



Vietnam - Power Development Plan 8 - Decarbonization

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Vietnam Economy at a glance



- Nominal GDP: **US\$449.09 billion**
- GDP per capita: **US\$3,756 (2021)**
- GDP Growth: **5.8%**
- Inflation: **4.89% (as of Jan 2023)**
- Population: **About 99.3 million**
- Total export and import turnover : **US\$ 730.2 billion in 2022** (increase by 9.1% compared with 2021)
- Regional Minimum wage (Region I): **VND 4,680,000 (US\$ 198.8) per month** (June 2022)
- Vietnam's average age: **30.9 years old**
- Recently, the Power Development Plan VIII (PDP 8) was approved by the Government and it is expected that investment into renewable energy sector will boom in the coming time

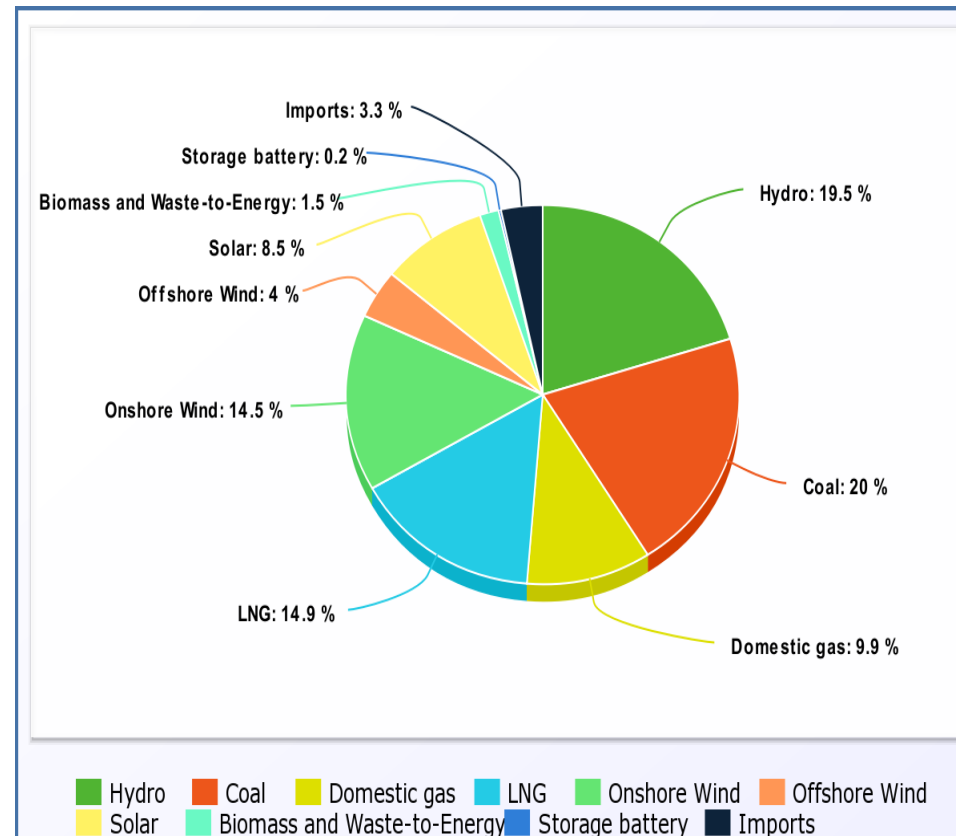
Power Development Plan 8 - Decarbonization

- The Power Development Plan 8 was approved on 15 May 2023 under Decision No. 500/QD-TTg.
- PDP8 sets out the goal of ensuring national energy security for Vietnam by 2050 to meet the target of socio-economic development with an average GDP growth rate of about 7%/year in the period of 2021-2030; 6.5%-7.5%/year for the period 2031-2050.
- The goal is to achieve a renewable energy ratio of 47% according to the commitment on equitable energy transition with Vietnam (JETP). With an orientation to 2050, the ratio of renewable energy is expected to be up to 67.5 - 71.5%.



