Greening Energy Market and Finance

Case Study 2:

Innovations in Renewable Energy Sources (RES): Adaptation to the Climate Change

TAURON

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With the support of the Erasmus+ Programme of the European Union

Case study - Description

As part of a research and development project, the energy company wants to build the first microgrid in Poland. The microgrid is to be composed of photovoltaics, wind turbines, an energy storage, a gas engine and an installation management system. The microgrid can operate in the following operating modes:

- classic method (generation sources generate energy to the grid, consumers get energy from the grid)
- island mode (the microgrid operates independently of the grid. The generation sources of the microgrid generate energy consumed by the microgrid consumers or accumulated in the microgrid energy storage).

The project has an innovative aspect, which is to test the island operation in real conditions. The production sources are devices available on the market. Their cooperation within the microgrid is an innovation - the production sources operate together as one installation thanks to the IT management system.

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Task 1- Identify possible climate and financial risks. Propose forms of mitigation

Climate Risks on RES:

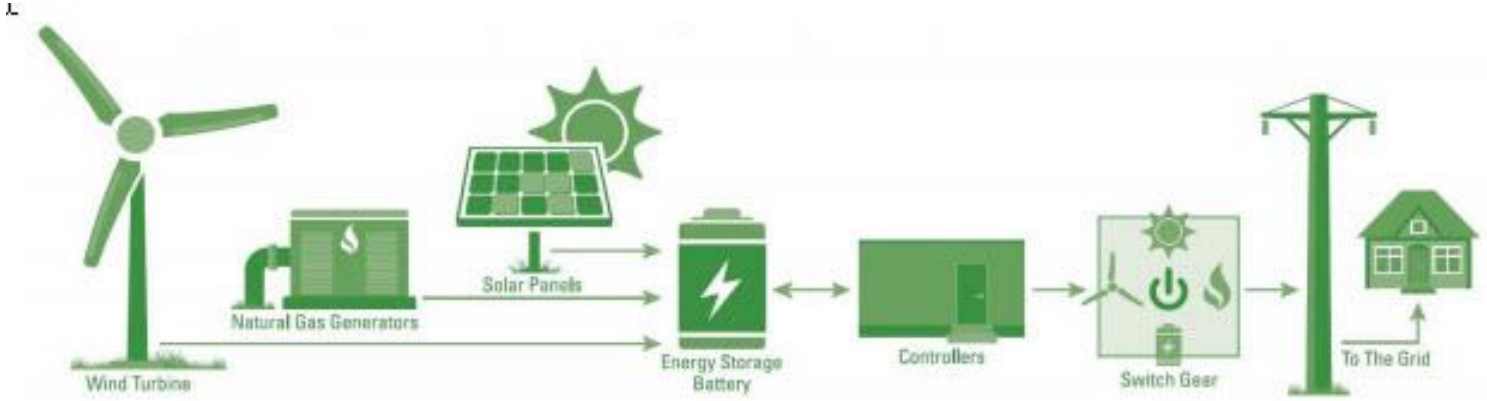
Floods and Landslides

Temperature Changes

Whirlwinds

Drought

Heavy Precipitation



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Task 1- Identify possible climate and financial risks. Propose forms of mitigation

Financial risks

- Inefficient or lacking storage
- Higher O&M costs
- Tariff collection from users

October of 2016, Hurricane Matthew hit the coast of Haiti, EarthSpark's microgrid

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Forms of mitigation

Connecting the microgrid to several energy sources is a way to reduce climate and financial risks
Making a microgrid provided by solar and wind sources.

