



HIGH VOLTAGE DC TRANSMISSION LINE

Topic Name:

HIGH VOLTAGE DC TRANSMISSION LINE

Presented by: *your name here*

Subject : Electric Power Transmission & Distribution Lab

Trade : D.EE

Roll :

No.:

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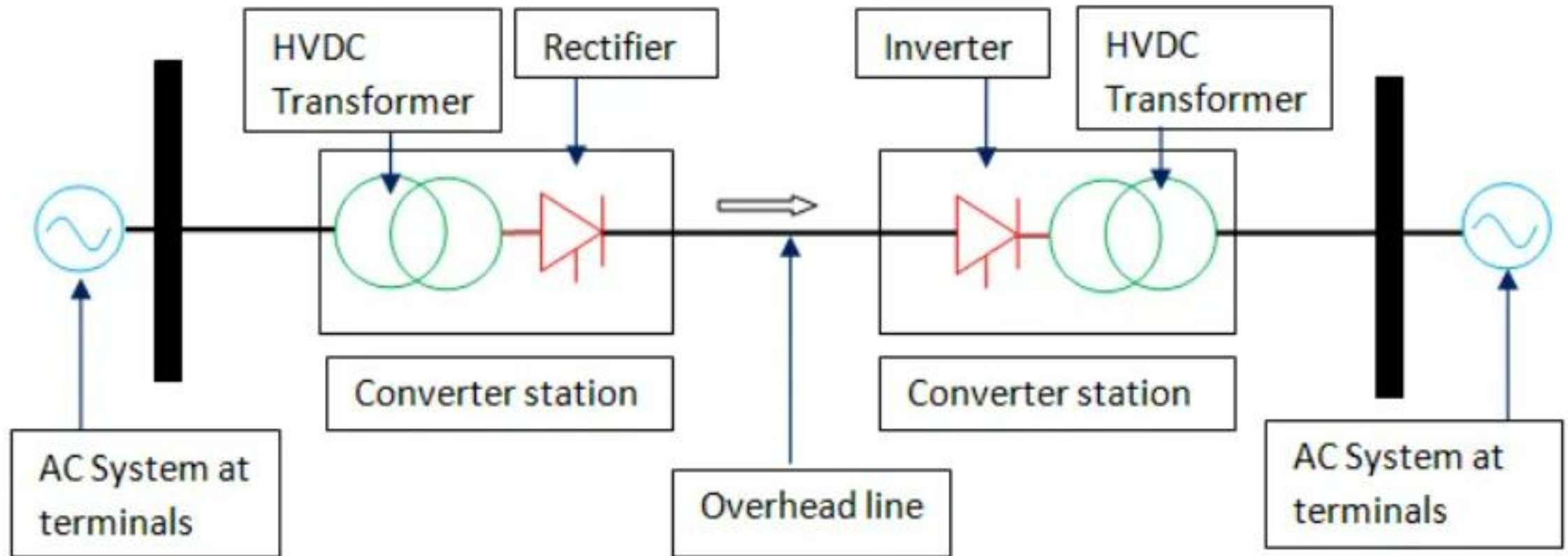
What is HV DC Transmission?

- ▶ AC power is generated in the generating station.
- ▶ This should first be converted into DC.
- ▶ The conversion is done with the help of rectifier.
- ▶ The DC power will flow through the overhead lines.
- ▶ At the user end, this DC has to be converted into AC. For that purpose, an inverter is placed at the receiving end.
- ▶ There will be a rectifier terminal in one end of HVDC substation and an inverter terminal in the other end.
- ▶ The power of the sending end and user end will be always equal (Input Power = Output Power).

