



Regional Energy Transition and Power Grid Interconnection

**Global Energy Interconnection Development
and Cooperation Organization
November 2020**



1 Regional Energy Transition

1.1 Energy Transition Path

1.2 Clean Supply

1.3 Electrification

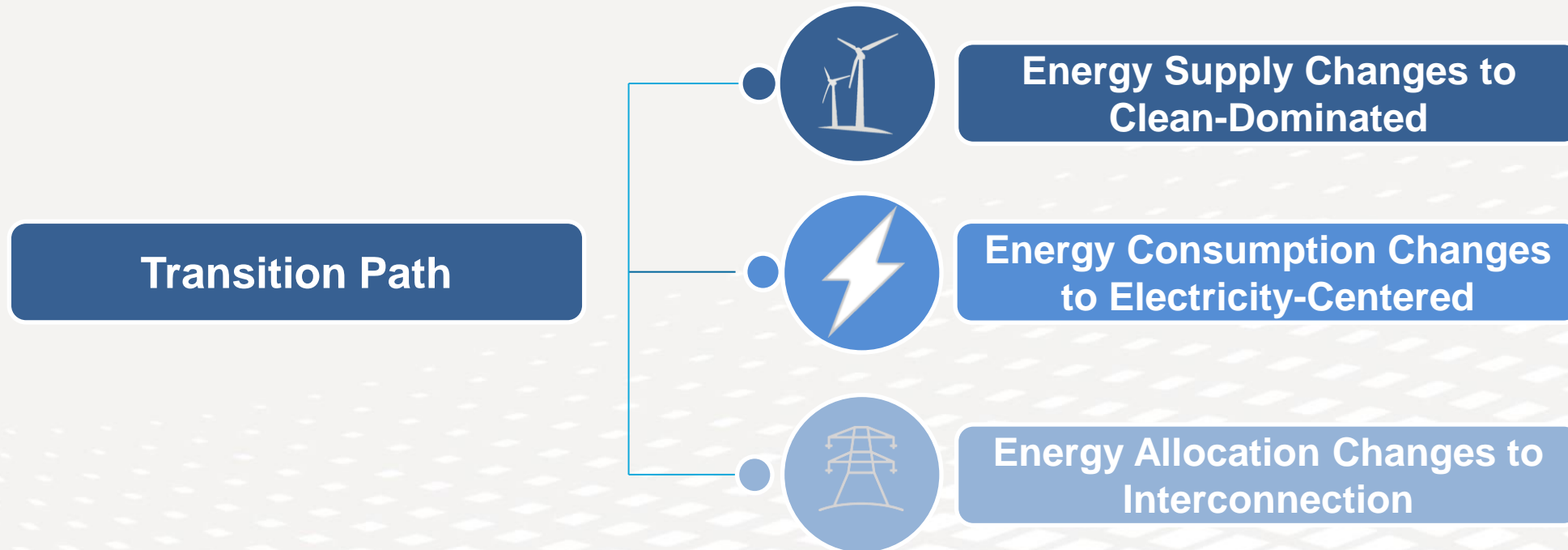
1.4 Interconnection

2 Power Grid Interconnection

1.1 Energy Transition Path



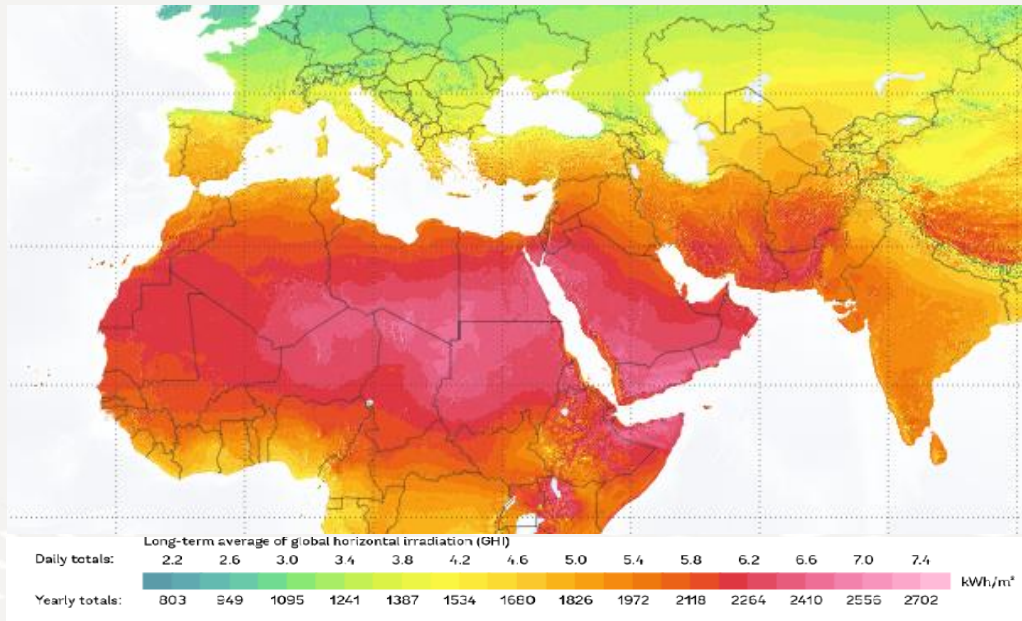
West Asia has an excellent location and abundant energy resources. The economic development of oil-exporting countries is mainly based on the oil industry, while the non-oil-exporting countries are mainly based on agricultural and animal husbandry, and their economic structure is relatively undiversified. The sustainable energy development in West Asia is of great significance to the energy transition in Asia and the world.





