



**MINISTÈRE
DE L'ÉCONOMIE,
DES FINANCES
ET DE LA SOUVERAINETÉ
INDUSTRIELLE ET NUMÉRIQUE**

*Liberté
Égalité
Fraternité*

Direction générale de l'énergie et du climat

OFATE – REGULATORY FRAMEWORK FOR RENEWABLES POWER GRID INTEGRATION IN FRANCE

AUDE MAILFAIT
DEPUTY HEAD OF UNIT ELECTRICITY NETWORKS, PLANNING AND SECURITY OF SUPPLY

MAY 15TH, 2024

REGULATORY FRAMEWORK FOR RENEWABLES POWER GRID INTEGRATION IN FRANCE

1. The issue of renewables integration in France
2. The regulatory framework for renewables integration in France
3. Optimisation and experiments

1. The issue of renewables integration in France

The power mix in France

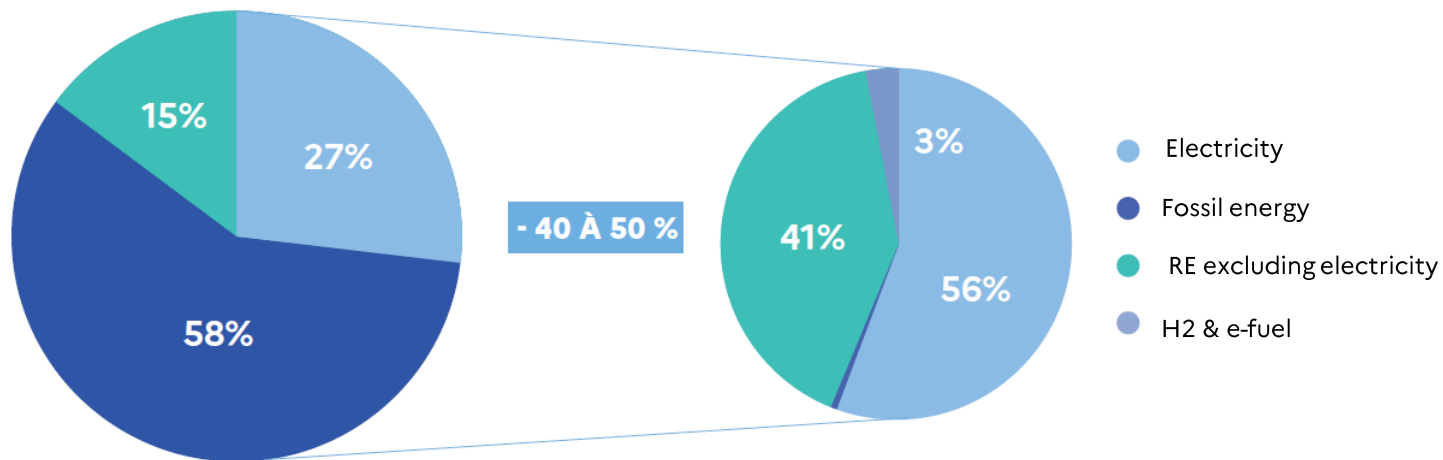
Overall fall in energy consumption and rise in electricity consumption

In 2021 :

1611 Twh of consumed energy

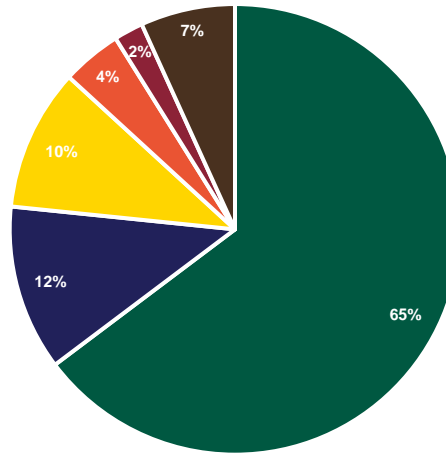
In 2050 :

