Plastic waste, Refuse derived fuels (RDF) and cement kilns - Viet Nam

November 2024

Research Centre for Gender, Family and Environment in Development (CGFED)
Viet Nam.

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Executive Summary

The Ministry of Natural Resources and Environment (MoNRE) of Viet Nam reports a dramatic rise in plastic consumption per capital, from 3.8kg/year in 1990 to 54kg/year/person by 2024.[1] The surge in plastic consumption has led to an increase in plastic wastes and the put pressure on the environmental management system. It requires safe and effective plastic treatment measures and management. Annually, Viet Nam consumes approximately 3.9 million tons of plastics, including PET, LDPE, HDPE, and PP, with around 33% (1.28 million tons) being recycled[2]. Numerous interventions and efforts have been made to address the issue of plastic pollution in various industries including cement production. The proposal of using non-recycle wastes for fuels in cement kilns is widespread in mass media in Viet Nam.

This research was conducted in August and September 2024 applying mixed methods including desk study, policy review, in-depth interviews, and focus group discussions. The information was provided by 20 participants who are the managers of cement companies, national authorities being delegated to waste and environment management and treatment. The research aims to document and understand the whole process of production, import, export, use of waste derived fuels in the cement industry. The findings and analysis from the research serve as a resource for raising public awareness, informing government agencies and policy makers with the purpose of advocating for limitations on the use of RDF and classifying it as a hazardous waste.

Current status of waste in Vietnam

Recently, Viet Nam has been releasing about 60.000 tons of household waste per day into the environment, of which around 60% is from urban areas[3]. According to MONRE, more than 70% this waste is landfilled, less than 20% is buried hygienically[4]. Improperly managed landfills are contributing to soil, water, and air pollution. These issues are particularly acute in major cities. Furthermore, of the 30% of waste treated by other methods besides landfilling, up to two-thirds is incinerated in rudimentary facilities, resulting in significant air pollution from dust and smoke[5]. Nationwide, there are

[1] Ministry of Industry and Trade, https://moit.gov.vn/bao-ve-moi-truong/ngay-trai-dat-2024-keu-goi-cac-quoc-gia-chung-tay-giam-60-san-luong-nhua.html
[2] World Bank Group. 2021. Market Study for Vietnam Plastics Circularity Opportunities and Barriers. Marine Plastics Series.World Bank,
Washington, DC. © World Bank. https://openknowledge.worldbank.org/handle/10986/36313 License: CC BY 3.0 IGO.
[3] Tien Phong Newspapers, 07 March 2024. https://tienphong.vn/moi-ngay-moi-truong-hung-chiu-60000-tan-rac-thai-sinh-hoat-post1618215.tpo
[4] MONRE, 2024
[5] https://dangcongsan.vn/thoi-su/hanh-dong-quyet-liet-de-giam-rac-thai-nhua-tai-cac-do-thi-660809.html

1,322 municipal solid waste (MSW) treatment facilities including 381 incinerators, 37 compost production lines, and 904 landfills.

Several methods of solid waste treatment in Viet Nam include landfilling, recycling, incineration, and waste-to-energy. The landfill method predominates in urban and delta areas. The recycling method transforms waste into organic compost for soil improvement. The incineration method involves collecting and burning solid waste in incinerators at appropriate temperatures, resulting in ash and gases, and thermal energy. The waste - to - energy method includes the conversion of solid waste into electricity. This method also encompasses gasification technology, such as biogas and pyrolysis to generate electricity. Incineration and waste - to - energy methods have not yet been widely adopted in Vietnam. The method of using Refuse-Derived Fuel (RDF), which is seen as a 'high-quality 'baled or pelletised waste, has been introduced but is not yet popular. Only a few cement plants use RDF.