Energy Supply Changes to Clean-Dominated

- **The pattern of energy production needs to be adjusted to reduce the dependence on oil and natural gas resources.** The role of oil and natural gas will be transferred from fuel to industrial raw materials to increase their value. The TPEC is expected to reach 1.9 billion tce, with a clean energy share of 58% in 2050.
- **The large-scale development of clean energy needs to be accelerated to realize diversified and clean energy supply.** In 2050, the power generation installed capacity will be 1750 GW with the proportion of clean energy increased over 80%.



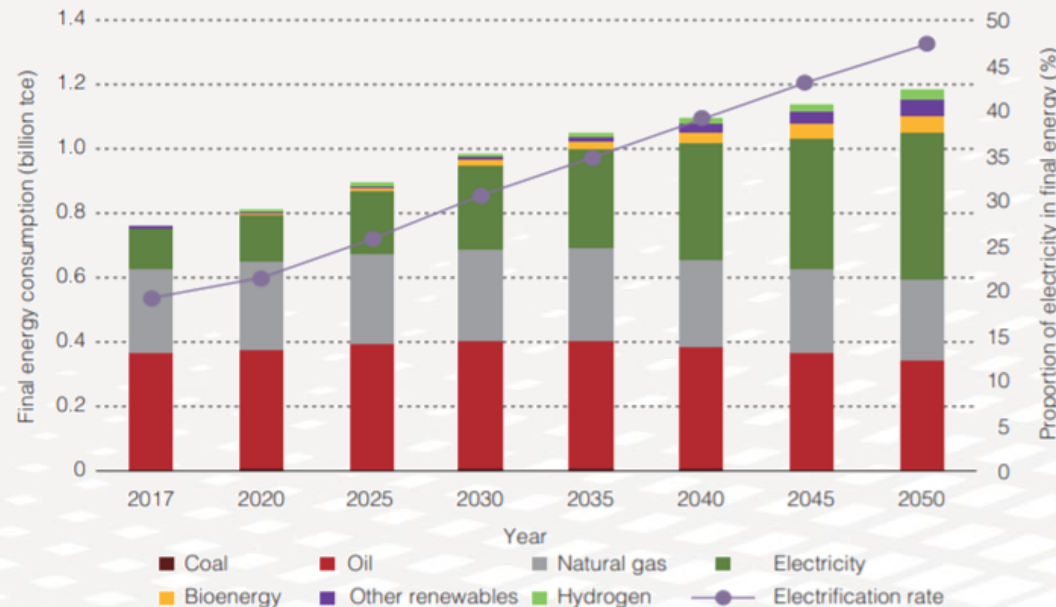
Distribution of Global Horizontal Irradiance

