

**UNDP VIETNAM**

**Report 4: Proposed criteria/requirements for investment projects in chemical sector in accordance with the principles of Green Chemistry**

**PROJECT**

**PROVIDE TECHNICAL ASSISTANCE TO INTEGRATE THE PRINCIPLES OF GREEN CHEMISTRY, AND PROPOSE APPROPRIATE LEGAL/POLICY SOLUTIONS INTO LEGAL DOCUMENTS ON CHEMICAL MANAGEMENT AND RELATED LEGAL POLICIES/TOOLS IN VIETNAM**

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**Introduction**

Along with the continuous development of the country's economy, Vietnam's chemical industry has increasingly affirmed its important strategic role, meeting the essential needs of society, contributing positively to the development of the national economy. According to the statistics, vietnam's total annual chemical industry output accounts for about 10-11% of the total gdp of the industry, the labor force accounts for nearly 10% and has ahighlabor productivity of1.36 times the average labor productivity of the whole industry due to the high level of automation. According to calculations, after the projects are completed and stable operation, the total output of the chemical industry accounts for 13-14% of the whole industry. Every year, the number of chemical operations enterprises is still increasing, which shows the important role and the continuous development of the chemical industry. In addition to the chemical manufacturing industry, other industries, agricultural production, medical facilities using chemicals also thrive leading to the increasing demand for chemicals, so along with the development of production, chemical business activities, Storage and transportation services have also evolved.

Besides the important role of the chemical industry in economic development in general, the chemical industry has many risks that negatively impact safety, human health and the environment. In fact, in the world in general, Vietnam in particular, in chemical activities, there have been chemical incidents causing material damage affecting human life, health and the environment. In the sustainable development strategy, the development and improvement of the legal system and the good implementation of regulations on safety, protection of human health and environmental protection in all sectors of the economy in general, of the chemical industry in particular is one of the important goals in sustainable development.

The Law on Chemicals was passed by the 12th National Assembly on November 21, 2007, regulating chemical activities, safety in chemical activities, rights and obligations of organizations and individuals participating in chemical activities, state management of chemical activities. The state's policy on chemical activities is to build a modern, sustainable chemical industry with efficient use of natural resources; focus on developing basic chemicals, environmentally friendly chemicals, chemicals of high economic value for socio-economic development; encourage organizations and individuals to invest in the development of the chemical industry; application of modern technology, environmentally friendly technology; gradually reduce the use of dangerous chemicals, replacing toxic chemicals with green chemicals. However, the concept and regulations of green chemistry are not specified in the current Chemical Law..

In order to create a legal basis for green chemical investment projects, it is necessary to have green chemical regulations in the Chemical Law (amended) project. To have regulations on green chemistry in accordance with international criteria and the actual use of chemicals in Vietnam in the coming time.

Research on the concept of green chemistry, policy frameworks, laws relating to green chemistry and the Stockholm Convention has been presented in its own thematic studies so this report does not present a repeat.

In order to make recommendations for the Chemical Law (amended), this report summarizes and analyzes three aspects:

- Current status of chemical industry, chemical sub-sectors.

- Criteria and evaluation standards for investment projects in the field of chemicals.

- Proposing policies and solutions to integrate green chemical principles to include in the draft Law on Chemicals (amended) for green chemical projects.

**1. Current status of chemical industry, chemical sub-sectors**

1.1. Policyto promote the development of the chemical industry

1.1.1. The party's policy direction

At the 13th National Congress, one of the main tasks and solutions for socio-economic development set out in the Congress document was to develop a number of foundational industries such as energy industry, mechanical engineering, metallurgy, chemicals, fertilizers, materials. This is an important basis for proposing and building policy mechanisms to promote the chemical industry's development. This orientation has been institutionalized by policies to promote the development of the chemical industry in the Law on Chemistry.

1.1.2. Policy orientation in legal documents

1) The Law on Chemicals defines:

 - Economic development associated with environmental protection and green economic development.

 - Based on new and modern technology to develop industries with advantages, making a great contribution to national added value.

2) Vietnam's chemical industry development plan to 2020, with a orientation to 2030:

- Building a modern, sustainable chemical industry, effective use of natural resources; focusing on the development of basic chemicals, environmentally friendly chemicals, chemicals with high economic value for socio-economic development.

- The State encourages organizations and individuals to invest in the development of the chemical industry; apply modern technology and environmentally friendly technology; gradually reduce the use of dangerous chemicals; replace toxic chemicals with less toxic and non-toxic chemicals in production and use; encourage recycling, reuse and minimizewaste oft-dot.

- Develop the chemical industry in a sustainable way, in line with the socio-economic development strategy oftheland.

- Develop the chemical industry on the basis of mobilizing all domestic and foreign resources; effective use of natural resources and domestic raw materials; promote the attraction of foreign investment for works with large capital needs, requiring high technology that domestically has not met; Promote the potential and strengths of each region, eachdirection.

- Invest in the development of chemical industry on the basis of using advanced technology, creating high-quality products, competitive prices, ensuring the ecological environment.

- Operating factories and new investment projects must fully comply with the provisions of the law on environmental protection and chemical safety; closing chemical production facilities using outdated technology, polluting the environment;

-Minimize the formation of small-scale chemical production and processing facilities.

- In addition, the Vietnam Industrial Development Strategy to 2025, the vision to 2035 issued together with decision No. 879/QD-TTg dated June 9, 2014 of the Prime Minister has oriented: The period to 2025, priority for investment in the development of basic chemical products, petrochemicals and plastic components – rubber technical products; In the period after 2025, priority is given to investment in the development of the pharmaceutical chemical industry." Vietnam's industrial development master plan to 2020, vision to 2030 issued together with Decision No. 880/QD-TTg dated September 14, 2014 of the Prime Minister has oriented: "Developing the chemical industry towards the use of high technology, modern, create products of good quality, competitive price, minimize and limit the discharge of toxic chemicals into the environment; Development of petrochemical industry, basic chemicals, chemicals for agriculture and rural areas; pharmaceutical chemistry"

3) Investment incentive policies

Clause 4, Article 6 of the Law on Chemicals stipulates:

"4. Organizations and individuals investing in chemical production projects in the fields and areas that the State encourages to enjoy preferential policies in accordance with the law on investment, land, taxes and other relevant provisions of law."

Vietnam's chemical industry development plan to 2020, by 2030, has come up with solutions to concretize investment incentive policies in the field of chemicals:

- Import tax incentives for domestic raw materials and machinery that have not yet been produced or imported for production; increase import duties on finished products and products that domestic production has produced on the basis of Vietnam's commitments when joining the WTO;

- Tax incentives for domestically produced chemical products directly serving agricultural production, ensuring food security and promoting food exports;

- Tax and fee incentives for technology transfer contracts;

- Loan incentives during the investment phase of construction of chemical production projects and supporting the training of project managers for enterprises; Operating factories and new investment projects must fully comply with the provisions of the law on environmental protection and chemical safety; close chemical production facilities using outdated technology, pollute the environment; Minimize the formation of small-scale chemical production and processing facilities. Priority is given to the development of chemical projects applying new, low-waste and environmentally friendly technologies, energy-saving solutions, increasing the efficiency of raw material use, and maximizing reuse of wastes generated in the production and processing of chemical products.

1.1.3. Status of the chemical industry

After 13 years of implementing the Law on Chemicals, the chemical industry has made strong developments, making an important contribution to the process of industrialization, economic development, and social development:

- Many large projects are implemented with the participation of many economic sectors (state, private, FDI). Typical projects such as nghi son petrochemical, Long Son, Hyosung, basic chemicals, Airliquid industrial gas, Messer, Brigestone, Sailoon, Kumho, some fertilizer and chemical plants under PVN, Vinachem, TKV, chemical complex in Lao Cai of Duc Giang Chemical Group Joint Stock Company, Causation-chlorine production project of Vedan Vietnam, Viet Tri Chemical Joint Stock Company, East Asia Joint Stock Company, Southern Basic Chemical Joint Stock Company. Chemical production projects have created jobs for millions of domestic workers, contributed to the local budget, stabilized the social securityorder.

- The chemical industry has maintained a stable growth rate over the years, contributing about 10-11% of the total gdp of the industry, labor productivity is 1.36 times higher than the average labor productivity of the whole industry. Some areas have basically met the domestic demand: fertilizers, pesticides, tyre chips, common paints, cleaning products. The types of products produced in the country are more diverse.

- Most of the projects invested in the past 13 years have used advanced technology, close to the regional and world level. Some projects that have been put into operation before have made technological improvements. Currently, causation-chlorine production projects all use ion exchange membrane electrolysis technology. New projects investing in NPK fertilizer production all use steam-powered rotary barrel particle making technology and chemical technology for good quality, highly competitive NPK products, instead of using mixing technology, rotary pan technology as before. Pp, PE production petrochemical projects,... all use modern equipment technology imported and transferred from advanced countries in the world such as Korea, USA, G7,.... Phosphate fertilizer production uses dual-contact technology,.... 12 principles of green chemistry have also been approached and applied by businesses. As a result, increasing production capacity, reducing fuel consumption norms, products of good quality, safety factors, environment are improved.

- Some chemical projects have been entitled to preferential policies. Some good examples are:

+ Chu Lai soda factory project invested in Chu Lai Open Economic Zone, Quang Nam is exempt from import duty to create fixed assets; exemption from import duty on domestic raw materials, supplies and components not yet produced for a period of 5 years; enjoys a corporate income tax rate of 10% for a period of 15 years, since the investment project has revenue; exemption from corporate income tax for 04 years, from the time of taxable income and 50% reduction of the amount of corporate income tax payable in the next 09 years; incentives on land rent.

+ Dung Quat Refinery is entitled to 7% reduction in import duty on gasoline and oil, 5% for LPG, 3% for petrochemical products (petroleum produced by Dung Quoc still has to pay import tax). This offer has been applied since 2009 and lasts until 2018 (according to Decision 2286/QD-TTg dated November 26, 2013). Corporate income tax rate incentive of 10% for a period of 30 years; be exempted from four years of tax and 50% reduction in the amount of tax payable for the next nine years from the first year binh Son Company has taxable income from Dung Quat Refinery project.

+ Southern petrochemical complex (Long Son) is entitled to preferential corporate income tax rate of 10% for a period of 30 years from the time of revenue; tax exemption for four years and 50% reduction of tax payable for the next nine years from the time of taxable income; imposition of 0% import tax rate for 30 years from the time the project goes into production for main raw materials including propane, butane, naphtha, industrial salts, coal (domestically unproductive or unsatis7thing in volume and quality); impose a preferential import tax rate (MNF) of 3% on PP, PE, VCM and causties products for 10 years from the time the project goes into commercial operation; naptha raw materials of the project are not subject to excise tax; exemption of land rent for 11 years from the date the project is completed and put into operation.

However, some related development lines in the document of the 13th National Congress have not been mentioned and institutionalized in the Law on Chemicals such as:

 - Harmonious development between width and depth, focusing on developing depth, constantly improving productivity, quality, efficiency and competitiveness.

 - Create all favorable conditions for the strong development of Vietnamese enterprises, especially private enterprises, as a driving force to improve competitiveness and economic autonomy. Build a spontaneously autonomous economy on the basis of technological mastery and proactive, actively integrate, diversify markets, improve the adaptability of the economy. It is possible to form a national production capacity to be autonomous, participate effectively, improve its position in the global value chain.

1.2. Assess the conformity with the relevant provisions of Vietnamese law

1.2.1. On Investment Policy

Some legal documents have provisions related to investment policies and development of chemical industry.

1) Right to business investment:

Article 5 of the Law on Investment No. 61/2020/QH14 dated June 17, 2020 provides for policies on business investment:

"1. Investors have the right to conduct business investment activities in industries and occupations that this Law does not prohibit. For conditional business investment sectors and professions, investors must meet the conditions of business investment in accordance with law.

2. Investors may make their own decisions and take responsibility for business investment activities in accordance with this Law and other relevant laws; access to and use of credit capital, support funds, land use and other resources as prescribed by law.

3. Investors are suspended, stopped or terminated for business investment activities if this activity is harmful or risks harming national defense and security.

4. The State recognizes and protects ownership rights to assets, investment capital, income and other legitimate rights and interests of investors.

5. The State treats investors equally; have policies to encourage and create favorable conditions for investors to carry out business investment activities, sustainable development of economic sectors.

6. The State respects and implements international investment treaties to which the Socialist Republic of Vietnam is a member."

Article 10 of the Law on Planning No. 21/2017/QH14 dated November 24, 2017 stipulates the State's policy on planning activities:

"1. The State shall manage socio-economic development and ensure national defense, security and environmental protection according to the approved planning.

2. The State shall promulgate mechanisms and policies to encourage and mobilize resources to promote sustainable development associated with environmental protection and climate change response according to the planning that has been decided or approved.

3. The State shall promulgate mechanisms and policies to encourage domestic organizations and individuals and foreign organizations and individuals to support resources for planning activities to ensure objectivity, publicity and transparency.

4. The State shall promulgate mechanisms and policies to encourage and create favorable conditions for organizations and individuals of all economic sectors to participate in planning activities.

5. The State promulgates mechanisms and policies to strengthen international cooperation in planning activities."

Thus, basically, the legal documents agree on the view of encouraging and creating favorable conditions for organizations and individuals to carry out investment activities, provided that national defense, security, environmental protection and sustainable development are ensured.

2) On investment incentive mechanism:

According to Articles 15 and 16 of the Law on Investment No. 61/2020/QH14, the chemical industry is not an investment incentive industry. However, chemical projects may enjoy investment incentives in the following cases:

- By industry: Production of products formed from scientific and technological results in accordance with the law on science and technology; production of products with added value of 30% or more; production of goods, provision of services that create or participate in value chains and industry-linked clusters.

- Investment projects in areas with investment incentives: areas with difficult socio-economic conditions, areas with particularly difficult socio-economic conditions; industrial parks, export processing zones, high-tech parks, economic zones.

- Investment projects with a capital scale of VND 6,000 billion or more, disbursement of at least VND 6,000 billion within 03 years from the date of issuance of investment registration certificates or approval of investment policies, and one of the following criteria: have a total revenue of at least VND 10,000 billion per year for the latest period after 03 years from the year of revenue or employing more than 3,000 employees.

- Investment projects in rural areas employing 500 or more workers; investment projects employing persons with disabilities in accordance with the law on persons with disabilities.

- Projects with technology transfer on the list of technologies encouraged for transfer in accordance with the law on technology transfer.

Investment incentives include:

- Corporate income tax incentives, including the application of a corporate income tax rate lower than the normal tax rate with a term or the entire duration of the investment project; tax exemption, tax reduction and other incentives as prescribed by the law on corporate income tax;

- Exemption from import duty on imported goods to create fixed assets; materials, supplies and components imported for production in accordance with the law on export duty and import duty;

- Exemption and reduction of land use levy, land rent, land use tax;

- Rapid depreciation, increase in expenses deducted when taxable income is calculated.

Thus, basically, the provisions on investment incentive policies in Clause 4, Article 6 of the Law on Chemicals are in accordance with the Provisions of the Law on Investment..

