

MINISTRY OF INDUSTRY AND TRADE

NATIONAL PROGRAMME

**VIETNAM - NATIONAL ENERGY EFFICIENCY PROGRAM
2019 – 2030**

DRAFTING ENTITY: Department of Energy Efficiency and
Sustainable Development

Hanoi – June 2018

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ACRONYM

Acronym	Description
ADB	The Asian Development Bank
APEC	Asia-Pacific Economic Cooperation
CC	Climate change
EB	Energy balance
GGG	Green Growth Strategy
DB	Database
EP	Energy policy
DANIDA	Danish International Development Agency
DO	Diesel oil
DSM	Demand Side Management
EVN	Electricity of Vietnam
GDP	Gross domestic product
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
TP	Transport
HHI	Herfindahl-Hirschman index
ES	Electricity system
IEA	International Energy Agency
INDC	Intended Nationally Determined Contribution
JICA	Japan International Cooperation Agency
IP	Industrial park
GHS	Greenhouse gas
BG	Biogas
LNG	Liquefied natural gas
LPG	Liquefied petroleum gas
BE	Basic energy
RE	Renewable energy
EEE	Efficient energy use
SIDA	Swedish International Development Cooperation Agency
TIMES	Integrated MARKAL-EFOM System
EC	Energy conservation
TOE	Tonne of oil equivalent
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change

UNIDO	United Nations Industrial Development Organization
USD	United States dollar
VND	Vietnamese dong
VNEEP	Vietnam - National Energy Efficiency Program
WB	World Bank

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PART I: NECESSITY OF THE PROGRAM

Vietnam's economy continues to see strong growth compared to regional and global economies. Average gross domestic product (GDP) growth rate reached 7.0% during 2001 - 2010, lowered to around 5.82% during 2011 - 2015 and gradually recovered at 6.8% from 2016 to present. Economic growth results in increased energy source serving the economy's development demand. In 2015, Vietnam's total basic energy (BE) is 70,588 KTOE, of which, commercial energy accounts for 75,5% and non-commercial energy accounts for 24,5% of total BR consumption. According to forecast in the National Power Development Plan (Revised PDP VII), in the next 15 years (2016 - 2030), Vietnam's power demand would increase 8.7%/year on average. Domestic power supply capacity increase from 38,358 MW in 2015 to 60,000 MW in 2020 and 129,500 MW in 2030, with its yield from 164 billions kWh to 265 - 278 billions and 572 - 632 billions kWh in 2015, 2020, 2025 and 2030, respectively. Hence, in the next 15 years, after each 5-year cycle, power demand would increase by 1.5 fold. This is a significantly higher growth rate than regional and international rates.

Developing energy to meet socio-economic growth's demand is inevitable, however, energy development must be consistent with energy security and environmental protection. To achieve this goal, there are two strategic solutions for the energy sector: (i) Enhance energy use efficiency, improve energy performance to reduce energy loss; (ii) Make changes to the energy source structure towards reducing fossil fuel, promoting efficient use of and increase usage rate of renewable energy in energy production and consumption, reducing greenhouse gas. Over the course of implementing the first strategic solution, the Government has issued many policies over energy efficiency and conservation. The "*Vietnam - National Energy Efficiency Program*" had been implemented during 2006 - 2015 (separated into two stages of 2006-2011 and 2011-2015). The program indicates the energy conservation of over 18 tonnes of oil equivalent (TOE); for 2011- 2015, the efficiency rate is 5.65 %, which is equivalent to the total energy conservation of 11.8 million TOE for the same period. Although positive achievements have been gained, Vietnam still has a lot of technical opportunities for minimizing energy production loss and waste in all sectors, from industrial production, commerce and service to family consumption. Surveys and calculations show that energy source efficiency in the country's coal and oil power

plant managed to achieve only 28% to 32%, which is 10% lower than that of developed countries; industrial boiler's performance reached only 60% in 2010 and increased to approximately 80% in 2014. Nonetheless, this rate is still around 10% lower than the worldwide average and that percentage would even increase if the comparison counterparts are developed countries. In many industries of the country, energy expenditure for a product unit is higher than that of developed countries. Energy conservation (EC) potential in some of the country's industries, such as production of cement, steel, ceramic, cold product, or consumer good, etc. may reach over 20%; for civil building and transport, the number may be well over 30%; for living and service activities, the saving potential is not inconsiderable. Experiences from countries which managed to develop a highly competitive economy, practice efficient energy use and reduce emission reveal that overall activities in energy conservation should be constantly maintained, enhanced and perfected along with the country's industrialization and modernization. Therefore, the task of maintaining energy efficiency and conservation activities in Vietnam must be extended by utilizing a long-term plan and strategy with clear guidance in order to eliminate barriers and potential risks in terms of rising national energy usage demand, at the same time, the 5 following core issues in the sustainable development requirements must be directly addressed to enhance national competitiveness: *(i) Alleviate the pressure of investment for a new power source; (ii) Preserve national energy resources; (iii) Offload national energy intensity; (iv) Practice environmental protection and greenhouse gas emission reduction; and (v) Bring about socio-economic benefits and build up a safe, civilized and modern livelihood for people, businesses and communities.* On that basis, the "Vietnam - National Energy Efficiency Program" (hereinafter called "the Program") is the implementation step to make specific the energy deployment strategy, a critical element in National Sustainable Deployment Strategy, with the aim of making Vietnam a country of energy efficiency and conservation.

The Program was developed on the following foundation.

1.1. Political foundation

- Resolution No. 18-NQ/TW, dated Oct. 25, 2007 issued by the 10th Politburo providing guidance for Vietnam's national energy development strategy by 2020, with vision to 2050.

- Resolution of the 12th National Congress of the Communist Party of Vietnam set out economic indicators for the period of 2016 – 2020: "5-year average economic growth rate shall reach 6.5 - 7%/year. As of 2020, average GDP per capita shall reach \$3,200 - 3,500; industry and service rate in GDP shall reach 85%; 5-year average total social investment shall account for approximately 32 - 34% GDP; State budget deficit shall reduce to around 4% GDP. Total-factor productivity (TFP) shall contribute about 30 - 35% growth; average social labor productivity shall increase about 5%/year; **energy expenditure per average GDP shall decrease by around 1 - 1.5%/year**"

- Resolution No. 23-NQ/TW, dated Mar. 22, 2018 issued by the 12th Politburo providing Guidance for national industrial development policy by 2030, with a vision to 2045.

1.2. Legislation foundation

- Energy Efficiency and Conservation Law;

- Decree No. 21/2011/ND-CP dated Mar. 29, 2011 issued by the Government detailing the Energy Efficiency and Conservation Law and measures for its implementation ;

- Decree No. 134/2013/ND-CP dated Oct. 17, 2013 issued by the Government setting forth administrative fine in electricity, hydroelectric dam safety, and efficiency and conservation;

- Intended Nationally Determined Contribution (INDC) – Vietnam’s commitment towards the international community to combat global climate change, of which, Vietnam committed to reducing 8% greenhouse gas emission against typical development scenario and may further reduce to 25% with international aid;

- Decision No.04/2017/QD-TTg dated Mar. 09, 2017 issued by the Prime Minister setting forth the List of equipment and appliances to which mandatory energy labeling and minimum energy efficiency standards are applied, and the roadmap to their implementation;

- Decision No. 403/QD-TTg dated Mar. 20, 2014 issued by the Prime Minister approving the National Action Plan on Green Growth for 2014-2020;

- Decision No. 78/2013/QĐ-TTg dated Dec. 25, 2013 by the Prime Minister setting forth List of energy consumption vehicles and equipment for disposal, and ban on construction of new low-efficiency power plants;

- Decision No. 1393/QĐ-CP dated Sep. 25, 2012 issued by the Prime Minister approving the National Strategy on Green Growth, in which there was an explicit statement on reducing greenhouse gas emission intensity and promoting clean energy and renewable energy use, with the following key indicators:

+ 2011 - 2020: Reduce greenhouse gas emission intensity by 8 - 10% against 2010 index, reduce per-GDP energy expenditure by 1 - 1,5%/year. Reduce greenhouse gas emission in energy-related activities by 10% to 20% against business-as-usual development plan. Of which, around 10% is from voluntary effort, the other 10% is with international aid;

+ Guidance for 2030: Reduce annual greenhouse gas emission by at least 1.5 - 2%, reduce greenhouse gas emission in energy-related activities by 20% to 30% against business-as-usual development plan. Of which, around 20% is from voluntary effort, the other 10% is with international aid;

+ Guidance for 2050: Reduce annual greenhouse gas emission by 1.5 - 2%.

- Directive No. 34/CT-TTg dated Aug. 07, 2017 by the Prime Minister on promoting power conservation;

- Other relevant documents.

1.3. Practical foundation

1.3.1. Assurance for national competitiveness enhancement

In 2015, **Vietnam became an average-income country** with gross domestic product (GDP) per capita reached \$2,109, 20 times higher than that of 1990 (\$114). Along with economic growth, Vietnam's energy overall state experienced drastic changes during the last 30 years. Energy supply quickly shifted from traditional biomass fuel for agriculture economy to a diverse model of state-of-the-art energy products. The increase in energy demand caused by economic growth with unmatched extension in energy supply led to the state of unbalanced energy, resulting in frequent occurrences of energy shortage, threatening energy security.

In 2015, Vietnam's total basic energy (BE) is 70,588 KTOE, of which, commercial energy accounts for 75,5% and non-commercial energy accounts for 24,5% of total BR consumption. The non-commercial biomass energy rate (NCBER)¹ in total basic energy supply decreased drastically from 44.2% in 2000 to 16.9% in 2015. During this period, commercial energy saw the growth of 9.5%/year. This growth rate was greater than the country's GDP growth rate in the same timeline, resulting in commercial energy - GDP elasticity being greater than 1 and reached the rate of 1.31. Among commercial energies, natural gas has the highest growth rate at 13.4%/year, followed by coal, oil products, and hydroelectricity at 12.2%, 6.2%, and 27.6% respectively. Basic energy supply development during 2000 – 2015 is presented in **Table 1**. Industrial growth, civil energy use and traffic mechanization have been the causes of the increase in Vietnam total energy demand in Vietnam over the past years.

Table 1. Basic Energy Supply Development during 2000-2015 (MTOE)²

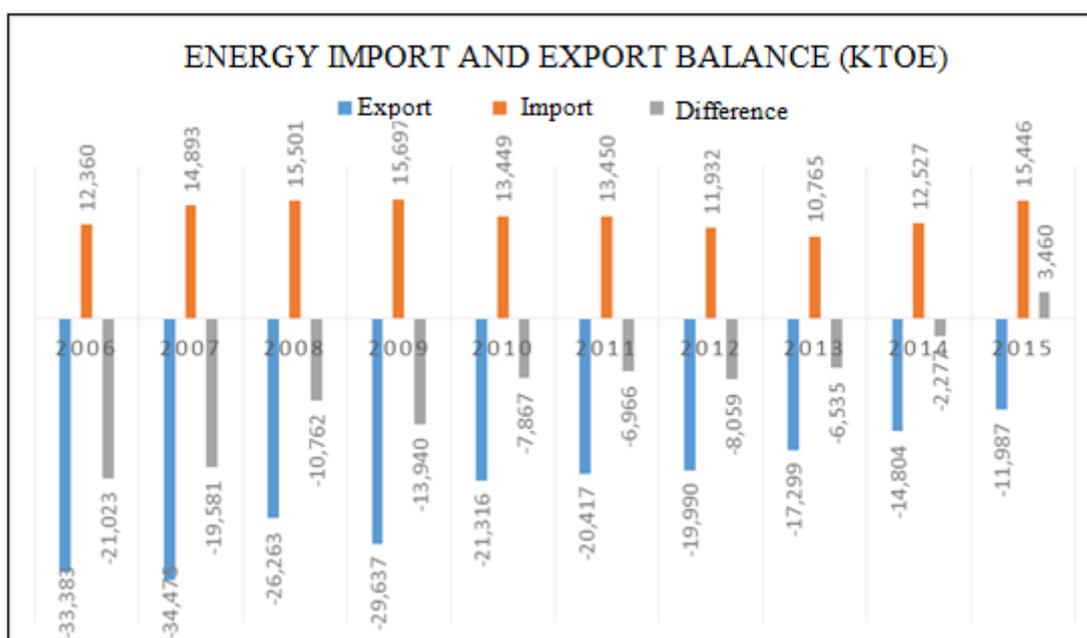
¹Non-commercial biomass energy: types of fuels having no commercial exchange or no official market, typically used as civil burning fuel, which, in this case, are mainly firewoods, agriculture by-products, or animal wastes, etc.)

² Institute of Energy, "Viet Nam Energy Statistics 2014," IE, 2016

	2000	2005	2010	2011	2012	2013	2014	2015
Coal	4.372	8.376	14.730	15.605	15.617	17.239	19.957	24.608
Oil	7.917	12.270	17.321	16.052	15.202	14.698	17.700	19.540
Gas	1.441	4.908	8.316	7.560	8.253	8.522	9.124	9.551
Hydroelectricity	1.250	1.413	2.369	3.519	4.540	4.468	5.146	4.827
Non-Commercial Energy	14.191	14.794	13.890	14.005	14.121	13.673	12.745	11.925
Imported Electricity		33	399	333	125	200	124	136
Total	29.171	41.794	57.025	57.075	57.857	58.801	64.797	70.588

Energy security, reviewed under the light of energy import and export balance is presented in **Figure 1** below.

Figure 1. Energy Import and Export Development during 2006-2015 (KTOE)



It's easy to notice the declining trend of energy export in recent years. Export yield in 2015 dwindled to around 12 thousand KTOE, which was equivalent to 2/5 that of 2009 while import energy, after a few years of decrease due to declined domestic demand, drastically achieved an increase in 2015. From the difference between energy import and export, it could be concluded that, **in 2015, Vietnam has become a net energy importing country³**.

Table 2. Key Energy Economic Indexes Development during 2010-2015

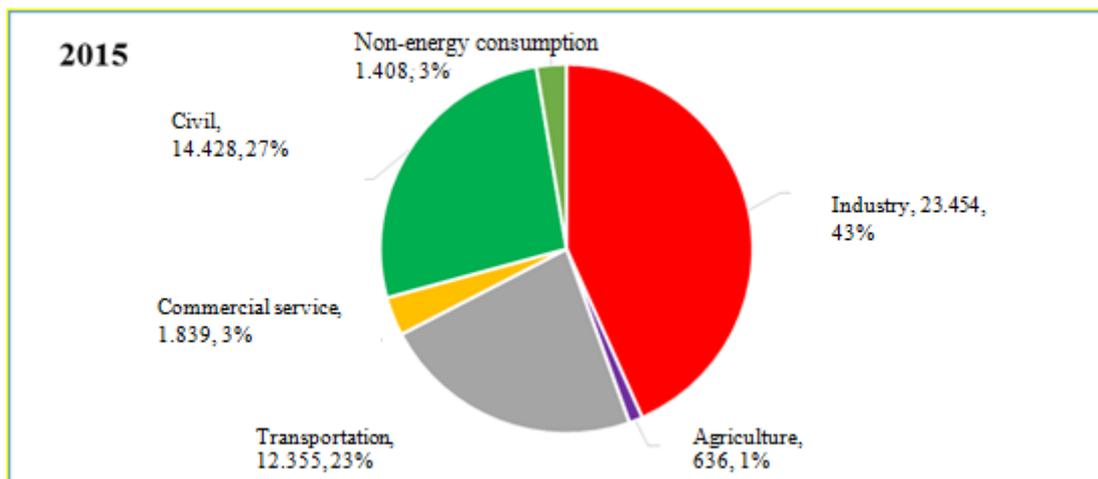
³ Domestic energy supply = Domestic production + Import – Export + Variable reservation; Net imported energy = (Import – Export)/Energy supply (%)

Category	Unit	2010	2012	2013	2014	2015
Total Basic Energy Supply	KTOE	57,023	57,855	59,203	64,797	70,588
Non-Commercial Energy/Total Basic Energy Supply	%	24.4	24.4	23.1	19.7	16.9
Total Final Energy Consumption	KTOE	47,445	49,134	50,606	52,248	54,080
Final Energy Consumption Per Capita	kgOE/capita	545.7	553.2	563.8	575.9	589.7
Basic Energy Supply/GDP	kgOE/\$1,000	491.9	446.3	433.2	447.4	456.9
Import/Total Supply	%	31.2	27.3	24.6	28.6	35.3
Energy Intensity	kgOE/\$1,000	289.6	270.4	270.6	273.1	270.0
Energy Consumption Per Capita	kWh/capita	998	1,187	1,294	1,416	1,564
Electricity Intensity/GDP	kWh/\$1,000	748	813	850	887	929
Electricity Consumption/Total Energy Consumption	%	22.2	25.9	27.0	27.9	29.2

Energy intensity (energy consumption converted to standard oil kilogram to produce 1 economic value unit – kgOE/VND or kgOE/USD) of the country were around 289.6 – 270.0 during 2010 – 2015 (refer to **Table 2**). The energy intensity index in combination with the energy consumption structure in 2015 (energy consumption rate for industrial sector accounted for around 43%, for civil sector accounted for around 27% of total national energy supply demand in 2015 (see **Figure 2**)) indicate the increasing growth rate of industrialization, improving people’s livelihood, and rising energy demand, however, when compared with

other nations, the country's energy intensity is currently over 2 times higher than world average (see **Figure 3**). In comparison with Thailand and Malaysia, the country's energy intensity is 1.5 and 1.7 higher, respectively. In certain extent, that means energy use efficiency in the country is 1.5-1.7 lower than that of those nations.

