

Sustainable consumption and removal of incandescent lamps through lighting market transformation in Vietnam

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Abstract

Climate change is becoming an urgent issue all over the world and Vietnam is also facing the same tendency and substantially impacted. However, Vietnam is positively taking actions such as energy savings and environmental protection against climate change including implementation of project of removal of incandescent lights through transformation of lighting market in Vietnam.

In order to investigate lights using behavior within Vietnam's customers, multiple methods to reach different respondents types: *direct interview* 7 relevant State administration agencies, *direct interview* 6 companies/ enterprises specialized in manufacturing and doing business in lights in Vietnam, *direct observation and interview* 52 distributors (wholesale and retail), *survey (used questionnaire)* 586 households and 58 organizations and enterprises as customers.

The research result shows that percentage of incandescent lights used in Vietnam is only 9.6% and trends to reduce because there are many more common substitute products.

However, there are still many consumers who like incandescent lights more since they (1) are cheaper; (2) radiate heat for warming; (3) are suitable to different electrical conditions and qualities; (4) customers do not see advantage of energy saving lights.

Keywords: sustainable consumption, energy saving lights, transformation of lighting market, Vietnam.

1. Introduction

The Vietnamese National Assembly promulgated the Law on Economical and Efficient

Use of Energy for the first time, effective since January 01, 2011. This Law includes 12 Chapters, 48 Articles, regulating economical and efficient use of energy; policies and measures to promote economical and efficient use of energy; rights, obligations and responsibilities of organizations, households and individuals in economical and efficient use of energy.

State policy on economical and efficient use of energy is defined in Article 5 of this Law, including:

a) Applying the measures of economical and efficient use of energy for socio-economic development is one of top priorities.

b) Supporting finance, energy price and other necessary preferential policies to promote economical and efficient use of energy.

c) Increasing investment, applying diverse forms of mobilizing resources to promote scientific research, advanced technology development and application for economical and efficient use of energy; developing renewable energy consistent with the potentialities and conditions of Vietnam, contributing to energy security, environmental protection.

d) Encouraging the use of devices, equipment saving energy; implementing roadmap of energy label application; removing devices, equipment with obsolete technology, low energy efficiency step by step.

e) Encouraging the development of consulting services; investing reasonably in propaganda, education, supporting organizations, households and for economical and efficient use of energy.

One of the effective method to encourage energy saving use should be based on the very popular using – lights using among population, to promote the saving energy behavior,

With about 450 million units in use and about 250 million units lights annual substitutes, Vietnam is a substantial market for manufacturers and very large electricity consumer market for lighting. Therefore, policy makers and producers need to aware detailed on demand and behavior of customers in using lights. Those information will be bases for them to remove incandescent lights through lighting market transformation to energy saving lights with higher quality to meet market demand toward sustainable consumption of energy.

This paper presents the results from a research on Vietnam's consumers in using lights, to draw out a comprehensive picture of/actual state of using indoor illuminators in households, agencies and organizations in Vietnam.

2. Aims

To search for information on the demand and the tendency for home light bulb consumption: reasons for utilizing various bulb types and barriers for the transfer to energy saving lamps.

And, to make suggestions for lighting manufacturers on how to access the market by knowing the tendency of the transformation of the lighting market to energy saving lamps in Vietnam.

Then, to make suggestions for policy makers on more efficient market adjustments by encouraging the manufacturing and consumption of energy saving lamps.

3. Theory, concept of the research and related findings

3.1. Overview of sustainable consumption

Initially, sustainable development - a concept that has been adopted and popularized by the Earth Summit in Rio in 1992, requires equal emphasis on the advancement of society, economy and environment. As predicted, in 2050 the world's population could nearly double – to about 10 billion - and consumption per person doubled. There is a growing consensus in science that the earth is simply not enough land, water, plants and minerals to support that many people consume that

much. Chemical industry, along with other industries, government and non-government organizations (NGOs) are just starting to translate the concept of long-term sustainable development in the strategy and the right tools in the present. One of the highlights for this process is the President's Council on Sustainable Development, which includes representatives from the U.S. government, industries, and other organizations.