1.3. Limitations, inadequacies

- Some relevant development lines in the document of the 13th National Congress have not been mentioned and institutionalized in the Law on Chemicals:

 + Harmonious development between width and depth, focusing on developing depth, constantly improving productivity, quality, efficiency and competitiveness.

 + Create all favorable conditions for the strong development of Vietnamese enterprises, especially private enterprises, as a driving force to improve competitiveness and economic autonomy. Build a spontaneously autonomous economy on the basis of technological mastery and proactive, actively integrate, diversify markets, improve the adaptability of the economy. It is possible to form a national production capacity to be autonomous, participate effectively, improve its position in the global value chain.

- The implementation of the Party's policies and guidelines on the development of the chemical industry is still delayed, there are no solutions and policies strong enough, synchronous and put into practice. Lack of mechanisms for coordination and sharing of information among central and local agencies on investment management, industry development in the field of chemicals, the implementation of policies and laws are limited, the inspection and supervision are not strict and ineffective. This has led to the current state of the chemical industry exposing weaknesses, the scale and speed of development of the industry is not commensurate with the role and potential for development.

Many types of raw materials and chemical products also depend on imports; The investment structure is still unreasonable, there are not many high-value-added products, new to provide some common basic chemical products, have not produced organic basic chemicals and products requiring high technology, have not clearly formed the value chain of chemical products in the region and the world..

Vietnamese enterprises have not focused on the field of scientific research, lack of source technology, leading to high prices, less competitive products. In fact, Vietnam has almost no research and has scientific and technological products on chemical industry, equipment technologies.

In general, Vietnam and Vietnamese enterprises have low capital levels. According to statistics, in the period of 2011-2015, the inherent capital of enterprises accounted for about 32%, but at the end of 2018, the capital of enterprises accounted for only about 27%, the size of credit capital in 2018 was equal to 133% of GDP, in 2019 about 134% of GDP / High interest rates, low capital and risks in investment have more or less affected the investment of enterprises in the country. water. The chemical industry requires a huge scale of investment, highly demanding technology, strict, potentially risky. While in Vietnam, enterprises are limited in terms of economic potential, small investment, spreading, lack of source technology. Some large chemical projects suffered losses, under inspection and investigation partly impacted the psychology of investors. In recent years, investment from the state-owned enterprises has been virtually none, only a small number of repairs, large investment projects in the chemical industry are mainly invested by FDI enterprises. FDI enterprises almost dominate the market in some areas..

- Besides the positive contributions to socio-economic development, the strong development of the chemical industry also impacts the environment and human health. For example, the discharge of wastewater containing toxic chemicals into the environment of Formosa Ha Tinh Project (causing mass fish deaths in [Vung Ang](https://vi.wikipedia.org/wiki/V%C5%A9ng_%C3%81ng) [(Ha Tinh)](https://vi.wikipedia.org/wiki/H%C3%A0_T%C4%A9nh)waters started on April6, 2016 and then spread to the waters of Quang [Binh,](https://vi.wikipedia.org/wiki/Qu%E1%BA%A3ng_B%C3%ACnh) [Quang Tri,](https://vi.wikipedia.org/wiki/Qu%E1%BA%A3ng_Tr%E1%BB%8B) [Thua Thien Hue](https://vi.wikipedia.org/wiki/Th%E1%BB%ABa_Thi%C3%AAn_Hu%E1%BA%BF) and affect the aquatic environment in these areas), Waste Dam rupture project of DAP Project No. 2 in Lao Cai (waste spilled with a PH of approximately 2, high acidity that affects the environment and the lives of people around the project); the discharge of wastewater polluting the environment of chu lai soda production project at Chu Lai Open Economic Zone, Quang Nam province (making fish, cattle is processed; affecting the field around the project area).....

With the potential risks, the poor compliance of a part of enterprises in the industry has negatively affected the thinking of a small part of the people and state management agencies. In many localities, the concept and awareness of the role and importance of developing the chemical industry is inadequate, concerns about the risk of pollution and danger, leading to the development policies of many localities do not attract investment in the chemical industry, instead some service industries, Tourism, other manufacturing industry. These concepts make it difficult for investors, hindering the development of the chemical industry, one of the foundational industries, as a premise for supporting many industries as well as providing other important essential products.

- Although there is a fairly synchronous policy system on investment incentives in accordance with the regulations on taxes, land, labor ... However, because chemicals are not a preferential industry for investment, in fact, almost only large projects or projects invest in difficult areas, local authorities give maximum priority to attract industrial development to enjoy incentives. Small and medium-sized chemical investors barely have access to preferential investment policies, so they are reserved when there is a lack of attractive and stable mechanisms..

1.2. Planning and strategy for development of chemical industry

1.2.1. Current regulations and enforcement in the past

1.2.1.1. Current regulations

Article 8, Article 9 of the Law on Chemicals provides for requirements for chemical industry planning and responsibility for formulating chemical industry planning:

1. Requirements for chemical industryplanning:

- The chemical industry planning must be in accordance with the Principles and policies of the State on chemical activities, the provisions of this Law and other relevant provisions of law.

- Chemical industry planning is built on the basis of the socio-economic development strategy of the whole country, the strategy for the development of industries and is set up for each ten-year period, oriented for the next ten years.

- Chemical industry planning must guide the formation of concentrated chemical industrial parks.

- The location of industrial parks and chemical production facilities must be in line with the characteristics and properties of chemicals and chemical production and preservation technologies, natural conditions, socio-economic conditions to meet chemical safety requirements.

2) Responsibility for the development of chemical industry planning:

- The Ministry of Industry and Trade shall promulgate according to its competence or submit to the Government for promulgation legal documents, *strategies*and plans forthe development of chemical industry; technical regulations on safety of dots; to assume the prime minister's prime minister and coordinate with ministries, sectors and localities in organizing national chemical industry planning to submit to the Prime Minister for approval; to guide and examine the implementation of the planning.

- Based on the national chemical industry planning approved by the Prime Minister and the objectives of local socio-economic development, the People's Committees of provinces and centrally-affiliated cities (hereafter referred to as provincial-level People's Committees) shall make and approve the chemical industry development plan in accordance with the local industrial development plan.

- The State shall ensure funding for the planning of the chemical industry in accordance with the Law on State Budget."

- Chemical-operating organizations and individuals are obliged to provide complete, timely and accurate information as requested by agencies in case of serving investigations and surveys to formulate strategies, plannings and plans for regional development and chemical industry.

Prior to the introduction of the Law on Chemicals, in 2005, the Prime Minister approved the Strategy for the Development of Vietnam's Chemical Industry until 2010, which is as of 2020 in Decision No. 207/2005/QD-TTg dated August 18, 2005. and the Vietnam Chemical Industry Development Plan to 2010, as of 2020 in Decision No. 343/QD-TTg dated December 26, 2005. In the first phase of implementation of the Law on Chemicals, the development of the sector is carried out in accordance with the 2005 Strategy and Plan.

In the period from 2010 onwards, the Ministry of Industry and Trade has formulated and submitted to the Prime Minister for approval the Development Plan of Vietnam Chemical Industry to 2020, which is up to 2030 in Decision No. 1621/QD-TTg dated September 18, 2013.

In addition, the Ministry of Industry and Trade has presided over the development and submission to the Prime Minister for approval or approval of the development plan of chemical sub-sectors: Planning of production system and fertilizer distribution system in the period of 2011-2020, taking into account 2025; Planning for development of Vietnam's paint and ink industry to 2020, with a vision to 2030; Vietnam basic chemical products production development plan to 2025, vision to 2035; Vietnam's industrial explosives industry development plan to 2020, oriented to 2030; Vietnam rubber product production development plan to 2025, vision to 2035.

The plans are developed in accordance with the Principles and Policies of the State on chemical activities, the socio-economic development strategy of the country, the strategy for the development of industries.

Implementing the Law on Chemicals, localities have also integrated the contents of chemical planning into the socio-economic development plans and industrial development plans of localities.

In the absence of chemical industry planning, chemical product development planning, enterprises invest in rampant production (not focusing on key chemical products in each period), lack of orientation, lack of sustainability, imbalance of supply and demand, use of outdated equipment technology leading to poor quality products, Competitiveness is not high and pollutes the environment,...

Since the planning was issued, which has strongly impacted the development process of the industry, chemical projects are oriented to invest in accordance with the planning (prioritizing chemical projects using advanced and modern technology, creating quality products, high competitiveness, less environmental pollution; prioritize investment projects in industrial zones and clusters with adequate infrastructure and centralized wastewater treatment systems; not approving projects using outdated technology, polluting the environment,...); no longer the phenomenon of massive investment, rampant, which imbalances supply and demand, affecting the sustainable development of the industry; has encouraged projects to invest in high-economic products such as petrochemical projects (PP, PE,...).

1.2.1.2. Enforcement Situation

The implementation of the Strategy and Planning has formed a relatively complete structured chemical industry, which has met the domestic demand for fertilizers, pesticides, tyre toothpicks, detergents, industrial gases, ink paint ... New projects, especially petrochemical, pharmaceutical and basic chemical projects, contribute to the more diverse range of chemical products in the country. Concrete:

- Basic chemicals: Some factories have been built since the 60s and 70s (Viet Tri Chemicals, Cb Chemicals in the South ...), recently due to the market demand these companies and some other investors have invested, expanded but have not yet met the demand. Domestic production has provided some common insegenerative basic chemical products such as H2SO4,HCl, H3PO4,causation.... Soda is a chemical that is in increasing demand to serve the production of flat glass, detergents but currently only one factory in the country but for different reasons is not working. Organic chemicals in the country are barely produced.

- Petrochemicals: Petrochemical and plastic products of all kinds are considered high value-added, used for many industries, have high development prospects in the coming years. In recent years, the petrochemical industry has been heavily invested with many large FDI projects such as Nghi Son, Long Son, Hyosung ... It is estimated that when these projects are put into operation, Vietnam still has to import about 2 million tons per year of petrochemical products annually..

- Fertilizer: Except for potassium and SA fertilizers must be imported because there are no advantages in raw materials in the country, Vietnam's fertilizer industry has provided enough for the domestic needs of most fertilizers. Processed phosphate fertilizer products and NPK have been partially exported to the regional market. Nitrogen fertilizers are currently oversupply at about 500,000 tons per year and continue to be oversupply in the coming years as the demand for innocuous fertilizers tends to decrease.

- Pesticide products: Basically meeting domestic demand, however, most are processing and concocting establishments; raw materials for the production of pesticide products must be imported up to 90%, mainly from the Chinese market.

- Rubber products: Many large FDI enterprises have invested in producing tires in Vietnam such as Bridgestone, Kumho, Sailun ..., making Vietnam a super exporter of tires. Currently, there are still other investors who are implementing tire chip manufacturing projects in Vietnam such as Dongah-Vina Factory project in Quang Ngai, Advance Factory project in Tien Giang, Jinyu Factory project in Tay Ninh ... However, the field of rubber engineering has high economic value for high-tech industries, assembly of electrical products, electronics, mechanical engineering ... It's not invested yet.

- Industrial gas production: Some industrial gas production projects are integrated in large chemical plants, in addition, there are some investors of independent lines (Messer, Airliquide ...) supplying gases used in the industrial sector (welding, raw materials) and the medical sector (O2, N2...),food production (sorbitol...).

- Paint production - ink: In addition to some FDI enterprises, mainly small and medium-sized enterprises. The types of paint produced in the country are quite diverse but have not yet produced high-end paint lines and special paints. Plastics, pigments, additives of raw materials must mainly be imported.

- Cleaning products: The product is quite diverse, meeting the domestic demand. The market is dominated by Unilever and P&G. Some factories are invested by Vietnamese enterprises but limited in size, mainly processing for large corporations.

- Electrochemical products: There are not many battery production projects (Pinaco, Hanoi Battery ...) and lack of high-quality products, (charge and discharge in the long term). Currently, Vietnam has many lead battery production projects including FDI components, but lacks lithium battery products due to lack of capital, lack of technology, competitiveness and product safety.….

- Pharmaceutical chemistry: The pharmaceutical industry has high technical requirements and strict legal requirements. Vietnam's pharmaceutical industry is generally young, statistics show that Vietnam still has to import the majority of pharmaceutical products (ingredients) for drug preparation.

Chemical production facilities are distributed across all six economic regions throughout the country. Investment-oriented projects in concentrated industrial zones and clusters. Initially formed a number of dung quat, nghi son, long son, hyosung petrochemical industrial complexes; some industrial zones and clusters focus on many chemical enterprises such as Dinh Vu Petrochemical Chemical Zone, Phu My - Cai Mep Industrial Park, Lao Cai Industrial Park...

Currently, the total annual output of Vietnam's chemical industry accounts for about 10-11% of the total gdp of the industry, according to calculations, after the projects are completed and stable operation, the total output of the chemical industry accounts for 13-14% of the whole industry, Close to the target of the plan.

1.2.2. Assessing conformity with relevant Vietnamese law

The Law on Planning promulgated and effective from January 1, 2019, Clause 2, Article 13 stipulates one of the prohibited acts: "*Making, appraising, deciding or approving, adjusting the planning on investment in the development of specific goods, services and products, determining the volume, the quantity of goods, services and products produced* and consumed." In the Law-making Submission submitted to the National Assembly, the drafting agency has specified: for specific industries producing goods, services and products, including chemical industry, investment activities, production and business development in the chemical industry are managed according to industry development strategies and market laws.

Accordingly, the chemical industry development plan expired on December 31, 2018, Article 8, Article 9 of the Law on Chemicals was abolished under the Provisions of law No. 28/2018/QH14 dated June 15, 2018 of the National Assembly amending and supplementing a number of articles of 11 laws related to planning..

- Pharmaceutical chemistry: The pharmaceutical industry has high technical requirements and strict legal requirements. Vietnam's pharmaceutical industry is generally young, statistics show that Vietnam still has to import the majority of pharmaceutical products (ingredients) for drug preparation.

Chemical production facilities are distributed across all six economic regions throughout the country. Investment-oriented projects in concentrated industrial zones and clusters. Initially formed a number of dung quat, nghi son, long son, hyosung petrochemical industrial complexes; some industrial zones and clusters focus on many chemical enterprises such as Dinh Vu Petrochemical Chemical Zone, Phu My - Cai Mep Industrial Park, Lao Cai Industrial Park...

Currently, the total annual output of Vietnam's chemical industry accounts for about 10-11% of the total gdp of the industry, according to calculations, after the projects are completed and stable operation, the total output of the chemical industry accounts for 13-14% of the whole industry, close to the target of the plan.

1.2.2. Assessing conformity with relevant Vietnamese law

The Law on Planning promulgated and effective from January 1, 2019, Clause 2, Article 13 stipulates one of the prohibited acts: "*Making, appraising, deciding or approving, adjusting the planning on investment in the development of specific goods, services and products, determining the volume, the quantity of goods, services and products produced* and consumed." In the Law-making Submission submitted to the National Assembly, the drafting agency has specified: for specific industries producing goods, services and products, including chemical industry, investment activities, production and business development in the chemical industry are managed according to industry development strategies and market laws.

