

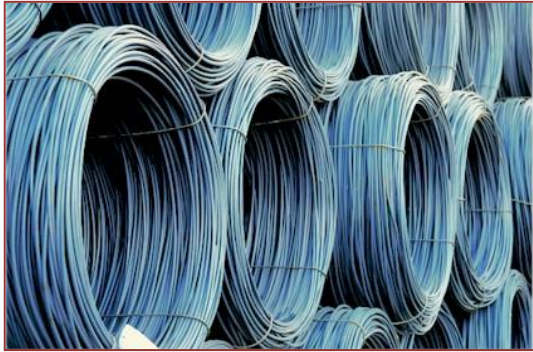
Vietnam Industry Sector At-a-Glance

15.8 MTOE
33% of country's energy use;
Growth rate 7.1% per year

Year	Population aged 65 and over (millions)
2000	4.5
2010	16
2015	22
2020	29
2025	37



Iron and Steel: Vietnam produces 6,633,000 tons of steel products per year, including 3,656,000 tons of “long products,” such as bars, rods, rails, and other elongated forms, and 2,977,000 tons of pipes and “flat products,” such as flattened sheets and strips. The raw material supply comes mostly from domestic and imported scrap metal (77 percent; 693,000 tons per year), which is further refined into steel; the

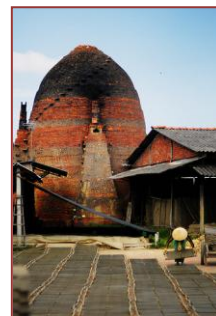


remainder (202,000 tons per year) comes from domestic iron-ore extraction and iron production facilities, the products of which are further processed into pig iron and then into steel. Because the sector is largely dependent on scrap steel as a raw material, production takes place predominantly in “mini-mills” that use both steel scrap and steel from electric-arc furnaces to produce steel that is then rolled into long products. The sector also uses imported flat products along with cold-rolling technologies, pipe fitters, and various coating technologies to produce pipes and flat products. The most rapidly modernizing part of the subsector surrounds the expansion and construction activities of joint-venture companies. Some older facilities are undergoing selective upgrades as well. The very small traditional metal processing facilities are the least modern.

Pulp and Paper: Total pulp and paper production in Vietnam in 2006 was 835,000 and 958,000 tons, respectively. Paper production has tripled since 2000 and is currently growing at 16 percent per year. Much of the production of printing and

writing paper is for domestic use; the major export product is carton boxes and other packaging. Domestic demand for pulp and paper cannot be met by the existing capacity, forcing Vietnam to import 63 percent of its pulp and 39 percent of its paper. Overall the pulp and paper industry consumes energy at high levels, accounting for 7 percent of electricity use and 9 percent of coal consumption in Vietnam’s industrial sector overall. Many of the facilities depend on technologies that are 10 to 30 years old, and only 27 percent of pulp and 36 percent of paper production employ more advanced technologies involving the use of synchronous motors, automated process lines, and more recently manufactured equipment. Older plants have lower energy efficiencies than do their more modern counterparts, cogeneration using pulp and wood wastes is employed in only some plants, and technologies for waste heat recovery and reuse are not fully exploited.

Brick Making: As with the cement industry, rapid growth of the construction sector has led to dramatic increases in brick production over the last 10 years: the volume of baked brick is expected to reach 20 billion pieces in 2010 and 40 billion pieces in 2020. The brick industry is dominated by small-scale manufacturers, including more than 10,000 traditional brick kilns that utilize coal or firewood and account for 65 percent of production. A small percentage of Vietnam’s bricks are produced in tunnel kilns or blast furnaces; these are more efficient than the traditional batch kilns, but they also use coal as their major source of energy.



