RENEWABLES IN INDUSTRY

KEY FACTS FOR 2024

- Industry accounts for more than 30% of global final energy consumption and roughly a quarter of energy-related CO_2 emissions.
- The sector remains heavily reliant on fossil fuels, particularly for process heat: almost 90% of industrial heat is fossil fuel-derived.
- Renewables accounted for an estimated 18% of industrial final energy use in 2022, mainly in the form of bioenergy and electricity.
- Decarbonisation remains limited due to the complexity of heat applications, long investment cycles and high capital intensity.
- High costs and price risks are increasingly mitigated by fiscal and financial policies such as Germany's Carbon Contracts for Difference.

49 policies supporting renewable energy in industry were in place across 28 countries.

Renewables covered **18.1%** of industrial energy use in 2022.

China alone was responsible for **more than 38%** of global industrial energy consumption in 2022.

SECTOR OVERVIEW

Industry remains the sector with the **highest energy consumption**, accounting for 34% of global total final energy consumption (TFEC) and for a quarter of global energy-related CO_2 emissions in 2022.[1] In 2023, energy demand from industry increased by 2% and emissions by less than 1%.[2]

In 2024, the industry sector accounted for around 26% of global gross domestic product (GDP) in terms of value added.[3] Industry generated 24% of global employment in 2023, with regional shares ranging from just 13% of total employment in Sub-Saharan Africa to 28% in East Asia and the Pacific.[4] These figures highlight the central role of the sector not only in the global economy but also in shaping pathways for decarbonisation. With net-zero targets in place in 90 countries in 2024, scaling up the use of renewables in the industry sector is essential to reducing emissions and meeting long-term climate goals.[5]

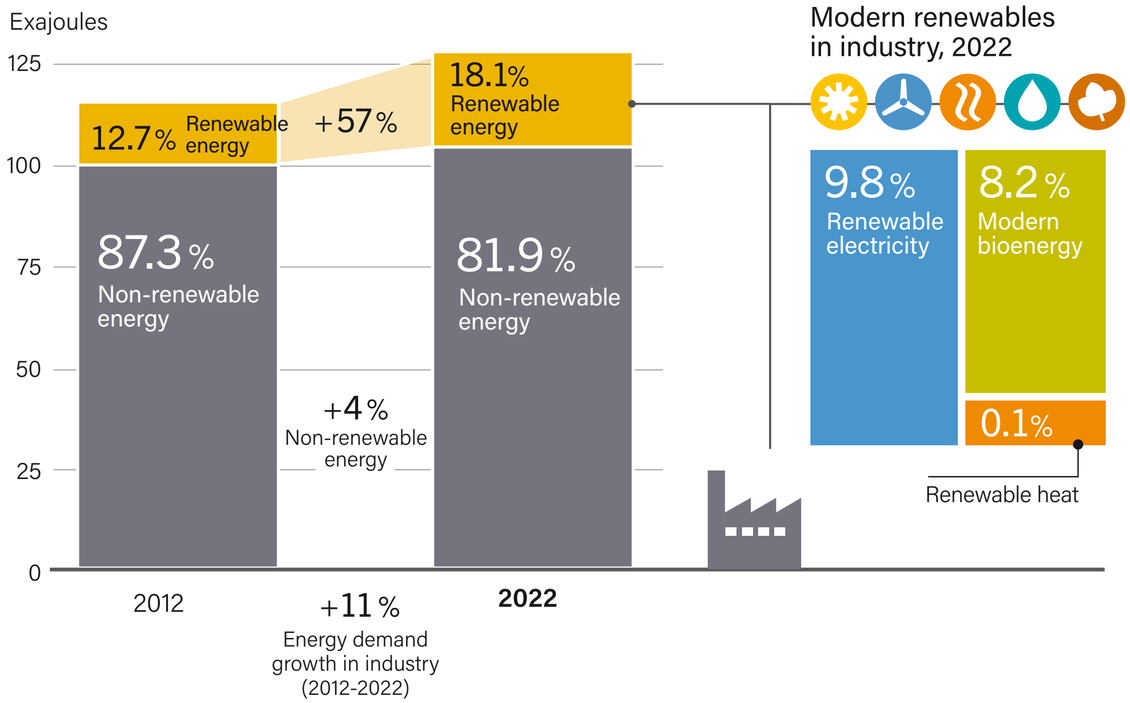
China alone was responsible for more than 38% of global industrial energy consumption in 2022, followed distantly by the United States (9.6%) and India (9.3%).[6] These numbers reflect the scale of China's industrial sector, which produces more than 40% of the world's major industrial products, while the world's major manufacturers source at least 2% of all their industrial inputs from China.[7]

In 2022, industry had the **highest share of renewable energy** across all end-use sectors, at 18.1%, up from 16.8% in 2021 and 12.7% in 2012, an increase of 57% in 10 years, reflecting a gradual, slow shift towards renewables in the sector[8] (→ *See Figure I-1.*). Yet, the share of fossil fuels in the sector's total final energy use declined only slightly from 87.3% in 2012 to 83.2% in 2021 and 81.9% in 2022, reflecting the sector's continuing reliance on fossil fuels.[9] The sector mainly used renewable energy in the form of renewable electricity (9.8%) and modern bioenergy[i] (8.2%), while solar and geothermal heat together only accounted for around 0.1%.[10]

As of 2022, **heat generation** still accounted for over two-thirds of the industry sector's energy consumption at 73.8%, down from 77.6% in 2012.[11] Heat is used across various industrial processes, ranging from basic operations such as drying and heating to more complex applications like material transformation, chemical production and process preparation.[12] Different processes and end uses require different temperatures.[13] Cement kilns, for instance, require high temperatures, while drying or washing processes in the food industry require lower temperatures.[14] Fossil fuels still represented around 87.6% of industrial heat consumption; renewables accounted for just 12.4% (89% modern bioenergy; 10% renewable electricity;

i Modern bioenergy refers to the use of biomass for heat, power or transport using advanced technologies, while traditional bioenergy typically involves the direct use of solid biomass for cooking or heating, often in household settings.

