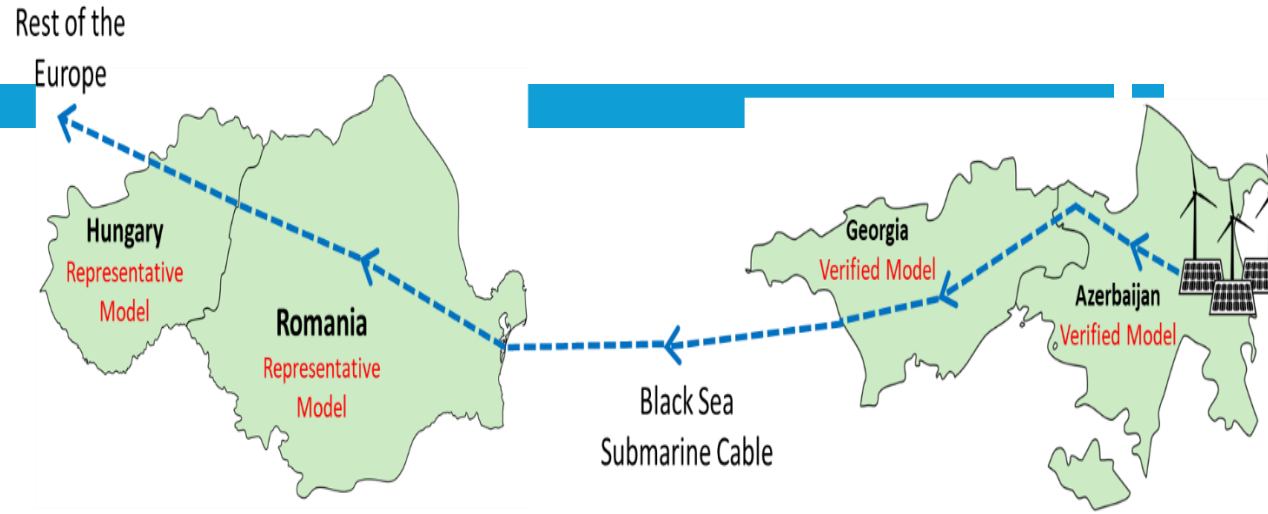
Black Sea Submarine Cable Project

GSE
GEORGIAN STATE ELECTROSYSTEM

ERRA

15 October 2025

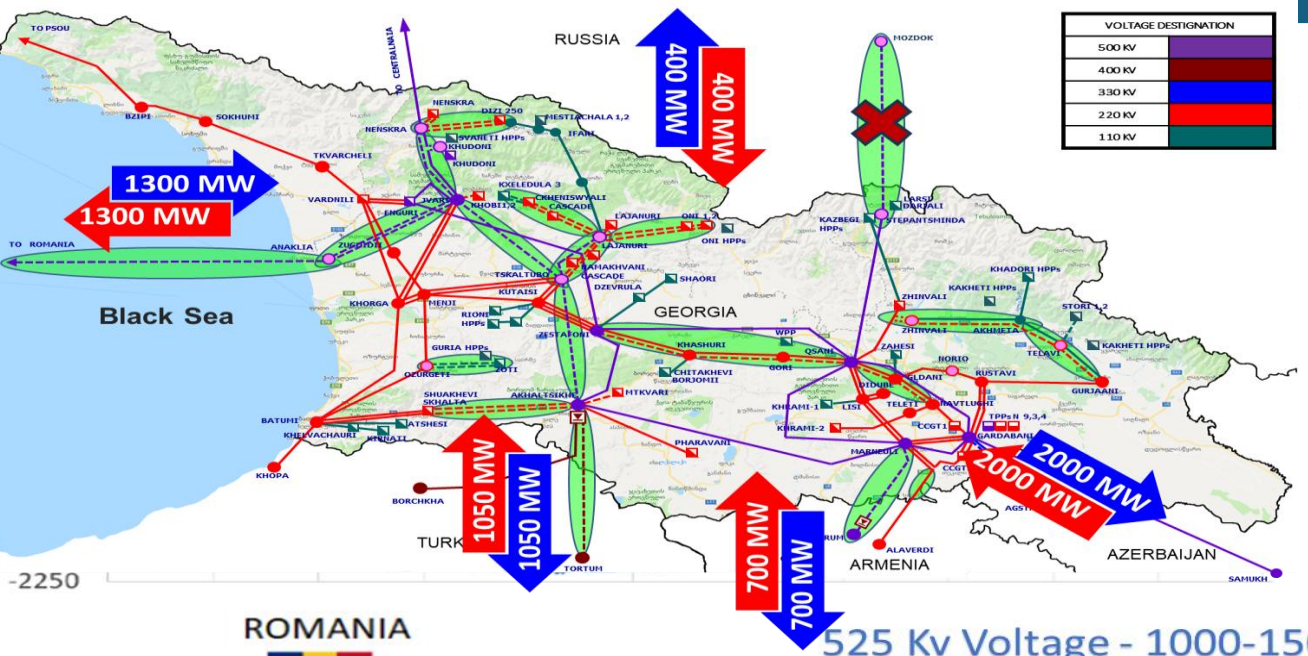
Black Sea Submarine Cable Project (BSSC) – Some Background Information

