

Interim of Meeting of Phase 2 TGEP-EEDP projects on
Energy Efficiency Indicators in Thailand
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Energy efficiency trends in industry: first analysis

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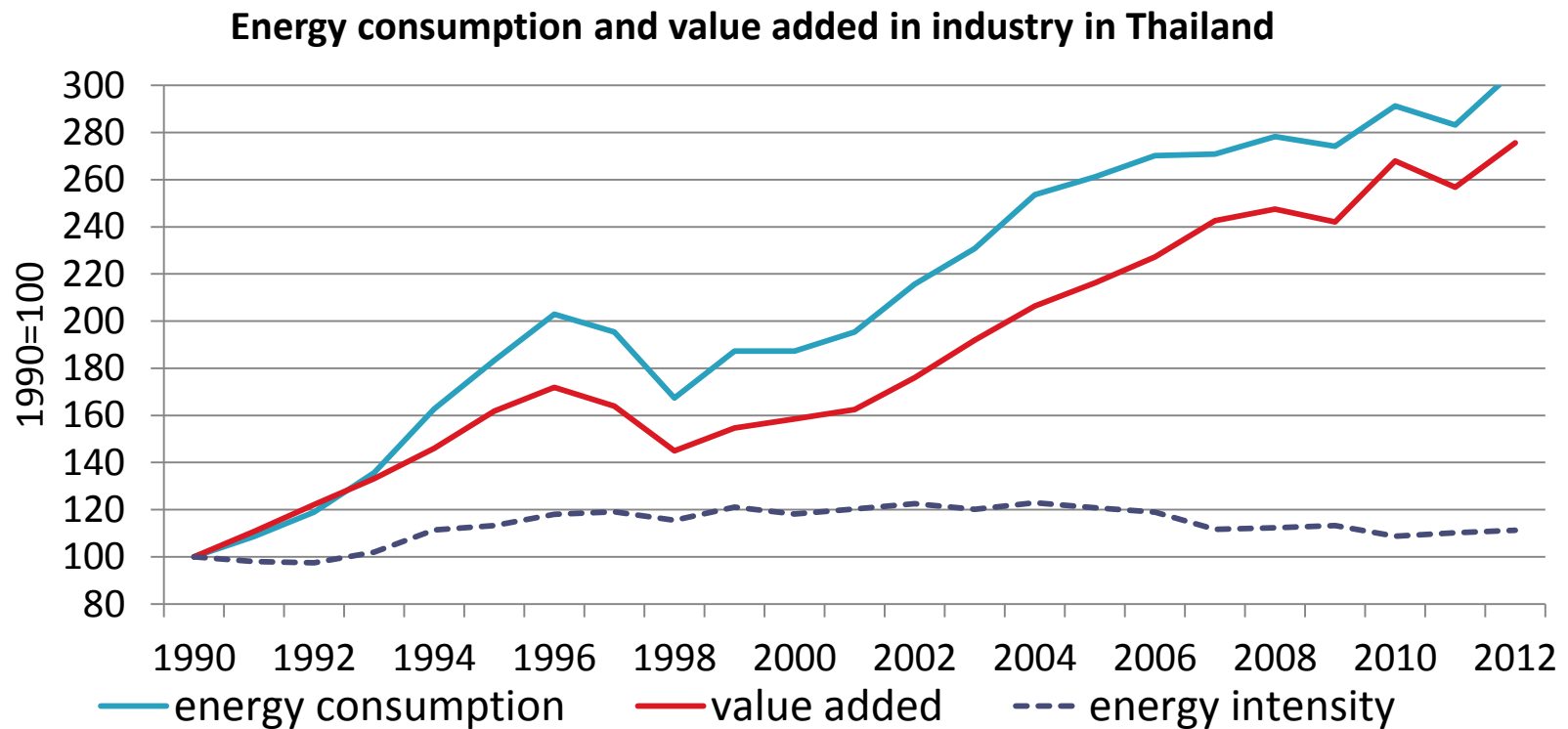
General comments about the indicators and analysis

- A great work of data collection has been done so far and, in terms of availability, the picture is quite good compared to a lot of other countries, even in Europe.
- Many problems have been identified based on the automatic controls included in the data sheets and also from this first analysis.
- They are being checked.
- The main issue with energy indicators is the disruption in data series, may lead to wrong conclusions, in terms of interpretation of energy efficiency trends, and/or restrict the period of analysis.
- Another issue lies in the different coverage (e.g. TSIC classification) between the energy consumption, the numerator of the indicator, and data on activity, the denominator.
- Therefore the analysis presented today is still provisional

- ▶ **1. Introduction**
- 2. Energy efficiency indicators by sub-sector
- 3. Effect of structural changes

