POWER DEVELOPMENT PLANNING VIII

- PRIORITY CONTENT, IMPLEMENTATION PLAN, CHALLENGES

Presented by: Nguyen Van Vy
Vietnam Energy Association

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I. CHALLENGES

1. Sufficient primary energy supply for electricity production

1.1. Regarding coal supply guarantee: Since 2015, Vietnam has imported coal for power production. In 2020, import 40 million tons; By 2030, about 90-95 million tons will be imported. Risks: imported coal source with suitable quality, reasonable price; major foreign currency for imports; disruption due to geopolitics,...

1.2. Regarding gas supply guarantee:

- Existing pipelines degrade rapidly;

- Gas projects under research and development:

+ *Project to bring Block B gas to shore:* Expected to be completed 2026-2027. 10 years later than approved in PDP VII.

+ *Project to bring gas from Ca Voi Xanh field to shore:* Expected to be completed 2028-2029. However, there are also many risks.

I. CHALLENGES

1. Sufficient primary energy supply for electricity production (continued)

1.3. Regarding the guarantee of LNG supply:

- Long-term import source (over 10 years), reasonable price;
- Meeting the progress of power projects using LNG;
- High-tech infrastructure, with huge investment capital;
- The price of LNG in the spot market fluctuates greatly.

2. Challenges in the development of renewable energy sources:

- Wind and solar power projects that change according to natural conditions;
- Lack of predictable, long-term support mechanisms and policies;
- Lack of regulations and standards for renewable energy technology;
- Asynchronous development between renewable energy sources and the power grid;
- Difficulty in financial arrangements.

I. CHALLENGES

3. Rising fuel prices, risks in ensuring sufficient electricity supply at a reasonable selling price

- The price of imported coal increased, the price of electricity from factories using imported coal was about 12-15 UScents/kWh;
- Gas prices from Block B and Blue Whale field to the power plant have been very high and volatile, the electricity price is 11-12 UScents/kWh in 2030 to increase to 16-17 UScents/kWh in 2050.
- The price of electricity from LNG projects is also very high, similar to the price from Block B gas plants, Ca Voi Xanh field.

4. Many legal regulations are slow to be removed, affecting investment and development of power projects

- The Planning Law greatly affects the elaboration, appraisal and addition to the planning of power projects;
- The current regulations on construction investment lack consistency, unclear, overlapping,...,

I. CHALLENGES

5. Risks in developing power projects using LNG:

- The LNG project for power generation requires high-tech infrastructure (LNG receiving port, LNG storage tank, LNG regasification facility and gas pipelines to the power plant,...) huge capital investment.
- Imported LNG prices are relatively high and fluctuate widely in the spot market. It is difficult for LNG projects to enter the electricity market.
- There are many forms of investment (PPP/BOT or IPP); each form has a different legal framework, management and operation mechanism. Vietnam currently has no LNG project in operation.
- The process of implementing projects needs to carry out many procedures in the steps of investment and investment preparation; Negotiating related contracts… to complete it takes a long time.
- By 2045 - 2050, projects to switch to using Green Hydrogen; difficulties in negotiating electricity prices.

I. CÁC THÁCH THỨC

6. Arrange enough capital for electricity development

Total investment capital for development of power source and transmission grid:

- 2021-2030: 134.7 billion USD, an average of 16.4 billion USD/year.
- 2031-2050: 399.2 - 523.1 billion USD, 20-26 billion USD/year.

It is necessary to diversify capital sources and forms of capital mobilization; implement the electricity selling price according to the market mechanism.

7. There is a possibility of serious power shortage in the coming years

I. CHALLENGES

8. Risks in developing rooftop PV:

- Decision 500/QD-TTg approving PDP VIII stipulates:

+ *Strive to have 50% of office buildings and 50% of residential houses by 2030 using self-produced and self-dissipating rooftop solar power (**for on-site consumption, not selling electricity into the national electricity system***).

+ *Encourage people and businesses to invest in the development of rooftop solar power, self-generating and self-consuming electricity.*

- This regulation leads to restrictions on the development of rooftop PV.

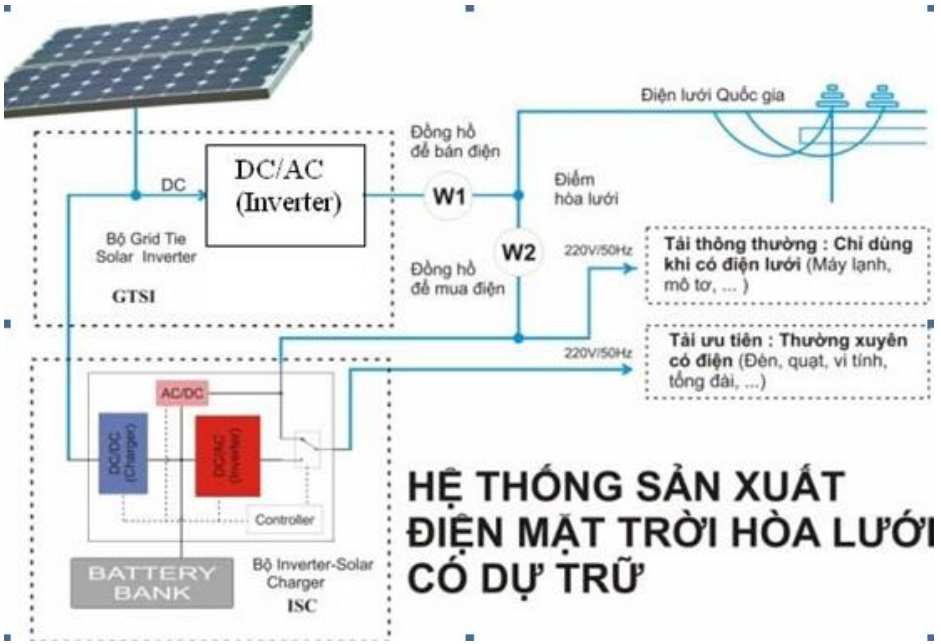
Buying and selling rooftop solar power according to the current mechanism

1. The Electricity Law stipulates that *"Organizations and individuals investing in building electricity generation facilities for their own use, not selling electricity to other organizations or individuals"* do not need an electricity activity license.

2. Decisions No. 11/2017/QD-TTg and No. 13/2020/QD-TTg of PM: Power output is sold out to EVN. All electricity demand is purchased from EVN according to the general retail tariff.