The concept of sustainable consumption was built on sustainable development perspective that was mentioned 1987 in the Brundtland Report (also known as General statements of our future) at Commission of Environment and Development World. The report noted that "Sustainable development is development that meets all the needs of the present without adversely affecting the ability to meet the needs of future generations". Accordingly, at the Conference on Environment and Development of the United Nations held in Rio de Janeiro in 1992, "Production and Sustainable consumption" (SCP) is considered as an important direction to connect development issues and the environmental issues. This conference showed the biggest causes of global environmental degradation that is caused by the unsustainable production and consumption. The Oslo Roundtable on Sustainable Consumption in 1994 was further discussed this issue, analyzing the role of stakeholders and come up with a concept for SCP.

Ten years after the Rio conference, World leaders signed the Implementation Plan at the Johannesburg World Summit on Sustainable Development. Chapter 3 of the Plan talks about "Changing methods of unsustainable production and consumption", and affirmed that fundamental changes in the way of production and consumption is a key factor to achieve sustainable development across the globe. All countries should promote production and sustainable consumption. The consumption of products and services is to meet the consumers' needs but still ensure improving life quality, both natural resources and minimize the amount of natural resources and hazardous materials, as well as reducing emissions and pollution throughout the product lifecycle and does not affect the needs of future generations.

3.1.1. Definition

The fundamental philosophy of sustainable consumption is to satisfy all the needs of the consumer society without losing the ability

to meet the consumption needs of future generations. The definition was proposed at the 1994 Oslo Symposium on Sustainable Consumption as “the use of services and related products to meet basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials as well as waste emissions and pollutants in the life cycle of the service or product. So it cannot adversely affect the demand of the generation future” (Norwegian Ministry of the Environment, 1994).

3.1.2. Key characteristics of sustainable consumption

Sustainable consumption does not mean consume less in quantity, but that is consumption in way efficient way, and using less resources, promoting energy efficiency, promote sustainable infrastructure, and enable that everyone can have access to the green services and a quality life (United Nation, 1987). Promoting the sustainable production and consumption is to help achieve sustainable development plans in general, reducing the cost of economy, environment and society in the future, enhancing economic competitiveness and poverty reduction.

Sustainable consumption has a relationship with sustainable production, always associated with the other goals of sustainable development such as poverty reduction, economic growth, education, and environmental protection. They all aim to improve the quality of life (United Nation, 2011). Therefore, the goal of sustainable consumption is to not less consumption, but to seek for a way to meet the needs of the present and future more intelligently.

Sustainable consumption required the cooperation of many subjects, including business, consumers, policy makers, researchers, scientists, distributors, the media, and the development bodies, and others. So, there is a need of a systematic approach and the cooperation of the entire production chain, from manufacturers to final consumers.

One of the main objectives of the SCP is integral economic growth and environmental degradation by increasing the efficiency of energy use in the production process, distribution and usage in order to keep power energy, materials and decrease of pollution in the production and

consumption process along with the ability of ecosystems renewable (United Nation, 2002).

SCP can contribute to the process of poverty removal and the millennium goals of the United Nations. For developing countries, SCP is creating opportunities such as opening new markets, sustainable jobs and ecological sustainability (such as organic food market, trade fair, sustainable real estate market, sustainable transportation and sustainable tourism, renewable energy) as well as methods of efficient natural resource management. It is also an opportunity to jump to the efficient technology of resource use, environmentally friendly and pure competition.

Household consumption contributed less than a quarter of global consumption over the world. This means that government consumption and state policy is significantly important (United Nation, 2002).

The equal treatment to low-income consumers is also important. 1998 Human Development Report proposed general principles to ensure a basic level of consumption for all while reducing the consequences of excessive consumption. While many governments have acted to limit the excessive consumption at national level, there are few initiatives impetus to redistribute consumer issues.

3.2. Introduction on lighting market transformation in Vietnam

Climate change is becoming an urgent issue all over the world and has substantial impact on socio-economic development in many countries in the world. To minimize emission of carbon dioxide, prevent temperature increase of the Earth, energy saving and effective use including conversion of incandescent lights are solutions. Being one of countries suffered seriously from climate change, Vietnam has been positively taking actions of energy saving and environmental protection in order to respond to climate change (Phuong Thanh, 2008).

The project of “Removal of incandescent lights through lighting market transformation in Vietnam” orients to reduce emission of greenhouse gases by replacing incandescent lights with energy saving lights (ESL) in Vietnam (ISPONRE, 2011).

