



ENERGY TRANSITION

PETROVIETNAM

Hanoi, 15/12/2021



1. OVERVIEW OF PETROVIETNAM

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1.1 Overview

PVN is assigned by the Government to perform all the tasks related to exploration, production and value addition of petroleum resources in Viet Nam.

Before 2015:

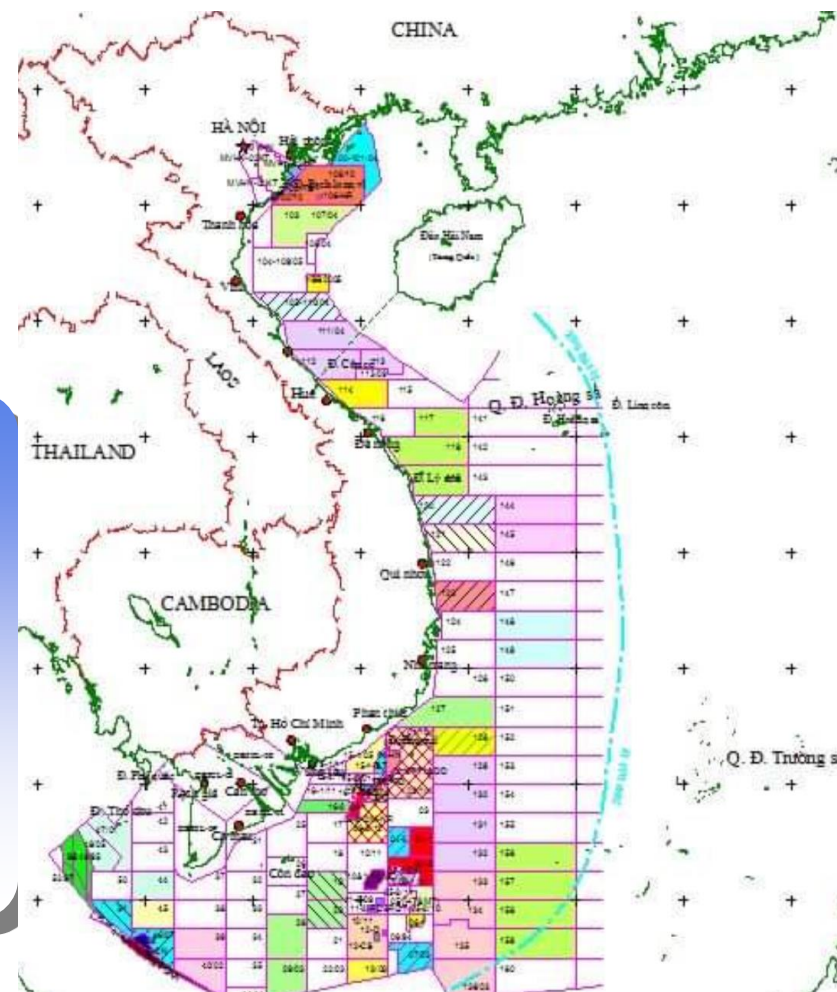
20 - 25% total state budget revenue
18 - 25% National GDP

2016-2020:

9-11% total state budget revenue
10 - 13% National GDP



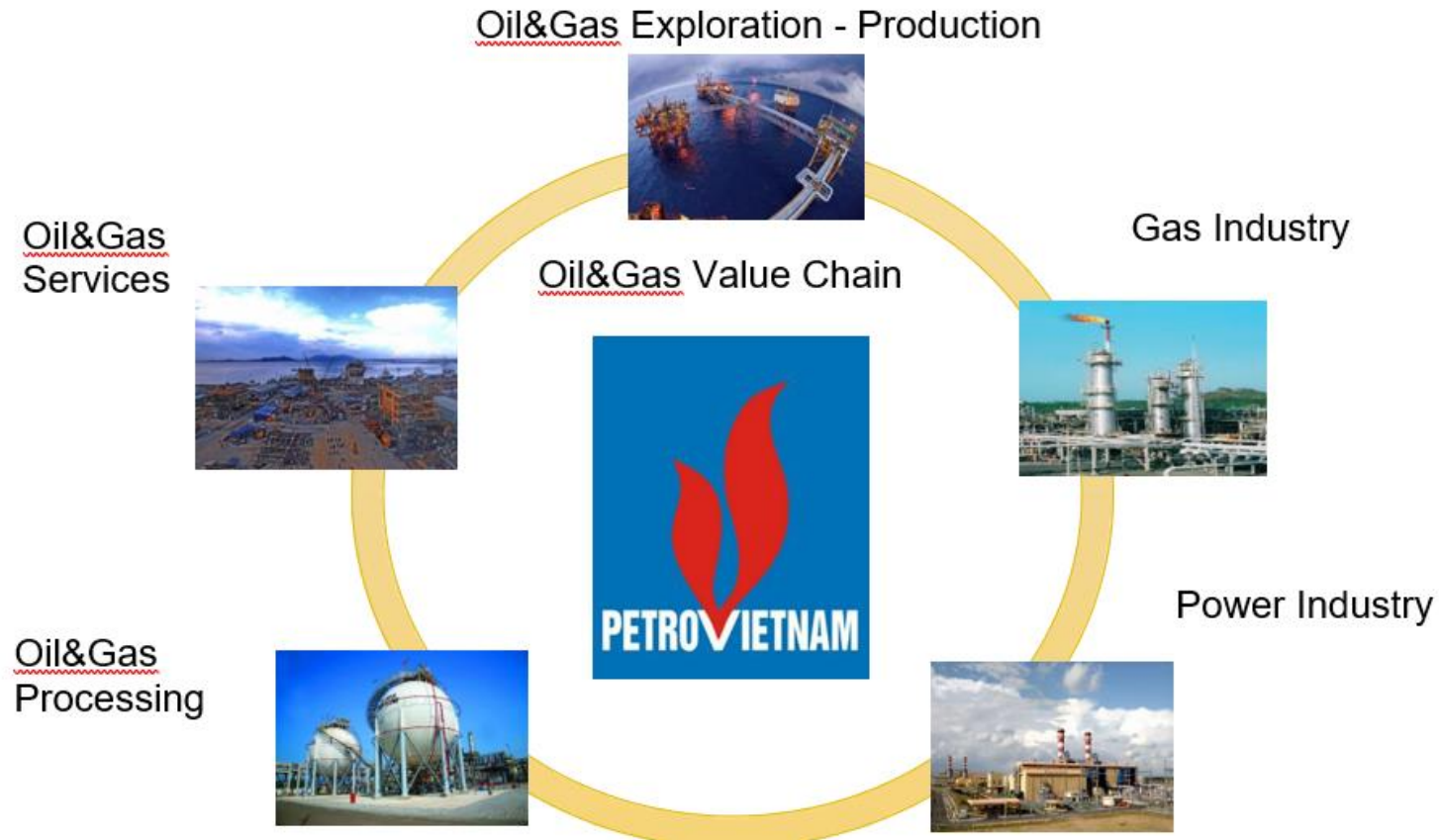
**Playing A key role
in the country's
economy,
contributing to the
protection of
maritime
sovereignty.**



1. OVERVIEW OF PETROVIETNAM



1.2. Production and Business Areas



PVN's business includes the entire oil and gas value chain from the extraction, transportation, storage, distribution and use of oil and gas products. The operation stretches from offshore to inland, contributing to boost the local economy.

1. OVERVIEW OF PETROVIETNAM



1.3. Business and production results in the 2016-2020 period

- **Total Oil & Gas production:** 121.14 million TOE (24.23 million tons/year), of which:
 - Domestic oil production: 61.45 million tons (12.29 million tons/year), oil production overseas: 9.82 million tons (1.97 million tons/year).
 - Domestic gas production: 49.87 billion m³ (9.97 billion m³/year).
- **Power generation:** 104.4 billion kWh (20.9 billion kWh/year) with 2020's power capacity of 4205 MW which is approximately 7% of the country's total capacity.
- **Petroleum production:** 50.23 million tons (10.05 million tons/year), meeting 70% of domestic demand.
- **Nitrogen production:** 8.28 million tons (1.65 million tons/year), meeting 75% of domestic demand.
- **NPK fertilizer production:** 264.1 thousand tons

2010-2020 period

Primary energy supply: PVN accounts for 25-27% of national total
Final energy consumption: PVN accounts for 18-27% of national total

PVN contributes an important part to ensure national energy security, the trend of national energy transition will greatly affect PVN's business and production chain activities and vice versa.