Figure 2. Advanced Energy Consumption Structure in 2015 by Economic Sector (million tonnes, %)



Consequently, it could be observed that energy efficiency and conservation is a key solution in reducing production expenditure, securing reliability, maintaining energy supply in a sustainable fashion, and making critical contribution to the enhancement of national competitiveness.

1.3.2. Demand for sustainable development and green growth

A lot of Vietnam's efforts went into establishing and developing an institutional mechanism suitable for sustainable development. Sustainable development has become the Party's guidance and standpoint, and the State's policies and guidelines; it has been incorporated and clearly manifested in Ministries, sectors and locals' strategies, schedules, plans, and projects for socio-economic growth and environmental protection. Many relevant policies have been issued, serving the country's sustainable development and executing international commitments which Vietnam has been a partner of.

In the environment sector, pollution prevention and control, greenhouse gas emission reduction and biodiversity preservation have been promoted and achieved favorable results. The State's governance system for environmental protection, from Central to Local level, has been step-by-step completed and

improved. Vietnam has proactively been practicing international integration and taken part in many sustainable development-related international agreements and conventions.

In 2010, Vietnam’s total greenhouse gas emission was 246.8 million tonnes of CO₂ equivalent inclusive of land use, land-use change and forestry (LULUCF) and 266 million tonnes of CO₂ equivalent exclusive of LULUCF. Greenhouse gas emission in the energy sector accounted for 53.05% of LULUCF-exclusive total emission, which was the highest proportion, followed by agriculture at 33.20%. Emission from waste and industrial process sectors were 7.97% and 5.78%, respectively (see **Table 3**).

Table 3. Greenhouse Gas Inventory Report throughout the years (million tonnes)⁴

Sector	1994	2000	2010
Energy	25,637.09	52,773.46	141,170.79
Industrial Process	3,807.19	10,005.72	21,172.01
Agriculture	52,450.00	65,090.65	88,354.77
LULUCF	19,380.00	15,104.72	-19,218.59
Waste	2,565.02	7,925.18	15,351.67
Total	103,839.30	150,899.73	246,830.65

During 1994-2010, Vietnam’s total greenhouse gas emission (inclusive of LULUCF) rapidly increased from 103.8 tonnes of CO₂ equivalent to 246.8 tonnes of CO₂ equivalent, of which, the energy sector attained the fastest growth rate, from 25.6 tonnes of CO₂ equivalent to 141.1 tonnes of CO₂ equivalent and was the sector with the most emission in 2010. It is expected that greenhouse gas emission from the four sectors of energy, agriculture, LULUCF and waste in 2020 would be 466 tonnes of CO₂ equivalent and would rise to 760.5 tonnes of CO₂

⁴ MONRE, “Viet Nam’s Initial Biennial Updated Report to United Nations Framework Convention on Climate Change,” MONRE, Hanoi, 2014

equivalent in 2030. Energy would remain as the largest source of greenhouse gas emission (see **Table 5**).

Table 4. Greenhouse Gas Inventory Report by Sectors 2010 (million tonnes)

5

Emission Source	Total	Rate (%)
Combustion	124,275.0	88.03
Energy	41,057.9	29.08
Production and Building	38,077.6	26.97
TP	31,817.9	22.54
Commerce/Service	3,314.2	2.35
Civil	7,097.6	5.03
Agriculture, Forestry and Fisheries	1,630.8	1.16
Other Non-Energy Use Sectors	1,279.0	0.91
Dispersion	16,895.8	11.97
Coal Mining	2,243.1	1.59
Oil and Natural Gas	14,652.7	10.38
Total	141,170.8	100

Table 5. Greenhouse Gas Emission Forecast for 2020 and 2030 (million tonnes) ⁶

⁵ MONRE, "Viet Nam's Initial Biennial Updated Report to United Nations Framework Convention on Climate Change," MONRE, Hanoi, 2014

⁶ MONRE, "Viet Nam's Initial Biennial Updated Report to United Nations Framework Convention on Climate Change," MONRE, Hanoi, 2014

Sector	2020	2030
Energy	381.1	648.5
Agriculture	100.8	109.3
LULUCF	-42.5	-45.3
Waste	26.6	48.0
Total	466.0	760.5

Estimated GHG emission results for 2020 and 2030 above shows that the total GHG emission from the four sectors of energy, agriculture, LULUCF and waste in 2010 was 225.6 tonnes of CO₂ equivalent and would rise to 466 tonnes of CO₂ equivalent in 2020 and 760.5 in 2030. Energy would remain as the largest source of GHG emission with 381.1 tonnes of CO₂ equivalent in 2020 and 648.5 tonnes of CO₂ equivalent in 2030. Greenhouse gas emission reduction targets are specifically communicated as follows:

(i) Green Growth Strategy:

- Reduce greenhouse gas emission in energy-related activities by 10% to 20% against business-as-usual development plan. Of which, around 10% is from voluntary effort, the other 10% is with international aid.

- Reduce annual greenhouse gas emission by at least 1.5 - 2%, reduce greenhouse gas emission in energy-related activities by 20% to 30% against business-as-usual development plan.

(ii) Intended Nationally Determined Contribution (INDC): As of 2030, by employing domestic resources, Vietnam commits to reducing 8% greenhouse gas emission against business-as-usual scenario and the figure may be increased to 25% with international aid. At the same time, Vietnam would organize adaptive activities to enhance climate change resistance capability so more contribution would be made towards greenhouse gas emission mitigation.

(iii) Alternative energy development strategy: mitigate greenhouse gas emission in energy-related activities by 10% to 20% against business-as-usual development plan. About 5% in 2020; about 25% in 2030 and about 45% in 2050.

From inventory statistics and greenhouse gas emission forecast in Table 4 and 5, it could be deduced that energy efficiency and conservation is the key

measure in completing aforesaid targets. However, recently, the implementation of energy efficiency and conservation solution have encountered the following issues:

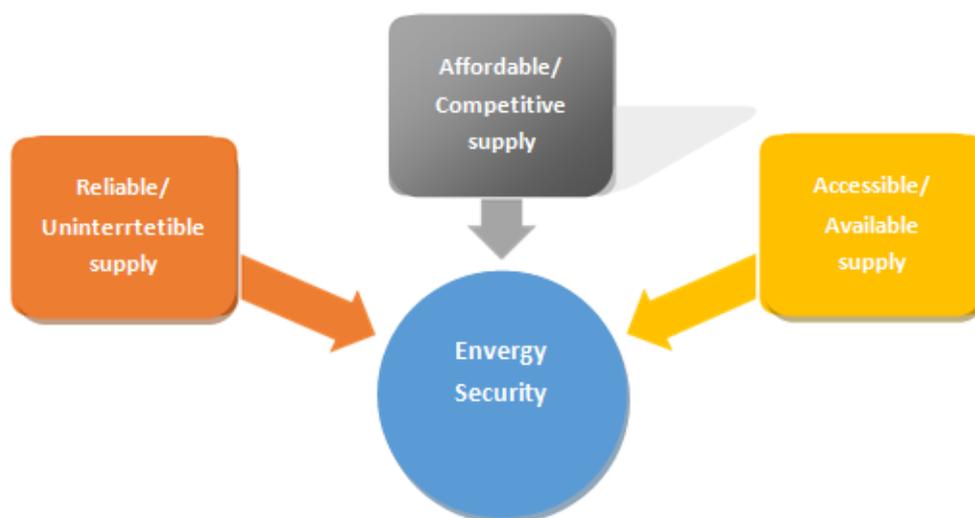
- Lack of mechanism and policy in investment encouragement, price support and technology localization;
- High investment cost;
- Difficulty in accessing funds from commercial banks for projects in innovating and replacing equipment and technologies with highly-efficient energy performance;
- Low level of skill and qualification in utilizing technologies, techniques, equipment and machines with energy efficiency and conservation;
- Limited capacity in receiving and applying technologies and techniques with energy efficiency and conservation;
- Shortage of technical infrastructure and support service for repairing, maintaining and replacing equipment.

As a result, sustainable development needs for the country in general and for the energy sector in particular require making energy efficiency and conservation a strategic and decisive solution.

1.3.3. Demand for securing national energy security

Strengthening energy security is a vital target in national energy policy. The International Energy Agency (IEA) defines energy security as ‘the uninterrupted availability of energy sources at an affordable price’. In long-term extend, energy security mainly deals with prompt investment in energy supply for economic growth and sustainable environment requirement, while, in short-term extend, energy security’s focus lies in the availability of energy systems in responding to unexpected changes in supply and demand balance. Unsecured energy security would lead to negative energy shortage-induced socio-economic impacts and non-competitive or unstable energy pricing.

Figure 3. The IEA Model of Energy Security



Fundamental challenges against national energy security include⁷:

- Insufficient access to energy;
- Lack of energy source diversity;
- Heavy reliance on traditional energies;
- Increasing shortage of supply and demand in domestic energy;
- Dependence on imported energy; and
- Shortage of adequate energy infrastructure.

Vietnam's energy security indicators for 2010 – 2015 are summarized in **Table 6**.

Table 6. Changes in Energy Security Indicators' during 2010-2015

⁷ ADB, Improving energy security and reducing carbon intensity in Asia and the Pacific, Mandaluyong: Asian Development Bank, 2009

Indicator	2010 value	2015 value	Comment/Annotation
Reserves-to-Production Ratio of Coal, Oil and Natural Gas		Coal: ~70 years Natural Gas: ~40 years; Raw Oil: ~ 20 years.	Coal mining capacity: 50 million tonnes/year; Gas harvesting capacity: 15 billion m ³ /year; Raw oil drilling capacity: 15 million tonnes/year.
Reliance on coal, oil and natural gas import (% net import)	-14%	5%	Increasing reliance on imported fuel.
Coal/oil/gas import expenditure/total import expenditure (%).		4.90%	The current ratio is not high, however, future increases in imported fuel reliance ratio should be noted.
Coal/oil/gas import expenditure/total export revenue (%).		4.78%	
Coal/oil/gas import expenditure/total gross domestic product (%).		4.16%	
Diversification of oil import product (HHI index).	1879	2122	Relatively diverse, however, concentration trends are on the rise.
Diversification of fuel structure for power generation (HHI index).	3107	3209	Relatively diverse, however, concentration trends are on the rise.
Commercial energy intensity.	0.37	0.38	There is a slight increase due to economy structure changes.

It could be noted that there were signs of a decrease in domestic production capacity and an increase in imported energy reliance during 2010-2015. These changes, in spite of being not too severe, are warning signs of future energy security for the country. In light of the above-indicated 6 energy security challenges, it could be speculated that Vietnam is facing all these challenges and the trends would become critical unless there were plans and policies for sustainable development in the energy sector.

To overcome energy security challenges, Vietnam should implement the following solution sets: (i) guidance for securing fossil fuel supply (ii)

development of energy efficiency infrastructure and diversification of renewable-energy-based energy systems and efficient usage of energy. The solution set of enforcing energy efficiency and conservation is considered as one of the key items in Vietnam's national energy security because of:

- Efficiency in utilizing traditional energy sources;
- Reducing imbalance in energy supply and demand;
- Securing long-term stability for national energy resources;

From the above-described actual state, with the urgent needs of sustainable development and national competitiveness enhancement, there are pressing requirements for mechanisms, policies and solutions to further implement energy efficiency and conservation in all aspects of life as well as deploy and implement the National Program of "*Energy Efficiency and Conservation*".

PART II: ENERGY EFFICIENCY AND CONSERVATION FOR SUSTAINABLE DEVELOPMENT AND NATIONAL COMPETITIVENESS ENHANCEMENT

2.1. Advantages and challenges

2.1.1. Advantages

a. Positive outcomes from Vietnam - National Energy Efficiency Program

In the early 2010s, when Vietnam was facing the risk of energy shortage due to high world oil price, hydroelectricity decline due to unfavorable weather conditions and inefficient utilization and exploitation of national basic energy sources, the Vietnam - National Energy Efficiency Program (The Target Program) for 2006-2010 was developed and submitted to the Government for approval in order to promote efficient use and conservation of the nation's limited energy sources, aiming at the target of sustainable economic growth. The Target Program was also incorporated into energy conservation projects funded by international organizations for the sake of making effective use of ODA fund and international experience in implementing practical energy conservation activities in Vietnam. The National Energy Efficiency and Conservation Office, which is directly under the Ministry of Industry and Trade was established and took charge of all of the Target Program's activities all over the country. By 2012, Phase II of the Vietnam - National Energy Efficiency Program was approved against a background associated with the target of promoting Green Growth in Vietnam. This is the follow up of the Program for 2006 - 2010 but with higher target, and the participation of more relevant nationwide entities and locals.

In general, we have organized the implementation of energy efficiency and conservation in systemic, methodical and scientific manner via the National Target Program since 2006. Results of this Target Program received the following specific evaluation:

(i) 2006 - 2010

The Vietnam - National Energy Efficiency Program for 2006 - 2010 was designed with 6 sets of content and 11 major project proposals across all energy consumption fields, categorized into 7 main themes: (i) Mechanism development; (ii) Awareness raising and capacity enhancement; (iii) High-performance equipment; (iv) Energy audit; (v) Pilot programs; (vi) Energy management model

and (vii) Financial assistance for client. The Program set its target at 3-5% reduction in total commercial energy consumption for 2006-2010.

Evaluation shows that the actual saving reached 3.4%, which is equivalent to 3,733 KTOE.

(ii) 2012-2015

The Vietnam - National Energy Efficiency Program for 2012 - 2015 (VNEEP 2) was approved by the Government via the Decision No. 1427/QD-TTg date Oct. 2, 2012. The program set **its target at 5-8% saving from total national energy consumption for 2012-2015 against the energy demand forecast in the National Power Development Plan for 2011-2020 with consideration to 2030 approved by the Prime Minister**, which is equivalent to 11 - 17 million TOE for 2012 - 2015. The Program also designated energy conservation indicators for heavy-energy consumption sectors, which were:

- Reduce the average energy consumption for the production of 01 ton of cement from 97 kgOE in 2011 to 87 kgOE in 2015;
- Reduce the average energy consumption for the production of 01 ton of finished steel product from 179 kgOE in 2011 to 160 kgOE in 2015;
- Reduce the average energy consumption for the production of 01 ton of fiber from 773 kgOE in 2011 to 695 kgOE in 2015.

Evaluation shows that the actual saving reached 5.65%, which is equivalent to 10,610 KTOE.

Although success was achieved to certain extends, **difficulties remained during the implementation stage of activities for Phase 2**, which are:

- Annual expenditures from the State's budget for the Program regularly arrived late, affecting execution progress of the objectives; in addition, total annual expenditures were relatively low, for instance: the figure is VND70 billions in 2011, VND82.5 billions in 2012 (VND55 billion from the State's budget and VND27.5 billions of grant from the Government of Denmark), VND96.1 billions in 2013, VND58.7 billions in 2014 and VND42 billions in 2015. Total expenditure from nation budget granted for the Program, as of the end of 2015, was VND349 billions (exclusive of local and corporate budgets) despite

the fact that the Program's intended population was broad and diverse, from Central to local level.

