



# NATIONAL POWER DEVELOPMENT PLAN

Ho Chi Minh City Aug 2017



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**1 POWER DEVELOPMENT PLAN BY 2030**



# OVERALL OBJECTIVES

**Fully supply for the domestic electricity demand, meeting the national socio-economic development objectives with an average GDP growth rate of around 7.0% / year during 2016-2030:**

- Mobilization of all domestic and international resources for power development in order to ensure the sufficient supply of electricity with increasingly quality and reasonable electricity prices for the country's socio-economic development;**
- Use of primary energy sources in diversified, efficient way for power generation; Boosting development and use of renewable energy sources for electricity production, step by step raise the proportion of electricity produced from renewable energy sources so as to reduce dependence on electricity sources from imported coal, contributing to ensuring energy security, mitigating climate change, protecting the environment and sustainable development of socio-economic;**
- Forming and developing intelligent electricity systems, capable of integrating with renewable energy sources.**



# DEMAND FORECAST

<b>Items</b>	<b>Unit</b>	<b>2015</b>	<b>2020</b>	<b>2025</b>	<b>2030</b>
<b>Power sale</b>	<b>GWh</b>	<b>143.300</b>	<b>234.558</b>	<b>352.288</b>	<b>506.001</b>
<b>Production</b>	<b>GWh</b>	<b>164.300</b>	<b>265.406</b>	<b>400.327</b>	<b>571.752</b>
<b>Pmax</b>	<b>MW</b>	<b>25.254</b>	<b>42.080</b>	<b>63.471</b>	<b>90.651</b>



# OBJECTIVES

- Fully supply for the domestic electricity demand, meeting the national socio-economic development objectives with an average GDP growth rate of around 7.0% / year during 2016-2030:
  - + Power sale: By 2020 about 235 - 245 billion kWh; by 2025 about 352 - 379 billion kWh; by 2030 about 506 - 559 billion kWh.
  - + Production and import: By 2020 about 265 - 278 billion kWh; By 2025 about 400-441 billion kWh and by 2030 about 572 - 632 billion kWh.
- Priority is given for the development of renewable energy sources for electricity production; Increase the proportion of electricity produced from renewable energy sources (excluding large and medium hydropower, pump storage) to about 7% by 2020 and above 10% by 2030.
- Building a flexible grid system with high automation capability from transmission to distribution; Development of unmanned substations and semi-manned substations to improve the labor productivity of the power sector.
- Acceleration of the rural and mountainous electrification program to ensure that by 2020 most of the rural households shall have access to electricity.



# DEVELOPMENT OF RENEWABLE ENERGY

- Total capacity of hydropower (including pump storage) will range from approximately 17,000 MW to around 21,600 MW by 2020, about 24,600 MW by 2025 (pump storage 1,200 MW) and about 27,800 MW by 2030 ( pump storage 2,400 MW ). Electricity production will account for about 29.5% by 2020, about 20.5% by 2025 and about 15.5% by 2030.
- The total capacity of wind power from current 140 MW to about 800 MW by 2020, about 2,000 MW by 2025 and about 6,000 MW by 2030. The generated electricity will account for about 0.8% by 2020, 1% by 2025 and about 2.1% by 2030.
- Development of electricity using biomass: the proportion of electricity produced will be about 1% by 2020, about 1.2% by 2025 and about 2.1% by 2030.
- The total capacity of solar power from the current insignificant level to about 850 MW by 2020, about 4,000 MW by 2025 and about 12,000 MW by 2030. The electricity produced from solar power accounts for approximately about 0.5% in 2020, about 1.6% in 2025 and about 3.3% in 2030.



# DEVELOPMENT OF THERMAL POWER SOURCE

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- Natural gas and LNG fired thermal: By 2020, the total capacity is about 9,000 MW, generating about 44 billion kWh of electricity, accounting for 16.6% of the electricity produced; By 2025, the total capacity is about 15,000 MW, generating about 76 billion kWh of electricity, accounting for 19% of the electricity produced; By 2030, the total capacity of 19,000 MW, generating about 96 billion kWh of electricity, accounted for 16.8% of the electricity produced.
- Coal fired thermal: By 2020, the total capacity will be about 26,000 MW, generating about 131 billion kWh of electricity, accounting for 49.3% of electricity production, consuming about 63 million tons of coal; By 2025, the total capacity of about 47,600 MW, generating about 220 billion kWh of electricity, accounting for about 55% of electricity production, consuming about 95 million tons of coal; By 2030, the total capacity of about 55,300 MW, generating about 304 billion kWh, accounting for 53.2% of electricity production, consuming about 129 million tons of coal.





