



INTEGRATION OF RENEWABLE ENERGIE SOURCES INTO THE GRID: ASSOCIATED PROBLEMS AND POTENTIAL SOLUTIONS.

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Guadeloupe

230 000 customers
277 MW
17,5 % from RES



Martinique

187 300 customers
326 MW
6 % from RES



Guyane

62 000 customers
241 MW
63% from RES



Corse

241 000 customers
505 MW
33 % from RES



La Réunion

355 000 customers
216 MW
38 % from RES

EDF SEI in a nutshell (2013 figures)....



More than
1 million customers

3,100 employees

9,6 TWh delivered

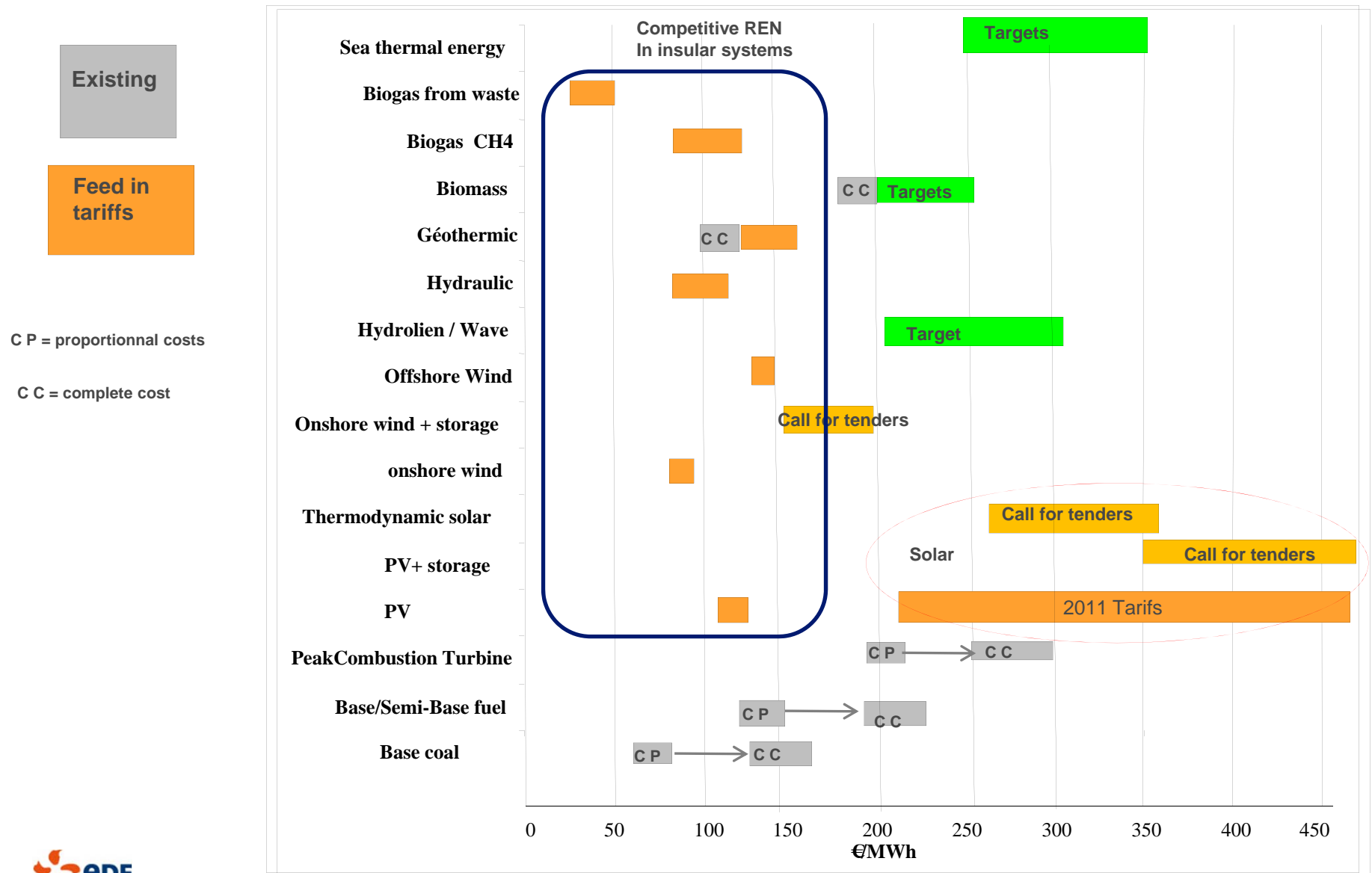
**2000 MW EDF
generation capacity
29% Renewable sources**