Accordingly, the chemical industry development plan expired on December 31, 2018, Article 8, Article 9 of the Law on Chemicals was abolished under the Provisions of law No. 28/2018/QH14 dated June 15, 2018 of the National Assembly amending and supplementing a number of articles of 11 laws related to planning.ai.

2) Clause 3, Article 8 stipulates that "The  *chemical industry planning must be oriented to the formation of concentrated chemical industrial zones"*  however, in the plannings, no solutions have been offered to implement this policy. Vietnam does not yet have a clear and adequate policy for the formation of concentrated chemical production complexes, where there is a synchronous and specific technical infrastructure that ensures safety and environmental requirements and serves the development of the chemical industry taking into account symuetic factors or according to the model of a circular economy (Synergis, Circular Economy), the products and waste of one plant becomes the raw material of another plant in the complex. Many developed countries in Europe and other continents (Japan, Korea, China, USA ...) have been very successful with this model, indirectly creating a competitive advantage for businesses in the complex.

3) Currently, according to the Provisions of the Law on Planning 2017, the planning of the chemical industry and the planning of chemical products have expired. Investment and development of the chemical industry are carried out according to development strategies. After the Strategy for the development of Vietnam's chemical industry to 2010, which, as of 2020, was approved by the Prime Minister in Decision No. 207/2005/QD-TTg dated August 18, 2005, so far, the Vietnamese chemical industry has no development strategy for the next stages.

The Ministry of Industry and Trade is developing a strategy to develop Vietnam's chemical industry in the period to 2030, with a vision to 2040. The strategy is expected to be completed and submitted to the Prime Minister for promulgation in 2021. When the strategy is issued, it will be a powerful tool to enhance the effectiveness and effectiveness of state management in the field of chemicals of competent agencies; At the same time, the strategy issued will guide organizations, individuals and enterprises to invest in production and business effectively to promote the fast and sustainable development of the chemical industry.

Currently, there are no regulations on the content, process of making, appraising and approving industry development strategies in general and chemical industry development strategies in particular. Therefore, the development of the chemical industry development strategy lacks legal basis for implementation, mainly learning from the experience of industry development strategies that have been developed before..

1.3. The status of the chemical industry

Vietnam's chemical industry was formed and developed in the 1950s, starting with fertilizer and consumer chemical plants in the North helped by the Soviet Union and China with the aim of providing fertilizers and some chemicals for consumption..

Industries, processing and manufacturing

Security and defense

**Traffic**

Extractive

**Agriculture**

**Environmental Protection**

**Houseware**

**Medical, health care**

**Construction**

**Seafood**

Currently, Vietnam's chemical industry is in the process of developing. The overall chemical industry in Vietnam is divided into 10 main sub-sectors, including: i) petrochemicals; ii) basic chemicals (including chemicals that consume pure chemicals...); iii) fertilizer; iv) petrochemicals; v) rubber, vi) paint - ink, vii) industrial gas; viii) chemical power source (battery, battery); ix) pesticide chemicals; x) detergent products and some other chemicals.

1.3.1. Industrial production value

According to the statistics, vietnam's total annual chemical industry output accounts for about 10-11% of the total gdp of the industry. According to calculations, after the projects are completed and stable operation, the total output of the chemical industry accounts for 12-13% of the whole industry.

According to the results of the survey of production capacity of some industrial products of the Ministry of Industry and Trade, the value of industrial production of the chemical industry in 2019 reached 610 trillion, up 5% compared to 2018, contributing 11.4% of the industry GDP; in 2020 reached 650 trillion, an increase of 7% compared to 2019, contributing 10.7% of industry GDP.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sector code** | **Industrial production index** | **Year 2017/2016** | **Year 2018/2017** | **Year 2019/2018** | **Year 2020/2019** |
| 00 | **The whole industry** | **109.4** | **110.2** | **109.1** | **102.4** |
| 20 | Manufacture of chemicals and chemical products | 109.0 | 108.2 | 106.5 | 107.9 |
| 2012 | Fertilizer production | 108.5 | 103.1 | 99.2 | 105.3 |
| 2022 | Manufacture of paints, varnishes and similar coatings; manufacture of printing ink and mastics | 106.9 | 109.3 | 112.8 | 105.7 |
| 2023 | Manufacture of cosmetics, soaps, detergents, dressings and sanitary preparations | 105.6 | 108.3 | 113.4 | 127.1 |
| 2029 | Manufacture of other chemical products n.e.c | 117.8 | 113.5 | 103.9 | 100.5 |
| 21 | Manufacture of drugs, pharmaceutical chemicals and medicinal herbs | 103.3 | 120.0 | 97.9 | 134.4 |
| 22 | Producing products from rubber and plastic | 114.4 | 103.3 | 114.3 | 104.4 |
| 2720 | Manufacture of batteries and accumulators | 95.9 | 118.8 | 109.1 | 103.3 |
|  | Chemical industry | 107.66 | 110.56 | 107.14 | 111.07 |

1.3.2. Number of enterprises of the entire chemical industry

1) Number of businesses

By the end of 2020, the total number of chemical production enterprises is 1818 enterprises. The number of enterprises by CNHC sub-sectors as of 2020 is presented in the following Table:

 Number of enterprises according to chemicals sub-sectors,

 by the end of 2020

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **TT** | **Product Groups** | **Total number of businesses** | **State enterprises** | **Non-state enterprises** | **FDA** |
| 1 | Fertilizer | 894 | 49,17% | 12 | 10,34% | 880 | 58,20% | 2 | 1,05% |
| 2 | Pesticides | 106 | 5,83% | 50 | 43,10% | 36 | 2,38% | 20 | 10,53% |
| 3 | Petrochemical | 14 | 0,77% | 2 | 1,72% | 0 | 0,00% | 12 | 6,32% |
| 4 | Basic chemicals | 68 | 3,74% | 6 | 5,17% | 59 | 3,90% | 3 | 1,58% |
| 5 | Electrochemical products | 37 | 2,04% | 2 | 1,72% | 25 | 1,65% | 10 | 5,26% |
| 6 | Industrial gases | 48 | 2,64% | 3 | 2,59% | 41 | 2,71% | 4 | 2,11% |
| 7 | rubber | 159 | 8,75% | 5 | 4,31% | 94 | 6,22% | 60 | 31,58% |
| 8 | Detergents | 195 | 10,73% | 5 | 4,31% | 171 | 11,31% | 19 | 10,00% |
| 9 | Paint and ink | 257 | 14,14% | 0 | 0,00% | 197 | 13,03% | 60 | 31,58% |
| 10 | Pharmaceutical | 40 | 2,20% | 31 | 26,72% | 9 | 0,60% | 0 | 0,00% |
| total | 1818 | 100% | 116 | 100% | 1512 | 100% | 190 | 100% |

*Source: Department of Chemicals (National Chemical Database and research team)*

According to the sub-sector: The number of fertilizer production enterprises accounted for the largest proportion with 894 enterprises (accounting for 49%); This was followed by paint and ink with 257 enterprises (accounting for 14.14%); at least petrochemical enterprises with 14 enterprises (0.77%).

|  |
| --- |
|  |

2) Structure of number of enterprises by economic composition

State-owned enterprises had 116 (6%) and foreign-invested enterprises 190 (11%), 1512 non-state enterprises (83%).



If in the period of 2000-2010, the number of non-state enterprises decreased sharply, showing the trend of small enterprises shrinking and foreign-invested enterprises increasing significantly, in the period of 2010-2020, there was a change in the restructuring in the number of chemical enterprises, The number of non-state enterprises increased sharply, state-owned enterprises and foreign investment enterprises increased not much.

The structure of the number of enterprises by sectors also varies between economic sectors..

For state-owned enterprises, the largest proportion is that of enterprises producing pesticide chemicals (43%), mainly agricultural supplies enterprises belonging to localities. For non-state enterprises, the largest proportion are fertilizer producers (58%), mainly small enterprises, producing mixed fertilizers. For FDI enterprises, the largest proportion are those producing ink and industrial gas paints (same 32%)

|  |  |
| --- | --- |
|  |  |

1.3.3. Size and production capacity of chemical sub-sectors

1) Fertilizer industry

The demandforfertilizers in the country is currently about 10-11 million tons of fertilizer of all kinds: Urea fertilizer: 2.3-2.5 million tons; Fertilizer containing Phosphate, including Supelân and molten phosphate fertilizer: ~1.6 million tons; NPK fertilizer: 4.5 - 5.0 million tons (production meets 100% of demand); DAP fertilizer: 600,000 – 700,000 tons; SA fertilizer: 500,000 - 600,000 tons (100% import); Potassium fertilizer: 600,000 - 700,000 tons (100% import); Compost, microbiological, leaf fertilization: ~300,000-500,000 tons (production meets the demand).

|  |  |
| --- | --- |
| TOTAL DOMESTIC DEMAND11 million tons | LOCAL PRODUCTION CAPACITY9 million tons (meet 80%) |
| Urea fertilizer | DAPfertilizer |  Phosphat fertilizer | NPKfertilizer |
| Inorganic fertilizers account for 90% | Organic fertilizers and other fertilizers 10% | Exceeded supply by 400,000 tons | Meet 65% | Meet 100%  | Meet 100% |

- Geographical distribution:

+ The production facilities are concentrated mainly in the southern region (181 out of 288 establishments have been granted GP - accounting for over 62% of the number of enterprises and consumption nationwide), concentrated in some Long An provinces (the most in the country, about 90 establishments, of which 73 have been granted GP), Can Tho, Tien Giang, An Giang and Ho Chi Minh City.

+ Central - Central Highlands region (54 out of 288 establishments have been granted GP - accounting for over 19% of the number of enterprises and consumption nationwide) mainly distributed in Nghe An and Thanh Hoa provinces.

+ Northern region (54 out of 288 establishments have been granted GP - accounting for over 19% of the number of enterprises and consumption nationwide) mainly distributed in Bac Giang, Ninh Binh, Hanoi

- About product types: Concentrated 12 fertilizer groups with the number of products announced as 5620 SP, of which the amount of NPK accounts for the largest proportion

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Fertilizer typetotal | Protein, Urea with additives | Pour melted | Super phosphate | Kali/ Kali Silic | DAP with additives | Other complex stools | NPK compound fertilizer for rooting | Medium | Micronutrients |
| **5620** | **203** | **02** | **18** | **129** | **98** | **64** | **3567** | **467** | **468** |

2) Plant Protection Chemicals Industry

Pesticide products (BVTV) belong to the group of chemical products for agriculture, including such as pesticides, fungic containants; herbicides, termite pesticides, rat poisons, snail pesticides..., hormonal chemicals; growth conditioners, insect repellents, other supportants….

In recent years, the amount of drugs produced and processing in the country has increasingly dominated the domestic market, providing enough for the demand for domestic agricultural production, and participating in exporting to some countries in the region.

In Vietnam, the amount of chemicals used also increases over time, due to the demand of the development of the agricultural sector. The use of many chemical products has contributed to controlling epidemics and pests of crops, increasing the output and quality of agricultural products but has also brought bad consequences for the environment and the community. To minimize their adverse effects, manufacturers are also pursuing product diversification programs, using new active ingredients that are highly toxic to pests but safer for humans and the environment. Microbiological active ingredients and extracts from herbs. In addition, manufacturers have successfully researched the introduction of new forms of processing; Advanced, safe, friendly, and clean to the environment.

According to the product type: Currently, the set of chemical products is allowed to be used in Vietnam by domestic factories produced and imported finished products directly by the Ministry of Agriculture and Rural Development and supplemented annually. This set of products is very diverse, rich, has met the needs of most crop objects.

Agricultural products produced and domestically processing include pesticides, except for fungal diseases, except weeds, hormones, crop growth, storage of treasures in traditional forms such as: Sprinkling powder (D), Seeds (H, Gr), Water Soluble Powder (BHN, SP), Water Absorbent Powder (BTN, WP), Emulsion (ND, EC), Solution (DD, SL)... This group accounts for 80% of all products in circulation. Currently, the forms of agricultural and pharmaceutical processing have also changed in the direction of limiting environmental effects, so there are many more advanced and environmentally friendly forms of processing such as: Concentrated Suspension (HP, SC), Domestic Petroleum Emulsion (EW), Micro-Emulsion (ME), Emulsion (SE), Domestic dispersed seeds (WDG)... This group only accounts for about 20%, most of which directly import finished products or semi-finished products to packaging bottles in Vietnam, only some units invest in domestic production equipment. In general, the technology of processing finished products in Vietnam has made many advances, reaching the technological level of countries in the region..

Small and medium-sized drug production facilities are usually distributed throughout the country, especially in the provinces of the Red River Delta and Mekong River such as Ho Chi Minh City and some southern provinces such as Binh Duong, Dong Nai, Tien Giang, Long An, An Giang, A number of other establishments are scattered in Hanoi and some northern, central and local provinces throughout the country.

In terms of size and production capacity: The majority of active ingredients for processing production still have to be imported. Organic synthesis technology in our country has not developed, so it has not been proactive in providing active ingredients for domestic demand. Currently, only two joint ventures under Vietnam Antiseptic Joint Stock Company have factories producing active ingredients: KOSVIDA Agricultural and Pharmaceutical Co., Ltd.: specializing in producing 02 main pesticide active ingredients of cacbamate group such as Carbofuran KT 95% and 75%, BPMC KT 95%. In addition, the finished production of glyphosate herbicides, isoprothiolan insecticides... This is a joint venture between VIPESCO and South Korea, with a capacity of 3,500 tons per year; VIGUATO Agri-Pharmaceutical Co., Ltd. (a joint venture between VIPESCO and China) specializes in producing validamycin active ingredient according to probiotic fermentation technology, with a capacity of 5,000 tons per year. The plant has a decent average level of technology and equipment in the region. It is expected that in the future the factory invests in technology equipment to produce Validamycin 5-10% tan powder.

3) Petrochemical industry

In recent years, the petrochemical industry has been focused on developing to improve the value of resources and meet the increasing demand of the market. However, the development achievements of this field have not yet reached the desired level. Currently, Vietnam has only produced urea protein from natural gas raw materials, PVC, DOP plastic additives, fibrous fibers from imported intermediate materials, building Dung Quat Polypropylene factory. Some other petrochemical projects are about to be put into operation such as Nghi Son Petrochemical Refinery Joint Project or are investing (Southern Petrochemical Complex project in Long Son).

Plastic Products (Plastics)

Plastics are petrochemical products obtained from the polymerization of olefine compounds (or compounds). This is an important material for the production of a variety of goods used in the fields of economy and life.

Starting in the 1980s, plastic products were originally crudely crafted with molding equipment to meet the demand for goods that were scarce at the time. Since the State's policy of opening up and transitioning to a market economy, the plastic industry has started to grow strongly. Besides state-owned enterprises is the development of the private sector engaged in production and business. Instead of manual equipment is the trend of entering synchronous production lines and applying high technology to produce quality items and beautiful designs to meet the diverse needs of consumers.