FIGURE I-1
Renewable Share of Total Final Energy Consumption in Industry, 2012 and 2022



Source: See endnote 8 for this section.

and less than 1% from solar and geothermal heat).[15] District heating networks accounted for 8.5% of industrial heat use in 2022, while district heating from renewable sources made up less than 1%.[16]

The use of **bioenergy** to generate industrial heat is growing worldwide, particularly in sectors that process biomass and can utilise by-products as a cost-effective energy source.[17] Bioenergy is considered a promising substitute for fossil fuels in these cases due to its availability onsite and potential for lower net emissions.[18] Geothermal and solar thermal energy are primarily used in industries such as food processing and chemicals (solar thermal only), where heat demand is moderate and relatively stable, making these renewable sources suitable for providing low- to medium-temperature process heat.[19] Electricity represented around 4% of total industrial heat in 2022, with renewable electricity making up only 1.3%.[20]

The share of overall **electricity** used in the industrial sector increased only slightly to 29.2% in 2022, from 29.1% in 2021 and 25% in 2012.[21] Electrification of industrial processes presents a significant opportunity to reduce emissions in the sector, decarbonise industrial heat, and boost efficiency.[22] Electric heating technologies, for instance, provide higher efficiency than fuel-based technologies.[23] In 2024, the industrial sector accounted for nearly 40% of total growth in electricity demand, driven by increasingly electro-intensive manufacturing processes.[24] Although technical hurdles remain, electricity has the potential to deliver heat across the full industrial temperature spectrum, from low and medium levels, using heat pumps and electric boilers (up to 500°C), to high-temperature applications like steelmaking with electric arc furnaces (around 1,800 °C), while emerging technologies such as induction heating and electric steam crackers are expected to extend coverage up to 2,500°C.[25] Yet, electrifying industrial processes can only lead to meaningful emission reductions if renewable electricity is used; in 2022, just 32% of electricity consumed came from renewable sources.[26]

Another low-carbon alternative to fossil fuels in industrial heat applications is **green hydrogen**[i], particularly applied in sectors that require very high temperatures. Overall demand for hydrogen grew 2.3% in 2023 compared to the previous year, yet the share of low-emission hydrogen, including green hydrogen, used in industrial activities remains very limited due to price uncertainties and concerns about competitiveness by industrial players.[27] Despite these challenges, the use of hydrogen is slowly expanding, for instance in steel, ammonia and glass production, and 2024 saw an increase in policies that aim at stimulating increased demand in the industrial sector.[28]

Global **clean industry investment**[ii] rose from USD 28.5 billion in 2020 to a peak of USD 55.2 billion in 2023, then plummeted to USD 27.8 billion in 2024 – a decrease of almost 50% to just slightly below 2020 levels.[29] This sharp decline is largely linked to challenges regarding affordability, technology maturity, and commercial scalability of clean industry technologies.[30] Asia-Pacific led global investment in 2020, with USD 21.2 billion.[31] However, spending dropped significantly to USD 5.9 billion by 2024. China's clean steel and bioplastics investments fell from USD 15.1 billion and USD 2.3 billion (2020) to USD 2.4 billion and USD 0.3 billion, showing cooling momentum after initial surges.[32] Although clean industry investment in the United States shrunk to USD 6.8 billion in 2024, from USD 10.8 billion in 2022, the country maintained high levels of investment in circular economy and clean steel in 2024, at USD 2.4 billion and USD 2.4 billion respectively.[33]

Steel production in an electric arc furnace

27.8 USD billion

invested in clean industry in 2024.

i Green hydrogen is defined as hydrogen produced using electrolysis powered by renewable sources. It is also known as renewable hydrogen.
ii Clean industry investments include investments in bioplastics, circular economy, clean ammonia and clean steel.

POLICIES SUPPORTING RENEWABLES IN THE INDUSTRY SECTOR

In recent years, governments have begun to recognise the strategic importance of decarbonising industry not only to reach climate goals but also to address energy security concerns.[34] To accelerate the decarbonisation of the industrial sector, governments can adopt a range of policy measures, including long-term decarbonisation strategies; market-based mechanisms such as carbon pricing and emissions trading systems; funding support; regulations; and renewable energy targets.[35]

