RPI-X@20 workshop

Technology and network regulation

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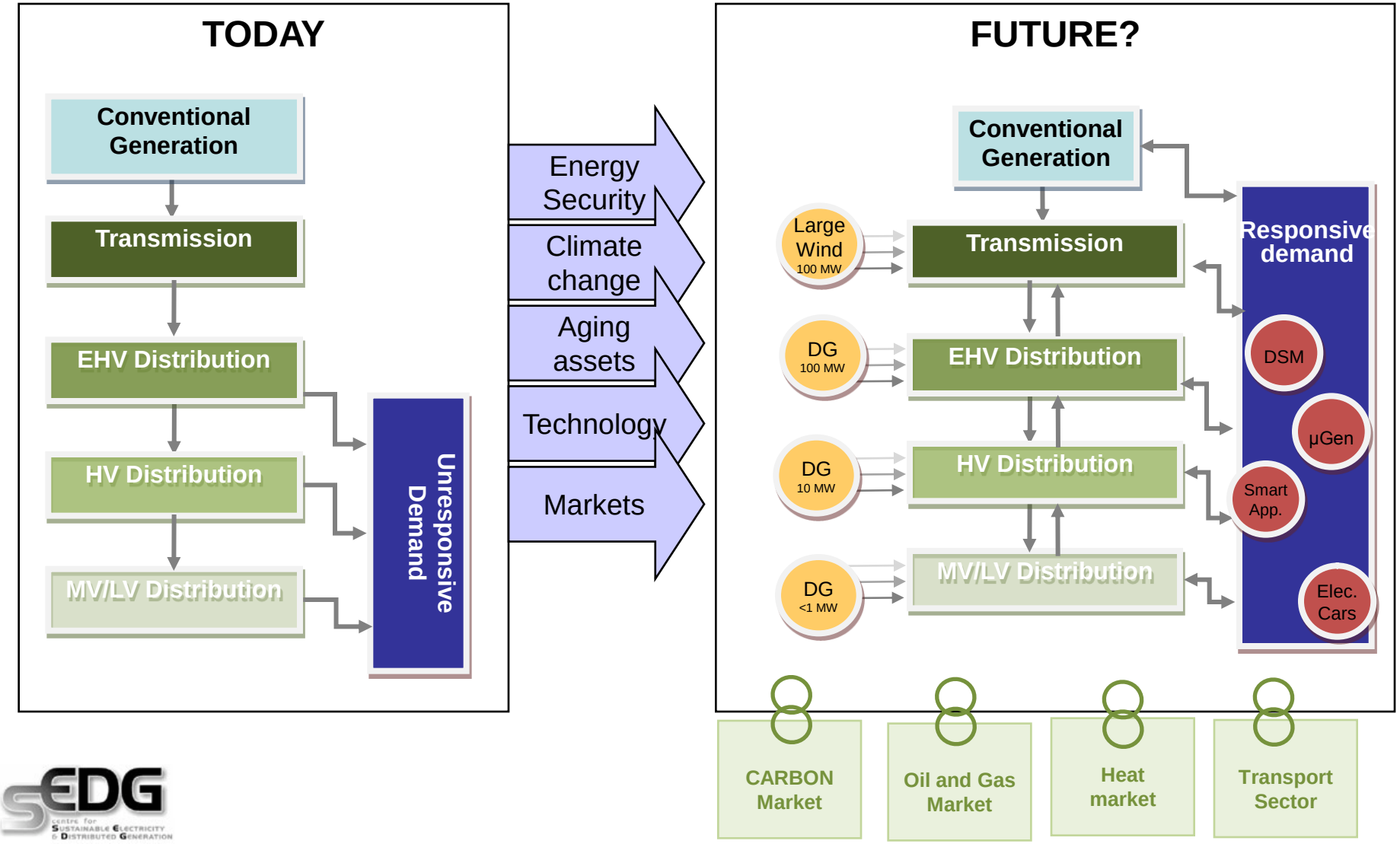
Drivers for change and network regulation

- Drivers for change
  - Security of supply: UK to become importer of gas
  - Renewable Energy Strategy: up to 40% renewable generating by 2020
  - Climate Change Committee: decarbonising electricity system by 2030 while substantially increasing the share of electricity sector; proportions of transport and heat demand to be supplied by electricity
  - Technology advances to potentially increase the utilisation of existing network capacity (currently only at 20-50% peak utilisation)
- Present market and regulatory framework was developed for the incumbent system
- **Is this framework appropriate for potential future systems?**
  - Example of TAR demonstrated that the present framework is inappropriate to support competition in generation and efficient network development in a system with significant contribution of wind power
  - The requirement to fix this market design failure was driven by the Energy White Paper, not by Ofgem. Is this model appropriate for the delivery of potentially radically different low-carbon electricity system?