The development of the plastics industry sharply increases the demand for raw materials produced mainly products from petrochemical processes. In 2010, polypropylene resin bead factory in Dung Quat using Mitsui's world-leading copyright technology was completed and put into production with a capacity of 150,000 tons / year polypropylene plastic with the main material derived from Propylene source of Dung Quat Oil Refinery, According to the product assessment of the factory will meet 30% of the domestic demand for this plastic.

Currently, PVC is produced in the country. There are two PVC factories located in the Southeast region that are the region where the largest concentration of plastic production and trading facilities (accounting for 80% of the country's plastic production) and also the area with the largest market consumption in the country.

 The first PVC factory located in Dong Nai, which has been in operation since 1998, is a joint venture between TPC Group (Thai Plastic and Chemicals Public Company), Vinachem (Vietnam Chemical Corporation) and Vinaplast (Vietnam Plastics Corporation) in which TPC holds a dominant stake. The initial design capacity was 80,000 tons per year, then increased to 190,000 tons per year.

 The second PVC plant located in Phu My is part of a joint venture between Vietnam Oil and Gas Group (43% capital), Ba Ria - Vung Tau Technical Supply and Services Company (6.7% capital) and Petronas Malaysia Group (50.3% capital). The factory has been in operation since January 2003 with a designed capacity of 100,000 tons per year. Due to the inefficient economic activities of the joint venture, The Vietnam Oil and Gas Group ceded its stake to Petronas in June 2007.

Both factories use imported vinylcloride monomer (VCM) materials, which are supplied by the foreign partners in the joint venture. Located in Vung Tau, Polystyrene Vietnam factory has a designed capacity of 128,000 tons per year, using imported styrene monomer raw materials, producing two main products, EPS and PS, of which 65% of the output is consumed domesticly, the rest is exported..

DOP is a product obtained through the synthesis of organic matter obtained from petrochemicals. The DOP market is supplied mainly from domestic sources, produced by LG Vina Chemical Joint Venture Company. This is a joint venture company that operates relatively effectively in the petrochemical sector today. DOP factory is located in Dong Nai province with a designed capacity of 30,000 tons / year and has been in production since October 1997.

PP, PE: This is a product that has attracted many investors in recent years. Nghi Son petrochemical refinery project entered into commercial operation at the end of 2018, can produce 380,330 tons of PP plastic particles, 158,775 tons of benzene, 525,600 tons of p-cylinders. Hyosung Vina Chemical Co., Ltd.'s Polyprolylene (PP) and Underground Storage Plant project has completed phase 1 of production of 300,000 tons of PP per year, the second phase of which will increase the capacity to 600,000 tons of PP per year and will be completed in 2021. Long Son Petrochemical Refinery Complex with a capacity of 420,000 tons of PP/year; 1.05 million tons of PE per year is expected to be completed in 2022. Phu My Polypropylene plastic bead factory of 300,000 tons pp per year is started in 2021.

Other major products from petrochemicals for the plastics industry Acrylonitril Butadien Styren (ABS), ... They all have to be completely imported. Our plastic industry needs about 1.7-1.8 million tons of plastic as raw materials every year, but domestic production capacity is very limited, to meet about 10%. Therefore, it is necessary to promote plastic production projects, one of the directions is to be maximumly engaged with oil refining projects to take advantage of the basic petrochemical raw materials from these projects..

Fiber: Up to now, the domestic fiber has not produced synthetic fibers directly from petrochemicals. In the market mainly consume imported synthetic fibers, especially Polyeste fibers (accounting for over 90%) and small amounts of other synthetic fibers such as polyacrylic, polyamide,... Therefore, the production of synthetic fibers from petrochemicals to proactively source raw materials for textiles is necessary. In order to meet the market demand, PetroVietnam has joint ventured with Vinatex to invest in the construction of Polyester Dinh Vu Synthetic Fiber Factory (PVTex) in Hai Phong to produce synthetic fibers with a capacity of 175,000 tons of fiber per year and use advanced technology, copyright of Uhde Inventa - Fischer (Switzerland) has been certified by Hai Phong Department of Science and Technology. No. 09/QLCL dated October 1, 2009. PTA and MEG raw materials are initially imported, then will be gradually replaced with domestic materials when Nghi Son Petrochemical Refinery Complex comes into operation. However, for various reasons the Synthetic Fiber Factory (PVTex) was suspended in 2015.

Formosa Industrial Company of Taiwan has built a factory to produce, process and process imported polyeste materials in Dong Nai, the product is Polyeste fibers with a capacity of 38,000 tons of products per year. Regarding the quality of Formosa Company said that domestic products are of the same quality as imported products and meet consumer requirements.

In general, the characteristics of synthetic fiber production are that investors mainly import raw materials or sell products to be fabricated into woven fibers according to the different types size requirements of the market. Therefore, the economic efficiency of factories is not high..

Some other petrochemical products

- BTX consumed in Vietnam is mainly used as an intermediate to synthesize other intermediate chemicals such as styrene (PS plastic synthesis), PTA (PET fiber synthesis) ,...; making solvents and laboratory chemicals. Currently, all demand for BTX is fully met by imports from countries such as China, Singapore, South Korea, Taiwan, Thailand,....

Synthetic rubber: Currently, the world market consumes the most styrene-butadien (SBR) rubber, obtained from the polymerization process of butadiene and styrene. In addition, the market also circulates some other synthetic rubbers such as chloroprene rubber (CR), ethyl propylene dien monomer (EPDM) rubber ,... The advantage of synthetic rubber is that it is better weather-affected than natural rubber and when it comes to product value is much cheaper (difference of nearly $ 100 / ton).

Up to now, Vietnam has not produced synthetic rubber from petrochemicals and every year our country still has to import synthetic rubber from some countries such as Japan and South Korea,... to mix with natural rubber production rubber products.

Linear Alkyl Benzene (LAB): Among organically sourced surface-operated cleaners, LABS (Linear Alkyl Bezene Sulphonate) is the most commonly used and accounts for the highest proportion of production in the world. LABS is synthesized from lab sulphonatization. Refineries will be a source of basic chemicals such as benzene, n-alkan for LAB synthesis for the purpose of producing LABS detergents. Currently, our country has not produced LAB from petrochemical processes, so it must be imported, mainly from Singapore, Thailand, South Korea,...

Up to now, Vietnam's petrochemical industry is still quite young with about 9 production plants and mainly focuses on a number of products such as urea, PVC, PP and fiber fiber, of which Polyester Dinh Vu synthetic fiber factory is currently suspended from 2015 to now. In general, with the current production capacity, the petrochemical industry only meets a small part of domestic consumption needs.

4) Basic chemical industry

In Vietnam, the production situation of chemicals in general and basic chemicals in particular in our country is in the process of development. In fact, Vietnam's HCCB production is mainly focused on a number of inductless products (such as acids, caustic oilseeds), basic organic chemical products In Vietnam initially also have some products with small capacity scale because the domestic petrochemical industry is in the development stage.

In the period of 2010-2020, the production of basic chemicals in the country meets the majority of the domestic market demand for some basic chemicals, mainly caustic and insoperable acids (Sulphuric acid, hydrochloric acid, phosphoric acid). Part of some of those major chemicals and some other basic chemicals for many reasons still have to be imported. Specifically for some of the following products:

*About caustic:* Domestic production meets the needs of manufacturing sectors such as paper, textiles, soap, water treatment, tanning and sillicat. Some production facilities (local paper factories far from caustic production facilities; small facilities producing silicate, food ...) still use imported caustic oil, because the use of low-content liquid caustic oil by domestic factories has made the product cost team due to high transportation costs, Bulky treasure.

*In terms of soda:* Manufacturing sectors such as glass, detergents, sodium silicates have a great demand for soda. In recent years, demand has averaged about 380,000 tons per year, of which:

Glass industry: 60% of total demand.

Detergent manufacturing industry: 20% of total demand.

Chemical manufacturing (silicate): 10% of total demand.

Other consumers: 10% of total demand.

But there are no domestic production facilities, so they have to be imported..

*Regarding small inorganic chemicals:* as mentioned above, because we have raw materials for production, production technology is not very complicated (except for some types such as titanium oxide, bicromat, electrolyte manganese oxide ...), the market has not great demand, so in general, the chemical industry has organized production to meet the maximum demand of the domestic market.

*Regarding pure and pure****chemicals:***  the majority of common pure inyaliencies, the chemical production facilities of the industry have been on the basis of salt roots such as sulfate root, chlorine root, phosphate root, carbonate root, silicate ... being produced, or from imported industrial chemicals that have organized production, meet quite fully the needs for domestic research and analysis.

*Some other in innocuous chemicals:* due to insufficient production, inability to produce or high prices, poor quality ... such as sodium sulfate, bicromat, sodium polyphotphat, titanium oxide, electrolyte manganese oxide, quite a variety of water treatment chemicals, etc. imported from dominant markets such as China, Taiwan.

Prior to 2000, HCCB manufacturing enterprises concentrated mainly in the state-owned sector, mainly member units of Vietnam Chemical Corporation (now Vietnam Chemical Group), but the number gradually decreased due to the conversion of ownership to equitization. In addition, many joint-stock companies have also been established, boldly built and expanded factories, invested in new technology equipment, improved the quality and type of products.

As of the end of 2020, Vietnam has about 68 enterprises producing HCCB products, with different economic components. The majority are production facilities belonging to the state economy and the state capitalist economy. These are subsidiaries (State capital accounts for 51÷100% of charter capital), affiliated companies (State capital accounts for less than 50% of charter capital) of Vietnam Chemical Groups (VINACHEM), Vietnam Coal - Mineral Industry Group (VINACOMIN), Vietnam National Oil and Gas Group (PVN). The number of HCCB production establishments belonging to the collective and private sectors, although there is but the output of products accounts for a small proportion.

Table 1. 1: Types of basic chemicals products

| TT | Classification by basic chemicals products  |
| --- | --- |
| 1 | Inorganic basic chemicals | If dividing enterprises by product group, the number of enterprises producing organic HCCB products (Binh Son Petrochemical And Refining Co., Ltd. produces propylene products) accounts for only 1% compared to 99% of enterprises producing innocuous HCCB products in the total number of enterprises. In the innocuous HCCB product group, innocuous salt producers accounted for over 35%, acid producers accounted for about 28%, hydroxide products accounted for 16%, 16% belonged to enterprises producing other HCCB products (Sulfur, Yellow Phosphorus, Liquid Chlorine) and 4% including enterprises producing oxide products.. |
| 1.1 | Acids of all kinds |
| - | Acid HCl |
| - | Acid H2SO4  |
| - | Acid H3PO4  |
| - | Acid HNO3 |
| 1.2 | Ocid |
| 1.3 | Hydroxit |
| - | NaOH |
| - | NH3 / NH4OH |
| - | Al(OH)3 |
|  |  |
| 1.4 | Inorganic salt |
| 1.5 | Other |
| - | Liquid Chlorine |
| - | Yellow Phosphorus  |
| - | Sulfur |
| 2 | Organic basic chemicals |
|  | Total |

Some of the main products:

*Causite (sodium hydroxide – NaOH):*

It is one of the key products of the CNHC industry. Caustic is used extensively in the production of paper, textiles, soaps and detergents, water treatment, in food (cooking oil, sugar production, starch, MSG), tanning and sillicat production. It is also used in the processing of bauxit (Bayer process) to produce aluminum hydroxide and aluminum oxide. According to statistics, the country has 5 liquid caus tough potions production facilities at concentrations of 32%, 45% and no solid caus tough caus tough potions. Total production capacity is about 163,000 tons / year (converted to 100% caus gong). Specifically as follows: Viet Tri Chemical Joint Stock Company (VINACHEM subsidiary); Bien Hoa Chemical Factory (under Southern Basic Chemical Joint Stock Company – a subsidiary of VINACHEM); Causite workshop of VEDAN Vietnam Limited; Causpite-chlorine workshop of Bai Bang Paper Factory; East Asia Joint Stock Company

Sulfuaric acid products (H2SO4): Sulfide acid is used mainly in the following industries: fertilizer production, ore processing, chemical synthesis, petroleum refining, metallurgy, food processing (in sugar, MSG), tanning; in the processes of producing water purification alums, textile dyeing, water treatment, battery manufacturing...

The major sulphuric acid production facilities of our country are now mostly member units of Vietnam Chemical Group, such as Supe Phosphate and Lam Thao Chemical Joint Stock Company, Supe Phosphate Long Thanh Factory (under Southern Fertilizer Joint Stock Company), Tan Binh 2 Chemical Factory (under Southern Basic Chemical Joint Stock Company), DAP-VINACHEM JOINT STOCK COMPANY, DAP No. 2 VINACHEM Joint Stock Company. There are also a number of other units besides VINACHEM such as Lao Cai Fertilizer Chemical Joint Stock Company, Phuc Lam Chemical Joint Stock Company and some other companies of Vietnam Coal - Mineral Industry Group (VINACOMIN; Lao Cai Fertilizer Chemical Joint Stock Company, these two units are located in Tu Loong Industrial Park in Lao Cai Province

Phosphoric acid products (H3PO4): Phosphoric acid in Vietnam mainly for the production of fertilizers and animal feed, a small amount of pure phosphoric acid is used in the pharmaceutical and food industries. Currently, there are 5 photphoric acid production enterprises: Two subsidiaries of VINACHEM, DAP-VINACHEM JOINT STOCK COMPANY and DAP No. 2 VINACHEM Joint Stock Company, have a production line of 162,000 tons per year to produce DAP fertilizer.

Dong Nai Chemical Plant belongs to Southern Basic Chemical Joint Stock Company (VINACHEM subsidiary). In 2000, the factory was invested by Southern Basic Chemical Joint Stock Company in the production line of H3PO4 acid engineering with a capacity of 2,500 tons / year, in 2002 the capacity was raised to 7,000 tons / year. In order to diversify products and expand the market, in 2005, the factory invested in more food H3PO4 production lines with a capacity of 3,000 tons per year (the input material is technical phosphoric acid). There is also Duc Giang Laundry Powder and Chemical Joint Stock Company and its affiliated companies. Specifically: Duc Giang Laundry Powder and Chemical Joint Stock Company is maintaining the production of 10,000 tons of food phosphoric acid line/ year; Lao Cai Fertilizer Chemical Joint Stock Company owns a 100,000-ton/year phosphoric acid line to produce TSP and MAP fertilizer products (expected to be raised to 160,000 tons per year) in the second phase.

*Yellow Phosphorus Products:*

By the end of 2020, Vietnam has 7 gold phosphorus factories all built in Lao Cai province, the capacity of each plant is small, in the range of 2,000 to 20,000 tons / year, with a total capacity of about 74,000 tons / year; The product is mainly for export, partly for the production of other chemical products. With the demand in the world is huge and in the future domestic demand tends to increase sharply, the development of the construction of a gold phosphorus factory is necessary. Existing factories include: Lao Cai Golden Phosphorus Joint Stock Company is operating a stable production plant of 2,000 tons per year; in December 2013, the company put into operation additional production line of 10,000 tons per year, bringing the total capacity to 12,000 tons per year. Vietnam Phosphorus Joint Stock Company (under Vietnam Basic Chemical Joint Stock Company – a subsidiary of VINACHEM) owns a production line of 6,000 tons per year of gold phosphorus, the first phosphorus products were born at the end of 2005. Lao Cai Southeast Asia Co., Ltd. is operating 2 gold phosphorus production lines, total capacity of 18,000 tons / year including 1 line with a capacity of 8,000 tons / year, in 2013 the company put 01 gold phosphorus production line with a capacity of 10,000 tons / year into operation.