Power Development Plan 8 (cont.)

- According to the PDP8, by 2030, the planned energy resource for local consumption shall reach 150,489 MW consisting of: (i) Hydro energy: 29,346MW; (ii) Coal-fired power: 30,127MW, (iii) Domestic gas: 14,930MW; (iv) LNG: 22,400MW; (v) onshore wind power: 21,880MW; (vi) offshore wind power: 6,000MW; (vii) solar power: 12,836MW; (viii) biomass and WTE 2,270MW, (ix) storage battery energy around 300MW and (x) foreign imported power 5,000MW. Meanwhile, the capacity for exporting is 5,000 – 10,000 MW.



Power Development Plan 8 (cont.)

- From 2021 to 2030, investment for power generation and transmission systems is estimated to be \$134.7 billion, including \$119.8 billion for power generation and \$14.9 billion for transmission systems.
- By 2030, two inter-regional renewable hubs will be set up for electricity generation, transmission and consumption, and manufacturing and services of renewable energy equipment
- The smart grid system is encouraged to be developed.
- The transmission grid system is given the green light for investment and development by private investors at a later stage.
- It is the aim of the PDP8 to have 50% of residential houses and offices to have rooftop solar system for on-site consumption.
- The pilot program for the Direct Power Purchase Agreement (DPPA) mechanism is encouraged and urged by the Prime Minister to be implemented.

Power Development Plan 8 (cont.)

- To implement the PDP8, a plan for implementation of PDP8 shall be drafted by MOIT and submitted to the Prime Minister for approval by June 2023 (Plan for Implementation).
- On June 17, 2023, the Energy Institute issued the Official Letter No. 0975/VNL-P8 to report to the Ministry of Industry and Trade (the MOIT) about the development of the implementation plan of the PDP8 in response to the Letter No. 3748/BCT-DL from the MOIT to the Energy Institute. On this Letter, the Energy Institute explained the completing the PDP8 planning tasks by June 2023 is impossible. Therefore, it is recommended that the MOIT allocate a reasonable timeframe for the Energy Institute to implement the planning tasks. Additionally, it is recommended to arrange funding to support the Institute in developing the planning tasks and reviewing the annual plan.

Power Development Plan 8 (cont.)

- The main instruments for bringing the PDP8 into life being the amended Electricity Law and the Law on Renewable Energy will be prepared by MOIT and it is expected that the draft for the mentioned laws will be submitted for the National Assembly's approval by 2024. Regarding the DPPA mechanism to be in line with PDP8, the regulations on DPPA will be finalized by MOIT and submitted to the Government for approval within this year.
- MOIT is also tasked to coordinate and work with local authorities to review and address issues under existing regulations, agreements to address issues of projects and report to the Prime Minister for instruction/ legislation if required.

Solar and Rooftop Solar power projects

- Rooftop solar power systems are encouraged to be developed by the PDP 8.
- On June 13, 2023, the Ministry of Industry and Trade submitted a draft of a mechanism to encourage the development of rooftop solar power installation in houses, offices, and corporate headquarters in Vietnam with the following incentives/requirements:
 - Total capacity of the rooftop solar power system is prioritized for development without capacity limit and belongs to the PDP 8;
 - Organizations and individuals investing in the development of rooftop solar power systems are exempted from electricity activity licenses and electricity business registration certificates;
 - Rooftop solar power systems installed in offices are prioritized for budget allocation for implementation;
 - Organizations and individuals investing in and using the Rooftop Solar Power System are entitled to receive or reduce taxes and fees; loans at preferred interest rates as prescribed by law.

Solar and Rooftop Solar power projects (cont.)