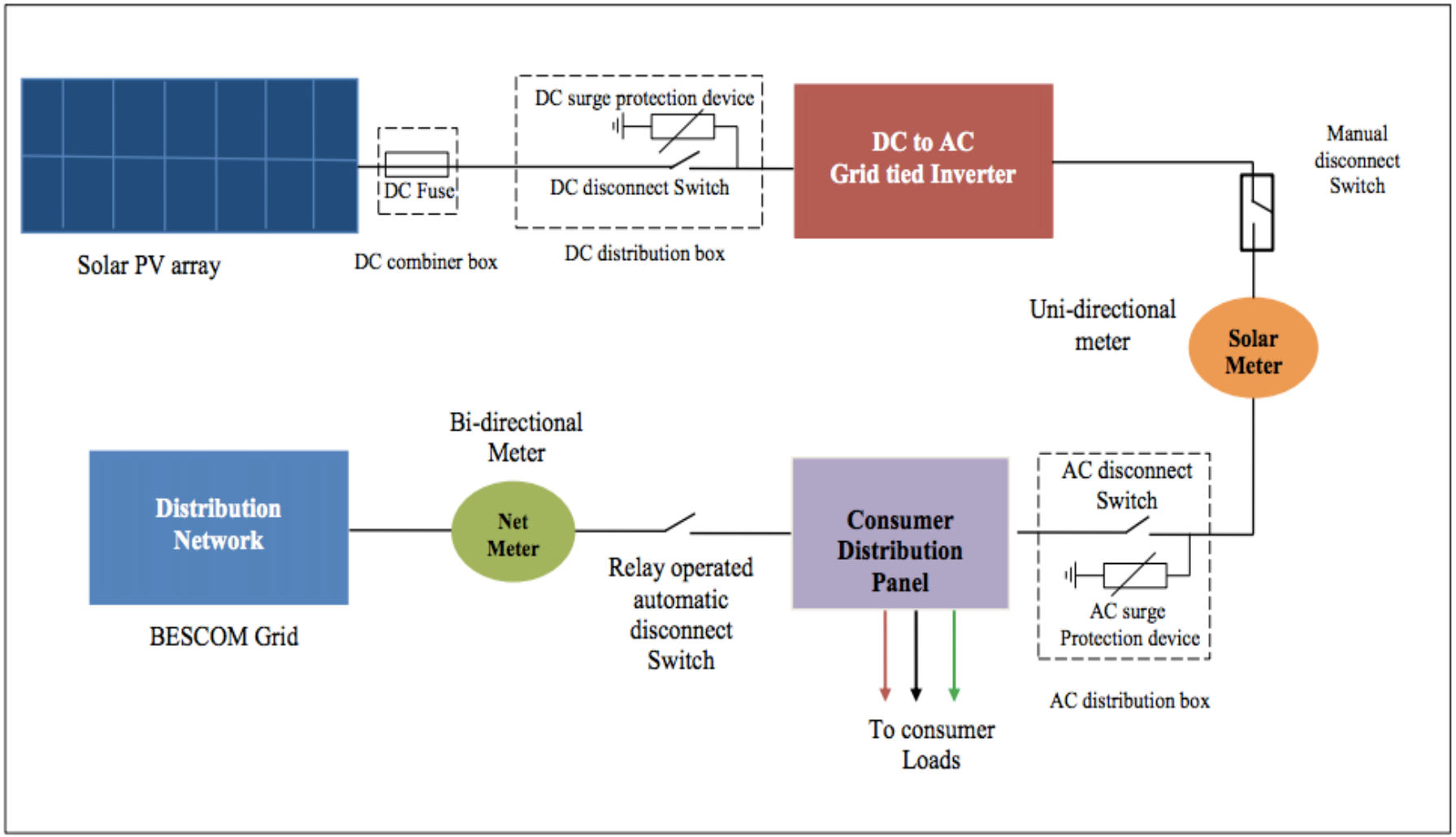
3. Inadequacies of Decision 11 and Decision 13:

- Must have an Electricity Activity License
- Must pay VAT for electricity purchased from EVN
- Must pay income tax on revenue from electricity sold
- Customers have to pay and receive at different rates for the same amount of electricity.



BUYING AND SELLING ELECTRICITY BY NET METTERING MECHANISM

Single Line Diagram of Rooftop Facility for Net Metering Interconnection

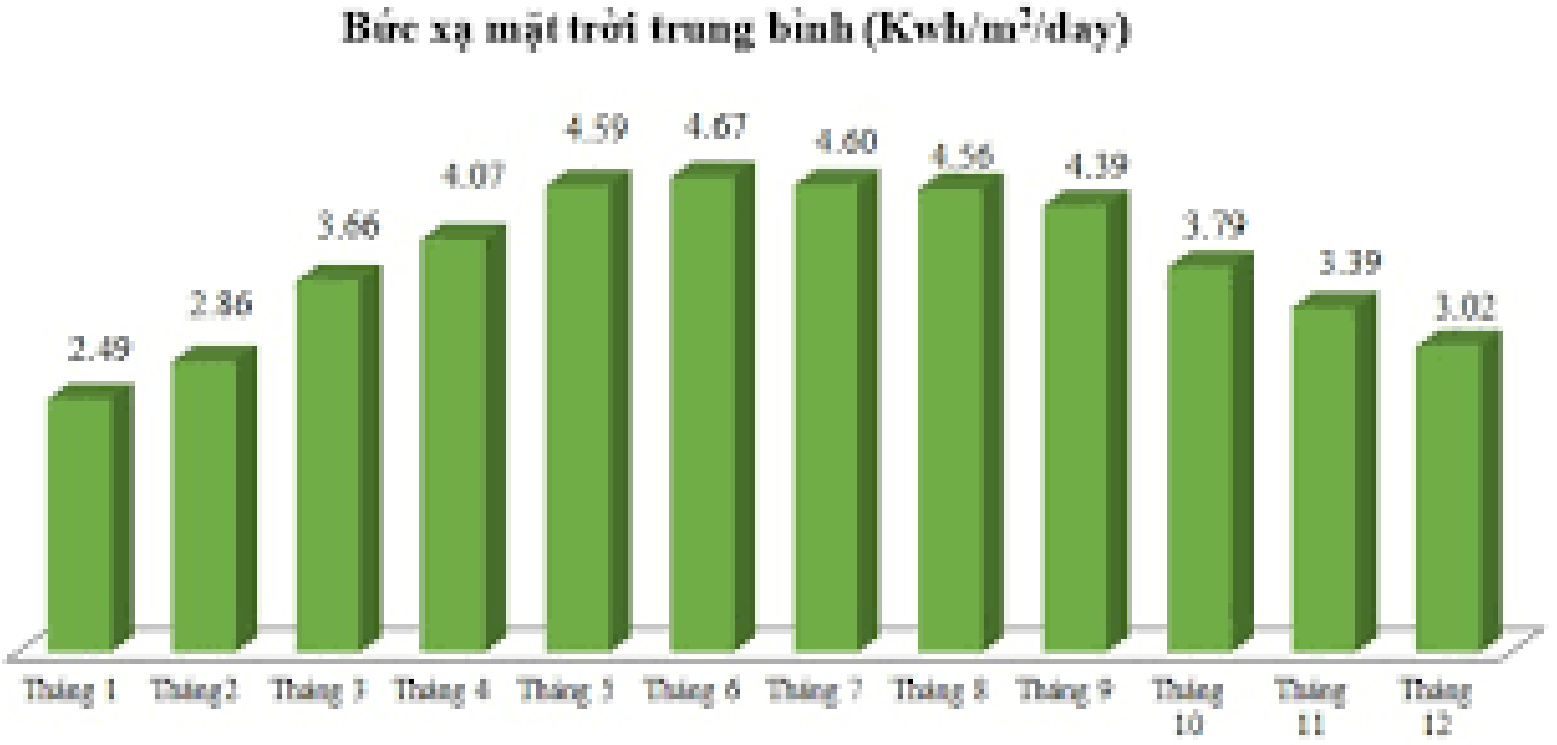


ADVANTAGES OF NET METTERING MECHANISM

- Make the most of electricity for the business's electricity needs.