Duc Giang Lao Cai Chemical Joint Stock Company (a subsidiary of Duc Giang Laundry Powder and Chemical Joint Stock Company) is operating a two-line gold phosphorus factory with a total capacity of 18,000 tons per year. Vietnam Golden Phosphorus Co., Ltd. with a production line of 10,000 tons per year, tested in August 2013. Nam Tien Lao Cai Joint Stock Company has just put into commercial operation nam Tien Golden Phosphorus factory with a capacity of about 10,000 tons / year in Lao Cai.

*In innocuous salts, in innocuous oxes:*

In innocrine salts, in innocuous oxididils cover many types and are widely used in many fields of production. The section below describes only some types that we have been producing industrially, in order to meet the needs of some production fields such as movies, food, water purification, construction, pharmaceutical production, paper production, rubber products, laundry detergent, laundry cream ... The production has more or less limited the import of common inductductible chemicals with a small demand that we have raw materials to produce.

Organic HCCB products: In fact, Vietnam's basic chemical production is mainly focused on a number of in inophysitive products (such as acids, caustic oil), vietnam organic HCCB products initially also have some products with small capacity because the domestic petrochemical industry is in the development stage.

Assessment of production scale and capacity

The period of 2010-2020 before the increasing demand of industries for basic chemical products such as causze, acids of all kinds and some other products such as Ammonia, Soda ... The chemical industry has made great efforts to invest in production development, gradually raising the scale to product quality to solve this important source of chemicals, in general, the scale and production capacity of some HCCB products has increased significantly, although still small compared to the huge scale of developed countries in the world, But basically meeting the requirements of the country's technological and economic development, some products have been published to the markets of the same region and the world.

However, the aggregate data shows that the chemical industry over 10 years has developed only focus on some insemical HCCB products such as causcus-chlorine, sulphuric acid, phosphoric acid and some other inductile chemical products, associated with the development of the fertilizer product group. For the organic HCCB product group, since 2009 after the 150,000-ton-per-year Propylen separator of Dung Quat Refinery has been put into operation, there have been no new products, large-scale refinery and petrochemical projects are still in the investment phase or suspended due to low economic efficiency and difficulties. About the ability to arrange capital.

However, with a production capacity of about 163,000 tons per year, if per capita about 2 kg, it is still too small compared to many other countries; In many countries in Eastern Europe such as Hungary, Bulgaria, Czechoslovakia, more than two decades ago reached 18-33 thousand tons per year, an average of 150-300 kg / per capita. This is partly influenced by the development of the petrochemical industry in Vietnam..

5) Electrochemical products manufacturing industry

In general, batteries and batteries manufactured by Vietnam only meet the common needs of the domestic market. Specifically:

Common batteries (R6 and R20) meet about 90% of demand.

Batteries already meet about 70% of the demand for cars and 50-60% of the demand for motorcycles.

Other special products such as batteries, batteries for post and telecommunications, batteries for computers, watches, cameras ... Currently, the country has not been produced but is still dominated by foreign products.

Although production capacity is limited in both output and product type, Vietnam's chemical power products have also been exported (mainly batteries). The export market is mainly to Cambodia, Middle East, Brunei, Hong Kong, Nigeria, Algeria, Egypt, Saudi Arabia, Yemen, Myanmar ...

In our country, there are currently only two main types of chemical power sources with currently copyrighted technology from reputable manufacturers in the world. In recent years, many new manufacturing companies have competed with state-owned manufacturing companies in both output and quality. The main product groups are being focused on domestic production such as:

Alkaline batteries (alkaline power generation Mn/Zn battery) with a majority ratio and salt batteries (salt-insulated Mn/Zn battery) are still maintained production due to market demand.

Maintenance Free (MF) airtight lead-acid batteries.

Dry charged battery.

The field of use of these power sources can be summarized as follows:

Battery: boots, lighting, radio, radio...

Battery : lighting, radio, camera, electric clock, toy…

The battery manufacturing sector has grown strongly in the fierce competition between businesses. The number of new companies entering the industry with careful preparation and investment is constantly increasing. In addition, battery products imported from foreign markets are also increasing to create fierce competition with domestic products.

There are also a number of joint ventures, foreign-invested enterprises and some small, manual manufacturing private companies (these private companies have outdated technology levels and small production scales so there is not much competitiveness).

If you compare the output of batteries and batteries produced by state-owned enterprises in recent years with the total output of economic components, we see that the market previously dominated by state-owned companies is now gradually shifting to joint stock companies and 100% foreign capital due to significant investment in technology as well. Like production capacity.

Judging by the product structure of the industry, the number of enterprises producing batteries for motorcycles accounts for up to 40% of the total number of specialized enterprises. While battery manufacturers account for only about 20%, the remaining 20% is for the group of enterprises producing batteries for cars and other batteries..

6) Industrial gas industry

Industrial gas is an important manufacturing sector in the Chemical Industry. Industrial gases include oxygen, nitrogen, acetylene, argon, compressed air, N2O, helium, hydrogen and mixed gases. plays an essential role and is widely used in many fields: oxygen for breathing is used in the medical field for treatment and health care for patients. Industrial gas, on the other hand, is widely used in many industries. Oxygen, axêtylene used in metal cutting welding industry, new construction and repair of ships, steel rolling smelting industry; Nitrogen used in frozen food processing industry, pharmaceutical industry, electronics industry, gas pipeline cleaning and some rubber storage application technology, special steel, floating glass manufacturing, fertilizer production ...

Along with the development trend of the economy, especially in the period of industrialization and modernization of the country, the industrial gas industry is also being invested in development commensurate with its role and importance in the national economy.

Industrial gas products consist of 2 forms of liquid and gas, with many different levels of quality, the demand for investment capital for each form, quality level is also different, so the current production of industrial gas in Vietnam has the participation of many economic sectors. Each economic component depends on the ability of capital, technology that has an approach suitable to the ability to provide to meet customer needs in terms of product quality and output.

Producing oxygen, nitrogen, argon directly into liquid form with oxygen content of 99.3%-99.6%, nitrogen and argon content above 99.999% requires large investment capital, modern technology lines, at this time there are foreign suppliers participating that is Messer Group German technology line capacity of 16,500 m3/h, Air Liquyde Technology Line of France with capacity of 14,000m3/h, Viet Nhat Gas Company (VIJAGAS) with a capacity of 17,500 m3/h. Producing oxygen and nitrogen in the form of gas with an oxygen content of 99.3 - 99.6% nitrogen content above 99.99%; liquefyed oxygen and nitrogen products to meet market demand, require advanced medium technology techniques, moderate investment capital needs suitable for state-owned enterprises. Since 1999, Sovigas, a member of The Vietnam Chemical Corporation, has invested in six production lines spread across three regions. Currently, the company's production capacity is about 8,000 m3/h. In addition, it must be mentioned that some other joint stock companies have modernized and innovated technology to meet the increasing demand of the market. Producing oxygen and nitrogen in the form of gas with oxygen and nitrogen content of 98-99%, satisfying the needs of customers without high quality requirements, technology requirements, low investment capital needs, so there is the participation of many economic sectors, especially the private sector mainly serving the needs of local economic development. Production capacity is estimated at 12,000 m3/h.

Currently, industrial gas products processing and trading enterprises of different sizes operate in all territories to meet the economic development and social needs of all regions. However, the main focus is in zones 2 and 5 where the key industrial regions of the country account for 71%, zone 3 accounts for 14% and other regions account for only 15%.

The industrial gas market in Vietnam so far, the production capacity has met the demand for use. Since joining the World Trade Organization the world's leading industrial gas producers of Germany, France and Japan have invested in modern technology and quickly invested in expanding and dominating the market, pushing domestic producers with outdated or bankrupt technology or having to shrink the market or convert into distribution agents for foreign companies..

7) Rubber products manufacturing industry

Production and trading of rubber products in the period of 2010-2020 have the participation of all economic components of different scales. Among the state-dominated enterprises, 3 enterprises are members of Vietnam Chemical Group (VINACHEM): Gold Star Rubber Joint Stock Company (SRC), Da Nang Rubber Joint Stock Company (DRC), Southern Rubber Industry Joint Stock Company (CASUMINA) – and these are also 3 key enterprises of domestic enterprises producing rubber products. The group of 100% foreign-invested enterprises (FDI enterprises) has 27 enterprises, among them big names in the world tire manufacturers such as Bridgestone, Kumho, Cheng-shin, Kenda, Yokohama, Sailun, Inoue ... Have invested in building a tire chip factory in Vietnam. 61 enterprises belonging to other economic sectors are classified as non-state enterprises..

Domestic rubber products produced, grouped according to technical and technological nature, use nature and main output, including:

Automotive tires consist of subgroups:

Heavy truck tires & bus [Truck & Bus Tires].

Light Truck Tires & Small Passenger Tires

Passenger Car Tires.

Tractor tires, agricultural tires (with low output rates should be statistically general with automobile tires).

Industrial tires, otr (off the road) (tractor trucks, forklifts, excavators, construction vehicles, mining vehicles... ).

Motorcycle tires (including motorcycle tires, trolley tires - trailers).

Bicycle tires (including cyclo tires, carts).

Car toothpicks (including tractor toothpicks).

Motorcycle toothpicks (including motorcycles).

Bicycles of all kinds (including pedestals, carts).

Technical rubber products: Includes types of rubber products with special features requirements, whose range of industrial applications is different from conventional civil rubber products: Conveyor belts; Cua-roa wire (drive belt); Other technical rubber products (gaskets, cushions and other types of vehicle parts, machine parts).

In the context of the world's rubber production capacity is very large, but the demand of vietnam's domestic market is still modest, the scale and production capacity of our rubber factories are planned and built by manufacturers and investors in accordance with the consumption capacity, supply and demand of the domestic and export markets. Rubber products have special feature requirements different from ordinary civil rubber products, collectively known as technical rubber products, due to the complex characteristics of product types and production technologies, so few enterprises with state capital are subject to production investment, for example, two types of products in high demand in the technical rubber product group are conveyor belts and cua-roa wires: on an industrial scale only Ben Thanh Rubber Joint Stock Company (BERUBCO) produces both conveyor belts and crab-roa; Two more companies are Rubber Co., Ltd. 75 (Rubber 75) formerly Z175 Factory of the Ministry of Defense and SRC has conveyor production lines. However, FDI enterprises have been present dongil rubber belt vietnam (Dongil) of Korea and Sanwu Rubber Co., Ltd. of Taiwan also participated in supplying this product..

Regarding the line of tires, the main product in the rubber product group, in general, the output of domestic enterprises has been balanced by enterprises to meet domestic demand and part of export according to the niche market opportunities obtained. The output of FDI enterprises is mostly exported, contributing mainly to making Vietnam a super tire exporter since 2010. The line of conveyor belts and crab-roa wires due to having to compete with foreign goods, especially price competition with Chinese goods, so production output is limited. The line of technical rubber products is produced mainly in non-state enterprises and FDI due to the very diverse and complex characteristics of the type of product specifications that the new output statistics achieve at a relative level of data. In fact, in the past years, the group of enterprises specializing in manufacturing technical rubber products has had a basic output to meet the demand for: machine parts (gaskets, rubber couplings, damping cushions); auto parts - motorcycles; solid wheels; oil and gas industrial pipelines; river dredging vessel tube; industrial floor coverings, etc. for major domestic customers such as Honda Vietnam, Vietnam Motorcycle Parts Manufacturing Company (VAP), Vietsopetro, Petroleum Services Corporation (PTSC), Saigon Beer Corporation ... There are also exportable enterprises such as Thanh Binh Rubber - Plastic Co., Ltd ( PERUBCO) in Ho Chi Minh City exporting 65% of production output; SRC's technical rubber products are exported to the United States, CASUMINA's products are exported to Japan. Rubber glove products, thanks to the advantages of abundant rubber latex raw materials, the product is of good quality, the output satisfies domestic and export demand.

8) Detergent industry

During the 1990s, the market for soaps and laundry creams in our country was messy, product quality was low, and management was relaxed. The presence of multinational corporations with famous brands with modern financial and technological capacity such as Unilever, P&G ... Has created fierce competition in the market of detergents of our country. After a few years most domestic enterprises accept processing for foreign-invested enterprises, or accept bankruptcy, merger, sale or transfer of other industries..

Currently in the cleaning industry of Vietnam, it can be seen that joint venture companies have foreign investment, production lines are equipped relatively modern, the capacity of large lines. However, some joint ventures still hire product processing to take advantage of the production capacity of domestic production facilities. Synthetic cleaners, including cleaning and personal hygiene products, are among the important product groups of the chemical industry. Thanks to the advancements of science and technology and with the development of society, cleaning products have increasingly developed and become indispensable products in human life. In addition to serving human consumption, detergents are directly involved in many stages of industrial production. Today, personal cleaners and hygiene are very conditional on development due to the increasing demand in production and life.

According to the scope of use of detergent products are divided into 2 groups: domestic use and personal hygiene. Specifically, these include: laundry detergents, scented soaps, detergents (for household and industrial use). Cleansers for personal hygiene needs include skin care products such as cleansers, shower gels, lotions, skin health oils, other skin care products. Hair care products: shampoos, hair conditioners and hair care products... Oral hygiene products: toothpaste. Increasingly diverse detergent products satisfy the different needs of consumers, but it is generally possible to divide the group of detergent products including 6 product groups accounting for a large proportion in the detergent manufacturing industry as follows: laundry detergent; fragrant soap; Shower gels, cleanser, skin care products; shampoo, hair conditioner, hair care products; toothpaste and scrubbing water.

In the past period, the market for production and trading of detergents in our country has been very active. Thanks to the open policy mechanism of the State has created conditions to encourage veteran economic sectors to invest in production and business.

With the presence of multinational corporations in the field of manufacturing cleaning products for home care and body hygiene products such as Unilever, P&G, Kao, Colgate - Pamolive, Dial, LG ... invest in the construction of manufacturing plants in Vietnam, so that the cleaning and personal hygiene products produced by domestic enterprises have met the demand for consumption.

In 2016, Tayca Vietnam's surface active substance factory was inaugurated each year producing 25,000 tons of surface active substance products for the production of shampoos, cosmetics and detergents..

9) Paint industry - ink

Vietnam's son industry, after achieving stable development during the financial crisis in Southeast Asia from 1997 to 1999 with a growth rate of 15-20% per year, starting from 2000 to 2010, developed at a stable rate of 5-10% in paint and 15-17% in ink. In 2008 alone, there was a threefold increase in external direct investment ($64 billion) in 2007, focusing mainly on three main areas: heavy-light industry, infrastructure construction and real estate. This financial flow is and has created more perfect conditions for the coating industry to develop, especially the protective paint industry, followed by construction paint followed by roll paint and traffic paint. Floor paint and waterproofing paints are also considered potential areas of development in the future..