- Rooftop solar power system installed into the electricity grid system that has been connected in accordance with regulations on the distribution power system is not required to perform the connection agreement. Previously installed Rooftop Solar PV Systems that meet regulatory conditions will also be eligible for this incentive;
- Organizations and individuals investing, installing and using the rooftop solar power system must ensure the requirements on electrical safety, construction safety, environment, fire prevention and fighting according to current regulations.
- According to the PDP8, solar power projects that have been planned for the period of 2021 - 2030 but have not yet been assigned to investors are not allowed to be implemented and will be put on hold after 2030 with the exception of on-site consumption without connecting to the grid, provided that there are no violations of planning, land and other provisions of the law

Direct Power Purchase Agreement (DPPA)

- Major international companies, including Samsung, Lego, Adidas, etc. wish to take part in the pilot program of the DPPA.
- As believed, the DPPA is an important mechanism to attract investors and private investments, not only in the energy sector but also in other sectors where companies have made commitments in the space of renewable energy, carbon reduction, and sustainability, e.g. trading of carbon credits.
- In 2022, a draft decision of the Prime Minister on a pilot program for the DPPA mechanism was published. Such a program offers a look into the possible structure of the DPPA mechanism under PDP 8.

Direct Power Purchase Agreement (DPPA)

(cont.)

Under the draft pilot program, the DPPA mechanism works as follows:

1. the renewable energy generator will enter into a DPPA in the form of a forward contract with a customer, under which the customer will guarantee a fixed price for the energy produced by the renewable energy project and in return, the generator will transfer the “environmental attributes” created by the project to the customer;
2. the generator will sell all of the generated electric energy to EVN in the wholesale electricity market under a template power purchase agreement provided in the Draft Decision. The power companies of EVN will then sell electric energy to the customer at retail prices. Such electric energy may not necessarily come from the project; and
3. if the price that the generator sells its energy in the wholesale electricity market (Floating Price) is lower than the fixed price, the customer will pay the generator the shortfall. If the Floating Price is higher than the fixed price, the generator will pay the generator the excess.

Transitional projects under the PDP 8

- Transitional wind and solar power projects are projects for which PPAs were executed with EVN before 1 January 2021 in respect of solar power projects and 1 November 2021 in respect of wind power projects, but which did not achieve COD (1 November 2021 for wind power and between 1 July 2019 and 31 December 2020 for solar power) within the deadline to be eligible for the favourable feed-in tariffs under Decision No. 13/2020/QD-TTg regarding solar power and Decision No. 39/2018/QD-TTg regarding wind power. These projects have faced considerable difficulty in achieving COD or obtaining financing due to the lack of certainty regarding the applicable tariff rate.

Transitional projects under the PDP 8 (cont.)

- On 26 April 2023, 26 April: EVN provides further guidance on price negotiation process for investors of transitional power projects whereby projects of which the price negotiation dossiers have been submitted to EPTC, the tariff after review is $> 50\%$ of the ceiling price in Decision 21/QD-BCT, and the investors proposed a temporary tariff $\leq 50\%$ of the ceiling price while waiting for the negotiation result: EPTC urgently negotiates and aligns a temporary tariff with investors without retroactive payment until the final tariff is agreed.

No.	Type	Ceiling price (VND/kWh)
1	Ground-mounted solar power plant	1,184.90
2	Floating solar power plant	1,508.27
3	Onshore wind power plant	1,587.12
4	Offshore wind power plant	1,815.95

Transitional projects under the PDP 8 (cont.)

- Recently, 31/85 investors have submitted price negotiation dossiers to EVN
- On 10 May, 10 May: EVN agreed the temporary tariffs with 2 investors (Nam Binh 1 wind project, Vien An wind project). The agreed tariffs have not been published.
- On 17 May, according to the meeting between the MOIT and the Deputy Prime Minister – Mr. Tran Hong Ha – the MOIT was asked to (i) urgently revise relevant documents on tariffs for transitional power projects. In the meantime, provide guidance on price negotiation process (e.g. tariff calculation methods). Study other methods for calculation of tariffs that could offer an acceptable level of profits and make economic sense for businesses; (ii) Accelerate electricity operations licensing process for already completed projects.

Transitional projects under the PDP 8 (cont.)