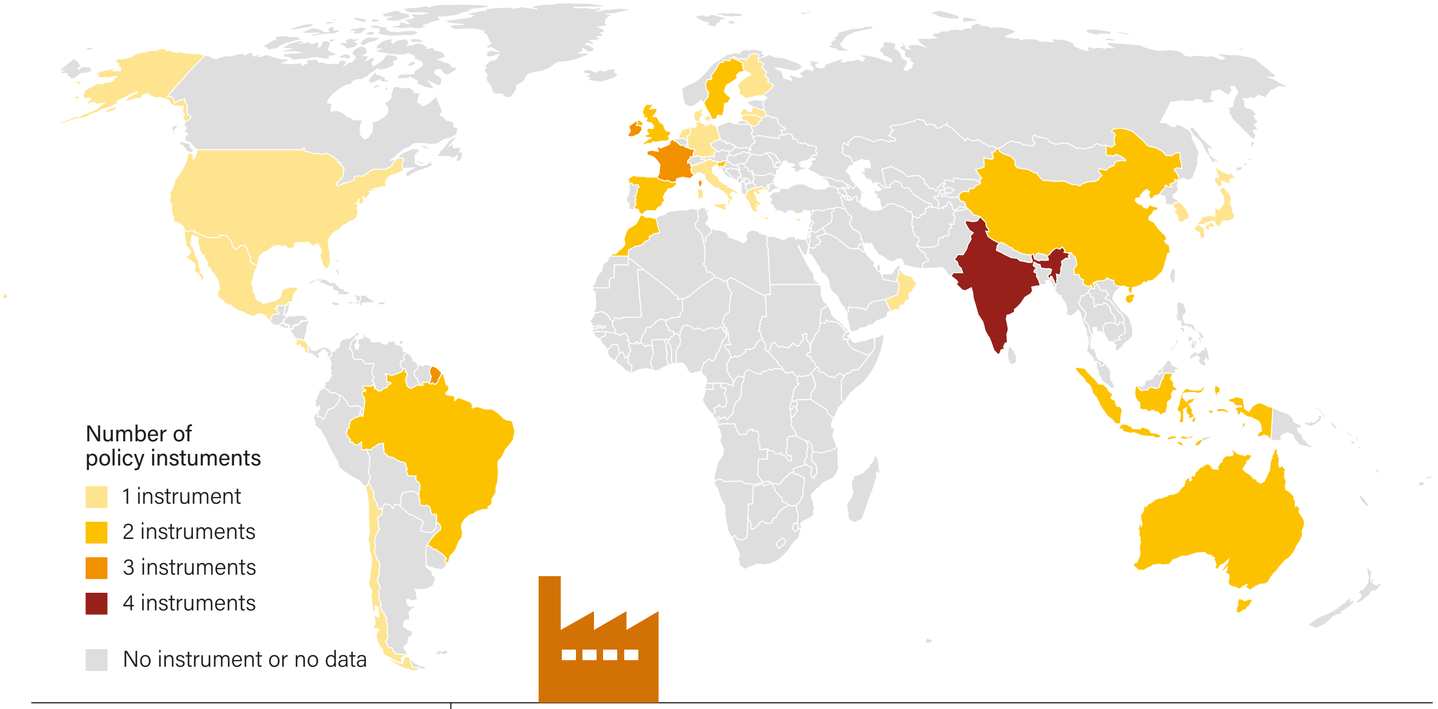
In 2024, a total of **49 policies to support renewable energy integration and decarbonisation in the industry sector** were in place in 28 countries[i] [36] (→ *See Figure I-2.*). This group of countries included 14 European countries, alongside six countries in Asia, four in Latin America, two in the MENA region, as well as Australia and the United States.[37] India had adopted four different types of policy instruments, the largest number of any country, including fiscal measures, regulations, a target and a long-term strategy.[38] France and Ireland each had three different types of policy instruments in place and most countries had introduced just one type of policy instrument as of 2024.[39] These policies largely focus on fiscal and financial incentives.[40]

Five countries, India, Italy, Latvia, Slovenia and Spain, had adopted **targets for the share of renewable energy** used in the industrial sector as of 2024.[41] In May 2025, EU Member States had to submit their new targets and measures to comply with the EU's Renewable Energy Directive, and thus adopt an indicative target of a 1.6% annual increase in renewable energy use and a binding target of 42% renewable hydrogen by 2030.[42]

Overall, **substantial progress** could be observed in the global policy landscape, as almost 20 new policies were enacted in 2024 to promote the uptake of renewables and decarbonisation in the industrial sector.[43]

i These policies include fiscal and financial policies, targets, regulations and strategies. Carbon pricing policies are discussed separately below.

FIGURE I-2.
Countries with Policies Supporting Renewable Energy Integration and Decarbonisation in the Industry Sector, as of 2024



28 countries with policy instruments

Number and type of instruments globally

13 Fiscal/ Financial	13 Target	12 Strategy/ Roadmap	11 Regulation

Source: See endnote 36 for this section.

An increasing number of countries aims to support the scale-up of low-carbon[i] and **green hydrogen** through the adoption of targeted financial instruments and market-building strategies.[44] In 2024, Australia announced a new hydrogen production tax incentive worth USD 4.4 billion (AUD 6.7 billion); Brazil introduced tax credits for low-carbon hydrogen; and India launched a programme to support green ammonia production for industrial use through time-bound financial incentives, all aiming at closing the price gap between low-carbon and fossil fuel-based hydrogen.[45] The EU Innovation Fund awarded grants of USD 5.6 billion (EUR 4.8 bn), with a third going to hydrogen projects.[46]

The revised EU Energy Efficiency Directive, which entered into force in late 2023, set a binding target to achieve an additional 11.7% reduction in energy consumption by 2030 compared to 2020 projections and introduced stricter requirements for the industrial sector, aimed at improving **energy efficiency**, including mandatory energy audits.[47]

