



VIETNAM WHOLESALE ELECTRICITY MARKET 2021



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- 02.** VWEM OPERATION AND IMPLEMENTATION FOR THE REMANING MONTHS OF 2021

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OPERATIONAL RESULT OF 2020 & Q1/2021



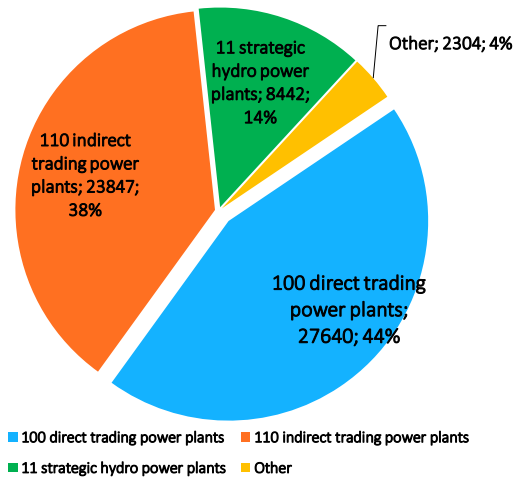
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OPERATIONAL RESULT OF 2020

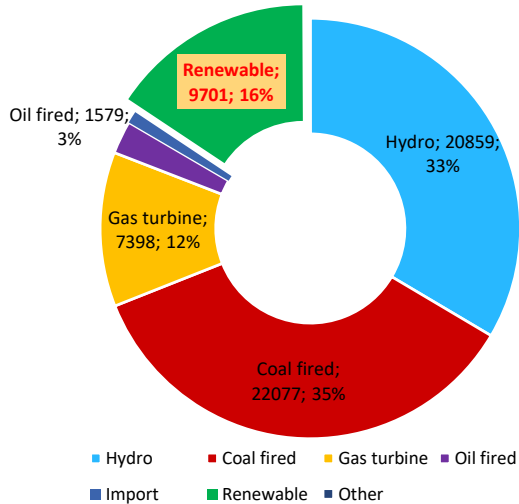
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2020 - Generation Installed Capacity

Generation Installed Capacity by Market Participation Status
(number, MW, %)



Generation Installed Capacity by fuel types (MW; %)



National Load Dispatch Centre

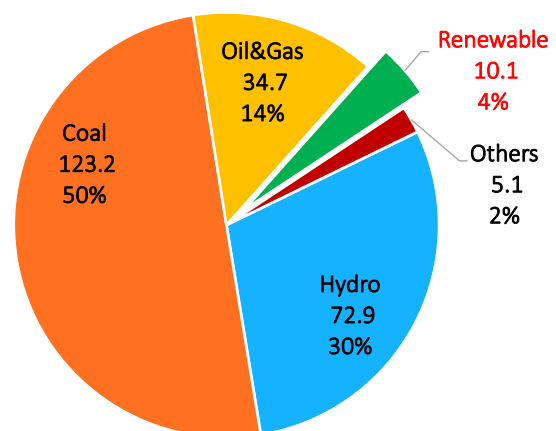
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2020 - Energy Production

Category	Energy production (bil. kWh)	(%)
Hydro	72.9	30%
Coal	123.2	50%
Oil & Gas	34.7	14%
Renewable	10.1	4%
Others	5.1	2%
Total	245.9	100%

Energy production (bil. kWh, %)