## SUMMARY OF POWER SOURCE BY 2030

	<b>2020</b>	<b>2025</b>	<b>2030</b>
Hydro power	18.060	17.962	25.400
Small hydro power	3.540	4,239	5.915
Pump storage		1,200	2,400
Wind power	800	2,000	6,000
Biomass	750	1,824	3,281
Solar power	850	4,000	12,000
Coal fired	26.000	47.600	55.300
Gas fired	9.000	15.000	19.000
Others	1.440	1.448	6.154
<b>Total</b>	<b>60.000</b>	<b>96.500</b>	<b>129.500</b>
<b><i>P</i>max (MW)</b>	<b>44.224</b>	<b>68.367</b>	<b>100.215</b>



# SUMMARY OF GRID BY 2030

Items	unit	2016 - 2020	2021 - 2025	2026 - 2030
500 kV Substation	MVA	26.700	26.400	23.550
220 kV Substation	MVA	34.966	33.888	32.750
500 kV line	km	2.746	3.592	3.714
220 kV line	km	7.488	4.076	3.435

+ build and upgrade power grid, step by step to meet the technical standards of transmission grids; By 2020, transmission grids will meet N-1 reliability standards for main equipment and ensure to meet the required quality standards.

+ 220 kV transmission grid is constructed in a double ring structure. Application of smart grid technology in power transmission



# SUMMARY OF INVESTMENT CAPITAL

## ***Total investment capital for development of the power sector***

- The total investment capital for development of power sources and grids (excluding BOT sources) in the 2016-2030 will be about \$ 148 billion, divided into phases as follows:
  - + For the period of 2016-2020 period: about USD 40 billion, on average USD 7.9 billion a year. Of which 75% for power generation; 25% for power grid construction.
  - + For the period of 2021 - 2030: about USD 108 billion, on average USD 10.8 billion a year. Of which 74% is for power generation; 26% for power grid construction.



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## RENEWABLE ENERGY



# 2. Current development status on Renewable Energy

## Small Hydro



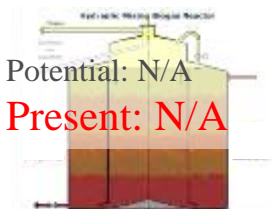
Potential: ~ 7.000 MW  
**Present: ~ 1670 MW**

## Biomass



Potential: ~ 2000 MW  
**Present: ~ 150 MW**

## Biogas



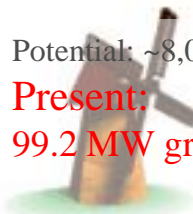
Potential: N/A  
**Present: N/A**

## Solar energy



Potential: ~ 4-5kWh/m<sup>2</sup>  
**Present: ~ 4 MW**  
 (Households, pilot projects)

## Wind energy



Potential: ~8,000 MW ( $\geq 6$  m/s)  
**Present: 146 MW (30 MW onshore and 99.2 MW grid-connected, 6 MW off-grid)**

## Geothermal



Potential: N/A  
**Present: N/A**

## M.Solid wastes

Potential: ~ 320 MW  
**Present: ~ 2.4 MW**

## Ocean energy

Potential: N/A  
**Present: N/A**

# Summary on Renewable Energy Policies



RE type	Status		Level	Note
	Existing	Proposing		
Small hydro	Avoided cost		By year, by season (about 5 UScents/kWh)	
Wind power	FIT	revising	7.8 UScents/kWh (Decision 37/2011/QD-TTg)	Under revising
Biomass	FIT		- (Combined Heat & Power) CHP: 5.8 UScent/kWh - Generation Cost from imported coal power plant.	
MSW	FIT		- Land fill gas: 7.28 UScent/kWh - Incineration: 10.05 UScent/kWh	
Solar PV	FIT	FIT	-9.35 US cents/kWh	
Biogas		FIT	Under studying	
Geothermal		FIT	Under studying	