~ 900 Twh of consumed energy



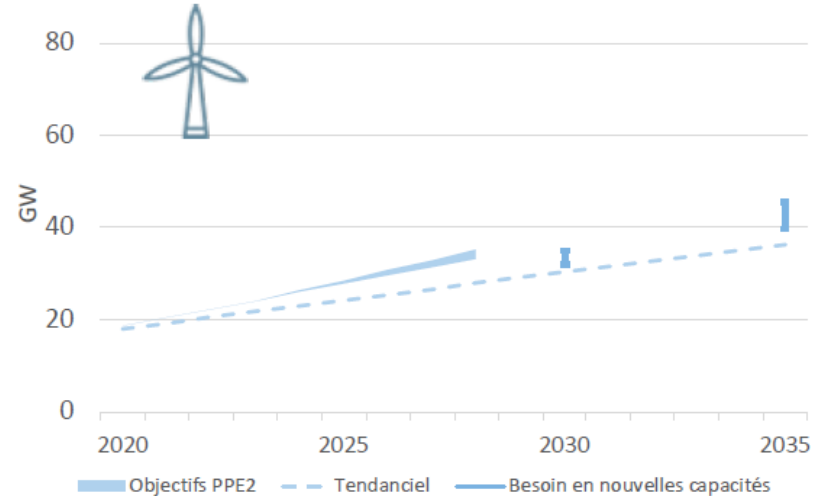
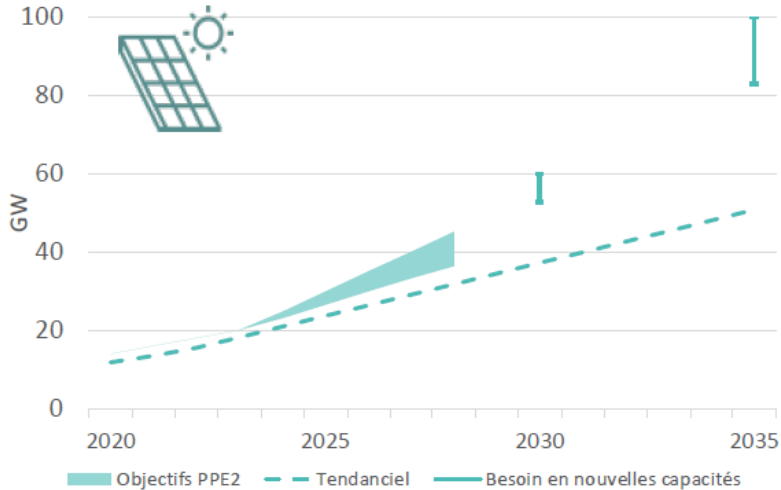
The power mix in France

Electricity production mix in 2023
Source : RTE Electricity Report 2023



- Nuclear
- Hydropower
- Wind energy
- Solar PV
- Bioenergies
- Fossil fuels and gaz

Pace of solar and onshore wind development

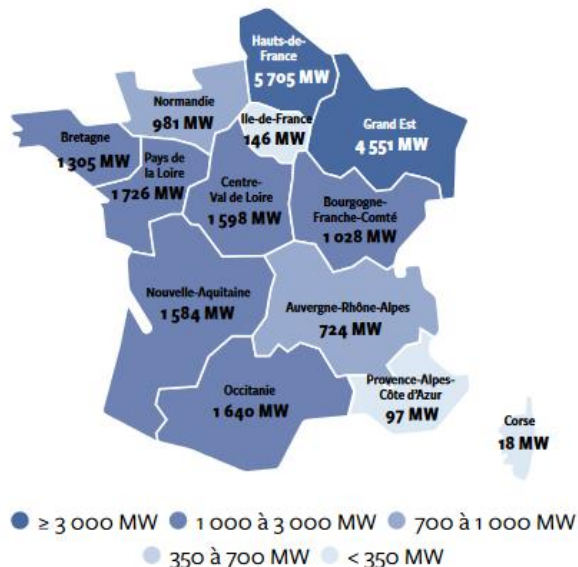


- Increase the rate of development of solar energy to at least 5.5 GW/year, with a target of 7 GW/year (compared with 3 GW/year at present).