- Reflect the physical nature of the generator for self-use.

- Accurately reflect the production and business process of the enterprise.



II. ACTION PLAN

1. Reviewing the progress of major power projects

Table 1: List of LNG thermal power plants

No	Projects	Capacity (MW)	Phase	Possible progress
1	LNG Quang Ninh	1500	2021-2030	After 2030
2	LNG Thai Binh	1500	2021-2030	After 2030
3	LNG Nghi Son	1500	2021-2030	After 2030
4	LNG Quang Trach II	1500	2021-2030	After 2030
5	LNG Quynh Lap/Nghi Son	1500	2021-2030	After 2030
6	LNG Hai Lang Phase 1	1500	2021-2030	After 2030
7	LNG Ca Na	1500	2021-2030	After 2030
8	Son My II Thermal Power Plant	2250	2021-2030	After 2030
9	Son My I BOT Thermal Power Plant	2250	2021-2030	After 2030
10	LNG Long Son	1500	2031-2035	
11	Nhon Trach 3 and Nhon Trach 4 power plants	1624	2021-2030	NT3-Quarter IV/2024; NT4 - Quarter II/2025
12	LNG Hiep Phuoc Phase I	1200	2021-2030	2026-2030
13	LNG Long An I	1500	2021-2030	After 2030
14	LNG Long An II	1500	2031-2035	After 2030
15	LNG Bac Lieu	3200	2021-2030	After 2030

II. ACTION PLAN

1. Reviewing the progress of major power projects

Table 2: List of coal-fired power plants

No	Projects	Capacity (MW)	Phase	Possible progress
I	**Projects under construction**			
1	Na Duong II Thermal Power Plant	110	2021-2030	2027
2	An Khanh - Bac Giang Thermal Power Plant	650	2021-2030	2027
3	Vung Ang II Thermal Power Plant	1330	2021-2030	2025
4	Quang Trach I Thermal Power Plant	1403	2021-2030	2025
5	Van Phong I Thermal Power Plant	1432	2021-2030	2023
6	Long Phu I Thermal Power Plant	1200	2021-2030	2026-2027
II	**BOT, IPP projects**			
1	Cong Thanh Thermal Power Plant	600	2021-2030	Transition of LNG - after 2030
2	Nam Dinh Thermal Power Plant I	1200	2021-2030	Stop
3	Quang Tri Thermal Power Plant	1320	2021-2030	Stop
4	Vinh Tan III Thermal Power Plant	1980	2021-2030	Stop
5	Song Hau II Thermal Power Plant	2120	2021-2030	2028-2029

II. ACTION PLAN

1. Reviewing the progress of major power projects

Table 3: List of cogeneration plants

No	Projects	Capacity (MW)	Phase	Possible progress
1	Hai Ha cogeneration plant 1	300	2021-2030	Self-supply of electricity in industrial zones
2	Hai Ha cogeneration plant 2	600	2031-2035	
3	Hai Ha cogeneration plant 3	600	2031-2035	
4	Hai Ha cogeneration plant 4	600	2031-2035	
5	Duc Giang cogeneration plant	100	2021-2030	
6	Formosa HT2	650	2021-2030	
7	Hoa Phat II residual gas plant	300	2021-2030	

II. ACTION PLAN

1. Reviewing the progress of major power projects

Table 5: List of domestic gas thermal power plants

No	Projects	Capacity (MW)	Phase	Possible progress	Note
1	O Mon I Thermal Power Plant	660	2021-2030	Chuyển đốt khí	
2	O Mon II CCGT	1050	2021-2030	2027	No PPA negotiation yet
3	O Mon III . CCGT	1050	2021-2030	2027	Change investor from EVN to PVN
4	O Mon IV CCGT	1050	2021-2030	2027	
5	Dung Quat I CCGT	750	2021-2030	2028-2030	
6	Dung Quat II - CCGT	750	2021-2030	2028-2030	
7	Dung Quat III - CCGT	750	2021-2030	2028-2030	
8	Central Region I - CCGT	750	2021-2030	2028-2030	
9	Central Region II - CCGT	750	2021-2030	2028-2030	
10	Quang Tri CCGT	340	2021-2030	Sau 2030	

II. ACTION PLAN

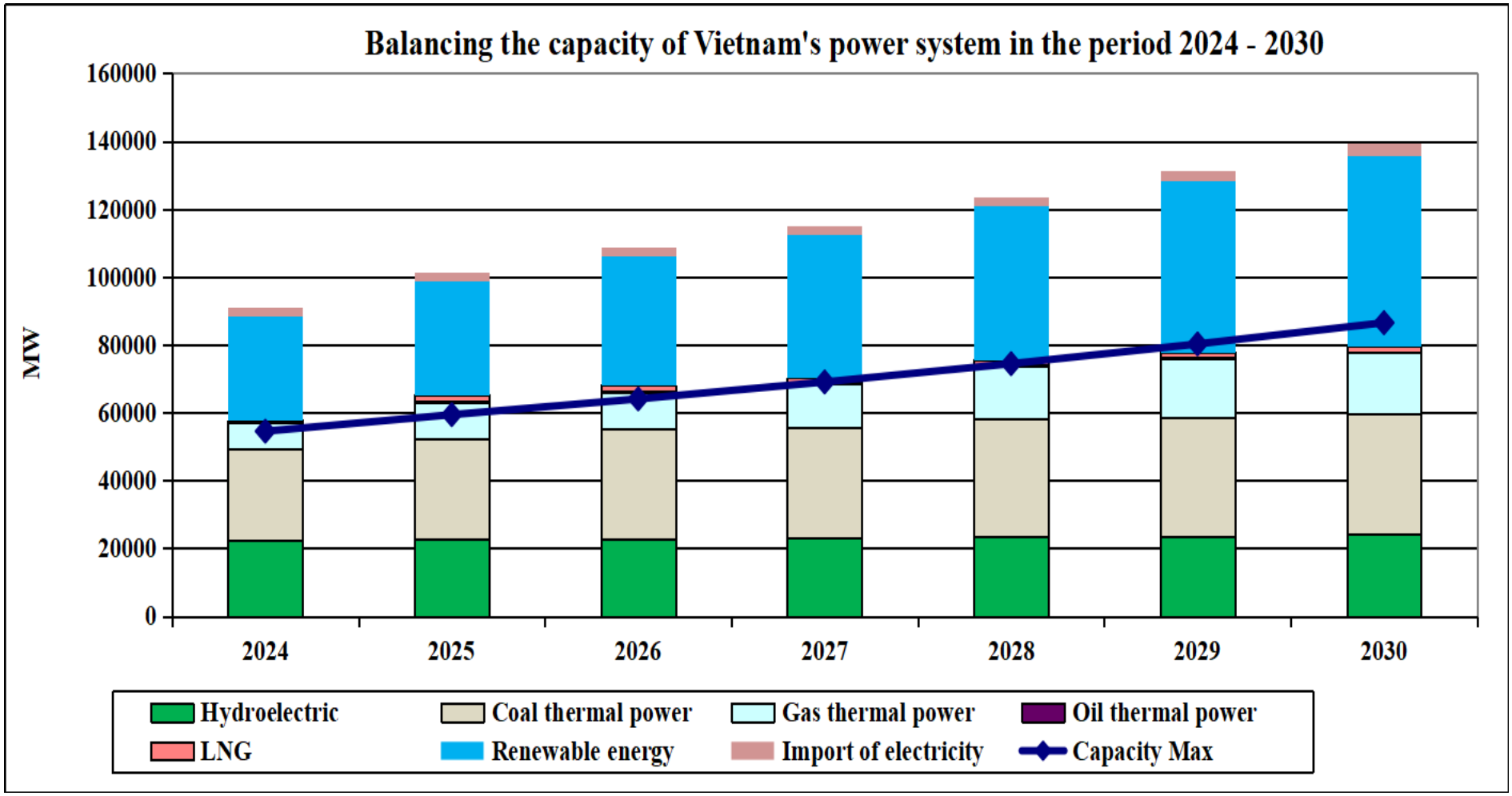
1. Reviewing the progress of major power projects