- ✓ Solar resources: GHI up to 2500 kWh/m²
- ✓ Scale effect: Abu Dhabi has the world's largest single PV power plant, “Abu Dhabi Noor”, with a total installed capacity of 1.177 GW
- ✓ Low financing costs: Land and financing policies are good for PV development, resulting in lower initial investment and operating costs



Energy Consumption Changes to Electricity-Centered

- Electricity will have the highest proportion in final energy in around 2040 with accelerating the “Electricity Replacement” and improving electrification.
- The power demand will grow rapidly, with desalination, hydrogen production by electrolysis, and electricity replacement in transportation sector as the new driving forces. In 2050, the electricity demand will be 3.9 PWh. Desalination, hydrogen production by electrolysis, and electricity replacement in transportation sector will be about 250 TWh, 240 TWh and 390 TWh, respectively.



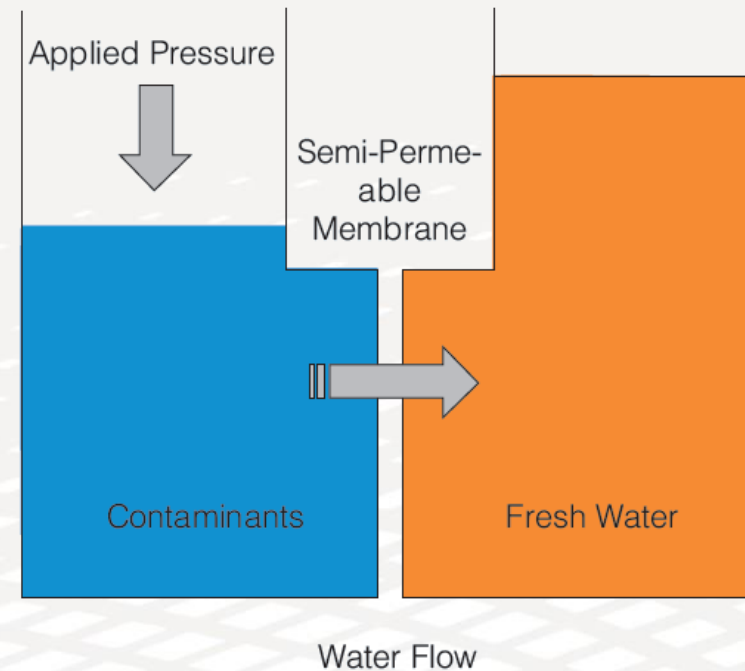
Forecast of the TFEC by Fuels and the Proportion of Electricity



Desalination Development

- **The combination of clean energy generation and desalination will be developed to meet fresh water needs.** The vigorous development of solar power generation and its combination with desalination technology can effectively reduce the energy consumption and investment costs.

✓ Reverse osmosis desalination technology can drastically reduce energy consumption. The large-scale development and application of reverse osmosis equipment will be completed in the entire region.

