Demand Connection Code Public workshop
Call for Stakeholder Input

Challenges Ahead

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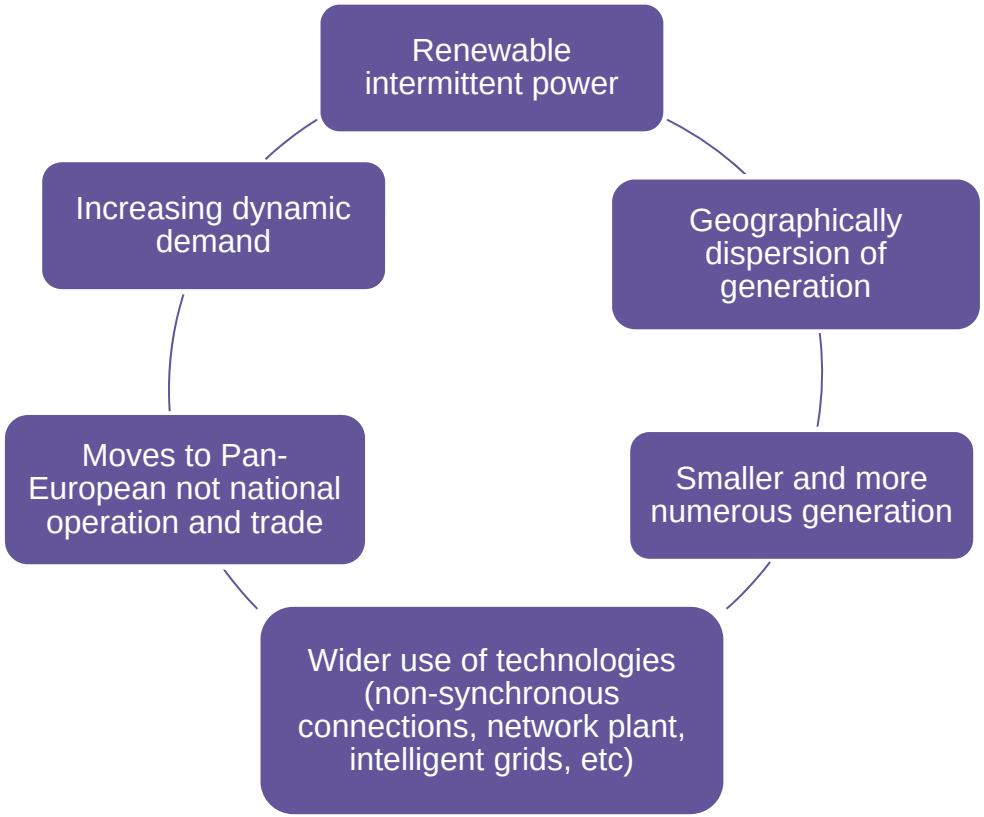
Reliable Sustainable Connected

Challenges Ahead - Drivers

Change is at the core of Transmission network planning and operation



However scale and speed of change in recent years is unprecedented

Challenges Ahead – Results of change

Within last 10 years:

- New generation has used most ‘spare’ capacity on the network
- Renewable grown to excess of minimum load in some countries
- Renewables built in remote (sparse) sections of network
- Centralised to dispersed generation (with reduced control and services)
- Greater energy efficiency in demand
- Networks highly leveraged
- Bi-directional power flow with distributions networks
- More automated users and networks
- Offshore generation
- Step change in interconnection
- Major network development programmes

10 years is within lead-time taken to build a major transmission line

Challenges Ahead – Necessary Response

Fundamental change to network planning and operation by TSOs to integrate RES and move from national to synchronous or European network view.

Network codes through EC 3rd legislative package will be instrumental in this

Key challenges identified within the context of this code:

- Replacing services previously held on large scale generation
- Dealing with the volatility of renewable energy sources
- Performance of distribution networks
- Ensuring Smartgrids deployment provides benefit to these needs

Challenges Ahead - Options to deal with High RES

Demand response appears to be most effective option

Option	Pros	Cons
synchronous conventional generators are required to provide the most significant system services	▪ No significant change from today	▪ Cost constraining off RES ▪ CO_2 emissions - RES constrained off ▪ 100 % CO_2 free production only with nuclear and CCS ▪ Risk of lack of system services
RES generators to provide their share of the system services	▪ No additional CO_2 emissions for voltage support services	▪ RES has to be constrained (and therefore wasted) ▪ Embedded generation needs full control
extensive building of storage systems	▪ Only limited CO_2 emissions (from less than 100% cycle efficiency) ▪ Supports RES integration	▪ New storage systems have to be built Europe wide ▪ Feasibility not in all areas ▪ High environmental impact
demand facilities provide their share of system services	▪ No additional CO_2 emissions ▪ Supports RES integration ▪ Services have the potential to be provided at low/no cost or minimum consumer impact ▪ Highly reliable - risk spread ▪ Consumers are able to participate in market to reduce CO_2 and will pay less	▪ Public perception of possible inconvenience ▪ Public acceptance ▪ DSOs need to contribute more towards managing a system with high RES (e.g. voltage)

Location in network requires that adequate network performance ensured both from both transmission and distribution networks to realise the full potential of RES

Challenges Ahead – Key points

1. Change is not new, but present rate and scale of change is
2. Moving to a decarbonise, high RES, provides major challenges
3. Problem in planning terms is already upon us; developing new tools/services to meet challenges needed immediately
4. Distribution networks increasingly important in balancing demand and generation
5. All users can and may play a role going forward
6. Increased volatility in future network development predictions increases need for a more flexible and wider source of network services