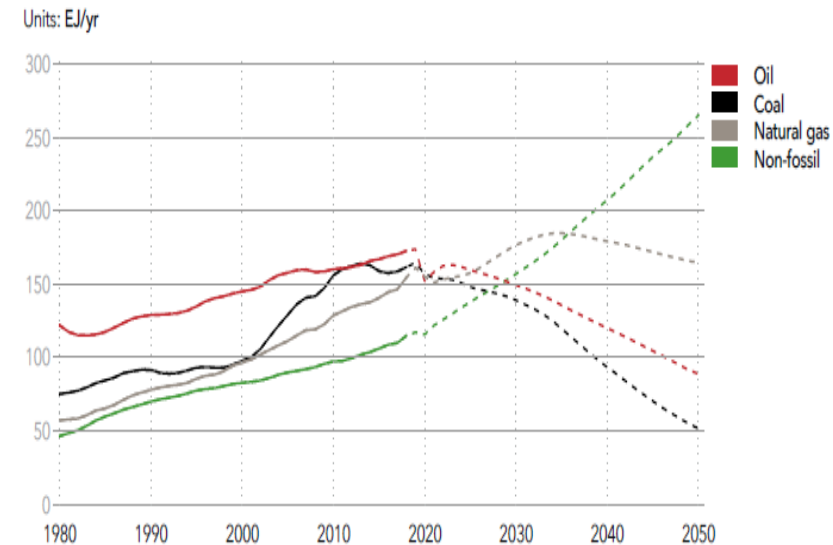
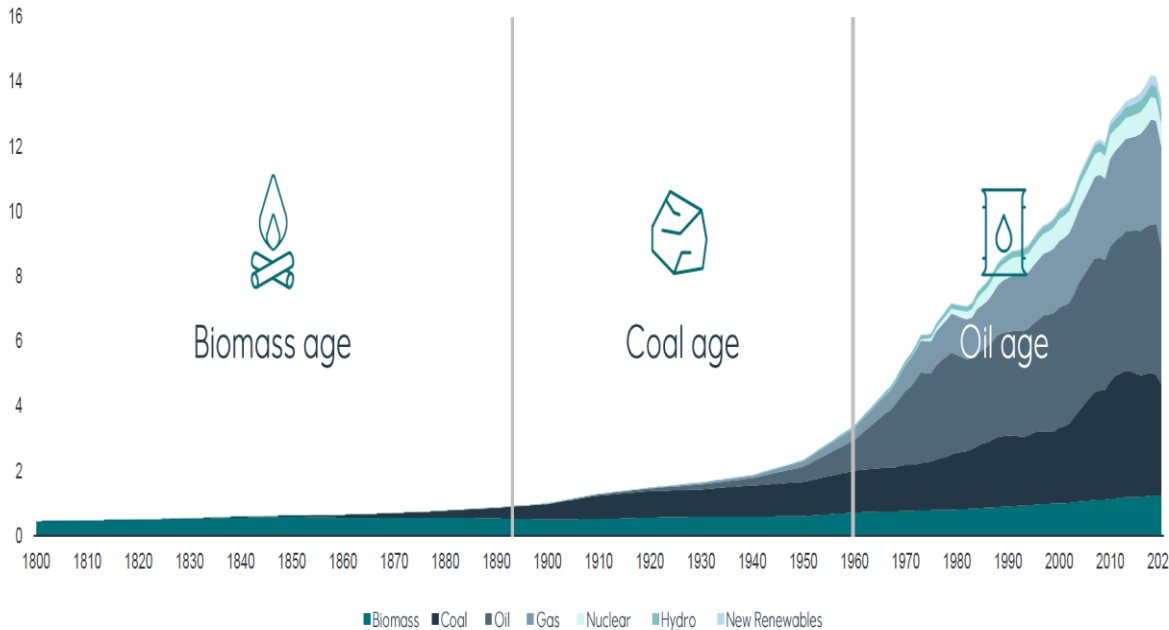


2. View on Energy Transition from PVN

2. View on Energy Transition from PVN



2.1 Energy Transition trend



Nguồn: DNV, 11/2020.

Energy transition in the 21st century ↔ Reduce GHG emissions

DIRECT EMISSION
REDUCTION (CCS/CCUS,
GIẢM CH₄...)

DEVELOPMENT OF
CLEAN ENERGY

ENERGY
EFFICIENCY

Renewable Energy
(wind, solar, biomass...)

Gas

Hydrogen

Electricity energy

2. View on Energy Transition from PVN



2.2 Energy Transition trend of Petroleum Corporations in the world

TT	Corp.	Improve core petroleum activities			CCUSS Implementation		Supplying low carbon fuel		Transited to Energy Corporation			
		Reduce Methane emission	Reduce CO ₂ emission	Integrate RE source	Collect from concentrated emission sources	Used for EOR	Low carbon emission gas	Advanced Biofuel	Producing wind, solar power	Producing other RE	Electricity distribution business	Provide electricity services
1	BP	●	●	●	●	●	●	●	●	●	●	●
2	Chevron	●	●	●	●	●	●	●	●	●	●	●
3	Eni	●	●	●	●	●	●	●	●	●	●	●
4	ExxonMobil	●	●	●	●	●	●	●	●	●	●	●
5	Shell	●	●	●	●	●	●	●	●	●	●	●
6	Total	●	●	●	●	●	●	●	●	●	●	●
7	CNPC	●	●	●	●	●	●	●	●	●	●	●
8	Equinor	●	●	●	●	●	●	●	●	●	●	●
9	Petrobras	●	●	●	●	●	●	●	●	●	●	●
10	Repsol	●	●	●	●	●	●	●	●	●	●	●

- Implemented
- Strategy/Plan issued
- No strategy/plan

Source: IEA, 2020.

