

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

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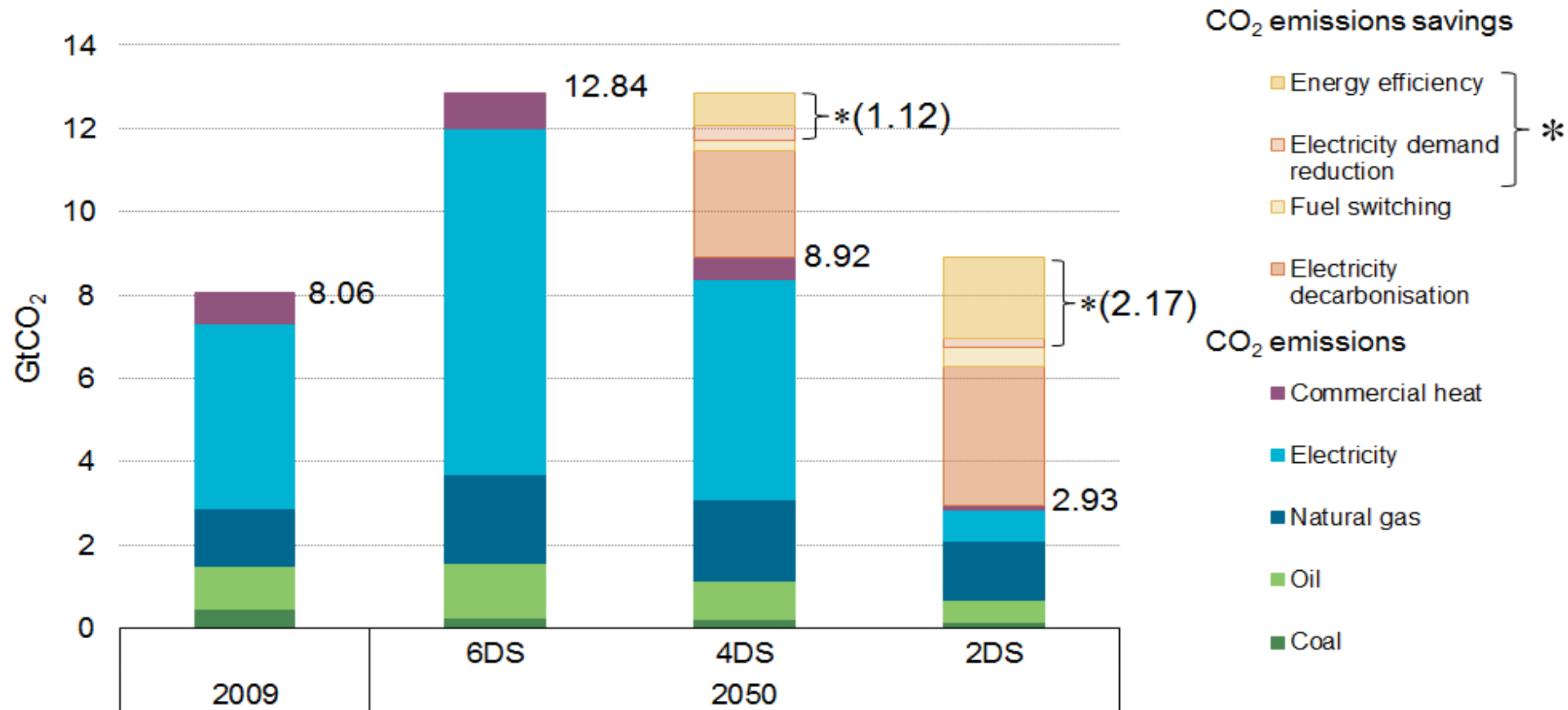
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In order to limit global temp. rise in 2050 to 2°C, 77% reduction in total CO₂ emissions in the building sector by 2050 would be required.