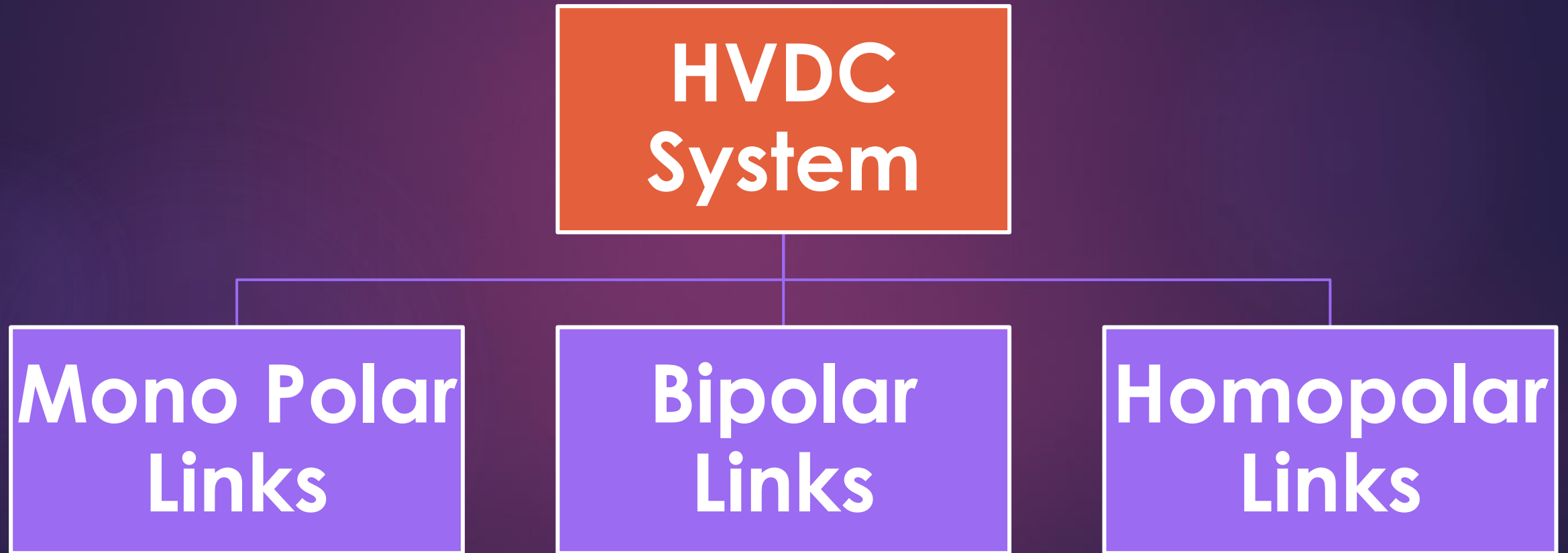


500 kV HVDC Transmission

HVDC Substation Layout



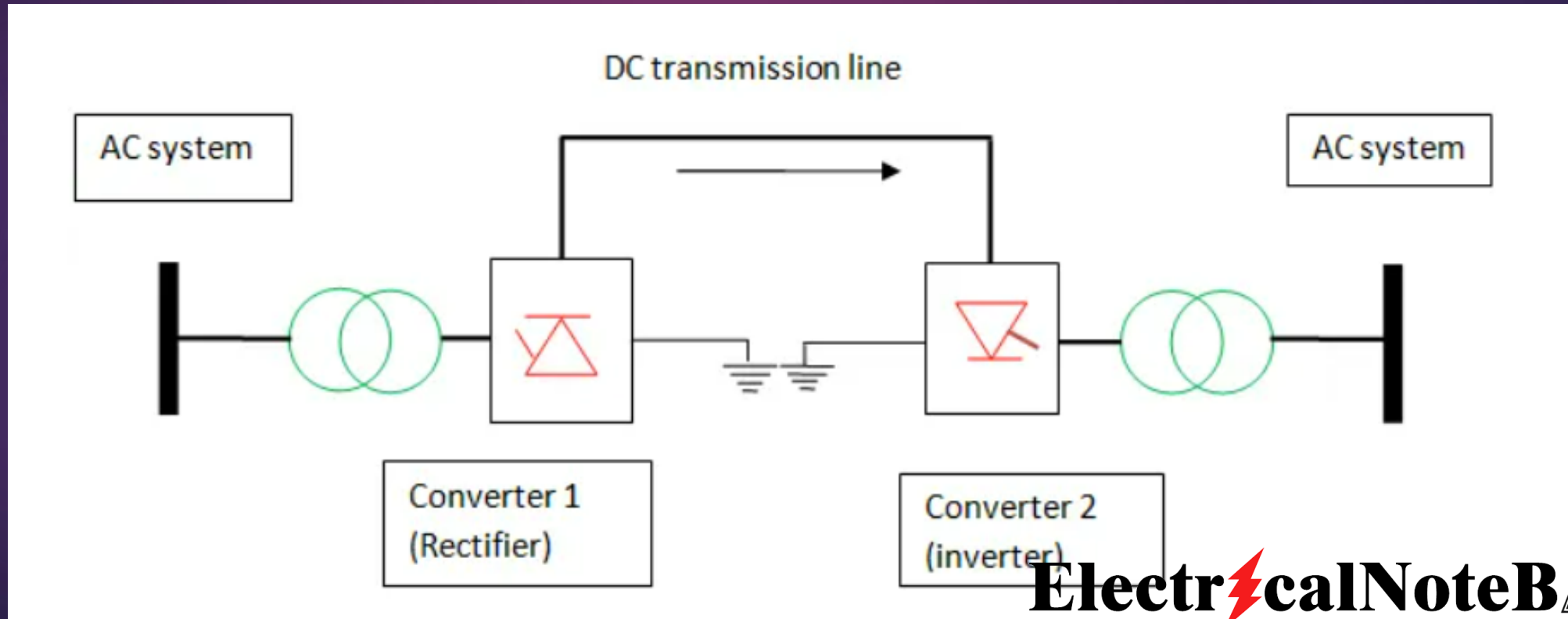