- The execution of energy labeling roadmap encountered many challenges, such as limited experiment infrastructure, human resource and implementation expenditure, and lacking and asynchronous energy performance experiment standard and equipment. As of the end of June 2015, 05 domestic laboratories and 02 foreign laboratories, which satisfied experiment requirements for 10 products, were designated;

- Asynchronous issue of standard caused more hardship for product energy labeling;

- Community and corporate awareness were limited as they are not yet ready to access information on energy conservation technologies and solutions;

- Many businesses have no fund or were not able to access soft credit loans for energy conservation projects. Besides, due to financial difficulty, many companies halted or were not able to implement energy conservation projects, especially steel and cement ones;

- The support mechanism on replacing production lines applying technology with ones taking advantage of high-performance energy conservation technology encountered many drawbacks. At the moment, the Program's offering of 30% of total investment fund for production lines and equipment utilizing high-performance technology and not over VND5 billions for a single entity is no longer considered attractive by large enterprises making investments in production line replacement as this aid is far lower than their total investment.

- There were a lot of companies who have not thoroughly complied with regulatory requirements from issued Laws, Decrees, Circulars and Decisions. Energy management model and annual and 5-year energy consumption plan for companies have not been developed; companies' energy consumption have not been properly reported to local authorities (Department of Industry and Trade);

- There were many hindrances in managing local businesses: disconnected management among governing Department, or confusion in auditing and inspecting of businesses for compliance of Legal requirement, which were also drawbacks in Law enforcement;

- Corporate projects encountered impediments due to declining economic conditions, rendering them unable to perform as planned, which in turn slow down or halt investment project's execution;

- Energy price increased by over 10% but it was still comparatively lower than that of other countries in the same region, which also affecting energy conservation measures' execution.

- Although resources for implementing and monitoring the compliance with Energy Efficiency and Conservation Law and legal normative documents, related regulations from Central to local level saw positive development, the texts should be supplemented and the personnel's capacity should be enhanced.

- Many entities and units in charge of carrying out the Program have not proactively and actively implemented assigned contents and duties; Financial resource, and technical experts, especially Civil Construction, Transport and local ones were limited, hence, energy audit at companies belonged to these sectors for determining energy conservation solutions, consulting in project development, and finding funds for energy conservation projects was lacking and poorly performed.

b. International aid in promoting energy efficiency and conservation

Besides the executed National Target Program, since 1997 up to now, there are energy efficiency and conservation-related activities having been organized in Vietnam. These activities were developed and executed thanks to financial and technical assistance from many international organizations: World Bank, ADB, UNIDO, GEF, UNDP, SIDA, JICA, and DANIDA.

(i) World Bank (WB)

The project of "Cleaner Production and Energy Efficiency" funded by GEF via WB was performed in 2011 - 2016. The overall objective of the project is Providing technical assistance for energy conservation market participants, especially manufacturing businesses in the sectors of chemical, food/beverage, paper, textile, brick/ceramic and energy service providers. In the time coming, there would be other industrial sectors chosen to be the next components of this Project.

For capacity enhancement activities within policy planning towards Green Growth, WB set up many supporting activities for Vietnam in the form of technical assistance for domestic partners, with the contact point being the Ministry of Planning and Investment. In 2012, experts from WB, in collaboration with 3 leading domestic research institutes, refined and transferred an emission calculation tool (called “EFFECT”). In addition, those experts, with assistance from the above-mentioned research institutes, developed a technical report, in which, there were solution recommendations for emission with costs and possible outcomes by 2040.

(ii) United Nations Development Programme (UNDP)

UNDP carried out the Promoting Energy Conservation in Small and Medium Scale Enterprises (PESME) program during 2002 – 2010, via the Ministry of Science and Technology, with funding from UNDP and GEF. The project ended with success and many recognized results. Since July 2009, UNDP also executed another project to promote labeling activities in Asian countries, including Vietnam. The target of this project called BRESL was removing barriers to enable the successful conversion of domestic products’ consumption market. A lot of activities within the projects were organized, including (i) standard development, label designing, (ii) mechanism and personnel capacity enhancement, (iii) information providing and technical support for manufacturers, (iv) information sharing, international partnership, (v) sample project performance. The program ended at the end of 2014 and its effectiveness is currently under review by UNDP.

(iii) The Asian Development Bank (ADB)

In 2011, ADB started to implement a project in policy planning capacity enhancement, with support for the National Target Program on Climate Change with a Focus on Energy and Transport (TA 7779). The main target of this project is to support the Ministry of Industry and Trade, the Ministry of Transport, and the provinces of Thanh Hoa, Da Nang, and HCMC in devising climate change plan to reduce greenhouse gas emission increase rate in target sectors by 2020. Key activities of this project are awareness and capacity enhancement for local officers, industry departments and ministries in developing and designing

scenario, developing necessary solutions and policies to support the effective performance of climate change mitigation and adaptation solutions.

(iv) Danish International Development Agency (DANIDA)

DANIDA's Low Carbon Energy Efficiency (LCEE) Project is a 2012 initiative resulted from the long-term partnership between the Government of Vietnam and the Government of Denmark for green growth in the energy sector in Vietnam. This project provided assistance to Target Program and was executed on the basis of partnership between the Danish Ministry of Climate, Energy and Building (Denmark), the Embassy of Denmark in Vietnam and the Ministry of Industry and Trade and the Ministry of Construction. The project's target was to make a contribution to the sustainable development and Vietnam's low-carbon economy conversion via the improvement of energy efficiency at small and medium-sized enterprises and construction sites. The project expected to end in June 2017.

(v) International Finance Corporation (IFC)

The overall objective of International Finance Corporation's "Cleaner Production and Energy Efficiency" Project was to improve resource efficiency, which, in turn, would reduce carbon emission in local businesses/entities. By utilizing financial tools serving energy performance and investments for cleaner production, this project supported businesses in upgrading production technology/equipment/infrastructure in order to achieve necessary energy performance, reduce waste, attain cost-effectiveness and practice environmental protection. The project also collaborated with domestic commercial banks in order to support the development of bank's business strategies towards products of energy efficiency improvement and clean production. In addition, the Project supported financial organizations in building partnership with energy service companies (ESCO), conducting corporate training and awareness raising in selected production sectors.

IFC also carried out a cooperation project with the Ministry of Construction in developing and issuing National Standard for energy efficiency and conservation construction projects (Standard QCVN 09:2013/BXD).

(vi) Japan (JICA & METI)

As part of “National Greenhouse Gas Inventories Capacity Enhancement in Vietnam”, JICA provided support for Vietnam in establishing a national system in greenhouse gas inventories. Short-term experts from JICA collaborated with domestic experts in statistics data collection and approach streamlining activities for inventory tasks.

In addition, Vietnam and Japan is currently in discussion for the early issue of Practice Guideline for Joint Crediting Mechanism - JCM (which is quite similar to CDM with the difference being its bilateral mechanism). Both parties approved a technical guideline for the pilot implementation of JCM projects in Vietnam. There are currently 28 JCM projects (of which, there are 17 energy efficiency and conservation-related projects) in the feasibility research phase with the total emission reduction potential being 10 tonnes of CO₂ equivalent.

(vii) United Nations Industrial Development Organization (UNIDO)

The project of “Promoting Industrial Energy Performance via system optimization and Energy Management Standards in Vietnam” was funded by UNIDO to provide assistance to industrial manufacturing businesses in energy performance improvement via access to the new ISO 50001 system and standard in energy demand management. By approving Energy Management standard, energy management measures would be integrated into the management cycle and realization of continuous performance improvement measures. This project’s initial priority will be given to capacity building for participants, including manufacturing businesses, equipment distributors and suppliers, energy supply and consultation companies, and policy planners. The project trained 10 domestic experts in energy management and capacity transfer for businesses by introducing Standard ISO 50001. The project started in 2011 and ended in 2014.

(viii) French Development Agency (AFD)

As part of the Government of France’s budget support plan for Vietnam in responding to climate change, a credit amount of €20 millions was granted to Vietnam via AFD. This grant would assist Vietnam in executing a multi-year program with public policy projects in 8 sectors: Renewable Energy, Energy Conservation, Forestry, Waste Management, Clean Deployment Mechanism, Water, Natural Disaster Prevention and Agriculture.

In addition to budget support, AFD implemented many technical assistance activities for Vietnam, such as defining energy conservation target in the steel sector, and preparing a local-scale action plan and analyzing bio-fuel development policy in Vietnam.

General evaluation:

Basically, Vietnam benefited from support activities from international organizations. Fund projects always included financial assistance (ODA and soft loan) and expert experience transfer on the basis of framework activities suggested by the Government of Vietnam. The projects were carried out in close collaboration with Vietnam's industry departments and ministries as part of energy efficiency and conservation activity: mechanism development (projects of WB, JICA, DANIDA...); human resources training and development, especially personnel with expertise (UNIDO, JICA,...); financial assistance (DANIDA, JICA...); technical assistance (UNIDO, IFC,...). It could be speculated from actual implementation that there were overlaps in support (one project received multiple supports form different institutions) in international funding projects, such as the labeling program received supports from UNDP and AUSAID and the Project of developing Standard QCVN 09/2013 for Construction Sites received supports from 3 organizations: DANIDA, IFC, and USAID.

Consequently, to effectively optimize all resources, there should be a **national orchestration program for energy efficiency and conservation activities on the basis of defining core points causing the nation's energy waste and inefficiency, establishing a hierarchy of tasks for each participating entities: the State's governance authorities, businesses, people and international organization's support.**

c. Institutionalize energy efficiency and conservation

(i) Energy Efficiency and Conservation Law 2010⁸

This Law stipulates energy efficiency and conservation issues; policy and measures for promoting energy efficiency and conservation; right, obligation and

⁸Law No. 50/2010/QH12

responsibility of organization, household and individual in energy efficiency and conservation. A legal framework is created by this law to promote efficient energy use activities in all aspects of the economy via regulations, standards, incentives, and encouragements. The main contents of this Law include:

- Obligation for key energy consumption households: develop annual and 5-year energy plans; appoint energy management officers, develop energy management model; conduct mandatory energy audit every 3 years;

- Develop standards and equipment labeling activities;

- Incentives: tax exemption and reduction, land use incentive, soft loan from Vietnam Development Bank, National Foundation for Science and Technology Development, National Technology Innovation Fund, Environmental Protection Fund, and Vietnam - National Energy Efficiency Program (VNEEP);

The Ministry of Industry and Trade is responsible for governance in energy efficiency and conservation.

(ii) Vietnam - National Energy Efficiency Program⁹

Goals of the Program: (i) implement in synchronization the Programs in depth, remove barriers, create breakthrough changes in improving end-use efficiency, focus on the sectors of Industrial Manufacturing; Heavy-Energy Consumption Buildings; Transportation; Services; Household; Popularization of Energy Saving, High Performance Equipment and Facility; (ii) achieve the goal of aggregated total energy conservation for the whole country and in heavy-energy consumption individual sectors, bring about socio-economic benefits; contribute to reduce investment in energy supply system development, secure energy security, environmental protection; rational exploitation of energy resources, and practice sustainable socio-economic development. The program set its target at 58% saving from total national energy consumption for 2012-2015 against the energy demand forecast in the National Power Development Plan for

⁹Decision No. 1427/QĐ-TTg approving the Vietnam - National Energy Efficiency Program for 2012 - 2015

2011-2020 with consideration to 2030 approved by the Prime Minister, which is equivalent to 11 - 17 million TOE (tonnes of oil equivalent) for 2012 - 2015.

(iii) Sustainable development strategy¹⁰

The overall objective of the Sustainable Development Strategy is “Sustainable and efficient growth coupled with progress, social justice, protection of natural resources and environment, maintaining social and political stability, securely protecting the independence, sovereignty, unity and territorial integrity of the country.” The strategy also mentions some energy - economic indicators that should be noted during the course of sustainable development:

- Reduce energy intensity/GDP ratio;
- Increase energy consumption rate in energy consumption.

(iv) National green growth action plan¹¹

The aim of green growth action plan is to realize Green Growth Strategy’s goals, including 04 main themes, 12 activity sets, and 66 specific action targets. All energy efficiency and conservation-related activities are included in Theme 02 with 20 actions. There are important actions as follows:

- Action No. 9: Develop implementation plan for National energy strategy for 2014-2020 and policies under the guidance of synchronous development of energy sources; practice efficient use and exploitation domestic energy sources; reduce reliance on imported oil products; gradually decrease exported coal and adjust imported coal to an appropriate volume; establish connection with adjacent countries’ energy systems.

- Action No. 14: Adopt advanced technical norms and standards in order to improve energy performance in business and manufacturing activities of companies in heavy-energy consumption sectors (electricity, cement, steel, textile).

¹⁰Decision No. 432/QĐ-TTg dated Apr. 12, 2012 approving Viet Nam’s Sustainable Development Strategy

¹¹Decision No. 403/QĐ-TTg dated Mar 20, 2014 approving National Action Plan for Green Growth for 2014 - 2020

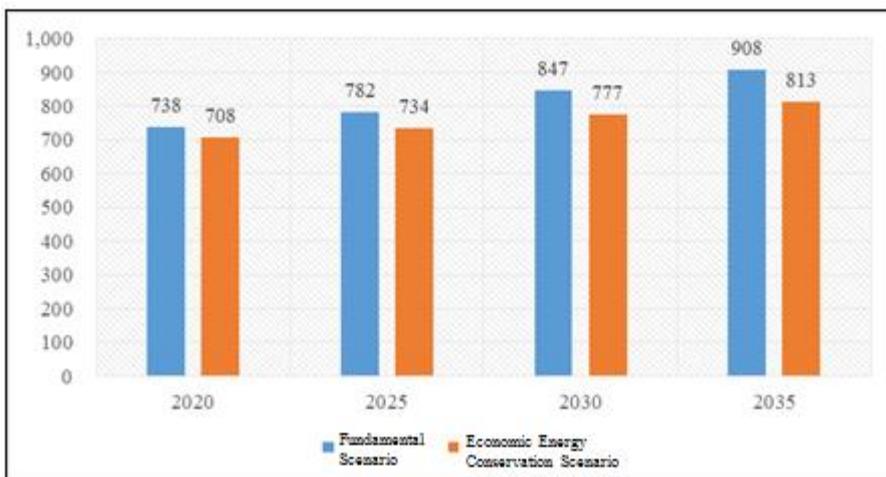
d. Energy conservation potential of the economy

Energy conservation potential of the economy was approved by the Institute of Energy determined via energy conservation scenario developed on the basis of Economic Growth Scenario.

(i) For agriculture sector

Basically, due to the low rate of mechanization in Vietnam’s agriculture, unpopulated large-scale livestock model, and popular near-shore fishery, the industry’s energy consumption is still very low. According to statistics, Vietnam’s agriculture contributed only 16.1% to total GDP in 2015 but consumed 1.2% of total energy consumption, which is equivalent to 636 KTOE. Only two sub-sectors of fishery and irrigation among other agriculture sub-sectors were used to calculate energy conservation potential for the agriculture sector. Against Fundamental Scenario, the resulting rate of energy conservation would be 4.2%, 6.2%, 8.2% and 10.4% in 2020, 2025, 2030 and 2035, respectively.

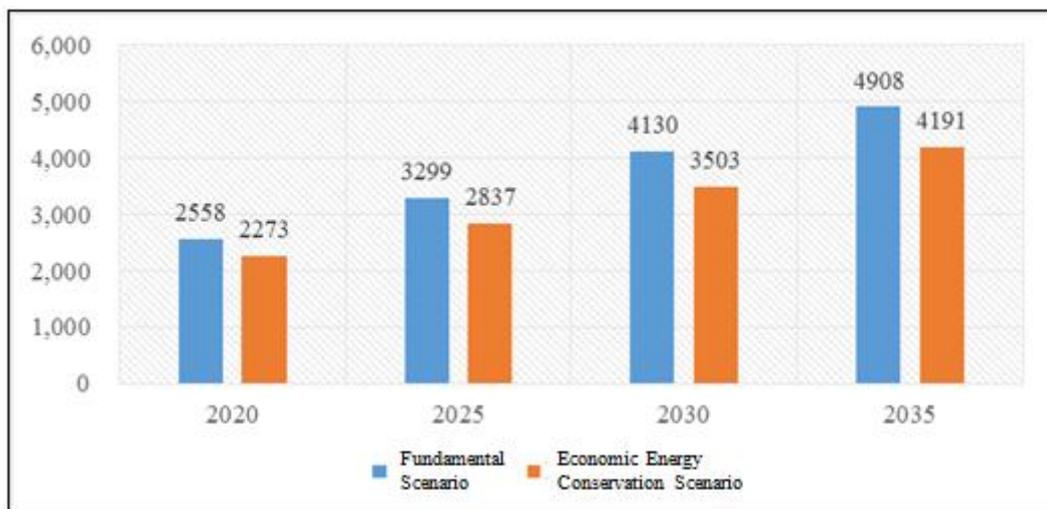
Figure 4. Energy Consumption - Conservation Demand Forecast for Agriculture Sector (unit: KTOE)



(ii) Service sector

Service sector has a high contribution rate to GDP but low total final energy consumption, just 3.4% over the total final energy consumption in 2015. However, according to the forecast, this would be the sector with a high energy consumption growth rate in the next period. Energy conservation scenario assumes that this sector’ energy intensity would gradually decrease, reaching 15% by 2035, with high fuel conversion rate, and near vanish of DO in 2035.

