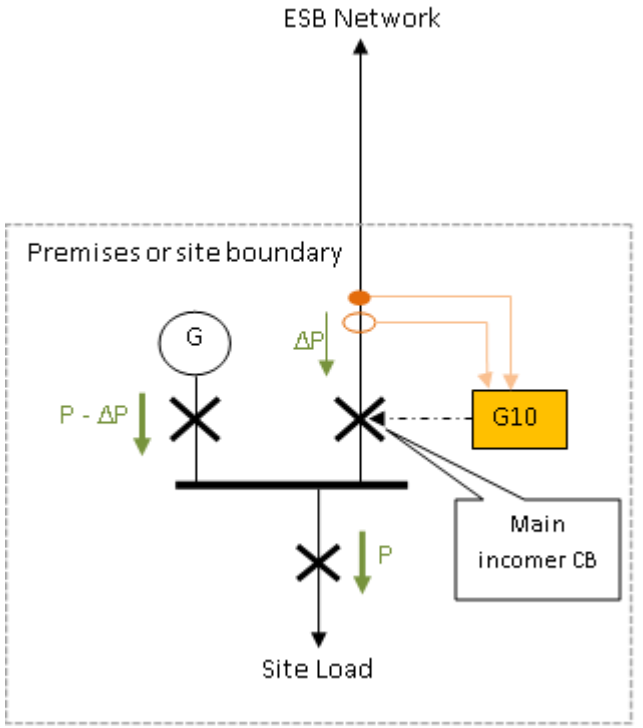


Non Wind

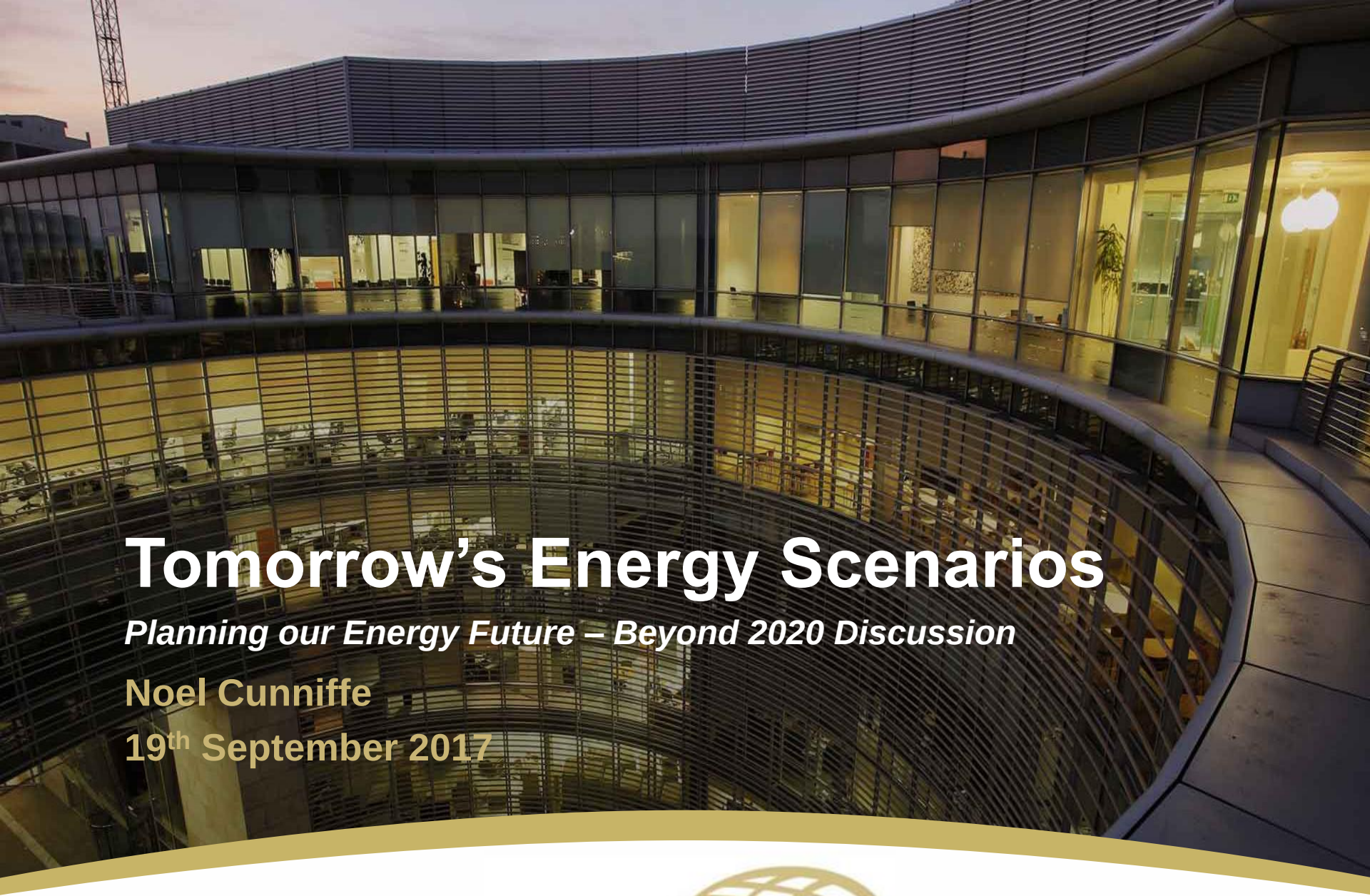
- To meet ESBN's 2017 target of coordinating the interface protection settings upgrade of 110 MW in 2017, ESB Networks focussed on engaging with customers to progress Stage 2 (Topology Questionnaire) and Stage 4 (Interactive Long Questionnaire).
- During August, 16 topology questionnaires were issued by ESBN and returned from OEMs totalling 0ver 20MW. The breakdown is as follows:
  - Diesel – 15,960kW
  - LFG – 3,700kW
  - Biogas – 500kW

Non Wind

- Of this total approximately 18MW of plant are considered to be complete for the purposes of this exercise.
- These have been confirmed to belong to an identified cohort of “Trickle Feed”
- ESBN and EirGrid are satisfied that it is in order to leave ROCOF settings as is for this particular set up



Questions?



Tomorrow's Energy Scenarios

Planning our Energy Future – Beyond 2020 Discussion

Noel Cunniffe

19th September 2017

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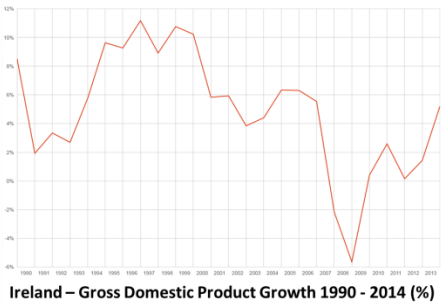
The future remains uncertain…

A significant transformation is underway in the electricity sector

- **National and International Policies on Energy and Climate Change**

- **National and International Economic Developments**





- **Technology Evolution and Adoption**


- **Other National and International Influences**
  - ✓ Environmental and Planning Policies
  - ✓ Job Creation and Industrial Development Policies
  - ✓ EU and International Policies, Regulations and Influences
  - ✓ Transport Policies

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…and we need to capture that in how we plan

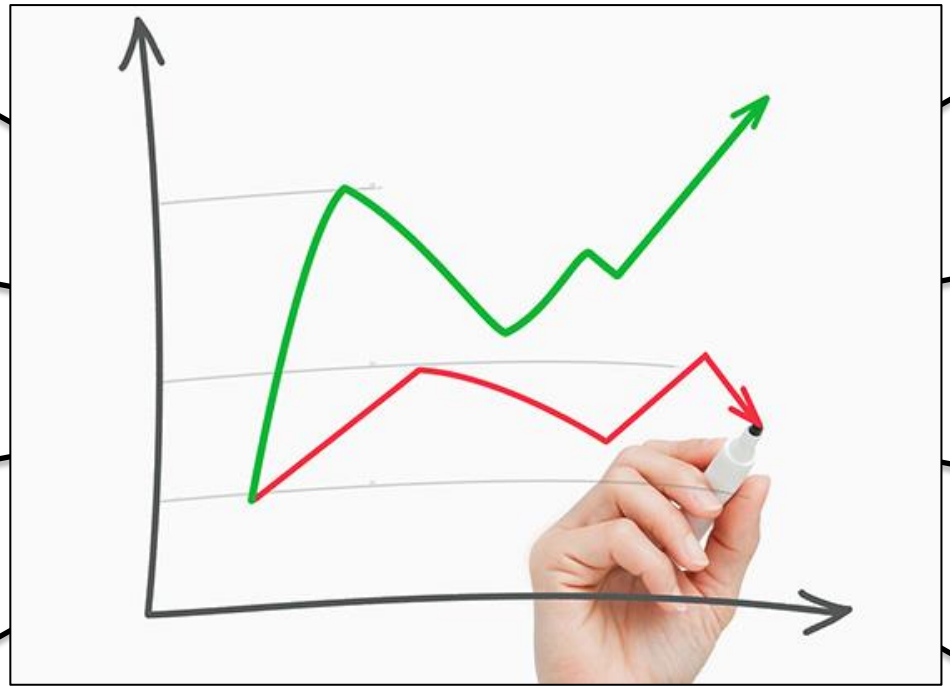
- Scenario Planning is a well proven method for accepting uncertainty