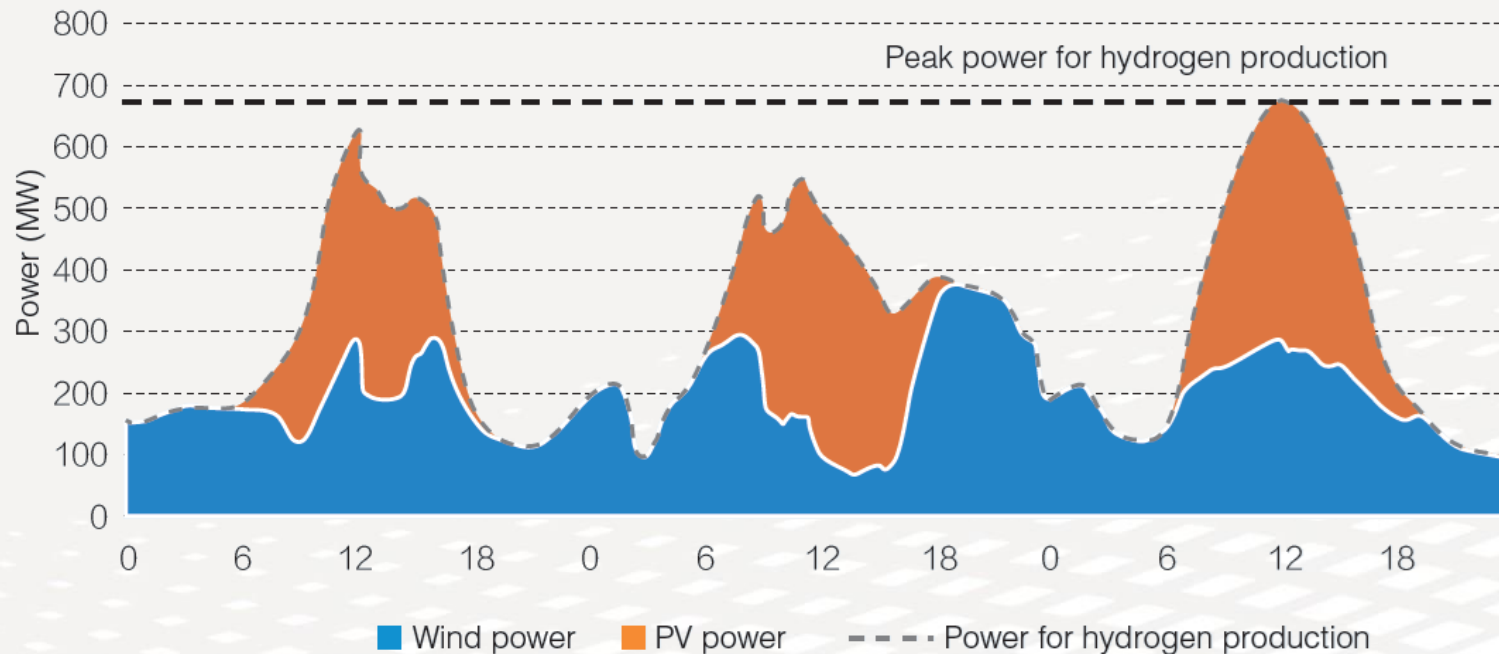


Reverse Osmosis Principle



Hydrogen Development

- **Hydrogen produced from renewable electricity has a large potential.** The cost of renewable energy generation is low in West Asia. The use of surplus electricity from large power grids integrated with large amount of renewable energy to produce hydrogen during low grid load periods, which can further improve equipment utilization and greatly reduce the cost of green hydrogen.