Figure 5. Energy Consumption - Conservation Demand Forecast for Service Sector (unit: KTOE)

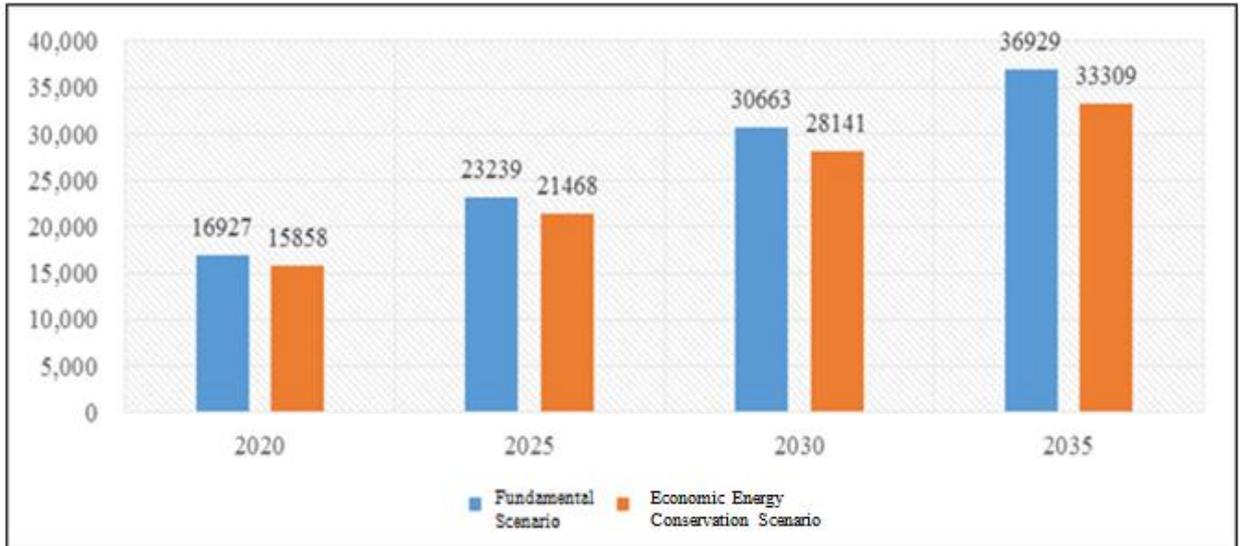


Calculation shows that the reduced energy rate against energy consumption in Fundamental Scenario would be 11.1%, 14.0%, 14.6% and 15.0% in 2020, 2025, 2030 and 2035, respectively.

(iii) Transport

Transport is a complicated sector, with various forms of transporting and technology. With the assumption of constant air fuel consumption, calculation shows that the reduced energy rate against energy consumption in Fundamental Scenario would be 6.3%, 7.6%, 8.2% and 9.8% in 2020, 2025, 2030 and 2035, respectively.

Figure 6. Energy Consumption - Conservation Demand Forecast for Transport Sector (unit: KTOE)



(iv) Household sector

Each household has 4 main needs requiring energy/fuel consumption listed below, with relevant technology and equipment in use.

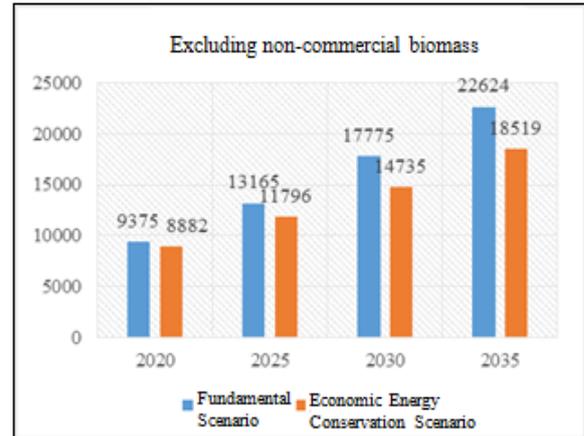
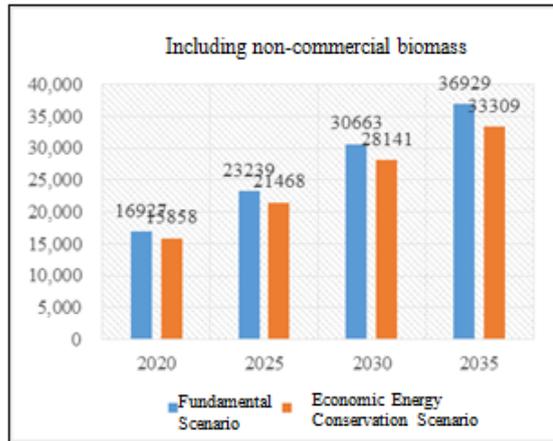
- Need for cooking: consume electricity, coal, biomass, kerosene, LPG and SH gas. Associated equipment includes cooker;

- Need for hot water: consume electricity, LPG and solar energy. Associated equipment includes electricity, gas or solar energy container-powered hot water dispenser;

- Need for lighting: mainly consume electricity. Associated equipment includes different types of lighting and lamp;

- Other needs: consume electricity and a small amount of DO for power generator. Associated equipment includes air conditioner, TV, refrigerator, washing machine, fan, DVD player, power generator, ...

Figure 7. Energy Consumption - Conservation Demand Forecast for Household Sector (unit: KTOE)



Calculation shows that the reduced energy rate against energy consumption in Fundamental Scenario, including non-commercial biomass, would be 4.0%, 7.2%, 12.9% and 14.3% in 2020, 2025, 2030 and 2035, respectively. If only commercial energies are taken into account, the energy rate would achieve further reduction at 5.3%, 10.4%, 17.1% and 18.1% in 2020, 2025, 2030 and 2035, respectively.

(v) Industry sector

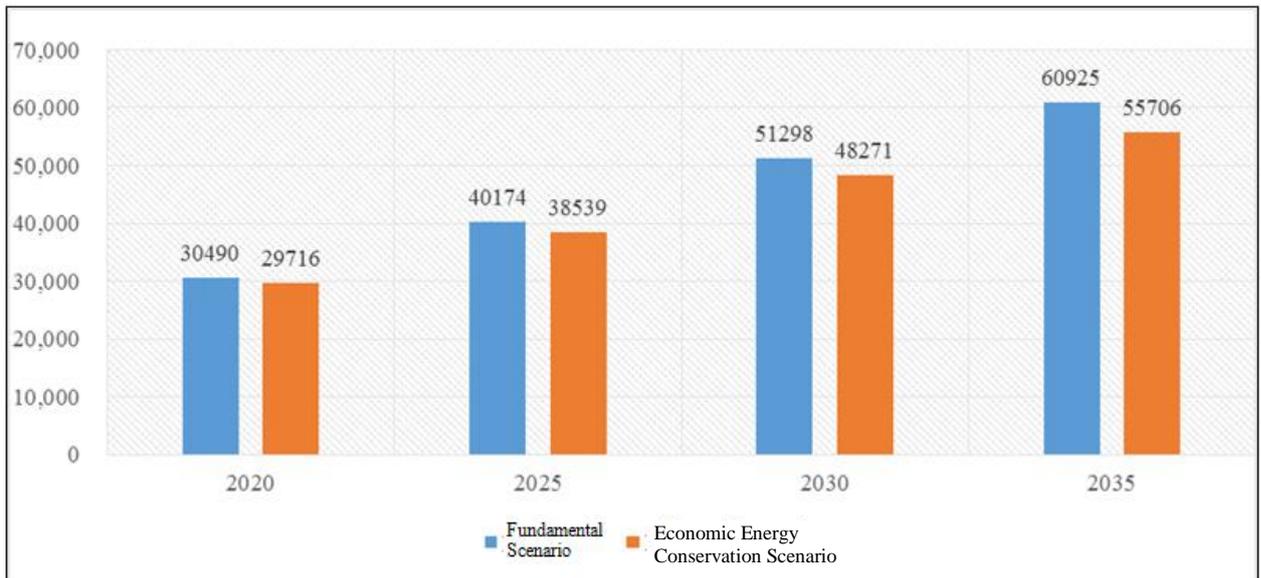
Industry is currently the top energy consumption sector, accounting for 43.4% of total energy consumption in 2015. There were a lot of past researches having pointed out that the energy intensity of Vietnam's industry sub-sector and fuel expenditure per product unit are higher than the advanced rate of the world. With that judgment, the Fundamental Scenario's calculation determined Industry sector's energy conservation potential down to Sub-sector level. Calculation shows that the reduced energy rate against energy consumption, including non-commercial energies, in Fundamental Scenario would be 2.3%, 4.1%, 5.9% and 8.6% in 2020, 2025, 2030 and 2035, respectively.

Table 7. Calculated Energy Expenditure and Conservation Potential Norms

Industry	Product	Specific Consumption		Saving Potential
		Total	Unit	
Beverage	Beer	255	MJ/ 100 liters	9-12%
	Non-alcohol beverage	78	MJ/ 100 liters	4-9%
Plastic	Civil plastic	1.32	kWh/kg	9-13%
	Construction plastic	0.41	kWh/kg	5-14%
	Packaging	0.49	kWh/kg	4-12%
	Plastic bottle	1.52	kWh/kg	5-14.5%
	Plastic bag	0.66	kWh/kg	11-17%
Paper	Paper powder	3,990	MJ/ton	6.8%
	Packaging	7,161	MJ/ton	3.8%
	Printing paper	9,804	MJ/ton	4.4%
	Toilet paper	11,433	MJ/ton	3.8%
Chemical	SVR 10CV, 20 CV Rubber	34.0	KGOE/ton	9.4 ÷ 32.7%
	SSVR 10, 20 Rubber	55.0	KGOE/ton	9.8 ÷ 32.7%
	Fertilizer	25.0	KGOE/ton	1.4 ÷ 5.4%

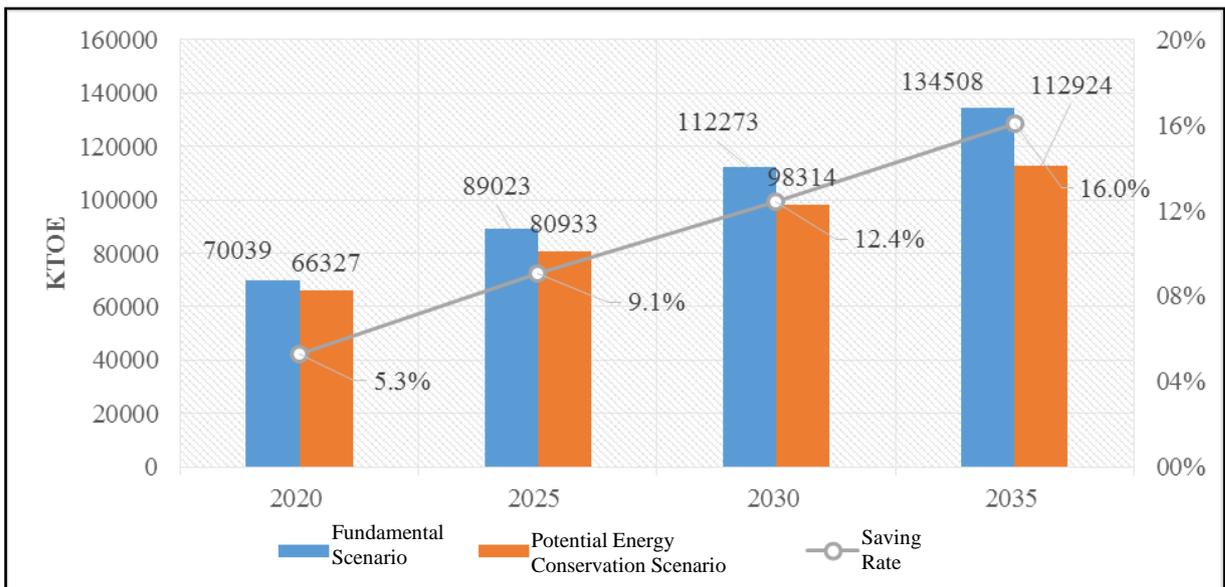
	Water-based paint	6.0	KGOE/ton	20 ÷ 30%
Heavy industry product	Finish steel product	179	KGOE/ton	13%
	Cement	97	KGOE/ton	14%
	Textile	773	KGOE/ton	14%

Figure 8. Energy Consumption - Conservation Demand Forecast for Industry Sector (unit: KTOE)



Evaluation shows that energy conservation potential is quite high with energy conservation rates over total final energy consumption against Fundamental Scenario are 5.3%, 9.1%, 12.4% and 16.0% in 2020, 2025, 2030 and 2035, respectively.

Figure 9. Summary of Energy Conservation Forecast Result (unit: KTOE)



2.1.2. Challenges

- Community and corporate awareness were limited as they are not yet ready to access information on energy conservation technologies and solutions;

- Many businesses have no fund or were not able to access soft credit loans for energy conservation projects. Besides, due to financial difficulty, many companies halted the implementation of energy conservation projects, especially heavy-energy consumption sectors such as steel and cement;

- The support mechanism on replacing production lines applying technology with ones taking advantage of high-performance energy conservation technology encountered many drawbacks. At the moment, the Program's offering of 30% of total investment fund for production lines and equipment utilizing high-performance technology and not over VND5 billions for a single entity are no longer considered attractive by large enterprises making investments in production line replacement as this aid are quite lower than their total investment;

- There were a lot of companies who have not thoroughly complied with regulatory requirements from the Law; energy management model and annual and 5-year energy consumption plan for companies have not been developed; companies' energy consumption have not been properly reported to local authorities (Department of Industry and Trade);

- There were many hindrances in managing local businesses: disconnected management among local governing Department, or confusion in auditing and inspecting of businesses for compliance of Legal requirement, which were also drawbacks in the enforcement of Energy Efficiency and Conservation Law;

- Energy price in 2013 increased by over 10% but it was still comparatively lower than that of other countries in the same region, which also affecting energy conservation measures' execution;

- Although resources for implementing and monitoring the compliance with Energy Conservation Law and legal normative documents, related regulations from Central to local level saw positive development, the texts should be supplemented and the personnel's capacity should be enhanced. Energy management personnel have insufficient knowledge of energy efficiency, and they are not sure about solution priority and extends requiring assistance. Service-providing businesses only focus on energy audit, not execution plan and solution.

- Financial resource and technical experts at many locals were limited, hence, energy audit at companies for determining energy conservation solutions, consulting in project development, and finding funds for energy conservation projects was lacking and poorly performed.

2.2. Standpoint

The Vietnam - National Energy Efficiency Program for 2019 – 2025, with consideration up to 2030 is established and implemented on the basis of following specific standpoints:

- Contribute to the development and establishment of the society with responsibilities for energy efficiency and conservation;

- Practice sustainable and efficient use of national energy resources, supporting national capacity enhancement;

- Keep inheriting positive outcomes from Vietnam - National Energy Efficiency Program

2.3. Principle

The Vietnam - National Energy Efficiency Program is established on the basis of following specific principles:

- Mobilize all social resources to cope with energy efficiency and conservation demands;

- Conduct institutional capacity enhancement in the implementation of energy efficiency and conservation policy;

- Make the most of international commitment to human resource development, financial capability, and advanced technique and technology as the foundation for the development of national capacity in energy efficiency and conservation;

- Advance technology and technical potential in energy efficiency and conservation field; and

- Become a critical element in national energy policy.