Political Uncertainty

Economic Uncertainty

Societal Uncertainty

Technology Uncertainty



Tomorrow's Energy Scenarios

Generation Uncertainty

Demand Uncertainty

Policy Uncertainty

Electricity Market Uncertainty

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Stakeholder Engagement

Getting input from experts is fundamental to the development of scenarios

Stakeholder Engagement Process	
Other TSOs – Best Practices	TenneT Taking power further; ercot Your Power. Our Promise.; nationalgrid; swissgrid; Rte Réseau de transport d'électricité
Government Bodies	CER Commission for Energy Regulation; Roinn Cumarsáide, Gníomhaithe ar son na hAeráide & Comhshaoil Department of Communications, Climate Action & Environment; An Roinn Tithíochta, Pleanála, Pobail agus Rialtais Áitiúil Department of Housing, Planning, Community and Local Government; Department of Agriculture, Food and the Marine An Roinn Talmhaíochta, Bia agus Mara; An Roinn Iompair Turasóireachta agus Spóirt Department of Transport, Tourism and Sport; An Roinn Caiteachais Phoiblí agus Athchóirithe Department of Public Expenditure and Reform; An Roinn Post, Fiontar agus Nuálaíochta Department of Jobs, Enterprise and Innovation
Government Agencies & Semi-State Bodies	IDA Ireland; COILLTE; Bord na Móna; Enterprise Ireland where innovation means business; ESB Networks; seai Sustainable Energy Authority of Ireland; Chambers Ireland; epa Environmental Protection Agency; Gas Networks Ireland
Industry Bodies and Research Groups	UCD Dublin; UCC University College Cork, Ireland Coláiste na hOllscoile Corcaigh; ESRI; IWEA Irish Wind Energy Association; ISEA; Ibec

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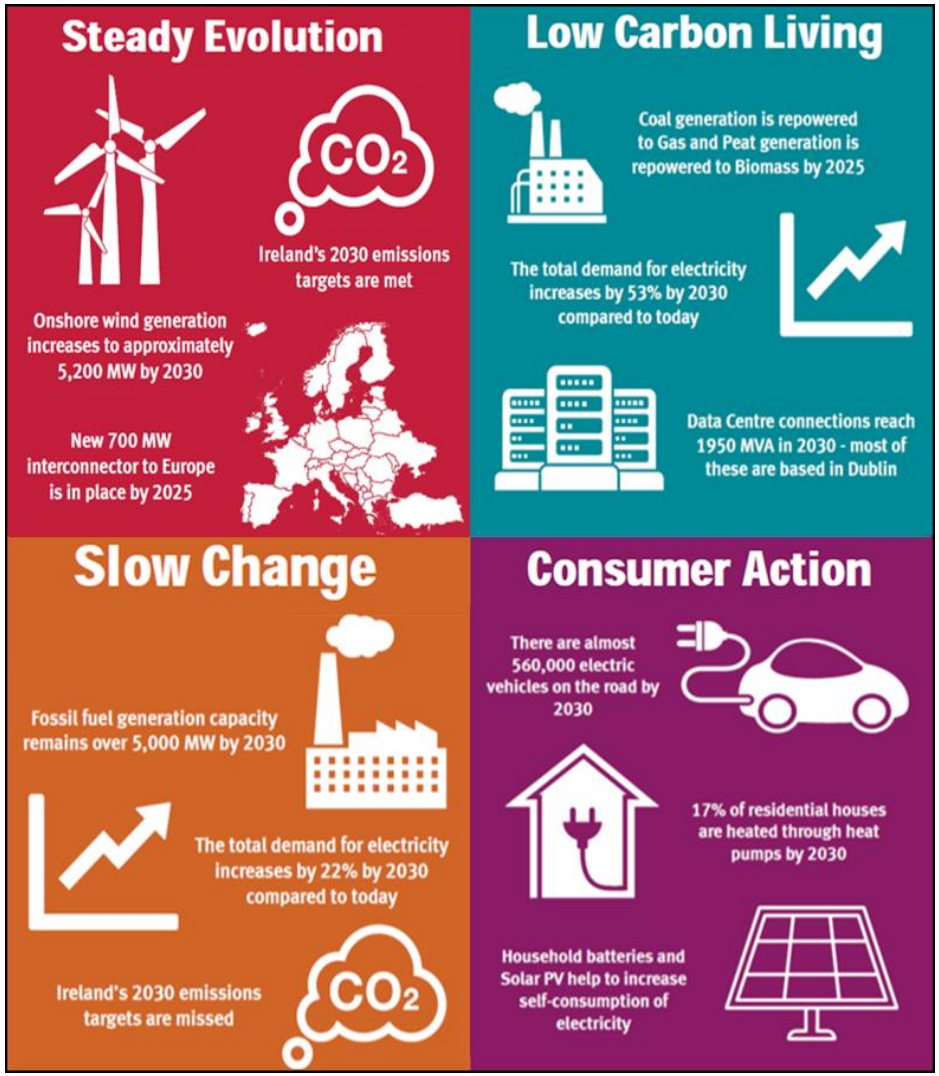
Tomorrow's Energy Scenarios



- Tomorrow's Energy Scenarios 2017 document published in July
- Sets out four scenarios from 2020 – 2040
- This publication covers scenarios for Ireland only
- Scenarios will be revised every two years
- We put a lot of focus on 2030 in our publications
  - Important year from climate change policy and targets
  - Needs identified in 2030 may require some projects to kick off now

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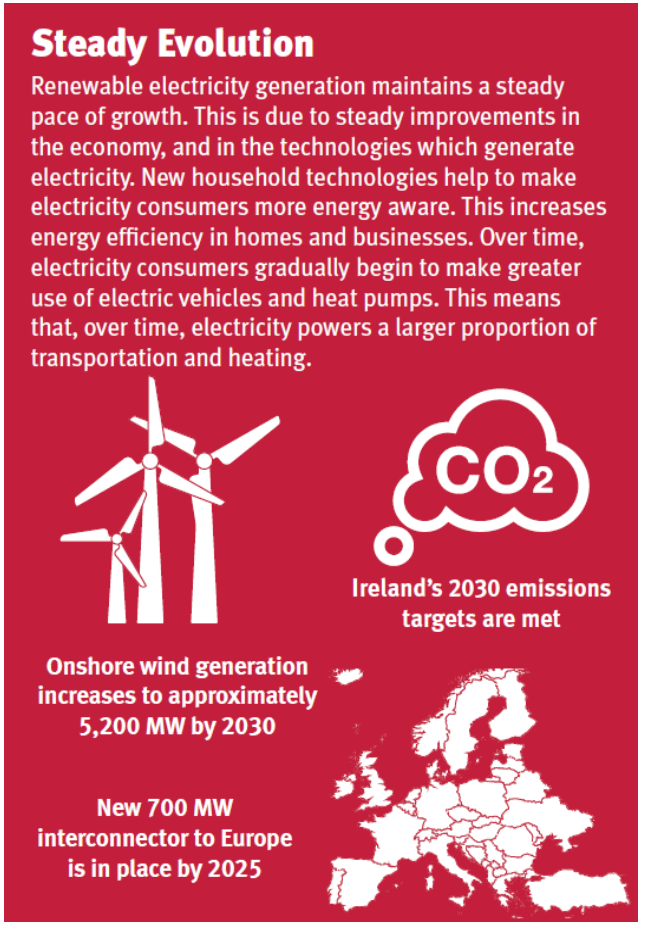
Steady Evolution

