



FLEXnCONFU PROJECT

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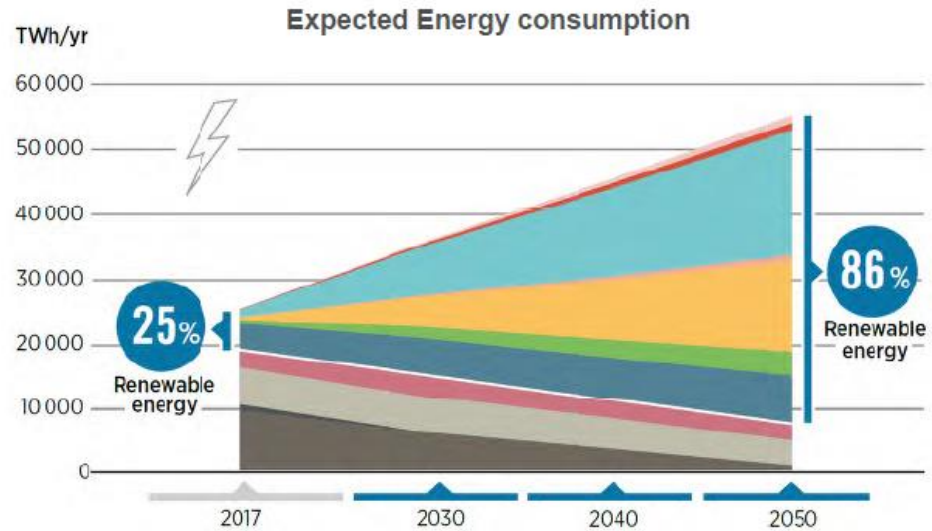
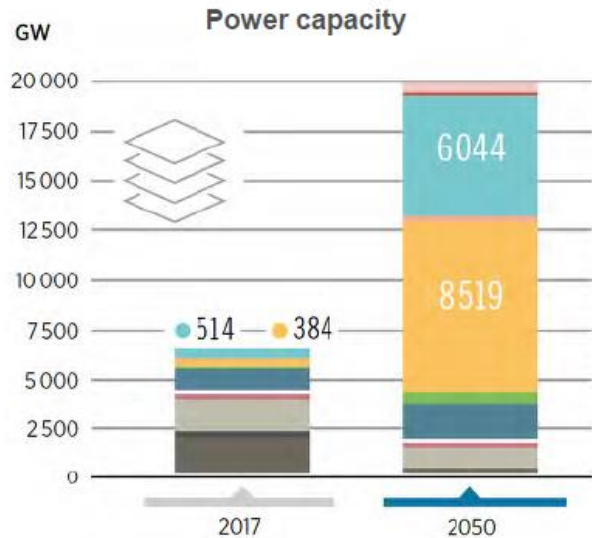
Flexible Power Generation Webinar



This Project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement N. 884157

Background

Renewables transforming Energy Scenario



Source: IRENA Global Renewable Outlook, Ed. 2020



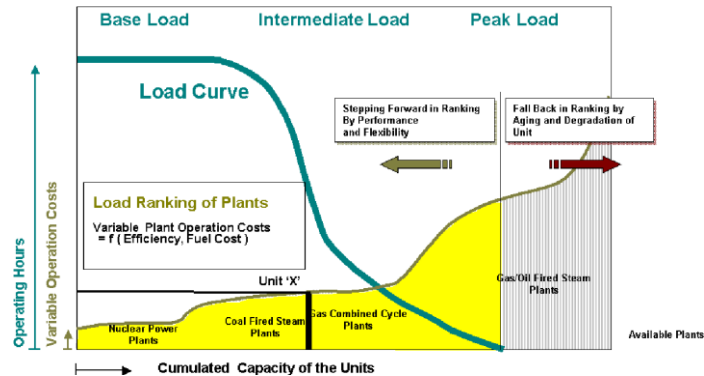
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Background