The project includes 4 specific objectives: (1) to improve capacity of domestic industry of light manufacture through technical support and move from manufacture of incandescent lights to energy saving lights to reduce emission of carbon dioxide and environmental protection; (2) to strengthen and harmonize standards of quality of energy saving lights in accordance with international standards; to improve capacity of quality control; (3) to educate and raise awareness of consumers in using energy saving lights; (4) to strengthen institutions and policies to support, encourage and monitor production, consumption and use of energy saving lights in domestic market in accordance with regulations on environment.

To obtain those objectives, the project is structured with four components: (i) capacity building for domestic light industry; (ii) strengthening of standard and quality control; (iii) formulation of market for energy saving lights and raising awareness of community; and (iv) support and strengthening of institutions and policies as well as regulations for promote use of energy saving lights.

Component 1- capacity building for domestic light industry is designed to orient national market to sustainable international integration. One of the first activities of this component is to investigate market and actual state of IL as well as ESL in Vietnam market. This report is the product of above-mentioned activity implemented on the basis of studying and sampling in Vietnam's overall market.

4. Methodology

In order to gather necessary information related to consumer behavior and business operation of enterprises specialized in lights, the study focused on different subjects, including: *direct interview* 7 relevant State administration agencies, *direct interview* 6 companies/ enterprises specialized in manufacturing and doing business in lights in Vietnam, *direct observation and interview* 52 distributors (wholesaler and retailer), *survey (used questionnaire)* with 586 households and 58 organizations and enterprises as customers.

As we thought that, sampling distributions are an important part of study for a variety of reasons. In most cases, the feasibility of an experiment dictates the sample size. Sampling

distribution is the probability distribution of a sample of a population instead of the entire population. Based on Handl et al (2007), we make the decision on the above size for sampling. The randomly taking sample helps us have good information to represent what population behave when using lights.

Collected samples represents all regions (the North, the Central Part and the South), with different topography (mountain, delta, coast and highland) and includes city and rural areas, etc. The sampling areas include large electricity consumption areas (Hanoi and Ho Chi Minh City) and small electricity consumption areas (Lang Son, Kien Giang). The samples were taken from areas which use electricity for rural needs and agricultural production (Lang Son, Lam Dong) as well as industrial production (Binh Dinh, Ho Chi Minh City).

In details, Hanoi and Ho Chi Minh City are cities but there are many districts with agricultural production; Binh Dinh represents Southern Coast with both city (Quy Nhon is Category 3 city) and districts which present rural areas; Lam Dong represents Central Highlands with ethnic minorities; Kien Giang represents South most areas bordered by Cambodia; Lang Son represents Northern mountainous bordered by China.

On the one hand, information collected in interviews: opinions of parties were qualitatively synthesized and analyzed by inductive method and comparative method in order to find out significance and value of information.

On the other hand, information collected in survey through questionnaires was processed by software SPSS version 19.0.

5. Study/experiment results

Today, using LED light has become a global trend and LED light has been applied widely in lots of fields in countries with high energy saving and efficiency.

The preponderant advantages of LED light source generally compared to other light sources are: saving energy much better than light types such as incandescent, fluorescent, compact fluorescent and Sodium lights, etc. (As per

different estimates, energy capacity of LED light is about 82% to 93% compared with incandescent light, according to Manual of efficient use of energy in industries of Asia - UNEP); friendly with environment, reducing exhaust CO₂, minimizing waste discharging to the environment; lifetime of LED is very long about 50,000 hours to 100,000 hours depending on color; LED lights friendly with human because LED minimizes ultraviolet ray and infrared radiation, does not flicker or make eyes ache.

The primary disadvantage of LED currently is the high initial costs; although experiences of some countries show that the initial investment maybe higher, LED lifetime is longer. Therefore, considering medium-term and long-term, the preponderant advantages will bring more profits including economic and environmental profits.

In recent years, several domestic companies manufacturing lighting light in Vietnam have studied LED, imported materials and LED Chip to assemble LED light in small scale and brought some products to the market, such as desk lights for student, etc.

LED light market in Vietnam has been transformed at the first step in previous years, especially LED lights imported from China with low price for decorations, festivals, advertisement, etc.

