

# Our Approach to Reducing CO<sub>2</sub> Emissions in the Semiconductor Industry

**Global warming poses serious problems to the continued existence of human life on Earth. TEL will respond more strongly to this issue and work for reductions in our CO<sub>2</sub> emissions as our contribution to the solution of this problem by the semiconductor industry.**

## Issues in the Semiconductor Industry

The CO<sub>2</sub> emissions by the Japanese electric and electronic products industry accounts for about 3% of all industrial emissions (see graph "Emissions Industries in Japan"). The structure of this industry has greatly changed in the past 10 years: manufacturing has moved away from heavy electric equipment and home electric appliances, which consume relatively low amounts of energy and involve much assembly of components, to products requiring high-precision processes. The sector of semiconductor device production is a heavy energy consumer and has gone through a period of exceptional growth, during which many new production facilities have been built. The energy consumption far outstrips the preliminary estimates (based on an excerpt from a Nippon Keidanren report on measures against global warming). It is predicted that CO<sub>2</sub> emissions involved with production of semiconductors, liquid crystal displays and plasma displays will increase, raising emissions for the industry as a whole.

In the wake of the Kyoto Protocol, Nippon Keidanren has published an environmental action plan. They proposed the goal of a 25% reduction by CY 2010 in production-caused CO<sub>2</sub> emissions per unit cost, relative to the CY 1990 level, for the four groups of electric and electronic groups, which include the semiconductor industry. One of the measures suggested is to reduce energy consumption in large-scale clean rooms where semiconductors are produced.

Meanwhile, semiconductor industry groups in the EU, Japan, South Korea, the U.S. and Taiwan have announced through the World Semiconductor Conference (WSC) that they will reduce emissions of the greenhouse gases PFCs\* by 10% by CY 2010.

As such domestic and international efforts get further underway, our customers are also stepping up initiatives, meaning that they also expect more from TEL.

\* PFCs: Perfluorocarbons. Gases belonging to this category are used in semiconductor production processes, for silicon wafer etching and for cleaning the chambers of film forming equipment.

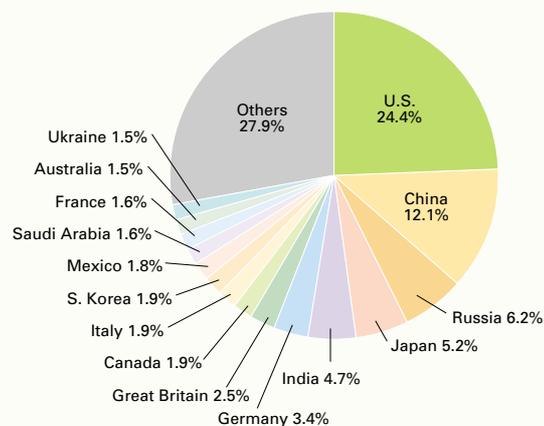
## Approaches Taken by TEL

A close look at the life cycle of our semiconductor production equipment reveals that its environmental burden, especially as measured by CO<sub>2</sub> emissions, is high during operation (see P.18). Thus, reducing emissions during operation is the main thrust of our efforts.

The electric power consumption of production facilities (lines) doubled as wafers were upsized from 200mm to 300mm. Some tentative forecasts have even warned that the growth of energy demand from that sector exceeds the

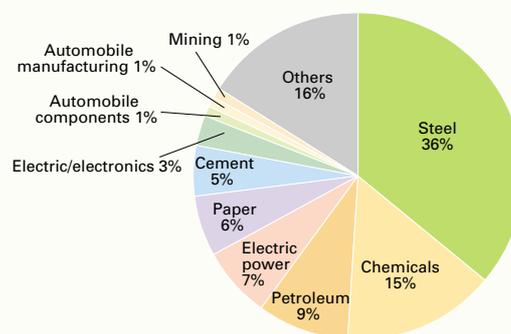
growth in power available from electrical generation facilities. The industry has tackled the problem of improving equipment efficiency in order to reduce energy consumption, but the big gains have already been made, and no great progress in that realm can be realistically expected in the future. Hereafter, it will be necessary to pursue energy savings throughout the factory from a variety of viewpoints – not only equipment, but also in methods of accomplishing tasks and by sharing technical information. New efficiency programs must encompass devices, equipment and facilities. All the departments of TEL – development, design, manufacturing and management – will pull together as a team to develop new environmental technology for our equipment.

**Percentage of Total World Carbon Dioxide Emissions Due to Top 15 Nations (CY 2000)**



Source: Oak Ridge National Laboratory  
Quoted from Japan Center for Climate Change Actions (JCCCA)  
<http://www.jccca.org>

**Emissions of Industries in Japan (FY 2003)**



Source: Ministry of Economy, Trade and Industry