HVDC System Configuration



Monopolar Links

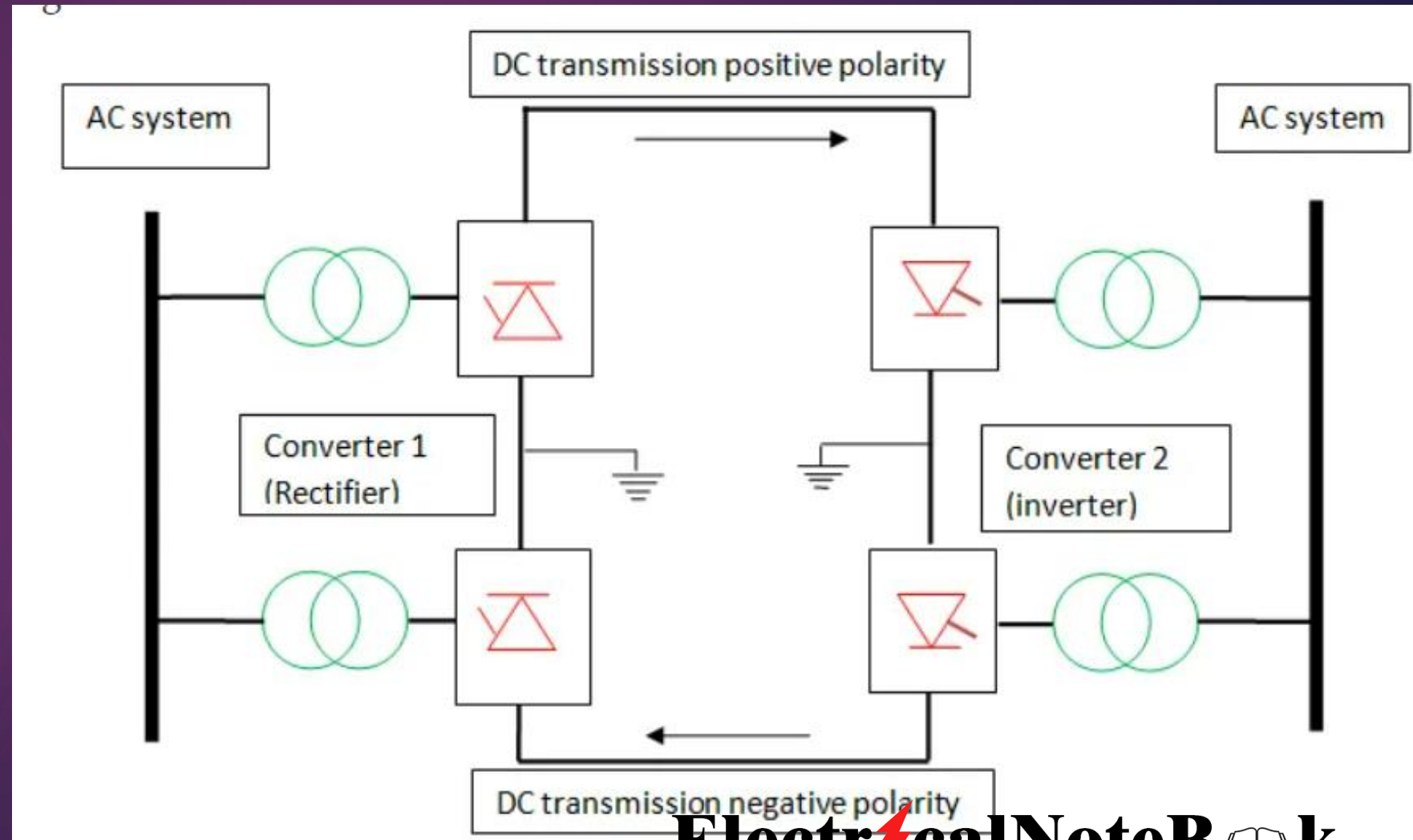
Single conductor is required and water or ground act as the return path.

