

Electrical grids - latest evolutions

**Clément Robert/ François
Gibelli (DGEC-3C)
OFATE**

Paris 24.11.2016



Connection to electrical grids : why adaptating the rules for the RES ?

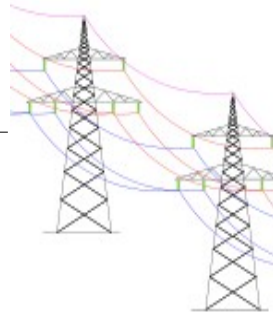
- According to the previous French regulation, each project promoter had to finance fast the entire costs of connecting its power plant to the grid.
- It could happen that the promoter had to fund an entire substation when needing only part of the capacity.
- Thus
 - a deterrent effect for small-volume producers, due to the cost of reinforcement
 - a risk of freeriders: the following producers may connect to the grid without paying

A risky environment (without S3RENR) : high barriers to entry

Initial situation : a wind farm (power = 30 MW)
available grid capacity = 40 MW => remaining grid capacity for a new project = 10 MW



30 MW



Project: a wind farm (power = 30 MW) => the wind farm can be built only if increasing the substation's capacity



30 MW

Due to transformers technical standards, there is a significant risk of oversizing the facilities => risk of barriers to entry, especially for small power plants



A risky environment (without S3RENR): freeriding

Initial grid capacity = 40 MW

Additional grid capacity (funded by wind power producer) = + 40 MW

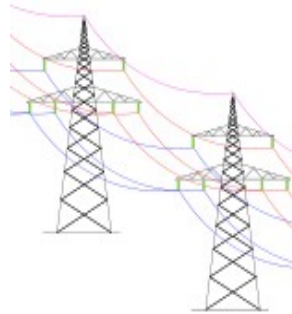
Available grid capacity: $40 + 40 - 30 - 30 = 20$ MW



30 MW



30 MW



10 MW

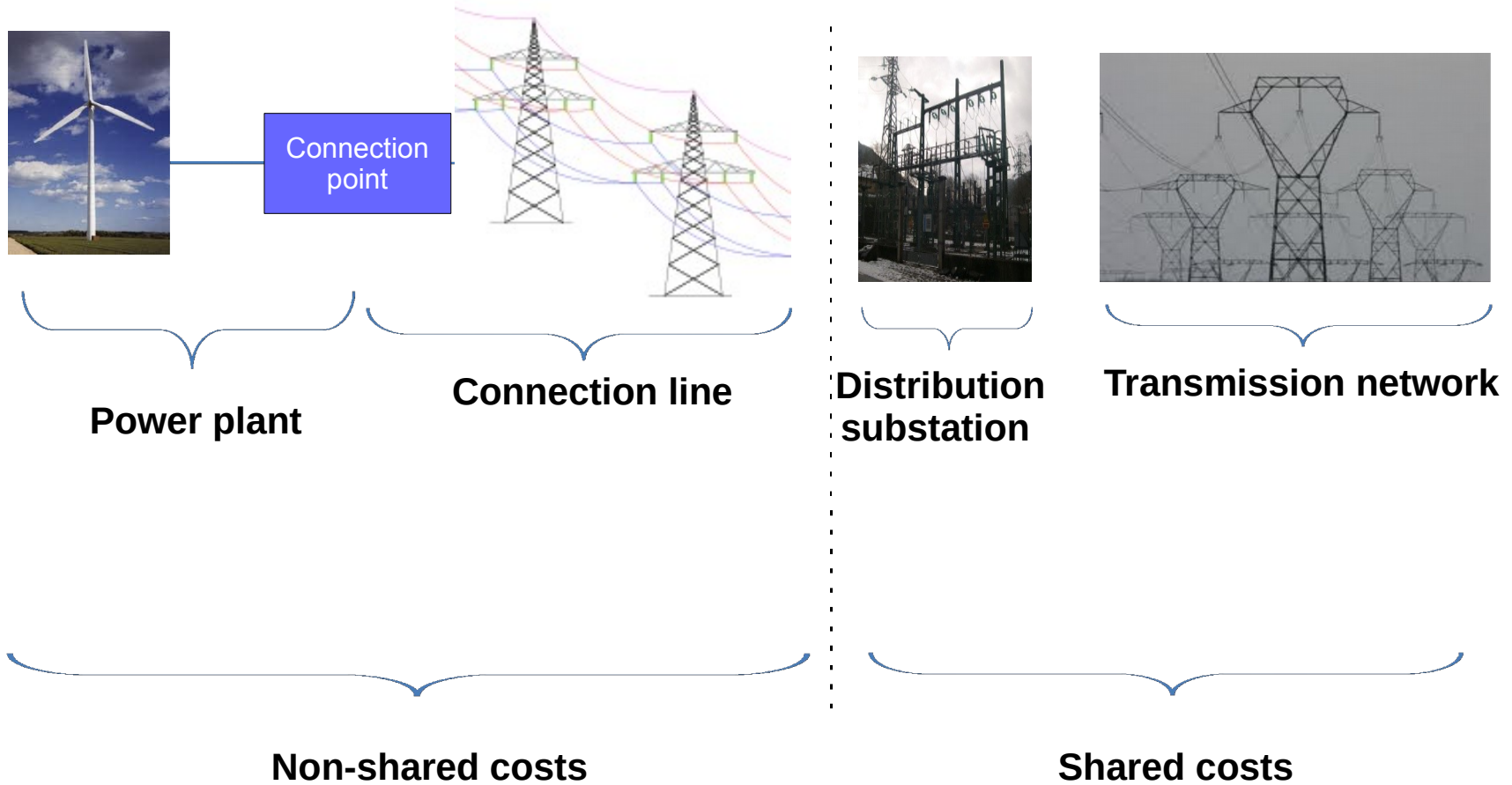
New project: a solar farm (power = 10 MW)
No need for a new reinforcement: the project promoter will benefit from wind farm producer-funded capacities
=> risk of freeriding