Progress of power plants in the period of 2023 - 2030

No	Projects	Fuel	Capacity (MW)	2023	2024	2025	2026	2027	2028	2029	2030
	Tổng cộng			1432	1624	2065	2715	3210	3610	2560	750
1	Nhon Trach 3	LNG	812		812						
2	Nhon Trach 4	LNG	812		812						
3	LNG Hiep Phuoc Phase I	LNG	3x400				400	800			
4	Na Duong II	Coal	110					110			
5	An Khanh - Bac Giang	Coal	650					650			
6	Song Hau II (BOT)	Coal	2x1060						1060	1060	
7	Vung Ang II (BOT)	Coal	2x665			665	665				
8	Quang Trach I	Coal	2x700			1400					
9	Van Phong I (BOT)	Coal	2x716	1432							
10	Long Phu I	Coal	2x600				600	600			
11	O Mon II CCGT	Gas	1050						1050		
12	O Mon III . CCGT	Gas	1050				1050				
13	O Mon IV CCGT	Gas	1050					1050			
14	Dung Quat I CCGT	Gas	750						750		
15	Dung Quat II - CCGT	Gas	750						750		
16	Dung Quat III - CCGT	Gas	750							750	
17	Central Region I - CCGT	Gas	750							750	
18	Central Region II - CCGT	Gas	750								750

II. ACTION PLAN

2. Balance of capacity - electricity 2024-2030 assess the ability to meet electricity demand



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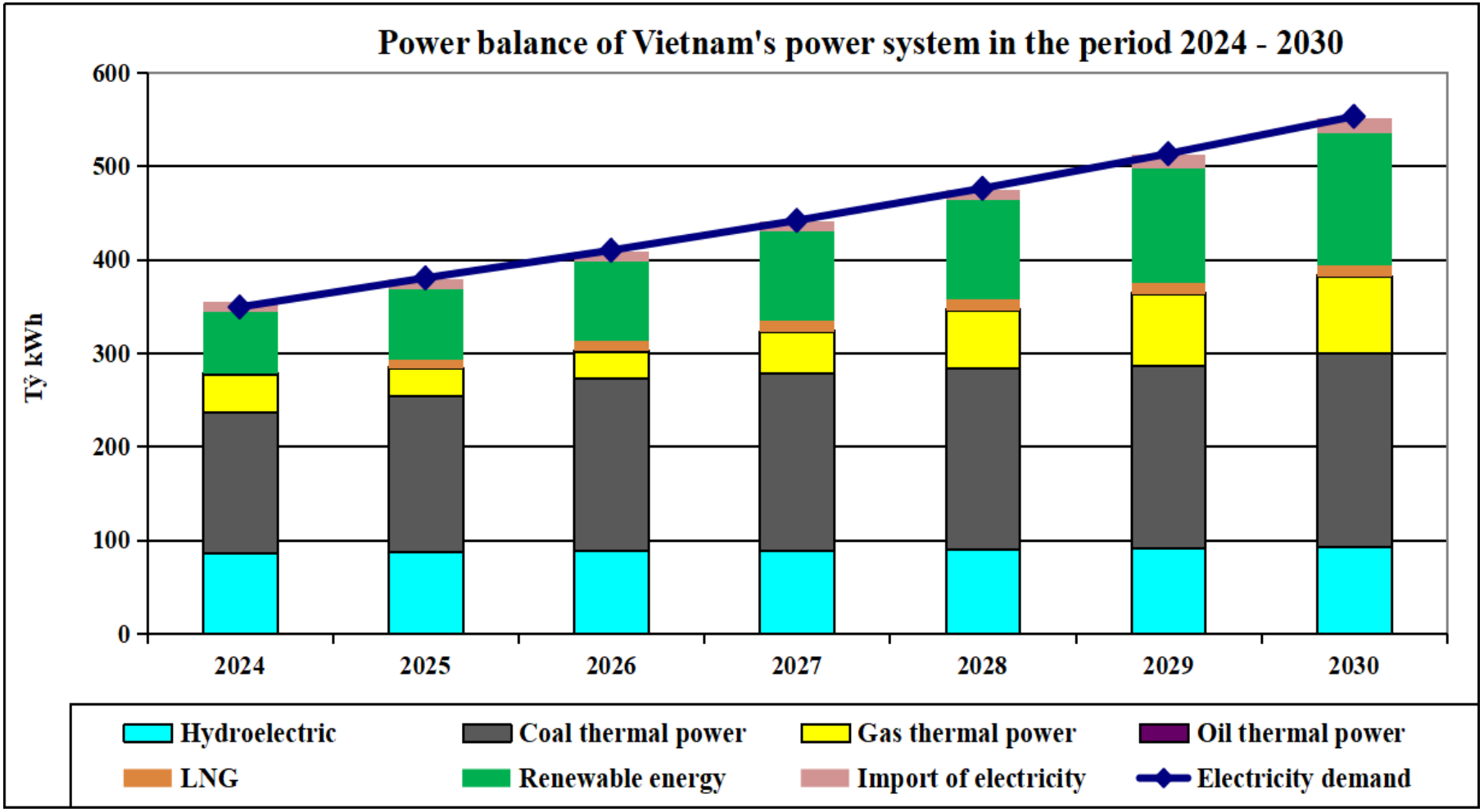