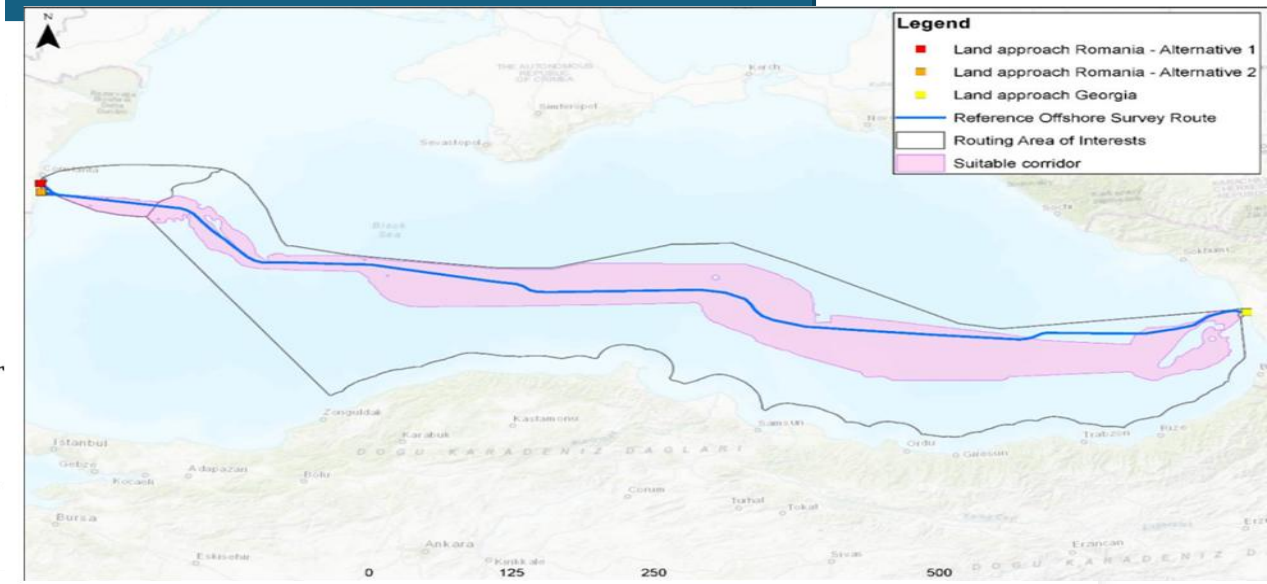


- BSSC was initiated by Georgia more than 10 years ago
- Feasibility study of BSSC completed in July 2024 by Italian consulting company CESI
- Inspired by BSSC, 4 countries signed agreement to cooperate and establish so called “Green Energy Corridor” – GECO project
- Feasibility study of GECO project ongoing
- BSSC is financed by the World Bank through multi phase loan on Enhancing Energy Security through Power Interconnection and Renewable Energy (ESPIRE) program for Georgia:

1. Phase – 35 Mln $ for marine survey, environmental impact assessment and other studies
2. Phase - 50 Mln $ - strengthening of the on-land transmission grid
3. Phase - support the financing of the submarine cable construction – 435 Mln $

BSSC Project Layout





ROMANIA

525 Kv Voltage - 1000-1500 MW Power

BLACK SEA

GEORGIA

HVAC overhead power line

AC/DC

Half Bridge VSC technology Bi-polar technology with electrodes

DC/AC

HVAC overhead power line

Import and export of power

Two subsea 1100 Km cable

Terrestrial HVDC cable aprox. 20 km

Joint

Joint

Terrestrial HVDC cable aprox. 20 km

HVAC electricity

HVDC electricity

HVAC electricity

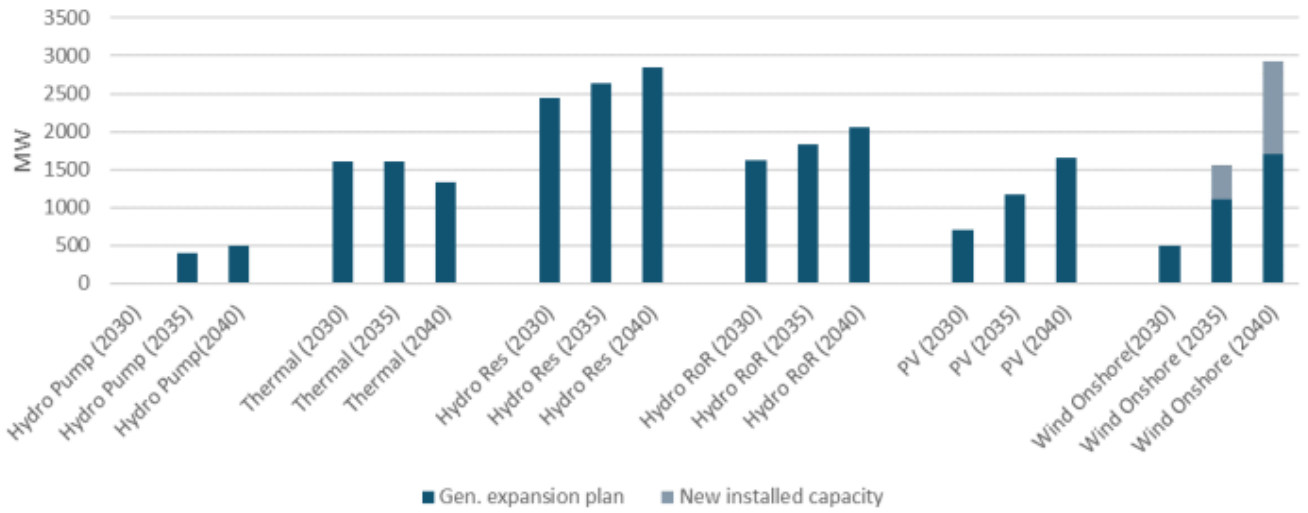
HVAC = High Voltage Alternating Current HVDC = High Voltage Direct Current

GECO Project layout

- Three cable, each 1300 MW. In total 3900 MW
- Offshore and onshore infrastructure
- One B2B connection each in country