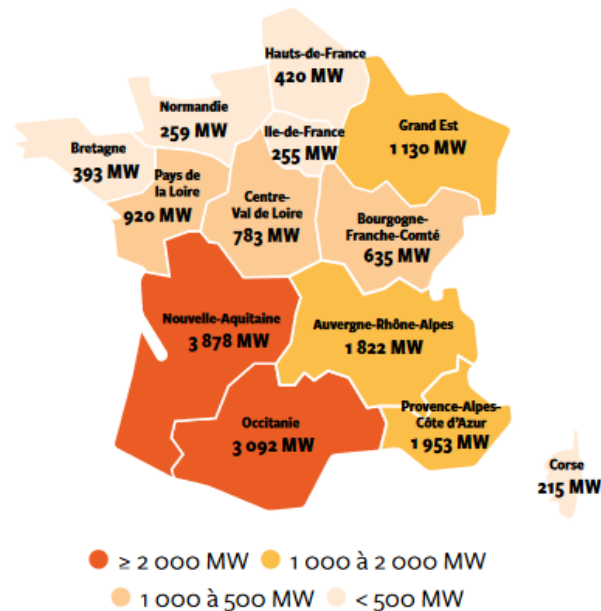
- Maintain at 1.5 GW/year, with the aim of achieving a more balanced distribution between regions

Geography of installed wind and PV capacity

Wind power by region the 31st of december 2022 :



PV power by region the 31st of december 2022 :



2. The regulatory framework for renewables integration in France

National network development plans

- The Directive (EU) 2019/944 on common rules for the internal market for electricity introduced 2 multiannual documents, one for each system operator
- For the DSOs : “the development of a distribution system shall be based on a **transparent network development plan** that the distribution system operator shall publish **at least every two years** and shall **submit to the regulatory authority**”
 - Five-to-ten years scope
 - Describes planned investments with particular emphasis on the main distribution infrastructure which is required in order to connect new generation capacity and new loads
 - Includes medium and long-term flexibility services, the use of demand response, energy efficiency, energy storage facilities or other resources that the distribution system operator is to use as an alternative to system expansion
- For the TSO : “**at least every two years**, the TSO shall submit to the regulatory authority a **ten-year network development plan** based on existing and forecast supply and demand after having consulted all the relevant stakeholders”
 - Contains efficient measures in order to guarantee the adequacy of the system and the security of supply
 - Indicates the main transmission infrastructure that needs to be built or upgraded over the next ten years
 - Takes into account the potential for the use of demand response, energy storage facilities or other resources as alternatives to system expansion, as well as expected consumption, trade with other countries and investment plans for Union-wide and regional networks

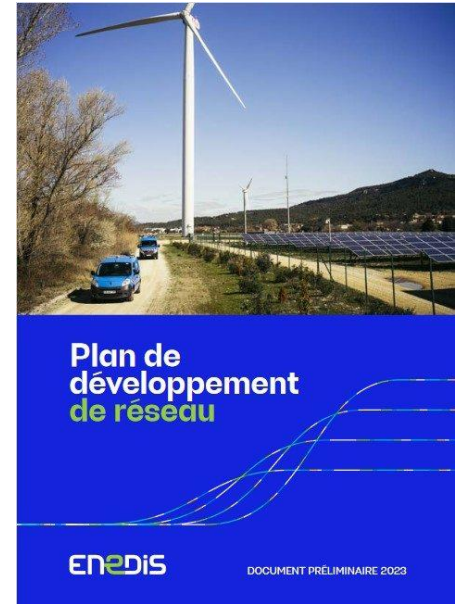
The transmission network development plan (SDDR)

A document which :

- Identifies the main infrastructures and investments to be made on the transmission network over the timeframe of the plan
 - Is based on existing supply and demand, as well as reasonable medium-term assumptions for their development and for cross-border exchanges
 - Must, in particular, be consistent with the multi-annual energy programme (PPE)
 - Adopts a forward-looking approach based on multiple scenarios
- ➔ The future SDDR will cover the period from 2024 to 2040
 - ➔ An expected increase in investment of 100 billion€
 - ➔ The challenge of industrial supply is central

The distribution network development plan

- A preliminary document prepared by Enedis before a decree set out the timetable, the content and consultation procedures
 - The investments announced by Enedis have been assessed on the basis of a reference scenario anticipating a strong development of renewables according the 2019-2028 multi-annual energy plan (PPE) : 28GW of wind power & 42 GW of PV connected to the public distribution grid by 2032
- + 4/5GW of renewables per year
- In total, Enedis' investments will go from an average of 4 billions € per year (4,4 billion in 2022) to more than 5 billion per year

