# Industry

**Figure 1  Japan's move to low carbon economy will be affected by its industrial activities**



Source: IGES stock image.

Considering Japan's industrial structure, the Low Carbon Navigator incorporates five components:

- Energy use and related GHG emissions in manufacturing and construction;

- Energy use and related GHG emissions in agriculture, forestry and fisheries;

- Non-energy GHG emissions from industrial processes (from cement industry, other ceramics, ammonia and soda, petro chemical, other chemicals, electric furnace, non-ferrous metal, machinery);

- Non-energy GHG emissions in agriculture; and

- Non-energy fossil fuel use in petro-chemical industry.

In 2005, value addition of these industries was around 20 trillion JPY, or about 4% of national GDP (MOE, 2012b).

In the Low Carbon Navigator, industrial sector's future energy use is determined by several factors: economic growth and industrial activity; energy intensity per industrial output, and energy mix in the industry.

## Economic growth and industrial activity

Economic growth and industrial activity levels are determined by the user's choice on 2050 society scenarios.

The activity levels of all the five components are affected by the choices of society scenarios.

For details, please see the Excel Model (Zhou et al. 2014).

## Energy intensity per industrial output

The energy-related GHG emissions are affected by energy intensity per industrial output. Two opposite scenarios are developed for this factor. In the first one, energy intensity per industrial output remains at base year level up to 2050.

The second scenario under this factor, which assumes the opposite of the first scenario, holds that energy intensity continues to reduce toward 2050 at reasonable levels determined by a group of experts.

## Energy mix in the industry

Energy carrier mix in the industry affects the manufacturing and construction subsector, and the agriculture, forestry and fisheries subsector. Four different levels of energy carrier mix have been assumed in the Low Carbon Navigator. Under **Level 1**, the energy mix remains the same as in the base year. On the other hand, for **Level 4**, energy mix shifts toward minimising direct emissions through, e.g. electrification, promotion of renewables and shift from coal to gas, that is consistent with the national efforts to achieve 80% emissions reduction by 2050, determined by a group of experts (MOE, 2012b).

## Installation of carbon capture and storage (CCS) technology in the industry

CCS technology is relatively new and its deployment in the industry is still limited to demonstration projects. However, a great amount of research work is being conducted on the actual deployment of this technology. The Low Carbon Navigator therefore includes a lever on the installation of CCS technology across industries in Japan. Similar to the CCS lever for conventional power plants, **Level 1** in the industrial CCS lever assumes that no CCS will be installed in the industry up to 2050. Only limited number of pilot projects will have CCS installed. **Level 2** assumes that Japan puts limited effort in

initiating industrial CCS roll-out. Under this level, 20% of the energy $CO_2$ emissions from chemical, ceramics and steel sectors as well as 20% of non-energy $CO_2$ emissions from industry are removed by the deployed CCS technology. **Level 3** increases the efforts more, and results in 50% removal of energy $CO_2$ and non-energy $CO_2$ from these sectors by CCS. Under great efforts in **Level 4**, the share of emission removal increases further to 80%.