Greenhouse gas emissions: Estimates from the Initial National Communication of Vietnam indicated that in 1994 greenhouse gas emissions from industry and construction were 11.5 million tCO₂-e — 11.1 percent of the total emissions in the country. The majority of these emissions were from energy use (7.7 million tCO₂e). The remainder were from industrial processes (3.8 million tCO₂-e), including the reactions in cement and steel making. Given the sector's high dependence on fossil fuels and its rapid growth, these sources have been growing and are expected to continue to grow in magnitude.

Potential Mitigation Measures for 2010 to 2015

Cement

Fuel switch: Vietnam's cement industry currently relies on coal as fuel and does not commonly make use of waste (tires, plastic, etc.) or biomass (rice husk, saw dust, etc.). Vietnam has large quantities of unused rice husk, wood waste, and other biomass that could be used in the cement industry. A 20 percent use of biomass or waste at two production facilities could save as much as 175,000 tons of CO₂ per year, and the overall potential for reductions at Vietnam's 41 largest cement plants is 2.2 million tons of CO₂ per year.

Waste-heat recovery: Using waste-heat recovery systems, waste heat from preheaters and clinker coolers in steam boilers can be recovered and used in condensing turbines to generate power. The power produced can be consumed by the plant itself or, whenever possible, delivered to the grid. These efforts can have substantial results, especially in large kilns. The total potential reduction for this intervention is 537,000 tCO₂-e per year.

Cement blending: Standards allow production of PCB30 cement containing as much as 40 percent additives, yet the ratio of additives in Vietnamese cement products is only 18 to 20 percent. Further blending of cement can reduce the quantity of clinker used and the corresponding energy needed to produce a ton of cement.



The potential reduction in greenhouse gas emissions in the largest cement plants is up to 924,000 tCO₂-e per year.

Energy efficiency: Cement plants in Vietnam that use traditional technologies have been shown to use twice as much fuel and 40 percent more energy than do international comparators. A variety of improvements that are common internationally can be made to improve energy efficiency in cases where traditional technologies are used or would otherwise be adopted. These include replacing wet kilns or vertical shaft kilns with more modern technologies and improving grinders and clinker mills, preheaters, and fan controls. Based on estimates of potential improvements in energy efficiency over current levels, the 41 largest plants in the country could achieve emission reductions of up to 6.2 million tCO₂-e per year.



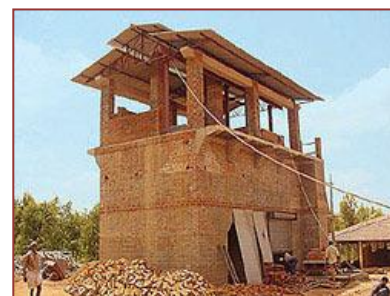
Iron and Steel

Waste-heat recovery: Many steel production processes offer opportunities for waste-heat recovery, resulting in fuel savings, yet are not widely adopted in the country. These include coke dry quenching (CDQ) during coke production, use of top pressure recovery turbines in iron making, and use of blast furnace gas (BFG) or basic oxygen furnace (BOF) gas for heat and/or power generation. The estimated potential emission reduction is 108,000 tCO₂-e per year if applied to the 10 largest plants.



Energy efficiency: Energy efficiency in Vietnam's steel and iron industry is low; for example, energy use per ton of steel in Vietnam's electric-arc furnaces is 40 percent higher than for international comparators. Possible electricity and fuel saving measures in the iron and steel industry include use of more energy-efficient furnaces and drying systems. If implemented in the country's largest plants, the estimated potential emissions reduction is 199,000 tCO₂-e per year.