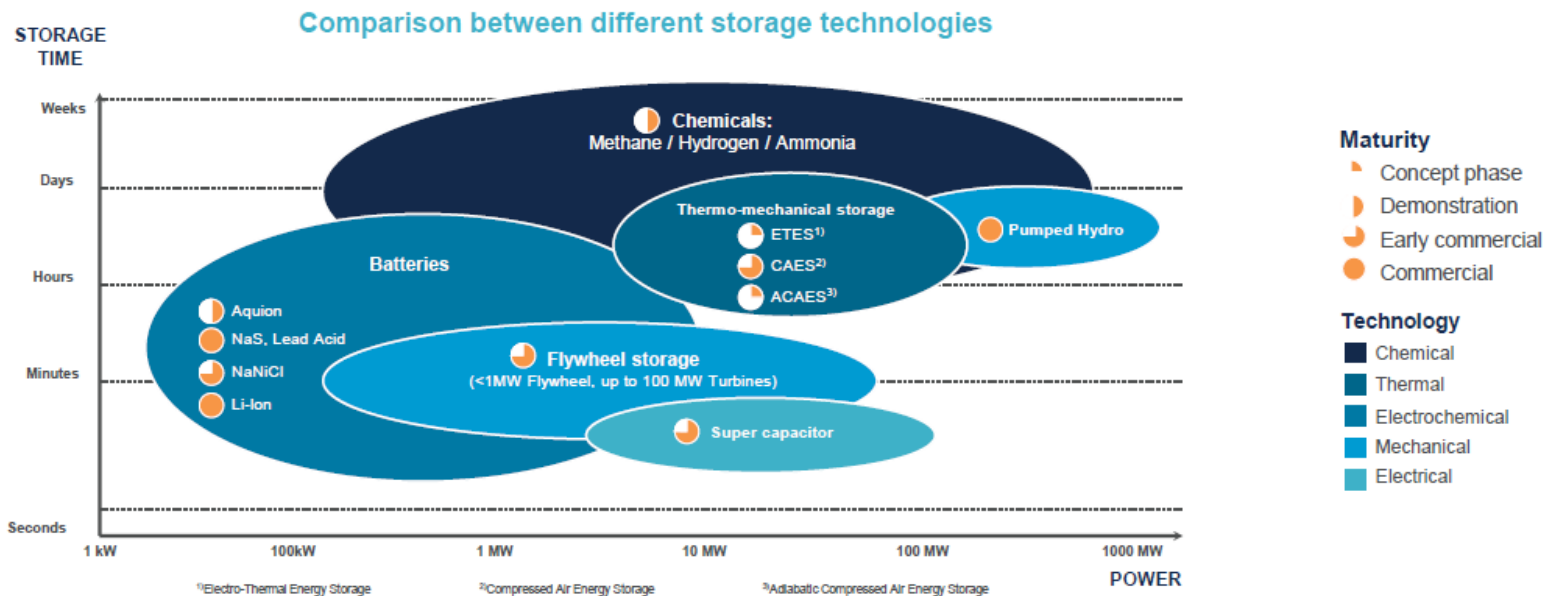
Studying the type of regulation (Primary-Secondary-Tertiary) locally needed, the type and size of the plant (e.g. if there is a dedicated energy off-taker like an industrial plants) and the need of local ancillary services market, RINA is able to study the best option/idea to make the plant more flexible and increase its remunerativity.

- STORAGE INTEGRATION (Battery, capacitors, flywheels depending on need and size)
- AGGREGATION (even of a part of power capacity coupled with a local industry)
- POWER-TO-X (Heat and hydrogen, depending on local contexts)



Background - storages

Overview of storage systems



Source: U.S. Department of Energy Fuel Cell Technologies Office



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H₂ NH₃

DRIVERS

Project Response

DRIVER 1

- Major role of Natural Gas in the EU energy system
- NG fueled power plants are the bridging technology to a 2050 decarbonized energy scenario

To demonstrate a cleaner and fast-response solutions to be coupled with the existing fossil fuel power plants, with a significant impact already in the short-term

DRIVER 2

- Hydrogen is an essential element in the energy transition
- H₂ can achieve a remarkable importance in the future EU economy

To use of hydrogen in fossil fuel power plant in order to accelerate the transition towards a decarbonized and energy efficient society

DRIVER 3

- Increasing share of H₂ and/or NH₃ combustion in gas turbines (target 100% H₂ by 2030)
- Use of ammonia in gas turbine as energy carrier to unlock the potential H₂ and reduce the NO_x

To become a reference point in the short term for H₂ and P2G solutions, and in the long term for NH₃ as energy carrier.