Rethinking the connection solutions: The benefits of the Regional development Plans for RES Connection (S3RENr)

- Planning a long-term development of RES at the regional level
 - Debating with all the stakeholders
 - Main responsibility: TSO (approved by the Préfet de région)
 - Fixing a RES target
 - Forecasting the evolutions of electrical grids
 - Giving visibility to the whole process for the investors
- Flexibility facilities
- Partly sharing the costs between all the RES producers through a financial contribution (« quote-part »)

Shared costs in the regional Development Plans or RES Connection



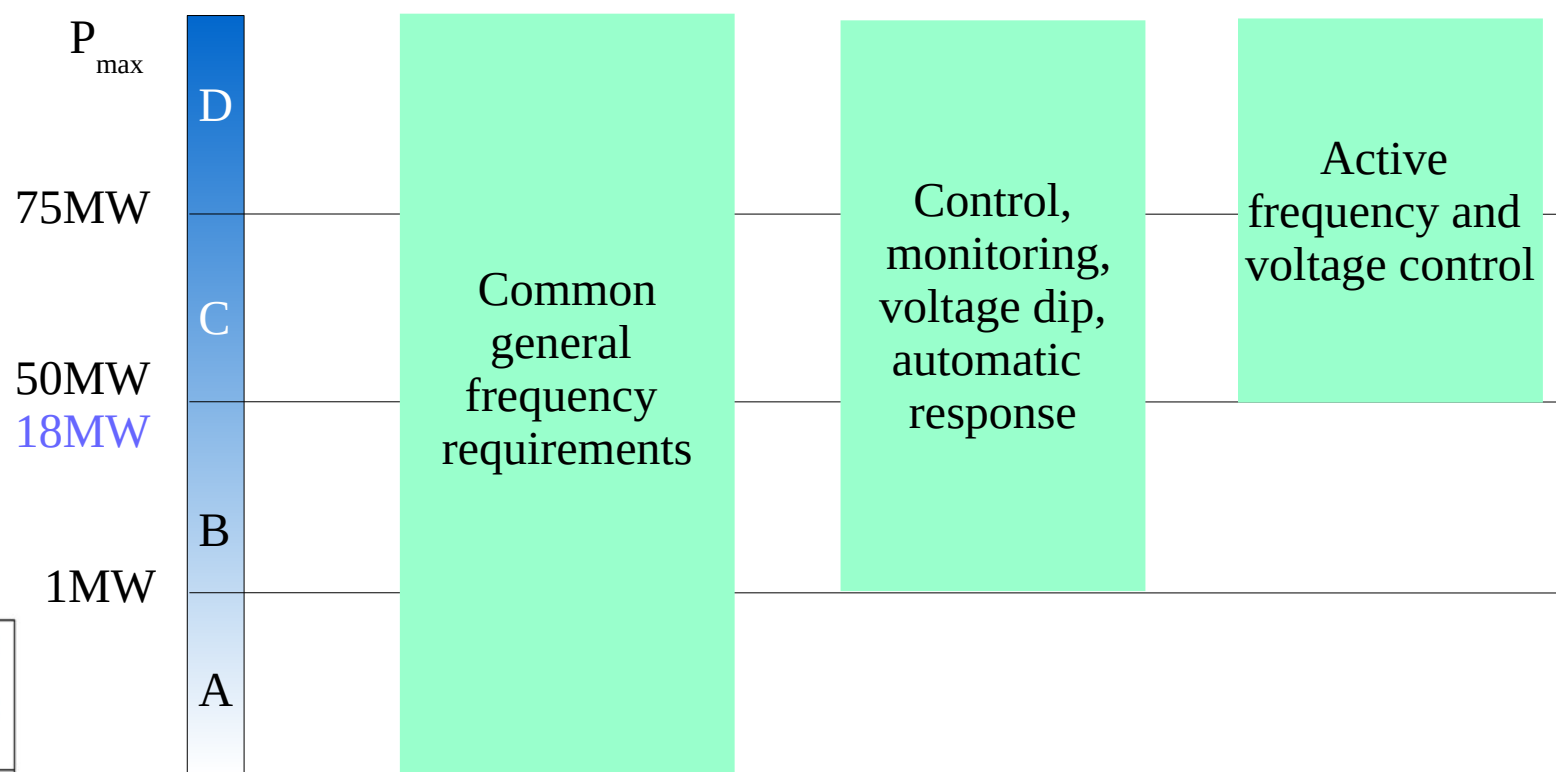
Key elements for setting up a realistic Regional development Plan for RES Connection (S3RENr)

- A prospective analysis
 - Generation opportunities
 - Grid capacity
 - Environmental constraints
 - Issues : avoiding as much as possible the reviewing of the scheme (and thus the financial contribution)
- Consulting all major stakeholders
 - taking into account the issues at stake (political, environmental, economical...)
- Feedback



UE Network code RfG : Requirements for Generators

- For new generators and those having been modified (Art.4)
- Existing generators (Art. 4.2) precised by each member State
- Derogations (Art 60-) according to conditions fixed by member State



UE Network code RfG : Requirements for type A Generators

- Constructive capacities (Art 13)
 - Frequency variation stability
 - High frequency behaviour (droop)
 - Admissible power loss in low frequency
 - Logical input
- Conformity
 - Compliance certificate (Art. 30)



UE Network code RfG : Requirements for type B Generators

- Compliance with type A requirements
- Reactive power capacity (Art. 17)
- Additionnal constructive capacities
 - Voltage dip profile (Art 14 and 20 for non synchronous generators)
 - Logical input for reactive power
- Conformity
 - Active frequency control (LFSM-O), Art 44 and 47 for non synchronous generators
 - Conformity tests can be replaced by simulations (Art 51 and 54)
 - Operational notification by Art. 31 and 32

UE Network code RfG : Requirements for type C Generators

- Compliance with requirements for type A and B (Art 15)
- Reactive power conditions (Art. 18 and 21 for non synchronous)
- Low frequency behaviour
- Primary and secondary frequency adjustment
- Voltage adjustment
- Power control
- Monitoring instruments
- Power variation slopes
- Conformity according to Art 45 and 48
- Simulations for conformity compliance (Art 52 and 55)
- Operational notification Art 31 and 32



Thank you for your attention !