Light market in Vietnam aims to provide to different using entities, including head offices of agencies, organizations from central to local agencies under the political system of Vietnam as stipulated in the Constitution; households from urban to rural area, in which rural population is about 73%, and urban population is about 27% in Vietnam; production, business sectors; public lighting for traffic vehicles of over 755 urban areas with special type, type 1, type 2, type 3, type 4 and type 5 in 63 provinces, cities under central government of Vietnam. By December 31, 2010, Vietnam had 11,112 commune-level administration units, including 1403 wards, 624 towns and 9085 communes.

Vietnam has about 25 million households, including rural and urban areas (in which there are about 18 million rural households, 7 million urban households); their demand of purchasing and using

lights is about 250 million lights of all kinds annually (ISPONRE, 2012).

From generalizing some data above, it is realized that lighting market in socio-economic sectors of Vietnam is quite large, including market trading in light, public lighting equipment in urban areas, agencies, organizations, households in wide urban and rural areas in Vietnam as well as import - export activities of lighting sources and lighting equipment. The market will shift in the direction of eliminating low-performance lighting sources, including incandescent lights with performance of higher than 60W to lighting market with high, effective performance, power saving, contributing to protect environment and reducing weather change in Vietnam and the world.

When purchasing for new or replaced construction works, it is necessary to untie barriers for works with investment from budget, from low investment rating costs, including purchasing low-price, low-quality lights for construction works since previous years which were not bound to use lighting lamps labeled energy saving.

Management force is insufficient and management is very poor in illicit import of low-quality light according to non-quota way in northern border of Vietnam, as well as management of market management force is still inefficient domestically. Therefore, low-quality lighting products are traded in abundance in shops of towns as well as big cities (Nguyen, 2012).

Organizations fails to inspect, supervise and handle strictly violations on economical and efficient use of energy, including lighting field according to regulations of Decree No. 73/2011 of the Government.

In brief: State management agencies issued a lot of legal documents related to economical and efficient use of energy in recent years, including law and legal documents promulgated as well as about to be promulgated by the Government, Prime Minister, ministries as per roadmap. These documents will be improved gradually, contributing to solve above barriers, regulations of these legal documents will come into life step by step, playing a role in socio-economic development, including field manufacturing, trading in types of lights and lighting equipment with higher and higher quality, power saving,

reducing glasshouse exhaust, protecting the environment (Tran, 2010).

6. Summary and explanation of results

6.1. Demands on household lights in Vietnam market size (Civil market)

- Approximately 25 million households.
- Average number of lights per household: approximately 14,3 lights.
- Number of lights in use: 359 million lights.

Household incandescent lights

- Number of households using: 60%
- Average number of lights per household: 2.3 lights/ household.
- Number of lights in use: 34.5 million lights.
- Number of incandescent lights in use: 9.6%.
- Incandescent lights from 60W of efficiency remain relatively common on the market at low price of 6,000-7,000 VND/light. (1USD approx. 21,000VND).
- Due to the social awareness, affordability as well as equal quality, the market still favors T10 fluorescent and incandescent lights.

6.2. Production capacity of domestic manufacturers and importers

As estimated, on annual basis light manufacturers produce and import approximately 408 million lights, which include about 34 million imported lights and the remaining 374 million manufactured lights. With this output, domestic manufacturers export about 237 million lights, keeping the other 171 million for Vietnam market. Among these, 137 million lights are produced by domestic manufacturers, about 34 million lights are officially imported and lights from other sources (including unofficial importing, uncontrolled sources, etc.).

Regarding types of lights, manufacturers annually produce approximately 38.8% of incandescent lights, 26.8% and 34.4% of fluorescent and compact fluorescent lights respectively.

6.3. Major factors affecting the lighting industry

Vietnam’s lighting industry has been established and developed along with the socio-economic development of Vietnam from the use of low-efficiency to high-efficiency lighting equipment in all social industries.

Through research into light market in Vietnam, the researchers have learnt that the major factors affecting the market include the legal and policy framework relating to energy efficiency; the demand and supply relation of lighting products (product quality, price, efficiency, etc.); and propaganda for high-efficient lighting products.

