# EstLink 2


*EstLink 2 is a high voltage direct current (HVDC) interconnection between Estonia and Finland.*

## Importance of EstLink 2

EstLink 2 is increasing the security of electricity supply in Estonia and the Baltics. At the same time, EstLink 2 plays an important role in the effective functioning of the electricity market. Together with EstLink 1, acquired by Elering AS and Fingrid Oyj at the end of 2013, EstLink 2 increases the transmission capacity between Estonia and Finland to 1,000 MW, making Finland and Estonia essentially one market area.

## Project information

In EstLink 2 HVDC interconnection the "classic" monopole current source converter technology (LCC) with insulated metallic return conductor is used.

| | |
|---|---|
| **Nominal transmission capacity:** | 650 MW |
| **Nominal voltage:** | 450 kV |
| **Connection in Estonia:** | Püssi 330 kV substation |
| **Connection in Finland:** | Anttila 400 kV substation |
| | |
| **Total length:** | ~170 km |
| Submarine cable | 145 km |
| Underground cable in Estonia | 12 km |
| Overhead line in Finland | 14 km |
| | |
| **Ownership:** | 50 % Elering AS<br>50 % Fingrid Oyj |
| | |
| **Cost:** | 320 MEUR, of which |
| EU funding | 100 MEUR |
| Submarine and underground cable | ca 180 MEUR |
| Converter stations | ca 100 MEUR |
| | |
| **Cable supplied and built by** | Nexans Norway AS |
| **Converter station built by** | Siemens AG and Siemens Oyj consortium |
| **Püssi substation expanded by** | Siemens Osakeyhtiö Estonian branch |
| **Anttila substation built by** | Empower Oy |

## Project schedule

**01/2008** start of preparatory works
**07/2009** seabed survey
**05/2010** start of cable and converter station tendering process
**12/2010** signing of contracts for building the cable and converter stations
**12/2011** start of converter station construction
**12/2012** end of submarine cable installation
**09/2013** end of underground cable installation and jointing
**12/2013** end of system testing and start of trial operation period
**02/2014** final handover of EstLink 2

## Submarine and underground cables

The submarine cable consists of two over 70 km long sections connected by a joint. The underground cable was installed by approximately 1 km long sections. Altogether there are 12 underground cable sections, 11 joints, and one transition joint to connect the submarine and underground cables.

## Submarine cable

**Weight:** 76kg /m
**Diameter:** 15 cm

1) Conductor
2) Paper insulation
3) Lead alloy sheath
4) Semiconducting screen
5) Return conductor
6) Return conductor insulation
7) Armour
8) Outer serving

## Underground pole cable

**Weight:** 45kg/m
**Diamter:** 13cm

1) Conductor
2) Paper insulation
3) Lead alloy sheath
4) Semiconducting screen
5) Metallic reinforcement tapes
6) Outer serving

## Underground return current cable

**Weight:** 20kg/m
**Diameter:** 9cm

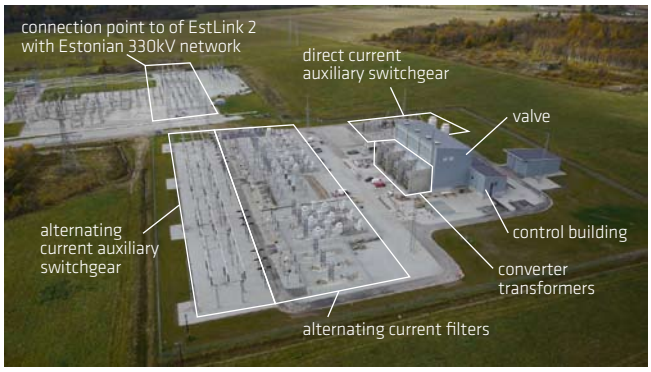
1) Return conductor
2) XLPE insulation
3) Outer serving

## Püssi and Anttila converter stations

The heart of the converter station is the valve where alternating current is converted to direct current and vice versa. Direct current is created by switching semi-conductive elements. In EstLink 2 converter station the 4" light-triggered thyristors are used.

The EstLink 2 valve hall houses the 12-pulse valve converter which consists of three stacks, each having four valves. Each valve contains two modules with 64 thyristors. In total 768 thyristors are used in one station.

*Püssi converter station valve hall*




*Püssi 330kVAC / 450 kVDC converter station*

Three one-phase transformers are used in EstLink 2 converter stations, each of them having one primary and two secondary windings. The nominal power of each transformer is 261 MWA and the total weight is 341 tons, out of which nearly 80 tons is made up of oil. The purpose of the alternating current filters (4 sets) is to reduce the harmonic voltage distortion and and the harmonic currents flowing into the connected AC systems as well as to compensate the reactive power consumed by the thyristors. Main systems in the converter stations, including the control and protection systems, are duplicated.

## Additional information

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Co-financed by the European Union
European Energy Programme for Recovery

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