Energy consumption and value added in industry

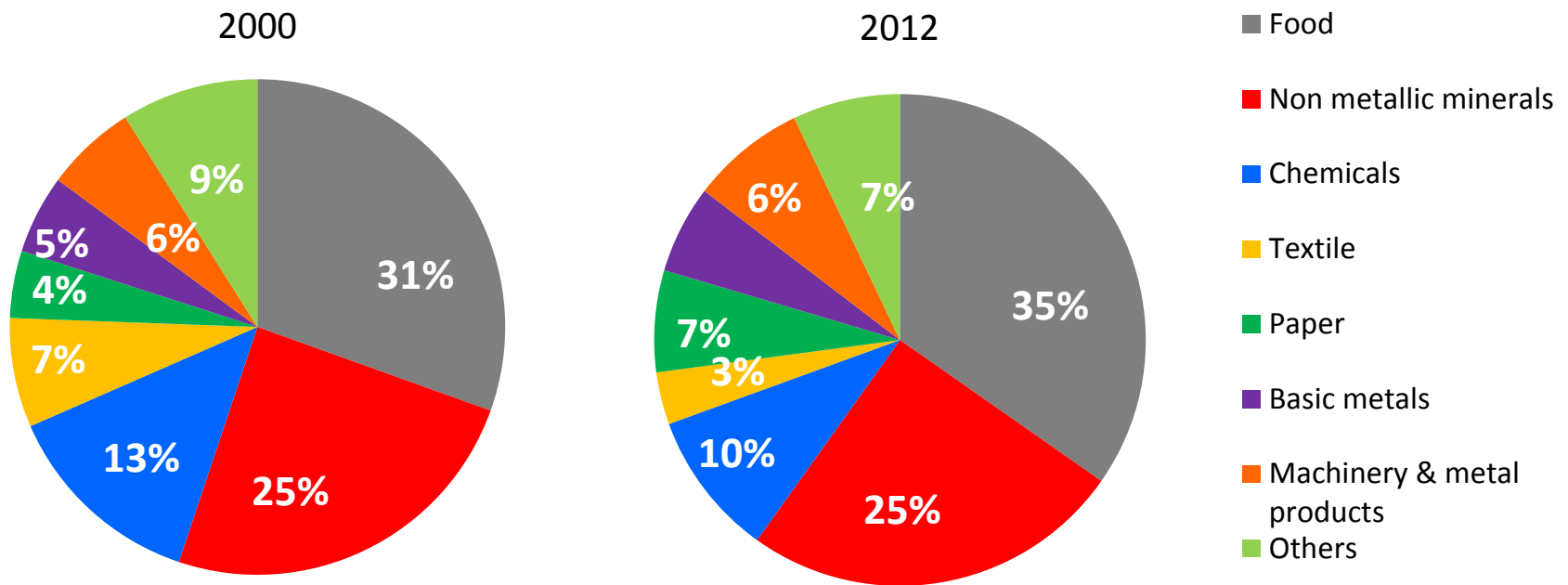
- Until 2004 the energy consumption increases faster than the value added; as a result, the intensity of industry increased (by 1%/year over 2000-2004 and by 2.5%/year over 1990-1997);
- Since 2004 the consumption increased less than the value added and the energy intensity has been decreasing.



Energy consumption by industry sub-sector

- Two sub-sectors represent around 60% of the consumption of industry: food (including beverages and tobacco) and non metallic minerals (mainly cement)
- Increasing share of food industry (processed and frozen products), of machinery (automobiles and electronics);
- Decreasing share of textiles and chemicals

Energy consumption of industry by sub-sector in Thailand

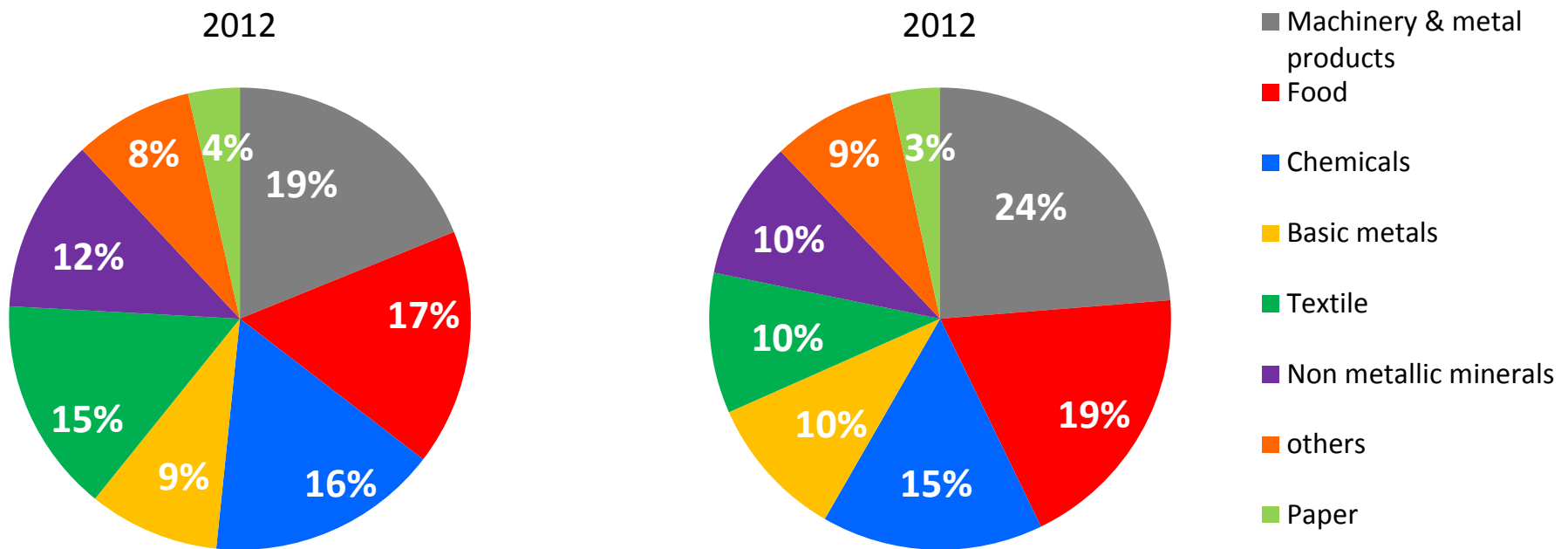


Source: DEDE

Electricity consumption by industry sub-sector

- Three sub-sectors represent around 60% of the consumption of industry: machinery (automobiles and electronics), food (including beverages and tobacco) and chemicals)
- Increasing share of machinery (+5 points) and food (+2)
- Significant decrease in the share of textiles (-5)

