IMEC Electricity Interconnection: Strategic Corridor for EU Decarbonization
India–Middle East–Europe Economic Corridor Energy Analysis Outlook

October 2025

Abstract

The India–Middle East–Europe Economic Corridor (IMEC) represents a paradigm shift in global energy connectivity, positioning Israel, Cyprus, and Greece as the critical gateway for renewable energy flows into the European internal electricity market. This outlook presents simulation results from the IMEC electricity interconnection project, highlighting the corridor's potential to facilitate large–scale renewable energy trade from India and the Middle East into the EU internal electricity market. The simulation models a 5GW HVDC transmission corridor stretching over 3,730km, linking renewable generation assets in India, UAE, Saudi Arabia, and connecting through Israel, Cyprus, and Greece to Europe. The energy corridor shows significant potential to accelerate EU decarbonization goals by enabling:

- **100% renewable energy corridor** with 5GW solar and 5GW wind capacities in India, UAE and Saudi Arabia
- **Annual energy flows:** 19.9TWh generated, 13.4TWh to EU markets, 2.7TWh to Israel and 3.8TWh transmission losses
- **Competitive pricing** with an average IMEC electricity cost of **US$44/MWh** delivered to EU borders
- Seamless electricity market integration in EU via Greece, Cyprus, and Israel interconnections
- Enhanced energy security and grid flexibility across multiple regions

Simulation Model Overview

The mathematical model employs large–scale, hourly–resolved optimization that co–simulates generation, transmission and market clearing over a full year. Key elements include:

- Renewable energy generation of 10GW capacity comprising solar and wind installations distributed in India, UAE, and Saudi Arabia
- 5GW HVDC corridor spanning from India towards UAE and Saudi Arabia to Israel, Cyprus and Greece
- Hourly resolution simulation over 8,760 hours capturing seasonal and daily renewable variability
- Decision variables representing solar and wind outputs, HVDC power flows, and imports into Israel and the EU internal electricity market
- Constraints enforcing power balance at each node, renewable capacity factors, HVDC line ratings, and fixed import limits

Key Results

IMEC Corridor Configuration

India, the UAE, and Saudi Arabia hosts significant renewable capacities that feed the corridor:

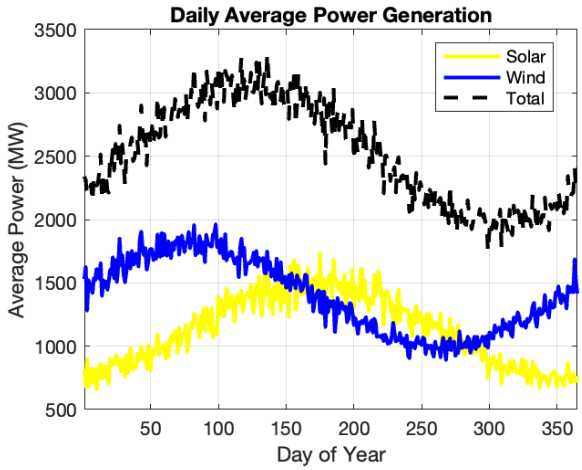
- The corridor crosses Israel, Cyprus, and enters the European grid at Greece, enabling multi–directional energy flows
- Annual multi–GWh renewable energy transfers demonstrated with optimal load matching and minimal transmission losses
- Israel, Cyprus, and Greece act as important intermediate nodes facilitating entry and market access into the EU internal electricity market
- Combined regional interconnections provide robustness and redundancy enhancing grid stability
- The corridor supports diversified energy supply routes helping mitigate regional risks and geopolitical dependencies

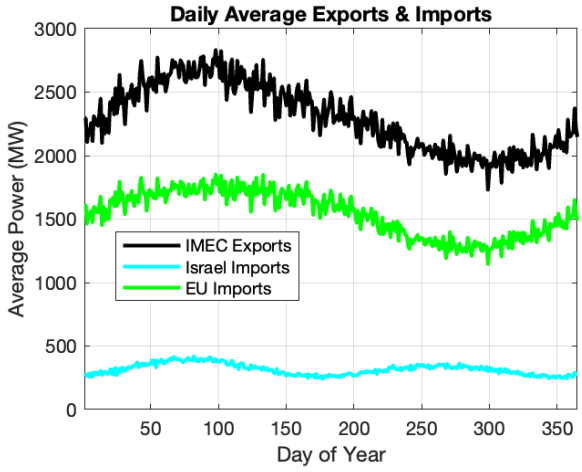
EU Decarbonization and Energy Security Impact

IMEC corridor enables large–scale renewable capacity integration supporting EU climate and energy targets:

- Facilitates competitive renewable energy pricing by reducing reliance on fossil fuel imports
- Enhances grid resilience through geographic diversity of power generation
- Contributes substantially to EU's interconnection and decarbonization ambitions
- Enables imported renewable electricity to support EU green hydrogen production