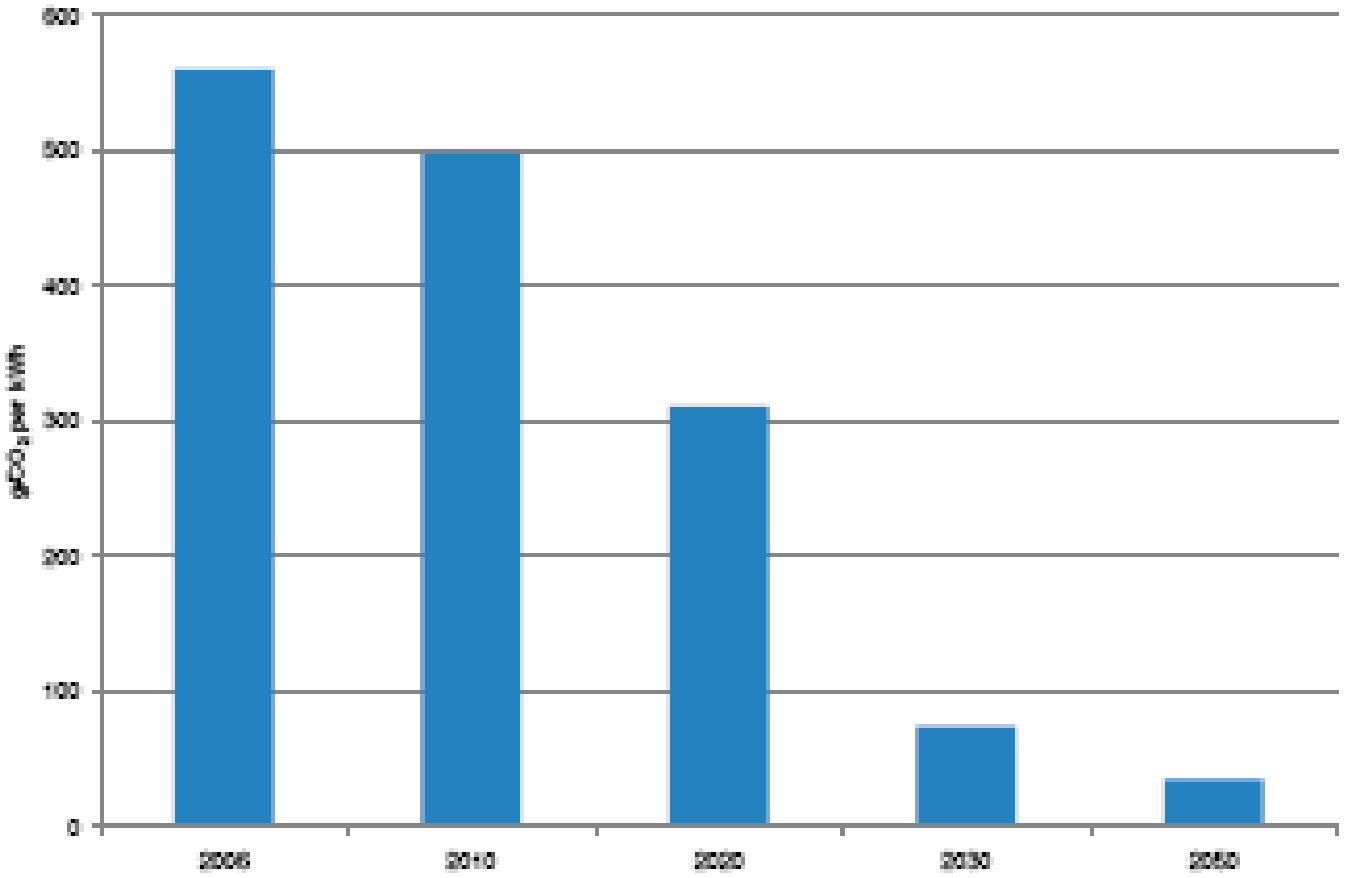
Electricity system in transition



sEDG centre for Sustainable Electricity & Distributed Generation

Towards decarbonising electricity system

Figure 5 CO_2 intensity per kWh of electricity generated, 2006-2050

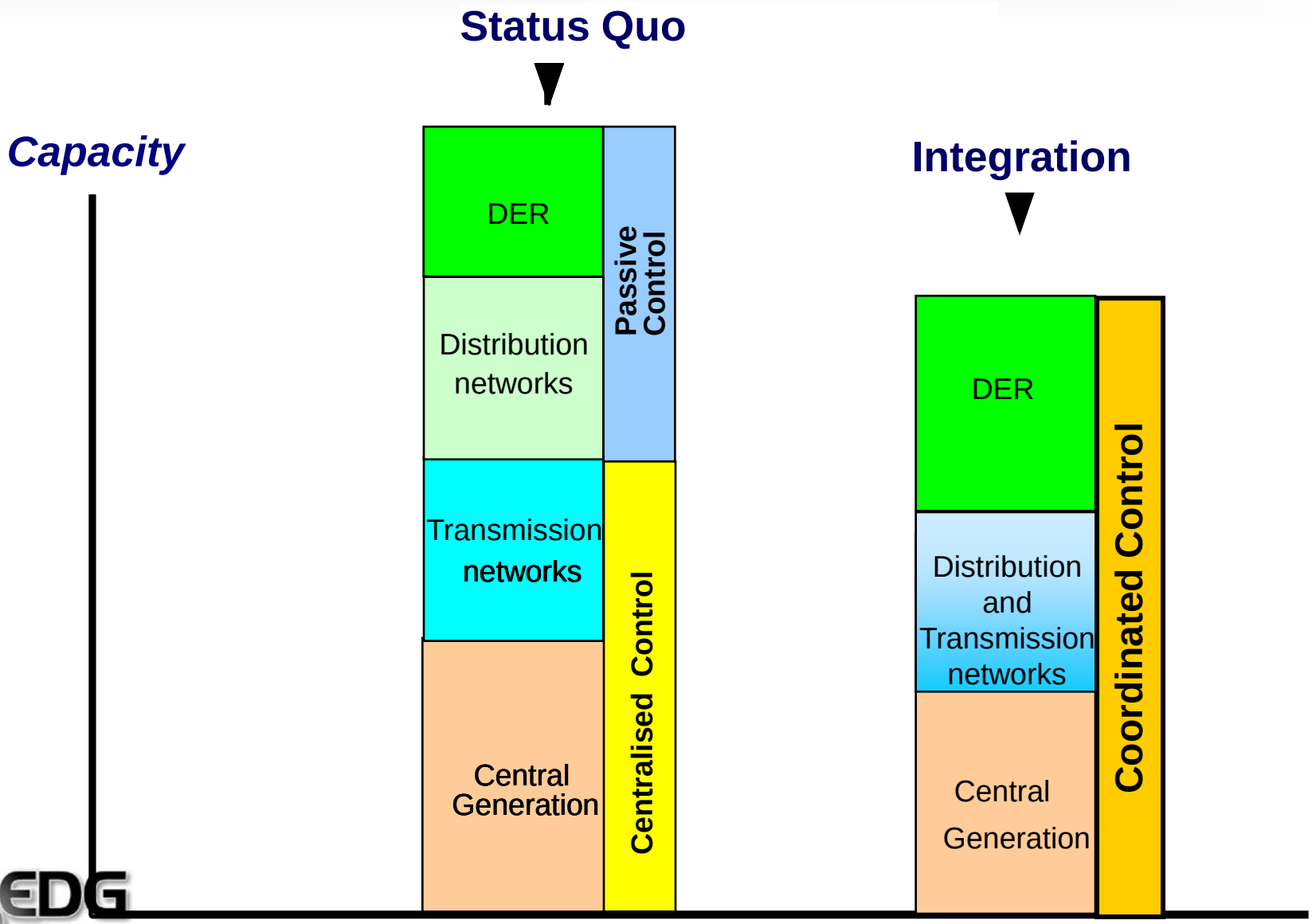


Source: DDD

2020 and 2050

- Can it be delivered?
  - This is only a question of economic efficiency (budget) not the question of technical feasibility
- Potentially significant new investment in networks will be required, but how much? How to ensure efficiency in network investment?
- What are the options? What are the choices?
  - Continue with investment in network primary assets (philosophy developed in late 40s) or invest in innovative more intelligent operation practices and make the infrastructure smarter while broadening the pool of participants (e.g. novel control and protection systems, novel maintenance practices, enhanced real time system management tools, smart metering, incorporation demand side response etc)
- Will the present market and regulatory framework continue to facilitate choices in the discovery of efficient solutions in future systems? Is Ofgem exploring this question?