Green H2 plans of Georgia under GECO Project

Electricity

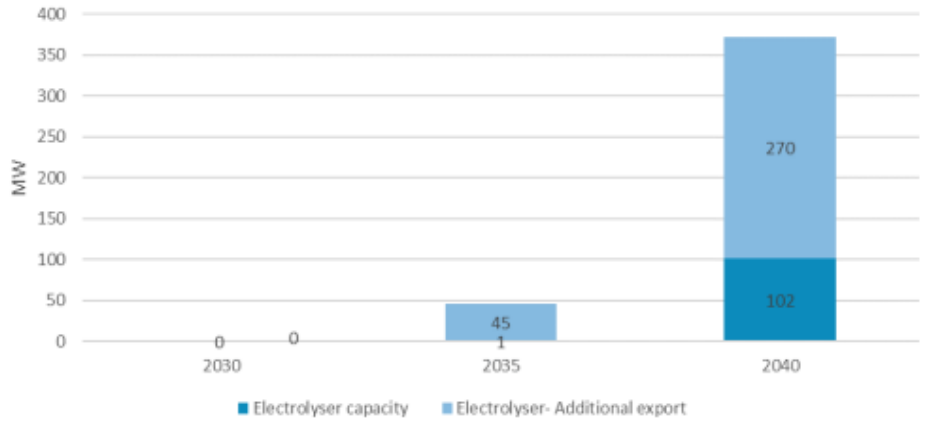


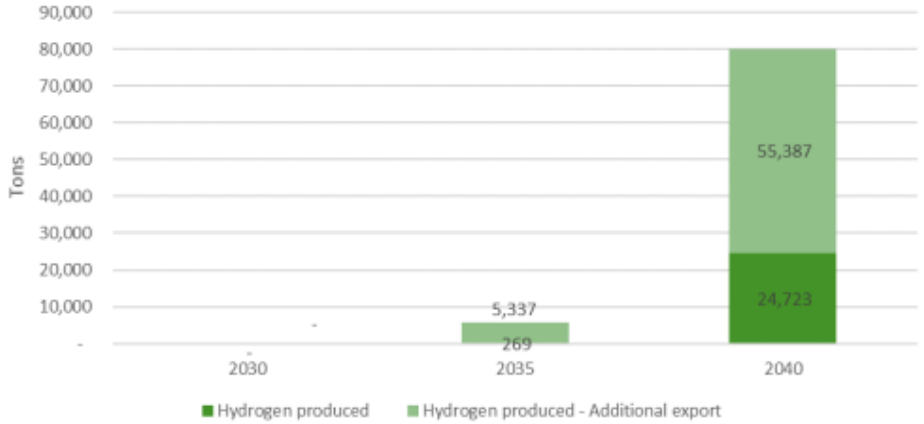
Total additional V-RES build cost:

- **2030**: + 0 M€
- **2031-2035**: + 465.89 M€
- **2036-2040**: + 780.3 M€
- **Tot:** + 1,246 M€

	Wind Onshore (MW)	
	Base	New
2030	500	-
2035	1,100	459
2040	1,700	1,224

Hydrogen





Total electrolysers build cost:

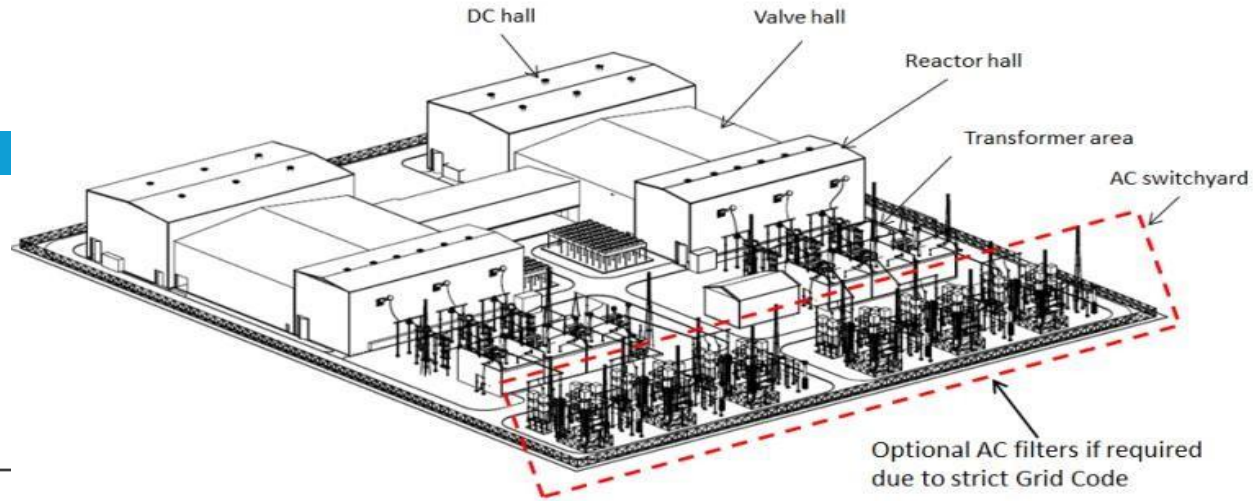
- **2030**: + 0 M€
- **2031-2035**: + 17.29 M€
- **2036-2040**: + 118.8 M€
- **Tot:** 136.1 M€

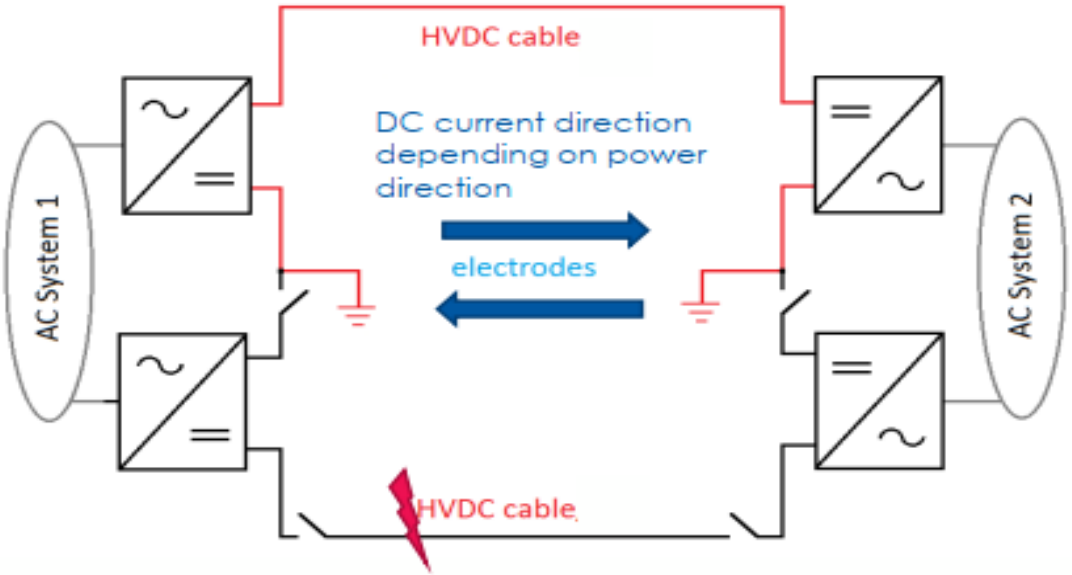
Source: CESI calculations

Characteristics of Converter Station Technologies

- Voltage Source Converter Half Bridge configuration (VSC HB) is the most suitable arrangement
- Fast power reversal without cable polarity reversal
- Allows the utilization of both paper and extruded Cables
- Approximately 53,000 m^2 – 250x250 m

Technology	DC Voltage [kV]	Power [MW]	Topology
VSC HB	±525	1000	Bipolar with electrodes
VSC HB	±525	1500	Bipolar with electrodes
VSC HB	±525	1000	Rigid Bipolar
VSC HB	±525	1500	Rigid Bipolar
VSC HB	±525	1000	Symmetrical monopolar
VSC HB	±525	1500	Symmetrical monopolar