A new development in 2024 was the introduction of **Carbon Contracts for Difference (CCfDs)**, an upfront financing mechanism that mitigates investment risks and helps companies offset the added costs of decarbonisation.[48] In early 2024, the German government launched its first large-scale CCfD programme to support energy-intensive industries.[49] The initial USD 4.7 billion (EUR 4 billion) tender aims to reduce financial risks related to carbon pricing and fluctuating input costs, such as those for renewable hydrogen. Morevoer, France allocated approximately USD 825 million (EUR 700 million) in 2024 to support low-carbon hydrogen production, including a new CCfD tender for 150 MW of renewable or nuclear-powered electrolysis capacity.[50]

Carbon pricing instruments remained a key policy measure for the decarbonisation of industry in 2024. Globally, 24 countries had carbon taxes targeting the industrial sector in place, with tax rates ranging from less than USD 1 to USD 167 per tonne of CO_2 or CO_2 equivalent[ii].[51] 42 countries, including all EU Member States, had established emissions trading systems (ETS) targeting industry, with most also covering transport emissions.[52] However, to prevent carbon leakage, the EU has largely exempted its heavy industry from ETS costs by granting free emissions allowances.[53] Two countries initiated new national carbon pricing frameworks applied to the industry sector in 2024: Pakistan, through the adoption of its National Carbon Market Policy, and Brazil, where the Congress approved a framework law to establish a national ETS.[54] In addition, in early 2025, China released plans to expand its national ETS to cover heavy industry, including the steel, cement and aluminium industries.[55]

Fewer than ten countries had policies focused on **bioenergy**, including Brazil's new Bioeconomy Strategy, and only seven countries had policies focused on **electrification** of industrial sectors based on renewable electricity in place in 2024.[56] As part of Cyprus' updated National Energy and Climate Plan in 2024, the government set a target of about 30% renewable energy in industrial consumption by 2030, with a focus on increasing electricity from photovoltaics.[57]

Several **global and regional commitments to decarbonise the industry sector** were strengthened in 2024: The First Movers Coalition, a global public-private partnership launched by the World Economic Forum and the United States, announced new initiatives to drive investment in industrial decarbonisation efforts through demand-side procurement strategies.[58] The UK-Brazil Industrial Decarbonisation Hub launched its first work plan in 2024, offering technical and financial support to energy-intensive industries like steel, cement and chemicals for the uptake of clean energy technologies with pilot demonstration projects[iii].[59] In early 2025, the European Commission launched its Clean Industrial Deal, which involves the mobilisation of over USD 118 billion (EUR 100 billion) to decarbonise heavy industry in Europe, including through a state aid framework to accelerate the rollout of renewable energy.[60]

24 countries

had carbon taxes for industry in place in 2024, alongside 42 with emissions trading systems.

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Biogas production, Holstebro, Denmark

i Definitions of 'low carbon' hydrogen vary: while they all include renewable energy, some also include other sources such as nuclear energy or fossil fuels combined with carbon capture and storage.

ii Uruguay had the highest carbon tax rate applied to industrial activities at USD 167 per tonne of CO_2 equivalent, followed by Switzerland and Liechtenstein (both with USD 132 per tonne of CO_2).

iii The term 'clean energy' often refers to not only renewable energy but also to nuclear energy.

TRENDS IN INDUSTRIAL SUB-SECTORS

The industrial sector is highly diverse, and energy use and decarbonisation potential vary widely across sub-sectors, depending on the processes, temperature requirements and feedstocks involved. While some industries are relatively advanced in electrification and the adoption of renewable energy, others face significant barriers.

Renewable energy shares range from 8% in the sub-sectors with the highest energy consumption (iron, steel and chemicals) to over 45% in one of the sub-sectors with the lowest energy consumption - pulp, paper and printing[61] (→ *See Figure I-3.*).

Several technologies have seen significant growth across industrial sub-sectors in 2024. Industrial **heat pumps**, which extract renewable energy from sources like air, water, sewage, waste heat and exhaust air from buildings to generate up to 180–200°C of process heat, have been adopted in sectors such as pulp and paper, wood, dairy, food, paint and textiles.[62] The launch of the US-based Industrial Heat Pump Alliance's procurement toolkit in September 2024 helped to streamline deployment, and the European Union extended its policy support through its Clean Industrial Deal, which advocates for large-scale uptake of these systems.[63]