An overview of the cement industry in Viet Nam

Viet Nam has become one of the fastest- growing countries in cement production and one of the world's leading exporters of this commodity. The production is expected to double over the next 10 years. Over the past decade, cement production in Viet nam has reached 120 million tons, leading the country among the top global producers[6]. There are 92 production lines in total, with an estimated financial investment of around 20 billion USD (equivalent to 500,000 trillion VND). The period between 2014 and 2023 witnessed an increase in clinker and cement production with a peak of 110.4 million tons in 2021. A wide variety of produced cements include those for the purpose of civil and industrial construction, high-quality cements that are rapid-setting, heat-resistant, fire-resistant, and marine-durable, and oil well cements for the petroleum industry

The State's policy and the use of recyclable materials in cement production

The strategy of construction materials development in the period 2021-2030, with the vision to 2050 was promulgated on August 18, 2020 pursuant to the prime minister's decision no.1266/QĐ-TT. Cement plants are transforming to use alternative fuels derived from household and industrial wastes. Recently, 11 cement plants have been using alternative fuels to replace around 30% coal. This

[6] Ministry of Construction, 2024

intervention is seen as a "*solution to environmental issues, but also as a source for electricity generation and recyclable materials, and contributing to the circular economy*"[7].

In early 2024, a number of cement plants in Viet Nam piloted the use of plastic waste derived fuel as an alternative to coal in the cement production. More than 200 tons of plastic waste from two plastic craft villages - Minh Khai in Hung Yen province and Trang Minh in Hai Phong province - was transported to Lam Thach cement plant in Quang Ninh province so that the waste was used as fuel for the incinerator. Burning waste in kilns during clinker manufacturing is regarded as waste 'co-processing'.

> *"At present, we are using waste derived fuel alternative to 35% - 40% coal"*[8].
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> *"Compared to the production without using waste derived fuel, the initial result from the rapid measurement indicates parameters are within the permissible limit and the same as when using pulverised coal as fuel. Waste decomposes quickly and does not emit hazardous gases"*[9].

According to Mr Hanh Nhu Nguyen, the director of Environment Protection Bureau, the Department of Natural Resources and Environment, using waste derived fuel as an alternative to traditional fuels not only helps cement plants save cost, reduce prices while ensuring the same quality, but also decreases CO2 emission, reduces environmental pollution, saves natural resources for the country.

There is huge demand for fuel for clinker kiln in Viet Nam, equivalent to 10 million tons of coal a year (calorific value at 6,000 kcal/kg). The Government of Viet Nam sets objectives of using alternative fuels in the clinker manufacturing process at 15% and 30% in 2030 and 2050 respectively. In order to achieve this goal concerning re-using waste and waste co-processing in cement production, the use of industrial waste derived fuels in the whole production lines is targeted at 20% and 30% in 2025 and 2030 respectively[10]. According to the internal statistics of the cement industry, only 1% of cement plants use non-recyclable plastic waste derived fuel in clinker manufacturing process. Using plastic waste derived fuel as an alternative to coal is supported by Norway to Viet Nam. "In the cement production in Norway, 75% coal has already replaced by waste derived fuel. We are the partner of Viet Nam in the Just Energy Transition Partnership"[11].

[7] In-depth interview with leaders of Cement plant, CGFED 8/2024
[8] From vice director of Nam Thach cement plant, Quang Ninh
[9] From vice director of Construction Cement JSC. Quang Ninh
[10] ""By 2025, at least 20% of fly ash from thermal power plants or other industrial waste must be used as alternative raw materials in clinker production and as additives in cement production. By 2030, this figure must increase to at least 30%." in accordance with Prime Minister's Decision No. 1266/QĐ-TTg dated August 18, 2020, by the Prime Minister regarding the Strategy for the Development of Vietnam's Cement Industry for the 2021-2030 period, with a vision to 2050..
[11] Đại diện Sứ quán Na Uy tại Việt Nam

Import, Export and Use of RDF in other industries

There has been no official data on the quantity of RDF imported in Viet Nam as there has been no specific policies and regulations concerning this material. Waste derived fuel sometimes is classified as plastic scraps. The list of scraps permitted to be imported from abroad into Vietnam as raw materials for production under the Prime Minister's Decision no. 13/2023/QD-TTg[12], or as a combustible substance under Viet Nam's nomenclature of exports and imports in pursuant to Ministry of Finance's circular no. 65/2017/TT-BTC[13]. Moreover, in the manufacturing industry, industrial boilers are used to generate heat, steam, vapour in the light industry such as textiles, leather, plastic, tobacco, agriculture processing, in the heavy industry like chemicals, fertiliser, mining, pesticide, sugar, timber, and so on. Fuels used for industrial boilers include oil and gas, coal, biomass, RDF. Currently, there has been lack of official number of industrial boilers. It is estimated that there are about 9,000 industrial boilers in use in accordance with sources from annual boiler inspection organisations and registration at the government agencies of labour management.