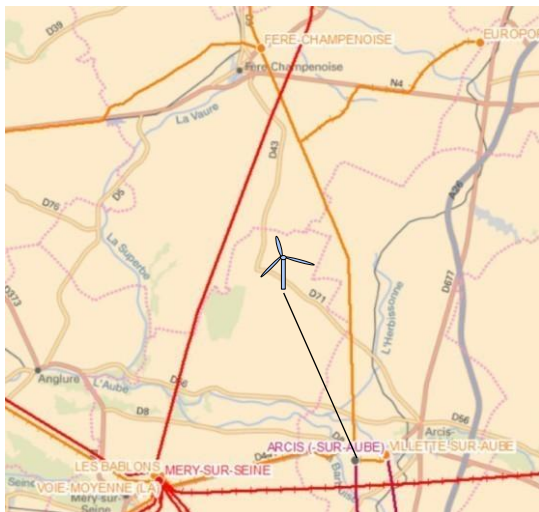


Regional schemes (S3REnR)

- Statement (~2012) : the electricity network was about to become a bottleneck for renewables development
 - A **shortage of grid capacities** was forecast
 - The **first renewable project** requesting connection in an area with scarce connection capacity would **pay all the expenses** for the network reinforcements (for instance: substations, etc.)
 - The **time for building new substations and transmission lines** (3-8 years) is **much longer than time needed for implementing renewables power plants** (2-3 years)
- **A regulatory framework to trigger investments in advance. Costs would be distributed between users (when they request their connection) proportionally to their power capacity**
 - → **Objective** : the grid shouldn't slow renewables integration (both capacity, time and cost related)
- Principles (in each region)
 - Global capacity and reserved capacity for renewables in each substation
 - Works schedule on the transmission and distribution grids → Estimated costs
 - **Validation of the scheme and the share to be paid by producers : estimated costs/scheme capacity (k€/MW)**
- Process
 - Taking into account PPE and SRADDET objectives
 - Broad consultation conducted by RTE with stakeholders (producers, public authorities, DSOs, etc.)
 - Localization of renewable production → grid investments needed (mutualized infrastructures)
 - Environmental assessment

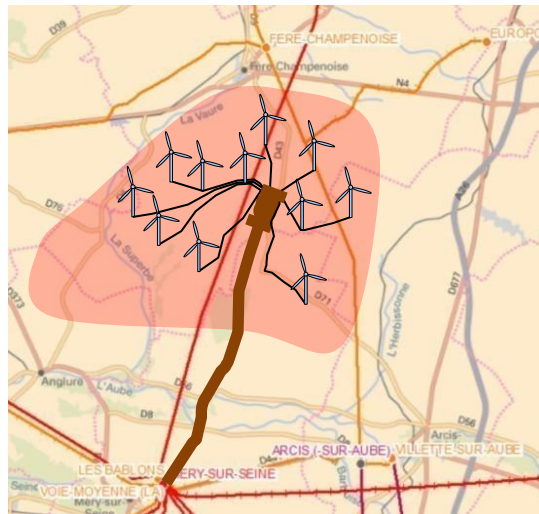
Regional schemes (S3REnR)

Without S3REnR



Investments needed for each renewable project are set on a « first-come first-served » basis. Costs are born by the applicant project, even if works profit to following ones.

With S3REnR



Investments needed to connect all identified projects in once.

Costs are mutualised between RES projects and TSO/DSO.