Electricity consumption of industry by sub-sector in Thailand



Source: EPPO

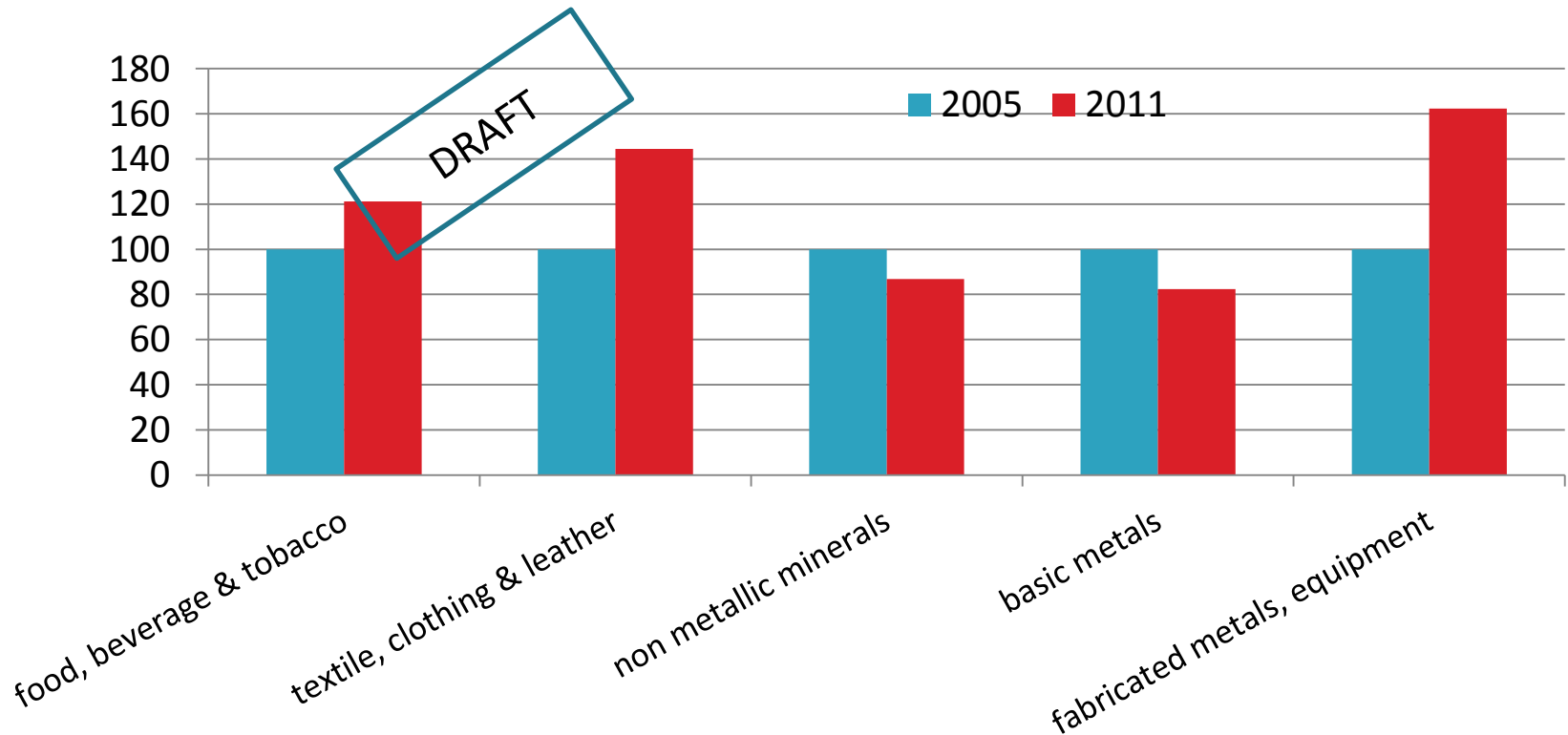
Energy efficiency indicators for industry

- Two types of indicators will be presented, corresponding to different levels of disaggregation :
 - **Specific energy consumption** by industrial sub-sector (**at 2 digits TSIC level**), calculated by relating the energy consumption to an **index of production** ;
 - **Specific energy consumption** per unit of physical production **for energy intensive production (at 3 to 5 digits level)**, relying mainly on detailed data collected from designated facilities; as these bottom up data are not yet available, indicators will be shown only for electricity, based on EPPO data

Trends in specific energy consumption by 2 digits sub-sector

- A decrease generally corresponds to energy efficiency improvement: this is the case of the most energy intensive sub sectors (non metallic and basic metals)
- An increase does not necessary means a deterioration of energy efficiency but generally is linked to change in the structure of production within the sub sector;