2. View on Energy Transition from PVN



2.3 Energy Transition in Viet Nam

Resolution 55

Firmly ensuring national energy security
Fast and sustainable energy development associated with environmental protection

Energy structure transition in Viet Nam
 (reduce GHG emission by 15% in 2030, 20% in 2040)

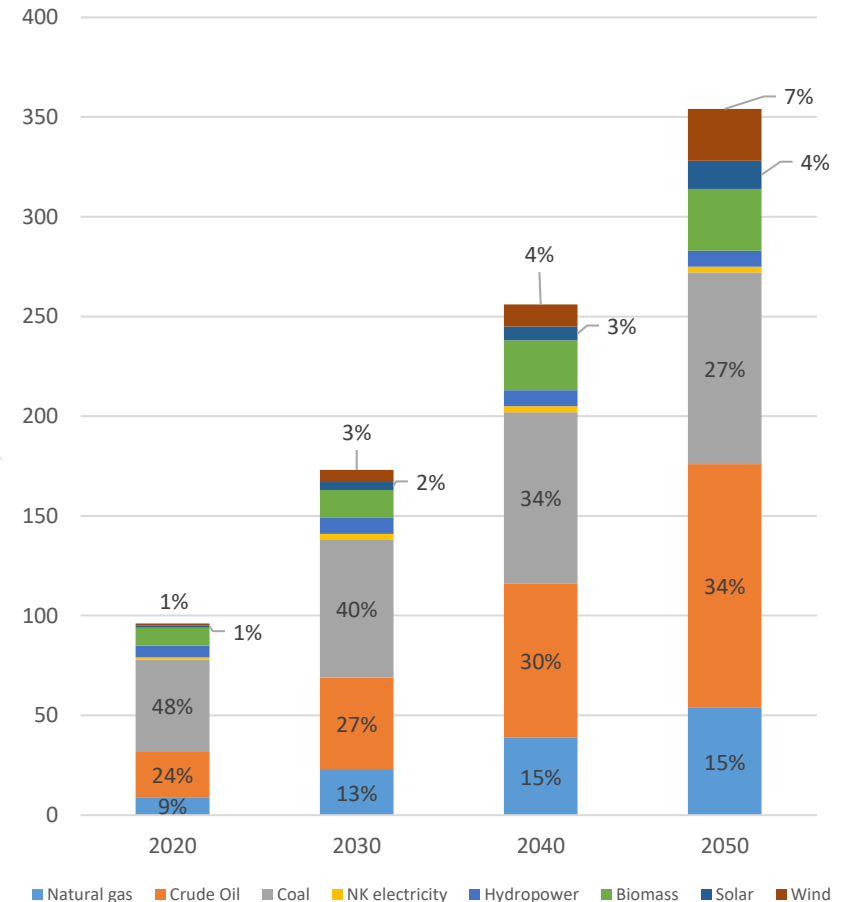
Prioritize RE, clean and new energy, (15-20% in 2030; 25-30% in 2045)

Reasonably exploit and use fossil energy sources (prioritize gas power development, reasonable roadmap to reduce coal power)

Energy Efficiency (7% in 2030; 14% in 2045)

Promote Energy Market (Competitive and transparent)

Primary Power Supply 2020-2050



Source: Draft PDP8, 3/2021.

2. View on Energy Transition from PVN



2.4 Energy Transition for PVN

With the goal of reducing greenhouse gas emissions and adapting to climate change, energy transition is an inevitable trend in the world as well as in Viet Nam. PVN is not out of that trend.

In Viet Nam, it is forecasted that by 2050, the demand for gas, crude oil as well as oil products in Viet Nam will continue to increase. Oil and gas still play an important role in the national energy system. Therefore, PVN's activities in the oil and gas sector will make an important contribution to help Viet Nam achieve its targets on reducing greenhouse gas emissions.

As well as major oil and gas corporations in the world, PVN is affected by many factors in the energy transition trend, affecting the chain of production and business activities. In addition, PVN also faces many challenges such as: (i) The situation in the East Sea is complicated (ii) Domestic oil and gas reserves are becoming limited (iii) Competing with imported products ...

PVN is a pioneer in the energy sector to build and approve the action plan to mitigate and adapt to climate change to 2030, issued a propaganda handbook on climate change.

PVN is developing a development strategy to 2030 and a vision to 2045 in the new situation, to report to the competent authorities.

2. View on Energy Transition from PVN



2.5 Implemented works

2010-2019

PVN and its member units carried out 3 ethanol biofuel production projects in North, Central and South regions in Phu Tho, Quang Ngai, Binh Phuoc. Every year, PVN reports to MOIT on energy use, the measures being applied to use energy economically and efficiently in business and production activities.