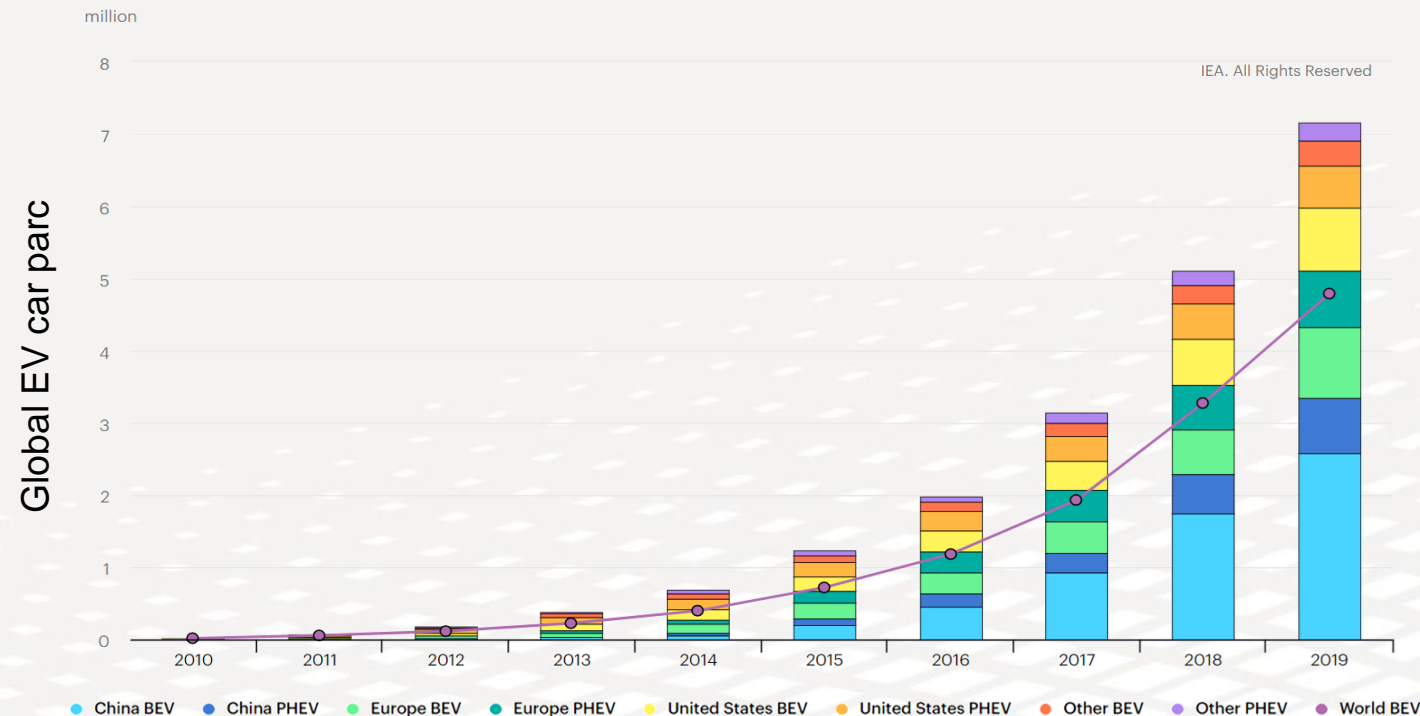


Hydrogen Production by Electrolysis Matched with Renewable Energy Generation



Electricity Replacement in Transportation Sector

- In view of the continuous improvement of infrastructure and the upgrade of road connectivity conditions, the market for electric vehicles will enjoy broad prospects.
 - ✓ Dubai has introduced a car subsidy policy to increase the number of EVs to 42,000 by 2030, and the Green Mobility Initiative plans to increase the proportion of EVs in government cars to 10% by around 2030.