- In dry and hot weather accumulating more energy with the help of PhotoVoltaic Farm
- In cloudy and rainy weather with the help of Wind Turbines
- Different energy sources allow minimizing energy consumption
- Users will not be disconnected from the microgrid due to insufficent energy
- Careful land use while construction and installation of the microgrid
- Plant trees while construction
- Use biogas as a source for the gas engine
- Improve energy efficiency with new raw materials

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Task 2 - Propose sources of co-financing for the project

*The investment outlays for the project are high. They are estimated at around **EUR 1,100,000**. Due to the environmental and innovative aspect of the project, it seems possible to obtain funding.*

Funding options

- Corporations
- Banks
- International Financial Institutions
- International Organizations
- Climate Funds
- National Governments
- Central Banks and Regulatory Authorities
- Institutional Investors
- Stock Exchanges
- Crowdsourcing

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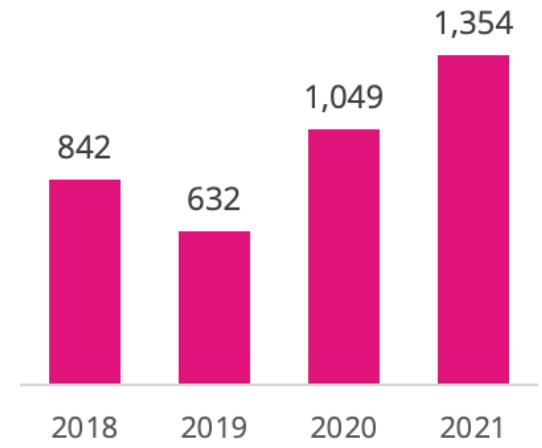
Internal Funding

TAURON Capitalization

Millions, EUR



680 million for energy investments in Małopolska

February 4, 2021

This year TAURON will spend over PLN 680 million on distribution projects in Małopolska. The plan will cover both new investment projects and the continuation of large and important long-term tasks aimed at improving the energy security of the region. In the previous year, TAURON invested over PLN 600 million in Małopolska. Thanks to such undertakings, the TAURON Group remains a leader among distribution companies.

A Billion for the Green Return of TAURON

October 23, 2020

TAURON will issue bonds worth PLN 1 billion on the Polish market for the energy transformation of the Group. It is the first issue of Sustainable Development bonds in Poland. The funds obtained from this operation will be used to accelerate the implementation of TAURON's Green Return. The company assumes that by 2030 it will produce more than 65 percent. energy based on renewable energy sources.

PLN 200 million for investments in the Opole region

October 16, 2020

The key investment and modernization tasks carried out by TAURON Dystrybucja in the voivodeship are to provide modern electricity infrastructure necessary to connect new customers and to improve the condition of the electricity grid and devices. Opole.

PLN 2 billion to increase the security of energy supplies

January 29, 2019

TAURON invested over PLN 2 billion in network infrastructure in 2018. The implemented projects, which include almost 70,000 investment tasks, allow for the development of the network at all voltage levels and in the entire area of TAURON Dystrybucja operations. This has a direct impact on the stability of energy supplies to the company's customers. An important course of action was also the automation of the network, allowing for faster reactions in crisis situations.