If the earth resistivity is high, metallic return is used.



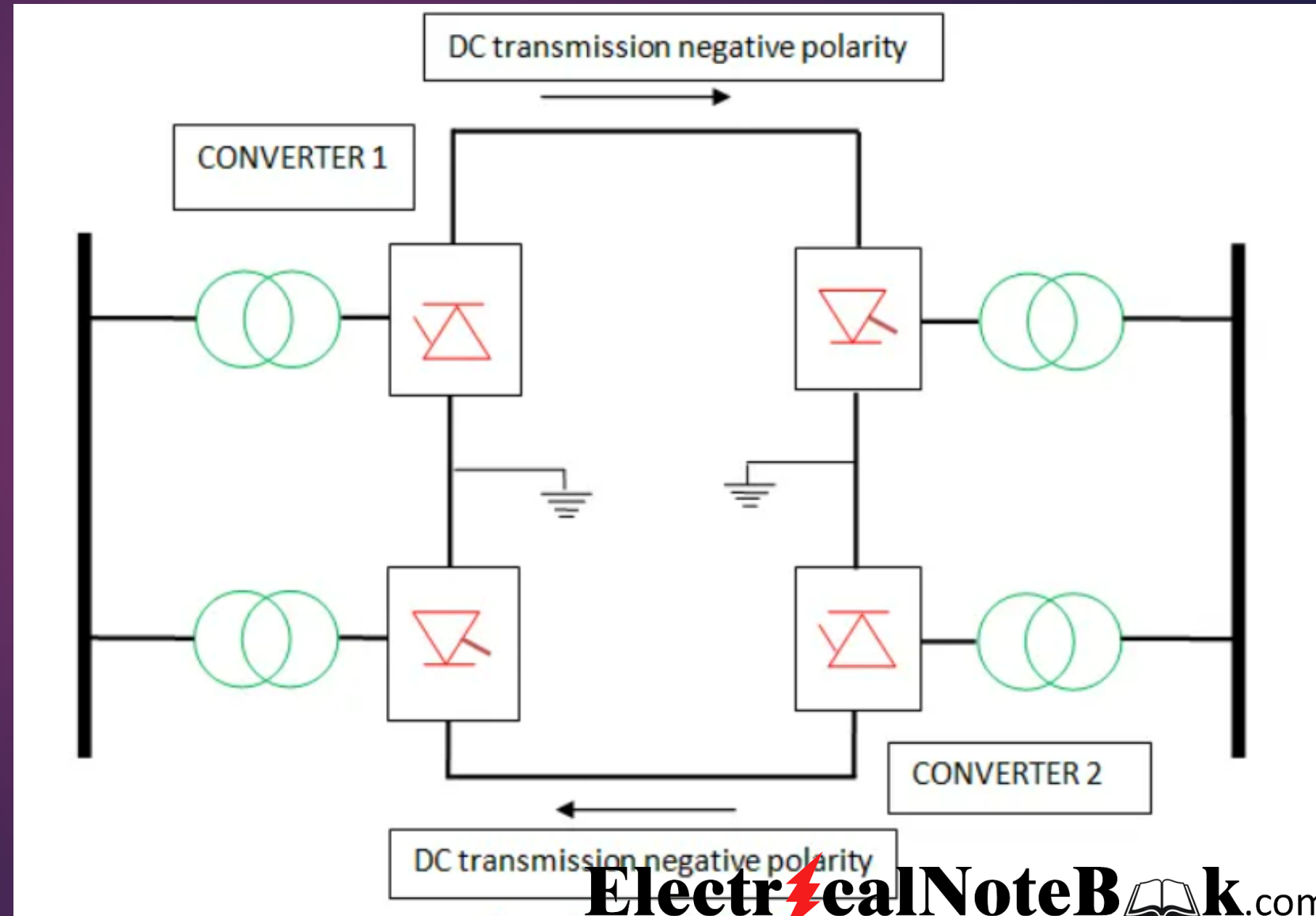
Bipolar Links

Double converters of same voltage rating are used in each terminal. The converter junctions are grounded.



Homopolar Links

It consists of more than two conductors which is having equal polarity generally negative. Ground is the return path.