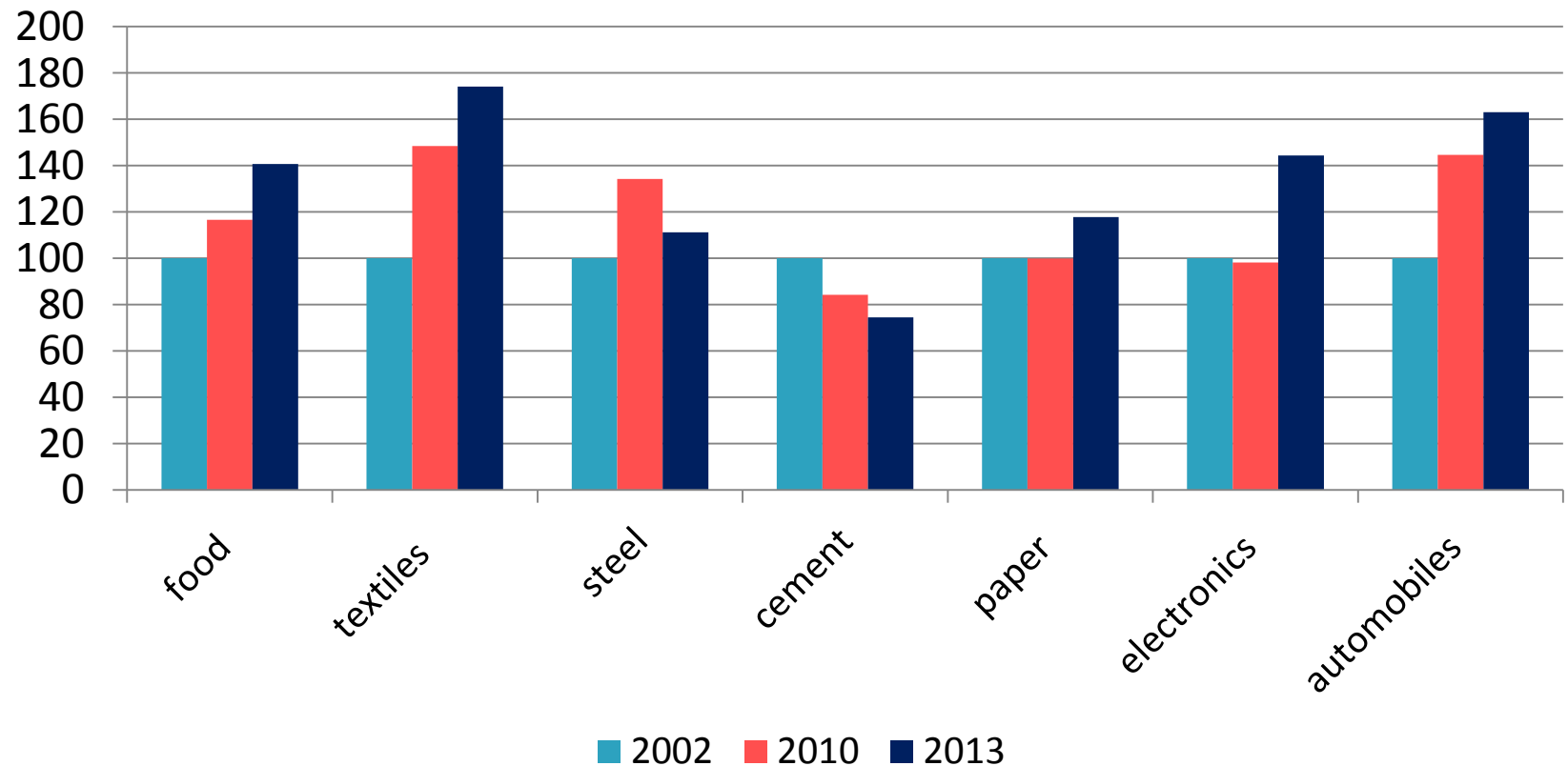
Specific energy consumption by industry sub-sector at 2 digits level (2005=100) (Thailand)



Trends in specific electricity production for selected energy intensive industrial sub-sectors