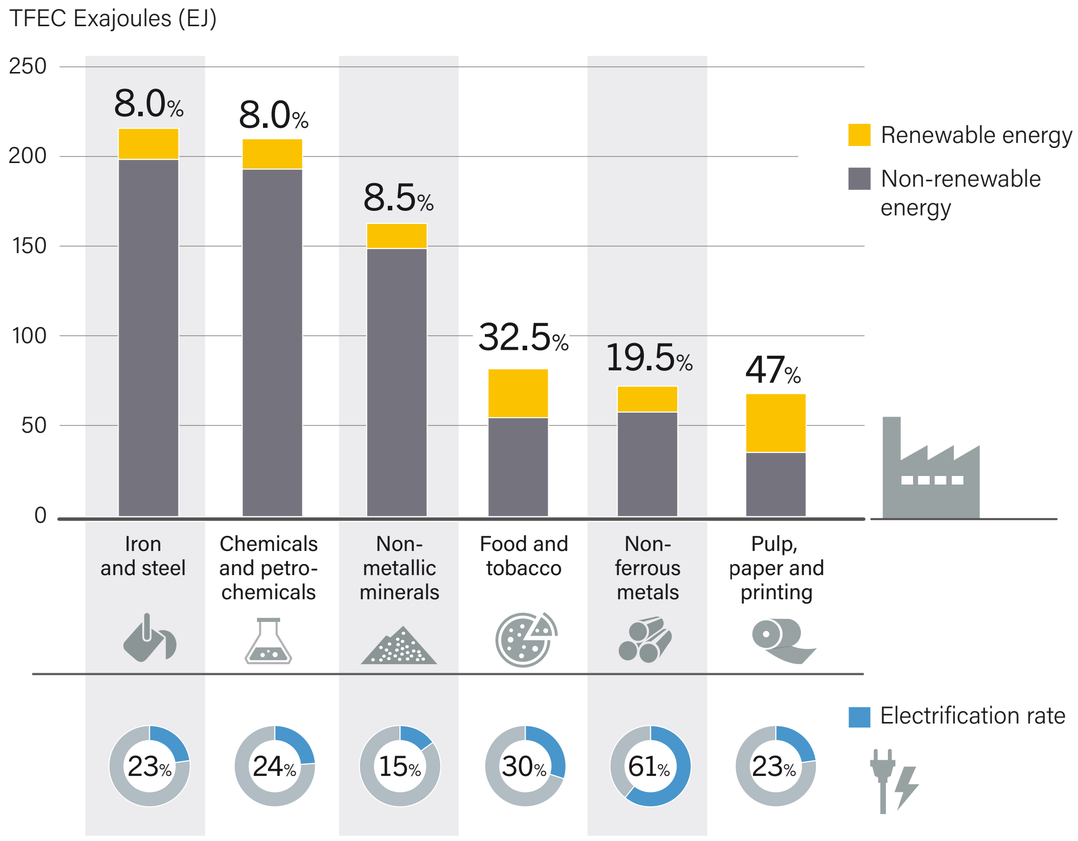
Electrification of processes advanced only slowly across sectors, despite the levelised cost of electricity for renewable technologies declining.[64] In 2022, electrification rates ranged from 15% in the non-metallic minerals sector, 29.6% in the food and tobacco sector to 61% in the non-ferrous metals sector.[65] Besides the application of heat pumps and electric arc furnaces, the uptake of electric boilers and resistance heating systems for lower-temperature processes increased, particularly in the food and textile industries.[66]

Digitalisation and AI for energy optimisation gained traction, particularly in energy-intensive industries like cement.[67] The primary motivation for adopting AI in industrial settings is to lower production costs by boosting productivity, minimising plant downtime, and cutting operating expenses, particularly for materials and energy.[68] Tools like real-time energy monitoring, predictive maintenance and AI-based load shifting have already been deployed to reduce energy use and align operations with renewable generation availability.[69]

61%

electrification rate in the non-ferrous metals sector, showing strong progress toward decarbonisation.

FIGURE I-3
Renewable Energy Share and Electrification Rate by Industry Sub-Sector, 2022



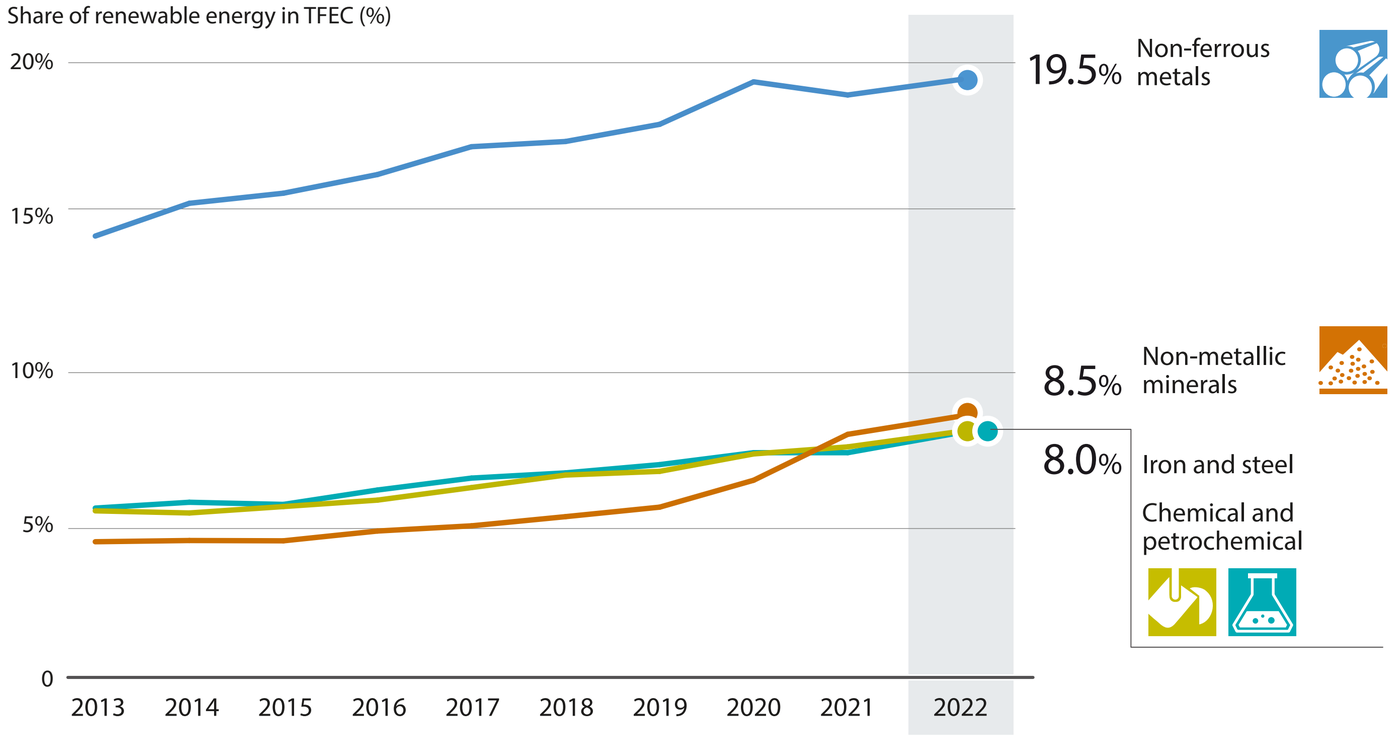
Source: See endnote 61 for this section.