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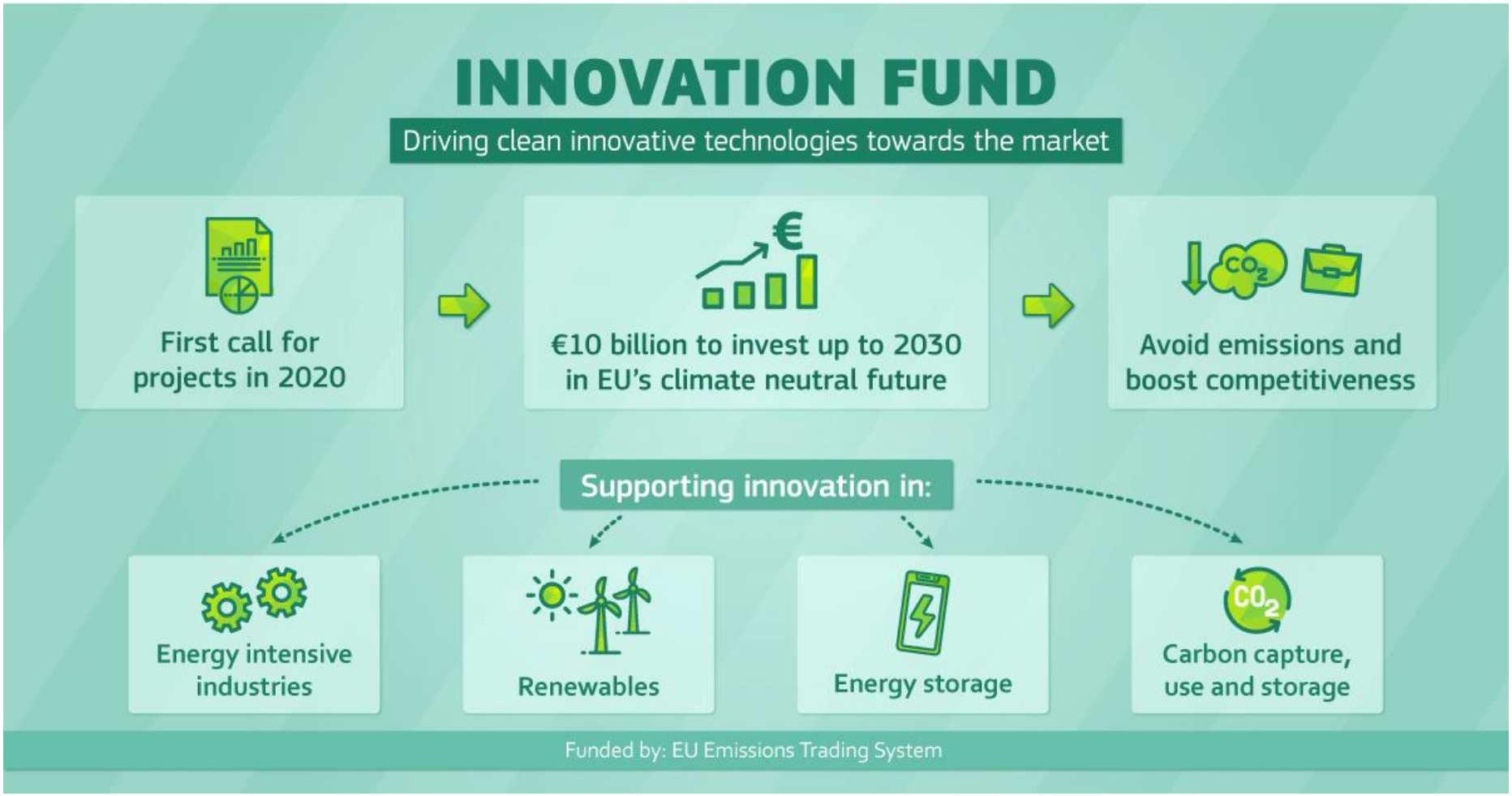
Most suitable external funding options

Region	Entity / Funds	Total Budget
European Union	Innovation funds (EU Action) ; Regional Development and Cohesion Fund; Horizon 2020; LIFE Programme; Just Transition Mechanism (JTM)	€ 100+ billion
Polish Government	National Centre of Research and Development ("NCBR")	€ 900k (2019)

Funded by the European Union

Narodowe Centrum Badań i Rozwoju

Innovation Fund



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Innovation Fund

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Innovation Fund

Innovation Fund Small Scale Call

Award Criteria & Focus

AWARD CRITERIA

- Degree of Innovation
- Greenhouse gas emission avoidance
- Project maturity
- Scalability
- Cost efficiency

GRANT DISTRIBUTION

- Up to 40% before or at financial close
- Remaining 60% over construction and operation phase (3 year default reporting period)

FOCUS

Innovative projects close to market
e.g. first sale of new technology to pioneer customers