- Steady growth in renewable electricity generation
- Steady economic growth
- Household adopt new technologies
- Consumers more energy aware
- Increase in energy efficiency in homes & businesses
- Consumers gradually use electric vehicles & heat pumps
- Electricity powers a larger proportion of transportation and heating



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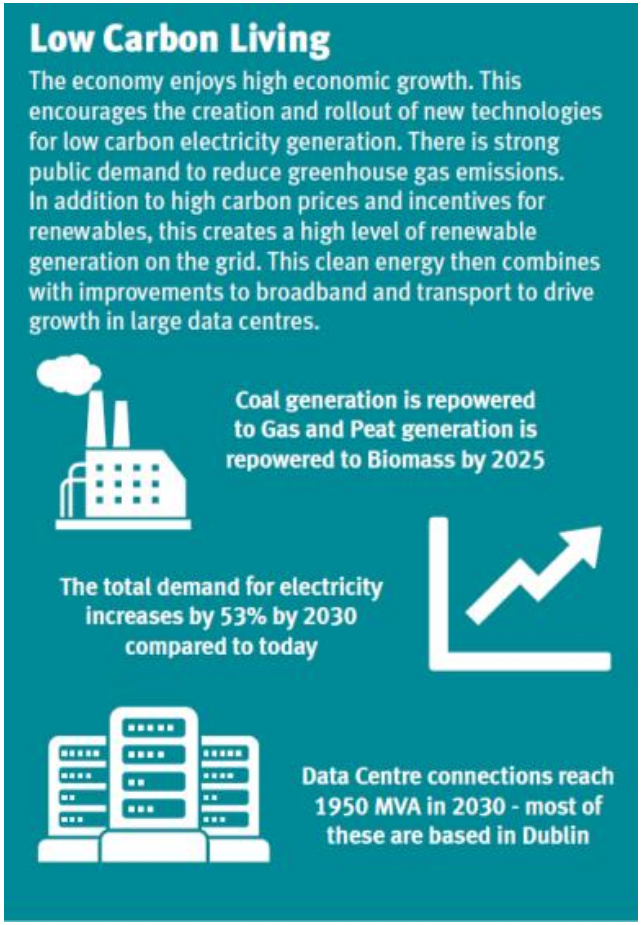
Low Carbon Living

- High economic growth
- Creation and rollout of new technologies for low carbon electricity generation
- Strong public demand to reduce greenhouse gas emissions
- High carbon prices and incentives for renewables
- High level of renewable generation on the grid
- Clean energy & improvements to broadband and transport drive growth in large data centres



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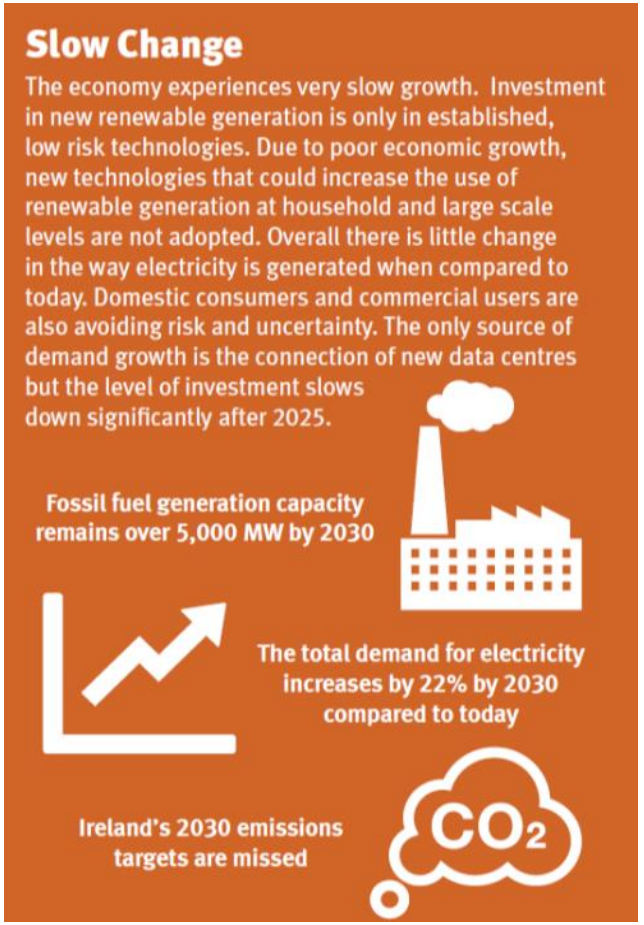
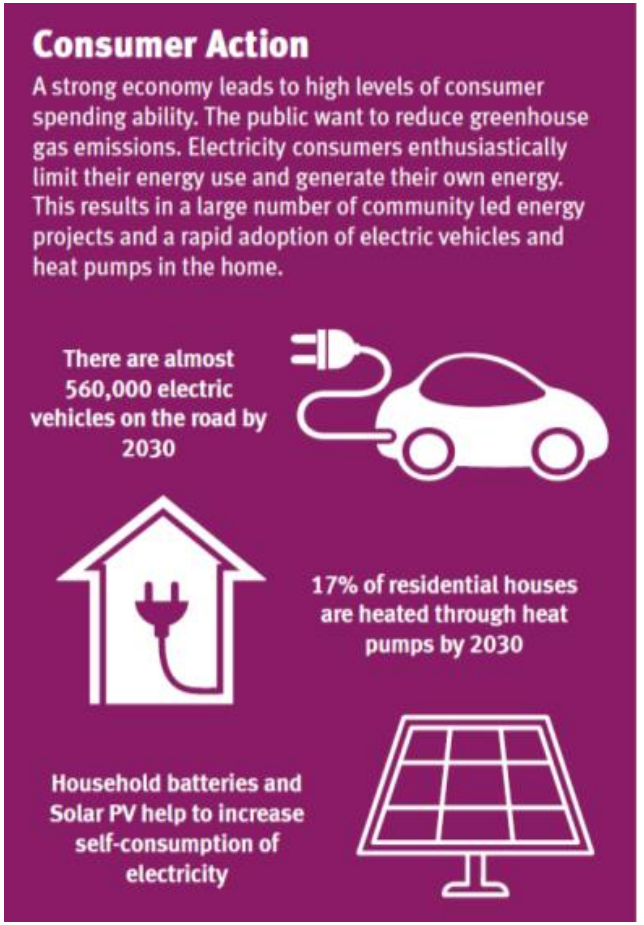
Slow Change

- Slow economic growth
- Investment in low risk technologies only
- Slow adoption of technology by households
- Little change in electricity generation
- Avoidance of risk
- Growth in demand coming from data centres only
- Level of investment slows down significantly after 2025



Consumer Action

- Strong economy
- High levels of consumer spending
- Public want to reduce greenhouse gas emissions
- Consumers limit energy use
- Consumers generate their own energy
- Community led energy projects
- Rapid adoption of electric vehicles & heat pumps