It can be said that the high-speed development of output, new technologies and improving product quality has created a spectacular picture of vietnam's son industry development in this period. The following are some common paint types: construction paints; Anti-rust paint; Industrial paint; Woodworking; Traffic paint; Other paints: refurbished car paint, can paint, plastic paint, floor paint, road line paint ...

In which construction paint manufacturers account for a large proportion of about 39%, industrial paint 26%, wood paint 18%, anti-rust paint 13% and finally traffic paint 3%.

Unlike many years ago, most of the ink is imported from abroad, now most common ink products are produced in Vietnam and the quality almost meets modern and current requirements. Current ink lines include:

Offset ink: usually oil system such as vegetable oils, mineral oils

Copper pipe ink: solvent system, alcol system, water system

Soft mold ink: alcol system, water system

Silk ink: oil system, solvent, water

Inkjet ink: solvent system, water system

In which offset ink manufacturers accounted for the largest proportion of 51%, followed by zinc mold ink 31% and soft mold ink 17%.

Up to now, most of the world's major paint companies such as Akzo Nobel/ICI, PPG, Sigma Kalon, Sherwin William, Valspa, Nippon in the form of 100% foreign capital investment or manufacturing cooperation with Vietnamese Paint Companies.

In terms of ink, most of them are private companies, shares participating in the market such as: Dy Khang, Duc Quan, Saprimco, Binh Khanh, Saigonmic, Tan Indochina, Tan Viet Sinh, Vinita, Synthetic Ink, Tan Song Long ... and companies from abroad such as Sakata, Toyo Ink, DIC, Imei, HMK ... The ink production facilities are of small type, with a capacity of from several tons to several thousand tons per year.

In terms of scale and production capacity, in recent years, thanks to attracting foreign investment, Vietnam's paint industry has made remarkable progress, paint production facilities have increased their capacity to several thousand tons to several tens of thousands of tons per year.

The total production of paint produced in the country is about 500,000 tons, if including individual production and business establishments is estimated at 600,000 tons, meeting about 80% of the demand. In which construction paint accounts for a large proportion of 57%, followed by wood paint 19%, industrial paint 15% and finally anti-rust paint 5% of the total output of the whole industry..

Because paint production technology in Vietnam has not been able to meet the standards of some high-end paints such as powder coating, steamed paint ... therefore, it still has to be imported from markets from Taiwan, Indonesia, China and Thailand.

10) Pharmaceutical chemistry

The Pharmaceutical Chemistry Industry is the industry that produces raw materials for making medicines (active ingredients with therapeutic effects), excipiers and additives (slippery additives, attachment additives) ...

Due to historical characteristics, due to various objective and subjective reasons, it is possible to assess that Vietnam's pharmaceutical industry has not really been developed. The scale of Vietnam's pharmaceutical industry is small, the product type is still poor. The product value of the pharmaceutical industry is still low, using outdated technology, slow development, the output of some pharmaceutical chemical products tends to decrease, develop disproportionately, does not meet the increasing demand of the pharmaceutical preparation industry.

Currently, Vietnam's pharmaceutical industry has not produced its own raw materials to meet the needs of pharmaceutical preparation. Most pharmaceutical raw materials must be imported, depending on the price dominance of pharmaceutical corporations around the world. The majority of basic chemicals, intermediate chemicals still have to be imported.

Up to now, there are only 02 pharmaceutical chemical production facilities: Viet Tri Pharmaceutical Chemical Plant, Phu Tho with a design capacity of 200 tons / year of inornical and adjune pharmaceutical chemical products; Mekophar company in Ho Chi Minh City produces antibiotic raw materials, designed capacity of about 200 tons / year Amoxillin and 100 tons / year Ampicillin. The products of domestic pharmaceutical production units are mainly innocuous, low-value conventional adi colts with small yields. Pharmaceutical chemical enterprises can only produce some simple innate and organic pharmaceuticals such as ether, clorofoc. A large part of the pharmaceutical industry is the production of the main adiology, which has not yet been developed even though we have abundant natural resources to produce them.

Particularly in terms of chemicals from natural and semi-synthetic compounds, some units have been involved in the production of a number of mainly Artemisinin and derivatives. However, the production of Artemisinin and derivatives in particular, the active chemicals from nature in general are limited and there are many inadequacies due to unstable raw material sources, not yet planned raw material production area. Some precious natural medicinal resources are exploited in a depleted way, lacking conservation and development strategies. The table below shows the list of domesticly produced pharmaceutical chemical materials, the majority of pharmaceutical chemical materials are basic inornical chemicals, except for 02 antibiotics.

List of domestic-produced pharmaceutical raw materials

| **TT** | **Pharmaceutical raw materials** | **TT** | **Pharmaceutical raw materials** |
| --- | --- | --- | --- |
|  | Canxi Clorit tiêm |  | Canxi cacbonat |
|  | Magie Sunfat tiêm |  | Bari sunfat |
|  | Magie Sunfat uống |  | Natri citrat |
|  | Magie cacbonat |  | Canxi hydrogenphotphat |
|  | Magie stearat |  | Magie lactat |
|  | Magie trisilicat |  | Vôi sô đa |
|  | Natri clorit tiêm |  | Terpin hydrat |
|  | Kali clorit uống |  | Cồn tuyệt đối |
|  | Kali clorit tiêm |  | Dietylphthalat (DEP) |
|  | Săt II Oxalat |  | Ampicillin |
|  | Canxi sunfat |  | Amoxicillin |

Source: Drug Administration – Ministry of Health

The above-mentioned pharmaceuticals are mainly extracted at some pharmaceutical establishments, recently some companies have invested in building relatively large refraction facilities such as Vietnam Chemical and Pharmaceutical Company, Domesco Company. The table below lists the raw materials and pharmaceutical chemical products extracted from medicinal herbs and semi-synthetic.

List of pharmaceutical raw materials and products extracted from medicinal herbs and semi-synthetic.

| **TT** | **Product** | **TT** | **Product** |
| --- | --- | --- | --- |
|  | Ajmalicin |  | Phitin |
|  | Essential oils: mint, anise, camphor cinnamon, cineol, ... |  | Hercogenin |
|  | Catharathin |  | Palmatin chlorid |
|  | Diosgenin |  | Artemisinin, DHA, Artesunat |
|  | Papain |  | Chitosan, kitin |
|  | Rutundin |  | Polyphenol |
|  | Solasodin |  | Berberin |
|  | Steviosit |  | Morphin |
|  | Vandolin |  | Rutin |
|  | Vinblastin |  | Cao opi 10 % M |
|  | Vincristin |  | Narcotin |

**2. Criteria and criteria for evaluation of investment projects in the field of chemicals**

2.1. Requirements and conditions for chemical projects

2.1.1. Current regulations and enforcement in the past

2.1.1.1. Current regulations

1) Provisions of the Law on Chemicals:

Article 10 of the Law on Chemicals, which has been amended and supplemented under Clause 2, Article 7 of law No. 28/2018/QH14, stipulates the requirements for chemical production and trading projects as follows:

- Chemical production and trading projects must comply with the provisions of this Law, the law on investment, environmental protection and other relevant provisions of law.

 - Chemical production and trading projects must use technology to ensure environmental standards, minimize the use of dangerous chemicals and minimize chemical waste.

 - The investor of the chemical production and trading project must develop measures to prevent and respond to chemical incidents or the plan for prevention and response to chemical incidents as prescribed in Chapter VI of this Law.

 - The investor of the chemical production and trading project shall coordinate with local authorities in organizing the consultation of the residential community where the project is implemented on environmental protection measures in accordance with the law on environmental protection.

- The location of industrial parks and chemical production facilities must be in line with the characteristics and properties of chemicals and chemical production and preservation technologies, natural conditions, socio-economic conditions to meetthe requirements of safety andquality.

 - In case the chemical production and trading project falls under the list of conditional production and business chemicals, it must be granted a certificate of eligibility for production and trading of chemicals on the list of conditional production and business chemicals.

2) Stipulated in Decree No. 113/2017/ND-CP.

Article 14 of the Chemical Law; Articles 8, 9 and 10 of Decree No. 113/2017/ND-CP stipulate:

 - In case the chemical production and trading project falls under the list of chemicals restricted from production and business, it must be granted a license to be eligible for production and trading of chemicals on the list of chemicals restricted from production and business. Article 15 of the Law on Chemicals; Articles 14, 15, 16 and 17 of Decree No. 113/2017/ND-CP.

 In Decree No. 113/2017/ND-CP and Circular No. 32/2017/TT-BCT, there are no specific provisions or further detailed guidance on requirements and articles for chemical projects.

2.1.1. 2. Enforcement situation

- In general, with many legal constraints, investment projects in the field of basic chemicals comply with the provisions of the law on investment, environmental protection, science and technology and other relevant provisions of law. Before designing and constructing, projects must make an environmental impact assessment report or environmental protection plan, the appraisal/confirmation agency shall organize the consultation of the community where the project is implemented on environmental protection measures in accordance with the law on environmental protection.

- The implementation of regulations on the construction and implementation of measures to prevent and respond to chemical incidents or the plan for prevention and response to chemical incidents increasingly enter the background. Not only new projects, but many projects have been put into operation have also developed measures, plans for prevention and response to chemical incidents. Up to now, the Ministry of Industry and Trade has approved 248 plans for prevention and response to chemical incidents. Prior to November 25, 2017, the Departments of Industry and Trade confirmed 2,194 measures, from November 25, 2017 to now, individual organizations have built and sent to the Department of Industry and Trade 910 Measures. The development and implementation of measures, plans for prevention and response to chemical incidents contribute to reducing the risk of incidents, improving the response capacity of organizations and individuals when incidents occur, thereby limiting the extent of the consequences of incidents.

2.2. Assess the conformity with the party and state's development guidelines and strategies

It can be seen that the provisions on requirements for chemical production and trading projects in the Law on Chemicals focus on the requirements of ensuring chemical safety and environmental protection, so it is basically in line with the socio-economic development line that has been documented by the 13th National Congress: "Linking economic development with environmental protection and green economic development."

However, some relevant development lines in the document of the 13th National Congress have not been mentioned and institutionalized in the Law on Chemicals:

 - Based on new and modern technology to develop industries with advantages, making a great contribution to national added value.

 - Harmonious development between width and depth, focusing on developing depth, constantly improving productivity, quality, efficiency and competitiveness.

 - Create all favorable conditions for the strong development of Vietnamese enterprises, especially private enterprises, as a driving force to improve competitiveness and economic autonomy. Build a spontaneously autonomous economy on the basis of technological mastery and proactive, actively integrate, diversify markets, improve the adaptability of the economy. It is possible to form a national production capacity to be autonomous, participate effectively, improve its position in the global value chain.

2.3. Assess the conformity with relevant Vietnamese law

2.3.1. Some concepts

1) The concept of "chemical project":

The Law on Chemicals and the guiding documents do not yet have provisions explaining the word "chemical project". The interpretation of the word "chemical project" is not really necessary with the current provisions in the Law, since the Law on Chemicals only has provisions for chemical production and trading projects or chemical operation projects (temporarily understood as basic chemicals), the words "chemical operation", "chemical production", "chemical business" have been explained in the Law on Chemicals and Decree No. 113/2017/ND-CP.

However, according to the industry, the chemical industry consists of 10 areas: fertilizer, basic chemicals, pharmaceutical chemicals, petrochemicals, rubber products, paint - ink, industrial gas, chemical power source (battery, battery), pesticide chemicals, detergent products, consumer chemicals. Therefore, the "chemical project" in the development of the chemical industry needs to be understood more broadly. Therefore, when supplementing regulations on conditions and requirements for projects and regulations on project management and investment in the Law on Chemicals, it is necessary to supplement provisions explaining the word "chemical project".

2) Some provisions explaining the words associated with ququ an in the legaldocuments:

(i) Article 3 of the Law on Construction No. 50/2014/QH132014 and the Law on Amendment No. 62/2020/QH stipulate:

- Construction investors are agencies, organizations and individuals that own capital, borrow or are directly assigned to manage and use capital to carry out construction investment activities

 - Construction works are products built by design, formed by human labor, building materials, equipment installed into the works, which are linked to the soil, which can include the sub-ground part, the above ground, the underwater part and the upper part of the water.

- Construction investment project is a set of proposals related to the use of capital to carry out construction activities for new construction, repair and renovation of construction works in order to develop, maintain and improve the quality of works or products and services within the specified time limit and cost. the project is expressed through the Pre-Feasibility Study Report on Construction Investment, the Construction Investment Feasibility Study Report or the Economic and Technical Report on Construction Investment."

(ii) Article 3 of the Law on Investment No. 61/2020/QH13 stipulates:

- Investment project is a set of proposals for medium- or long-term capital to conduct business investment activities in specific areas, within a specified period of time.

-An expansion investment project is an investment project developing an active investment project by scaling up, improving capacity, technological innovation, reducing pollution or improving the environment.

- A new investment project is a first-time investment project or an investment project independent of an active investment project.

*-* Innovative start-up investment project is an investment project that implements ideas on the basis of exploiting intellectual property, new technologies, business models and has the potential to increase rapidly.

2.3.2. Requirements for the project

The Law on Construction No. 50/2014/QH132014 and the Amended Law No. 62/2020/QH contain provisions related to requirements for projects, applicable to construction investment projects in general, including chemical projects.

1) Basic principles in construction investment

 - Ensuring investment in construction according to planning, design, protection of landscape and environment; in accordance with natural, social and cultural conditions of localities; ensuring the stability of people's lives; combining socio-economic development with national defense and security, Disaster prevention and response to climate change.

 - Reasonable use of resources and resources in the area where the project is available, ensuring the right purpose, objects and order of construction investment.

 - Comply with standards, technical regulations and regulations of the law on the use of construction materials; ensure the need for access to convenient and safe use of works for people with disabilities, elderly people, children in public works, high-rise buildings; application of science and technology, applying the information system of works in construction investment activities.

 - Ensuring the quality, progress, safety of works, life, human health and property; fire and explosion prevention and control; environmental protection.

 - Ensuring synchronous construction in each project and synchronous with technical and social infrastructure works.

 - When making and implementing construction planning, construction investment, construction operation management, construction material development must have technical and management solutions to ensure economical, energy efficiency, resources and environmental protection (Article 4).

2) Requirements for construction investment projects

Construction investment projects regardless of the types of capital used must meet the following requirements (Article51):

- In accordance with national planning, regional planning, provincial planning, construction planning, land use planning in the locality where the construction investment project is.

- Have appropriate technology and construction design plans.

- Ensuring quality and safety in construction, operation, exploitation and use of works, fire prevention, explosion and environmental protection, responding to climate change.

- Ensure adequate funding on schedule of the project, financial efficiency, socio-economic efficiency of the project.

