Circumstances of International and National Standards on Building Energy Calculation Especially for Commercial Buildings

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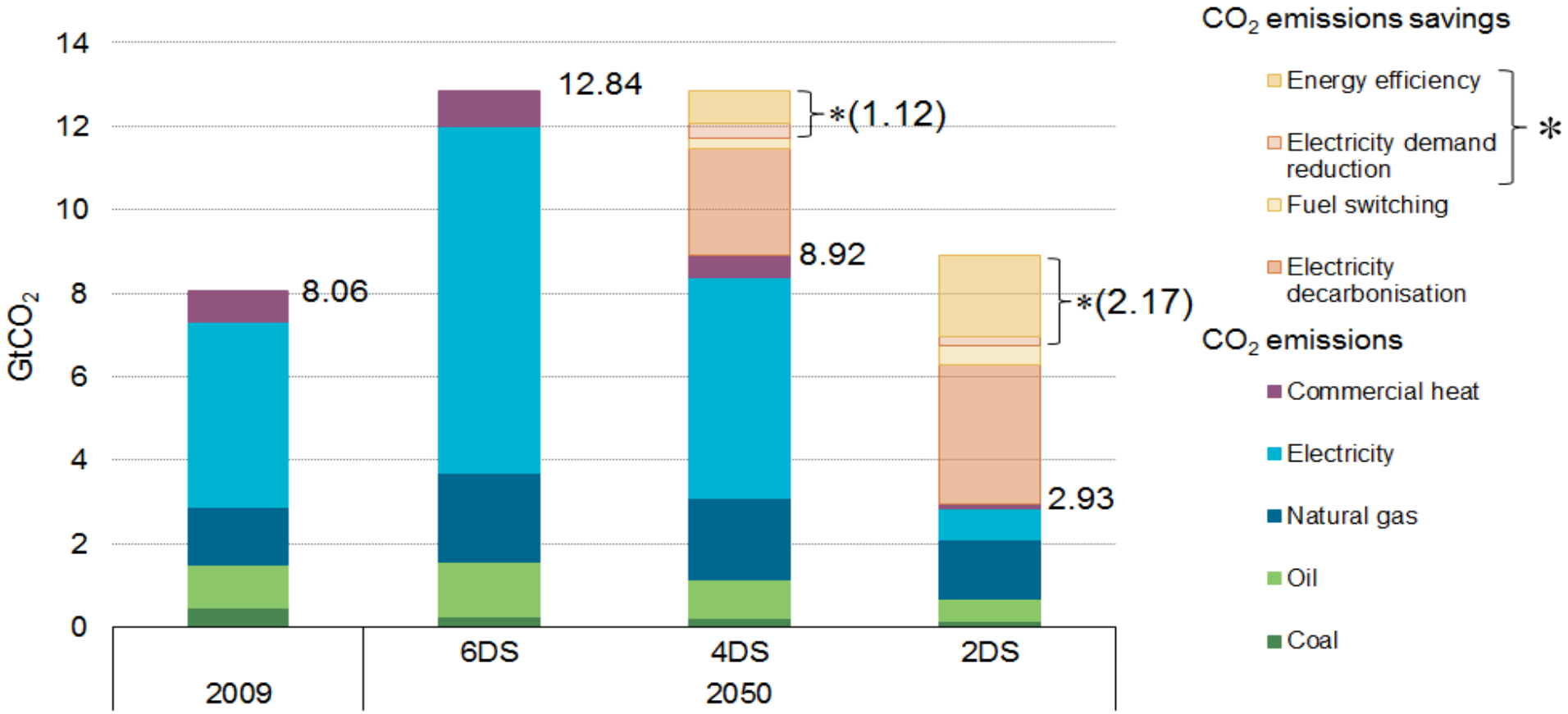
In order to limit global temp. rise in 2050 to 2°C, 77% reduction in total CO_2 emissions in the building sector by 2050 would be required.



Source: IEA ETP2012 and IEA EBC programme Strategic Plan 2014-2019

Japan's Target for Sectors by 2030 (million t-CO_2 , energy originated):

	FY2013	FY2030	
● Industry	429	→ 401	
● Transport	225	→ 163	
● **Commercial and other**	**279**	**→ 168**	**40% reduction**
● **Residential**	**201**	**→ 122**	**39% reduction**