European Commission

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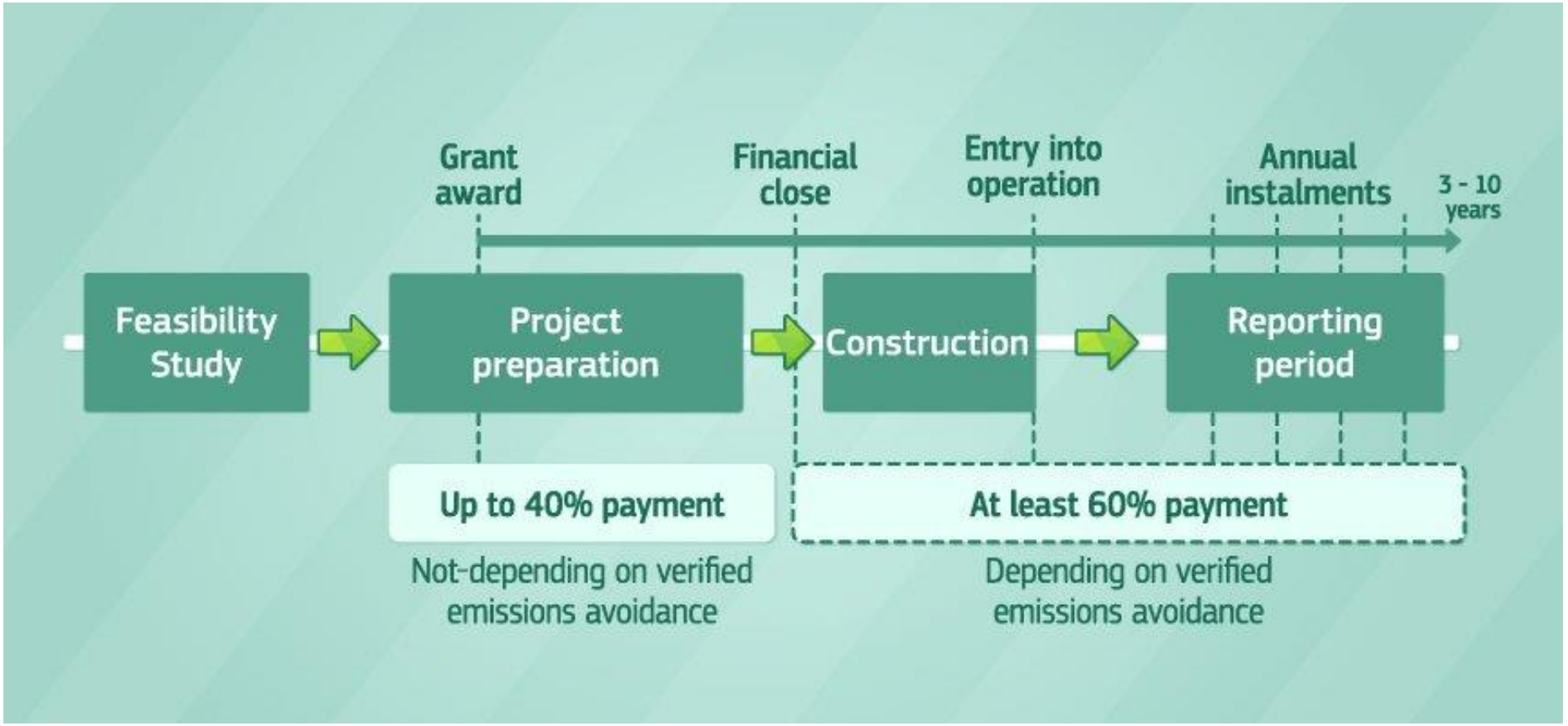
Innovation Fund