No.	Project	Power	Capacity (MW)	Application dossier received by EPTC	The investor has proposed temporarily 50% of the ceiling price of the price bracket	Projects approved by the MOIT on the temporary price and signed PPA
1.	Cong Ly Soc Trang - Phase 1	Wind	30	X		
2.	Bac Lieu – Phase 3	Wind	140.6	X		
3.	No. 3 Soc Trang (V2-1)	Wind	29.4	X		
4.	No. 3 – Thanh Hai 3	Wind	30	X	X	
5.	Cau Dat	Wind	68	X	X	
6.	No. 7 – Phase 2	Wind	88.2	X		
7.	Nhon Hoi – Phase 2	Wind	30	X	X	
8.	No. 5 – Thanh Hai 4	Wind	30	X	X	
9.	Yang Trung	Wind	145	X	X	X
10.	Lac Hoa 2	Wind	130	X	X	X
11.	Vien An	Wind	50	X	X	X
12.	Thanh Phu	Wind	120	X		
13.	HBRE Ha Tinh	Wind	120	X		
14.	Lig Huong Hoa 1	Wind	48	X		
15.	Nam Binh 1	Wind	30	X	X	X
16.	Binh Dai No. 2	Wind	49	X		
17.	Binh Dai No. 3	Wind	49	X		
18.	Asia Dak Song 1	Wind	50	X		
19.	VPL Ben Tre	Wind	4.2	X	X	X
20.	Hanbaram	Wind	93	X	X	X
21.	Tan Phu Dong	Wind	100	X	X	X
22.	No. 5 – Thanh Hai 2	Wind	25.75	X	X	
23.	Ia Le 1	Wind	52.8	X	X	X
24.	Hiep thanh	Wind	64.5	X	X	X
25.	Huong Linh 7	Wind	17.4	X	X	X
26.	Cho Long	Wind	105.5	X	X	X
27.	Hoa Dong 2	Wind	45.6	X	X	X
28.	Thuan Nhien Phong	Wind	11.4	X		
29.	Binh Dai	Wind	25.8	X		

Transitional projects under the PDP 8 (cont.)

No.	Project	Power	Capacity (MW)	Application dossier received by EPTC	The investor has proposed temporarily 50% of the ceiling price of the price bracket	Projects approved by the MOIT on the temporary price and signed PPA
30.	Hung Hai gia Lai	Wind	96	X	X	X
31.	Huong Hiep 1	Wind	25.5	X	X	X
32.	Thien Tan 1.4	Solar	78.925	X		
33.	Phu My 1	Solar	64.75	X	X	X
34.	Phu My 3	Solar	23.75	X	X	X
35.	Thien Tan 1.2	Solar	85.4	X	X	X
36.	Thien Tan 1.3	Solar	41.3	X	X	X
37.	Factory at Phuoc Minh commune, Thuan Nam district, Ninh Thuan province (450MWac)	Solar	172.12	X	X	X
38.	Khai Long – Ca mau – Phase 1	Wind	100			
39.	Hoa Thang 1.2	Wind	100			
40.	Phuoc The	Wind	26.25			
41.	Ca Mau 1A	Wind	88			
42.	Ca Mau 1B	Wind	88			
43.	Ca Mau 1C	Wind	88			
44.	Ca Mau 1D	Wind	86			
45.	Nexif Energy Ben Tre	Wind	30			
46.	Thanh Phong – Phase 1	Wind	29.7			
47.	Duyen Hai (V1-4)	Wind	48			
48.	No. 2 - Soc Trang	Wind	30			
49.	No. 18 – Soc Trang	Wind	22.4			
50.	Huong Linh 3	Wind	30			
51.	Che bien Tay nguyen	Wind	50			
52.	Phat trien mien nui	Wind	50			
53.	Dak N'Drung 1	Wind	100			
54.	Dak N'Drung 2	Wind	100			
55.	Dak N'Drung 3	Wind	100			
56.	Hoa Thang 2.2	Wind	19.8			

Transitional projects under the PDP 8 (Cont.)