- Comply with other relevant laws. "

It can be seen that the provisions on requirements for chemical production and trading projects in the Law on Chemicals concentrate the requirements for ensuring chemical safety and environmental protection, therefore, basically in accordance with the relevant legal provisions. However, the provisions of the Law on Chemicals do not mention the requirements of industry development orientation, quality and competitiveness of products or requirements on economic efficiency.

2.3.3. Limitations, inadequacies

- The Law on Chemicals only has provisions for chemical production and trading projects or chemical operation projects (temporarily understood as basic chemicals). However, according to the industry, the chemical industry consists of 10 areas: fertilizer, basic chemicals, pharmaceutical chemicals, petrochemicals, rubber products, paint - ink, industrial gas, chemical power source (battery, battery), pesticide chemicals, detergent products, consumer chemicals. Therefore, the "chemical project" in the development of the chemical industry needs to be understood more broadly.

- Cevil provisions on requirements for chemical production and trading projects in the Law on Chemicals focus on the requirements to ensure chemical safety and environmental protection, not to mention the requirements on industry development orientation, quality and competitiveness of products or requirements on economic efficiency.

- Regulations on conditions for investment in chemical business, chemical management, regulations and standards in the field of chemicals are of little interest to industry and other sector management agencies to evaluate and guide enterprises in the process of implementing procedures for approving investment projects, environmental impact assessment, design appraisal... leading to problems arising when works or projects operating chemicals or having chemical items complete the investment, construction and operation phase.

*-* Clause 4, Article 36 of the Law on Chemicals stipulates: "The investor of the chemical operation project on the list specified in Clause 1, Article 38 of this Law must develop a plan for prevention and response to chemical incidents and submit it to the competent state management agency for approval; The project will only be put into operation after the Chemical Incident Prevention and Response Plan has been approved." .

In fact, plans are usually evaluated when the project has completed construction and before being put into official operation. In some cases, the planning appraisal process arises that requires the renovation of certain items or the addition of technical solutions to ensure chemical safety, leading to changes to the design profile and completion records..

2.4. Chemical Project Management

2.4. 1. Current regulations and implementation situation in the past

The Chemical Law does not regulate chemical projects. The management of chemical projects in the past time is carried out in accordance with the relevant provisions of the law on investment and construction...

2.4.2. Relevant Vietnamese law provisions

1) Investment law

According to the Law on Investment No. 61/2020/QH13, chemicals are conditional business investment professions:

(i) Principles for implementing investmentprojects.

 - For investment projects subject to investment policy approval, the approval of investment policies must be carried out before the investor implements the investment project.

 - For investment projects subject to investment registration certificates, investors shall carry out procedures for issuance of investment registration certificates before implementing investment projects.

 - The investor shall comply with the provisions of this Law, the law on planning, land, environment, construction, labor, fire prevention and fighting, other relevant laws, the written approval of investment policy (if any) and the certificate of investment registration (if any) during the implementation of the investment project.”

Depending on the field and size of the project, the authority to approve investment policies shall be decentralized by the National Assembly, the Prime Minister or the Provincial People's Committee:

(ii) Authority to approve the Investment Policy of the National Assembly

- The National Assembly approves investment policies for investment projects:

Investment projects that have a major impact on the environment or potentially seriously affect the environment, including:

. The investment project requires the change of purpose of using special-use forest land, watersuhead protection forest, border protection forest of 50 hectares or more; wind protection forest, flying sand shield and wave protection forest, encroaching sea from 500 hectares or more; production forests of 1,000 hectares or more;

. The investment project requires the transfer of the purpose of using rice and water land from 02 or more crops with a scale of 500 hectares or more;

. The investment project requires migrants to resettle 20,000 or more people in mountainous areas, 50,000 or more in other regions;

. Investment projects that require the application of special mechanisms and policies need to be decided by the National Assembly.

(iii) Competence to approve the Prime Minister's investment policy

Except for investment projects specified in Article 30 of this Law, the Prime Minister approves the investment policy for investment projects:

- Investment projects regardless of capital sources in one of the following cases:

. The investment project requires migrants to resettle 10,000 or more people in mountainous areas,2,000or more in other regions..

. Oil and gas processing investmentproject.

. Investment projects on construction and business of lower frequency structuresof industrial parks and export processingzones.

- Investment projects of foreign investors in the field of telecommunication services business with network infrastructure, reforestation, publishing, press;

- Investment projects are simultaneously under the competence to approve investment policies of 02 or more provincial-level People's Committees;

 Other investment projects fall under the competence of the Prime Minister to approve investment policies or investment decisions in accordance with law.

(iv) Competence to approve investment policies of provincial-level People's Committees

- Except for investment projects specified in Articles 30 and 31 of this Law, provincial-level People's Committees shall approve investment policies for the following investment projects:

. Investment projects that request the State to assign land, lease land without auction, bidding or receipt of transfer, investment projects with proposals to allow the transfer of land use purposes, except for cases of land allocation, land lease, permits to change the purpose of land use of households, individuals who are not subject to written approval of provincial-level People's Committees in accordance withthe law on land.

. Investment projects of foreign investors, foreign-invested economic organizations implemented in islands and communes, wards and border towns; communes, wards and coastal towns; other areas affecting national defense and security.

. For investment projects specified in Points a and d Clause 1 Article 32) of this shall be implemented in industrial parks, export processing zones, hi-tech parks and economic zones in accordance with the planning approved by competent authorities, the management boards of industrial parks, export processing zones, high-tech parks and economic zones approve investment policies.

2) Construction law

Law on Construction No. 50/2014/QH132014 and Law on Amendment No. 62/2020/QH stipulate management of construction activities including: construction planning, construction investment project making, construction survey, construction design, construction, construction supervision, project management, contractor selection, acceptance and handover of works for use, warranty, maintenance of construction works and other activities related to construction works.

According to the Government's Decree No. 06/2021/ND-CP dated January 26, 2021 detailing a number of contents on quality management, construction and maintenance of construction works and Decree No. 15/2021/ND-CP dated March 3, 2021, detailing some contents on management of construction investment projects, The Ministry of Industry and Trade is responsible for managing specialized construction works for works under investment projects for construction of industrial works except for light industrial construction investment projects, industrial works producing construction materials and construction products regulated by the Ministry of Construction.

Chemical works of the classification of industrial works include: An independent work, a combination of works or a technological line in production facilities, warehouses, filling stations of the following products: fertilizers, pesticide chemicals, basic chemicals, petrochemicals, petrochemicals, cosmetics and other chemicals; chemical power source (battery, battery, welding rod,...); industrial gas; rubber (toothpick, tire, conveyor belt, technical rubber,...); detergents (washing creams, laundry detergents, detergents, shampoos, water/detergents, soaps,...); paints and ink of all kinds; plastic material (alkyd, acrylic,...); chemical mine raw materials (apatite ore recruitment); explosives, industrial explosive precursors.

Based on the importance, capacity size and structural scale, each type of work is decentralized into a special level and from level 1 to level 4. Specialized management agencies of the Ministry of Management for special and level I-level works, specialized management agencies of provincial-level People's Committees managing works from level II onwards.

3) The Law on Environmental Protection and the documents under the Law

The Law on Environmental Protection (incorporated at 13/VBHN-VPQH dated July 4, 2019 includes the Law on Environmental Protection No. 55/2014/QH13 dated June 23, 2014 of the National Assembly, effective from January 1, 2015, amended and supplemented by the Law No. 35/2018/QH14 dated November 20, 2018 of the National Assembly amending, Supplementing a number of articles of 37 laws related to planning, effective from January 1, 2019).

According to Article 12 and Restoration II VBHN No. 11/VBHN-BTNMT dated October 25, 2019, the Decree provides for environmental protection planning, strategic environmental assessment, environmental impact assessment and environmental protectionplan:

- Production of chemicals and chemical fertilizers (excluding mixing); chemical pesticides; petrochemical refining of industrial production at risk of environmental pollution,the development of environmental impact assessment reports and in the environmental impact assessment report must have a plan for prevention and response to environmental incidents for gases. waste; environmental incident prevention and response plan for wastewater.

- Investment projects to build production facilities for chemicals, plastics, products from plastics and paints: environmental impact assessment reports must be made for hazardous chemical and paint production establishments; capacity of 100 tons of products per year or more for other product production establishments. Capacity of less than 100 tons of products per year for other product production establishments must register the environmental protection plan. All projects must make a dossier of request for inspection and confirmation of the completion of environmental protectionworks.

An investment project only prepares an environmental impact assessment report. The project owner shall submit to a competent state agency for appraisal the environmental impact assessment report before the competent authority appraises the feasibility study report, economic-technical report or facility design, construction drawing design (in case the project requires only one step). In case the project has the same agency to appraise the environmental impact assessment report and appraise the design of the facility or design the construction drawing, the above-mentioned dossiers shall be submitted simultaneously for appraisal as prescribed.

In the process of carrying out environmental impact assessment, the project owner must consult the People's Committees of communes, wards and townships (heretized collectively as commune-level People's Committees) where the project is implemented, organizations and communities directly affected by the environmental issues of the project (wastewater, emissions, dust, solid waste, hazardous waste, subsidence, landslides, sedimentation, noise, biodiversity); research, absorb and explain the opinions of the subjects involved in consultation to minimize the adverse impact of the project on the quality of living environment, biodiversity.

2.4. 3. Limitations and inadequacies

Recently, through the mass media or inspection results, the level of legal observability of many chemical projects has not been guaranteed from the approval of investment policies, design appraisal, construction activitycertificates, adjusting the total investment ... Increase progress, reduce investment efficiency...

This is due to the habit of part of the sense of observing of investors and consulting units in the field of construction of chemical industry works. Besides, the regulations are inadequate.

 - Chemical industry is a specific industry, the construction investment has been assigned to the Ministry of Specialized Management (Ministry of Construction is the general steering agency) to comply with the regulations of the basic construction sector but lack of regulations for specialized agencies on inspection, supervision and handling of violations (belonging to the construction industry), the level of influence of specialized management agencies is not high. The decentralization in localities is decided by the Provincial People's Committee, so in many localities and at the time, the Department of Industry and Trade is not assigned to handle

1. The issuance of certificates of construction capacity is not currently granted exclusively to the field of chemicals, instead, the Ministry of Construction only grants to individual organizations operating for industrial, light industry, and heavy industry works, the implementation is only applicable to organizations, Individually recognized for industrial works.
2. Design appraisal: Through monitoring, some project investors have actively adjusted the capacity and investment stage (on paper), failed to submit to the Ministry of Industry Management for appraisal or only local appraisal (not in accordance with regulations on decentralization of works), failing to comply with regulations on quality management of works, commencement... accept administrative sanctions with the goal of ensuring the efficiency and progress of investment.
* Through research, most projects are implemented locally, consulted and supported by local management agencies, low level of sanctions, insufficient deterrence, very few projects are stripped of licenses (except for projects that have a great impact and impact on the community, having opinions from superiors), undermining the legality of regulations.

2.4.4. Insurance, compensation for damages in chemical activities

2.4.4.1. Current regulations and enforcement in the past

1) Liability insurance for damages:

Law on Chemicals No. 06/2007/QH12 dated November 21, 2007 stipulates in Article 61 of The Liability Insurance for Compensation for Damages in Chemical Activities:

 "1. The State encourages insurance enterprises to carry out insurance activities for liability for compensation for damage caused by chemical activities.

 2. The State encourages organizations and individuals operating in the production and trading of chemicals to purchase insurance to pay compensation for damages in chemical activities.

 3. Based on the socio-economic development situation, the requirements for ensuring the safety of chemical activities in accordance with the Law on Insurance Business, the Government shall submit to the Standing Committee of the National Assembly for consideration and provisions on compulsory insurance for dangerous chemical activities, Toxic chemicals."

2.4.4.2. Enforcement Situation

In the period of implementation of the Law on Chemicals from 2007 to now for 13 years, Vietnam's economy has achieved many outstanding results, the Department of Chemicals - Ministry of Industry and Trade has drafted and submitted to competent authorities to issue many decrees and circulars guiding the provisions of the Law. However, there have been no mandatory insurance regulations for dangerous chemical and toxic chemical activities.

2.4.5. Assess the conformity with the relevant Provisions of Vietnamese law

1) Liability for compensation for damages:

The Law on Environmental Protection No. 72/2020/QH14 stipulates in Article 140 of the Insurance liability for compensation for damage caused by environmental incidents as follows:

 - Encourage insurance enterprises to implement insurance liability to compensate for damage caused by environmental incidents.

 - Based on the group of investment projects classified in accordance with Article 28 of this Law, the Government shall detail the subjects having to buy insurance for liability for compensation for damage caused by environmental incidents.

 - Encourage non-covered subjects specified in Clause 2 of this Article to buy insurance liability for damage caused by environmental incidents.

2) Liability for purchasing compensation insurance

Decree No. 19/2015/ND-CP issued on February 14, 2015 detailing the implementation of a number of articles of the Law on Environmental Protection stipulates that organizations and individuals purchasing insurance liability for compensation for environmental damage specified in Article 31:

(i) The following organizations and individuals operating in production, business and services must purchase insurance for environmental damage or set up a risk provision fund as prescribed by law.:

Oil and gas activities include oil and gas exploration, exploration, development and exploitation, including activitiesthat directly serve theseactivities.

- Productionand trading of chemicals,gasoline.

- Use specialized sea vessels to transport oil, petroleum preparations or other dangerous goods when operating inthe waters of the sea and the waters ofVietnam.

- Storage, transportation and treatment of hazardous waste; transportation of dangerous goods.

3) Oil and gas activities include oil and gas exploration, exploration, development and exploitation, including activitiesthat directly serve theseactivities.

- Productionand trading of chemicals,gasoline.

- Use specialized sea vessels to transport oil, petroleum preparations or other dangerous goods when operating inthe waters of the sea and the waters ofVietnam.

- Storage, transportation and treatment of hazardous waste; transportation of dangerous goods.

2.4.6. Limitations, inadequacies

Basically, the provisions of the Law on Chemicals on Insurance liability to compensate for damages in chemical activities are oriented and encouraged for implementation. However, according to the development of socio-economic, diversifying forms from production, business, stockpiling and use of chemicals in many areas regulating compensation liability insurance by sector, as can be seen through the documents of the Ministry of Natural Resources and Environment, Department of Transportation ...

For the provision "Based on the socio-economic development situation, requirements for ensuring the safety of chemical activities in accordance with the Law on Insurance Business, the Government shall submit to the Standing Committee of the National Assembly for consideration and provision of compulsory insurance for dangerous chemical activities, "Inthe period of implementation of the Law on Chemicals since 2007 up to now for 13 years, Vietnam's economy has achieved many outstanding achievements, the Department of Chemicals - Ministry of Industry and Trade has developed and submitted to the competent authorities to issue many decrees and circulars guiding the provisions of the Law. However, there have been no mandatory insurance regulations for dangerous chemical and toxic chemical activities.