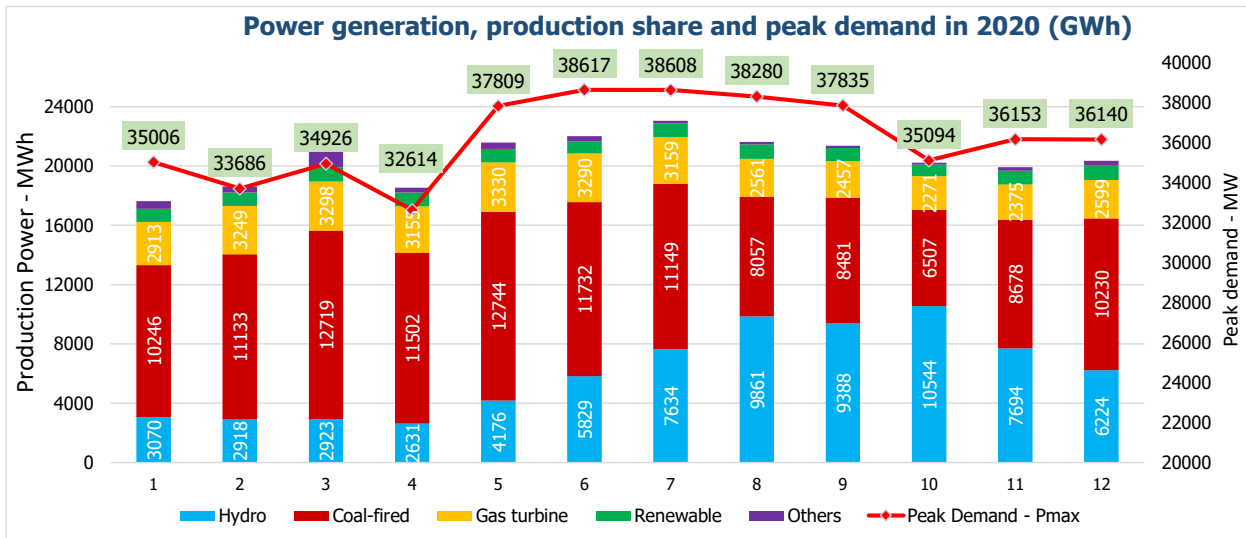


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2020 - Operational results - System

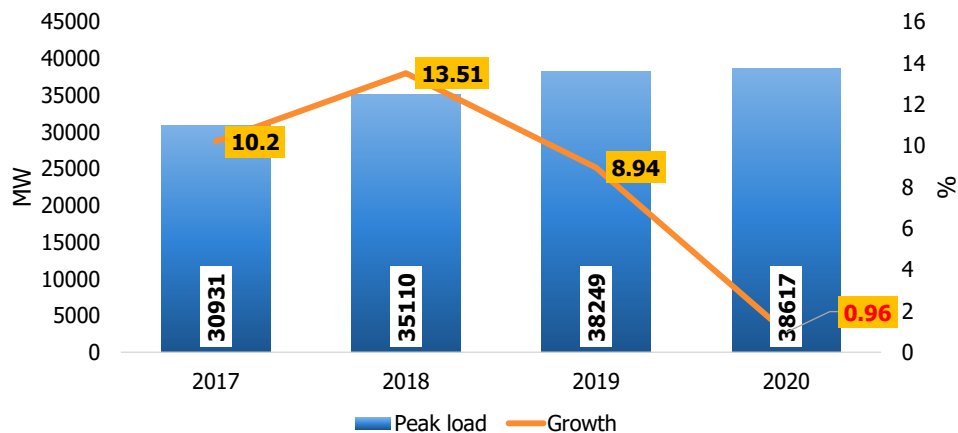


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Annual Peak Load Growth



Due to the strong influence of COVID-19 global pandemic, the peak load in 2020 only reached at 38,617MW. Actual growth was at 0.96%.
(In 2020 annual planning, peak load was expected to increase by 7.8%).

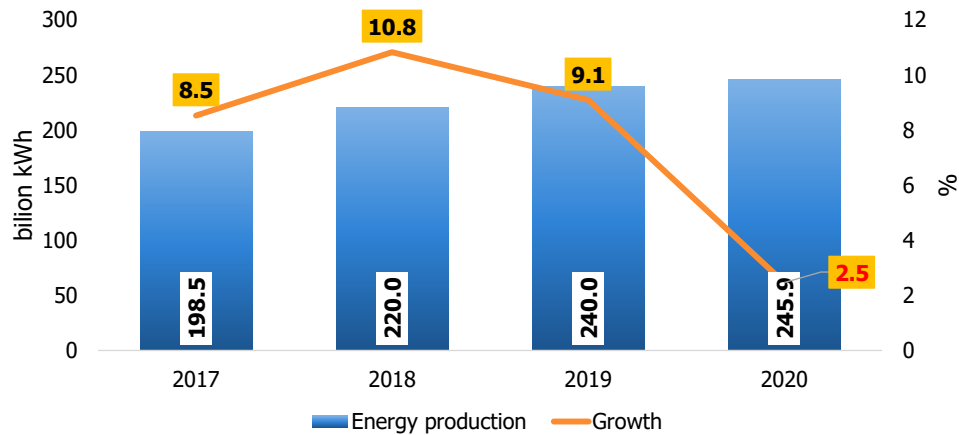


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Annual Energy Production Growth