2.4. Goal

2.4.1. General goals

- Mobilize all domestic and international resources for the promotion of energy efficiency and conservation via the synchronous and end-to-end solutions in governance of government and development of policy enforcement; research and development of science, product, and technology; training and development of human resources; international collaboration in energy efficiency and conservation;

- Establish the habit of energy efficiency and conservation in all aspects of social activities; decrease energy intensity in industrial sectors; make energy conservation a mandatory indicator for key energy-utilizing facilities with guidance towards green growth, greenhouse gas emission reduction, and sustainable development.

2.4.2. Specific objectives

- Achieve the efficiency rate of 8 - 10% per total national commercial energy consumption for 2019 - 2030 against the energy demand forecast in the National Power Development Plan for 2011 - 2020 with consideration up to 2030;

- Complete and implement the legal normative document system for energy efficiency and conservation;

- Make sure that most businesses and households are trained in law and knowledge about energy efficiency and conservation;

- Promote advancement for market conversion of highly efficient energy consumption vehicle and equipment for consumer, industrial and commercial products; perform review and raise the minimum energy efficiency for energy-labeled products; encourage changes in consumption behavior, product use methodology, energy conservation equipment, and clean and environmentally

friendly technology in all sectors, from industry, construction, transport, service activity, and commerce to people's livelihood.

- Promote the application of energy management system, encourage the standardization of energy management system complying with ISO 50001, optimize energy system, employ energy conservation equipment and technology to improve industrial facilities' energy;

- Verify that 100% newly built or repaired building/construction applies the National Technical Regulation of QCVN 09:2017/BXD;

- Develop and implement energy conservation practice standard/procedure for 100% transport vehicles/means;

- Develop and supplement energy efficiency and conservation standard/procedure within the standard for industrial park/storage and concentrated industrial cluster. As of 2025, verify that 100% newly built industrial park/industrial cluster apply the standard/procedure, then further advance the application to all industrial parks/industrial following 2030;

- Develop and implement energy conservation practice standard/procedure for 100% fishing and fishery vessel/boat;

- Train and develop high quality personnel for energy efficiency and conservation activities by 2025, meeting actual fundamental human resource demand;

- Conduct research, develop and adopt source/core science and technology for energy efficiency and conservation sectors;

- Establish the National Foundation for Energy Efficiency and Conservation Promotion via socialization, and domestic and foreign individual and organization's funding.

2.5. Subject, scope, and duration of the Program

The Vietnam - National Energy Efficiency Program's focus lies on the following subjects:

- Subject:

- + Legal agencies, entities and individuals practicing production/consumption/research in energy located in Vietnam;

- + Equipment, means, machines, energy distribution and conversion system allowed to be in use and circulation in Vietnam;

+ Other specific subjects.

- **Scope:** The Vietnam - National Energy Efficiency Program is implemented and applicable for the whole country.

- **Duration:** The Program shall be implemented from 2019 to 2030.

2.6. Key objectives of the Program

1. Validate, develop and complete energy efficiency and conservation policy and institution;

a) Validate, amend, supplement and streamline the legal normative document system for energy efficiency and conservation;

- Validate and amend Energy Efficiency and Conservation Law and sub-law documents in a manner compatible with other newly issued legal normative documents; study to elaborate accountabilities between Central and local agencies, highlighting the roles and responsibilities of provincial/city People's Committee in the matter of energy efficiency and conservation within the State's governance area; study to develop regulations for energy use management applicable for industrial park and industrial cluster.

- Study to develop regulations for energy efficiency and conservation certification for energy-utilizing facilities, including Verification criteria; Organizing of verification, monitor, qualification, certification and certification procedure.

- Study to develop regulations for energy saving valuation method, elaborate related expenditure for practicing cost-effective, efficient and safe use of energy.

- Study, develop and issue regulations for conducting audit and monitoring compliance with energy efficiency and conservation legislation against energy-utilizing and consuming individuals and entities.

- Study, develop and issue regulations for the development of energy conservation service market and energy service companies (ESCO) model.

b) Validate, amend, and supplement technical standards and norms for energy efficiency and conservation;

- Study, develop and issue technical norms for energy-utilizing supplies, materials, equipment, production lines, transport means, communications,

telecommunications, fishings and fisheries in compliance with energy efficiency and conservation requirements.

- Amend and supplement design standards for industrial and civil construction, building, industrial park, concentrated industrial cluster, urban, different types of traffic road in compliance with energy efficiency and conservation requirements.

- Validate and amend technical norms for energy supply source quality (coal, oil, gas,...) in observance with management requirements and compatibility with socio-economic conditions, risk management and control guidelines for energy supply source quality in compliance with energy efficiency and conservation conditions.

- Evaluate capacity, recognize and announce energy audit entities meeting regulatory standards.

- Study, develop and issue energy use norms for each industry, agriculture, transport, construction and service sector/sub-sector, satisfying management requirements and compatible with socio-economic conditions.

2. Invest in manufacturing, transform and convert vehicle market, import equipment, machine, production line, vehicle for transport, communication, telecommunication, irrigation, and fishing/fishery in satisfaction with energy efficiency and conservation conditions.

- Invest and improve procedure and technology for environmentally-friendly energy convert, efficiency and conservation, in compatibility with climate change conditions.

- Study and apply new technologies in manufacturing and producing high energy efficiency equipment, machine, production line, vehicle for transport, communication, telecommunication, irrigation, and fishing/fishery.

- Invest and install energy conservation equipment for public work, building, industrial park, industrial cluster, urban lighting system, transport road; transform and replace highly energy-consuming accessories, machines, etc.

- Invest, manufacture and install energy conservation measuring equipment and technology; carry out other support activities in risk management, energy loss, troubleshooting.

3. Apply information technology in cost-effective, efficient and safe use of energy

- Build and provide manual for software to manage and update data of cost-effective, efficient and safe use of energy, which is compatible with energy-utilizing subjects, Central to local level energy management agencies.

- Apply smart equipment and technology, with integration into energy expenditure system operation and management.

- Set up database and information system for monitoring, tracking and evaluating the cost-effective, efficient and safe use of energy, energy labeling agency; establish information sharing and collaboration for database of cost-effective, efficient and safe use of energy with other databases.

4. Capacity enhancement for energy efficiency and conservation

a) The State's governance authorities:

Conduct capacity training and enhancement for direct managers of energy efficiency and conservation from Central to local level in the subjects of organizing and managing energy efficiency execution, controlling efficient energy use, and perform service agreement in rendering energy efficiency and conservation technique.

b) Research institutes, training facilities, provincial/city energy conservation centers, ESCOs:

- Compile training material for capacity enhancement in energy efficiency and conservation (textbook, teacher' materials, handbook for establishing and performing energy efficiency and conservation, handbook for monitoring and verifying energy conservation, etc.).

- Validate and elaborate relevant contents on energy efficiency and conservation into university and colleges' energy curriculum.

- Develop and connect nationwide energy conservation network (local Departments of Industry and Trade, centers, energy service companies, and related individuals and entities...).

c) Energy-utilizing entities:

- Develop training plan, conduct capacity enhancement for internal officers and workers about energy efficiency and conservation.

- Organize workshop, guidance conference to exchange and share experience in practicing efficient and safe energy use.

- Form partnership (bilateral, trilateral...) for experience sharing in developing and practicing energy efficiency and conservation between entities.

5. Inspect, monitor and evaluate energy efficiency and conservation practice result

- Study to develop indexes for the inspection, monitoring and evaluation of energy use risk for each form of energy expenditure, securing energy efficiency and conservation.

- Reinforce the management and monitoring the procurement of product labeled as highly efficient energy consumption for entities using the State's budget.

6. Communication for community's awareness raising

- Develop communication plan for energy efficiency and conservation; implement the plan in different forms in order to raise community's awareness and accountability towards energy efficiency and conservation.

- Develop and support distribution system for green, energy-efficient and environmentally-friendly products.

- Develop communication plan for energy-efficient products, including organizing educational programs providing information for corporates and communities, recurring awards for fairs and exhibitions promoting energy conservation products and technologies.

7. Expand international partnership

- Expand international collaboration, improve and intensify technical cooperation with international organizations and non-government organizations in energy efficiency and conservation;

- Receive technical support, technology transfer and training in energy efficiency and conservation activities;

- Carry out technical support projects relating to energy efficiency and conservation towards targets of climate change response and national Green Growth.

8. Conduct scientific research and technology development in energy efficiency and conservation

- Mobilize human resource, research equipment, fund from the State's budget, and domestic and foreign individuals and organizations to develop national science and technology capacity in energy efficiency and conservation;

- Conduct research, develop and adopt source/core science and technology for energy efficiency and conservation sectors;

9. Establish the Foundation for Energy Efficiency and Conservation Promotion

Study to develop, suggest and establish the Foundation for Energy Efficiency and Conservation Promotion on the basis of mobilizing all domestic and foreign resources for the implementation of energy efficiency and conservation in Vietnam.

2.7. Expenditure on the Program's implementation

The expenditure source for the Program's implementation includes:

1. Funding from the State's budget:

- The State's budget at Central level distributes VND600 billions for relevant Ministries/sectors based on annual Budget Planning for the Program's implementing entities.

People's Committee of provinces and cities directly under Central should secure the budget distribution from local budget to locally fulfill objectives and complete projects of the Program.

2. Funding from energy-utilizing individuals and entities and energy service companies (ESCO):

Energy-utilizing individuals and entities and energy service companies make use of their funding to fulfill objectives of securing energy efficiency and conservation.

3. Other lawful mobilization sources:

Other off-budget sources could be mobilized to invest in the execution and implementation of energy efficiency and conservation activities including Support for study to develop information and communication policy and mechanism; invest for energy efficiency and conservation capacity enhancement, experiment for corporates' business and production; training for experts, ministry, sector, local and business officers, improving management skills; invest for the

improvement of energy expenditure and equipment for energy efficiency and conservation, etc.

PART III: EVALUATION OF THE PROGRAM'S EFFECTIVENESS

3.1. Evaluation of the Program's feasibility

- The project closely sticks to energy efficiency and conservation standpoint and guidance;
- The standpoints, principles, goals, and objectives are consistent with the necessity and scientific foundation of energy efficiency and conservation;
- Objectives and implementation solutions.

3.2. Forecast possible challenges causing negative impact and remedies

3.2.1. Challenges

- Implementation time of the Program, especially in 2019, is not much left;
- Energy price structure does not promote the urgent need of energy efficiency and conservation;
- Expenditure on the project (scale and budget distribution).

3.2.2. Remedies

- Determination of the political system;
- Support from domestic and foreign experts, international funding for promoting energy efficiency and conservation in Vietnam.

3.3. Specific impact of the Program

3.3.1. Social impact

- There are a lot of subjects benefiting from the Program: All energy-utilizing and energy-providing entities and individuals, and the State's governance authorities benefits from the Program's result
- The Program is the measure for basic energy supply reservation and national development following the guidance of sustainability, green growth and national competitive capacity enhancement.
- Establish a society of energy efficiency and conservation.

3.3.2. Socio-economic impact

a. Economy

- Contribute to the implementation of National Energy Policy:

+ Reduce the increase in commercial energy source by average 0.8%/year for 2020 - 2030;

+ Reduce greenhouse gas emission by 10 – 15 millions tonne of CO₂ equivalent;

+ Achieve energy saving of 55 – 60 millions TOE.

b. Society

- Enhance national competitiveness index;

- Establish a society of energy efficiency and conservation.

3.3.3. Sustainability of the Program

- Enhanced national competitiveness;

- Is an important solution in the implementation of National Policy on Energy, Sustainable Development Policy and Green Growth Policy.

PART IV. IMPLEMENTING ENTITIES

4.1. Organizing inter-sector collaboration

a) The Steering Board of the Energy Efficiency and Conservation Action Plan:

- Establish National Steering Board for Vietnam - National Energy Efficiency Program (hereinafter called the “Program Steering Board”) with the Deputy Prime Minister acting as the Head, Minister of Industry and Trade acting as Permanent Deputy Head, and representatives from other Ministries: Construction, Transport, Agriculture and Rural Development, Training and Education, Information and Communication, Planning and Investment, Finance, Natural Resource and Environment, Vietnam Union of Science and Technology Associations, representatives from provinces/cities directly under Central acting as the Steering Board members; completing the Steering Board’s statute

- The Steering Board issues the operation statute of the Steering Board of Vietnam - National Energy Efficiency Program;

- The Steering Board provides guidelines for provinces/cities directly under Central to develop an action plan for energy efficiency and conservation,

assigning specific energy conservation indicator, and supervise and speed up the implementation.

b) The Program Steering Board's Office:

Develop functions and duties and complete the operation statute of the Program Steering Board's Office under Vietnam - National Energy Efficiency Program. The Program Steering Board's Office is responsible for aiding the Program Steering Board in the activity of inspecting, monitoring and evaluating energy efficiency and conservation implementation outcome.

4.2. Responsibility of Ministries and Departments

a) Ministry of Industry and Trade:

Ministry of Industry and Trade is the permanent agency of the Program Steering Board, responsible for the directing and guidance to achieve effective implementation for the Program, with details as follows:

- Annually organize the selection and collection of duty suggestions for related Ministries/Departments, collaborate with the Ministry of Finance in identifying and unifying list of missions and projects for the Project's implementation.

- Direct and collaborate with related ministries and departments to validate, amend, supplement, develop, submit to issuance-competent level or issue mechanisms and policies for energy efficiency and conservation;

- Direct and collaborate with related ministries and departments to validate, amend, and supplement technical standards and norms for energy efficiency and conservation:

- Direct and collaborate with related ministries and departments to study to develop certification regulation for energy efficiency and conservation;

- Direct and collaborate with related ministries and departments to study to develop regulations for energy efficiency and conservation certification for energy-utilizing facilities, including Verification criteria; Organizing of verification, monitor, qualification, certification and certification procedure;

- Direct and collaborate with related ministries and departments to study, develop and issue regulations for conducting audit and monitoring compliance

with energy efficiency and conservation legislation against energy-utilizing and consuming individuals and entities;

- Direct and collaborate with related ministries and departments to study, develop and issue regulations for the development of energy conservation service market and energy service companies (ESCO) model;

- Validate and amend technical norms for energy supply source quality (coal, oil, gas,...) in observance with management requirements and compatibility with socio-economic conditions, risk management and control guidelines for energy supply source quality in compliance with energy efficiency and conservation conditions;

- Validate, study, develop and issue energy use norms for each industry, commerce and service sector/sub-sector, satisfying management requirements and compatible with socio-economic conditions;

- Validate, study, amend, supplement and issue design standards for industrial construction in compliance with energy efficiency and conservation requirements.

- Provide guideline for locals over the development, approval and implementation of energy efficiency and conservation plan;

- Organize the inspection, supervise and speed up the implementation of energy efficiency and conservation;

- Organize the preparation of training textbook, provide implementation guideline for energy efficiency and conservation;

- Direct the organizing of communication, education and capacity enhancement activities for energy efficiency and conservation;

- Expand international partnership, intensify experience, science, technology, finance, training, information exchange for the implementation of National Program. Implement International Collaboration Projects in energy efficiency and conservation, fulfilling Vietnam's NDC and Green Growth Targets;

- Build and provide manual for software to manage and update data of cost-effective, efficient and safe use of energy, which is compatible with energy-utilizing subjects, Central to local level energy management agencies;

- Apply smart equipment and technology, with integration into energy expenditure system operation and management;

- Set up database and information system for monitoring, tracking and evaluating the cost-effective, efficient and safe use of energy; establish information sharing and collaboration for database of cost-effective, efficient and safe use of energy with other databases;

Study to develop, establish and issue Operation Statute for the Foundation for Energy Efficiency and Conservation Promotion on the basis of mobilizing all domestic and foreign resources for the implementation of energy efficiency and conservation in Vietnam;

- Study to develop indexes for the inspection, monitoring and evaluation of energy use risk for each form of energy expenditure, securing energy efficiency and conservation;

- On the basis of ministries, departments and locals' summary report and annual implementation plan, conduct the task of review, evaluation and experience take-away, development of annual and 5-year plan for the Program's implementation effort then report it to the Program Steering Board.

b) Ministry of Construction:

The Ministry of Construction is responsible for the directing and organizing of energy efficiency and conservation implementation effort within its governmental governance:

- Validate, study, supplement, develop and issue technical norms for energy-utilizing supplies, materials, equipment, production lines under construction sector in compliance with energy efficiency and conservation requirements;

- Amend, supplement and issue design standards for industrial and civil construction, building, urban, different types of traffic road in compliance with energy efficiency and conservation requirements;

- Validate, study, develop and issue energy use norms for each construction sector/sub-sector, satisfying management requirements and compatible with socio-economic conditions.

