

## Preamble

### HVDC Scheme: $\pm 320$ kV, 1x1000 MW HVDC Voltage Source Converter (VSC) based link

Adani Electricity Mumbai Infra Limited (AEMIL), a 100% subsidiary of Adani Electricity Mumbai Limited (AEML), a member of Adani Group has been incorporated for the specific purpose of development, construction, operation and maintenance of **HVDC Scheme** i.e.  $\pm 320$ kV Monopole, 1x1000 MW HVDC Voltage Source Converter (VSC) based link between 400 kV Maharashtra State Electricity Transmission Company Ltd. (MSETCL) Kudus EHV substation (Palghar) and 220 kV AEMIL-Transmission Aarey EHV substation (Goregaon East). AEMIL has been granted transmission license under Section 14 of the Electricity Act 2003 by the Maharashtra Electricity Regulatory Commission (MERC) on March 21, 2021 for the said "HVDC Scheme".

The scheme consists of 400 kV bay extension sub-station at MSETCL Kudus, HVDC Converter Stations at Kudus with interconnection to MSETCL Station & HVDC converter Station at Aarey with interconnecting  $\pm 320$  kV HVDC transmission link from Kudus to Aarey with capacity of 1000 MW. HVDC converter shall be connected to Mumbai Grid through 220 kV Aarey sub-Station.

The gist for the said scheme with salient features are mentioned as under:

#### **1. Technology**

- 1.1. The technology considered for this project is VSC based HVDC technology with Hybrid Transmission comprises of overhead transmission line and XLPE HVDC Cable as practiced globally in various running projects.
- 1.2. VSC with Modular Multilevel Converter (MMC) Technology to be used.
- 1.3. Valves of VSC based technology are self-commutated with Insulated Gate Bipolar Transistor (IGBT) & suitable for Hybrid transmission link i.e. HVDC Over Head Transmission line & underground HVDC Cable with XLPE extruded technology.

#### **2. Benefits of the technology**

- 2.1. Bulk power transfer (virtual Generator) with 100% capacity utilization.
- 2.2. Less footprint requirement compared to conventional HVDC technology.
- 2.3. Independent & continuous control of active and reactive power at each terminal giving attributes of virtual generator.
- 2.4. Black start features support during Grid restoration.
- 2.5. Steady state reactive power capability can be used for voltage control.
- 2.6. Less filtering requirements & smaller foot print.
- 2.7. No impact on already stressed short circuit level of equipment.

### 3. Brief scope of the Scheme (Detailed scope is mentioned under Tender Documents)

#### 3.1. At MSETCL Kudus: 400kV Connectivity from MSETCL Kudus line

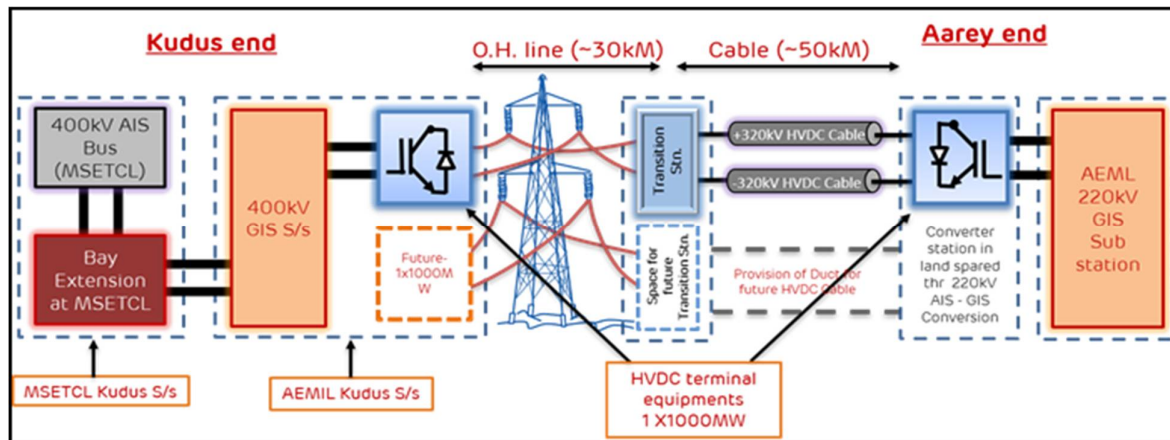
- 3.1.1. This would be accomplished through a 400kV Bus Extension with addition of GIS bays at MSETCL Kudus along with 400 kV Interconnection between MSETCL & AEMIL Kudus.
- 3.1.2. Installation of 1X1000 MW, VSC based HVDC Converter station at AEMIL Kudus.

#### 3.2. At AEMIL Aarey

- 3.2.1. Installation of 1X1000 MW, HVDC VSC based Converter station at AEMIL Aarey.
- 3.2.2. 220kV GIS bus extension from new Aarey S/S (HVDC) to existing AEMIL 220kV Aarey S/S.

#### 3.3. HVDC Connectivity between Kudus to Aarey through Hybrid Transmission link

- 3.3.1. Kudus HVDC Station and Aarey HVDC Station shall be connected through a 320 kV Hybrid Transmission Link of 80 Km consisting of 30 Km of HVDC Over Head Transmission Line and 50 Km of HVDC underground Cable. HVDC Over Head Line and HVDC underground Cable shall be interconnected at Transition Station near Shirsad (around 50 km from Aarey).
- 3.3.2. Block diagram for the scheme is illustrated as under:



### 4. Current status of scheme approval & financial closure

- 4.1. The Project (scheme) has already been granted necessary approvals by the Maharashtra Electricity Regulatory Commission (MERC).
- 4.2. The Project has also successfully achieved financial closure.