## 2. Renewable Energy Development - Targets



RE Strategy Targets	Unit	2020	2030	2050
<b>Electricity Generation from RE</b>	<b>Bil. kWh</b>	<b>101</b>	<b>186</b>	<b>452</b>
<b>Electricity Generation from RE</b>	<b>%</b>	<b>38</b>	<b>32</b>	<b>43</b>

Power Generation (Bil. kWh)	2020	2030	2050
<b>Hydro Power</b>	<b>90</b>	<b>96</b>	
<b>Wind Power</b>	<b>2,5</b>	<b>16</b>	<b>53</b>
<b>Solar Power</b>	<b>1,4</b>	<b>35,4</b>	<b>210</b>
<b>Biomass</b>	<b>7,8</b>	<b>37</b>	<b>85</b>



### 3 CHALLENGES - SOLUTIONS





# Challenges

- Vietnam will face a shortage of primary energy and must import coal (2017) and LNG (2023) to ensure adequate supply of energy for socio-economic development.
  - The investment capital for the energy sector infrastructure which is estimated at over USD 310 billion in the period up to 2035, is a great pressure on the economy, especially the power industry (over 66%). For power sector alone, the demand for investment by the year 2030 is \$ 148 billion (excluding BOT projects).
- To ensure reasonable energy prices so as not to put pressure on the socio-economic sectors.
- To ensure the sustainable development objectives, paying attention to environmental factors in the development of the energy industry, especially the coal-fired thermal power projects.



# SOLUTIONS FOR ENERGY SECURITY

**Looking forward to ensure the supply of fossil fuel.**

**Development of efficient energy infrastructure and diversify energy system basing on renewable energy and efficient use of energy.**

**The solutions for improvement of energy security include:**

- solutions to ensure supply of fossil fuel.
- development of strategic reserve storage.
- explore and discover new natural resources: increase of reserve and local supply.

**Solutions to decrease dependence on fossil fuel:**

- Development of renewable energy.
- Encouraging and promoting efficient use of energy.



# SOLUTIONS FOR FUNDING

- Boosting equitization of the generation corporations, State owned enterprises where as per regulations it is not necessary for the State to hold the dominant shares.
- Step by step increase the ability of mobilizing internal finance in the enterprises operating in the power sector through the solutions:  
Improvement of efficiency and operation of the enterprises, ensure the ratio of the equity for development investment as required by the local and international financial institutes
- Attract more foreign direct investment (FDI) for development of power projects.
- Sector restructuring to gradually develop healthily competitive market given the basis of ensuring energy security and cost reduction.
- Develop market and suitable policies to provide price signal in transparent manner to attract investment and development of sustainable energy sector



# SOLUTIONS FOR SUSTAINABLE DEVELOPMENT

**Develop efficient energy infrastructure and diversify energy systems based on renewable energy and efficient use of energy.**

**Apply clean technology in coal-fired power plants:**

- Selected technologies must be advanced, highly efficient, with little impact on the environment.
- Utilization of ash residue of the coal-fired power plants for construction materials and other industries in order to reduce the waste dump area for thermal power plant projects in accordance with regulations.

**Attracting investment:**

- To implement electricity prices according to the market mechanism and regulated by the State, ensuring harmony combination between the socio-economic objectives of the State and the objectives of production and business, financial autonomy of the enterprises.
- Electricity prices should stimulate the development of electricity, create an environment that attracts investment and encourages competition in the generation, transmission, distribution, retail and electricity use; Encourage the rational use of energy forms and the use of domestic energy, reducing the dependence on imported energy.

**Renovation, upgrading and modernization of power transmission and distribution grids to reduce losses, ensure safety and reliability.**

**To step by step apply incentives and compulsory for renovation of technologies and equipment of electricity-intensive industries (steel, cement and chemicals); Limit and prepare to ban the import of old equipment, low efficiency in the production and use of electricity.**



**THANK YOU VERY MUCH**