Disadvantages of HVDC Transmission

- Converters with small overload capacity are used.
- Circuit Breakers, Converters and AC filters are expensive especially for small distance transmission.
- No transformers for altering the voltage level.
- HVDC link is extremely complicated.
- Uncontrollable power flow.

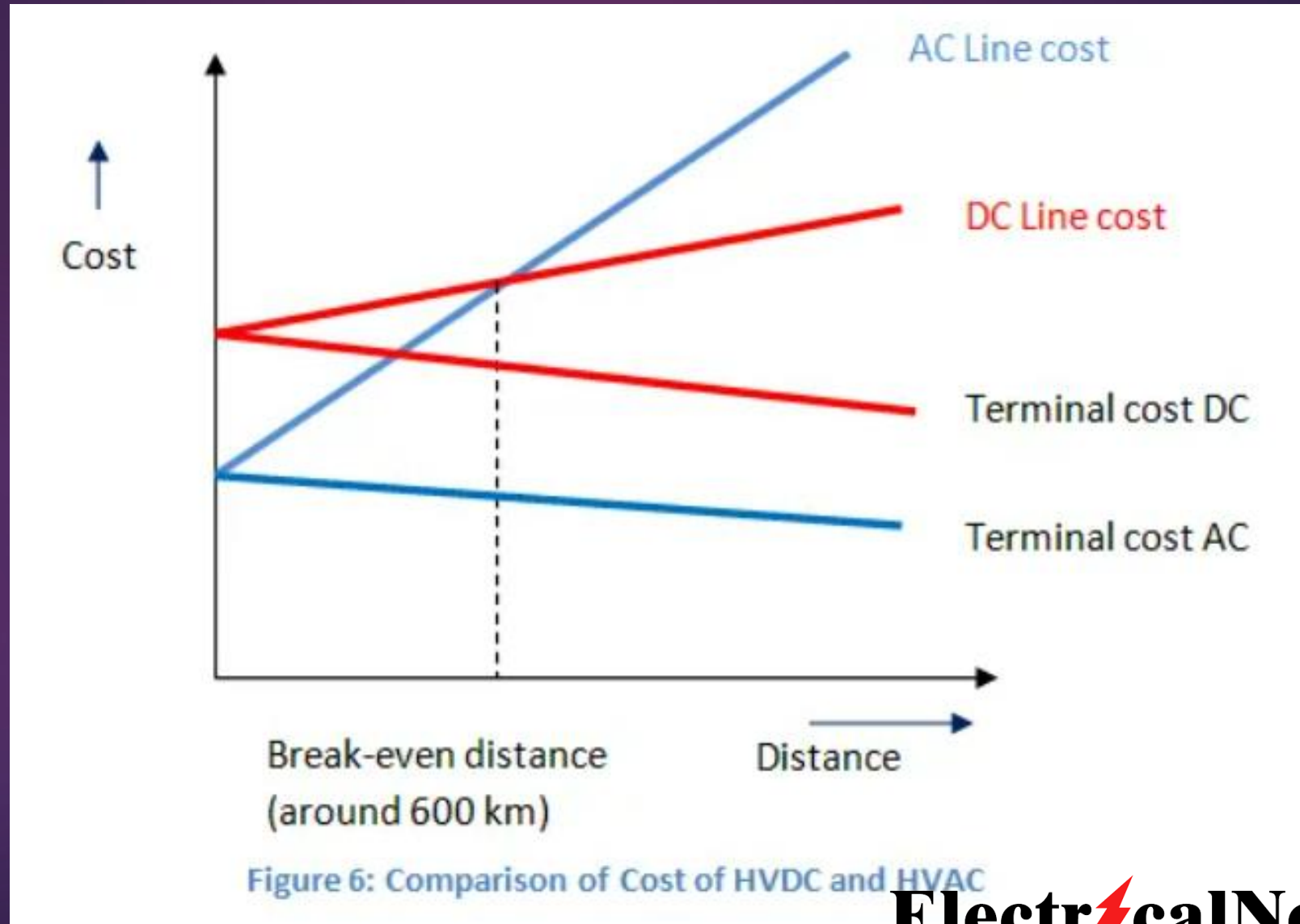
Application of HVDC Transmission

- Undersea and underground cables
- AC network interconnections
- Interconnecting asynchronous system

