Greening Energy Market and Finance

Innovations in Renewable Energy Sources (RES): Adaptation to the climate change

Group 2F

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Project website: http://grenfin.eu

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Company and project description

TAURON GROUP ⇨ **4.18 billion euro Equity Capital – 25 000 employees**

Core business: coal mining, generation, distribution and supply of electricity and heat

Operating strategy: dynamic development of Renewable Energy Sources in the coming years

Project: Building the first MICROGRID in Poland

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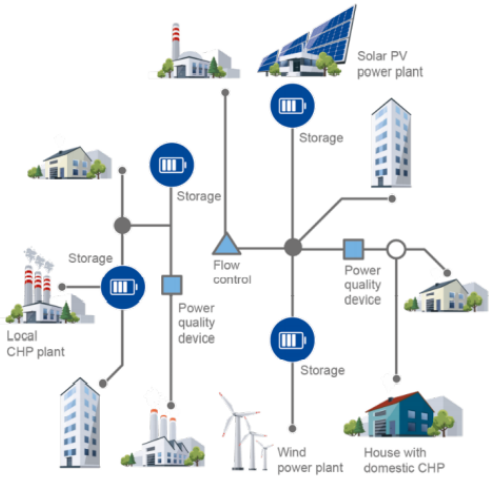
What is…?

"A **microgrid**, or a self-balancing area of the power grid, is a physically separated area of electricity supply that includes local energy sources (mainly those generating electricity from renewable resources) and the energy consumers gathered around them (households, offices, shops, etc.)"



Installation features for the project:

- A **photovoltaic farm** with a capacity of 200 kW
- Five **wind turbines** with a capacity of 10 kW each (50 kW in total)
- A **gas engine** with a capacity of 40 kW
- **Energy storage** with 150 kW active power and 250 kWh capacity

The operation of the installation will be controlled by the Microgrid Management System

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Project objectives

Aim of the project: test the process of designing, building and operating microgrids with the use of own pilot installation operating in real conditions

Innovative aspect: the island mode (the microgrid operates independently of the power grid)

TASK 1:
Identify possible climate and financial risks. Propose forms of mitigation.

TASK 2:
Propose sources of co-financing for the project

TASK 3:
Develop a schedule for the described project

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Climate risks and forms of mitigation

Climate risks	Mitigation solutions
Increase of temperature	Green roofs, green walls, plant bushes around the microgrid
Dust deposit on the solar panel	Dust suppression systems that include wet surfactant systems, foam surfactant systems, humectants. Also manual cleaning cycle, photovoltaic nanotechnologies or dirt-repellent chemicals.

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Climate risks and forms of mitigation

Climate risks		Mitigation solutions
Cloudy sky	⇨	Using other energy generators a such as energy storage systems or the gas engine
Storms and strong wind	⇨	Put cables underground, water management systems for rainy storms, special material for water
Transition risk...		
Stricter regulation on gas	⇨	Biogas, produced after organic materials

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Financial risks and other risks

Financial risks

- The project doesn't fit the **requirements** concerning local regulations, laws
- **Hard to obtain funding** for microgrids because it is quite new and so we need to convince that it is a reliable project
- Succeed in having a **positive financial margin** in the future to be able to ensure maintenance operations to be sustainable

➔ Take into account the **cost of replacement** of some installations that may evolve in the future with some new and more powerful technologies, also thinking of the cost of recycling our equipments and facilities

➔ Take into account the **cost of decommissioning**, which is often neglected

Other risks

- **Overheating** of our **storage system**. Solution: fans and we thought about collecting rainwater to create coldness
- **Recycling** our solar panels, which can be a tedious process and requires advanced machinery

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Sources of co-financing for the project

Available sources

EU Innovation Fund: Available grant funding of €100 million for small-scale projects. Offer of project development assistance. Projects will be selected based on: effectiveness of greenhouse gas emissions avoidance, degree of innovation, and sectoral balance.
The fund will support up to 60% of the capital costs of the project.

Poland Government's Funds: Business development innovation Fund, funded by the EEA and Norway Grants 2014-2021.
National Fund for Environmental Protection and Water Management (NFEP&WM).
Investment incentives for renewable energy producers via auction system.

Conventions on renewable energies and microgrids: EU-organized "Covenant of Mayors Investment Forum – energy efficiency finance marketplace".
Professional-organized "Microgrid 2021 Global".

Energy Service Companies (ESCOs): Companies that offer energy services, can finance or arrange financing for the operation, acting as contractors, and their remuneration is directly tied to the energy savings achieved.