No.	Project	Power	Capacity (MW)	Application dossier received by EPTC	The investor has proposed temporarily 50% of the ceiling price of the price bracket	Projects approved by the MOIT on the temporary price and signed PPA
57.	Tan Tan Nhat – Dak Glei	Wind	50			
58.	Ia Pech 2	Wind	50	X	X	
59.	Song An	Wind	46.2	X	X	
60.	Huong Linh 4	Wind	30			
61.	Hoa Dong	Wind	30	X		
62.	Lac Hoa	Wind	30	X		
63.	Nexif Energy Ben Tre – Phase 2.3	Wind	50			
64.	Tan An 1 – Phase 2012-2025	Wind	45	X	X	
65.	Phong Dien 1 – Binh Thuan – Phase 2	Wind	30			
66.	TNC Quang Tri 1	Wind	50			
67.	TNC Quang Tri 2	Wind	50			
68.	Thien Phu	Wind	30			
69.	Thien Phu 2	Wind	30			
70.	Lig Huong Hoa 2	Wind	48			
71.	Tan Hop	Wind	38			
72.	Cu Ne 1	Wind	50			
73.	Cu ne 2	Wind	50			
74.	Krong Buk 1	Wind	50			
75.	Krong Buk 2	Wind	50			
76.	Xanh Song Cau – Phase 1	Wind	49.5			
77.	Tan An 1 – Phase 2021-2025 (30MW)	Wind	30	X		
78.	No. 19 Ben Tre	Wind	50			
79.	No. 20 Ben Tre	Wind	50			
80.	Hai Anh	Wind	40			
81.	Sunpro	Wind	29.4			
82.	Lac Hoa – Phase 1	Wind	5			
83.	Ia Pech	Wind	33.5	X	X	
84.	Krong Pa 2	Solar	39.516			
85.	Ngoc Lac	Solar	45			

Price range of power purchased by EVN in recent PPAs and distributed to the customers

COMPARISON TABLE FOR AVERAGE ELECTRICITY PRICE FOR COUNTRIES IN SOUTH EAST ASIA (FOR REFERENCE ONLY)

	Vietnam	Thailand	Singapore	Cambodia
Household	0.11	0.13	0.21	0.148
Business	0.13	0.15	0.21	0.148

CURRENT ELECTRICITY SITUATION

- Until now, EVN has successfully developed Vietnam's Competitive Generation Market (VCGM) and Vietnam's Wholesale Electricity Market (VWEM).
- Under the VWEM, power plant with a installed capacity of over 30 MW directly participates in the electricity market while hydropower plants with installed capacity of 30 MW or less have the right to choose to participate in the electricity market when they fully satisfy the conditions on infrastructure. The buyers are EVN and electricity buyers satisfying the relevant conditions.
- The ancillary service providers are the National Load Dispatch Center (EVNNLDC); National Power Transmission Corporation (EVNNPTC) and other subsidiaries of EVN.
- Under both the VCGM and the VWEM, EVN and its subsidiaries are currently enjoying a vertically integrated monopoly.

CURRENT ELECTRICITY SITUATION (cont.)

- Insufficient electricity supply due to drought in the North and malfunctions of thermal power machineries.
- Offices in Hanoi have experienced short power outages and there have been incidents of people trapped in condominium elevators due to blackouts.
- As reported, one of the industrial park's developer in the North of were told to cut power 50% on blackout risk, leading to suspension of production of many factories.



CURRENT ELECTRICITY SITUATION

(cont.)

- The transmission network is under great pressure and is experiencing congestion since transmission grids are not enough in quantity, especially in Ninh Thuan and Binh Thuan provinces, to accommodate the increasing number of solar power projects and reduction in construction time of them due to advanced technology. As a result, most projects that have come into operation in such localities are being subjected to daily decrease in generating capacity to avoid overloading the regional grid.



CURRENT ELECTRICITY SITUATION (cont.)