Choices:


Status Quo
Capacity
DER
Distribution networks
Transmission networks
Central Generation
Passive Control
Centralised Control
Integration
DER
Distribution and Transmission networks
Central Generation
Coordinated Control

Issues to be considered

- What are the fundamental economics of the alternative future systems?
  - It is critical that the economic performance of alternative systems is understood including the tradeoffs between alternative solutions for delivery of each particular scenario, in order to *then* engage with the question:
- Will the existing market framework support efficient development of such a system?
  - Who should be continuously and proactively searching for (potential) inadequacies in market and regulatory framework to ensure that it continues to support efficient delivery of any future system? Ofgem? But this was not the case with TAR.

Example: Need for Transmission Access Reform

- Significant interest in wind power: intermittent resource with (very) low capacity value ("cannot be relayed upon")
- Sharing of network capacity between conventional and wind generation
  - Wind generation contribution to security of supply is limited; future system will be characterised by larger capacity margins
    - Example: Peak demand 60GW, installed capacity of generation 100GW (70GW conventional and 30GW of wind)
    - How much transmission is required?
  - Network capacity should be shared: e.g. on windy days, wind will tend to occupy transmission capacity, on non-windy days conventional generation takes over
  - Present access does not facilitate sharing, change required

Will TAR facilitate efficient network operation and development?

- TAR: choice in network access: *Use the existing network capacity (short term) OR support building of new capacity (long term)*
- In order to exercise this choice, users need to know how much network capacity there is now
  - But what is the capacity of the present system and how it changes with system conditions?
  - What rules are being used to decide as to how much network capacity there is?
  - Are these rules efficient? Has the efficiency been quantified?
  - Are the rules a barrier to entry and a barrier to competition in generation and supply?
- Are the networks delivering maximum value for money to users? What has been done to ensure that this is the case? Are the above questions of interest to Ofgem?
- RPI-X@20 Project should ensure that networks continue to facilitate competition in generation and supply energy and do not present a barrier to entry

Will TAR facilitate efficient integration of renewables?

- Is the Balancing Mechanism within BETTA appropriate for facilitating efficient sharing of network capacity and access and for signaling efficient investment in transmission?
  - BETTA is an energy only market and generation investment costs appear in the balancing mechanism, increasing the costs of short term access
  - Will the short term access options be taken as this is likely to expensive?
  - Might this then undermine one of the key objectives of TAR to facilitate connection early of renewables and become a barrier to entry?
  - Can enduring access arrangements be developed on the basis of an inappropriate market design?
  - Should new wind energy generation in Scotland displace energy produced of plant in Scotland or in England ? Can BETTA facilitate market based solution?
- Other concerns:
  - Is the short term and long term network access efficiently priced?
    - Consequence of not getting this right would undermine the very objective of TAR and would lead to inefficient network operation or development.
  - Demand is excluded, single sided market in access? Is a significant opportunity unnecessarily missed?
  - The proposed time scale for short term access trading is 48h. This is unlikely to be helpful given that half hourly wind generation outputs cannot be sensibly predicted for such a long lead time.

Options for network regulation

- Regulated networks
  - Capex / Opex tensions need resolving
  - Non-network solutions
    - Is the separation of network and energy sustainable; Can RPI-X be isolated from the Energy Market?
    - Innovation?
  - Will the incremental development (multiple of 5 year windows) provide long term efficient solution?
- Merchant networks (no explicit regulation)
  - Can the market deliver sufficient investment?
  - Limited (international) experience

Wider context

- Policy context: formation of DECC, CCC report on Carbon Budgets
  - CCC: legal framework for CO2 reductions to be developed
  - Formation of DECC: Governments wants more power for State for the UK Energy Industry
    - …..and also to correct market failures.
- How do these developments change scope of Ofgem's activities, particularly if markets are to be much less relied upon?
- Where is the *new* boundary between regulation and markets, incentive and central planning, risk and rewards?

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