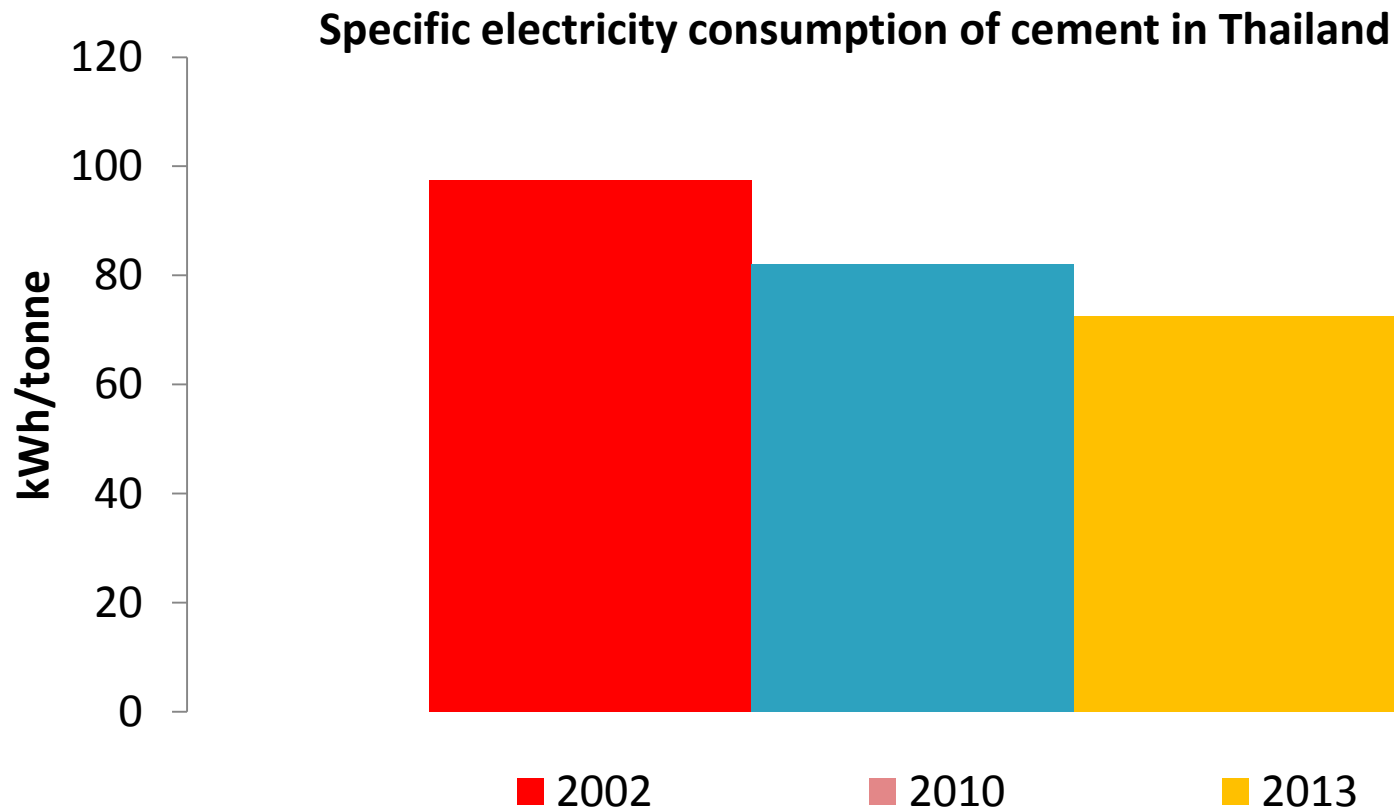
Apart from steel and cement the specific electricity consumption is increasing

Specific electricity for electricity intensive products (3 to 5 digits level (2002= 100))

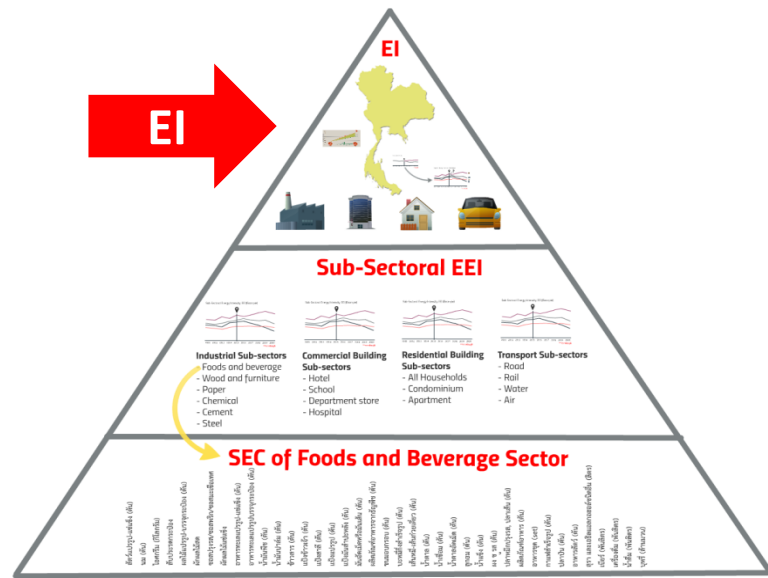


Energy efficiency improvements for cement

- Decrease by 25% of the specific electricity consumption of cement.
- This trend is the result of energy efficiency improvement and probably also from the fact that electricity has been produced by the cement factories, as the data correspond to the purchased electricity only; the magnitude of this second factor still needs to be checked.