DRIVER 4

- Rapid growth in variable generation is driving the need for a more flexible combined energy and storage technologies
- P2G technologies are receiving particular focus in Europe as the next future best storage to be coupled with RES

Replication of FLEXnCONFU P2X solutions for future applications in other energy sectors in order to enable higher RES penetration.



PROJECT in a nutshell

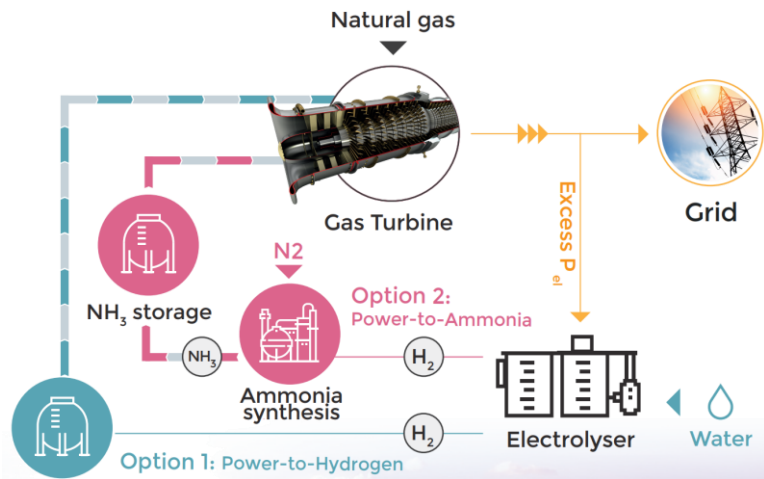
48
MONTHS

9.8
MIL. €

21
PARTNERS

Develop and demonstrate in a real operative plant the **integration of power-to-X-to-power system** able to:

- increase fossil-based power plant flexibility
- reduce emissions of the power plant
- use the intermediate product in which power is stored within the power plant itself to produce power again






ADVANCED CONTROL SYSTEM

GAS TURBINE FUEL FLEXIBILITY

ECONOMIC, SAFETY AND ENVIRONMENTAL SUSTAINABILITY

Expected impacts:

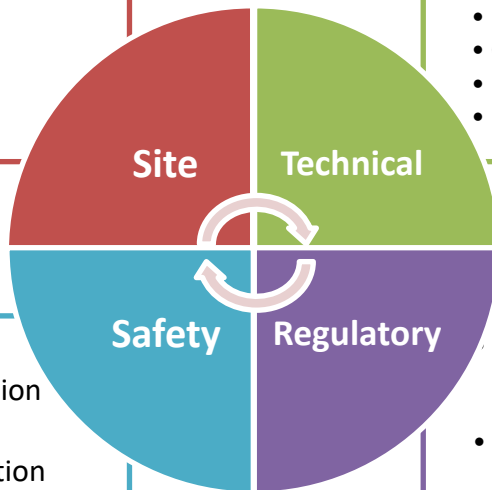
-  Smart, secure and more resilient power system
-  Smoother operation of fossil fuel power plants
-  Energy system adaptation to intermittent RES



MAIN CHALLENGES

- Site constraints
- Space availability
- Secure site for storage
- Layout definition

- GT assessment
- Compatibility with non-conventional fuels
- Control system integration
- Electrolyser capacity
- Compression & storage needs
- BOP assessment and interfaces management
- PFD and BOP integration



- Safety requirements assessment
- Safety requirements for GT protection
- ATEX
- Safety requirements for PP integration
- Risk assessment (HAZID/HAZOP)

- Licensing process
 - ✓ Environmental authorizations and permits (EIA, SEVESO...)
- For installation and operation
 - ✓ Low voltage project
 - ✓ Pressure equipment project (PED)
 - ✓ Fire safety project
 - ✓ Emissions limits





**MANY
THANKS!**



<https://flexnconfu.eu/>



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