6.3.1. Legal and policy framework

Over the last few years, the lighting industry in Vietnam has seen significant changes in policies and laws such as the Law on energy efficiency or regulations on the use of high-efficiency devices. With these legal documents, there have been fundamental changes in household use of high-efficiency lighting devices. These include the switch from incandescent lights into compact fluorescent lights, from fluorescent lights T10 to T8, T5 and recently LED lights. Changes have also been seen in commercial use with the switch from high-pressure mercury lights into Metal Halide and Sodium lights. The switch in usage has resulted in changes in technologies employed by domestic manufacturers and importers.

6.3.2. Supply-Demand relation

To promote energy efficiency and due to increasing energy price over the last few years, manufacturing and commercial services sectors as well as households have made fundamental and positive changes in energy use to reduce energy costs by switching into higher-efficiency devices.

This is clearly shown in the increasing use of high-efficiency lighting devices. However, in order to meet current demand for lighting devices on Vietnam market, the product quality and efficiency should be enhanced and product price should be more reasonable.

6.3.3. Propaganda, promotion and awareness improvement

The recent popularity of compact fluorescent lights among Vietnamese users results from intensive and extensive media propaganda (such as TV, radio, conferences, etc.) aiming at

both rural and urban areas. Light sales program of Vietnam Electricity group is among the most effective programs to promote people's use of compact fluorescent lights. This indicates that propaganda plays an important role in promoting energy efficiency.

6.3.4. Management issues of Ministry of Industry and Trade

Ministry of Industry and Trade impact to lighting industry in many aspects, especially in term of Trademark Policy; Nationally recognized energy-efficient products; and Production quota issuance

There have been a number of strict legal documents which ensure a healthy market of energy-efficient lights in Vietnam. The establishment of testing laboratories and agencies aims to monitor the manufacturing process and product supply, ensuring both quantity and quality; protect consumers and create a healthy competitive environment for manufacturers. However, inadequate capacity among the management team involved still exists, especially in post-testing stage and market management. Besides, autonomy among manufacturers also makes it difficult for the authority to manage this market, for examples, reporting, the accuracy of reported data, report deadline, etc.

6.3.5. Management issues of Ministry of Construction

In term of building-design standards, Interior and exterior lighting related to national energy policy..., Ministry of Construction made some influences into lighting market.

In fact, Vietnam has had various draft regulations on the above mentioned issues. These include the implementation of 2005 draft regulation despite unofficial announcement and the proposal of 2009 draft regulation. On October 03, 2012, the Ministry of Construction together with the International Finance Corporation (IFC) under the World Bank (WB) organized a workshop to report on the implementation of building-design standards related to national energy policy. This is the testing implementation of 2005 draft regulations in consultation with local and international experts, consulting agencies and managers.

At the conference, there were a lot of arguments that drew the attention of relevant

agencies. From the construction investors' point of view, some suggested that certain overlapping regulations should be abolished because of their infeasibility and unnecessary. They reasoned that once someone rented a building for office, they obviously had to save electricity and use energy efficiently. From the designers' standpoint, architecture and construction practice has shown that regions with different climate should have different building-design standards and energy-efficiency standards are accordingly different. The local authorities on construction management pointed out that it is unreasonable to set the standards for buildings that are not less than 500m² in area. Why not 600m² (?) They also wonder how the departments in charge have enough staff for management, monitoring, inspection and testing, etc. However, in Hanoi and Ho Chi Minh City, this restriction is compulsory because of the building density and limited area of the inner city.

6.3.6. Vietnam Electricity Group (EVN)-related issues

From the electricity seller's point of view, there are some difference thoughts to lighting market. Vietnam Electricity Group with its social awareness and responsibility has taken part in power saving encouragement campaign by funding programs such as exchanging incandescent lights for compact fluorescent lights; turning off one light or limiting the use electrical appliances during peak hours; offer 1 million VND for customers who buy solar water heater (in combination with Son Ha Company), etc.

However, from the business standpoint, besides public objectives, EVN also has to fulfill profit targets. Therefore, they need proper policies, measures and steps. These must be in accordance with the country's economic situation in which there is basically no truly competition in power distribution and supply as well as the unresolved problem of unplanned power production and consumption.

6.4. Opportunities and impacts of eliminating incandescent lights

6.4.1. Opportunities

The Law on Energy Efficiency has come into effect since January 1, 2011. Moreover, Decree number 51/ND-CP of the Government has also been valid since September 12, 2011, stipulating devices, including lighting devices, to be labeled

and subjected to the minimum efficiency as well as setting implementation schedule. These are favorable conditions for lighting device market in Vietnam to switch from low-efficiency to high-efficiency lighting devices.