Bank loan

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Sources of co-financing for the project

The decision

- Tauron Group will apply for the EU Innovation Fund to support up to 60% of the capital costs of the project.
- To finance the remaining 40%, the company will take a loan with a bank, considering contracts that have the present value of interest payments lower than the present value of the expected cash flows generated from the sale of the energy produced by the microgrid.

Potential risks

- The project is not elected to obtain the EU Innovation fund support.
- The cash flows are lower than initial expectations, as a fraction of the sale of the electricity relies on the connection to the national grid, which is lost in case of power outage in the area.

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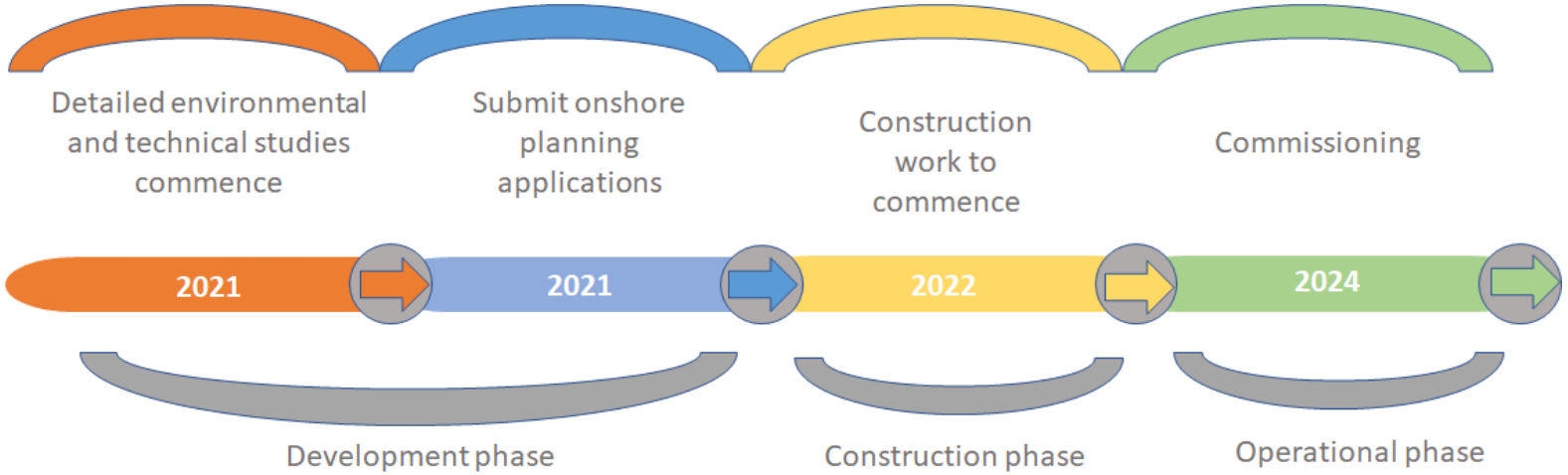
Schedule

This is an overview of the project schedule from development on to construction and then at commissioning. These are the timeframes assuming there are no unexpected delays.

Development: One year
Construction: Two years
Commissioning expected 2024



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Development phase schedule

Here is a more detailed analysis of the milestones and applications carried out during the development stage. Failure to complete within the deadline could result in project delays, issues with EU fund approval and an increase in project costs. Some of these applications will be included in funding agreements and non-fulfilment of submissions could put a risk to the future of the project.

	2021							2022				
Schedule (months) starting from June 2021	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Development phase												
Ongoing risk assessments												
Environmental and technical studies/site investigations												
Project cost audit (EU commissioners)												
Launch of procurement and client engineer tenders												
Waiting for initial offers												
Negotiations												
Selection of the offer and signing the contract												
Priliminary designs												
Onshore planning applications submission and approval												
Site insurance applications												
Grid connection agreement												
Residential land agreements and red line boundaries												
Production of RFP												
Release public consultations												
DD												
Financial close												

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Construction phase schedule

The milestones and processes carried out in the construction phase will be managed by the contractor appointed during the development phase to construct the project and overseen by the company.

Providing processes were completely with accuracy during the development phase the likelihood of unexpected delays will be decreased.

As mentioned in the risk section earlier in the presentation decommissioning will take place in the future but not included in this project schedule.

Schedule (months) June 2022	13	15	17	19	21	23	25	27	29	31	33
Construction phase											
Ongoing risk assessments											
Preparation of the site for construction											
Accompanying work (fence, weather station, access road)											
Installation of a gas engine											
Construction of an energy storage											
Construction of wind turbines											
IT system configuration											
Trial Movement											
Commissioning											

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