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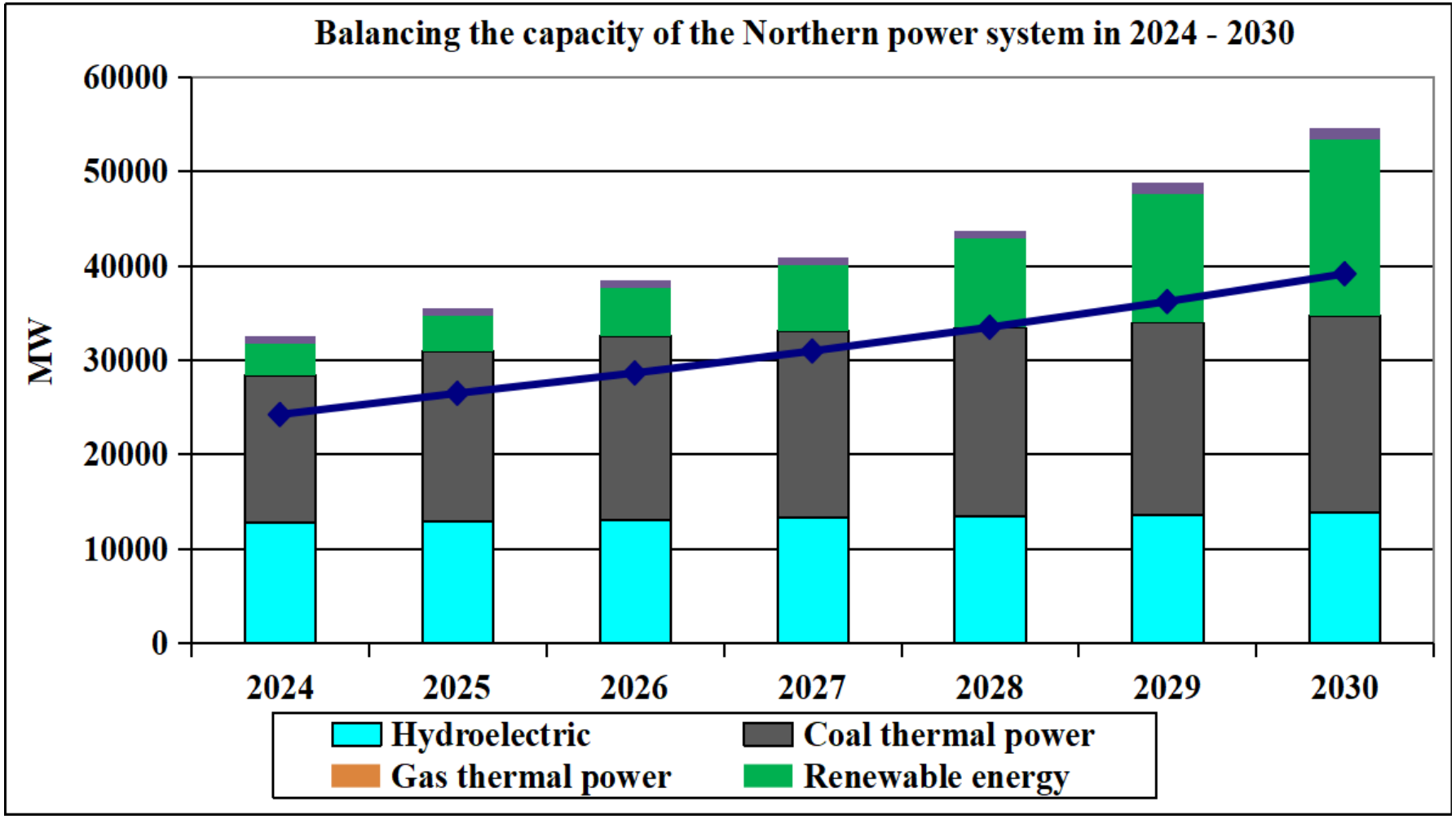

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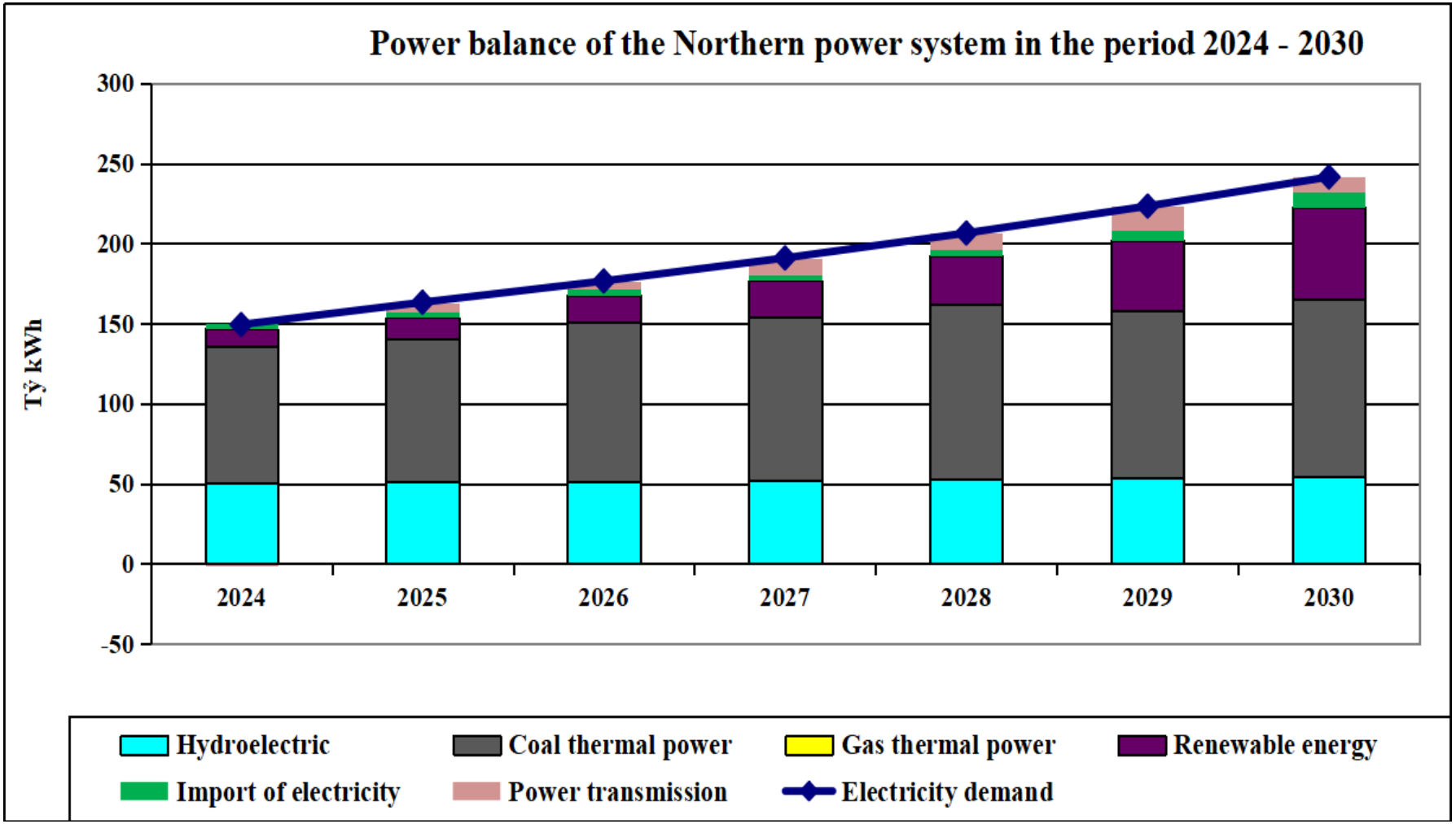