RENEWABLES IN HEAVY INDUSTRY SECTORS

Heavy industries, including the production of iron and steel, chemicals and petrochemicals, nonmetallic minerals, and non-ferrous metals, are the most energy-intensive industrial sectors, which together accounted for almost 55% of industrial energy use in 2022.[70] Together, they were responsible for up to 70% of global energy-related CO_2 emissions from industry.[71] Nearly 700 low-carbon industrial projects were in development globally across sectors such as steel, cement, chemicals and aluminium in 2024, but fewer than 20% have reached operation or secured full financing and permitting.[72]

Despite improvements in electrification technologies, such as industrial heat pumps and electric steam crackers, the many **high-temperature industrial processes** in these sectors continue to depend heavily on fossil fuels.[73] Renewable energy shares in heavy industries range from around 8% in chemicals, iron and steel and non-metallic minerals, to 19.5% in non-ferrous metals industry[74] (→ *See Figure I-4.*). The slow pace of electrification is mainly due to grid challenges, fluctuating electricity prices, technology readiness at commercial scale and limited financing support for electrification projects.[75]

FIGURE I-4
Share of Renewable Energy in Total Final Energy Use by Heavy Industry Sub-Sector, 2013 to 2022



Source: See endnote 74 for this section.

IRON AND STEEL

Iron and steel industries were responsible for 16.9% of industrial energy use in 2022.[76] During the same year, only 8% of total final energy consumption in iron and steel production came from renewable sources, representing one of the lowest renewable energy shares across industrial subsectors, as the sector still depends on coal for the reduction of iron ore.[77] The sector's electrification rate reached 23% during the same year.[78]

Green hydrogen-based direct reduced iron (DRI) processes have received increasing attention, given their large emission reduction potential.[79] Supported by a growing number of decarbonisation incentives, **electric arc furnaces** (EAF) have further advanced in the steel sector as a low-carbon alternative to traditional blast furnaces, particularly where scrap metal is available.[80] However, scrap availability has been declining and cannot fully meet growing global steel demand, making green hydrogen-based DRI essential for a long-term transition in the sector.[i]

In 2025, the European Union approved about USD 1.2 billion (EUR 992 million) to support 15 green hydrogen projects for heavy industries, explicitly targeting steel decarbonisation through DRI development.[81] In 2024, China halted approvals for new coal-based steel projects for the first time and launched EAF-based steel making projects with a total production capacity of over 7 million tonnes, marking a policy shift towards cleaner production.[83] The UAE commissioned its first industrial-scale green steel plant integrating hydrogen-based DRI with EAFs in 2024, aligned with its national industrial decarbonisation roadmap.[84] In the United States, Electra raised USD 85 million in 2024 to commercialise its low-temperature electrochemical ironmaking process, which uses renewable electricity to produce iron at just 60°C – a potentially transformative innovation for decarbonising iron and steel.[85]

Despite these advancements, investment in **clean steel projects** dropped sharply to USD 17.3 billion in 2024, from USD 40.2 billion in 2023.[86] Around USD 9 billion were invested in clean steel across EU countries in 2024, and only around USD 2.4 billion in the United States and China respectively.[87]

NON-FERROUS METALS

Non-ferrous metals, including aluminium, copper, zinc, and nickel, are widely used in the construction sector and to manufacture electrical cables, engines, pipelines, containers and batteries.[88] The sector was responsible for around 5.7% of total industrial energy use in 2022, and 19.5% of the sectoral energy use came from renewable sources.[89] The comparatively high share of renewables is linked to the sector's electrification rate of more than 60%, which is mainly due to the use of electric furnaces for primary aluminium production and non-ferrous metals processing.[90]

The **aluminium industry**, in particular, has seen notable progress in decarbonisation efforts. Several companies have committed to net-zero targets and are participating in international initiatives such as the First Movers Coalition.[91] Aluminium smelters have signed long-term power purchase agreements (PPAs) for solar and wind energy in Australia, Brazil and Spain, totalling around 4.1 GW as of 2024.[92] Norsk Hydro signed a 6.6 TWh PPA with Statkraft in Norway, and Tomago Aluminium is aiming for 100% renewable energy use at its Australian smelters.[93]

New technologies are also being piloted including electric and hydrogen-based calcination, mechanical vapour recompression and inert anode technology to reduce direct emissions.[94] The Rocky Mountain Institute has introduced a Sustainable Aluminium Finance Framework to guide green lending, and the International Aluminium Institute (AIA) has launched a public emissions tracking system.[95] In China, the State Council announced plans to use more than 25% of renewable energy in the electrolytic aluminium industry by the end of 2025.[96]

4.1 GW

of wind and solar power purchase agreements signed by aluminium smelters in Australia, Brazil and Spain in 2024.