Energy production in 2020 also grew slowly, reached 245.9 billion kWh.
 2020 annual planning was expected to grow by 8.9%. Actual growth was 2.5%.



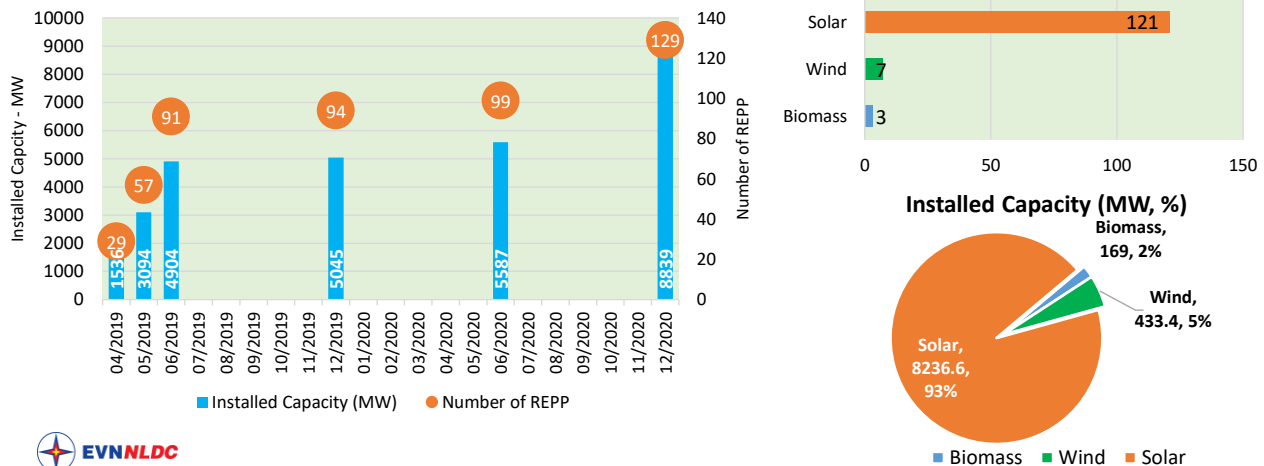
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Renewable Energy Growth

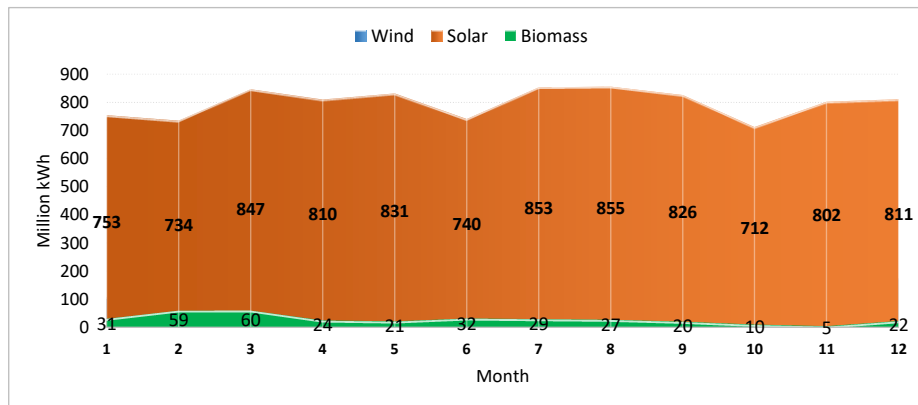
- By the end of 2020, the total number of renewable power plants in operation was **129** (including **121 solar power plants**, **07 wind power plants** and some other biomass) with a total installed capacity of **8839 MW**.