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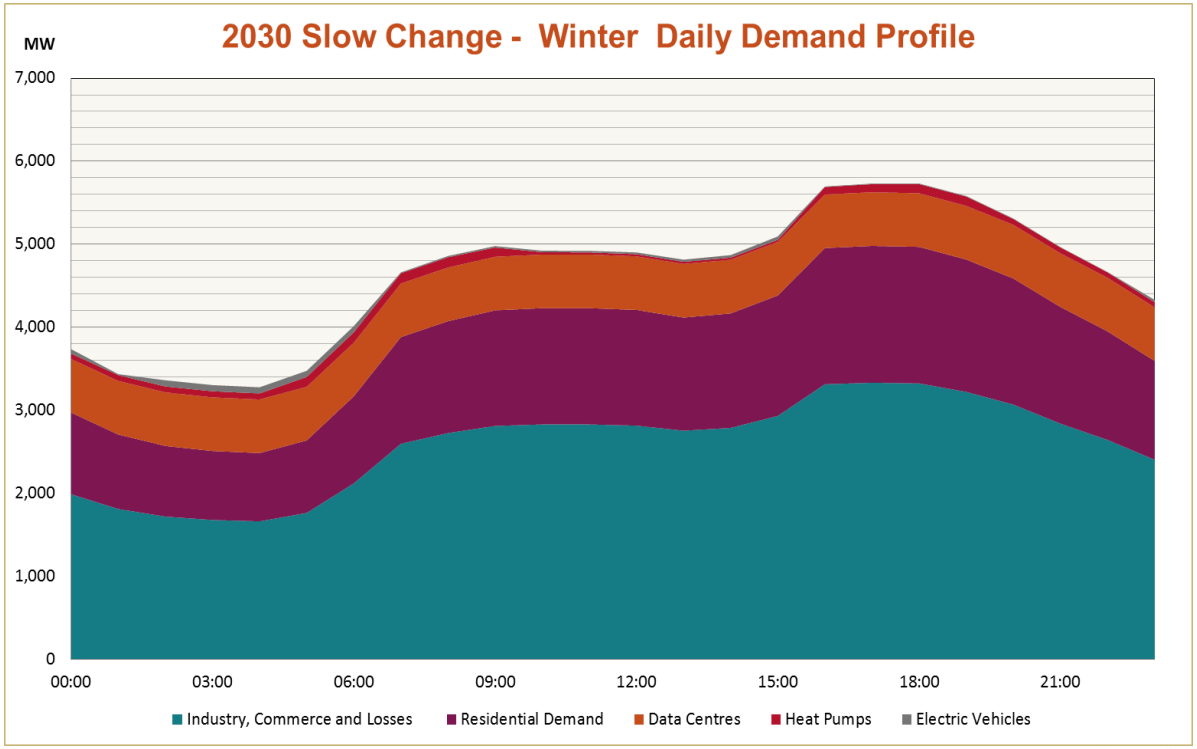
Focus on: Electricity Demand

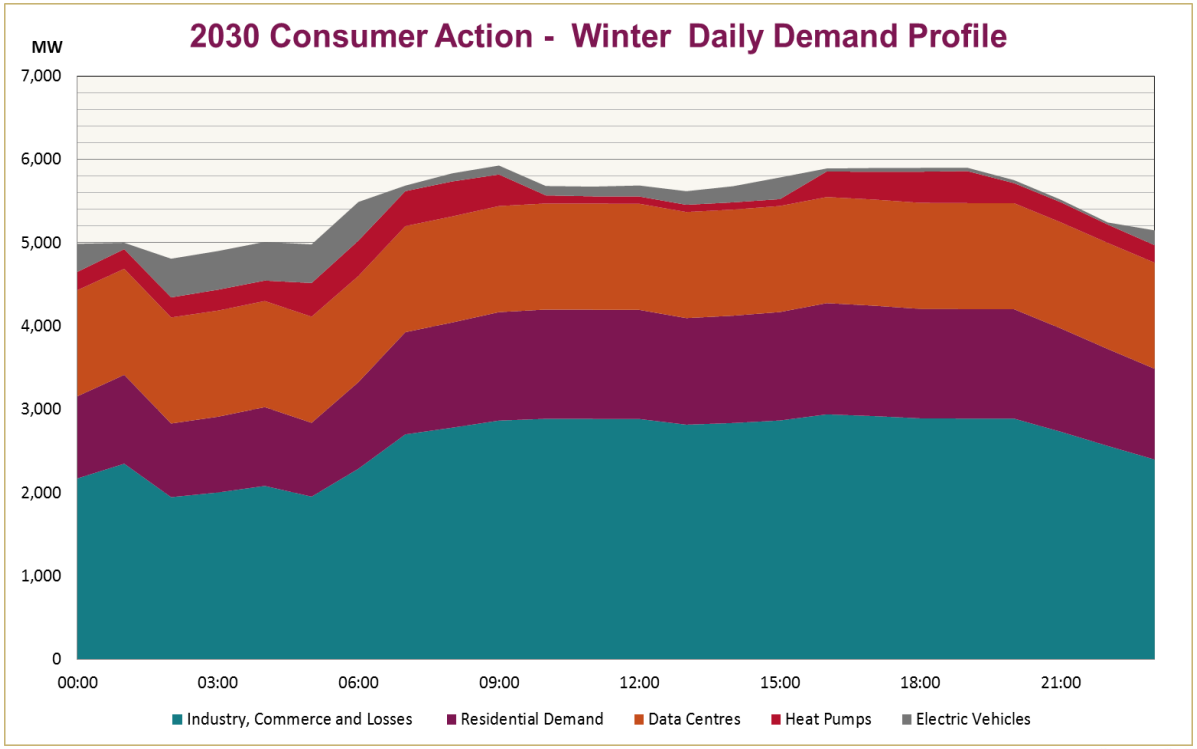
- Composition of demand varies dramatically between scenarios
- 2030 Slow Change
  - Little change to existing demand portfolio
  - Minimal demand side participation
  - No major new technologies altering profile



EIRGRID

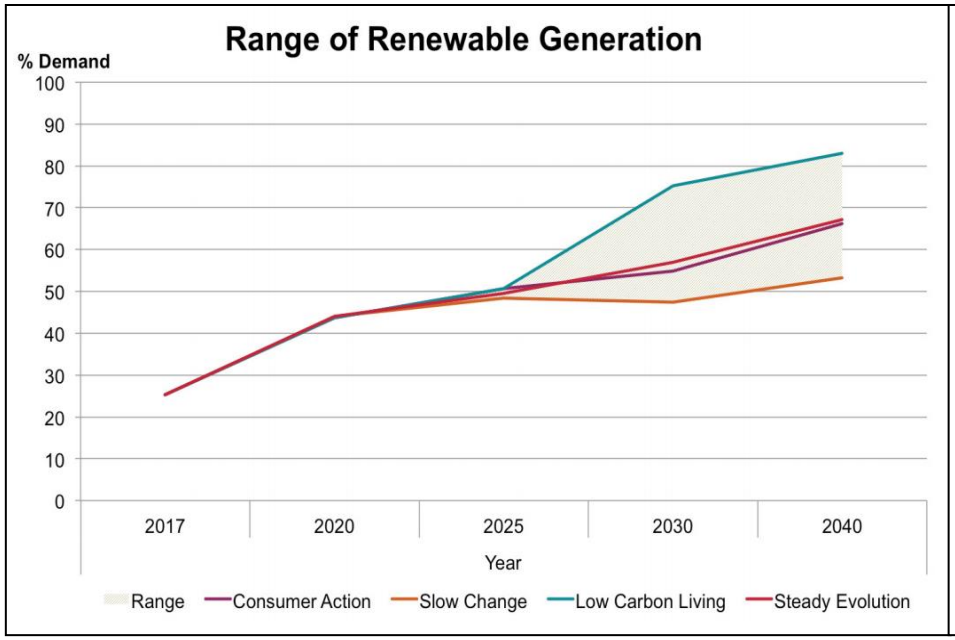
Focus on: Electricity Demand

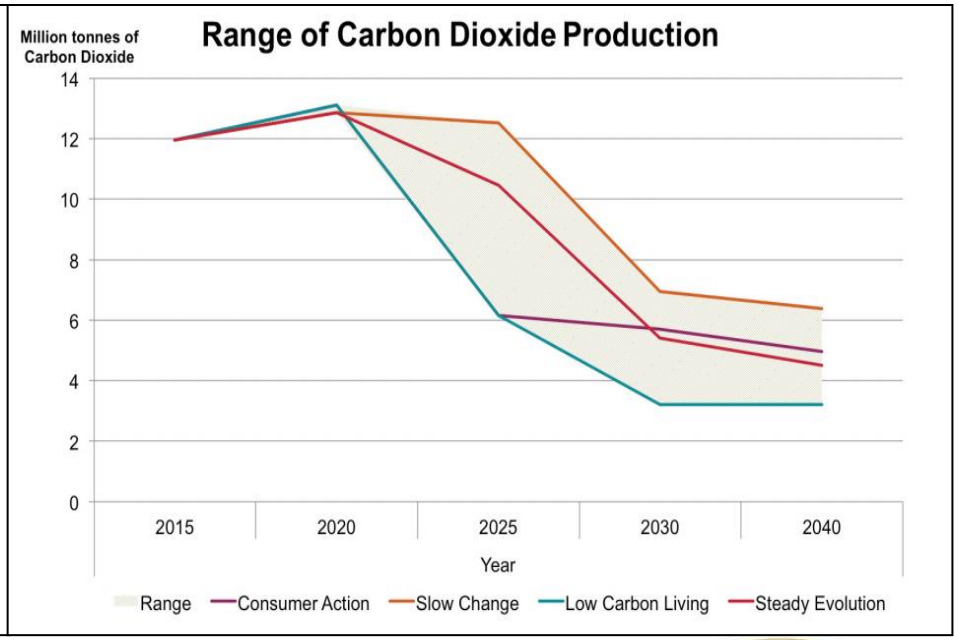
- Composition of demand varies dramatically between scenarios
- 2030 Consumer Action
  - Major changes to existing demand portfolio
  - Demand side participation leads to high levels of peak shifting
  - Electric Vehicles and Heat Pumps alter traditional demand pattern