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i European Commission. 'Commission Introduces Surveillance of Imports and Exports of Metal Scrap.' Accessed 31 July 2025. https://taxation-customs.ec.europa.eu/news/commission-introduces-surveillance-imports-and-exports-metal-scrap-2025-07-23_en.


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NON-METALLIC MINERALS

The **non-metallic minerals** sector includes industries such as cement, glass, lime and ceramics production, all of which require high-temperature heat and generate significant process-related GHG emissions.[97] These industries represented 12.8% of total energy consumption in the industry sector in 2022.[98] In the same year, 8.5% of energy used in the non-metallic minerals sector came from renewable sources, and 15% was from electricity.[99] The cement sector alone accounts for around 6% of global energy-related CO_2 emissions, 60% of which are process emissions.[100]

Clinker production, a key component in **cement manufacturing** that requires temperatures of around 1,400°C, is a major source of emissions due to related chemical reactions.[101] In 2022, low-emission clinker production accounted for less than 1% of total production worldwide.[102] Carbon capture, utilisation and storage (CCUS), often seen as critical for decarbonising the sector, has seen very limited deployment.[103] The cement and ceramics sectors have begun to invest in electrified and hybrid kiln systems, as well as heat batteries, in early efforts to move away from fossil fuel-based thermal processes.[104] In addition, several low-clinker and alternative cement types, including some based on calcined clay or industrial by-products, are being developed to reduce process emissions and energy needs.[105]

In early 2025, China introduced Renewable Portfolio Standards (RPS) for high-emission sectors including cement and polysilicon. These standards require industrial producers in certain provinces to source up to 70% of their electricity from renewables by 2030.[106] 2024 saw an almost 10% drop in cement production, reflecting lower demand linked to a slump in the real estate market and a slowdown in infrastructure investment.[107] The global construction sector also saw a decline in productivity in 2024.[108]

CHEMICALS AND PETROCHEMICALS

Chemical and petrochemical industries accounted for 16.4% of industrial energy use in 2022; while 8% of energy used in the sector came from renewable sources, and 24% from electricity.[109]

The sector faces challenges in transitioning towards renewables, as it still largely relies on fossil energy carriers as feedstock.[110] Yet, technologies such as electrified steam cracking, which replaces fossil fuels with electricity to break down hydrocarbons, as well as the use of industrial heat pumps to recover and upgrade waste heat, have been gaining traction.[111] In parallel, green hydrogen is emerging as a replacement of fossil fuel-derived hydrogen in high-temperature and feedstock applications. For example, an initiative by the United Nations Industrial Development Organization (UNIDO) promotes green ammonia production using renewable energy, to reduce the carbon footprint of fertiliser production.[112]

In Spain, the global energy company Repsol announced a 25 MW green hydrogen electrolyser project at its Castellón oil refinery in September 2024.[113] Powered by solar energy under a long-term PPA, the plant is expected to reduce fossil-based hydrogen use in refining.[114] In addition, the world's **first commercial e-methanol plant** opened in Denmark in early 2025, converting renewable hydrogen and captured CO_2 into low-emission methanol, potentially cutting lifecycle emissions by up to 95% and providing heat to over 3,000 households.[115] However, due to high production costs, commercial deployment of e-methanol and other hydrogen-derived fuels remains limited, with most projects still at the pilot or demonstration stage.[116]

70%

renewable electricity target by 2030 for certain high-emission industries under China's new Renewable Portfolio Standards.


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Cement factory; Yunnan Province, China

RENEWABLES IN LIGHT INDUSTRY SECTORS

Light industry sectors, including the pulp, paper and printing industries as well as food and tobacco industries, account for 12% of the industry sector's total final energy use, and have achieved a significantly higher share of renewables in final energy consumption than heavy industry sectors.[117] Renewables accounted for around 47% of energy use in the pulp, paper and printing industries in 2022 and 32.5% in the food and tobacco industries, up from around 40.6% and 27.7% in 2012 respectively[118] (→ *See Figure I-5.*). The majority of renewable energy used in light industry sectors is bioenergy, while the uptake of solar and geothermal energy remains negligible.[119] Electricity accounts for around 23% of total energy use in paper, pulp and printing industries, and around 30% in food and tobacco.[120]


