IGES research on energy and climate scenarios in Japan

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Japan and energy

- Japan relies 96% of its energy supply on imports (as of 2009, incl. nuclear fuels)*
- Japan was the 3rd largest user of nuclear energy after US and France (45 GW)**, relying 1/4-1/3 of its power generation on nuclear

*IEA (2011) Energy Balances of OECD Countries, 2011 Edition.
** http://www.world-nuclear.org/info/reactors.html

Post-Kyoto climate targets

No (unconditional) GHG reduction target for post-2012 enshrined in the national legislation

- Copenhagen pledge: -25% vs 1990 level in 2020 (conditional)
- 2010 Basic Energy Plan (energy related CO_2): -30% vs 1990 level in 2030
- Bill of Basic Law for Global Warming Countermeasures: -25% by 2020, -80% by 2050 vs 1990 level

Whatever the targets may be, the increased nuclear power generation was considered to be the key to achieve climate targets

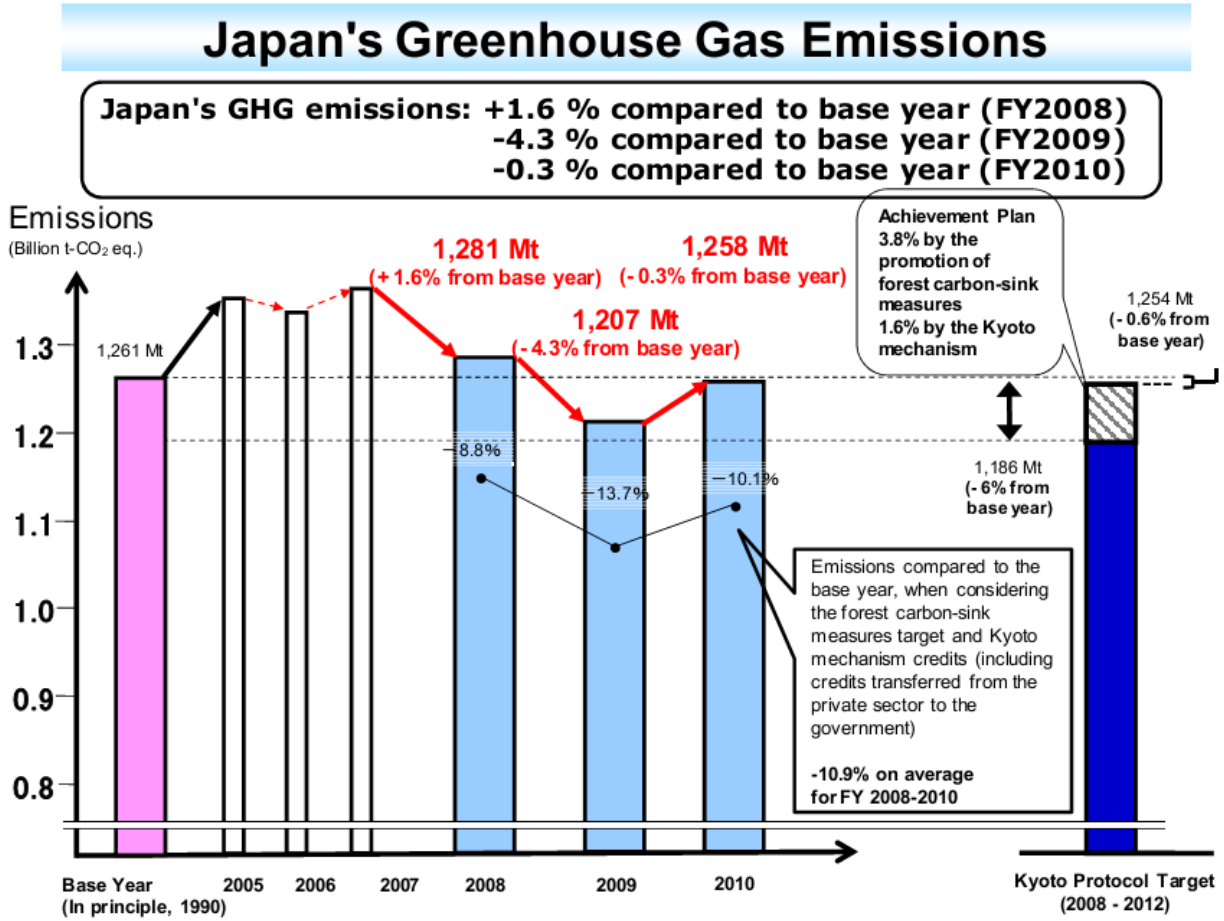
Japan and energy after Fukushima

Situation is highly uncertain, but there are some signs…

- All nuclear power plants stopped operation on 5 May 2012
- Strong public opposition against nuclear (e.g. governor of Osaka)
- RE Act* (bill passed in August 2011): revised FIT scheme
  - FIT for all electricity generated (as opposed to net metering)
  - FIT also for renewables other than PV

* The Act on Special Measures concerning the Procurement of Renewable Electric Energy by Operators of Electric Utilities , http://law.e-gov.go.jp/announce/H23HO108.html (in Japanese). English description available at: http://www.jurists.co.jp/ja/topics/docs/newsletter_201112_cb.pdf

Climate targets in the post-Fukushima period



Indications that no nuclear may result in CO_2 emissions increase as high as 10% of 1990 emissions

→ *How will the climate change policy change in the post-Fukushima period?*

Reference: NIES (2012) http://www.nies.go.jp/whatsnew/2012/20120413/gaiyou-e.pdf

Innovative Strategy for Energy and the Environment*

- To be formulated under the National Policy Unit around summer 2012
- Three basic philosophies*
  - Realization of new best-mix of energy sources
    - Draw up a scenario of **reduced dependence on nuclear energy**
    - Utilize a clear and strategic schedule to avoid energy shortfalls and price rises
    - Thorough review of nuclear power policies and operate under a new framework
  - Realization of new energy systems
    - **Distributed energy system**
    - Seek to make an international contribution as advanced problem-solving nation