- 220 renewable power plants have not been fully dispatched due to local congestion.
- During low-peak hours, over-generation occurs due to high renewable penetration.
- Lack of incentive mechanism for ancillary services and currently, there is no mechanism for operations of smart grid/battery energy storage system.
- Infightings are in place as the Director of the National Load Dispatch Centre was temporarily suspended to serve the specialized inspection in the management and administration of power supply.



Transmission Grid and Smart Grid

- Electricity of Vietnam (EVN) currently holds a monopoly on electricity transmission, distribution, wholesale, and retail.
- Under the PDP 8, in the future, private entities can take part in the development of electricity.
- Currently, National Power Transmission Corporation – a subsidiary of EVN – is the only company to manage and operate the transmission system.



Transmission Grid and Smart Grid (cont.)

Power Grid development plan under the PDP 8

- Developing both 500 kV and 220 kV transmission power grids to support the capacity of power sources, improve the reliability of power supply, reduce power loss
- Fostering collaboration in research and grid connection implementation with neighboring countries, Southeast Asian nations, and Greater Mekong Sub-region (GMS) countries.
- Connecting the power grid with Laos with 500kV and 220kV transmission lines to import electricity from power plants in Laos according to the memorandum of understanding signed between the two governments.

Investment into the power sector

- Under WTO Commitments, EVFTA and CPTPP, Vietnam has not committed on the production, transmission and distribution of electricity.
- Under the EVFTA, Vietnam retains the right to adopt or maintain measure to the operations of enterprises implementing the transmission and distribution of electricity.
- Under the CPTPP, Vietnam reserves the right to adopt or maintain any measure with respect to hydroelectricity and nuclear power.
- As for production of electricity, it is common practice that foreign investors can implement such business with no foreign ownership restriction.
- Until now, Trung Nam Group – a domestic group - is the only entity known to be allowed to develop 500kV substation and 500kV, 220kV transmission line as a pilot program.



Investment into the power sector (cont.)

WTO analysis of liberalization of market access

Country	Limitation of market access*	Country	Limitation of market access*
Malaysia	medium	Myanmar	high
Indonesia	medium	Cambodia	medium
Philippines	medium	Laos	medium
Singapore	low	India	high
Thailand	medium	China	medium
Brunei	high	Vietnam	low

* Typical restrictions: number of opened sectors, JV requirement, limits on foreign-owned shares, permission requirement

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Investment into the power sector (cont.)

- The infrastructure of the electricity grid creates a natural monopoly – very similar to telecommunication infrastructure, railroads, or motorways.
- Public private partnerships (e.g. - BOT) should be the first option.
- Due care on negotiations of the PPA and grid connection agreement with EVN
- Electricity selling in off-grid areas can be a good choice
- Sound financing structure, good business model and great legal assistance are keys to success.
- Accurate prediction of where the market is heading to, in the context of Vietnam's critical power shortage, should be considered.

Investment into the power sector (cont.)

- More pressure on the government to adequately address key issues on tariff increase, demonopolization of the power market and government guarantee.
- Vietnam's market is extremely in need of financing and EPC capability. There are rooms for cost-effective and high quality EPC contractors and resourceful lenders.
- In many cases, you can “test the water” with a small power plant project.

Key department EVN – Electricity Market Department

- Officials from Ban Thi Truong Dien (Electricity Market Department) are responsible for negotiating Power Purchase Agreements.
- Responsible persons (Last updated on August 2022):
 - Mr. Tran Dang Khoa: Head of Market Department
 - Ms. Minh Loan, Mr. Minh Tuan, Mr. Trung: Deputy Heads of Market Department