- Report the review and prepare annual planning on energy efficiency and conservation in construction sector then submit it to the Ministry of Industry and Trade for collection.

c) Ministry of Agriculture and Rural Development:

The Ministry of Agriculture and Rural Development is responsible for the directing and organizing of energy efficiency and conservation implementation effort within agriculture sector:

- Validate and perfect energy conservation policies, technical norms and standards for irrigation, fishing and fishery, and direct the implementation effort;

- Validate, study, develop and issue energy use norms for irrigation, fishing and fishery, satisfying management requirements and compatible with socio-economic conditions;

- Direct and collaborate with related ministries and departments to carrying out communication activities for community's awareness raising in energy efficiency and conservation for rural areas.

- Report the review and prepare annual planning on energy efficiency and conservation in rural areas then submit it to the Ministry of Industry and Trade for collection.

d) Ministry of Transport

The Ministry of Transport is responsible for the directing and organizing of energy efficiency and conservation implementation effort within transport sector:

- Validate and perfect energy conservation policies, technical norms and standards for transport sector/sub-sector, and direct the implementation effort;

- Validate, study, develop and issue energy use norms for each transport means and the national traffic lighting system, satisfying management requirements and compatible with socio-economic conditions;

- Validate, study, amend, supplement, and issue design standards for different types of traffic road in compliance with energy efficiency and conservation requirements;

- Report the review and prepare annual planning on energy efficiency and conservation in transport sector then submit it to the Ministry of Industry and Trade for collection.

e) Ministry of Science and Technology

The Ministry of Science and Technology is responsible for the directing, jointly guiding and organizing scientific research and technology/product deployment activities for energy efficiency and conservation:

- Collaborate with the Ministry of Industry and Trade in developing a list of scientific research and technology development duties on energy efficiency and conservation;

- Collaborate with other Ministries: Ministry of Industry and Trade, Ministry of Finance, Ministry of Planning and Investment, and other Ministries/Departments in organizing the management, implementation and application of scientific research and technology development results in the Priority List;

- Validate, supplement and develop the national standard in energy efficiency for energy-utilizing equipment and vehicle.

f) Ministry of Planning and Investment

- The Ministry of Planning and Investment, on the basis of the Program's content and suggestions from the Ministry of Industry and Trade, ministries, departments and locals, is responsible for balancing and distributing development fund and regular expenditure on the implementation of annual Plan under applicable budget hierarchy;

- The Ministry of Planning and Investment shall validate, study, amend, supplement and issue design standards for industrial park in compliance with energy efficiency and conservation requirements;

g) Ministry of Finance

- The Ministry of Finance, on the basis of the Program's content and suggestions from the Ministry of Industry and Trade, ministries, departments and locals, is responsible for balancing and distributing development fund and regular expenditure on the implementation of annual Plan under applicable budget hierarchy;

- The Ministry of Finance, in collaboration with the Ministry of Industry and Trade and related Ministries/Departments, shall study to develop and issue

regulations for energy saving valuation method, elaborate related expenditure for practicing cost-effective, efficient and safe use of energy.

h) Other Ministries: Ministry of Education and Training; Ministry of Labor, War Invalids and Social Affairs

- The Ministries of Education and Training and Labor, War Invalids and Social Affairs is responsible for the directing and executing training activities, organizing knowledge training in energy efficiency and conservation within the national education system;

- Report the review and prepare annual planning on energy efficiency and conservation in education sector then submit it to the Ministry of Industry and Trade for collection.

i) Other related ministries and departments:

Pursuant to functions and duties assigned by the Government, other related ministries and departments shall collaborate with the Ministry of Industry and Trade in implementation effort of the Program.

j) Vietnam Energy Efficiency and Energy Conservation Association:

- Participating in collaboration with the Ministry of Industry and Trade and other relevant agencies in the task of training, popularizing of knowledge, organizing experience-sharing workshop and conference on energy efficiency and conservation for energy-utilizing individuals and entities;

- Collaborate with the State's governance authorities in developing indexes for the inspection, monitoring and evaluation of securing energy efficiency and conservation implementation outcome.

- Strengthen international partnership for experience, science, technology, finance, human resource training, information exchange for the implementation of National Program.

k) Electricity of Vietnam:

Assume the responsibility for monitoring, evaluating the implementation of contents within its sector management authority; submit periodic report to the Minister of Industry and Trade (Head of the Steering Board of Vietnam - National Energy Efficiency Program):

- Set out targets, plan and financial option for the implementation effort of electricity saving activities within all phase of production, and electricity

distribution, annually and every 5 years, regularly submit report to the Steering Board.

- Organize the implementation of demand side management in pursuance of the Prime Minister's Decision.

- Collaborate with the Program Steering Board in organizing communication activities, especially nationwide events.

- Implement pilot ESCO project in agriculture, industry,...

3. Responsibility of Committees at provinces and cities directly under Central

- Establish or perfect the operation and organizing of local Steering Team on energy efficiency and conservation;

- Study to develop regulations and detailed guidelines for the implementation of energy efficiency and conservation applicable for each local authority; study and issue incentives, encouragement and award mechanism and policy for individuals and entities with outstanding performance in energy efficiency and conservation action.

- Develop and approve Action Plan, clearly specify energy efficiency and conservation roadmap and item within authority; conduct audit, monitor and evaluation of quality, progress and impact of the energy efficiency and conservation implementing in the local;

- Organize and collaborate in the implementation of popularization of energy efficiency and conservation;

- Direct Department of Industry and Trade collaborate with other related Departments to intensify audit and inspection activities for energy efficiency and conservation.

- Mobilize lawful funds for the implementation of the Program's contents within local governance authority.

- Assign Department of Industry and Trade as the permanent Steering Team and other specialized agencies directly under the Province or City implement the Program in accordance with their responsibility and duty.

- Submit regular report to the Ministry of Industry and Trade, the Program Steering Board on the Program's implementation.

4. Responsibility of energy-utilizing entity

- Establish and implement energy efficiency and conservation plan for energy-consuming vehicle and equipment under the entity's management in accordance with approved roadmap; organize the task of monitoring and evaluating energy efficiency and conservation implementation outcomes; update and supplement the plan for later phase;

- Secure energy-consuming vehicle and equipment; collaborate with related agencies in performing auditing, validating and assessing impacts associated with energy use; study to suggest source management measure to energy loss and waste;

- Invest and recondition energy-utilizing vehicle, equipment and work; study to apply energy efficiency and conservation technology; adopt information technology in management and monitoring of energy use within the entity;

- Develop risk management, respond and remedy procedure; promptly allocate human resource and equipment in the event of issues in energy use within the entity;

- Develop training plan, conduct capacity enhancement for internal officers and workers about energy efficiency and conservation;

- Organize workshop, guidance conference for experience exchange and sharing, and popularizing the practice of efficient and safe energy use within the entity;

- Form partnership (bilateral, trilateral...) for experience sharing in developing and practicing energy efficiency and conservation between entities;

- Submit regular report on the implementation of energy efficiency and conservation to the provincial Steering Team of Efficient and Safe Energy Use and Department of Industry and Trade.

5. Responsibility of community

The population, households, individuals and entities bear the responsibility of securing energy source, protecting energy supply system, practicing environmental protection and energy efficiency and conservation, inspect energy efficiency and conservation implementation; detect, report, and suggest to

competent authorities about violations to secure the implementation of energy efficiency and conservation.

ANNEXES

Annex 1. Review of the implementation of the Vietnam - National Energy Efficiency Program

1. Performance against the Program goals:

- The goals of reducing the total energy consumption nationwide by 5-8% in the 2011-2015 period were met against the energy demand forecast for the 2011-2020 period with an outlook to 2030, equivalent to an 11-17 million TOE reduction in the 2011-2015 period;

- Energy efficiency and conservation (EEC) targets were met among the most energy-consuming industries; the implementation of EEC Building Code was strengthened among large-scale energy consuming buildings; EEC solutions and technologies were promoted in the transportation sector; additional specific goals and targets were also introduced.

2. Achievements in the 2011-2015 period

594 tasks and projects under the Program were implemented in the 2011-2015 period. The Program activities are divided into different project groups as follows:

Project group 1: Strengthening education, dissemination and communication, public advocacy, awareness raising, promoting EEC and environmental protection.

The key activities of Project group 1 aim to:

- i) Promote and raise public and community awareness of EEC.
- ii) Introduce EEC education into the National Education System.
- iii) Develop and pilot the use of alternative energy sources and models of energy saving households.

The activities under Project group 1, led by MOIT in coordination with MOET and other stakeholders, have led to the following achievements:

- Coordinated with Vietnam Television and other local media channels in developing and releasing video clips, reportages and newspapers articles to disseminate and advocate EEC. Maintained and regularly updated the contents and articles, performed data management, and improved the quality of the Program website at (<http://www.tietkiemnangluong.com.vn> and

<http://www.vneec.gov.vn>), disseminating useful EEC know-how and solutions, promoting EEC efforts in production, business and daily living among enterprises and communities;

- Organized annual competitions such as “Energy efficient building” and “Energy conservation in the industrial sector” nationwide in the 2011-2015 period; organize energy-saving homes advocacy campaigns and emulation movements; organize Earth Hour campaign, promoting the Law on EEC and under-law documents to municipal sectoral departments and agencies as well as enterprises across the country, etc. These activities were well received and participated in by organizations and enterprises nationwide;

- Formulated and promulgated in a synchronous manner directive and guiding documents which guide DOET, intermediate schools, colleges and universities to mainstream EEC education into all levels of education. Five years of implementation saw positive results. EEC contents were incorporated into a number of subjects at preschool, primary school, lower secondary school, upper secondary school, professional intermediate school, college and university level. School-based EEC models were developed by a number of educational establishments.

- Developed, disseminated and replicated successful demonstrations of the use of new energy sources (e.g. solar, biogas, etc.) at production and business facilities and households across many cities and provinces nationwide.

2.2 Project group 2: Developing and popularizing high efficiency and energy saving equipment and devices, eliminating low-efficiency ones step by step

The key activities of Project group 2 aim to:

- i) Develop EE standards and introduce required energy labeling.

- ii) Provide manufacturers, assemblers, importers and retailers of high-efficiency products as well as local EE testing laboratories with technical support.

- iii) Support enterprises in applying technical standards and norms, in improving efficiency towards EEC.

- iv) Promote the deployment of energy management models at industrial establishments.

v) Develop technical and financial services for the implementation of EEC investment projects.

The activities under Project group 2, led by MOIT in coordination with MOST, have led to the following achievements:

- Strengthened the system of legal normative documents with 30 documents of all types: Circular, Technical Guideline, Code, National standard TCVN etc. for EEC state management purpose, i.e. management of activities under EEC standard implementation program and energy labelling of energy powered vehicles and devices, as well as development of a specific implementation roadmap.

- As of the end of 2015, MOIT had approved energy labeling for over 8,000 types of products, impacting tens of millions of energy powered devices. Over the past years, energy labeling has been successfully performed by MOIT, shifting the market of energy powered devices and vehicles from low efficiency to high EE.

- Delivered over 50 policy dissemination and training workshops on energy labeling to relevant stakeholders such as DOIT, market surveillance and quality management agencies, importers and exporters, supermarkets, retailers of energy powered devices across the country.

- Provided technical support to 05 local EE testing laboratories, improving the capacity of testing personnel. Cross-checked between different testing laboratories to ensure the accuracy across EE testing laboratories.

- Developed energy consumption quotas for steel, plastics, paper, cement, beverages, textile and garment, fibre manufacturing and agricultural produce processing industries. 05 circulars on energy consumption quotas of key industries and energy consuming industries were promulgated by MOIT to strengthen management and monitoring of energy consumption at industrial establishment level.

- Supported 585 enterprises in energy audit; surveyed and analyze energy-saving possibilities and potentials of production enterprises, in order to optimize production processes, improve the current state of energy consumption, and save power.

- Facilitated investment in the replacement and EE improvement of outdated devices as part of energy saving plan; improved the efficiency of new devices by providing technical support to introduce optimal operating parameters to new device assembly lines. As of the end of 2015, 11 projects had received support to replace their outdated lines with high EE ones.

- Supported key energy consuming establishments develop ISO:50001 energy management system. As of the end of 2016, the Program had supported over 150 enterprises develop their energy management system, among which 20 enterprises had successfully applied for ISO:50001.

- Provided training and certification to 2,200 energy management staff and issued 250 energy auditor certificates. Developed and promulgated 02 standardized training materials on energy auditing and management; 03 training materials on advanced energy auditing in textile, beer and paper industries.

- Introduced and implemented the model of energy service companies (ESCO), and provided consulting service and financial support to EEC investment projects. So far 6 ESCOs have been established and registered.

2.3 Project group 3: Promoting efficient use of energy in buildings

The key activities of Project group 3 aim to:

i) Strengthen the implementation of energy efficiency building code in large-scale buildings.

ii) Promote the use of energy saving solutions, technologies, devices and materials; organize green and energy saving building competitions.

iii) Promote efficient and saving use of energy in public lighting

The activities under Project group 3, led by MOC, have led to the following achievements:

- Promulgated the National technical standard QVCN 09/2013/BXD on EE buildings. Reviewed, supplemented and amended regulations on public lighting to meet what is required by QCVN 07:2014/BXD.

- Set up and updated energy consumption database of key buildings and large-scale buildings, i.e. over 200 high-rises, commercial buildings and hotels nationwide.

- Piloted green building assessment criteria and green building certification of buildings which meet EE standards. Organized national EE building competitions annually, building energy saving solution design and application competitions.

- Piloted the development and upscaling of public lighting command and control centers using GSM/GPRS to improve Hanoi's public lighting EE.

- Surveyed the state of energy consumption across the provinces; provided support to pilot solar-powered public lighting in public spaces such as parks, squares, and streets; Developed EE and energy saving lighting models across cities and provinces nationwide.

2.4 Project group 4: Promoting energy saving in the transportation sector

The key activities of Project group 4 aim to:

- i) Promote energy saving in the planning and construction of transportation infrastructures.

- ii) Improve EE in the organization and exploitation of transportation systems.

- iii) Promote the use of new technologies and renewable energy in the transportation sector

The activities under Project group 4, led by MOT, have led to the following achievements:

- Surveyed, developed and deployed EE solutions applicable to passenger transportation buses in major cities; surveyed and developed codes, standards and fuel consumption quotas applicable to a number of means of road transportation.

- Developed an EE improvement handbook for planning and formulation of road transportation works, a fuel efficiency improvement handbook for marine propulsion system, a fuel improvement handbook for key enterprises in the road transportation sector; developed and promulgated energy labeling standards and procedures for under 7 seater vehicles.

- Optimized flight routes in the aviation sector to reduce the fuel consumption of certain flight routes.

- Designed and manufactured 12-15 seater mini-bus to be rolled out in certain cities and tourist areas; designed and manufactured test electric cars for use in airports.

- Piloted the use of biodiesel in certain types of locomotives; introduced natural gas-powered technologies in passenger car manufacturing and assembly, and proposed solutions rolled out in cities in order for EE improvement, environmental protection, and accessible transportation.

- Developed technical and management solutions to reduce fuel cost in maritime transportation and aviation; developed technical and management EEC solutions to port exploitation.

3. Evaluation of energy conservation results within the Program for the 2011-2015 period

The accumulated energy conservation rate in the 2011-2015 period was **5.96%**, equivalent to 11.880 TOE, according to the calculation done by the Institute of Energy.

Table 8. Energy conservation results for the 2011-2015 period¹²

Item	Unit	2010	2011	2012	2013	2014	2015	2011-2013	2011-2015
Assumed energy intensity	kgOE/10 ³ USD	428.8	428.8	428.8	428.8	428.8	428.8	428.8	428.8
Total GDP (2005 fixed price)	million USD	78,282	83,167	87,531	92,277	97,795	103,858		
Total assumed energy consumption	KTOE	33,570	35,662	37,533	39,568	41,934	44,534	112,764	199,233
Total actual energy consumption	KTOE	33,570	34,502	35,216	36,987	39,169	41,480	106,705	187,353
Energy conserved	KTOE	-	1,160	2,317	2,582	2,766	3,055	6,059	11,880
Conservation rate (%)		0.0%	3.3%	6.2%	6.5%	6.6%	6.9%	5.37%	5.96%

¹² *The 2011-2015 National Target Program review report, the Institute of Energy*

4. Existing problems

Compared to the identified energy consumption potential, despite having the set goals met, the Program encountered a number of challenges during implementation, which reduced its sustainability, as follows:

- The Law on EEC was not strictly enforced. Many organizations and enterprises did not fulfill all of what is stated in the promulgated Law, Decree and guiding documents, e.g. development of establishment-based energy management model, formulation of annual and five year energy consumption plan, energy statistics, periodic reporting to local authorities, procurement of high efficiency devices using their budget, sanctions imposed on violators, etc.