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Renewable Energy

- The total renewable power energy production reached about **10.1 billion kwh** (about 27.6 million.kwh/day), contributed 4.1% of the total power production of Vietnam national power system.



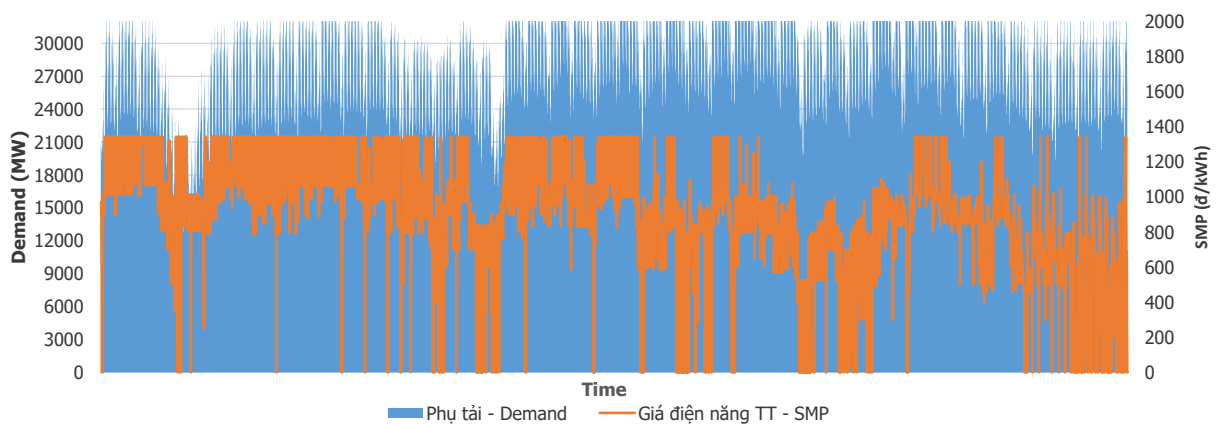
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Operational results – Hourly market Price

Demand versus system marginal price



Average monthly SMP in 2020 is at medium and low level

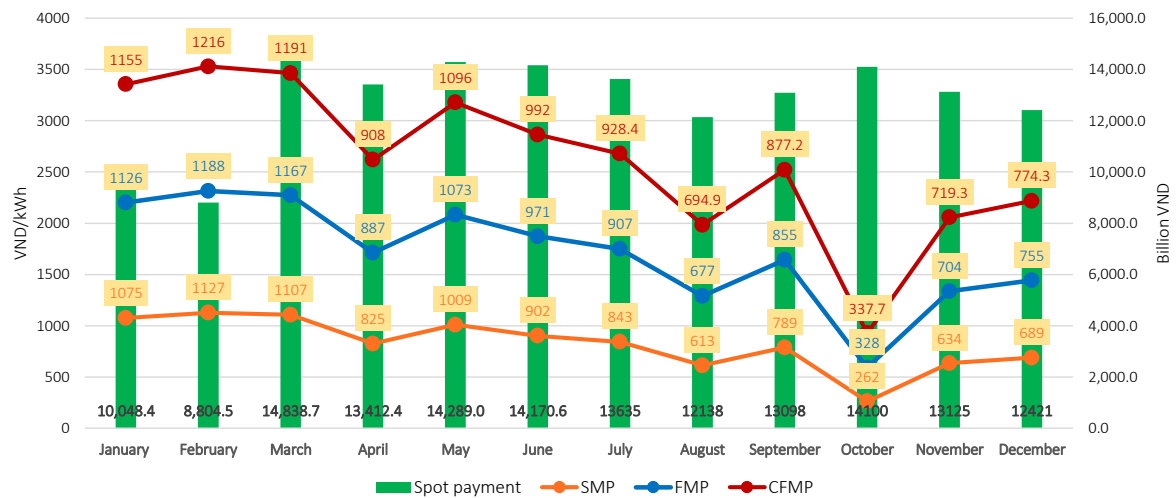


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Operational results – Full market Price