**3. Proposing policies and solutions to integrate green chemical principles for inclusion in the draft Law on Chemicals (amended)**

3.1. Trends in chemical industry development

3.1.1. Industrial Revolution 4.0 and the trend of digital technology adoption

In the current period, the economy and chemical industry face many opportunities and challenges in the context of the Fourth Industrial Revolution (4.0); Vietnam's deep and extensive cooperation in the international arena, economic crisis and economic transformation, namely:

First,the Fourth Industrial Revolution is a combination of technology in the fields of physics, digital and biological technologies, creating entirely new production possibilities and having a profound impact on the economic, political and social life of the world (basedon the combination of new sensortechnology, Big data analytics, cloud computing and internet of things connectivity will accelerate the development of automation machines and intelligent manufacturing systems; Using 3D printing technology to produce products in a complete manner by consizing production lines not through the assembly stage of auxiliary equipment – this technology also allows people to print new products using non-traditional methods, bypassing intermediaries and reducing production costs as much as possible; using nanotechnology and new materials to create new material structures widely applied in almost every field; Application, artificial intelligence development and cybernitics allow humans to control remotely, unlimited space, time, interact faster and more accurately.

The process of hyper-automation and hyper-connectivity (robots) can improve the productivity of existing jobs and create demand for completely new jobs while bringing some disadvantages to Vietnam as the workforce is increasing in quality assurance amounts.

The adoption of digital platforms over the years is allowing the collection of more and more data on the operation of chemical production and trading facilities, creating transparency. Digital transformation trends help businesses improve the level of production automation, change business models more effectively.

3.1.2. International integration

Vietnam is one of the countries with stable politics and a very high level of economic integration, when it basically shapes a network of 17 free trade agreements (FTAs) and frameworks for economic and trade cooperation with leading economic centers. as well as marking an important historical milestone in the process of international economic integration during the past time.

Vietnam has actively and actively participated in multilateral and regional economic institutions, with important milestones such as joining the Association of Southeast Asian Nations (ASEAN - 1995), as a founding member of the Eurasian Economic Forum (ASEM - 1998), became a member of the Asia-Pacific Economic Cooperation (APEC) in 1998 and in particular joined the World Trade Organization (WTO ) in 2007, marking the full integration into the global economy.

To date, Vietnam has signed 15 FTAs at the bilateral and regional levels (of which 14 FTAs and 1 FTAs have been signed but have not yet taken effect), and are negotiating two FTAs. Among them, the most prominent are 3 new generation FTAs: the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), the Free Trade Agreement between Vietnam and the European Union (EVFTA) and the Free Trade Agreement between Vietnam and the United Kingdom of Great Britain and Northern Ireland (UKVFTA); And the world's largest FTA within ASEAN is the Regional Comprehensive Economic Partnership (RCEP).

The FTA has been opening the market door for Vietnam's exports, which is an opportunity for Vietnam to connect and participate more deeply in the global value chain and production network. In particular, in the context of the Covid-19 epidemic, new-generation FTAs such as EVFTA, CPTPP, UKVFTA have energized Vietnam's economy to recover from the pandemic.[[1]](#footnote-1)

3.1.3. World economic crisis and investment shift to Vietnam

The trend of shifting investment to Vietnam emerged in 2020 because this is a time of convergence of many external and internal factors due to many factors including some basic reasons such as Vietnam maintaining the growth rate during the crisis; the Chinese market has been saturated, policies to attract investment are no longer attractive while regulations are increasingly strict, production costs are rising and the direction of industrial development is changed; Vietnam has stood firm and grown under the impact of the Covid-19 pandemic; Vietnam's strategic position is increasingly promoting its advantages andindustrial exports in Vietnam benefit from free trade agreements and the U.S.-China trade war.

The context of the world economy is clearly having a profound direct impact on Vietnam's economy and industry.

3.1.4. Sustainable development trends

The resources and minerals that are raw materials for chemical production are gradually running out of resources and are being competitive by demand from new industries. Meanwhile, environmentally friendly production requirements will strongly promote innovations in raw materials and technologies.

The Government and businesses in France are very focused on investing in research and implementation activities, towards sustainable development, the Strategic Council on Chemicals and Materials france has set up a long-term development plan for the chemical industry, which focuses on three main trends: sustainable development, focus on energy and alternative materials, enhancing recycling. Japan and EU countries do not interfere deeply in the investment decisions of enterprises, but set high requirements with product quality and strict management of emission factors, thereby requiring enterprises to apply modern technology, thereby, requiring enterprises to apply modern technology, use environmentally friendly materials to meet standards and regulations.

In Vietnam, 12 green chemical principles are being encouraged to support green growth, and reduce the use and emissions of hard-to-decompose organic chemicals (POPs) and hazardous chemicals.

3.1.5. Concentrated chemical industry complex model

Many developed countries build concentrated chemical industrial parks depending on the specifics and development investment needs. These industrial zones are usually located in convenient, accessible deep-water coastal areas and ports for large tonnage vessels, connecting to the country's important roads and highways, as well as the transport system, pipelines of the whole region, thereby supporting very well for transportation, import and export of goods. Industrial parks are usually large area, well-invested, highly convenient, providing adequate infrastructure for research, development and production, services for workers, logistics, maintenance and repair services...

*In Germany*

Germany is Europe's leading country in chemical industry with nearly 30 industrial parks including some BASF and Leun complexes. There is a highly developed infrastructure, a pipeline system of product materials integrated into the European pipeline network, highly qualified workers, a good research environment and close cooperation with many well-known research institutes and universities (the idea of a chemical industrial park was developed in Germany on Wednesday. Early 1990s).

The world-renowned chemical industry group BASF(Ludwigshafen Verbund -Germany) owns the largest integrated chemical industry complex in the world with an area of about 10 km2 (1,000 hectares), where production facilities, energy chains and logistics are constantly connected, efficiency to serve the production of basic chemicals to other high-quality products creates high added value by 200 factories connected to each other by more than 2,850 km of pipelines and more than 230 km of rails and about 40,000 workers (BASF and other enterprises) creating about 8,000 products (petrochemicalsector, Materials, agriculture, health care... ) with a total volume of 8.5 million tons/year.

TheLeuna chemical complex (Leipzig-Halle), located in the heart of a German economy. Leuna covers an area of 1,300 hectares with a history of over 100 years of development. In the Leuna complex, there is a convenienttransportation system: there are 600 km of pipes for transport between businesses, transportation in the area ensures 5,000 means of transport daily. Transportation connections are very convenient. The distance to Leipzig/Halle International Airport is 25 km, in the Complex there is a helipad. The Leuna Motorway is directly connected to the A 38 Leipzig-Göttingen, A9 Berlin-Munich and A14 Leipzig-Magdeburg-Hanover. From Leuna, 70% of the cargo is transported by rail (a dedicated rail network that connects to the main lines of Deutsche Bahn AG for freight). Four inland waterway ports are available for ship freight: Halle/Trotha (23 km), Aken (80 km), Haldensleben (120 km) and Magdeburg (140 km).

*In China*

By the end of 2018, China had a total of 676 chemical industrial parks (national level: 57; provincial level: 351 and cities: 268 industrial parks) distributed throughout the eastern region: 32% - mainly in Shandong province and Jiangsu province; Western region: 25%; Central region: 21%; Northern region: 22%).

Chinese regulators say the concentration of chemical production in chemical industrial parks creates better monitoring conditions and facilitates the implementation of tightening environmental protections and, accordingly, the need to relocate chemical plants into industrial parks. China also argues that the world-class chemical industrial park is an organic ecosystem, not just a simple set of companies that includes the integration of raw materials, logistics, safety, environmental protection, data and management services. Chemical companies are recommended to look for chemical industrial parks with high standards and a good reputation, although such industrial parks may have higher investment and environmental protection requirements.

SinopecGroup: Enterprises engaged in the production of various petroleum products, including gasoline, diesel, jet fuel, kerosene, ethylene, [synthetic](https://en.wikipedia.org/wiki/Synthetic_rubber)fibers, synthetic [rubber,](https://en.wikipedia.org/wiki/Synthetic_rubber) synthetic plastics and chemical fertilizers, [exploration](https://en.wikipedia.org/wiki/Hydrocarbon_exploration) of crude oil and natural gas, the production of some [biofuels](https://en.wikipedia.org/wiki/Biofuel) such as [biodiesel](https://en.wikipedia.org/wiki/Biodiesel) and green aircraft fuel, from discarded vegetable oil, ethanol production. As of the third quarter of 2020, Sinopec Group has 582,648 employees working in 110 member units in the oil and gas (15 enterprises), petrochemical refining (38 enterprises) and other enterprises including 7 research institutes.

Through some of the above-mentioned evidences, it can be seen that the advantages of the formation of chemical industrial complexes promote the effectiveness of circular economic trends (focusing on management, concentrating production, easy investment and utilization of technical infrastructure, linkages between enterprises, ...) and the formation of nuclear chemical industrial complexes with many satellite enterprises supplying raw materials, using products and disposing of waste of the production process.

*In* Vietnam, a number of petrochemical industry complexes have been formed in Dung Quat, Nghi Son, Long Son, Hyosung. Some industrial zones and clusters are concentrated in many chemical enterprises such as Dinh Vu Petrochemical Chemical Zone (mainly storage, convenient for sea and road traffic), Phu My - Cai Mep industrial zones (near oil and gas supplies, convenient for sea traffic, road), Lao Cai Industrial Park (concentrated many factories producing phosphorus products due to its proximity to apatit ore).

With the advantage of favorable location, Vietnam now has many localities and land funds in areas far from residential, near the sea, especially some localities with deep-water ports, which are good choices, many potentials to orient and attract, calling on large investors to pay attention to infrastructure investment, invest in advanced, modern, safe chemical complexes and factories, creating high added value, developing the local and national economies.

The concentration of chemical production in concentrated industrial parks facilitates easier management and supervision, facilitates the implementation of control and response to risks, tightens environmental protection and sustainable development.

3.2. Develop policy contents on chemical industry development

3.2.1. Policies to promote the development of the chemical industry

1) Orientation of priority projects:

 - Priority is given to the production of environmentally friendly, high-value-added products, deeply involved in the regional and global value chains, highly competitive products.

- The project applies modern technology, environmentally friendly technology; gradually reduces the use of dangerous chemicals, replaces toxic chemicals with less toxic and non-toxic chemicals in production and use; applies green chemical principles; encourages recycling, reuse and minimize chemical waste.

- Preferential policy:

+ Amending the Investment Law in the direction of adding a number of priority chemical sectors to the objects of investment incentive projects, creating conditions for priority projects to access the investment incentive regime in accordance with regulations on taxes, land, labor ...

+ Supplementing preferential policies for projects to develop infrastructure of concentrated chemical industrial parks, centralized logistics centers and investment chemical activities projects in concentrated chemical industrial parks.

3.2.2. Planning and strategies for development of the chemical industry

- Supplementing regulations on chemical industry development strategies:

+ Requirements for the content of the strategy;

+ Responsibility for formulating and approving strategies;

+ Mechanism to ensure the implementation of the strategy.

3.2. 3. . Requirements and conditions for chemical projects

- Additionally explaining the word "chemical project" in the direction of including the project of 10 areas: fertilizer, basic chemicals, pharmaceuticals, petrochemicals, rubber products, paint - ink, industrial gas, chemical power source (battery, battery), pesticide chemicals, detergent products, consumer chemicals.

- Amending and supplementing regulations on requirements for chemical projects:

+ Ensuring compliance with industry development strategies, strategies and plannings for local and territorial development;

+ Requirements to ensure chemical safety and environmental protection;

+ Requirements for the application of advanced technology;

+ Reasonable use of resources and resources, ensuring economical and energy efficiency;

+ Apply green chemical criteria.

3.2.4. Chemical Project Management

- The agency approving the provincial investment policy should consult with the Ministry of Industry and Trade on the suitability of investment projects in the chemical sector with the industry development strategy.

- Chemical projects, which must be (specialized management ministry) evaluated technology as prescribed. The Ministry of Science and Technology shall formulate and publicly post the list of technologies allowed for use and prioritize use in each period (needing a minimum orientation of 20 years), the technology must be discontinued.

- Investment information: The central investment management agency monitors, updates, publicly posts all chemical projects and works on the website, is monitored and updated regularly (about project name, size, capacity, capital source, progress, products, locations and changes if any)

- Appraisal of pre-feasibility study report: According to current guidelines and regulations. Chemical production projects with potential dangers and risks to people and communities must be approved by the Ministry/Cquan specialized in chemicals. The Department of Chemicals specialized management must have an opinion and report to the Ministry of Specialized Management

- Appraisal of investment projects / feasibility study reports

+ Option 1: comply with the current Construction Law, which adjusts the appraisal contents including the following groups of contents:

Legal and general: Specialized regulatory body. Procedures, dossiers of appraisal and approval of firefighting, environment ... as currently prescribed (must be approved, no later than before announcing the results of project appraisal/ feasibility study report)

Construction: construction management agency (Ministry of Construction / Department of Construction)

Technology: science and technology industry and specialized management appraisal / giving opinions

+ Option 2: Enterprises self-appraise and approve. Specialized management agencies shall inspect and supervise the progress of implementation according to investment certificates.

- Quality management of construction works

+ Option 1: State management agencies perform as currently, however, only check the dossiers on quality management. The Ministry of Construction promulgates detailed guidance on the dossiers that need to correspond to each stage of the project

+ Option 2: State management agencies do not perform the quality management of works of the project, only check the progress and supervise investment assessment

- Implementing the reporting and updating regime including that of the Ministry of Investment Management, the Ministry of Specialized Management, investors (publicly), additional research on chemical projects in the national chemical database.

The issuance of certificates of constructioncapacity:

+ Option 1: The Ministry of Construction shall assume the same interest in coordinating with the Ministry of Industry and Trade to issue certificates for multi-sectoral activities including chemical activities

+ Option 2: The Ministry of Industry and Trade shall assume the case and coordinate with the Ministry of Construction in issuing certificates if only the chemical/other sectors are in the field of industry and trade (currently, the Ministry of Industry and Trade is issuing electricity operation licenses)

- Amendments to relevant laws to ensureregulations on conditions for investment in chemicalbusiness, chemical management, regulations and standards in the field of chemicals are less considered and evaluated in the process of implementing procedures for approval of investment projects, environmental impact assessment, Design appraisal...

*-* Amending regulations on the time of appraisal and approval of the plan for prevention and response to chemical incidents in accordance with the progress and implementation of the project.

3.2.5. Insurance, compensation for damages in chemical activities

Bringing the subjects of dangerous chemical trading whose largest storage volume at one time is large or equal to the threshold specified in Decree No. 113/2017/ND-CP dated October 9, 2017 detailing and guiding the implementation of a number of articles of the Law on Chemicals (subjects must make a prevention plan, chemical incident response) in the implementation of mandatory insurance regulations for chemical activities.

1. Inthe EU market, in the first three quarters of 2020, exports reached 29.44 billion USD, down 4.7% compared to the same period in 2019. In3 months of implementing evfta agreement, exports to the EU market reached about 11.08 billion USD increased by about 5% compared to the same period in 2019. By the end of 2020, exports to the EU market reached 40.05 billion USD. ...

 [↑](#footnote-ref-1)