2019

Promulgating the Action Plan to reduce and adapt to climate change of Viet Nam Oil and Gas Group in the period of 2018-2030.

2020

Establishing the Steering Committee on energy transition of PVN, in which the PVN's CEO is the Head of the Steering Committee, members including CEO of units of different business and production fields.

2021

Developing an energy transition scheme as a basis for reviewing PVN strategy for the period of 2021-2030, orienting to 2045 to submit to competent authorities for approval
PVN's Action Plan is expected to be issued to adapt and seize opportunities, towards the goal of sustainable development in the trend of energy transition.



3. Energy Transition Strategy of PVN

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3.1 Targets – Development Orientation in the trend of energy transition

To build and develop PVN to become Viet Nam's leading national energy cooperation, taking the role of the locomotive and pillar in the national economy; contributing to the energy security and national sovereignty; financial potential, science and technology capabilities, management capabilities matching regional levels.

Oil & Gas Exploration and Production

- Continue to boost the search and exploitation work to increase oil and gas reserves.
- Look for other available energy sources.

Gas Industry

- Provide gas to consumer households, becoming the main fuel source for thermal power plants (gradually replacing coal power plants).
- Strengthen infrastructure for the development of LNG, hydrogen.

Electricity Industry

- Focus on developing power plants with clean materials (gas, hydrogen..)
- Develop renewable energy towards prioritizing offshore wind power.
- Research green solutions for existing coal power plants.

Processing oil & gas products

- Process oil & gas in the direction of prolonging the deep processing chain, increasing the petrochemical rate.
- Diversify and improve product quality.

Oil & Gas services

- Improve capacity, meet new energy projects.

3. Energy Transition Strategy of PVN



3.2 Tasks

1. Manage volatility, maximize value to adapt to market changes

- For current production and business activities, change and maximize value to adapt to market fluctuations.
- Chain linkage to develop traditional types of production and business.
- Digital transformation application to optimize administration.
- Portfolio management.
- Corporate culture.

2. Research new technologies, towards clean energy investment to diversify investment types

- Research and propose mechanisms and policies to support new forms of energy/clean energy.
- Form chain links to develop new/clean energy.
- Capacity building (infrastructure and human resources).
- International cooperation.

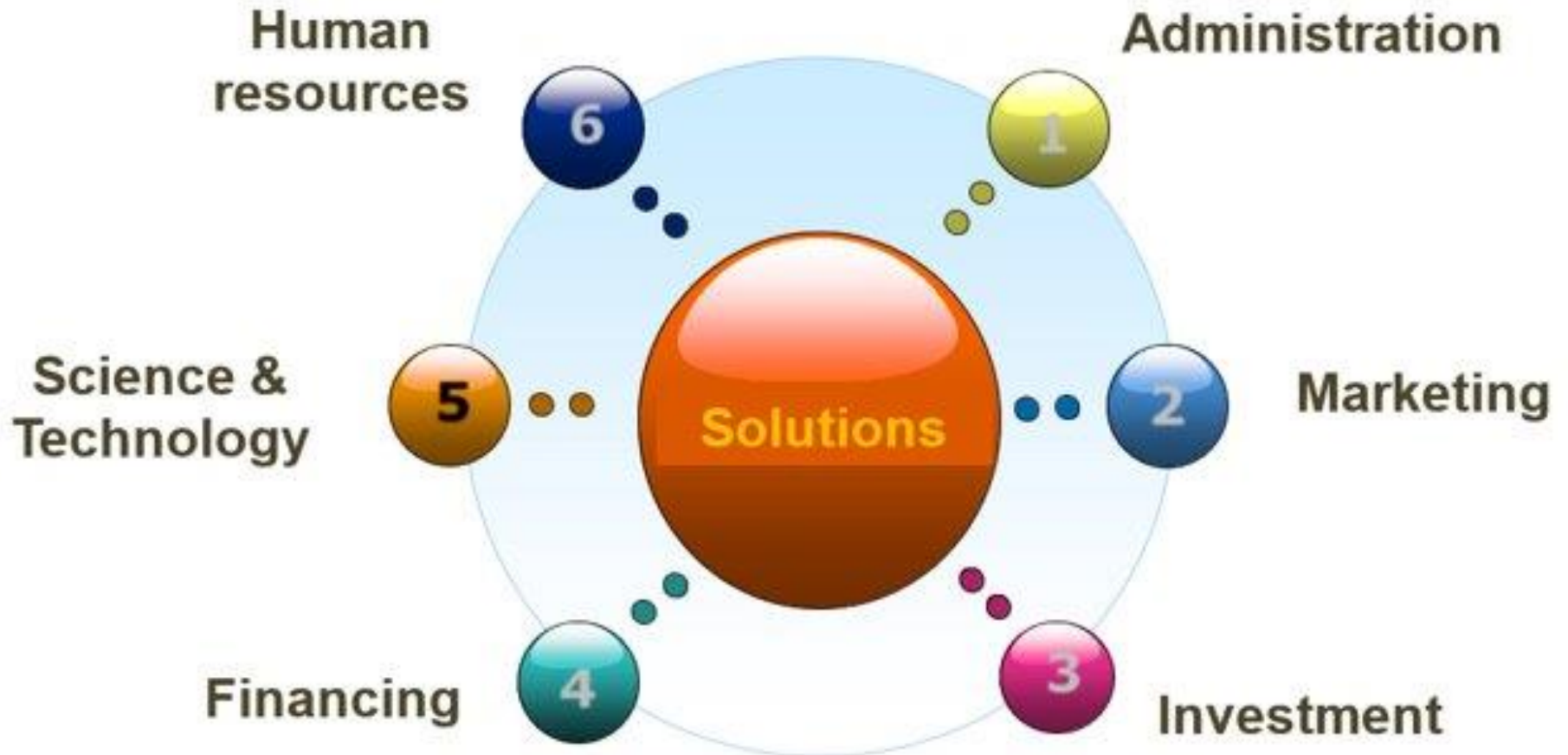
3. Research and apply the solutions to reduce greenhouse gas emissions while bringing economic efficiency