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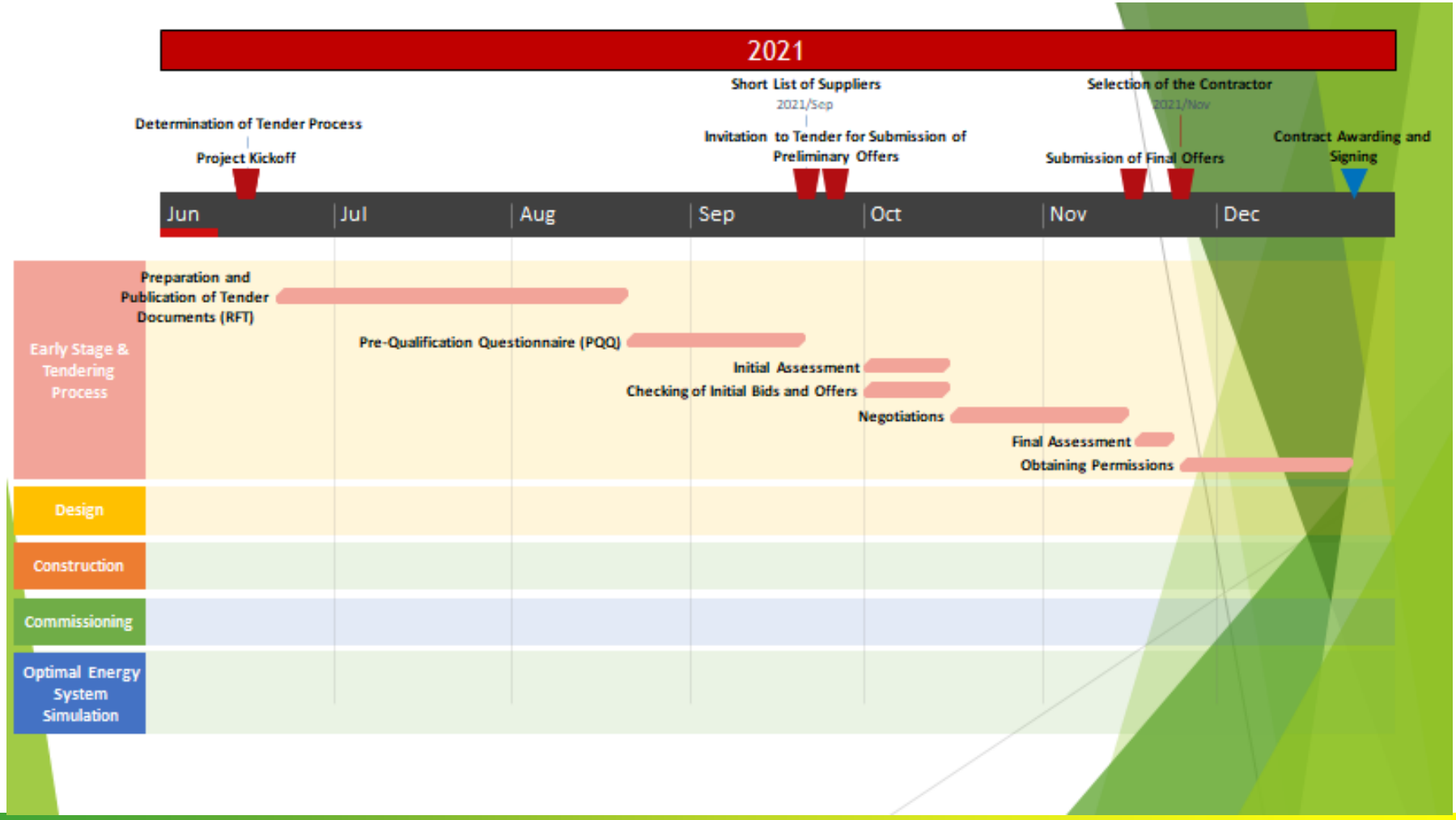
Task 3- Develop a schedule for the described project