Around 95% RDF manufactured in Viet Nam (around 5 million tons) is for export. Main imported markets are Japan and South Korea. This material is mainly made of wood, a small number of RDF is made of recyclable waste. Only 5% RDF in Viet Nam is used domestically, mainly for industrial boilers in small scale facilities[14].

Government's legal framework on the manufacture of pelletised solid waste

Viet Nam's legal framework has not yet specified the treatment of plastic waste. Some critical policies regarding the manufacture of RDF have been promulgated as follows.

The Prime Minister's decision no. 942/QĐ-TTg dated August 05, 2022 on the Approval of the Action Plan for Methane Emissions Reduction by 2030. The development of technology for RDF manufacture is one of interventions on waste management sewage treatment in order to minimise methane emissions.

The Prime Minister's decision no. 980/QĐ-TTg dated August 22, 2023 on the Issuance of the Specific List of Technologies, Equipment, and Products in Environment Industry. RDF production line is classified

[12] https://thuvienphapluat.vn/van-ban/Thuong-mai/Quyet-dinh-28-2020-QD-TTg-Danh-muc-phe-lieu-duoc-nhap-khau-tu-nuoc-ngoai-lam-nguyen-lieu-san-xuat-453837.aspx
[13] https://vanban.chinhphu.vn/default.aspx?pageid=27160&docid=190622
[14] The Association of Environmental Technology of Viet Nam, 2024

under the groups of facilities relating to the classifying, collecting, transporting, recycling household solid waste management, conventional industrial solid waste management, hazardous waste, and other waste and scraps recycling facilities.

The strategy of the development of construction materials for the period 2021-2030, vision to 2050 aims at the sustainable development of construction materials, application of new science and technology in construction materials production. This strategy set objectives on natural minerals saving, energy saving, greenhouse emission reduction, linkage between construction materials production and recycling and re-use of industrial waste, agricultural waste, waste management and environment protection. The strategy leads to the change in cement production, which allows new cement plants with capacity at least 5,000 tons per day, locating near the raw materials areas, investment in heat-recovered fuel for electricity generation, meeting the technology and environment standards. Additionally, the government encourages to utilise municipal waste and industrial waste, agricultural waste derived fuels for the production.

Conclusion and Recommendations

In Viet Nam government authorities and industry view waste derived fuel as a solution to plastic waste and cheap fuel for cement production. However, they do not adequately consider the toxic emissions and carbon emissions from RDF. Cleaner fuel substitutes for cement production such as hydrogen are being used in other countries and should be fast tracked for Viet Nam instead of RDF.

RDF is not a solution to the problem of plastic pollution and waste. Using RDF is unsustainable as it is burning fossil based plastic, leads to air pollution, will increase the risk of exposures to the public health and environmental and is not part of a circular economy. RDF should be controlled by the Basel Convention as hazardous waste shipments if it is exported. The Vietnamese government should implement policies and actions to prevent the harmful effects of RDF use and develop programs for safer and cleaner alternatives for for cement production.

Founded in 1993, the Research Centre for Gender, Family and Environment in Development (CGFED) has been carrying out social scientific research and intervention activities, targeting at women's development and gender equity. As one among the first Vietnamese public interest non-governmental organizations (NGO), CGFED is proud of its work building the foundation and the development of a young NGO community among members of the Vietnamese civil society.

IPEN is a network of non-governmental organizations working in more than 100 countries to reduce and eliminate the harm to human health and the environment from toxic chemicals.