Focus on: Renewables and Emissions

- Today's capacity is just over 2,800 MW Onshore Wind, 25 MW Offshore Wind, 20 MW Solar
- In 2030, our scenarios see onshore wind generation increasing to between 4,640 MW and 5,500 MW and offshore up to 3,000 MW
- Our 2030 scenarios consider solar capacities from 200 MW to 2,500 MW





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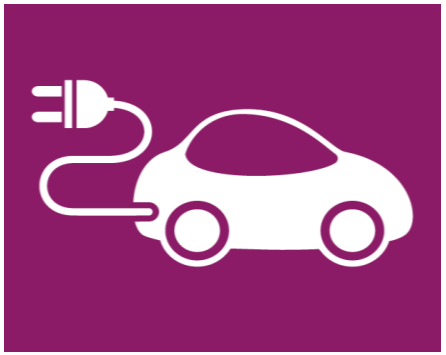
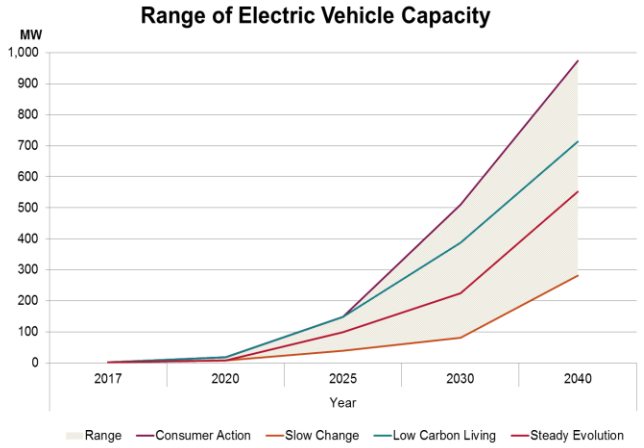
Focus on: Electric Vehicles and Storage

- There are just over 2,000 electric vehicles on the road today in Ireland
- In 2030, our scenarios see the number of electric vehicles increasing to between 90,000 and 560,000
- Key adoption rate actors include: Improvements in battery technology, consumer engagement, government policy and incentive schemes
- Battery storage increases to 1,200 MW capacity in our Consumer Action scenario by 2030 – it will play an important role in providing services to the system in future





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Tomorrow's Energy Scenarios – 2030 Summary

Variables	Today	Steady Evolution	Low Carbon Living	Slow Change	Consumer Action
Wind (Onshore) (MW)	2,995	5,140	5,500	4,640	5,380
Wind (Offshore) (MW)	25	700	3,000	250	1,000
Solar (MW)	20	500	2,500	200	1,500
Total Demand (TWh)	29	36.3	43.8	35.1	42.6
Total Data Centre Capacity (MVA)	250	1,100	1,950	850	1,675
Total Electric Vehicles	1,800	247,000	426,000	90,000	560,000
Total % of Vehicles which are Electric	0.1%	11%	19%	4%	25%
Coal (MW)	855	0	0	0	0
Gas (MW)	4,128	4,660	4,210	4,660	4,660
Peat (MW)	311	0	0	0	0
Fossil Fuel Generation Total (MW)	6,314	4,930	4,360	5,020	4,810
Carbon dioxide production (Mt)	12	5.4	3.2	6.9	5.7
RES-E as % of demand	25%	57%	75%	47%	55%

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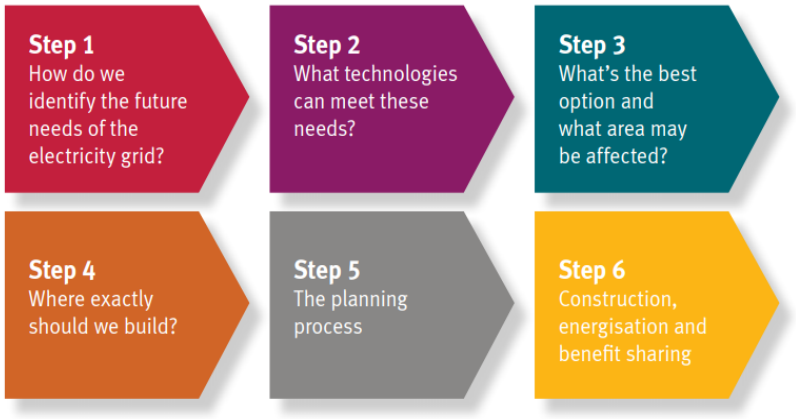
TES input into Planning and Operations

- Tomorrow's Energy Scenarios are key to the new Framework for Grid Development process

- They are utilised in every aspect:
  - Needs Identification
  - Solution Optioneering
  - Detailed Solution Analysis
  - Cost Benefit Analysis
  - Least Worst Regrets



- Utilised in future operational analysis too – EU SysFlex & Future Interconnection Study

EUSysFlex

- A more robust approach in the face of increasing uncertainty

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19th September 2017

John Young

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Horizon 2020
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Presentation Overview

- H2020 Scheme
- EU-SysFlex Project Overview
- The Consortium
- Benefits
- Next Steps

Horizon 2020

- Financial instrument implementing the “innovation union”
- Aimed at securing EU competitiveness
- €80bn fund 2014-2020

The Call for Proposals

Demonstration of ***system integration*** *with* ***smart transmission grid*** *and* ***storage technologies*** *with* ***increasing share of renewables.***

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Project Dimensions

EUSysFlex

- *Characterise technical shortfalls of EU system for 50% RES 2030 scenarios.*
- *Recommendations of Market and Regulatory augmentation.*
- *Increase capability of system service to facilitate high RES*
- *Provide tools to support TSOs in integration of system services*
- *Scalability and Replicability analysis*

Its in the name!

EU-SysFlex - A Flexible System For Europe

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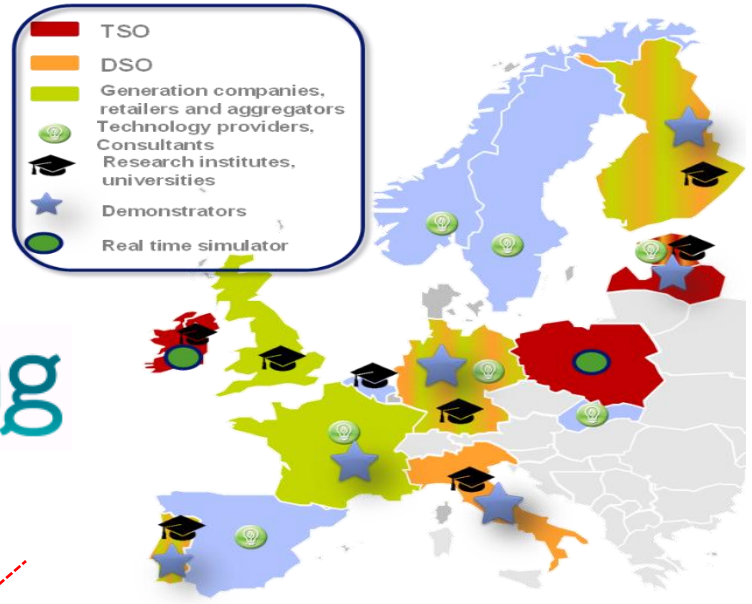
The Consortium