- Build energy management systems and set quotas for monitoring.
- Prioritize, encourage energy-saving and energy-efficient solutions.
- Reduce methane leakage.
- Reduce burning during exploration.
- Research the solutions for carbon capture and storage.

3. Energy Transition Strategy of PVN



3.3 Solution





4. PVN's new technology orientation to adapt and take advantage of energy transition opportunities

4. Orientation on new technologies

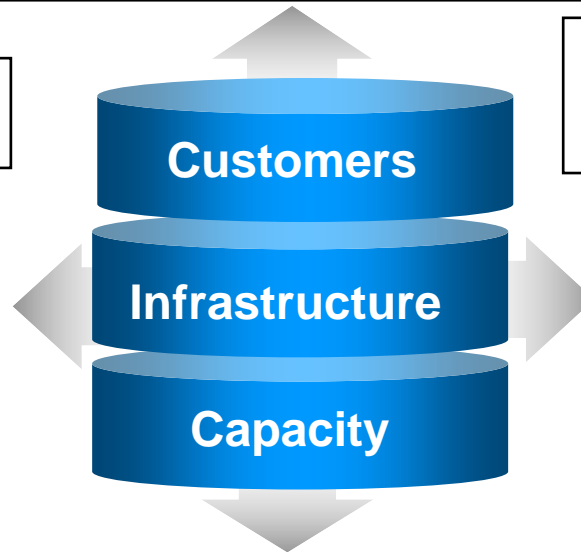


4.1 Natural gas - LNG

Diverse customer system: Electricity, industrial households, low-pressure consumer households

Own the entire gas processing and distribution system from North to South

State-owned corporation, which owns the entire oil and gas drilling and exploitation rigs of the country.



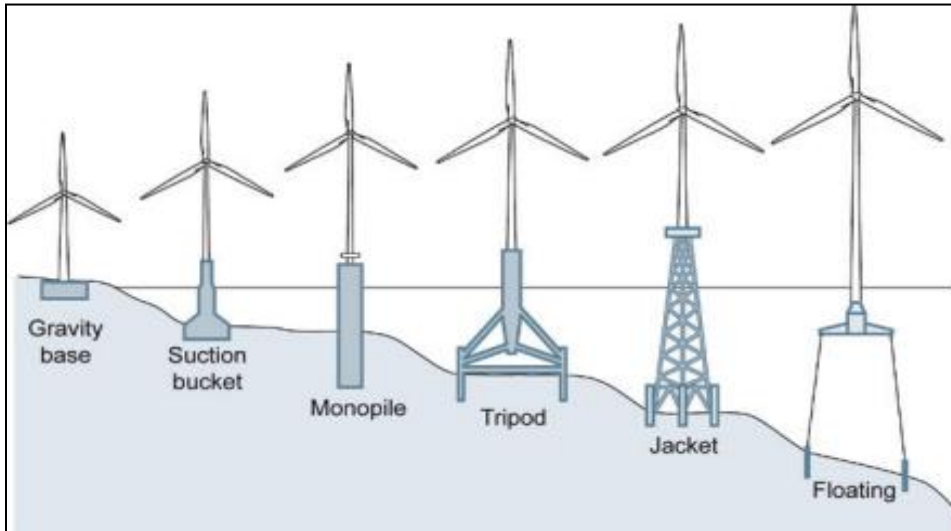
Investors of major gas project: Lô B, CVX, LNG Thị Vải, LNG Sơn Mỹ...