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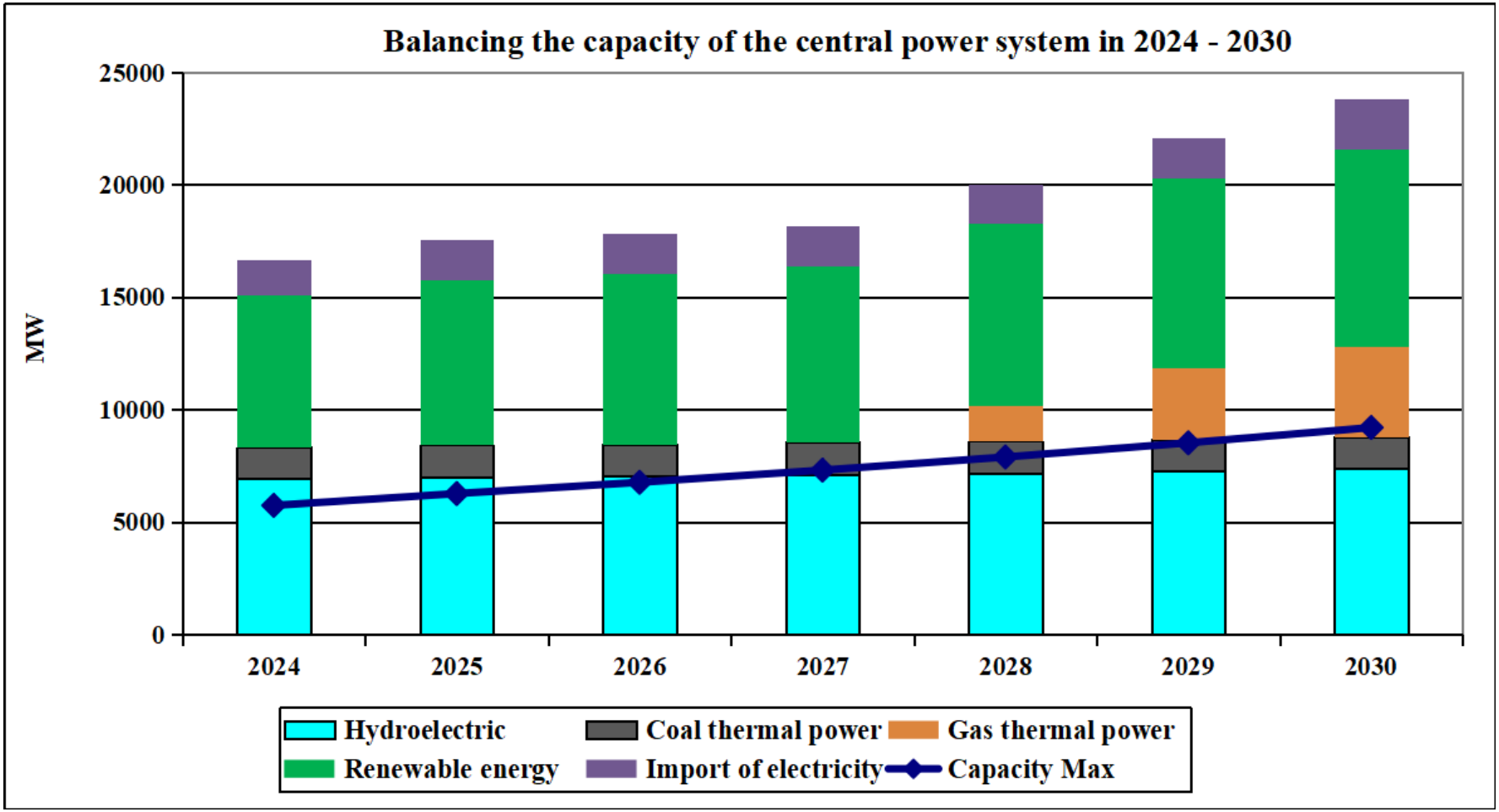

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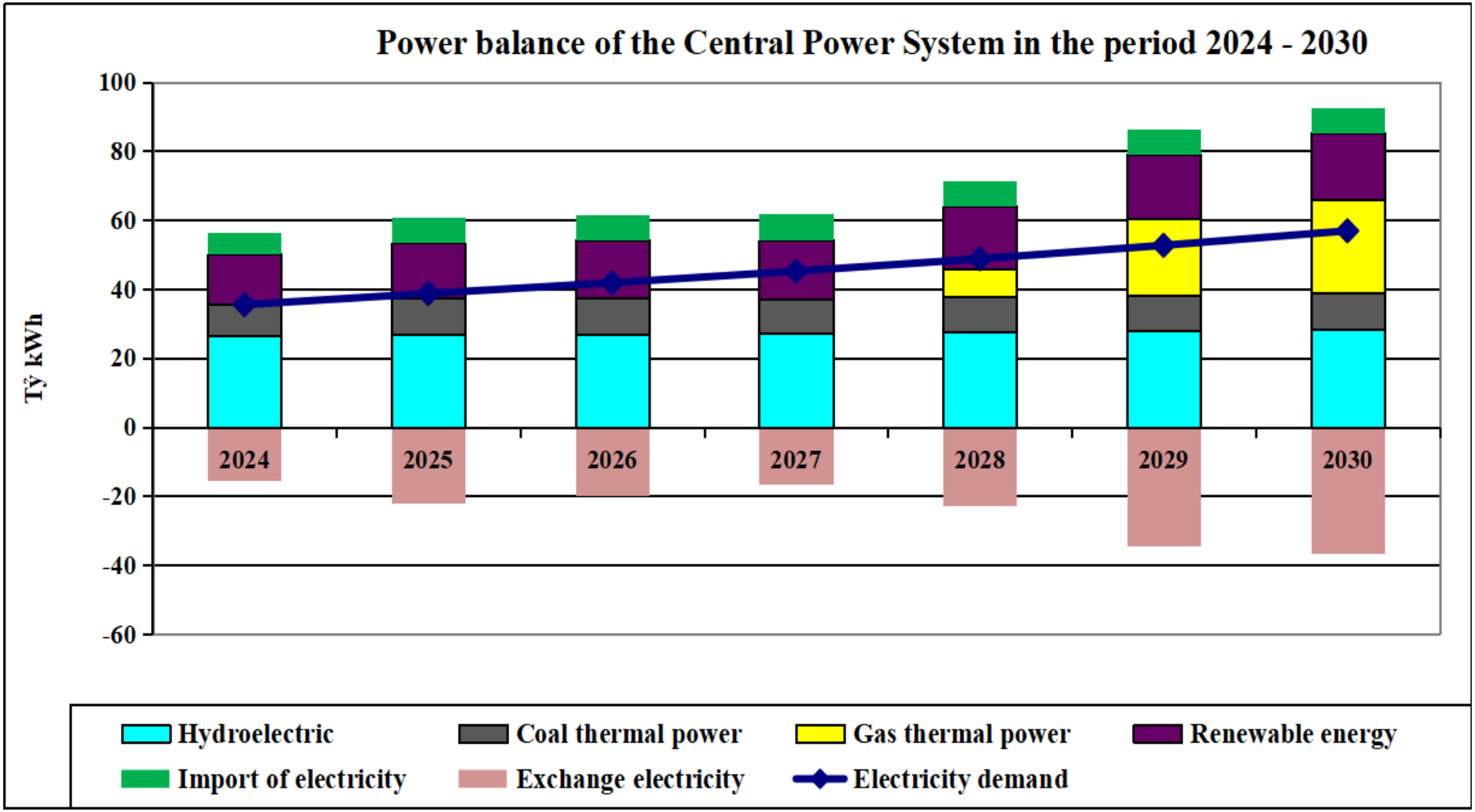