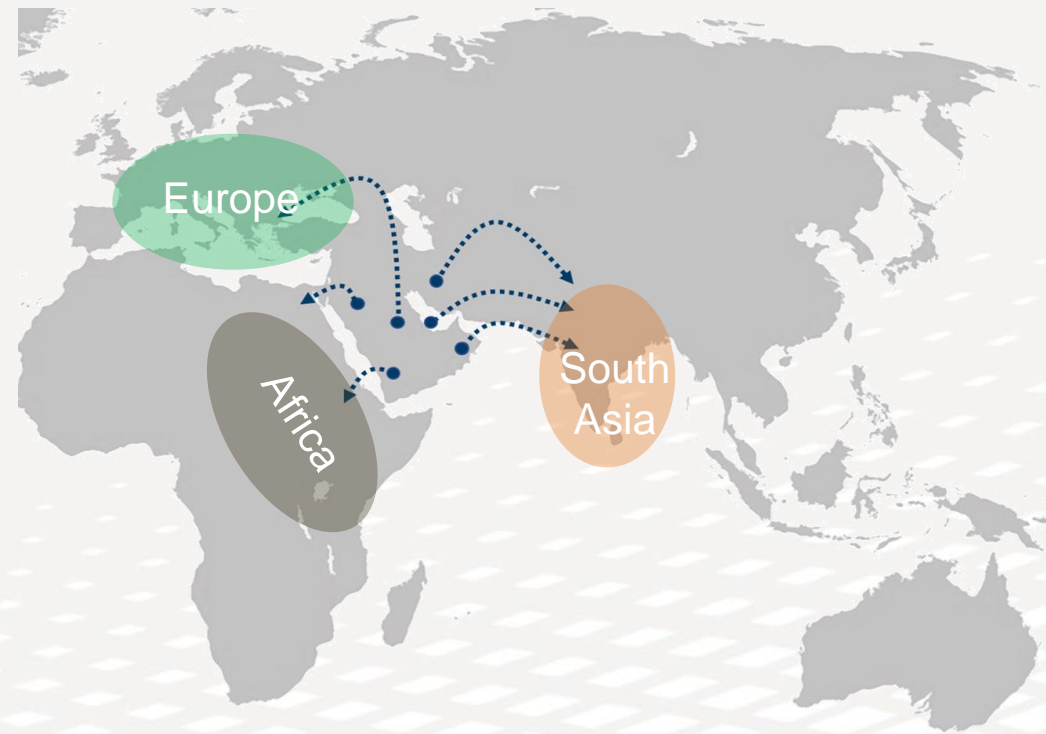


Global Electric Vehicle Development Trend



Overall Pattern

- With the advantages of superior location and abundant clean energy resources in West Asia, the overall power flow presents a pattern of “sending electricity to South Asia, Europe and Africa” outside the region. By 2050, the inter-continental and inter-regional power flow will be 57 GW.