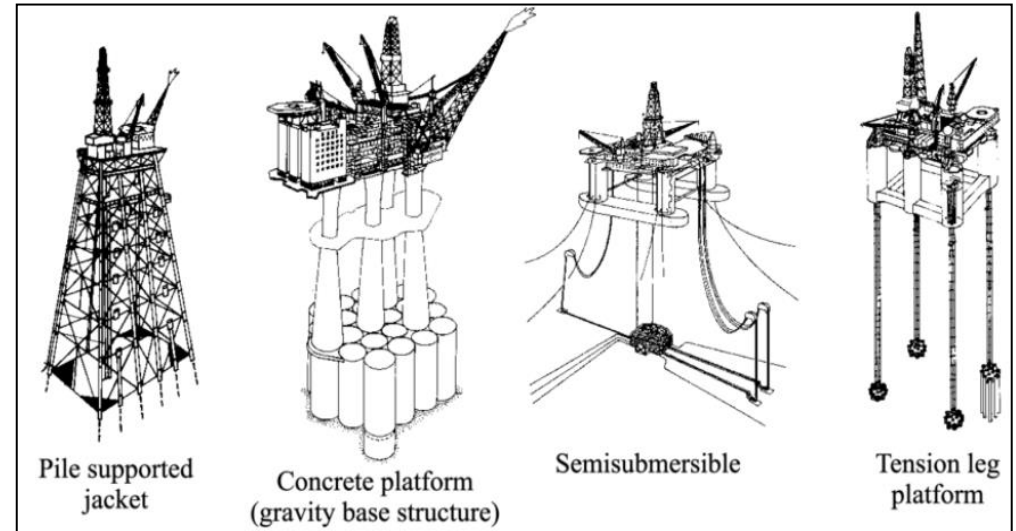
PVN plays a leading role: Forming and developing the gas market (which prioritizes domestic gas extraction); Investing in large-scale LNG import infrastructure, providing renewable gas resources for gas thermal power centers nationwide.

4.2 Offshore wind power

Similarities between offshore wind power and oil and gas constructions



Foundation of wind turbine



oil and gas exploitation rig foundation

- Steel structures are completed onshore and installed offshore.
- The growth of offshore wind power provides opportunities for those providing offshore oil and gas services (supply chain sharing and technology), the synergy between the two sectors will contribute greatly to offshore wind power developers.

4. Orientation on new technologies



4.2 Offshore Wind power

PVN's capacity in oil&gas constructions

DESCRIPTION	BASE-SHAPED WIND POWER POLE (FORMOSA II-OWF)	RIG STAND (SAO VANG CPP)
TYPE	4 LEGS JACKET	4 LEGS JACKET
DIMENSION	83 M X 29.4M X 29.4M	125 M X 50M X 87M
WEIGHT	1350 TON	12500 TON

PVN is the leading enterprise in Vietnam in mechanical engineering, construction and installation of offshore works, highly appreciated by international customers.

Large offshore projects with national record that PVN has implemented: Tam Dao self-lifting rig 03, 05 (depth of 90, 120 m of water), Sao Vang gas exploitation and processing rig (26600 thousand tons), Hai Thach gas exploitation and processing rig (25000 thousand tons)

Dozens of mining rigs with a total weight in the range of 2000-10000 tons

PVN exports services, which are highly appreciated by international investors/contractors such as Qatar's largest oilfield drilling rig in the Gallaf project (26000 thousand tons), the EPCC Maharaja Lela South project in Brunei for Total E&P (about 2 thousand tons), the project for India Oil and Gas Group... In particular, PVN/PTSC has signed an agreement with Hai Long Offshore Wind Power company to build two offshore substations under the Hai Long 2 and Hai Long 3 offshore wind power projects in Taiwanese waters.

PVN has carried out more than 100 large projects, from onshore to offshore

4. Orientation on new technologies

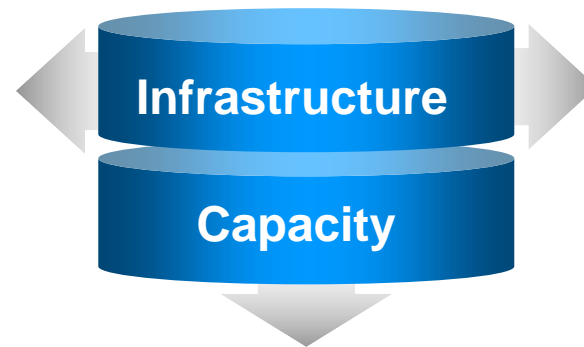


4.2 Offshore Wind power PVN's capacity in offshore wind power

Owning and managing a fleet of service ships (nearly 100 ships) at sea, diverse in capacity and types



Owning service ports in all 3 regions with workshops and equipment made onshore.



Starting and surveying stage

Providing survey services (seabed survey, physical engineering survey ...).