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

Japan's Target for Sectors by 2030 (million t-CO₂ , energy originated):

	FY2013	FY2030	
● Industry	429	→ 401	
● Transport	225	→ 163	
● Commercial and other	279	→ 168	} For Building Sector
● Residential	201	→ 122	

40% reduction
39% reduction

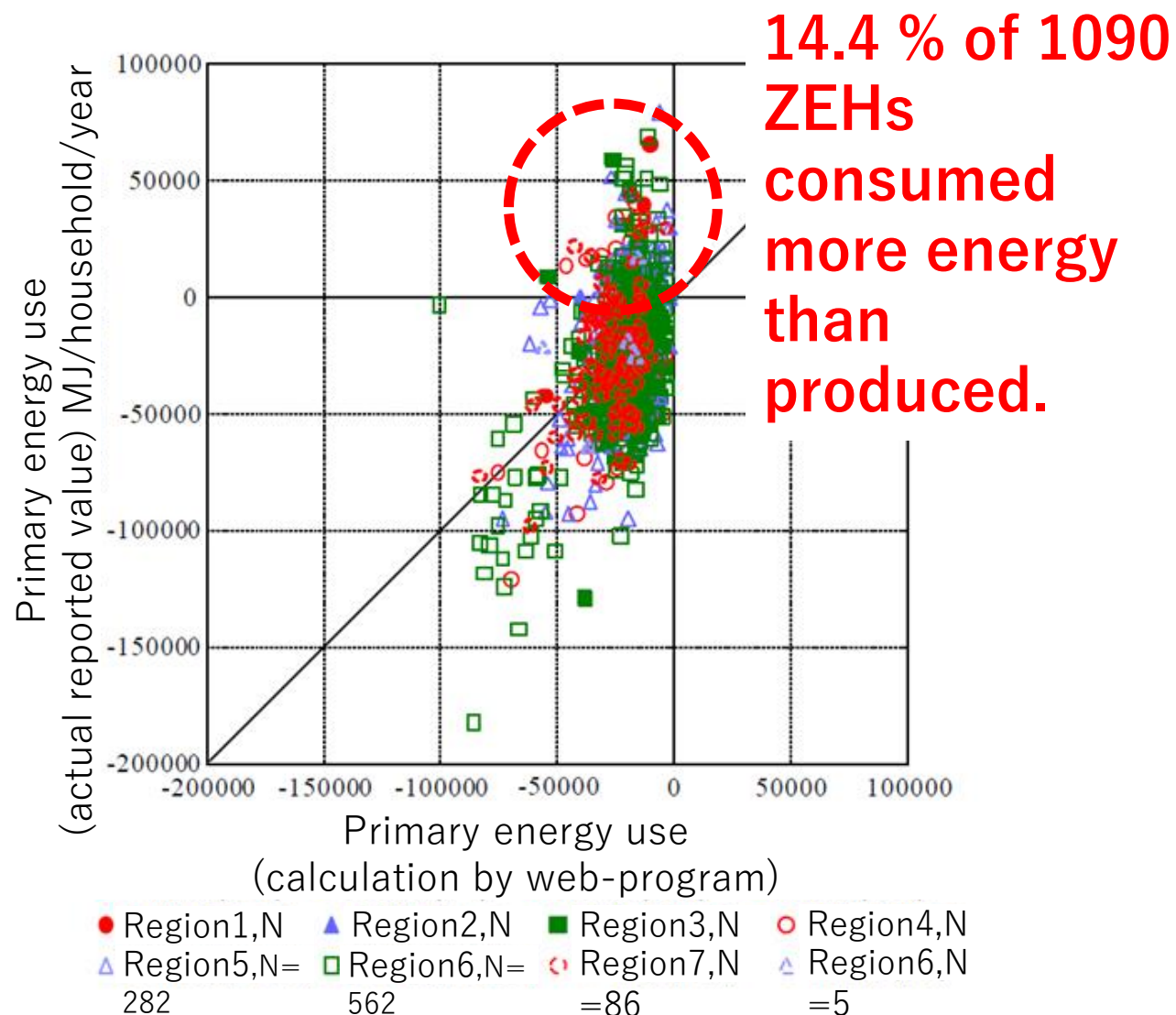
Source: http://www.mofa.go.jp/press/release/press4e_000811.html

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.



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).