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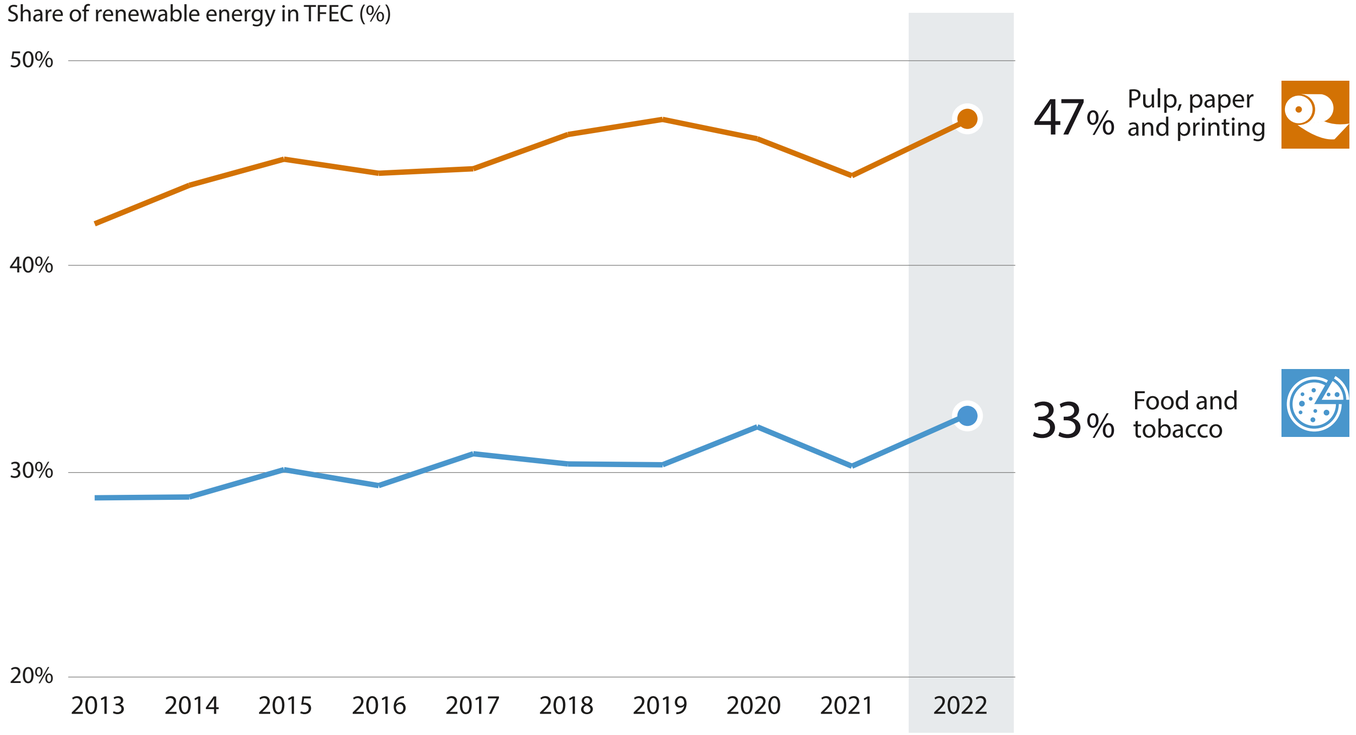
FIGURE I-5
Share of Renewable Energy in Total Final Energy Use by Light Industry Sub-Sector, 2013 to 2022



Source: See endnote 118 for this section.

PULP AND PAPER

Pulp, paper and printing consumed 5.4% of total final industrial energy consumption in 2022.[121] 47% of pulp, paper and printing's total final energy use came from renewable sources, and 23% from electricity during the same year.[122] Bioenergy provided 40.16% of overall energy consumption in the sector.[123]

Producers are increasingly investing in bioenergy and electrification to displace coal and gas in mills.[124] The company International Paper, for example, is adding a new biomass boiler at its Madrid paper mill to halve CO_2 emissions, and about 10% of the mill's electricity demand is met using solar energy under a new PPA.[125] Another Spanish paper mill, ALIER, is installing a USD 32.8 million (EUR 28 million) 100% forest biomass boiler.[126] Brazil's Suzano opened its new "Cerrado" pulp mill; a 2.55 million t/yr eucalyptus pulp line built with a USD 4.3 billion (BRL 22.2 billion) investment.[127] The mill will use renewable biomass to generate an average of 180 MW of surplus electricity each month, supplying both its local suppliers and the national grid.[128]

FOOD AND TOBACCO

Food and tobacco industries represented 6.5% of industrial energy use in 2022.[129] 32.5% of food and tobacco final energy consumption came from renewable sources, while 30% of the sector's processes were electrified during the same year.[130] Modern bioenergy provided 23.5% of energy in food and tobacco in 2022.[131]

Renewable energy uptake is rising as major food and beverage firms switch to renewable electricity and bioenergy to power key processes. Nestlé reports that since 2024, all electricity consumed by its Mexican factories comes from renewable sources.[132] Meanwhile, the company funded a 326 MW solar farm in Texas under a 15-year PPA for its US factories.[133] In Vietnam, major sugar producer Quảng Ngãi Sugar approved an investment of over USD 76.6 million (VNĐ 2 trillion) to expand its biomass power plant using bagasse from sugar production, while also increasing its sugar processing capacity.[134] In Kenya, British American Tobacco has invested around USD 1.1 million (KES 145 million) from 2023 to expand its solar energy capacity.[135] Morocco launched a national programme in 2024 to integrate solar thermal energy into agro-processing industries, with 15 pilot sites operational by mid-2024.[136]

47%

renewable share in the pulp, paper and printing sector — the highest among all industry sub-sectors.

>700

low-carbon industrial projects in development worldwide in 2024.

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Paper industry; Suzano Papel e Celulose, Brazil

LEAD CONTRIBUTOR

Hind Couzin
Jonathan Lyons

REN21 DATA AND KNOWLEDGE TEAM

Jad Baba
Janne Luise Piper
Andrea Wainer
Jiayi Wang
Glen Wright

TOPICAL CONTRIBUTORS

Christopher Hope (UNIDO)

EDITING, DESIGN AND LAYOUT

Maria van Veldhuizen (Editor)
weeks.de Werbeagentur GmbH (Design)

PRODUCTION AND COMMUNICATION

REN21 Secretariat, Paris, France

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For the 2025 edition of the Renewables Global Status Report, REN21 updated the methodology and classification system of its Policy Database to improve clarity and better capture current policy developments. Consequently, some figures in this edition may not be directly comparable with data from previous reports.

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REN21 Secretariat
158 ter rue du Temple
75003 Paris
France

www.ren21.net