Construction, installation stage

- Design capacity
- Purchasing capacity
- Capacity for onshore manufacturing
- Transportation and installation capacity

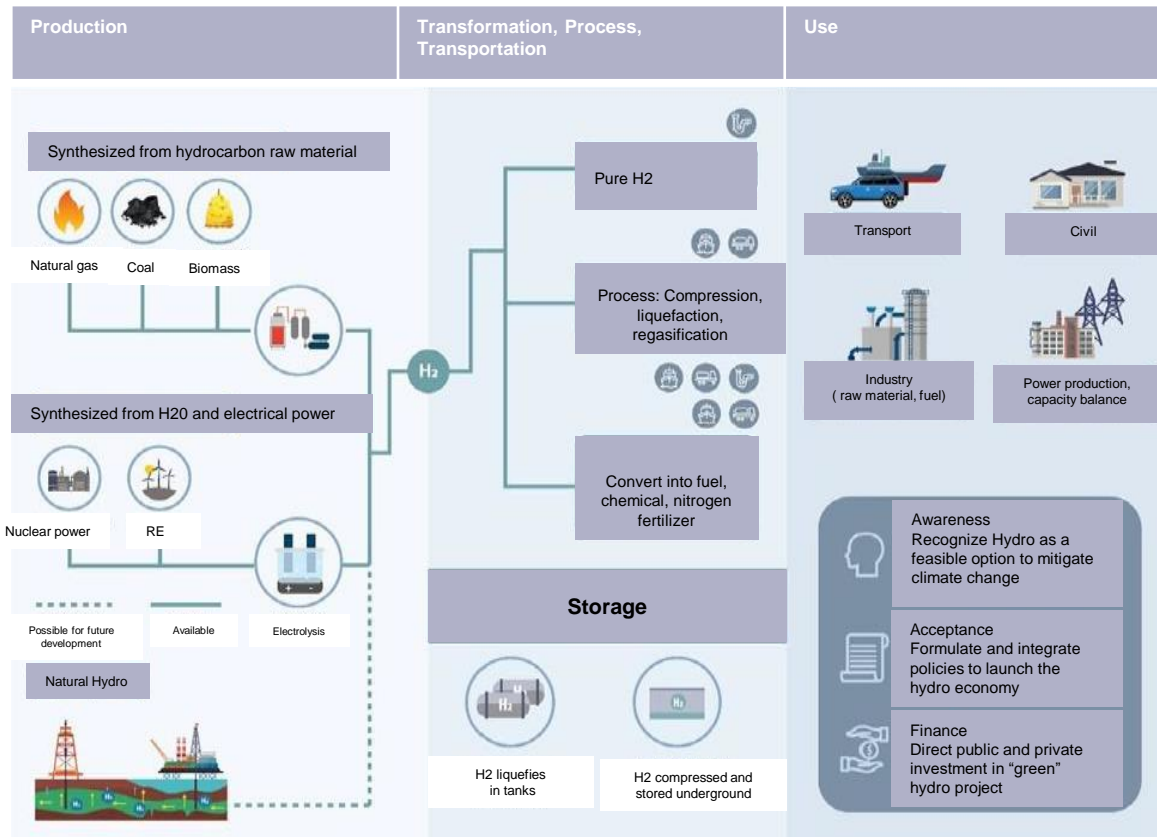
O&M stage

- Experience in the O&M of marine oil and gas works
- Experience in O&M: Gas, coal, hydropower, onshore wind power (Phu Quy)

With the experience, capacity, resources and infrastructure system available in the field of offshore oil and gas extraction, PVN's participation in the offshore wind power industry will bring great benefits, take maximum advantage of most of the available resources of domestic units, avoid wasting investment costs, be able to export services to the international market, contribute to protect national island sovereignty

4. Orientation on new technologies

4.3 Hydrogen



- **Hydrogen production:** PVN has experience in the production of gray hydrogen at petrochemical refineries (BSR, NSRP) and Protein Factory (PVFCCo, PVCFC);
- **Transportation, distribution, storage of hydrogen:** Available infrastructure (storage, pipelines, etc.) and experience in operating natural gas systems can be converted for application to the hydrogen sector;
- **Hydrogen use:** PVN's petrochemical refineries and nitrogen fertilizer producers can use "green" hydrogen to partially replace traditional H₂ and to process synthetic fuels from natural gas sources with high CO₂ content.

PVN has great advantages in creating hydrogen value chains from production, storage, transportation, distribution and use.

4.4 Energy Efficiency

Technical solutions for energy efficiency

- 1 Prioritize using of advanced, modern technologies**
- 2 Maximize recovery of excess energy sources and reasonable reuse**
- 3 Implement an efficient energy management system**
- 4 Maintenance as recommended by the manufacturer**
- 5 Continuous improvement**



Thank you!