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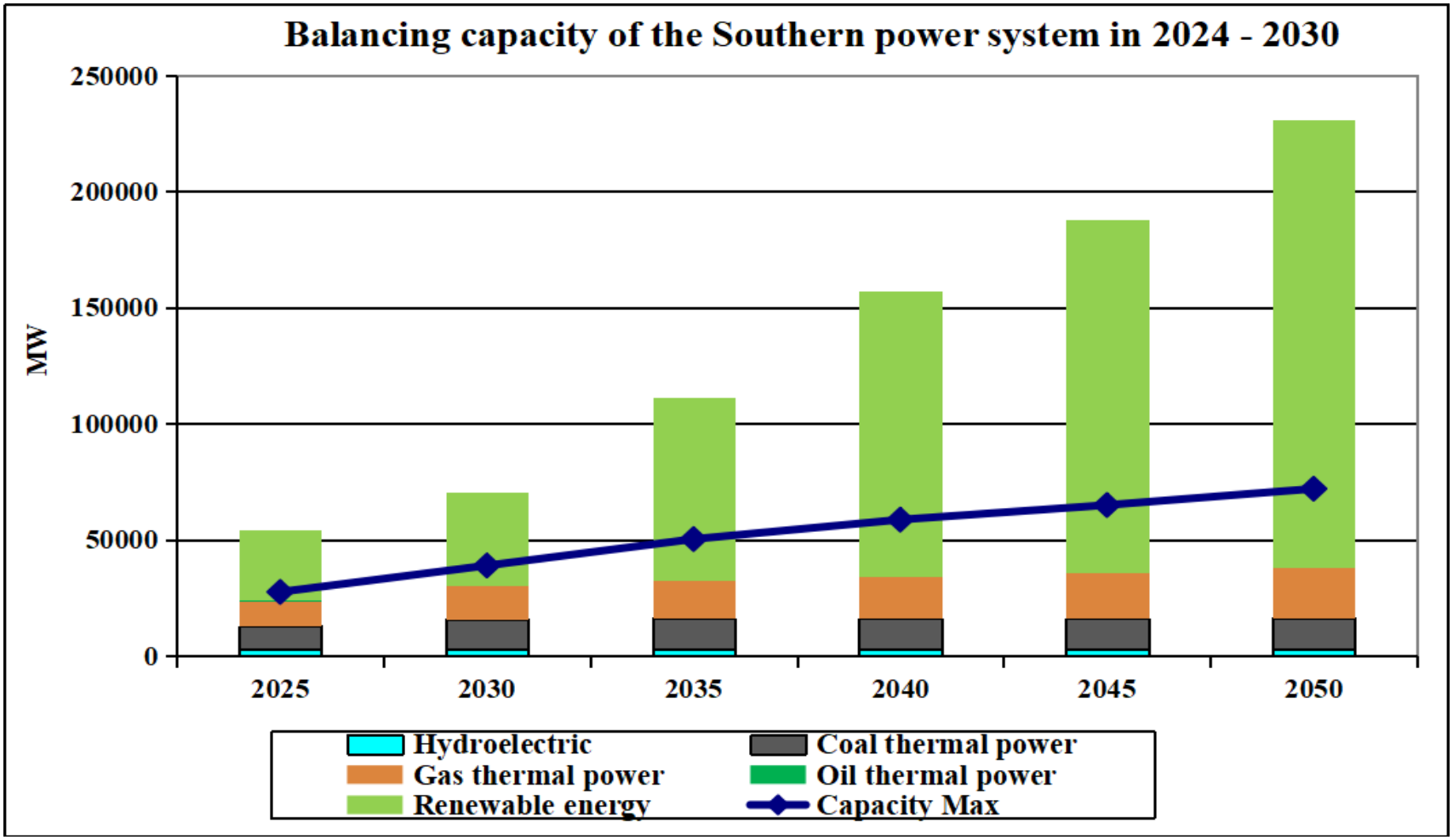