Promotion of **Demand side
Management**

Stepping-up **Fossil-fired
capacity** to guarantee the
energy balance of its
networks and modernize the
plants

Developing
**Renewable Energy
Sources** to limit the
dependence on fossil
fuel and protect its
local fragile
environment

1/ RENEWABLE PRODUCTIONS COSTS IN ISLANDS



2/ CHARACTERISTICS OF INTERMITTENTS RES

1/ Fatal Energy

- ❑ Not always available when needed, influenced by time and by availability of the primary energy source
- ❑ No modulation of production without energy losses
- ❑ Not delivering energy reserve

2/ Intermittent Energy

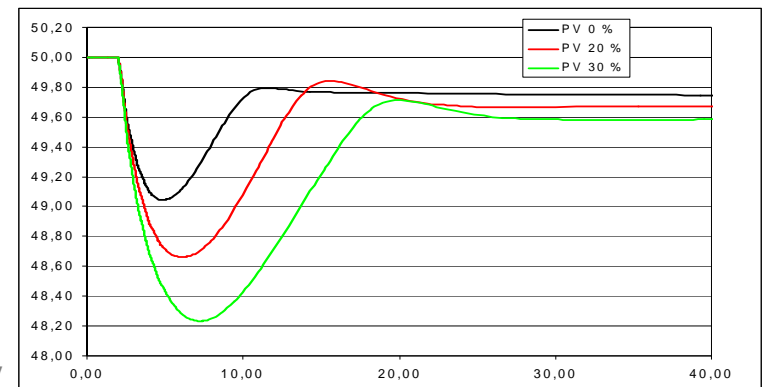
- ❑ Variability from an hour to another, from an minute to another

3/ Lack of inertia

- ❑ These productions does not sustain the electrical system which needs rotating inertia : kinetic energy stored limits frequency drop when loosing a production group

4/ Voltage and frequency withstand capability

- ❑ These productions may disconnect themselves from the grid in case of voltage and frequency drop.



3/ MAIN POSSIBLE SOLUTIONS

Limitation of intermittent RES share

- When intermittent production reaches 30% of the instantaneous production, disconnection of the last production connected.
- Initially, this situation is only occurring with a low consumption and a high level of production from intermittent RES.
- It may become an economic barrier to RES development when disconnection hours increase.
- To apply such a rule, real time observation system of production is needed completed with disconnection tools.

Adaptation of electric system management

- Increase the flexibility of base production
- A redistribution of primary reserve means may enable an higher integration of intermittent energy.
- Cost may be high.
- It depends of the initial state of each electrical system and the foreseen power.
- In a more prospective way, a real time tariff may enable the interruption of some load uses to follow the availability of the production

Storage

- Storage is a mean to reduce or even suppress the intermittency
- Storage may be operated in a centralised manner (optimized by the system operator) or in a decentralized way (optimized to smooth the production of each customer).

Production forecast

- The uncertainty on prevision forecast leads the dispatching to have permanently supplementary reserve means to meaning extra costs.
- Production forecast on small insular territories is a difficult exercise limited simultaneously by availability of meteorological data and by modelization capability.

Thank you