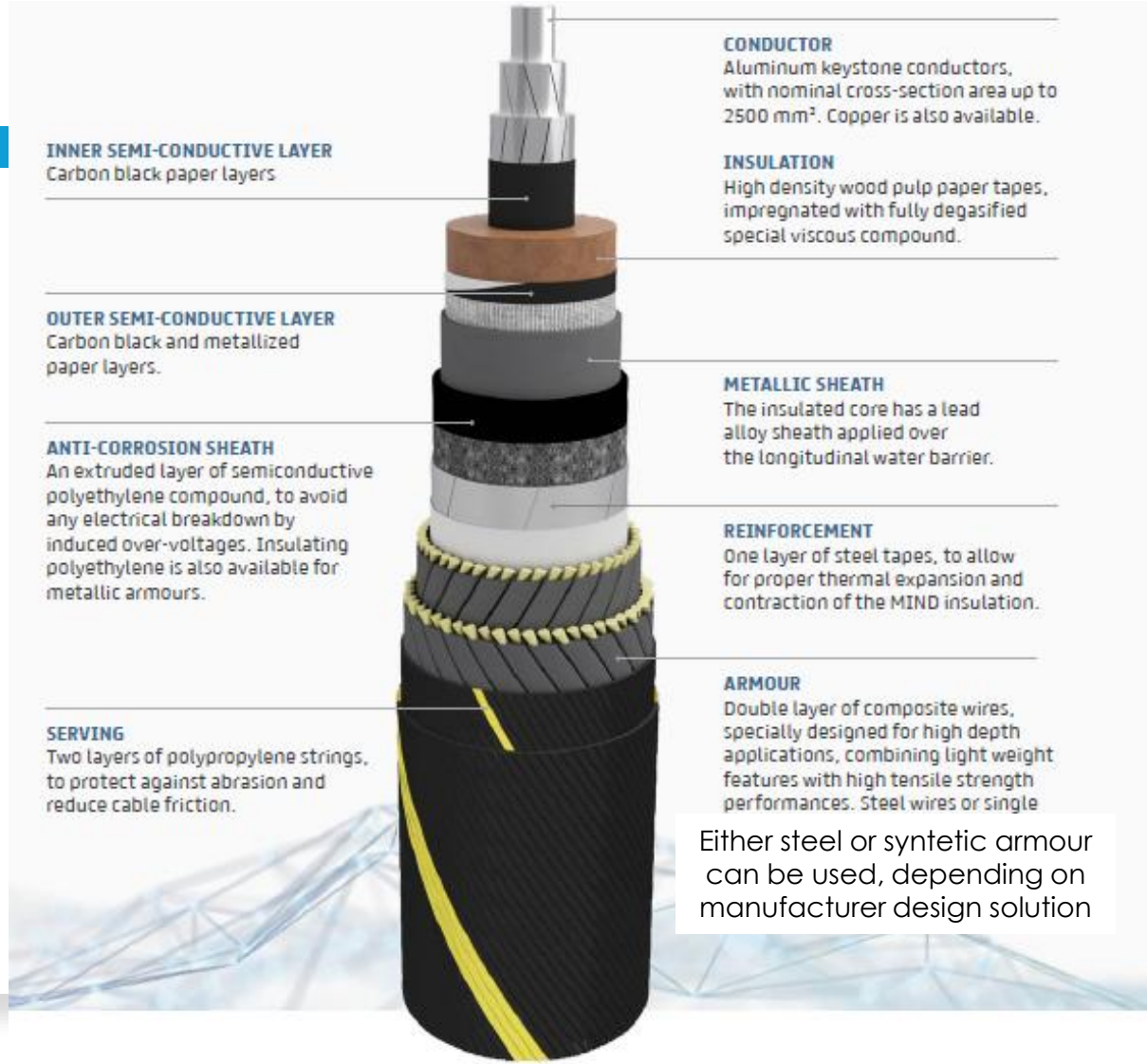




Characteristics of Cable

- Paper **MIND insulation** (Mass Impregnated Non-Draining) The insulation is realized with **kraft paper impregnated** with high viscosity compound (no leakage in case of damage);
- XLP technology also perpsective
- **Aluminum conductor** to reduce the cable weight

  - 1650 m max water depth (SAPEI link, from 2010);
  - 2150 m max water depth (Tyrrhenian link, contracts assigned to Prysmian and Nexans in 2022 by Italian TSO).



Either steel or syntetic armour can be used, depending on manufacturer design solution

Electrodes

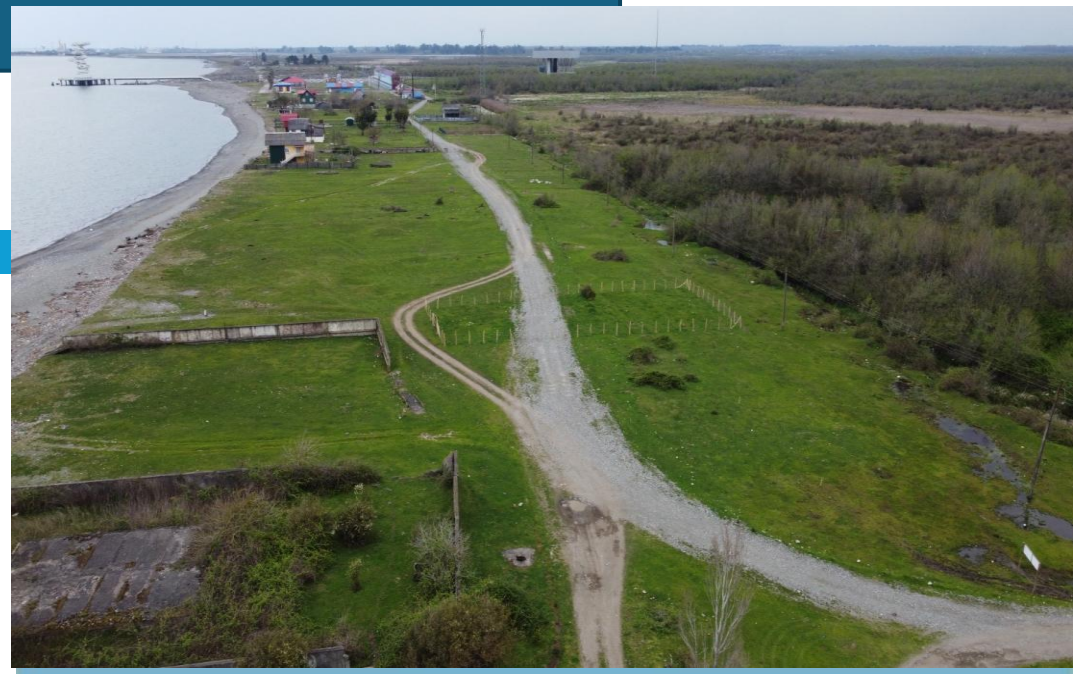
- Due to a large variation in geographical, geophysical and technical properties of electrode sites and HVDC system requirements, different electrode shapes and configurations have been developed (CIGRÉ, 2017; Carloni et al., 2019).