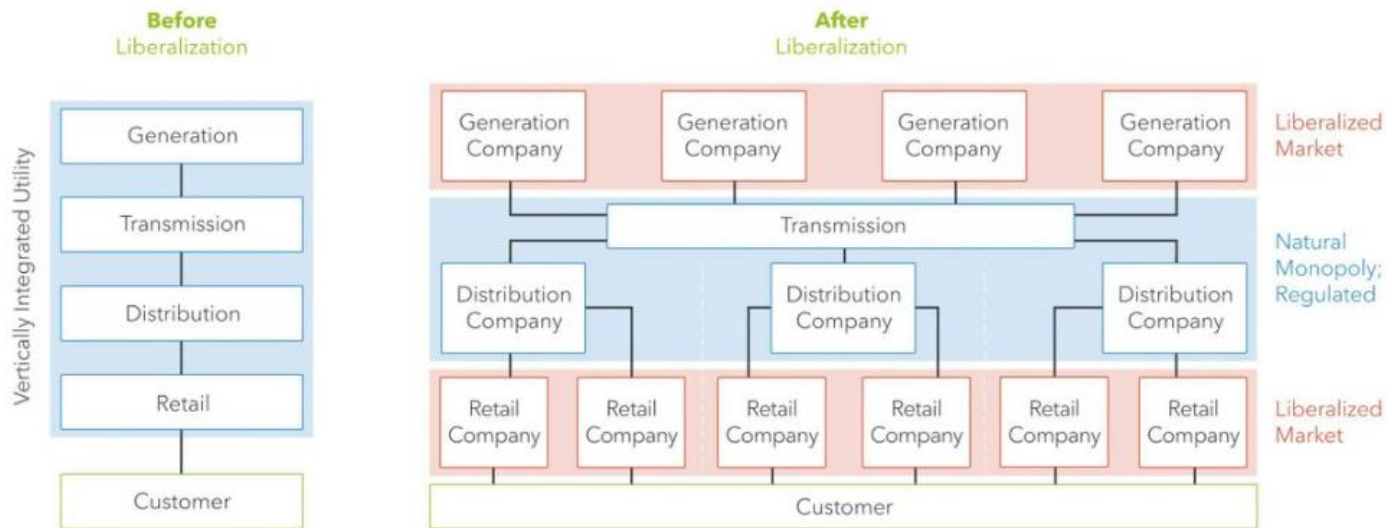
Case study: the EU and Germany

- Thirty years ago, the European electricity sector was a monopoly. Vertically integrated companies were responsible for generation, transmission and supply of electricity.
- In 1996 the European Union started to gradually open the market for competition – to liberalize the energy market just like it did before with several other sectors.
- A key step in this process was and is the unbundling of the European power sector with the aim to split up the generation, transmission, distribution and retail activities. As a result of the unbundling process, the vertically integrated companies can no longer both generate, transport, trade and supply electricity while managing the transmission and distribution networks.

Case study: the EU and Germany (cont.)

- The process of unbundling was to achieve the fully-integrated, further decarbonized electricity market and ensures security of supply through solidarity and cooperation between EU member states.

Liberalization of Energy Markets



Case study: the EU and Germany (cont.)

- Thanks to the market premium model, renewable energy systems can even offer their electricity at negative prices, which gives them high priority in dispatch. Negative electricity prices provide incentives for controllable producers to make generation more flexible, as inflexible assets exacerbate the magnitude of negative prices. Consumers can also play their part, bidding flexibility by shifting demand to low-price periods.
- Both on the supply and demand side, liberalization has established competitive forces that promote a more cost-effective power system. Consumers are free to choose their electricity supplier and thus create competition between energy providers.
- For household customers, liberalisation has led to a lasting reduction in the costs associated with generating and transporting electricity. While the final price paid by household customers is now approximately twice as high as it was before liberalisation, this is attributable to higher taxes and levies, particularly for subsidising the expansion of renewables.

Future development on decarbonization

- Development of the DPPA mechanism to allow consumers to buy electricity directly from renewable power plants.
- Development of mechanism to facilitate the participation in ancillary services to support the national grid.
- Development of pilot program for the mechanisms for BESS and smart grid.
- Approval and issuance of relevant regulations (Law on Renewable Energy, DPPA pilot program, etc.)
- Development of new financial mechanisms for investors to hedge the risk of price different between load's node and the generator's node; to create new forms of financial contracts for financing purpose; to create new derivative financial market, etc.

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Jim Elliot

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Thank you very much!

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