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EurActiv
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AST
PSE
HELEN
Enel Distribuzione
SIEMENS
ENERCON ENERGY FOR THE WORLD
AKKA TECHNOLOGIES
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enoco
CYBERNETICA
UCD DUBLIN
UNIKASSEL VERSITÄT
KATHOLIEKE UNIVERSITEIT LEUVEN
Imperial College London
TARTU ÜLIKOOL UNIVERSITAS TARTUENSIS 1632
UPSIDE
PÖYRY
RSE Ricerca Sistema Energetico
NEW ENERGY WORLD
ESADE
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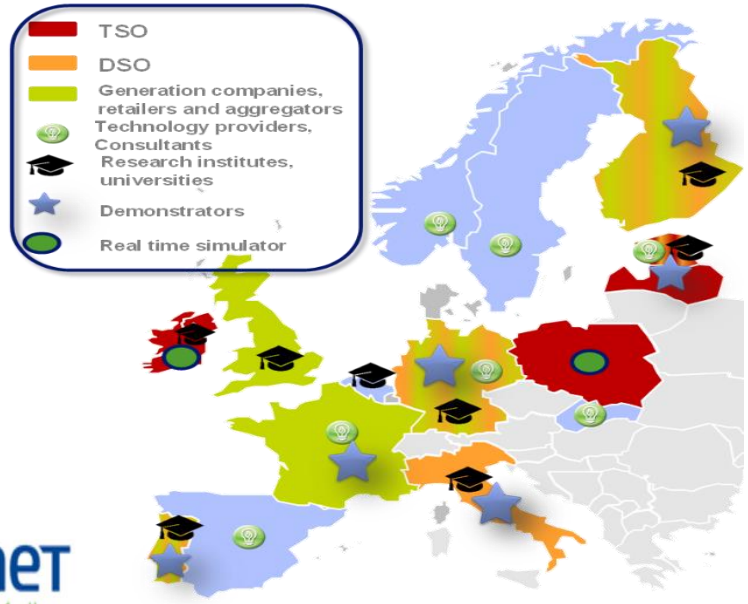
Advisory Group



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EirGrid & SONI Leadership

WP1 – Project Co-ordination and Management Activities
EIRGRID – Leader

WP2 – Development of new approaches for system operation with high RES-E
EIRGRID – Leader

WP3 – Analysis of market design and regulatory options for innovative system services
EIRGRID – Participant

WP4– Simulation of the integration of new system services into System Operator control centres.
SONI - Leader
EIRGRID – Participant

WP5 – Data management for facilitation of new flexible solutions
EIRGRID – Participant

WP6 – Demonstration of flexibility services from resources connected to the distribution network
WP Leader – Innogy

WP7 – Demonstration of flexible capability, pumped storage & wind.
WP Leader - EDP

WP8 – Demonstration of aggregation approaches for multi-services project from a portfolio of distributed resources
WP Leader – EDF

WP9 – Demonstration of cross-border and cross-section data management and exchanges
WP Leader – Elering

WP10 – Pan-European Scalability and Replicability Analysis and Flexibility Roadmap
EIRGRID - Participant

WP11 – Exploitation, Communication & Dissemination and Co-ordination with other H2020 projects
EIRGRID/ SONI – Participant

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H2020 Grant and Benefits

Consortium grant - €20m

- ***EU Funding to facilitate the Island of Ireland meeting its renewable targets.***
- ***Growing influence within Europe.***
- ***Learn from of European Partners.***

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Next Steps

- ***Project Commencement 1st November.***
- ***Official Project Public Launch Q1 2018.***

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System Services Update

Ian Connaughton, DS3 System Services Programme Manager

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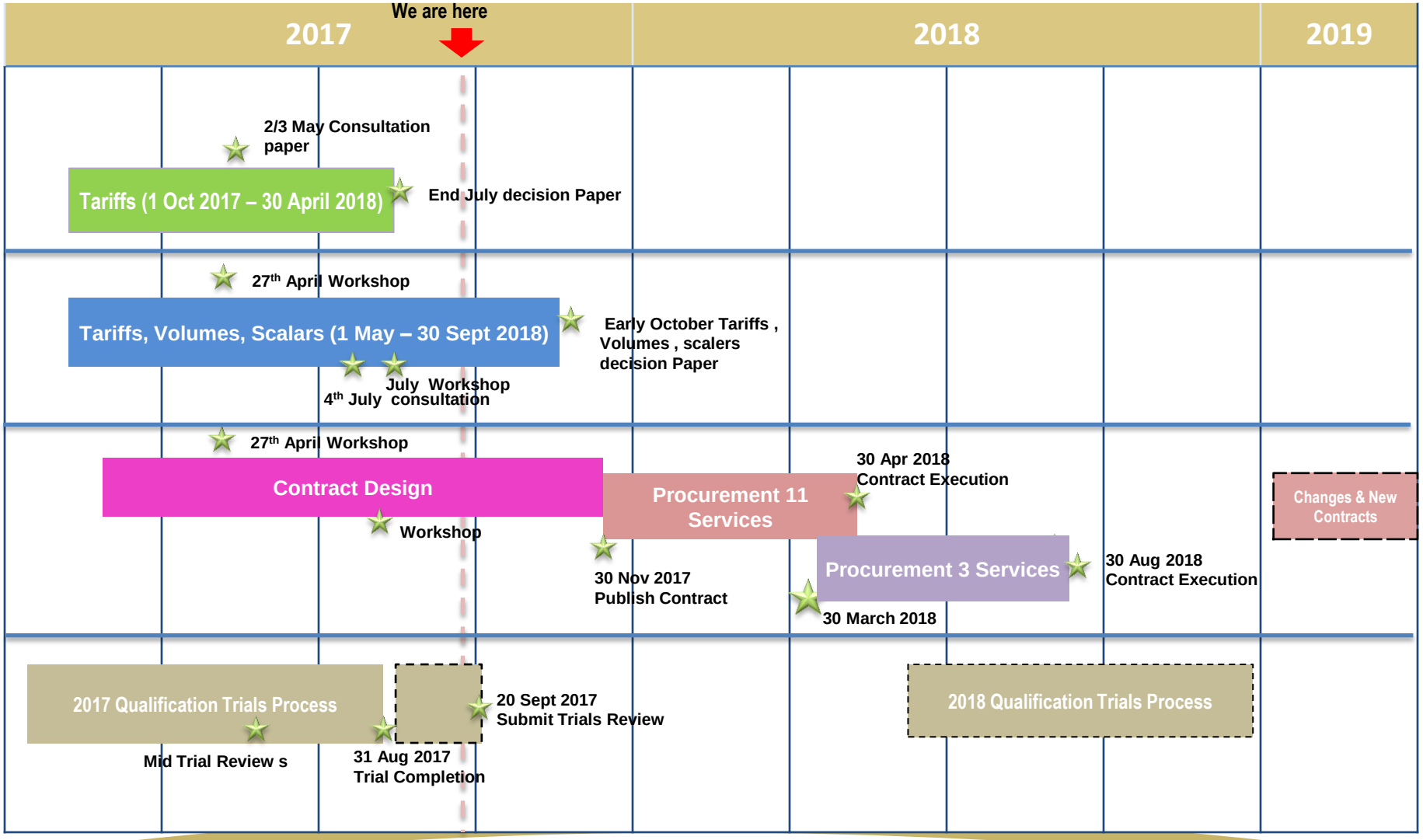
DS3 System Services 2017/18 - Milestone Plan