Advantages

- To agree on the renewables localization and capacity
- To increase the capacity to connect renewables to the grid with limited new assets
- To provide visibility on the localization of the planned developments and reinforcements and
- **To provide visibility and stability on the cost for connection (share)**
- To anticipate grid developments to facilitate renewables' development
- **To share the costs of grid developments between renewables producers**

Works themselves start only when is reached a « trigger threshold »

Regional schemes (S3REnR)

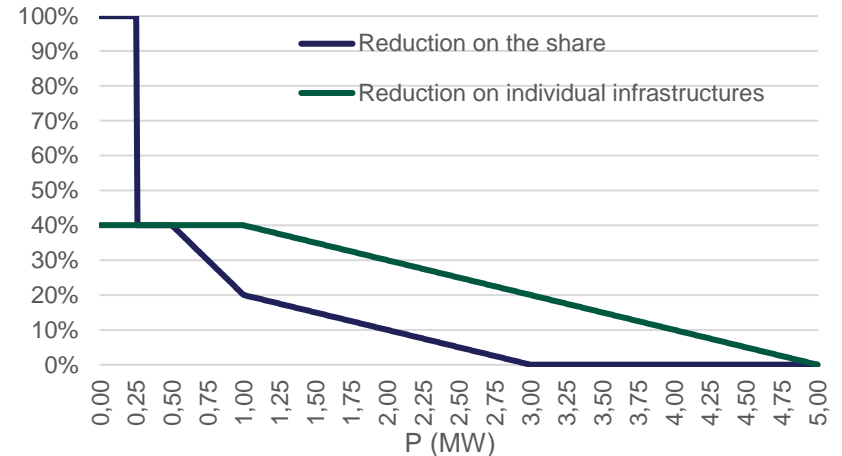
The ongoing reform issued by the law on accelerating the production of renewable energies (APER) – 10th of March 2023 :

- **The inclusion of a timeframe of ten to fifteen years** for the network upgrades required to connect generation facilities ;
- **The introduction of technical and economic criteria**, to be defined by decree, to rationalise the planning of network upgrades by delaying the inclusion in the plan of certain renewable energy sources whose connection cost would prove too high for the community as a whole. Projects corresponding to these sources will still be able to connect to the grid, but will be treated differently from the common law framework provided by the S3REnR ;
- **Ensuring the reliability of energy sources by prior declaration to the transmission system operator**, in order to avoid permanent adaptations that create instability for the players and the planning process ;
- **The obligation to prioritise work on infrastructure deemed to have no regrets (anticipatory investments)**, without waiting for connection requests, thereby speeding up the connection of generation facilities ;
- The introduction of a frequency for updating the plans.

The connection financial framework

- When requesting a connection to the grid, renewable producers have to pay
 - A share depending on the capacity of the plant corresponding to the contribution to “shared” investments (identified in the S3REnR)
 - The cost of their “individual” connection to the grid
- The financial framework enables reduction on connection costs

| Power of the plant | Reduction on individual infrastructures | Reduction on the share |
|---|---|--------------------------------|
| $P < 250 \text{ kVA}$ | 40 % | 100 % |
| $250 \text{ kVA} < P \leq 500 \text{ kW}$ | | 40 % |
| $500 \text{ kW} < P < 1 \text{ MW}$ | | $40\% - (P - 0,5) \times 40\%$ |
| $P = 1 \text{ MW}$ | | 20 % |
| $1 \text{ MW} < P \leq 3 \text{ MW}$ | $40\% - (P - 1) \times 10\%$ | $20\% - (P - 1) \times 10\%$ |
| $3 \text{ MW} < P < 5 \text{ MW}$ | | No reduction |
| $P \geq 5 \text{ MW}$ | No reduction | |



- For offshore wind farms (call for tenders), the connection is totally supported by RTE

3. Optimisation and experiments

- Grid operators are allowed to issue an **alternative proposal for connection** (ORA – *offre de raccordement alternative*) when requested by a producer
 - Doesn't guarantee the full injection of produced electricity
 - But cheaper and faster connection
- The energy and climate law (published on November 8th 2019) introduced a **"regulatory sandbox"** to deliver derogations to regulatory principles (and explore potential future evolutions)
 - Project "Reflex" submitted by Enedis (the main French DSO)
 - Take advantage of the complementarity of wind and solar power to optimize substations' capacity
 - Connect higher capacity than the theoretical maximum (and potentially faster)
 - In exchange of limited production curtailment
 - Experimentation in a few regions





**MINISTÈRE
DE L'ÉCONOMIE,
DES FINANCES
ET DE LA SOUVERAINETÉ
INDUSTRIELLE ET NUMÉRIQUE**

*Liberté
Égalité
Fraternité*

Intitulé de la direction/service