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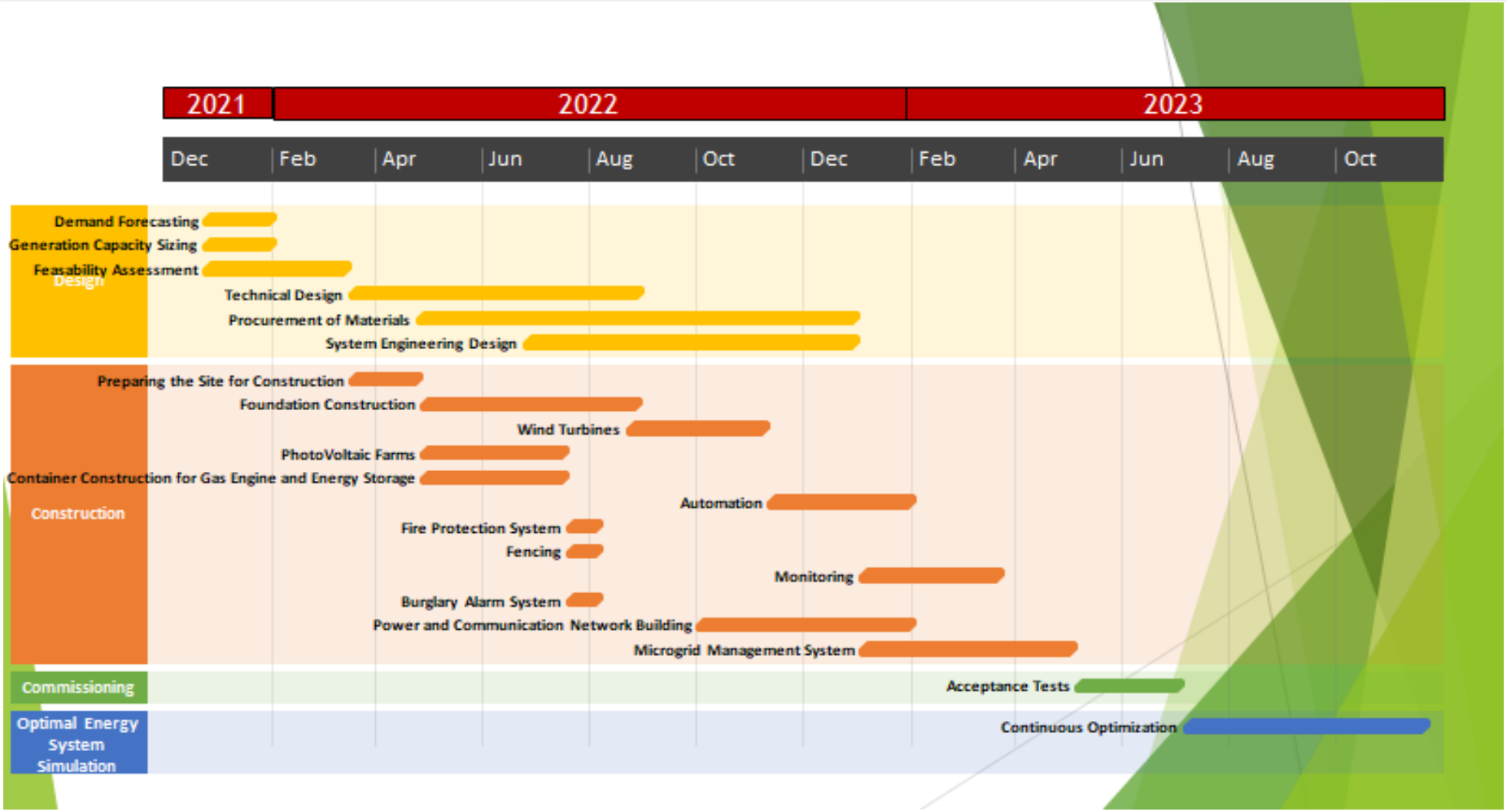

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Project website: http://grenfin.eu