  - Formation of national consensus
    - **Stimulate national discussions overcoming the confrontation between nuclear proponents and opponents**
    - **Verify objective data**
    - Formulate innovative energy and environmental strategies while maintaining dialogue with a broad range of national people
- Options to be proposed in the coming weeks (incl. GHG targets up to 2050)

* National Policy Unit (2011) Interim Compilation of Discussion Points for the Formulation of "Innovative Strategy for Energy and the Environment", http://www.npu.go.jp/policy/policy09/pdf/20110908/20110908_02_en.pdf, accessed on November 29, 2011.

Long-term energy and climate scenarios: A modeling study

IGES research on energy and climate scenarios

- Since 2010, IGES has been performing energy-CO_2 scenario analyses using energy techno-economic model
- Assessment on the possible long-term consequences of reduced nuclear power on Japan's energy system and CO_2 emissions (up to 2050)
- (Hopefully) contribute to the discussion on the Innovative Strategy

Key questions addressed

- Is 80% reduction of CO_2 emissions by 2050 vs. 1990 level technically and economically feasible without relying on nuclear?
- How will the nuclear phase-out affect Japan's energy system technically and economically?
- How much renewables and CCS required by 2050?
- How will nuclear phase-out affect fossil fuel imports?

Modeling approach

- TIMES Integrated Assessment Model (developed originally by IEA-ETSAP)
- Long-term CO_2 emissions reduction pathway: two scenarios compared (-80% vs. 1990 level by 2050)
  - Increased dependence on nuclear (~50% of total electricity in 2030 as assumed in the 2010 Basic Energy Plan, and ~60% by 2050)
  - Gradual nuclear phase-out by 2050 (Share in total power generation: 13% in 2020, 5% in 2030, zero in 2050)

Modeling approach

- Updated technology data based on the discussions in the National Policy Unit (verified objective data)
- Renewables: upper limits for installed capacity based on the discussions in, e.g., MoE committees
- Inclusion of additional costs for nuclear power related to Fukushima disaster compensation, policy costs, etc

Results coming up soon!

- Report "*Balancing Energy and Climate Goals of Japan: Exploring Post-Fukushima Energy Supply Options*" (A.Bhattacharya, N.K.Janardhanan and T.Kuramochi)
- To be published in June 2012
- Downloadable from www.iges.or.jp

Thank you for your attention!

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