Detailed Results

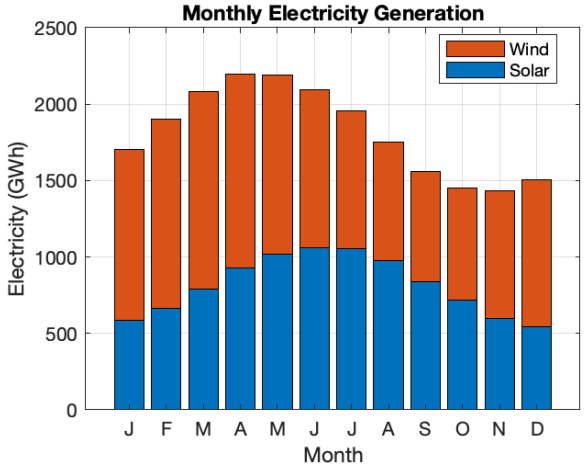


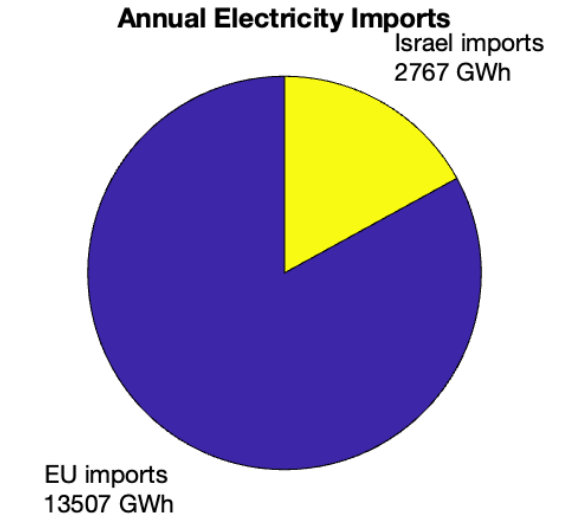


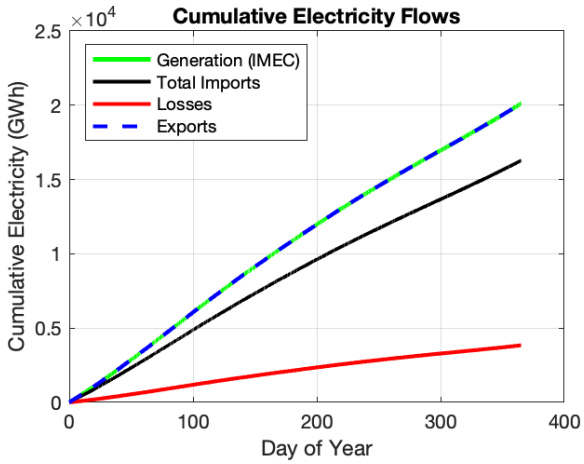
Strategic Implications

Expanding renewable energy is reshaping regional energy dynamics, with:

- Competitive renewables from India, UAE, and Saudi Arabia providing cost–effective electricity supply
- Transmission investment supporting long–term energy trade and cooperation between India, the Middle East, and Europe
- Regional collaboration fostering stronger economic ties and boosting clean technology development







Economic Outlook

IMEC electricity interconnection simulation reveals significant economic benefits and transformative market opportunities for the participating regions. The comprehensive economic analysis reveals the corridor's potential to reshape energy markets across India, the Middle East, and Europe through competitive renewable electricity trade:

- HVDC infrastructure: Generating over 13,000 construction jobs and 3,600 permanent positions across India, the Gulf, Israel, Cyprus, and Greece while generating US$1.2 billion in annual transit fees and export revenues
- Highly competitive pricing: Delivering renewable electricity at US$44/MWh through merit–order dispatch across 8,760 hours
- Strategic renewable energy hubs: Securing stable, competitive electricity, enhancing energy security, and unlocking US$B31 in total economic impact through technology transfer and industrial development
- Infrastructure investment requirements: US$15–25 capital expenditure for 3,730 km of HVDC transmission infrastructure, including submarine cables, converter stations, and supporting systems across seven countries

Infrastructure Capital Expenditure

Component	Quantity	CapEx (US$B)
Submarine HVDC Cable	∼2,000km	4.0
Land HVDC Transmission	∼1,730km	2.5
VSC–HVDC Converter Stations	5 terminals	4.0–6.5
Supporting Infrastructure & permitting	–	5.0–10.0
	Total	15–25

Policy Recommendations

Based on our modeling, we recommend:

1. **HVDC infrastructure and renewable capacities**: Encourage investments along the IMEC corridor
2. **Gateways to the EU electricity market**: Accelerate development of electricity interconnections between Israel, Cyprus, and Greece
3. **Cross–border electricity trade**: Support regulatory frameworks for regional cooperation
4. **Foster international cooperation**: Address geopolitical and technical challenges in corridor operations and energy production methods

Conclusion

IMEC corridor represents a transformative opportunity for EU decarbonization, with Israel, Cyprus and Greece positioned as strategic entry hubs to the EU internal electricity market. The modeling demonstrates:

- **Technical feasibility and economic viability of a 19+ TWh renewable energy corridor** connecting India's, UAE's and Saudi Arabia's renewable potential to European demand centers
- **Efficient transmission of clean electricity** across 3,730km of advanced HVDC interconnections
- **100% renewable energy generation, zero emissions, and competitive pricing at US$44/MWh** delivered, the IMEC corridor offers Europe a pathway to energy independence while accelerating decarbonization objectives.
- **Coordinated investments** in transmission infrastructure, market integration mechanisms, and regulatory frameworks, the IMEC corridor can deliver transformational change for European energy security and sustainability.
- **The strategic positioning of Israel, Cyprus and Greece as the EU entry hubs** create unprecedented opportunities for regional energy cooperation while supporting continental European climate targets