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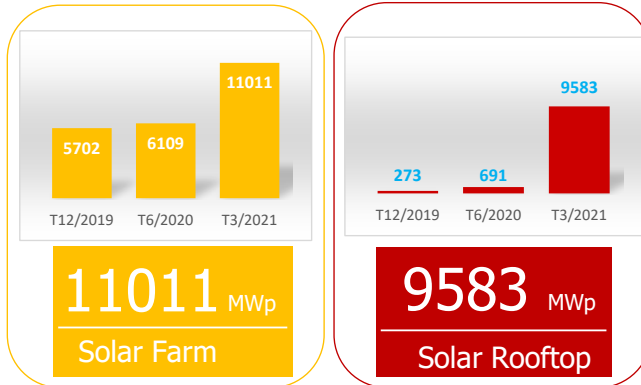
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OPERATIONAL RESULT OF Q1-2021

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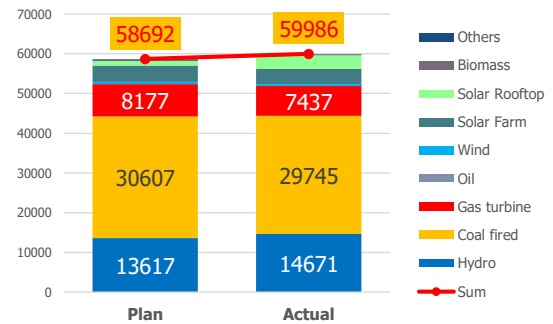
OPERATIONAL RESULT OF QUARTER 1ST OF 2021

RE resources growth in the first quarter of 2021



Load growth in Quarter I / 2021

Output of sources in the Q1/2021 according to plan and actual (bil.kWh)



The explosive growth of rooftop solar power in the late of 2020



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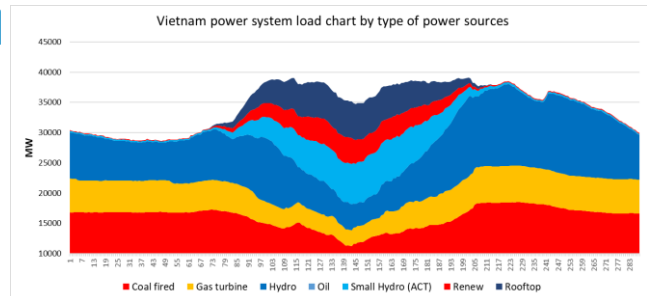
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OPERATIONAL RESULT OF QUARTER 1ST OF 2021

The explosive growth of rooftop solar power in the late of 2020

Type of generation	Installed Capacity (MW)	Ratio (%)
Hydro	16,972	24.11%
Coal fired	22,077	31.36%
Oil fired	1,579	2.24%
Small Hydro	3,887	5.52%
Gas turbine	7,398	10.51%
Biomass	325	0.46%
Wind	538	0.76%
Solar farm	8,852	12.58%
Solar rooftop	8,145	11.57%
Nhập khẩu	572	0.81%
Diesel	24	0.03%
Total	70,393	100%



At noon

- ❑ The solar (Farm and Rooftop) and wind mobilize high, about 14000 MW
- ❑ Traditional sources must be reduced to about 20000MW
- ❑ **Overload of transmission system**
- ❑ **Overgen**

At night

- ❑ The solar is no longer playing
- ❑ Suitable thermoelectric configuration to reduce the amount of renewable energy curtailment
- ❑ **Deficit Gen or Mobilize highly hydroelectric sources**