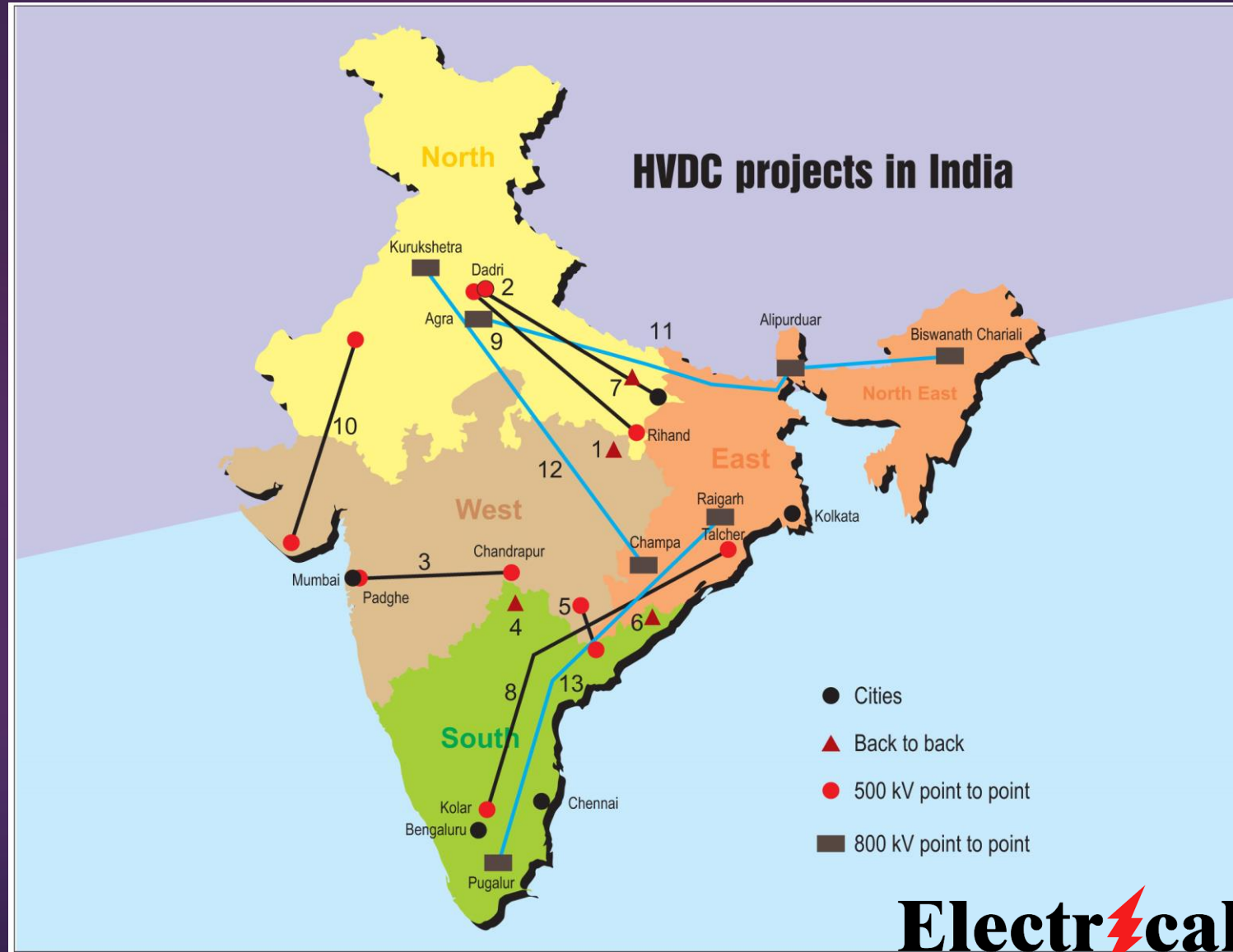
Comparison of HVAC and HVDC Transmission System

| HVDC Transmission System | HVAC Transmission System |
|--|---|
| Low losses. | Losses are high due to the skin effect and corona discharge |
| Better Voltage regulation and Control ability. | Voltage regulation and Control ability is low. |
| Transmit more power over a longer distance. | Transmit less power compared to a HVDC system. |
| Less insulation is needed. | More insulation is required. |
| Reliability is high. | Low Reliability. |
| Asynchronous interconnection is possible. | Asynchronous interconnection is not possible. |
| Reduced line cost due to fewer conductors. | Line cost is high. |
| Towers are cheaper, simple and narrow. | Towers are bigger compared to HVDC. |

Comparison of Cost of HVDC & HVAC



HVDC Project in India



765 kV DC Hyderabad-Wardha Transmission Line (Courtesy: L&T)



800 kV HVDC Biswanath Chariyali- Agra Transmission Line (Courtesy: L&T)



Thank You