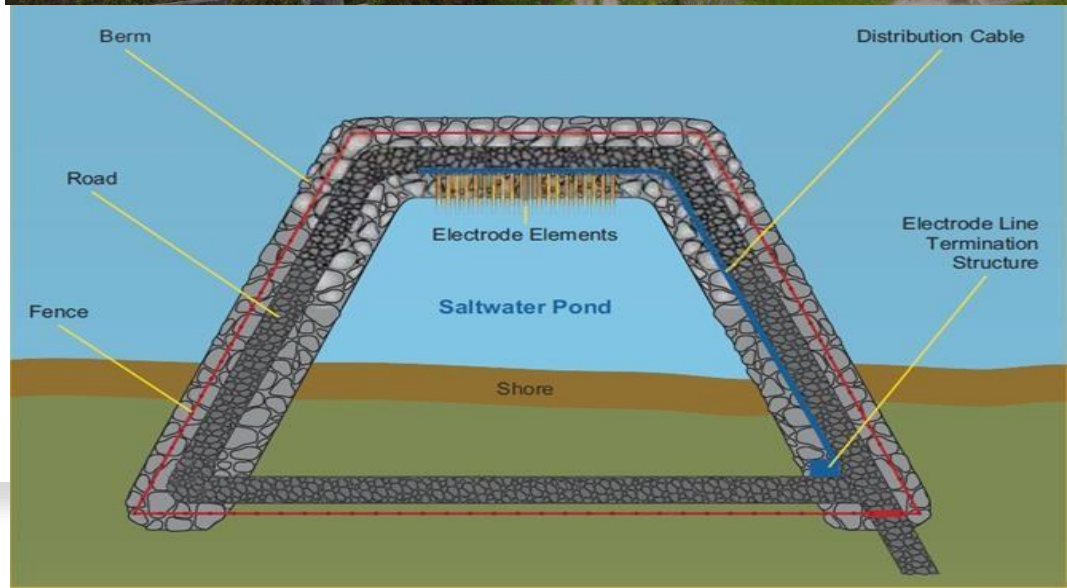
❖ **Shore electrodes**

❖ **Pond electrodes**

❖ **Marine Electrodes**

- Considering the constraint of the high-water depth in the Georgian area the POND electrode has been selected as the sole possible solution
- Marine electrode is considered for Romania

