

Industry Efficiency

Other than electrification, industrial manufacturing is also driven by an underlying need to increase efficiencies in both energy and industrial processes. Lower energy intensity can be achieved by using energy-efficient appliances, such as high-energy-efficient boilers or chillers, or by increasing and optimizing processes. In contrast, process emissions intensity can be reduced by utilizing lower-carbon emissions sources or by minimizing the use of materials that may lead to higher emissions.

Level 1

Level 1 assumes that by 2050, the energy emissions intensity range will be between no change and a 13% decrease depending on the type of industry, while process emissions intensity will remain the same as in the base year.

Level 2

More industries have implemented energy audits to identify hotspots and have adopted more energy-efficient technologies. The industrial process also has also been improved to reduce the process emissions intensity. Level 2 assumes that by 2050, the energy emissions intensity range will be between no change and a 28% decrease, depending on the type of industry, while process emissions intensity will decrease by 14%.

Level 3

Level 3 assumes that by 2050, there will be improvements in energy intensity and emissions across all industries. The energy emissions intensity range will be between a 10% to 49% decrease, depending on the type of industry, while process emissions intensity will decrease by 29%.

Level 4

Level 4 assumes that by 2050, more efforts and investments will be made to further reduce energy consumption and improve overall industry processes. The energy emissions intensity range will be between 25% to 60% decrease, depending on the type of industry, while process emissions intensity will decrease by 43%.

	2050	2050	2050	2050
Energy Emissions Intensity Reduction	Level 1	Level 2	Level 3	Level 4
Metal	No change	No change	10%	25%
Cement, ceramics and glass	No change	No change	10%	25%
Chemicals	13%	28%	49%	60%
Other Industry	13%	28%	49%	60%

	2050	2050	2050	2050
Process Emissions Intensity Reduction	Level 1	Level 2	Level 3	Level 4
Metal	No change	4%	8%	12%
Cement, ceramics and glass	No change	15%	30%	45%
Chemicals	No change	18%	37%	55%
Other Industry	No change	17%	33%	50%

Industry Electrification – Share of heat produced from electricity

Electrification of industrial sectors, coupled with the decarbonization of electricity generation, has been identified as one of the key pathways to achieve a low-carbon future. Electrification options are being explored on different scales for energy-intensive industries, such as the iron and steel industry, which primarily uses natural gas as the main fuel source.

Level 1

Level 1 assumes that by 2050, the share of electricity used for generating heat in industries will be in the range of 0% to 20%.

Level 2

Level 2 assumes that by 2050, the share of electricity used for generating heat in industries will be in the range of 0% to 43%.

Level 3

Level 3 assumes that by 2050, the share of electricity used for generating heat in industries will be in the range of 0% to 50%.

Level 4

Level 4 assumes that by 2050, the share of electricity used for generating heat in industries will be in the range of 0% to 90%.

		2050	2050	2050	2050
Share	2016	Level 1	Level 2	Level 3	Level 4
Metal	27%	13%	43%	50%	85%
Cement, ceramics and glass	21%	11%	21%	44%	85%
Chemicals	11%	12%	21%	44%	85%
Other Industry	27%	20%	35%	50%	90%

Industry Shift to Gas

Natural gas plays a pivotal bridging role in transition towards low-carbon industrial sector. Moving away from the remaining coal and diesel oil consumption will help to reduce further carbon emissions in the industrial sector. This is because natural gas has lower carbon emissions intensity compared to coal and diesel oil. In 2016, natural gas is the main fuel source for energy use, 36% of total energy consumption.

Level 1

Level 1 assumes that in 2050, the share of heat generated from gas by industries will be between 15% and 74%.

Level 2

Level 2 assumes that in 2050, the share of heat generated from gas by industries will be between 34% and 78%.

Level 3

Level 3 assumes that in 2050, the share of heat generated from gas by industries will be between 52% and 83%.

Level 4

Level 4 assumes that in 2050, the share of heat generated from gas by industries will be between 70% and 88%.

		2050	2050	2050	2050
Share of process heat supplied by Gas	2016	Level 1	Level 2	Level 3	Level 4
Metal	60%	15%	34%	52%	70%
Cement, ceramics and glass	6%	50%	57%	63%	70%
Chemicals	61%	74%	78%	83%	88%
Other Industry	50%	40%	52%	63%	74%