Power Flow Pattern



1 Regional Energy Transition

2 Power Grid Interconnection

2.1 Grid Interconnection Scheme

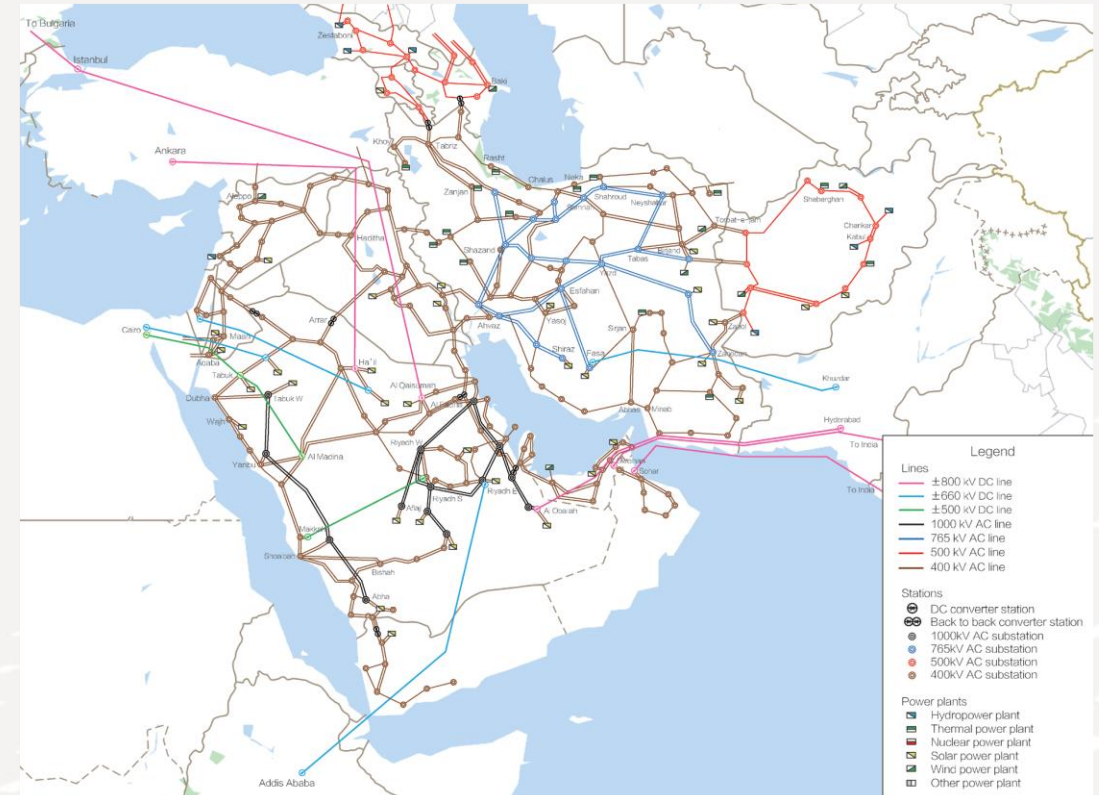
2.2 Key Interconnection Projects

2.1 Grid Interconnection Scheme



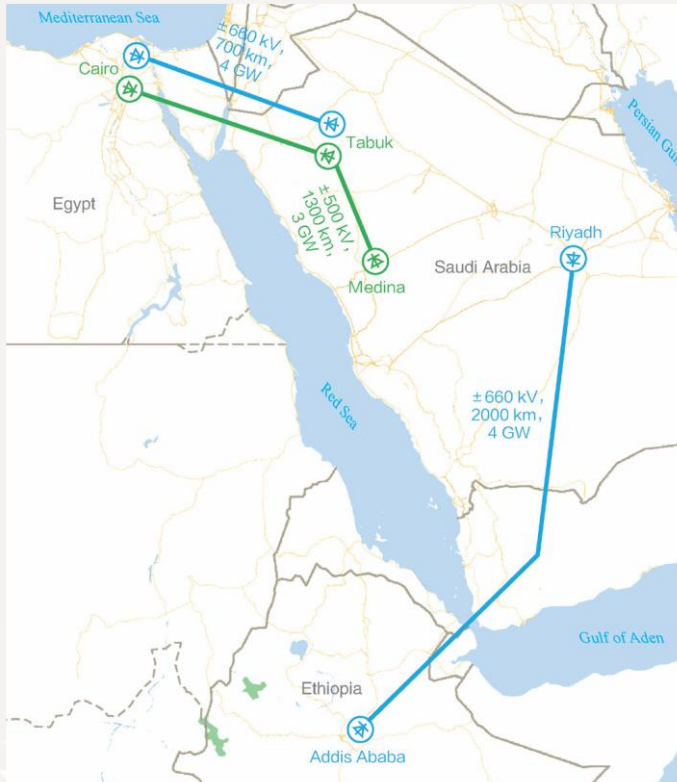
2050 Outlook

- **Intra-regional:** the domestic 380/400 kV power grids will be further strengthened or upgraded. A strong HVAC network will be built to cover clean energy bases and load centers. The cross-border interconnection will be strengthened.
- **Inter-regional and inter-continental:** West Asia will interconnect with South Asia through three ± 800 kV DC projects, with Europe through two ± 800 kV DC projects, with Africa through one ± 500 kV triple-terminal DC project, and two ± 660 kV DC projects.