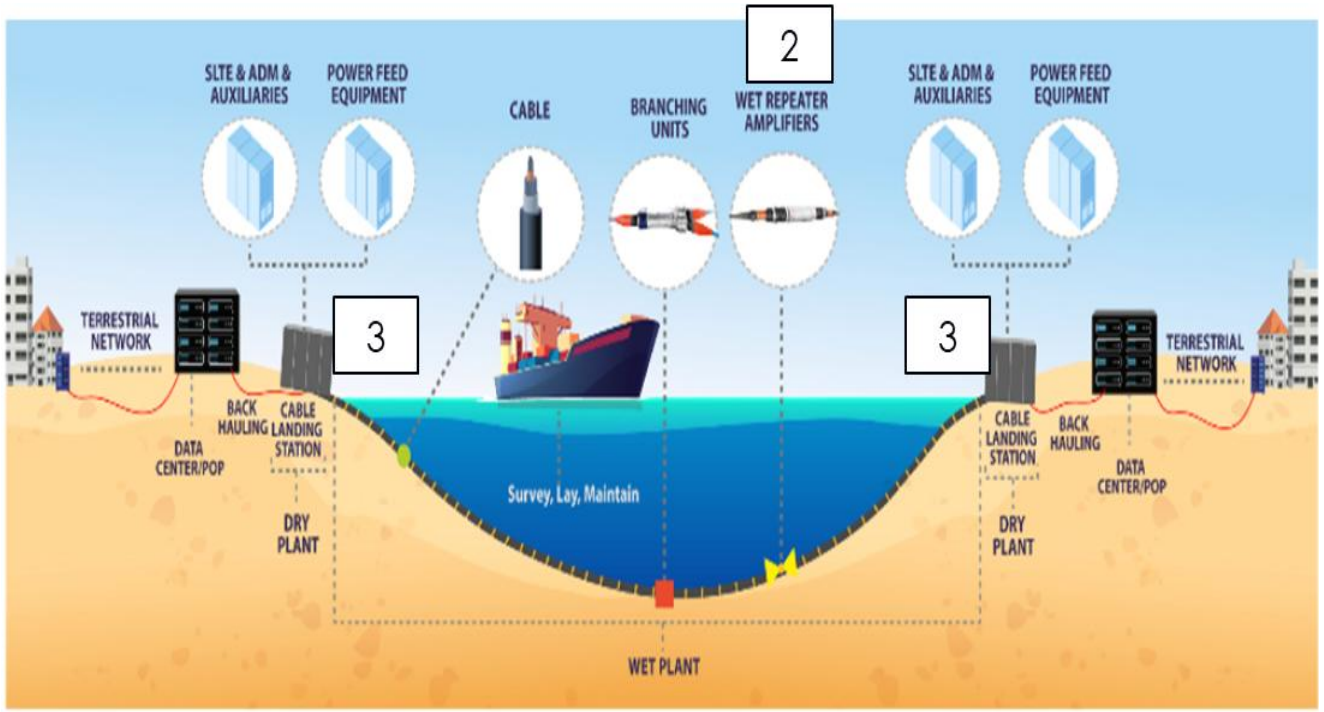


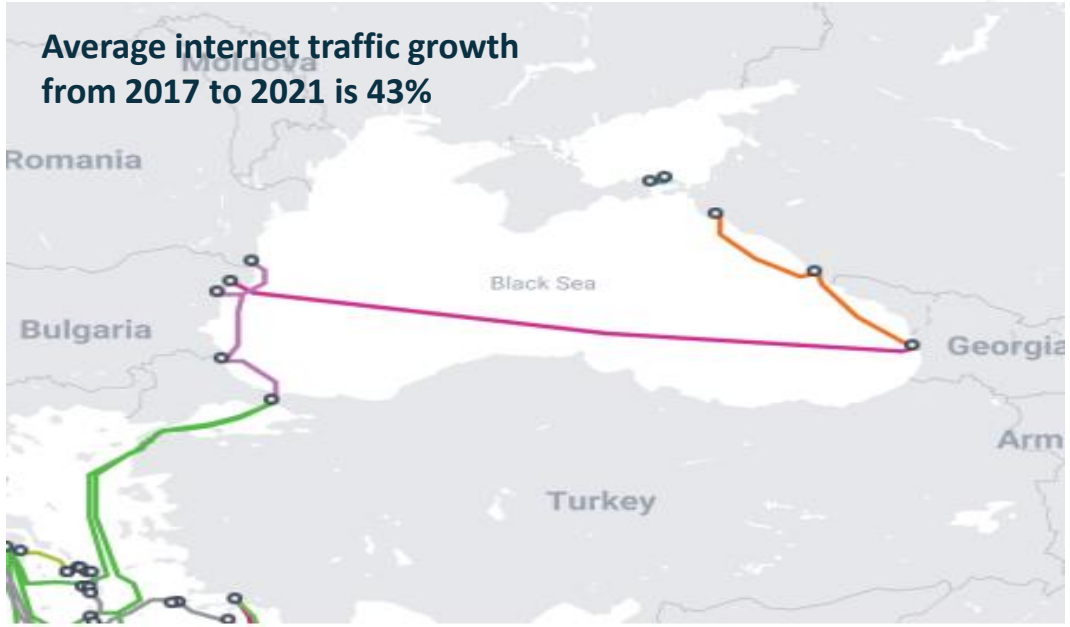


Data Cable

A **repeated submarine fiber optic cable** is needed due to the length of the link. The **distance between repeaters** depends on the final bandwidth and the number of fiber pairs selected, spanning is in the range of 70 to 100 km

- **Integration of TLC fibers inside the power HVDC cables** system is not possible due to the presence of repeaters and water depth constraints.
- Design limits: up to 24 fiber pairs, 24 Tb/s per fiber pair



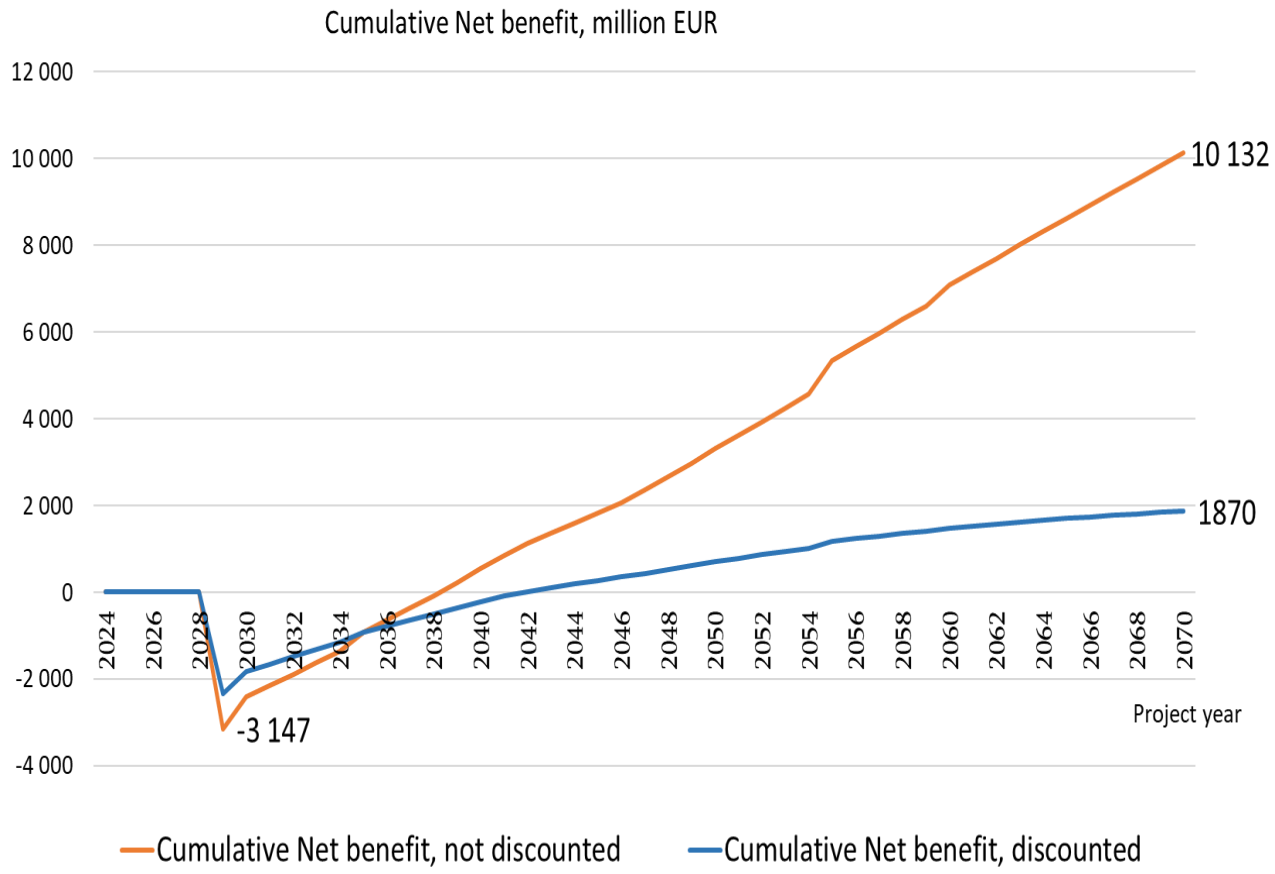


The impact of this Telecom route will be for 1.8 billion of people in Georgia, Caucasus, Middle East, Central and South Asia Regions

In 2021, mobile Internet traffic grew at a record speed. Mobile service subscribers consumed about 65% (311 petabytes) more of mobile Internet than in previous years