- Local management of energy consuming establishments remained limited. There was a lack of coordination among state management authorities at local level (DOIT, DOC and DOT), leading to certain struggles in inspection and examination of establishments which had not observed the Law.

- The implementation of energy labeling roadmap encountered certain difficulties in terms of testing infrastructures, inadequate and inconsistent standards, shortage of EE testing devices, weak human and financial resources. As of the end of June 2015, only 05 local laboratories and 02 laboratories overseas had been appointed to conduct EE testing, meeting the need for testing only 10 products as per Decision 51. Preparation and investment in testing equipment and devices are being made for the testing of other products such as television receivers, electric motors, washing machines, office equipment and devices, etc.

- The community and enterprises have limited awareness and readiness to access information on energy conservation technologies and solutions. Many government agencies and units were not really proactive and active in implementing their assigned contents and tasks in the Program; EE technical experts, especially in civil construction and transportation sectors and at local level fell short in number and weak in capacity.

- Annual funding allocated from the State budget to the Program often came late, affecting the implementation progress of Program tasks. Moreover, the annual amount of funding remained small, e.g. VND70 billion in 2011, VND82.5 billion in 2012 (VND55 billion from the State budget and VND27.5 billion funded by the Government of Denmark), VND96.1 billion in 2013, VND58.7 billion in

2014, and VND42 billion in 2015. The total accumulated funding the Program had received as of the end of 2015 was VND349 billion (not inclusive of the funding from local budget and enterprises), while the Program covered a wide variety of beneficiaries from central to local level.

- The outcome of EEC activities in civil construction and transportation sectors was below their potential. Owners of buildings and transportation facilities had limited awareness of EEC. There lacked a focus in the implementation of solutions, and specific results achieved in the assigned areas were not yet quantified.

- Enterprises were short of funding or unable to access preferential loans applicable to energy conservation projects. Due to financial difficulties, many enterprises, especially in the steel, cement, chemicals... industries, had not had a plan to implement energy conservation projects, despite having the largest energy saving potential.

- There were many limitations in the mechanism of support provided to enterprises to invest in the replacement of outdated technological lines with high efficiency, energy saving ones. So far, the Program has funded enterprises with 30% of the total investment capital in technological lines and high-efficiency devices, and funding per enterprise does not exceed VND5 billion. Such incentive no longer attracts large enterprises to invest in transforming their technological line, because the amount of funding is far smaller than the total investment capital that they have to make.

- The energy service market has not been formed yet to promote investment in energy conservation solutions. There is a small number of energy conservation service providers and ESCOs (so far only 6 ESCOs established) with limited technical, technological and financial capacity. The existing legal framework is inadequate to execute EE contracts between ESCO and enterprises.

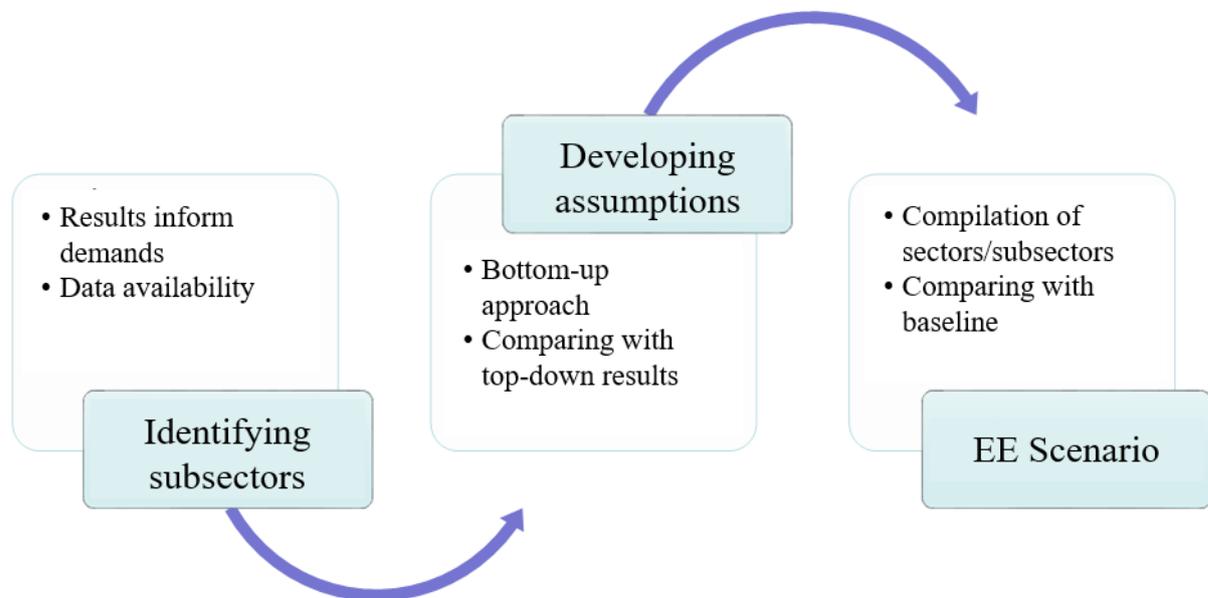
- Vietnam's energy price, especially electricity price, was lower than that of other countries, influencing the adoption of energy conservation solutions among the people and enterprises.

Annex 2. Methodology of assessing energy conservation potential

An EE scenario was developed, calculating the amount of energy conserved per type of fuel and subsector against the baseline scenario (also known as BAU) and estimating added costs against BAU.

Future energy consumption was forecasted using Simple_E regression model, which is a top-down approach. However, it was required to adopt a bottom-up approach to develop a complete EE scenario per type of fuel and subsector. The level of detail provided by the bottom-up approach depended on data availability and ability to develop calculation assumptions. The figure below describes the approach which the Institute of Energy adopted to develop the EE scenario.

Figure 10. Approach to EE scenario development



In the EE scenario, each sector/subsector or type of fuel was taken into account separately.

Figure 11. Non-industrial subsectors

Agriculture	Service	Transportation	Domestic use
<ul style="list-style-type: none"> • Fishing • Irrigation and drainage, and other agricultural uses 	<ul style="list-style-type: none"> • Lighting • Air conditioning • Water heating • Other devices 	<ul style="list-style-type: none"> • Road • Railway • Maritime and waterway • Aviation 	<ul style="list-style-type: none"> • Lighting • Cooking • Water heating • Others

Figure 12. Industrial subsectors

1	Mining and exploitation
2	Food processing and tobacco
2.1	Beverages
2.2	Food processing (dried) and tobacco
3	Textile & Garment and Leather & Footwear
3.1	Textile
3.2	Garment, Leather & Footwear
4	Timber and timber products
5	Paper and pulp
5.1	Pulp
5.2	Finished paper manufacturing
5.3	Printing
6	Chemicals and chemical products
6.1	Nitrogenous fertilizer
6.2	Other chemicals
7	Rubber and plastic products
7.1	Rubber
7.2	Plastics
8	Non-metallic mineral products
8.1	Cement
8.2	Other non-metallic minerals
9	Steel
10	Generation and distribution of electricity, gas, heated water, steam, and air conditioning
11	Construction
12	Other subsectors

Annex 3. Analysis of energy conservation solutions

1. Domestic use

The demand for electricity in domestic use has increased because of improved standard of living and growing population. The past few years have also witnessed the increasing use of electricity partly due to the shift away from other sources of energy such as coal, oil or biomass, mainly in heating and cooking. To save electricity, an instantly recognized solution is the replacement of low-efficiency devices with high-efficiency ones.

Electricity also competes with solar energy in meeting the need for heated water. However, the number of solar powered water heating tank will soon reach a saturation point since it is restricted by installation space (e.g. there is a large number of households living in one high residential building, but a fairly small number of solar-powered tanks may be installed at maximum) and by regional climatic conditions. Nevertheless, installation of solar-powered tanks is a highly effective solution to reducing electricity consumption. According to a recent survey conducted by the Institute of Energy, a four-member family consumes approximately 1.8-2.5kWh/day on average for water heating, which accounts for around 16-21% daily electricity consumption.

Therefore, two basic solutions to reduce domestic electricity consumption are identified as follows:

- Replacing electricity (or gas) powered water heating with solar powered water heating tanks;

- Promoting the replacement of low-efficiency devices with high-efficiency ones. In addition, it is important to gradually raise the Minimum energy performance standard (MEPS) based on a roadmap in order to drive technological advancement research and development activities. It means that allegedly high-efficiency devices today may fail to enter the market tomorrow.

There is also a tendency of replacing biomass with other sources of fuel in cooking and heating with biomass losing its popularity. However, within the context of domestic animal husbandry, biogas is an effective practice of capitalizing on existing inputs, requires little investment or brings about immediate reduction in the amount of CO₂ released into the environment.

2. Building use

Similarly to domestic use, there is a significant increase in the demand for electricity and gas in buildings, and electricity takes a dominant share in the energy consumption structure. Therefore, an immediate solution is to promote the use of high-efficiency devices. The design and materials of walls and ceiling also influence electricity consumption, mainly in ventilation and lighting. Therefore, two basic solutions to reduce building electricity consumption are identified as follows:

- Promoting the replacement of low-efficiency devices with high-efficiency ones;
- Applying new construction design standards (e.g. QCVN 09:2013/BXD on energy efficiency building) with an aim to conserve the energy of buildings right from when they have not gone into operation.

3. Agriculture

Agricultural production in Vietnam consumes relatively little energy. In fact, not many significant EEC activities are recorded in the agricultural sector.

Nevertheless, MARD promulgated Circular 19/2013/TT-BNNPTNT dated March 15, 2013 guiding the implementation of EEC measures in agricultural production. The Circular mentions a number of EEC measures in the agricultural sector, e.g. cultivation, plant protection, animal husbandry, vet medicine, irrigation and drainage, aquaculture, forestry, salt making, and fishing. Among all of the measures stated by the Circular, this Report only identified two following ones which mainly focus on two agricultural areas with the largest energy consumption and are possible to develop calculation assumptions:

- Fishing: using high-efficiency lighting and solar batteries to reducing the amount of electricity generated (from diesel oil) on seafaring vessels.
- Irrigation and drainage: using high-efficiency pumps to reduce electricity consumption.

4. Transportation

Energy consumption structure is complex in the transportation sector due to its various types of transportation and stakeholders involves. Based on the purpose of transportation, there are two categories: passenger transportation and

freight transportation. Based on the type of transportation, there are five categories: road transportation, railway, inland waterway, maritime transportation and aviation.

Even road transportation itself involves various means of transport. However, there are two types of means of transportation involved in road transportation: personal vehicles and public vehicles.

For each aforementioned type/means of transportation, it is possible to develop different solutions to reducing fuel consumption. MOT also promulgated Circular 64/2011/TT-BGTVT dated December 26, 2011 providing EEC measures in the transportation sector.

Recent studies conducted by World Bank (EFFECT), ADB (technical support) and the UK Energy Agency (Vietnam Calculator2050) have identified certain integrated solutions applicable to Vietnam, including

- Promoting the use of biofuels (e.g. E5 petrol);
- Promoting the use of high-efficiency vehicles or clean fuel powered vehicles (e.g. hybrid cars);
- Promoting the use of public transportation (e.g. buses and metro) and reducing the circulation of personal vehicles;
- Shifting from road to railway and waterway in freight transportation.

5. Industrial production

Industry is currently the economic sector with the highest level of energy consumption. This will continue to be the case in the next several years, as Vietnam is still in the process of Industrialization. It can be said that the increase in energy consumption in industrial production over the past years was a concern of Vietnamese policymakers. Therefore, there have been numerous programs and projects concerning industrial energy efficiency implemented over a long period of time, with strong support from several international organizations.

In almost every industry sub-sector, it is possible to determine dozens of solutions to improve efficiency and operation. This is because the results of the aforementioned projects in energy efficiency are highly shareable. It is quite easy for the mass public to learn from success stories. In addition, the Ministry of

Industry and Trade has issued guiding circulars and provided energy conservation solutions applicable in industrial production in general and some specific sub-sectors in particular, such as:

- Circular 02/2014/TT-BCT dated January 16th 2014 on solutions for economical and efficient use of energy in industries;
- Circular 19/2016/TT-BCT dated September 14th 2016 regulating the energy consumption norms in the beer and beverage production industry;
- Circular 38/2016/TT-BCT dated December 28th 2016 regulating the quota on energy consumption of the plastic industry.

Based on typical success stories in Vietnam and in comparison with other countries, Vietnam industries can be said to have a “wealth” of solutions. However, many other challenges still remain.

As mentioned above, there are many solutions for energy conservation applicable to each industry sub-sector. If the solutions for all industries are to be listed, the number can reach the hundreds. However, they can be classified into six solution groups as follows:

- Promoting the development of energy management systems (for example the ISO 50001 certificate system). This solution group is mainly directed at the upper levels of the business, at investment decision makers. In addition, a management system will directly affect the operation of equipment and improve the ability to monitor as well as seek opportunities to improve the internal efficiency of the enterprise;
- Optimizing auxiliary systems (such as air compressor system, steam or chiller system): this solution group is aimed at conventional auxiliary systems with great potential. A recent survey of a research group of the Institute of Energy evaluating some audit reports shows that the number of solutions under this solution group usually accounts for nearly half of the solutions proposed to enterprises;
- Increasing engine efficiency (for example switching to more efficient engines/pumps or installing additional frequency converters): this is one of the common solutions, often proposed in audit reports;

- Utilizing waste heat: in cement production, waste heat can be utilized for electricity production, but the costs are relatively high. In some other low-cost applications, the waste heat retrieved can be used to provide more heat for other processes, such as fuel drying;

- Substituting fuels: mainly in steam systems, for example using cashew nut husk instead of coal, CNG instead of DO, or coal gasification instead of DO (this application, in particular, can help to decrease operation costs of the business, but it leaves more negative impacts on the environment);

- Replacing technologies (new technologies to replace old technologies, for example, cement shaft kilns are replaced by rotary kilns, traditional brick kilns are replaced by vertical shaft brick kilns, etc.). In some sense, “demolition to make way for new construction” is not entirely a solution for energy efficiency improvement. However, choosing new technologies certainly leads to higher competitiveness for products, through the reduction of fuel costs and fulfillment of increasingly strict environmental requirements.

Appendix 4. Targets on energy efficiency and conservation for some industries.

- Cement production: Reduce the average energy consumption to produce 1 tonne of cement from 87 kgOE in 2015 to 81 kgOE;

- Textile: Reduce the average energy consumption to produce 1 tonne of fiber from 773 kgOE in 2015 to 734 kgOE;

- Electric power industry: Reduce power loss across the entire power network to 6.0%;

- Chemical industry: the chemical sector sets the target of reducing the level of energy consumption by a minimum of 10%;

- Plastic industry: By 2025, reduce the average energy consumption to produce one unit (kg) of product as follows:

- + Household plastic/Engineering plastic: reduce the energy consumption level from 1.27 kWh in 2020 to 1.00 kWh;

- + Plastic as construction materials: reduce the energy consumption level from 0.46 kWh in 2020 to 0.35 kWh;

- + Packaging plastic: reduce the energy consumption level from 0.79 kWh in 2020 to 0.62;

- + Packaging plastic (bags, bottles): reduce the energy consumption level from 0.7-1.96 kWh in 2020 to 0.55-1.45 kWh.

- The beer and beverage production industry: By 2025, reduce the average energy consumption level (MJ/hl) to produce one unit of product as follows:

- + Beer production: reduce the energy consumption level from 140 MJ in 2020 to 129 MJ (for production scale of over 100 million liters); from 215 MJ in 2020 to 196 MJ (for production scale of 20 to 100 million liters); from 306 MJ in 2020 to 286 MJ (for production scale of less than 20 million liters);

- + Beverage production: reduce the energy consumption level from 55 MJ in 2020 to 52MJ (for carbonated beverages); from 111 MJ in 2020 to 107 MJ (for non-carbonated beverages).