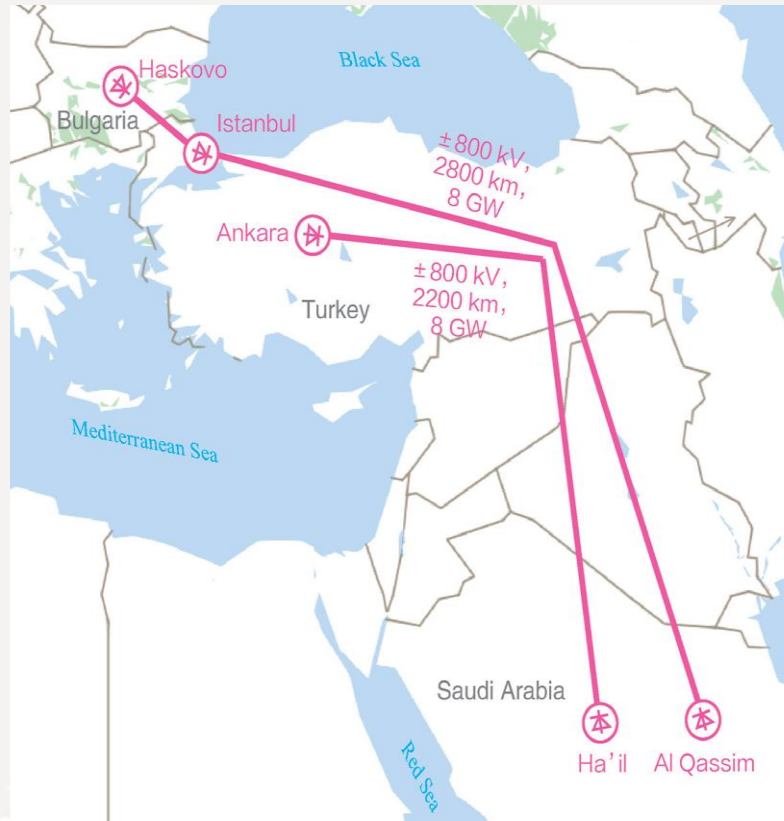


Schematic Diagram of Grid Interconnection in West Asia by 2050

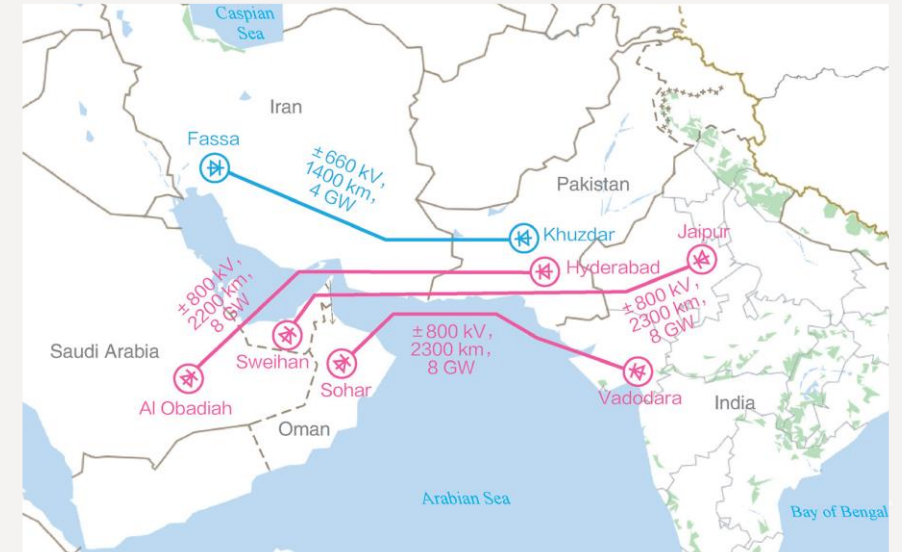
2.2 Key Interconnection Projects



West Asia-Africa Interconnection Projects



West Asia-Europe Interconnection Projects



West Asia-South Asia Interconnection Projects





Global Energy Interconnection
Development and Cooperation Organization
全球能源互联网发展合作组织



Let's make joint efforts for innovative
development, and create a better
future together

Thank You!