For Building Sector

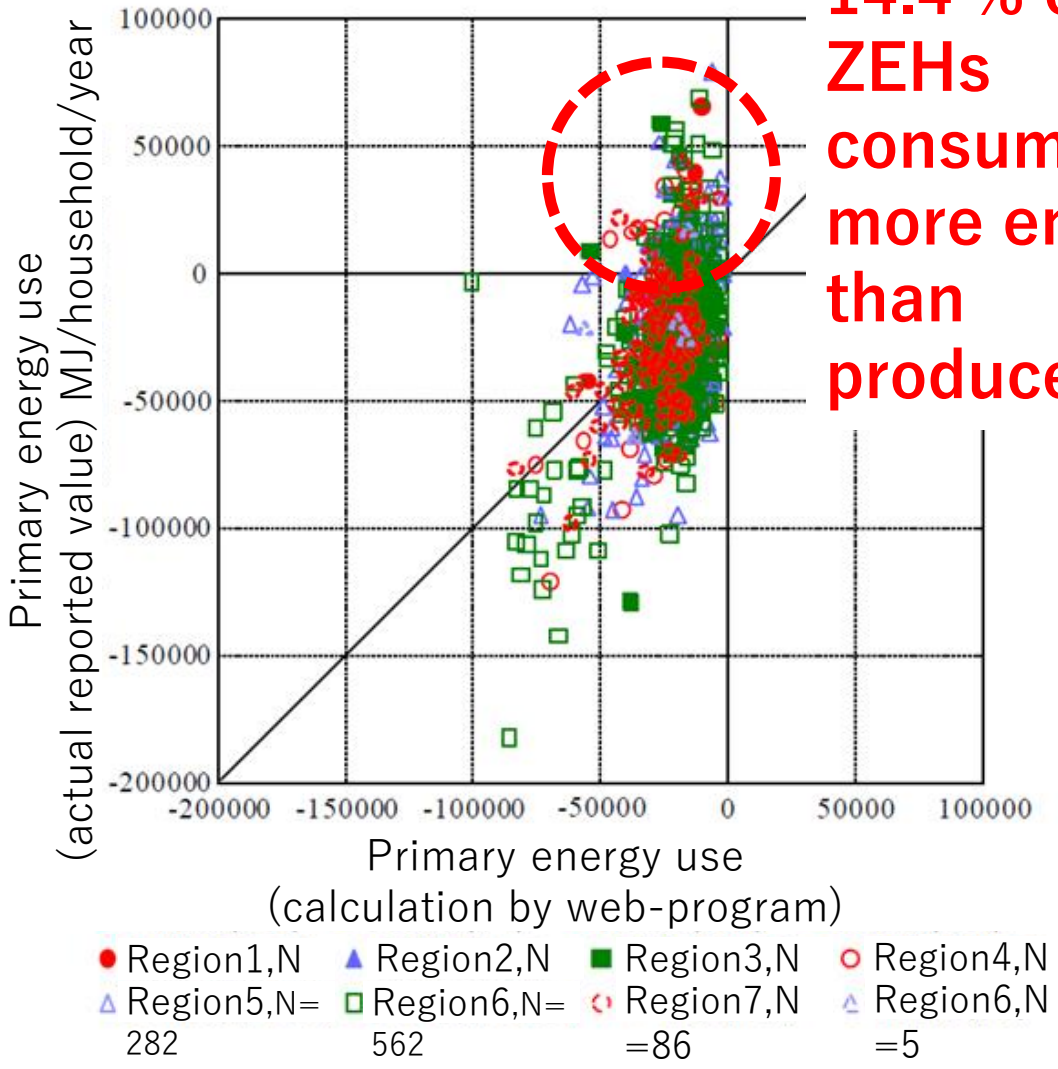
Source: http://www.mofa.go.jp/press/release/press4e_000811.html

How to achieve the target for building sector:

- De-carbonizing electricity, of which share is 50% in building sector (energy demand base) → reduction by **25%** (rough estimation) in FY2030
- Improving energy performance of buildings → reduction by **20%** (rough estimation) in FY2030

The promotion of “Zero Energy House” is becoming active in Japan.

- About 6,000 ZEHs used subsidy (1.2 million yen) by the METI.
- Additional about 1,000 ZEHs were constructed in 2015 by local builders using subsidy by the MLIT.
- ZEHs built by using the subsidy are obliged to report actual energy use for three years.
- The correlation between calculated and actual energy use have been analyzed (see Figure on the right).
- The similar policy to promote zero energy commercial buildings is expected to be launched soon in Japan.
- The energy calculation program, which can stand validations, is a major tool to promote ZEH and ZEB.



14.4 % of 1090 ZEHs consumed more energy than produced.

Japanese methodologies for estimating primary energy use in commercial buildings (overview)

- Annual primary energy use for space heating/cooling, ventilation, DHW, lighting and elevator are calculated.
- 8 building categories and 201 space (room) categories with schedules of internal heat gains, system operations and set-points for indoor environment. Condition of space usage is as influential on energy use as climatic condition in non-residential buildings.
- Standard value of primary energy uses is given for each space category in the regulation.
- Web based program is supplied by public organizations.
- The evaluations of techniques without clear and quantitative definition have been postponed (for example, natural ventilation).

Web-program for non-residential building

Web-program for residential building

Statistics of access (2013-2016)

- Main Site 790,000
- Non-residential program 1,930,000
- Residential program 5,280,000

National Energy Efficiency Conference 2016 in Sydney (15-16 November)

CEN, ISO, national standards and calculation methodologies

- CEN/TC 89 (thermal performance), TC156 (ventilation), TC169 (lighting), TC228 (heating and cooling systems) and TC247 (building automation) have developed standards on energy calculation since EPBD was published in 2002.
- More than 50 CEN standards plus newly developed few overarching standards are becoming ISO 52000 series for building energy calculation, under JWG between ISO/TC163 and TC205.
- However, the above-mentioned standards were originally developed consistently with many national standards and calculation methodologies, which had already existed.
- Therefore, existing international standards are not restrictive, decisive nor exhaustive, but can be a good guidance to develop the software for energy calculation.

What should be done for commercial buildings in the near future?

- There are many things to be done.
- It is much more behind residential buildings due to the complexity and variety of them and their building services.
- The energy calculation methodology to predict energy use should be developed.
- The methodology must be unbiased across various energy saving measures and validated transparently of its reliability.
- Energy saving measures (design methods such as natural ventilation for heat removal, variable air volume control, CO_2 control of ventilation …) must be redefined more strictly and quantitatively, in order to be evaluated in the prediction of energy use.