- Paper industry: reduce the energy consumption level to produce one unit tonne of product until the end of the Program as follows:

+ Packaging paper: reduce the energy consumption level for one unit (tonne) of product: from 7,809 MJ/T in 2020 to 6,713 MJ/T (for production capacity of over 50,000 tonnes/year); from 7,872 MJ/T in 2020 to 6,744 MJ/T (for production capacity of 10,000 – 50,000 tonnes/year); from 6,728 MJ/T in 2020 to 5,484 MJ/T in 2025 (for production capacity of less than 10,000 tonnes/year).

+ Tissue paper: reduce the energy consumption level on one unit (tonne) of product: from 16,503 MJ in 2020 to 14,572 MJ (for production capacity of 10,000 to 50,000 tonnes/year); from 14,914 MJ in 2020 to 13,169 MJ in 2025 (for production capacity of less than 10,000 tonnes/year).

+ Printing paper, writing paper and photocopying paper: reduce the energy consumption level on one unit (tonne) of product: from 15,138 MJ in 2020 to 13,639 MJ (for production capacity of over 50,000 tonnes/year); from 10,459 MJ in 2020 to 9,455 MJ (for production line using pulp as raw material with production capacity of 10,000 to 50,000 tonnes/year, excluding systems for recycled paper treatment).

- Steel industry: reduce the average energy consumption level to produce a tonne of product in production processes until the end of the Programme as follows:

+ Sintering of iron ore: reduce the energy consumption level on one unit (tonne) of product from 2,530 MJ in 2020 to 1,960 MJ;

+ Cast iron production by blast-furnace: reduce the energy consumption level on one unit (tonne) of product from 14,000 MJ in 2020 to 12,400 MJ;

+ Steel ingot production by basic oxygen furnace (oxygen converter): reduce the energy consumption level on one unit (tonne) of product from 150 MJ in 2020 to 100 MJ;

+ Steel ingot production by electric arc furnace: reduce the energy consumption level on one unit (tonne) of product from 2,600 MJ in 2020 to 2,500;

+ Steel ingot production by induction furnace: reduce energy consumption on one unit (tonne) of product from 2,600 MJ in 2020 to 2,500 MJ;

+ Long hot-rolled steel: reduce the energy consumption level on one unit (tonne) of product from 1,650 MJ in 2020 to 1,600 MJ;

+ Cold-rolled steel sheet: reduce the energy consumption level on one unit (tonne) of product from 1,600 MJ in 2020 to 1,500 MJ;

Appendix 5. List of duties performed in the Programme

No.	Duty	Objective	Content	Expected outcome	Implementation period	Estimated funding (State budget)/VND	Agency in charge/coordinating agency for implementation
I	Group of duties on Reviewing, developing and completing the mechanisms, policies on energy efficiency and conservation						
1	Review, consider to amend, supplement, develop, and submit to competent authorities to issue, or issue according to the respective competence the mechanisms and policies on energy efficiency and conservation	Issue legal documents under the Law on the economical and efficient use of energy	- Review and amend the Energy efficiency and conservation law and by-law documents to align with other legal documents recently promulgated; consider to add more responsibilities between central and local agencies, thereby highlighting the roles and responsibilities of the People’s Committee at the provincial/municipal level on energy	Legal documents under the Energy Efficiency and Conservation Law	2019 - 2025	According to estimates	Ministry of Industry and Trade and relevant ministries/agencies

		<p>efficiency and conservation in the area under their state management; consider to develop regulations to manage energy use in industrial parks and clusters.</p> <p>- Consider and formulate regulations on certificates of energy efficiency and conservation for energy-using establishments, including evaluation criteria; organize the evaluation, monitoring, inspection, issuance of certificates and the implementation process of issuing certificates.</p>				
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			<ul style="list-style-type: none">- Consider and formulate regulations on guiding the pricing methods of conserved energy, add relevant costs to the implementation of energy efficiency, conservation, and safety.- Consider, formulate, and issue regulations on the implementation of inspection and monitoring of law compliance regarding energy efficiency and conservation for individuals and organizations using and consuming energy.- Consider, formulate, and issue regulations on				
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			the development of the energy conservation services market and energy services companies (ESCO).				
2	Review, revise, supplement the standards, technical regulations, technical norms in energy efficiency and conservation	Issue/replace/supplement documents prescribing the standards, technical regulations, technical norms in energy efficiency and conservation	<ul style="list-style-type: none"> - Consider, formulate, and promulgate technical regulations regarding energy consuming materials, equipment, production line, transport vehicles, telecommunication, and fishing, to meet the requirements of energy efficiency and conservation. - Amend and supplement the design standards of 	Documents prescribing the standards, technical regulations, technical norms in energy efficiency and conservation	2020 - 2030	According to estimates	Ministry of Industry and Trade and relevant ministries/agencies

		<p>industrial, civil works, buildings, industrial parks, industrial clusters, urban areas, roads of all kinds, to meet the requirements of energy efficiency and conservation.</p> <p>- Review, revise technical regulations on the quality of energy sources (coal, oil, gas etc.) to meet the requirements of management and match socio-economic conditions, guide the management and control risks regarding the quality of energy sources in accordance with the</p>				
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			<p>conditions on energy efficiency and conservation.</p> <ul style="list-style-type: none">- Assess capacity, recognize and publicize energy audit organizations meeting the standards as prescribed by law.- Consider, formulate, and issue the energy consumption norms for each sector/sub-sector in industry, agriculture, transport, construction, and services, to meet requirements of management and match socio-economic conditions.				
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II	Group of duties on Investment in production, improvement and shift of the vehicle market, import of equipment, machinery, production line, transport vehicles, telecommunications, irrigation, and fishing to meet the conditions of energy efficiency and conservation:						
I.1	Invest and improve technological processes, transition to and use energy economically and efficiently, in an environment-friendly manner to cope with climate change.	Replace equipment, machinery, vehicles, production line with low energy consumption efficiency with respective products with low energy consumption/high energy efficiency	<ul style="list-style-type: none"> - Research and apply new technologies to produce and manufacture machinery, equipment, production line, means of transport, telecommunications, irrigation, and fishing with high energy consumption efficiency. - Install/replace energy saving equipment for public works; building, industrial parks, industrial clusters; urban lighting systems, roads; improve and/or replace components, machinery etc. with high energy consumption. 	Technological products, equipment, vehicles with certified high energy efficiency.	2020 - 2030	According to estimates	State management agencies at all levels, manufacturing enterprises, organizations and individuals

			<ul style="list-style-type: none"> - Produce and install equipment and technologies to count and measure the level of energy conservation and implement other support activities to manage risks, energy loss, and handle incidents. 				
1.2	Market shift of products, technologies, equipment with high energy efficiency and energy conservation services	<ul style="list-style-type: none"> - Form a market to shift to vehicles and equipment with high energy consumption efficiency for household, industrial, and commercial products 	<ul style="list-style-type: none"> - Conduct review, increase the minimum energy efficiency level for products already having energy labels; - Encourage and promote the change in consumer behavior, product usage methods, energy saving equipment and clean, 	Market of equipment, vehicles with high energy efficiency.	2019 - 2030	According to estimates	State management agencies at all levels, manufacturing enterprises, organizations and individuals

			environment-friendly technologies in all areas from industry, construction, transport, services, commerce and people's daily lives.				
1.3	Energy labelling and application of the minimum energy efficiency level	Equipment and vehicles to be put into use and circulation are assessed in terms of energy efficiency	<ul style="list-style-type: none"> - Conduct energy labelling for certain products by the method of voluntary certification for energy-labelled products with the highest efficiency on the market. - Consider the addition of information on the costs of energy usage to the energy label (listing the cost of usage, life cycle 	Equipment, machinery, vehicles getting energy labelling when being put into usage or circulation.	2019 - 2030	According to estimates	State management agencies at all levels, manufacturing enterprises, organizations and individuals

			<p>on the energy label or bar code etc.).</p> <ul style="list-style-type: none"> - Provide technical support to manufacturers, businesses, or importers and distributors of equipment and vehicles with a high energy consumption level. 				
III	Group of duties on the Application of information technology in energy efficiency, conservation, and safety						
I.1	Develop specialized software to manage and update data on energy efficiency, conservation, and safety to align with energy users, and energy management	Manage and operate national data on energy efficiency and conservation	<ul style="list-style-type: none"> - Develop and provide instructions on the usage of management software, update the data on energy efficiency, conservation, and safety. - Train human resources on software usage. 	Specialized software to manage and update national data on energy efficiency and conservation to align with energy users, and energy management agencies from the central to local levels	2019 - 2020	According to estimates	Ministry of Industry and Trade, relevant ministries and agencies

	agencies from the central to local levels						
I.2	Apply smart, integrated technologies and devices in the management and operation of energy consuming systems	Replace or install smart, integrated technologies and devices in the management and operation of energy-consuming systems, devices, and vehicles	<ul style="list-style-type: none"> - Consider to select and propose smart and integrated devices for the operation and management of energy consumption at factories, buildings, and industrial parks etc. - Install and operate integrated and smart technologies/devices at factories, manufacturing plants, or vehicles with high levels of energy consumption; - Provide training and additional training for human resources in the 	Some exemplary models in applying smart, integrated technologies in the operation and management of energy usage.	2020 - 2030	According to estimates	State management agencies at all levels, manufacturing enterprises, organizations and individuals

			usage, operation, and maintenance of smart, integrated, and technological devices.				
I.3	Establish a system of database and information to monitor, supervise, and evaluate energy efficiency, conservation, and safety, as well as energy labelling facilities; establish mechanisms for the coordination and sharing of information between the database on energy efficiency,	Develop a national database on energy efficiency and conservation	<ul style="list-style-type: none"> - Develop a national network on the collection of data on energy efficiency and conservation; - Develop a national information center on the usage, analysis, storage and research, and sharing of information on energy efficiency and conservation; - Train and develop human resources in the development of the national information 	National Information Center for Energy Efficiency and Conservation.	2019 - 2025	According to estimates	Ministry of Industry and Trade/ministries, local agencies, enterprises, organizations, individuals

	conservation, and safety with other databases.		network on energy efficiency and conservation				
IV	Group of duties on Capacity building in energy efficiency and conservation						
V.1	Capacity of staff directly managing energy efficiency and conservation from the local to central levels	Develop human resources in state management agencies at all levels as well as in enterprises for the implementation of energy efficiency and conservation	- Train and enhance the capacity for officials directly in charge of managing energy efficiency and conservation from the central to local levels and at the enterprises in the management and implementation of energy conservation, control of energy efficiency, and implementation of service agreements to	The human resources of all state management agencies on energy at all levels, providers of energy services, centers on energy conservation are enhanced in the knowledge and skills regarding energy efficiency and conservation.	2019 -2030	According to estimates	Relevant ministries/agencies

			<p>provide techniques in energy efficiency and conservation;</p> <ul style="list-style-type: none">- Compile training materials, build capacity in energy efficiency and conservation (textbooks, teaching materials, handbook on the establishment and implementation of energy efficiency and conservation, handbook on the monitoring and assessment of energy conservation etc.).- Review and supplement relevant content on energy efficiency and conservation to the training curriculum of				
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			<p>the program in energy studies at universities and colleges.</p> <p>- Develop the linkages and networks of energy conservation nationwide (local Department of Industry and Trade, industry associations, centers or businesses providing energy services, and relevant organizations/individuals etc.)</p>				
V.2	Build capacity and raise awareness for enterprises on energy efficiency and conservation	Most businesses/manufacturing plants, including 100% of key facilities in energy consumption understand and fully exercise their responsibility in energy efficiency and conservation.	- Develop plans for training and additional training to enhance the capacity of officials and staff in each unit on	Raise the awareness of workers on energy efficiency and conservation in the operation of energy consuming equipment/machinery or vehicles.	2019 - 2030	According to estimates	Ministries/agencies, and localities

			<p>energy efficiency and conservation.</p> <ul style="list-style-type: none"> - Organize seminars and conferences to guide, discuss, and share the experience in implementing measures for energy conservation and safety. - Cooperate (bilateral, trilateral etc.) to share the experience in establishing and implementing measure of energy efficiency and conservation among agencies/organizations 				
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V	Group of duties on the Inspection, monitoring, and assessment of implementation results in energy efficiency and conservation
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7.1	Research and develop a set of indicators for the inspection, monitoring and assessment of risk control in energy usage for each type of energy consumption to ensure energy efficiency and conservation	Develop a set of indicators for risk control in energy usage for some common energy consumption types.	<ul style="list-style-type: none"> - Research, survey and classify, evaluate the characteristics of energy consumption types; - Develop a set of indicators to assess energy usage risks for some energy consumption types; - Apply the set of indicators for the assessment of energy consumption risks to state management activities in energy and energy usage. 	Set of indicators for risk control in energy usage	2019 - 2020	According to estimates	Ministry of Industry and Trade, ministries, agencies, localities
VI	Group of duties on the Communication for raising awareness of the community						
7.1	Communication for raising awareness of	Ensure most organizations and individuals have the	-Formulate communication plans on	Awareness on the responsibility of people and	2019 - 2030	According to estimates	Ministry of Industry and Trade, ministries, agencies, People's

<p>the community on energy efficiency and conservation</p>	<p>awareness and practice of energy efficiency and conservation, helping to create a lifestyle on energy conservation.</p>	<p>energy efficiency and conservation; implement the plans through different forms in order to raise the awareness and responsibility of the community in energy efficiency and conservation.</p> <ul style="list-style-type: none"> - Formulate and support the implementation of the distribution system for green, energy saving, and environmental friendly products. -Develop communication programs on energy saving products, including: education programs, information 	<p>organizations in energy conservation</p>			<p>Committee at a levels</p>
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			sessions for businesses and communities, organize periodical awards, fairs, and exhibitions to promote the market for energy saving products and technologies.				
II	Scientific research, technological development, international cooperation regarding energy efficiency and conservation						
II.1	Develop and implement technological and scientific missions for the research, application, development, and replication of technological	Formulate scientific and technological achievements of Vietnam in the field of energy efficiency and conservation	<ul style="list-style-type: none"> - Develop directions to prioritize scientific and technological missions in the field of energy efficiency and conservation; - Call for and urge the implementation and management of prioritized scientific and technological missions in 	Technological and scientific products applied, implemented and protected in intellectual property in the field of energy efficiency and conservation.	2019 - 2030	According to estimates	Ministry of Industry and Trade, relevant ministries, agencies, People's Committee of all levels, suitable organizations and individuals

	and scientific achievements in energy efficiency and conservation		<p>the field of energy efficiency and conservation;</p> <ul style="list-style-type: none"> - Apply and develop the market for technological and scientific advances in the field of energy efficiency and conservation; - Support the registration for protection and enforce the protection of intellectual property for technological and scientific products in the field of energy efficiency and conservation. 				
VII.2	Develop a list and implement international	Systematize international funding sources with a long-term direction in the	- Review and develop a list to call for	List of international projects being supported or calling	2019 - 2030	According to estimates	

<p>support projects for Vietnam in the field of energy efficiency and conservation</p>	<p>national target on energy efficiency and conservation</p>	<p>international funding for energy efficiency and conservation projects;</p> <ul style="list-style-type: none"> - Implement in an effective and systematic manner, to ensure the close adherence of the national target on energy efficiency and conservation for current and upcoming internationally funded projects; - Formulate mechanisms and policies in order to call for and leverage international resources invested in energy efficiency and conservation projects 	<p>for support in the field of energy efficiency and conservation</p>			
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III	Establishment of the Promotion Fund for Energy Efficiency and Conservation						
III.1	Establish the Promotion Fund for Energy Efficiency and Conservation	Develop new financial institutions for the mobilization of all resources to realize the national target program on energy efficiency and conservation	<ul style="list-style-type: none"> - Consider the development and propose the establishment of the Promotion Fund for Energy Efficiency and Conservation of Vietnam; - Develop the operating mechanisms and call for contribution of resources for the Fund; - Develop the mechanisms on utilizing the Fund's resources for activities in energy 	The Fund will promote energy efficiency and conservation in Vietnam, ensuring the supply of resources for 80% of the financial demand for energy efficiency and conservation.	2019 - 2030	According to estimates	Ministry of Industry and Trade, relevant industries and agencies

			efficiency and conservation in Vietnam				
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