Particularly, Decree No. 51/ND-CP stipulated that from January 1, 2013, import, production and circulation of incandescent lights of more than 60W in efficiency are not allowed. This provides a legal basis for enterprises to switch in incandescent light market structure in Vietnam.

Beside factors related to the legal framework, propaganda and campaigns to replace incandescent lights in Vietnam have been actively implemented and have brought about positive results. The programs include light sales of EVN (which is considered a successful program in eliminating incandescent light in the world), propaganda on compact fluorescent lights of provincial Vietnam Women's Unions under the national program on energy efficiency. Through these programs, there have been changes in people's awareness of household use of compact fluorescent lights. This is also a chance for manufacturers in Vietnam to transform from incandescent technological lines into those of high-efficiency lights.

6.4.2. Consequences

The research does not aim at studying the impacts of eliminating incandescent lights which require specific investigation and assessment (such as the cost of line switching, employment, etc.). The research only focuses on the general assessments of the program such as national (resources, environment, etc.) as well as local benefits from lower energy costs. However, the elimination of incandescent lights in the Vietnam should be properly planned so that light manufacturers are prepared to change technological lines. So that a future research can consider to focus on, for more details of such things.

7. Recommendations

7.1. To the Vietnamese government and state administration agencies

To implement the road map for removal of incandescent lights and use of energy saving lights to contribute to green growth strategy by the Government and global sustainable growth, the

Government and state administration agencies should have some actions including:

- Establish a road map to remove incandescent lights.
- Support domestic producers through policies and mechanisms so that they can transform their production in Vietnam.
- Identify minimum efficiency for substitute lights (compact fluorescent lights, fluorescent lights).
- Implement compulsory labeling for light products. Market control should be strict to avoid production and import of low efficiency lights to Vietnam markets; this is a very important element to conversion of incandescent light.
- Communicate and encourage users to use high efficiency lights.
- Continue financial assistance for poor and especially disadvantaged households in mountainous, highland, island areas and ethnic minorities to substitute incandescent lights with energy saving lights as stipulated in Provision 2, Article 5, Law on Energy Efficiency and Saving: "support in terms of finance, energy price and necessary priority policies to promote energy saving and efficient use. This is an important policy by the Government to promote all organizations, individuals, and households to save and use energy effectively in lighting area.
- Ministry of Finance (MOF) may consider applying low import tax rate for materials and equipment which are not available in the country for production of certified high efficiency lights and equipment: Certified label (energy stars) or equivalent label with 5 star energy label.
- Ministry of Industry and Trade (MOIT) may consider issuing policies for supporting energy price for local producers of certified high efficiency lights and equipment: Certified label (energy stars) or equivalent label with 5 star energy label.
- Ministry of Natural Resources and Environment (MONRE) should identify specific standards to limit mercury residue to lowest level (near zero) when the lights reach their life time.
- Ministry of Construction (MOC) needs to issue circular to guide the application of planning and design of building to match national standards, natural conditions to reduce energy consumption for light and

installation of high efficiency lights in state offices.

- General Department of Customs and Department of Market should have effective measures to limit illegal import of the low efficiency lighting equipment through the north border and strengthen the control of selling low quality and no origin lights.
- Law reinforcement agencies should conduct strict penalties for law violations related to illegal import of low quality lights.

7.2.To producers and sellers/retailers

Domestic producers should establish road map to convert technologies to comply with government regulations and implement them.

One important factor to ensure the successful conversion of light use behavior is the quality improvement of energy saving lights because energy saving lights have much higher price than incandescent ones. High initial cost requires lower use cost. Therefore, it is necessary to improve quality, durability, lighting capacity and low consumption of energy as committed. Moreover, in the future it is necessary to research and invest to lower sales price of the products. It is possible to conduct market segmentation and create different products for different types of customers.

7.3.To users

The most important factor in the lighting market must be end-users. In order to promote the saving energy lighter, the users themselves must perceive and adapt it as the best choice not for their budget only but also the social sustainable development. Thus, they should raise awareness of using energy saving lights. Besides, it is necessary to promote energy saving programs in all households, organizations and enterprises.

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