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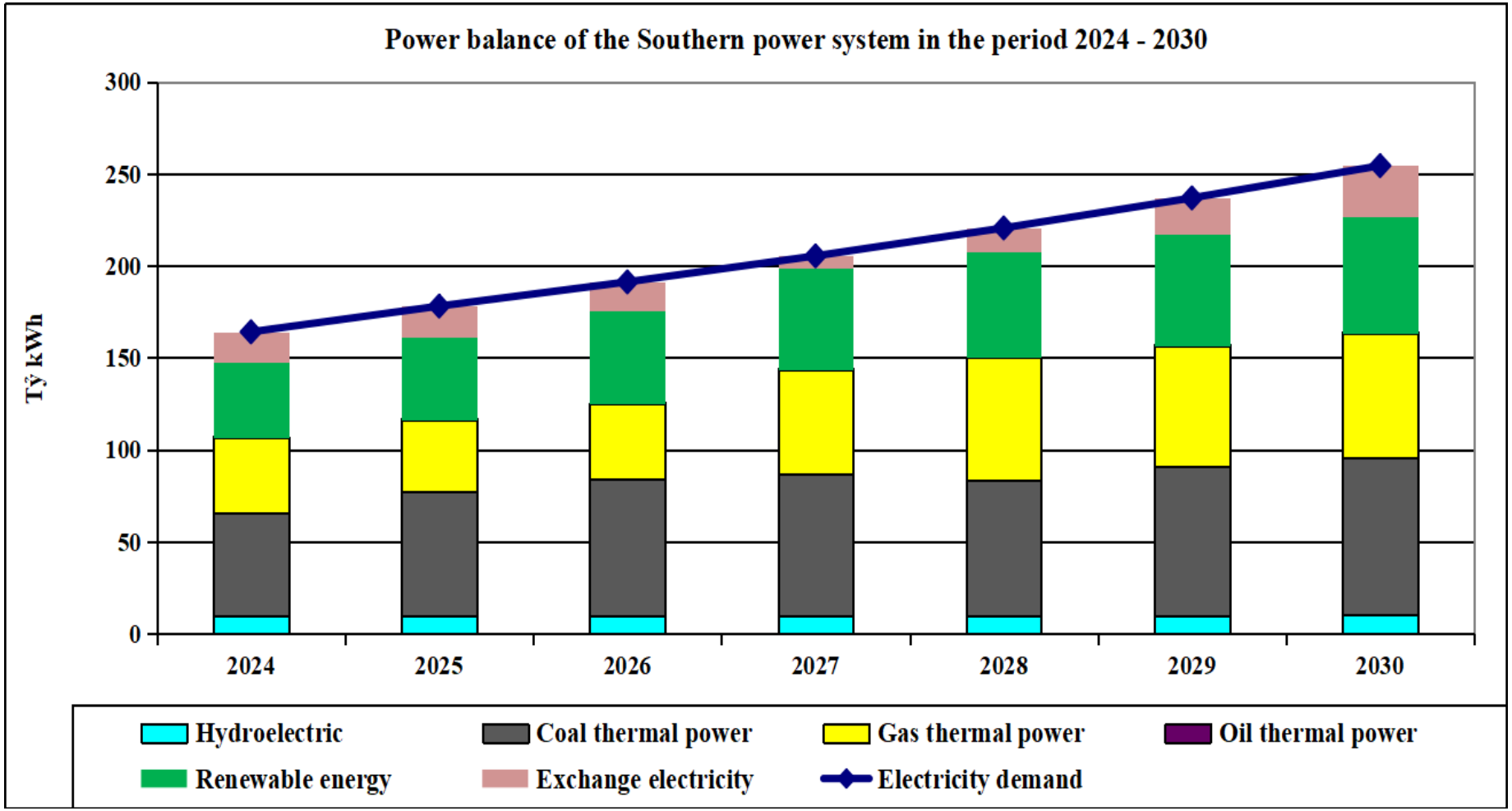
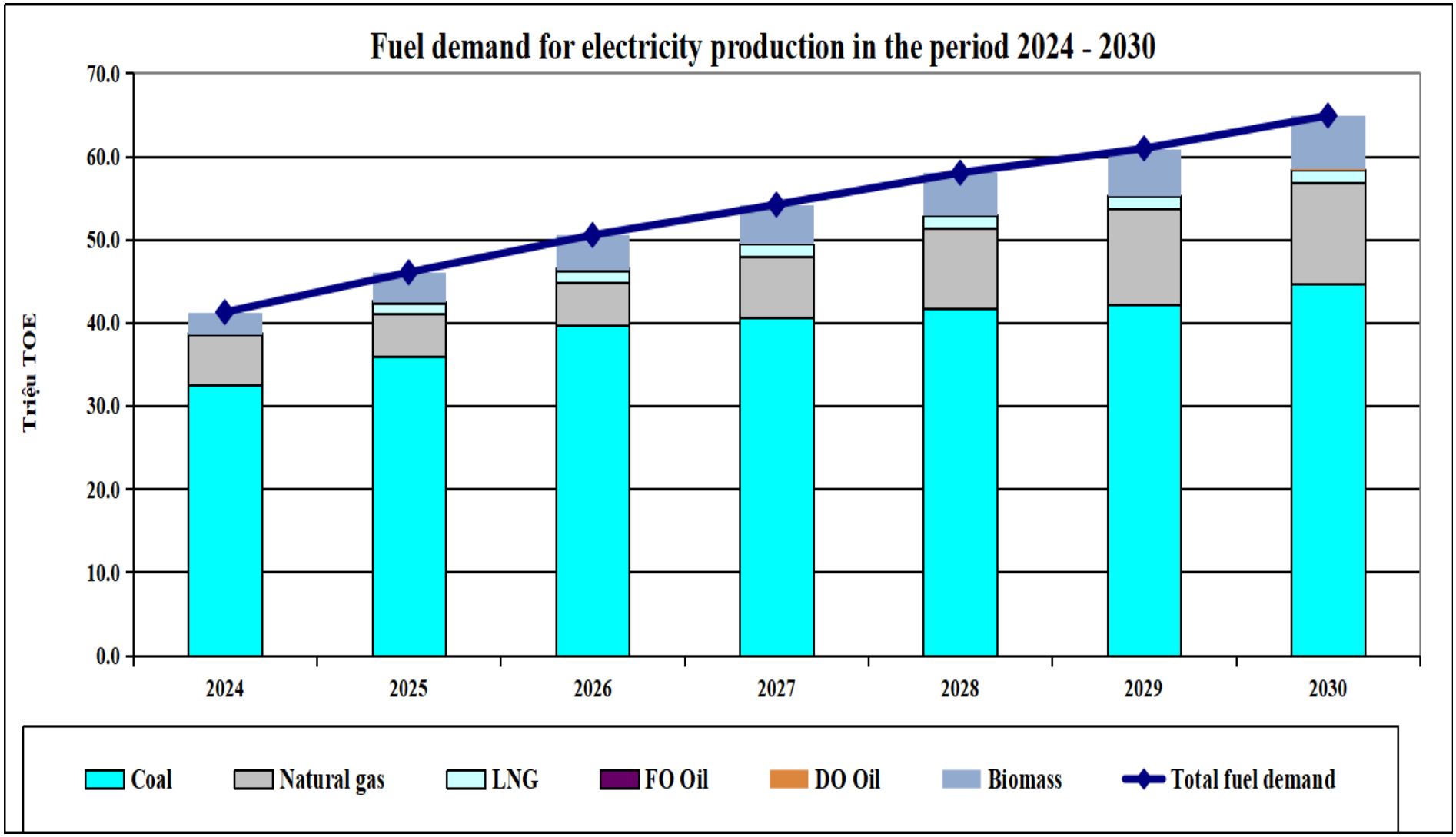


II. ACTION PLAN

3. Calculation of fuel demand for power generation



III. PRIORITY CONTENTS

1. Expeditiously develop the Power Planning Implementation Plan VIII.

2. Implement solutions to ensure electricity supply security

3. Formulate a project to create capital sources and mobilize investment capital for electricity development

4. Completing the policy and legal framework on electricity development:

- Promulgating mechanism to encourage the development of wind power and solar power

- Implement pilot, build a mechanism of direct electricity purchase and sale contract between renewable energy sources and consumers (DPPA).

- Promulgating the Law on Renewable Energy

5. Implement solutions on economical and efficient use of electricity

6. Switching to electricity for groups of households using fossil fuels

7. Building a Green Hydrogen Development Strategy

THANK YOU
FOR YOUR ATTENTION