エネルギー消費性能計算プログラム（非住宅版） Ver 2.1.1 (2016.05) WEBPRO

HOME PAL* 空調 換気 照明 給湯 昇降機 効率化設備

クリア 保存 読込 出力 再出力 外皮・設備仕様入力シート ダウンロード

OFFICE BUILDING (SAMPLE)

延床面積 **10000 m²** BPI **0.79**
 地域区分 **6 地域** BEI **0.91**
 日射地域 **A3**
 換算値 **指定しない**

編集 **簡易表示** **詳細表示**

空調

BEI/AC: 0.96
 設計値: 838.51 MJ/延床m²
 基準値: 880.45 MJ/延床m²

詳細

空調以外の機械換気

BEI/V: 0.91
 設計値: 62.66 MJ/延床m²
 基準値: 69.51 MJ/延床m²

詳細

照明

BEI/L: 0.82
 設計値: 341.32 MJ/延床m²
 基準値: 420.93 MJ/延床m²

詳細

給湯

BEI/HW: 1.98
 設計値: 27.37 MJ/延床m²
 基準値: 13.88 MJ/延床m²

詳細

昇降機

BEI/EV: 1.00
 設計値: 17.07 MJ/延床m²
 基準値: 17.07 MJ/延床m²

詳細

効率化設備

創エネルギー 12.16 MJ/延床m²
 量:

詳細

Web-program for non-residential building

Program for calculating primary energy consumption in house Ver 2.0.4

Load Save Designed 54656 MJ/year Cat Output

Commons Envelope Heating Cooling Ventilation HEX DHW Solar Lighting PV Cogeneration

Commons

Name of house or dwelling unit: HOUSE A (SAMPLE)

Method of construction: ☒ Detached house ☐ Apartment house

Floor area:

Main habitable room: 29.81 m² (the second decimal place)

Other habitable room(s): 51.34 m² (the second decimal place)

Sum: 120.08 m² (the second decimal place)

地域

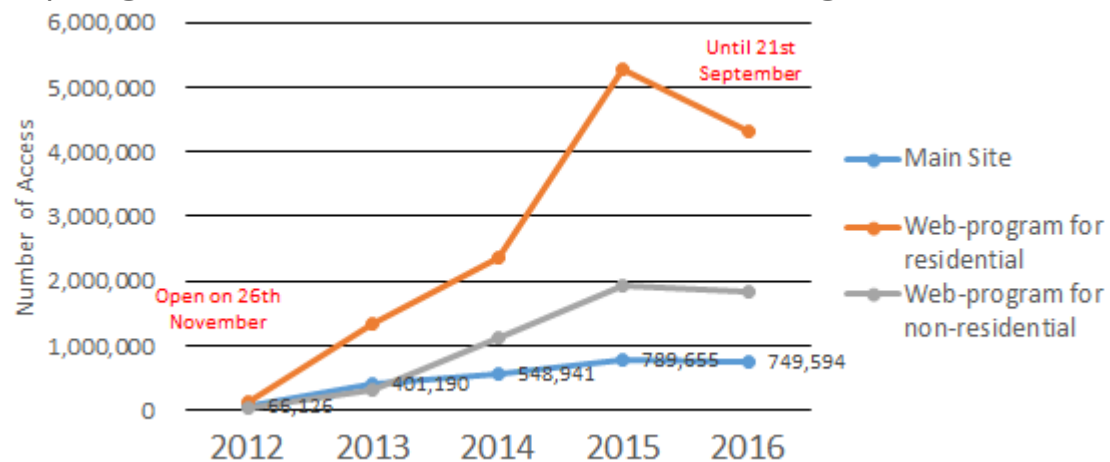
Area classification: ☐ Zone 1 (Zone Ia) ☐ Zone 2 (Zone Ib) ☐ Zone 3 (Zone II) ☐ Zone 4 (Zone III) ☐ Zone 5 (Zone IVa) ☒ Zone 6 (Zone IVb) ☐ Zone 7 (Zone V) ☐ Zone 8 (Zone VI)

Solar radiation area classification: ☐ Not selected ☒ Selected

Climatic zone for annual solar radiation: ☐ Area A1 (with very low annual solar radiation) ☐ Area A2 (with low annual solar radiation) ☒ Area A3 (with medium annual solar radiation) ☐ Area A4 (with high annual solar radiation) ☐ Area A5 (with very high annual solar radiation)

Language: 日本語 English

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, CO₂ control of ventilation ...) must be redefined more strictly and quantitatively, in order to be evaluated in the prediction of energy use.