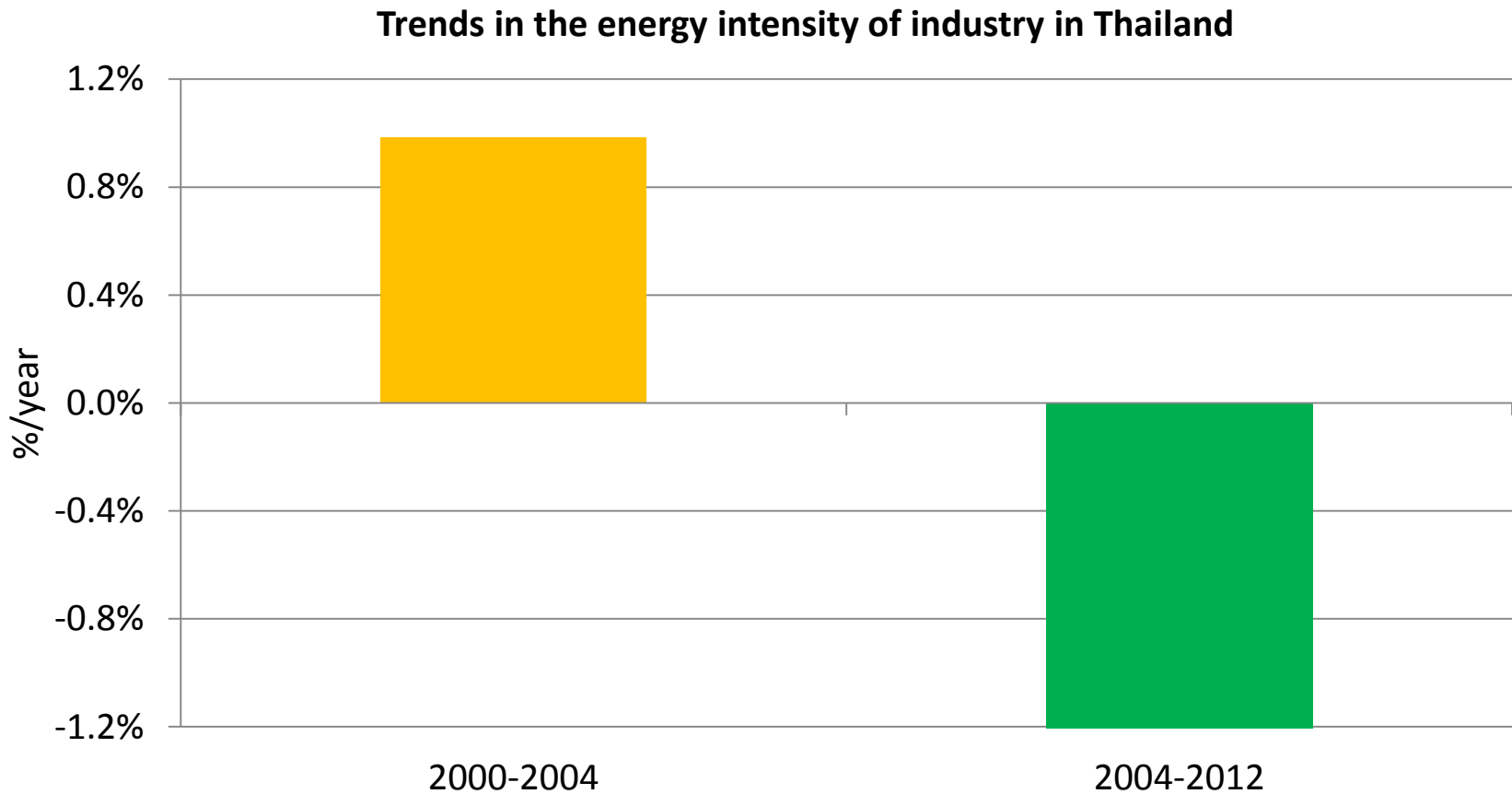


1. Main trends
2. Energy efficiency indicators by sub-sector
- ▶ 3. Overall energy intensity trends: effect of structural changes



Trends in energy intensities in industry and manufacturing

- Since 2004 the energy intensity has decreased by 1.2%/year for industry: this trend may be the result of energy efficiency improvements but also of changes in the structure of production towards less intensive sub-sectors.



How structural changes in industry affect the overall energy intensity of industry

- All industrial sub-sectors do not require the same amount of energy inputs to produce 1 Baht of value added. Some sub sectors are more energy intensive than others.
- Industrial growth is not uniform: some sub-sectors grow faster than others. As a result, the share of each sub-sector in the total value added of industry change over time: this is what is called **structural changes**.
- If **less energy intensive sub-sectors grow faster** than energy intensive sub-sectors, this will reduce the overall energy intensity of manufacturing, all other things being equal, and this is **not linked to energy efficiency improvements**.
- This is important to clean the energy intensity variation from these structural changes

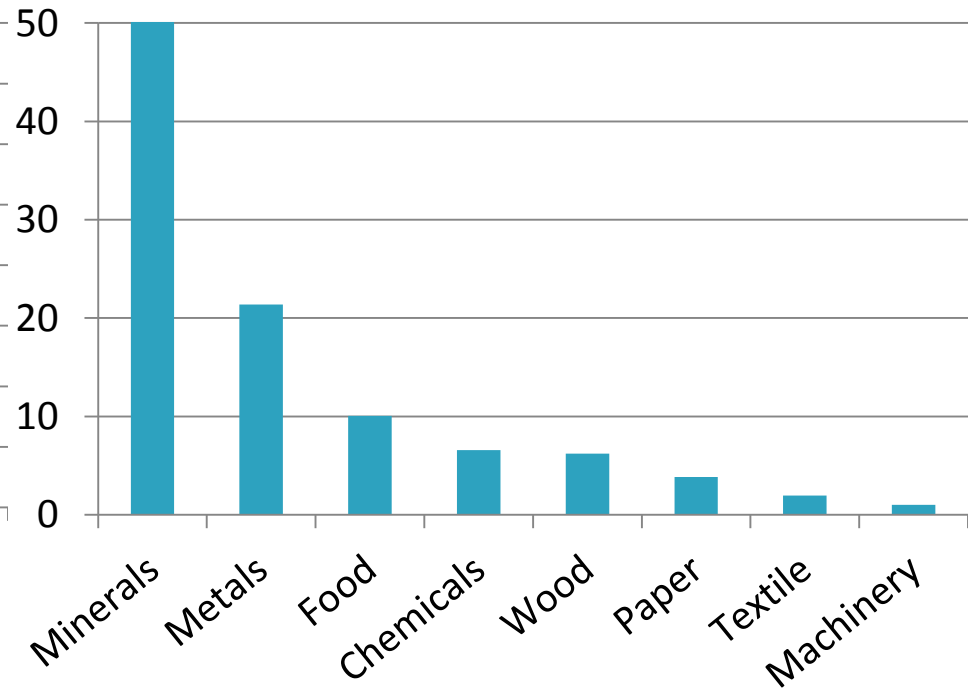
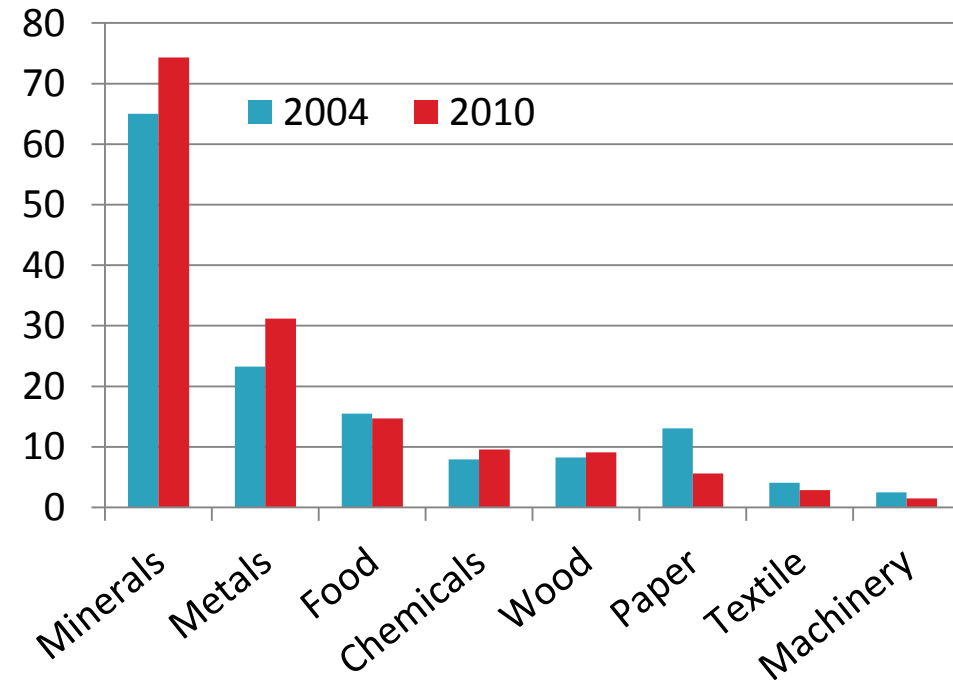
Difference in energy intensities by industry sub-sector