Brick Making



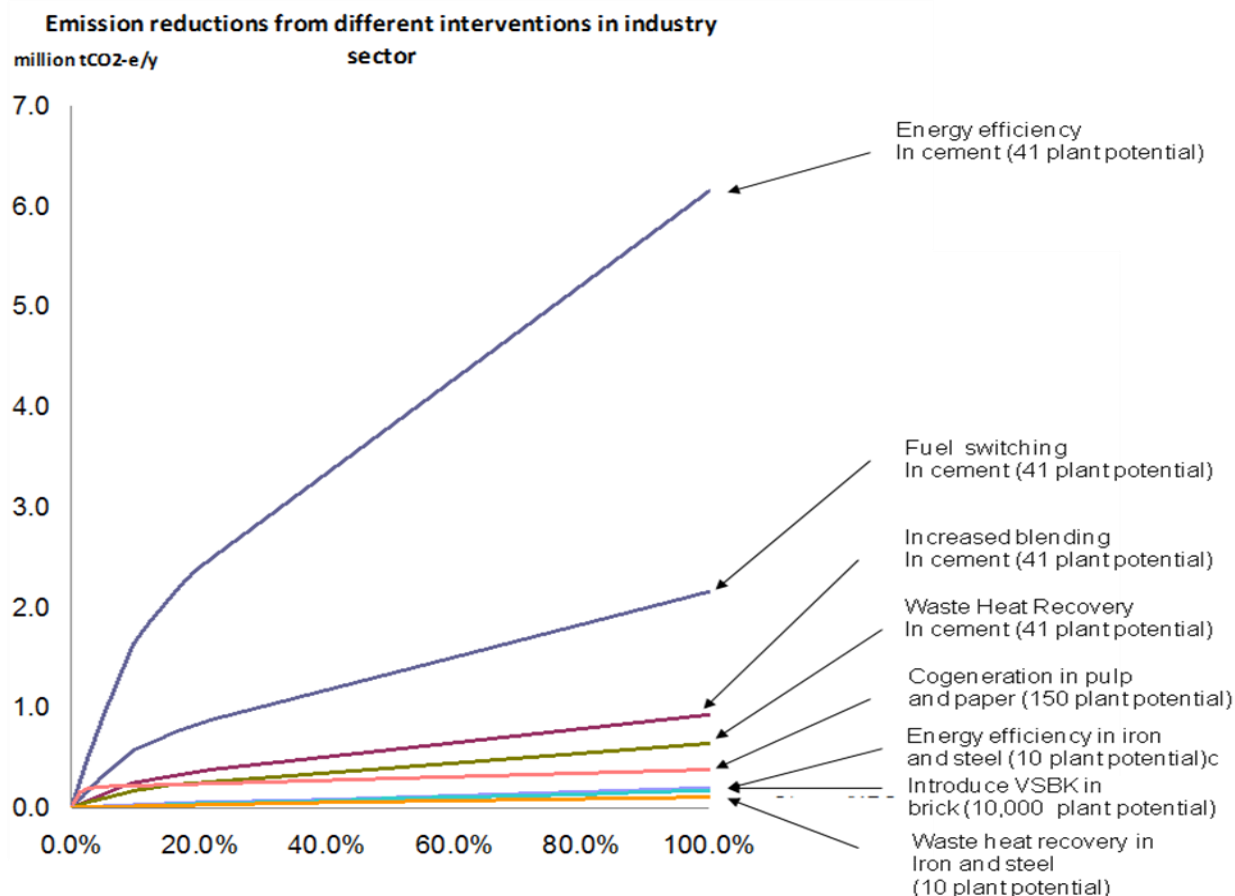
Energy

efficiency: While not common practice, limited adoption of vertical shaft brick kilns (VSBK) has demonstrated that using this technology can improve energy efficiency and productivity and reduce energy consumption by up to 50 percent. This technology could be applied to the more than 10,000 traditional kilns found in the country, reducing carbon dioxide emissions by up to 170,000 tCO₂-e per year.

Pulp and Paper

Cogeneration: One of the biggest opportunities to reduce greenhouse gas emissions in the pulp and paper industry is installation of cogeneration systems that use waste byproducts and other fuels with lower GHG emissions to produce both heat and power for this coal-dependent subsector. While initially some mills installed cogeneration units, others built more recently have not done so, mainly due to the high investment costs. The potential emission reduction for the 150 plants in the subsector is 381,000 tCO₂-e per year.





Note: Estimates based on annual reductions during 2010-2015

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