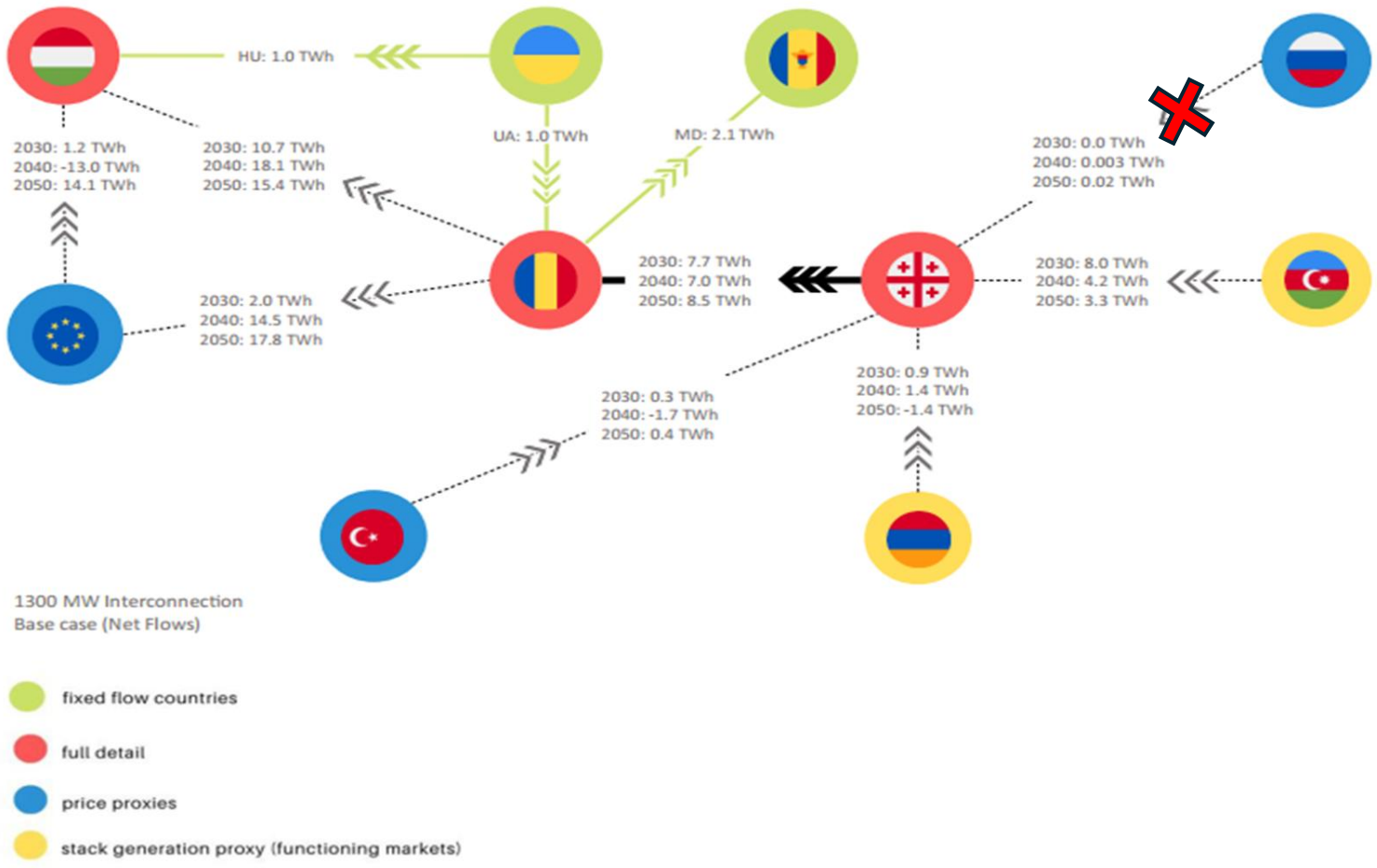
BSSC-Feasibility Study

- FS of the BSSC was carried out by Italian consulting company CESI. The project is technically and economically viable
- The project includes construction of 1155 km power and digital cables, of which 1115 km will be underwater
- Lifespan of the project is 40 years and start of operation by 2031 or 2033
- Approximate investment amounts to 3.1 – 3.6 bln Euros which includes submarine data and power cables, two converter stations, two electrodes and terrestrial OHL
- Evaluated EIRRs in different scenarios equals 6.8-10.8% and BCR ranges from 1.7 to 2.7 in different scenarios
- Internal network reinforcement needs are minor
- CBA is conducted based on the ENTSO-E methodology
- Main outcomes and other relevant documentation resulted from the feasibility study can be viewed at GSE website: *https://www.gse.com.ge/projects/international-projects/Black-Sea-Submarine-Cable-Project*