Non metallic minerals and basic metals require respectively 50 and 20 times more energy to produce 1 baht of value added than machinery, the less intensive sub-sector.

Energy intensities by industry sub-sector in Thailand

Values in toe per Mbht 2002

Relative values in 2010 (machinery =100)



Source: based on data from DEDE and NESDB

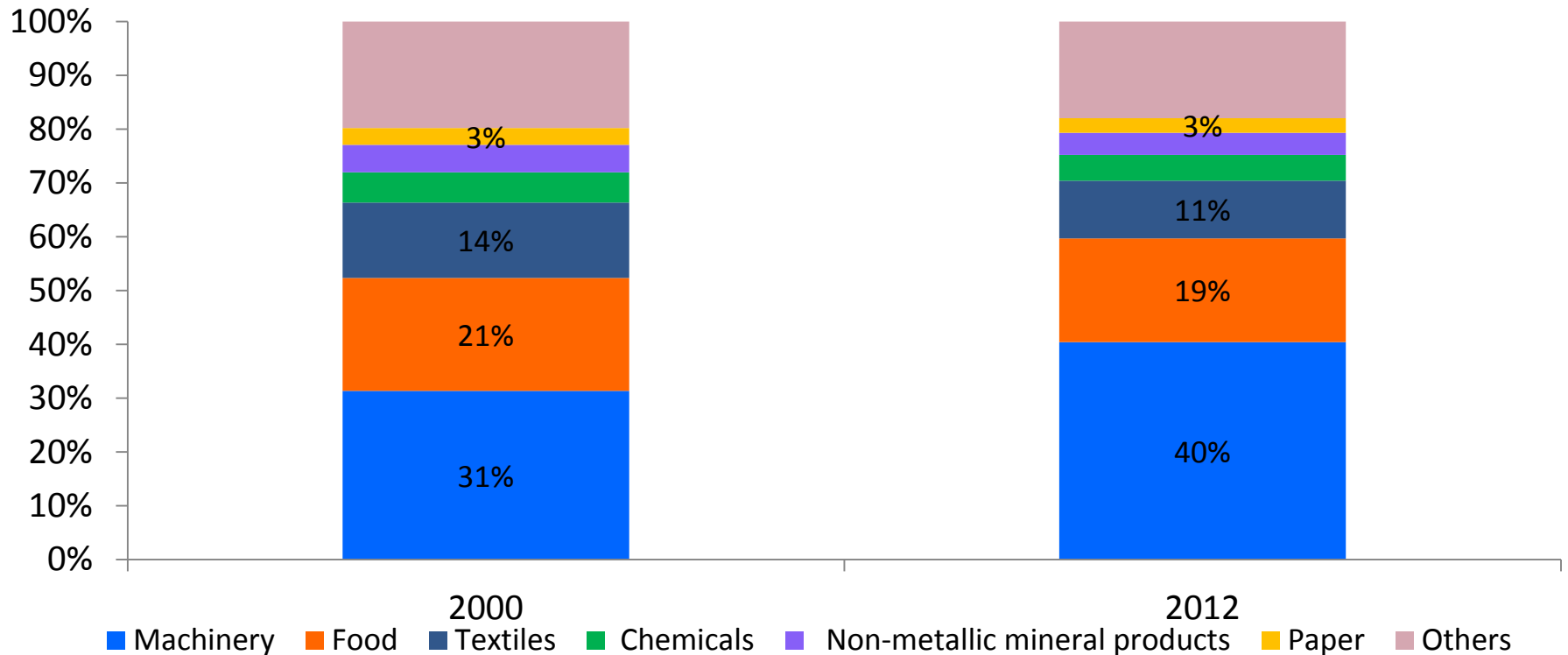
Minerals: non metallic minerals; metals: basic metals;

Machinery: fabricated metals, machinery and electronics

Change in industry value added structure

■ Industrial growth is not uniform: some sub-sectors grow faster than others. As a result, the share of each sub-sector in the total industry value added of manufacturing change over time: this is what is called **structural changes**. Increasing share of machinery, the less intensive sub-sectors but decreasing share of food and to a lesser extent of non metallic minerals and basic metals, the 3 most intensive sub sectors.