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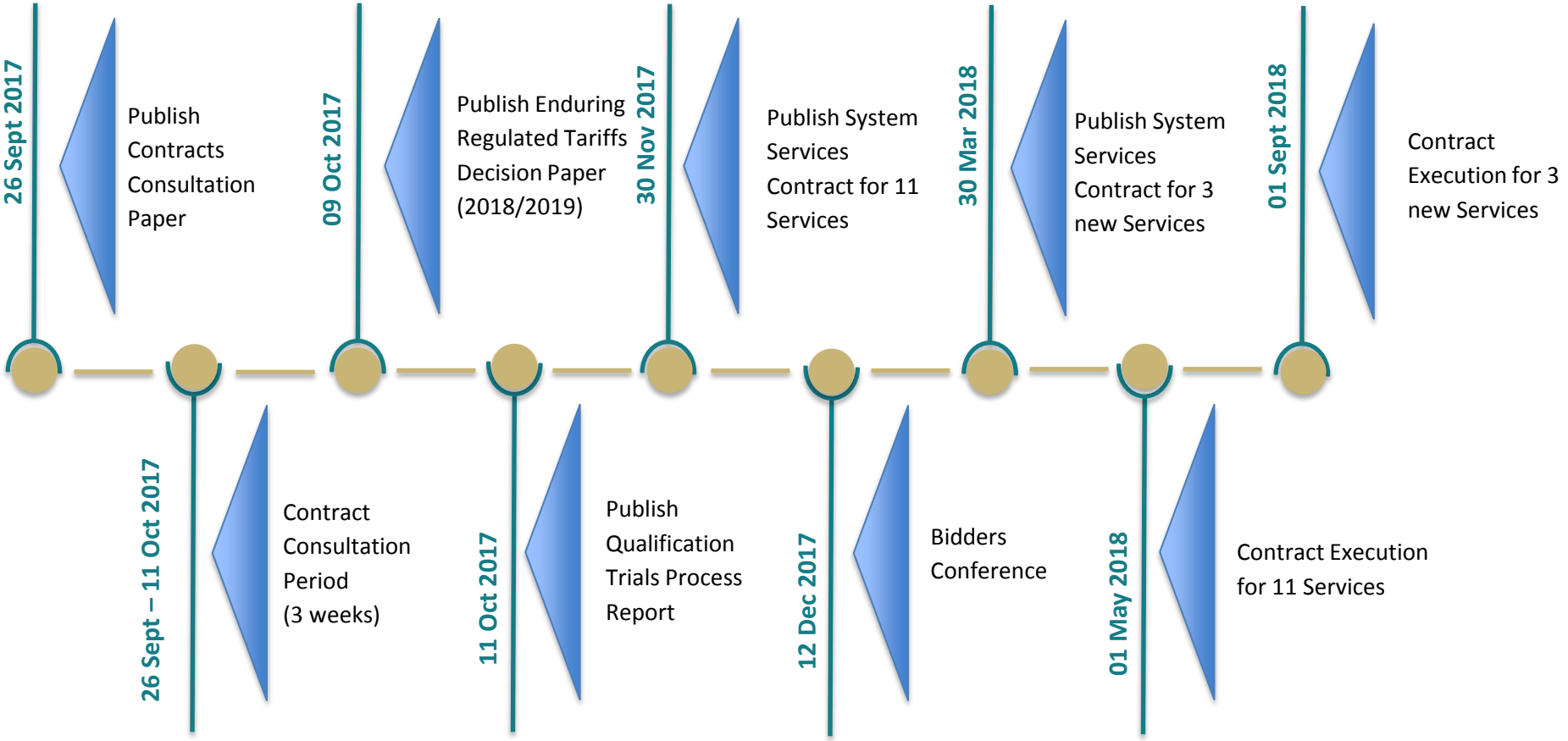
Upcoming Milestones



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Achievements

Qualification Trials Process	01 March – 31 August 2017
DS3 System Services Industry Workshop	27 April 2017
Roll Over Tariffs (Oct 2017 – May 2018) Consultation	02 May – 30 May 2017
Publish Roll Over Tariffs (Oct 2017 – May 2018) Decision Paper	24 July 2017
Regulated Tariff and Scalar Design Consultation Period	04 July – 21 August 2017
DS3 System Services Industry Workshop	01 August 2017

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Placeholder for RA update

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Future Interconnection Study

Noel Cunniffe

19th September 2017

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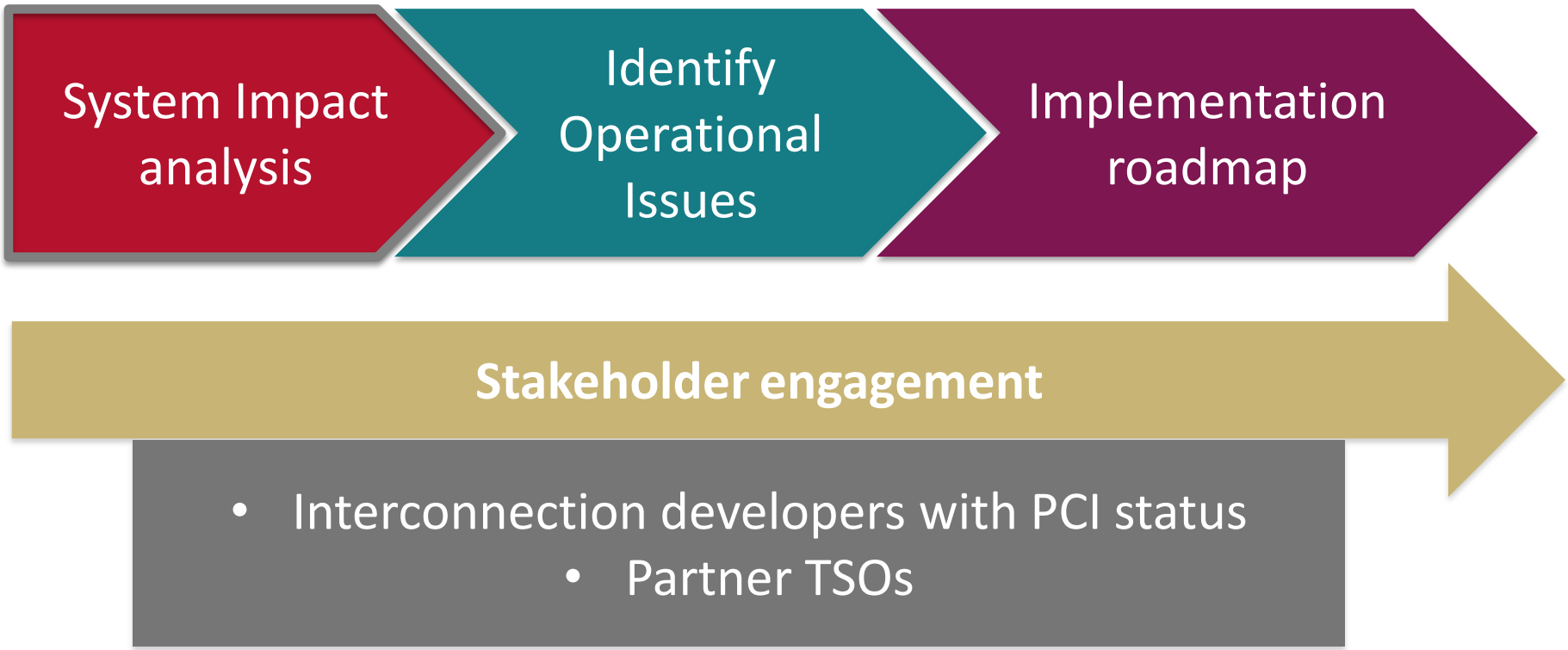
Introduction and Background

- Additional interconnection is likely over the next decade to Great Britain and/or France

- Numerous benefits to increased interconnection:
  a) Increased security of supply – high capacity link
  b) Support to renewable development
  c) Increased market competition

- Potential system impacts due to:
  a) Increased SNSP levels
  b) Increased Largest Single Infeed/Outfeed from 500 MW to potentially 750 MW

Future Interconnection Study Overview



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Potential System Issues

Areas of Focus

- Single Export Loss – MW Excess (High frequency event)
- Single Import Loss – MW Deficiency (Low Frequency Event)
- DC cable fault – Converter or equipment damage investigation
- HVDC controller interactions
- Reduced synchronising torque
- Fault current reduction – protection operation
- Common mode failure w/ GB IC