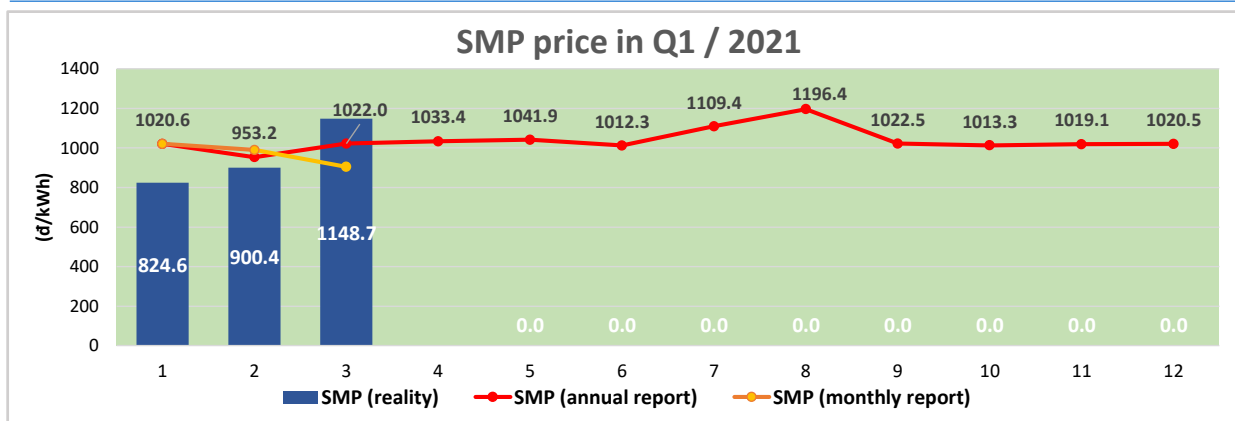


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OPERATIONAL RESULT OF QUARTER 1ST OF 2021



- The market electricity price in January and February 2021 is lower than the annual plan due to the impact of COVID-19 and the increasing penetration of renewable energy, especially rooftop PV.
- Electricity system load shows signs of recovery from March, after disease has been controlled and the dry season begins.

OPERATIONAL RESULTS - SYSTEM

□ System Operation difficulty

1. The installation of plants and grid is slow and inconsistent. It does not meet proposed schedule causing overload and electricity shortage on the power system.
2. Uncertainty of hydro power plant with many constraints in operation and irrigation
3. Limited fuel for electricity generation (coal, gas...)
4. Renewable Energy (mostly solar) high penetration:
 - Congestion
 - Power balancing challenge (Large frequency fluctuation and oscillation, Forecast error, Balancing power from conventional plants)
 - System reliability (Capacity firm of RE is inversely proportional to penetration of RE)
 - Power quality (Voltage, Harmonic)

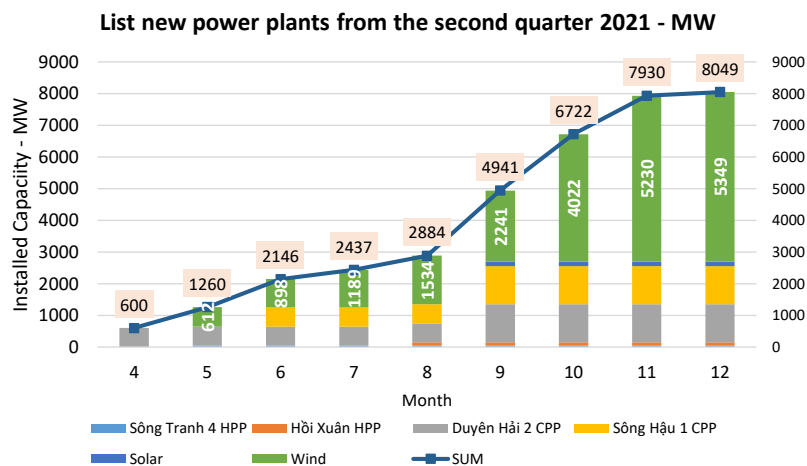
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VWEM OPERATION AND IMPLEMENTATION FOR THE REMANING MONTHS OF 2021



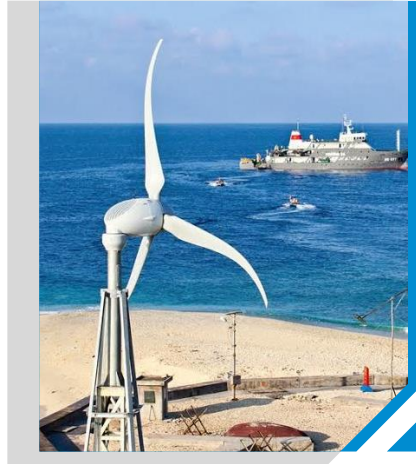
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List of new power plants from the second quarter 2021 - MW



The booming development of wind power in the second half of 2021 will bring many new difficulties and challenges in the operation of the power system and the electricity market.

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Thank You!