Share of industry value added by sub-sector in Thailand

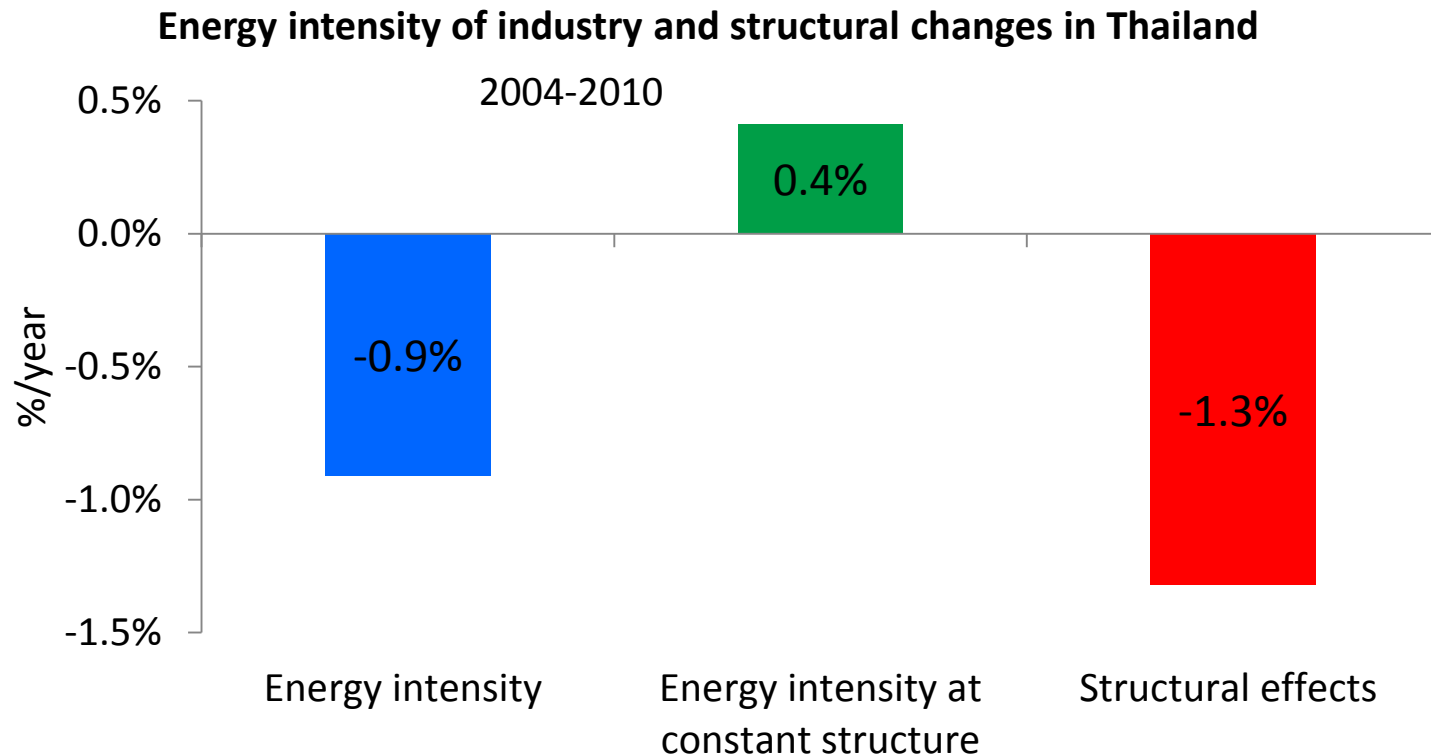


Measuring the impact of structural changes in industry

- To quantify the impact of structural changes on the energy intensity of industry, the usual approach is to calculate a fictive energy intensity at constant structure, i.e. assuming that the structure did not change compared to a base year (e.g. 2004 here).
- This intensity at constant structure (IES) is calculated at year t (e.g. 2010) with the sectoral intensities of year t and the value added structure of the base year (2004):
$$IES_t = \sum (VA_i/VA)_{2004} * (E_i/VA_i)_t$$
- Comparing the trend in the intensity with the value at constant structure measures the impact of structural changes

Impact of structural changes on industry intensity

- Between 2004 and 2010, the energy intensity of industry decreased by 0.9%/year;
- At constant structure, i.e. without such changes in the composition of industry, the energy intensity in the industry sector would have increased by around 0,4%/year
- Structural changes towards less energy intensive branches, such as automobiles and electronics, contributed to decrease the energy intensity by 1.3%/year.



Conclusions

- It is still too early to draw definitive conclusions as to the trend in energy efficiency in industry as there are some disruptions in the energy consumption for some sub sectors that are being checked ;
- For some sub sectors, like steel and cement there is clearly an improvement of efficiency in the use of electricity