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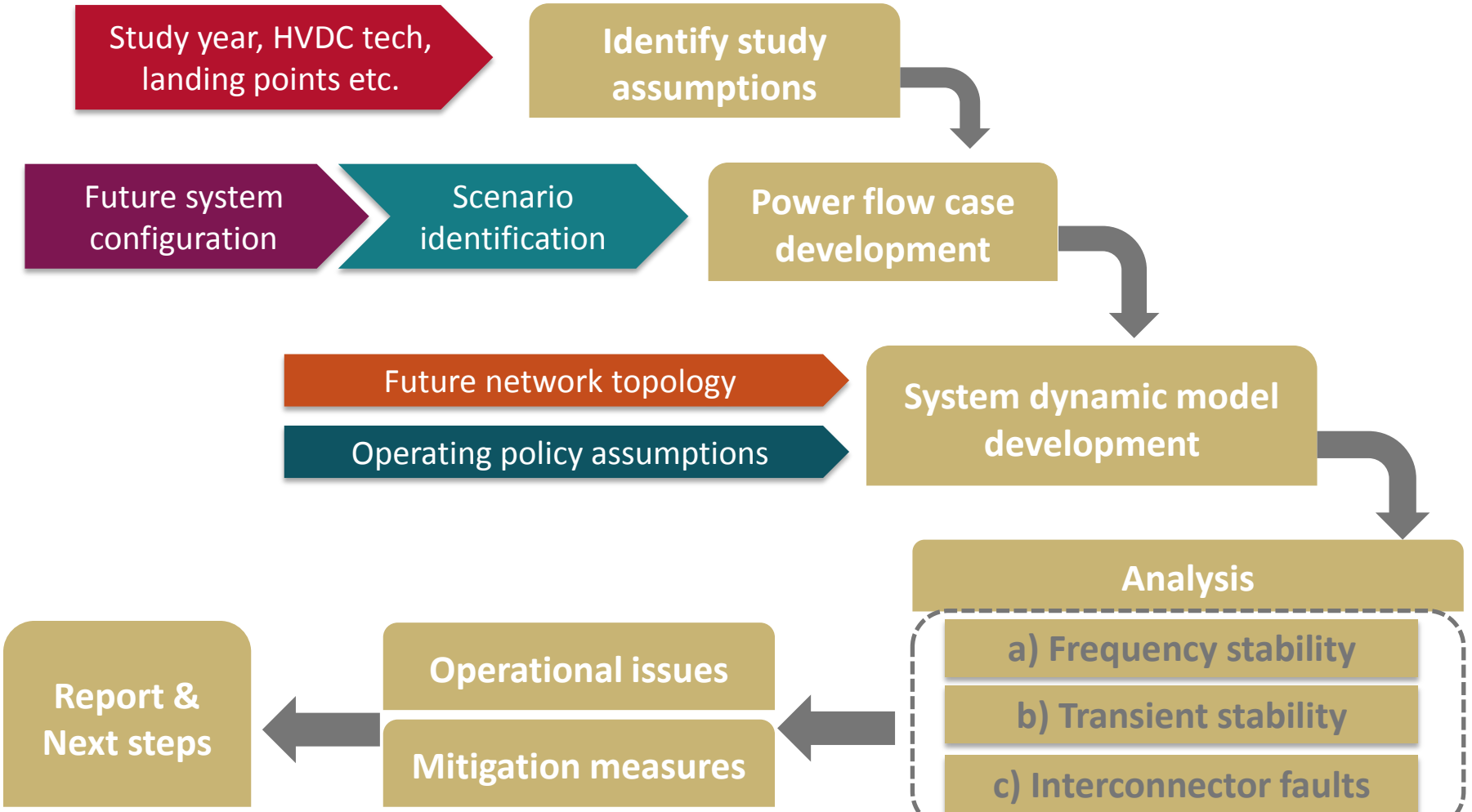
Future Interconnection Study Process



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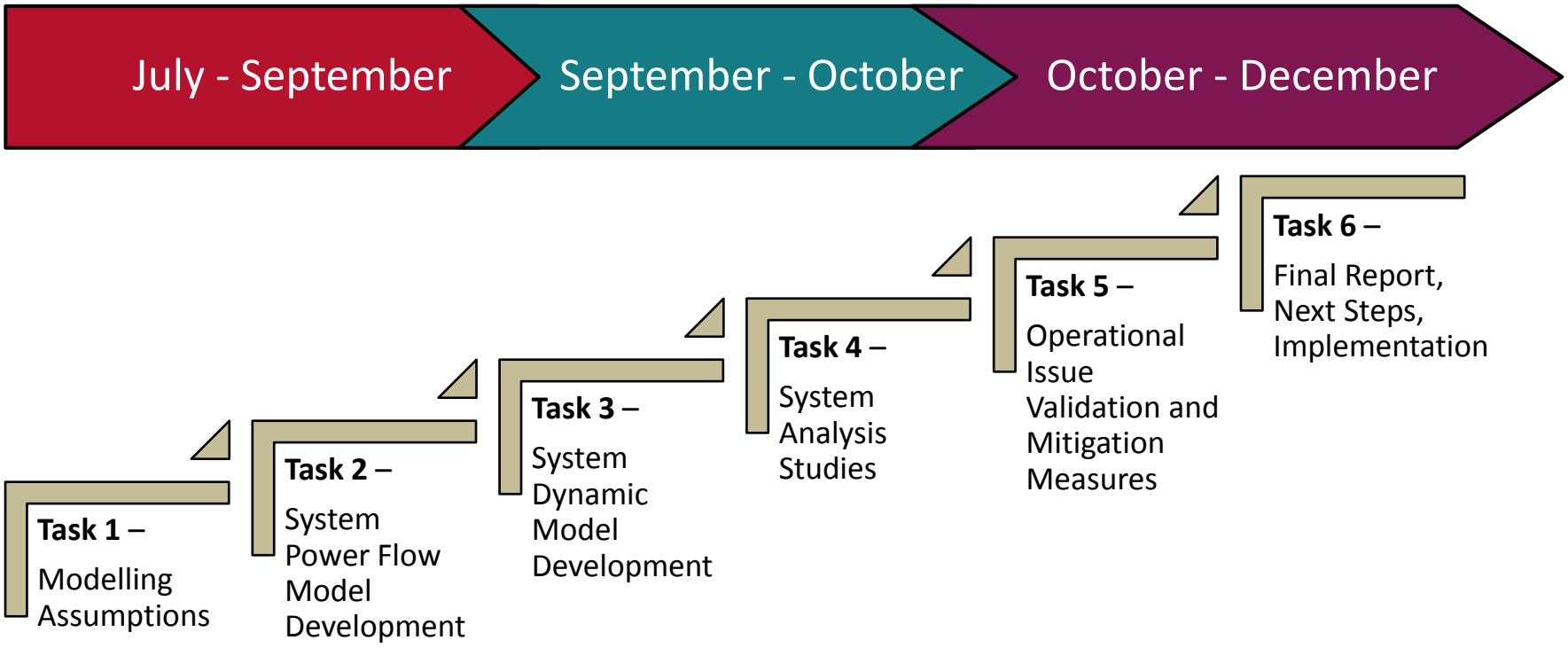
Future Interconnection Study Timeline



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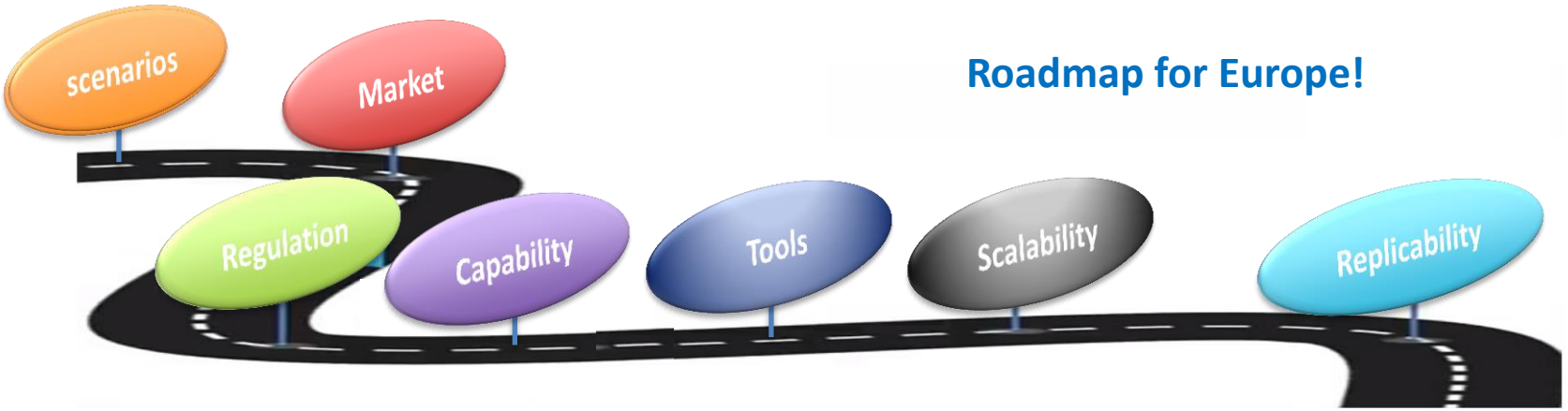
Next Steps – EUSysFlex

- Work Package 2 focuses on high levels of renewables with the large-scale rollout of new technologies on the All-Island system
- Future interconnection will be studied in detail for 2030 scenarios
- Work from Future Interconnection Study will be feed into this



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