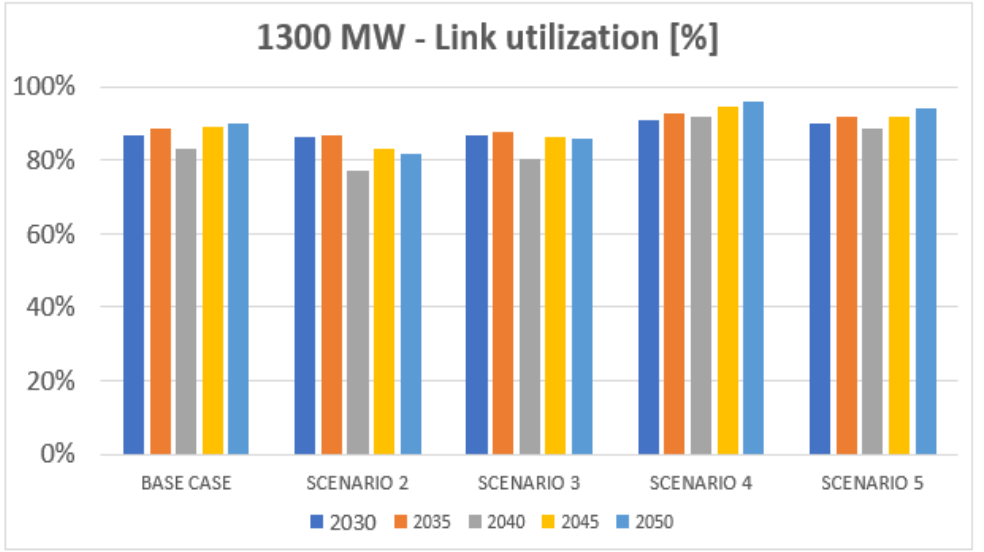


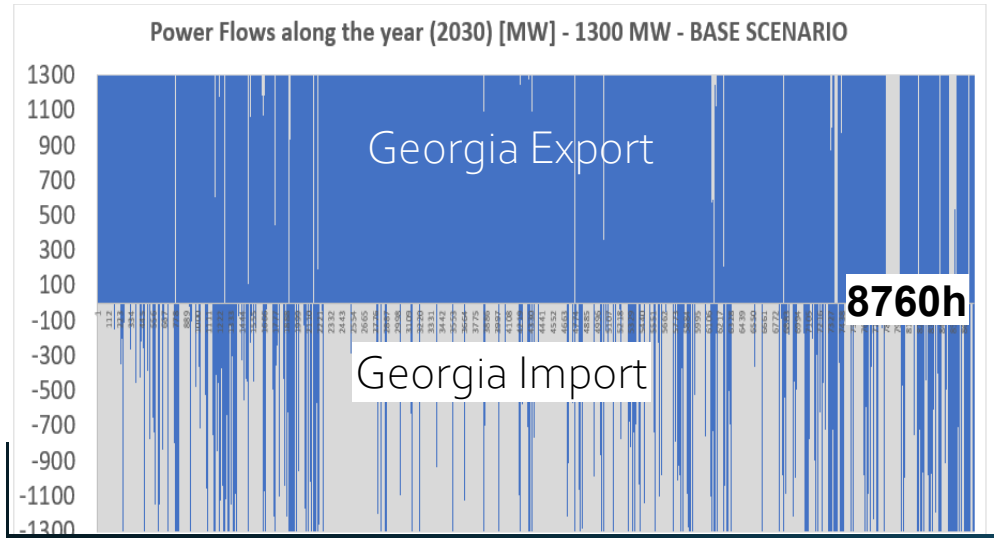
Cable Loading

- Energy mix of the export flows passing through the cable in different target year for the base case scenario
- Approximate RES share in flow amounts 80-90%



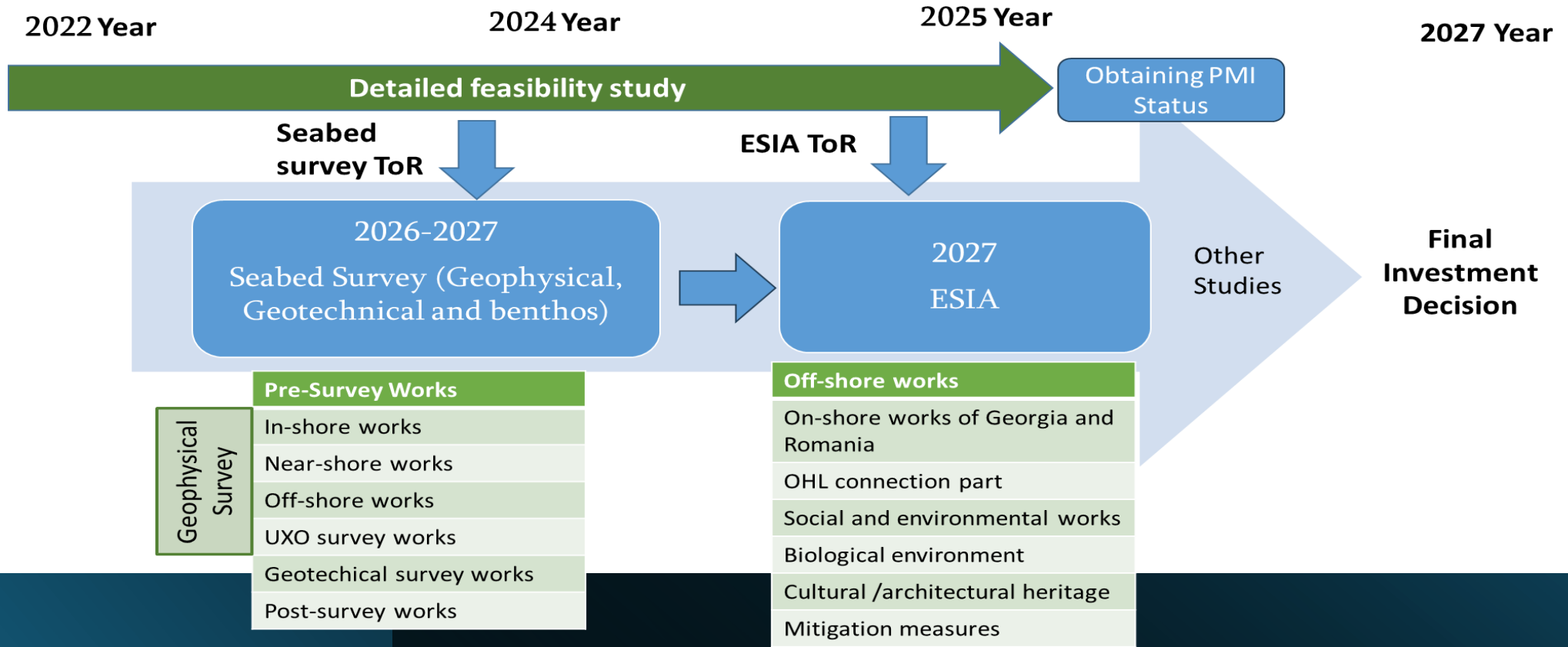
1300 MW: 9 - 10 TW annually, Load factor 77 - 96 %





Way Forward – 1) Seabed Survey

- In 2024, a loan agreement was signed between Georgia and World Bank for the project “Enhancing Energy Security through Power Interconnection and Renewable Energy Program - Multi-Phase Programmatic Approach” - which amounts 0.5 bln USD
- Within the framework of this loan, it is planned to carry out geotechnical and geophysical surveys of the Black Sea seabed throughout the whole route and Environmental and Social Impact Assessment, and other studies
- Currently GSE is finalizing the process for contracting CESI. The scope of their services will comprise supporting GSE in obtaining necessary permits in the Black Sea basin involved countries for conducting seabed surveys and to assist in procurement



Way Forward – 2) Application for Project of Mutual Interest (PMI)

BSSC project was already included in ENTSO-E TYNDP of 2022-2032 and 2024-2034 projects lists (1105 project)

BSSC nominated for 2026-2036 TYNDP

In fall 2024 Transelectrica, in close cooperation with GSE submitted the project for PMI status, as it is a cross-border energy infrastructure project between EU and non-EU countries that contributes to the energy and climate policy objectives of the EU

Two project promoters are defined in the application: Transelectrica and GSE

Discussion in DG Ener for the PMI status to be granted is underway and will be completed by fall 2025

BSSC is already in the PMI short list

Way Forward – 3) Stakeholder Engagement

- Involved countries
- Impacted countries
- EU structures
- IFIs and Investors
- Vendors
- Offtakers and traders
- NGOs and local population
- Environmental issues

Thank You For the Attention

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