COOL CHOICE
未来の
ために、
いま選ぼう。

Ministry of the Environment
Government of Japan

L2-Tech Japan Initiative toward 26% reduction by 2030

Shigemoto Kajihara
Director General, Global Environment Bureau
Ministry of the Environment, Japan (MOEJ)

COP21

Adoption of the Paris Agreement in COP21

● “The Paris Agreement” was adopted in COP21 (from 30 Nov to 13 Dec, in Paris, France).

✓ New international framework in place of Kyoto Protocol for GHG reduction post 2020.

✓ Reached Agreement that is fair and applicable to all Parties for the first time in history.

● Prime Minister Abe attended the Leaders Event hosted by President Holland of the French Republic.

✓ Announced ¥1.3 trillion of public & private climate finance in 2020, 1.3 times up from the current level, to developing countries.

✓ This pledge contributed to realization of 100 billion target in 2020, and facilitated successful adoption of the Paris Agreement.

Overview of the Paris Agreement

✓ Japan’s proposal is reflected

the Paris Agreement includes:

✓ Setting a long-term common global goal for holding the increase in the global average temperature to well below 2 degrees above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 degrees above pre-industrial levels

✓ Communicating or updating an emission reduction target every five years

✓ Reporting implementation of a target and undergoing a review in common but flexible manner.

✓ Use of market mechanisms, including JCM

✓ Setting the global goal on adaptation, and engaging in adaptation planning processes and the implementation of actions

✓ providing financial resources by developed country Parties to assist developing country, and providing support voluntarily by other Parties

✓ Recognizing the importance of innovation

✓ taking stock of the implementation of this Agreement to assess the collective progress towards achieving the purpose of this Agreement and its long-term goals (global stocktake)every five years

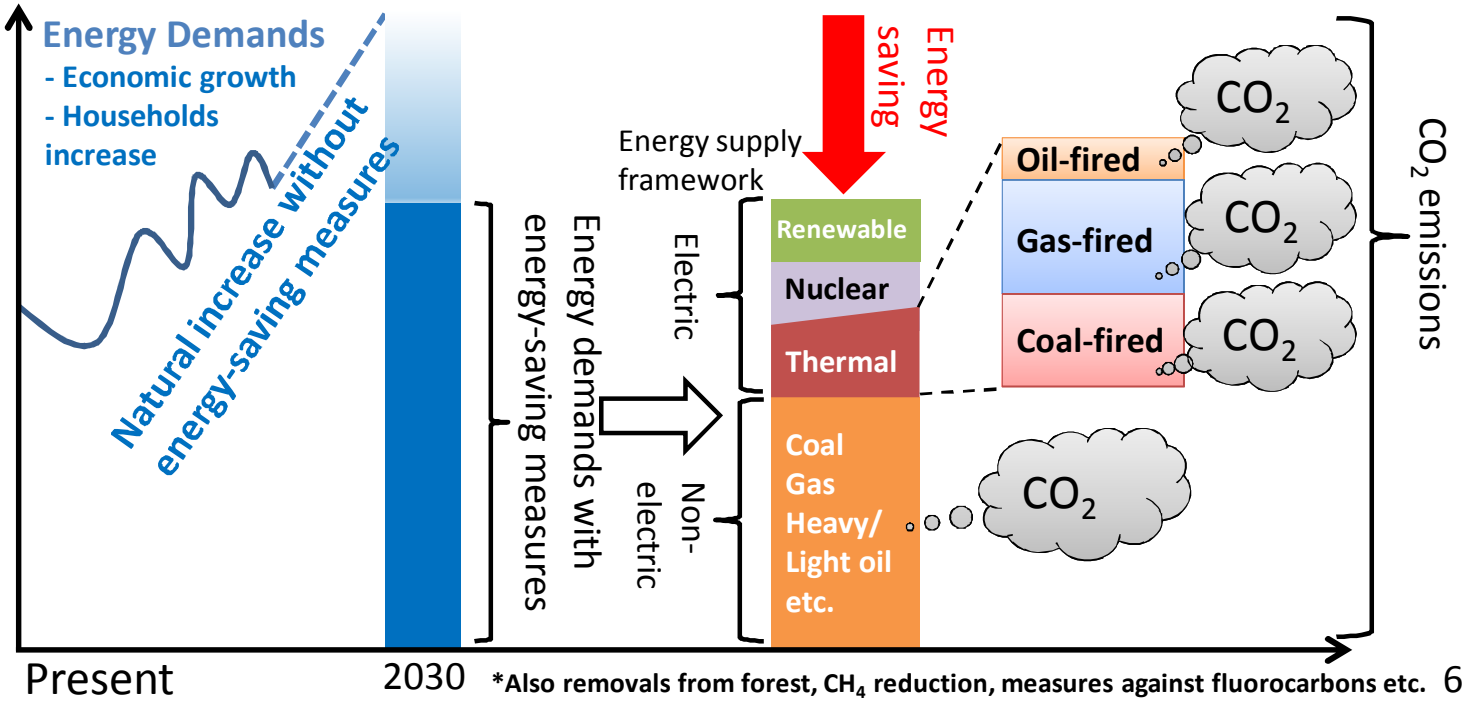
✓ Entry into force; at least 55 Parties accounting in 55 percent of the total global GHG.

INDC

Framework of Emissions Reduction Target

- First, **control of energy demands** by energy conservation
- Second, use of zero-emission source and **less CO2 energy**

Prime Minister, Shinzo Abe "We will mobilize all measures to promote thorough energy conservation and introduce renewable energies to the greatest possible extent." in Feb, 2015.



*Also removals from forest, CH_4 reduction, measures against fluorocarbons etc.

Japan's INDC（Intended Nationally Determined Contributions）

◆Reduces GHG emissions by 26.0% compared to FY2013 (25.4% compared to FY2005), which is approximately 1.042 billion t-CO2eq, by securing the domestic emission reductions and removals.

◆ Sets as the feasible target, ensuring consistency with the energy mix, by bottom-up calculation with concrete policies, measures and individual technologies.

◆The plan for global warming prevention was adopted by cabinet dicision.

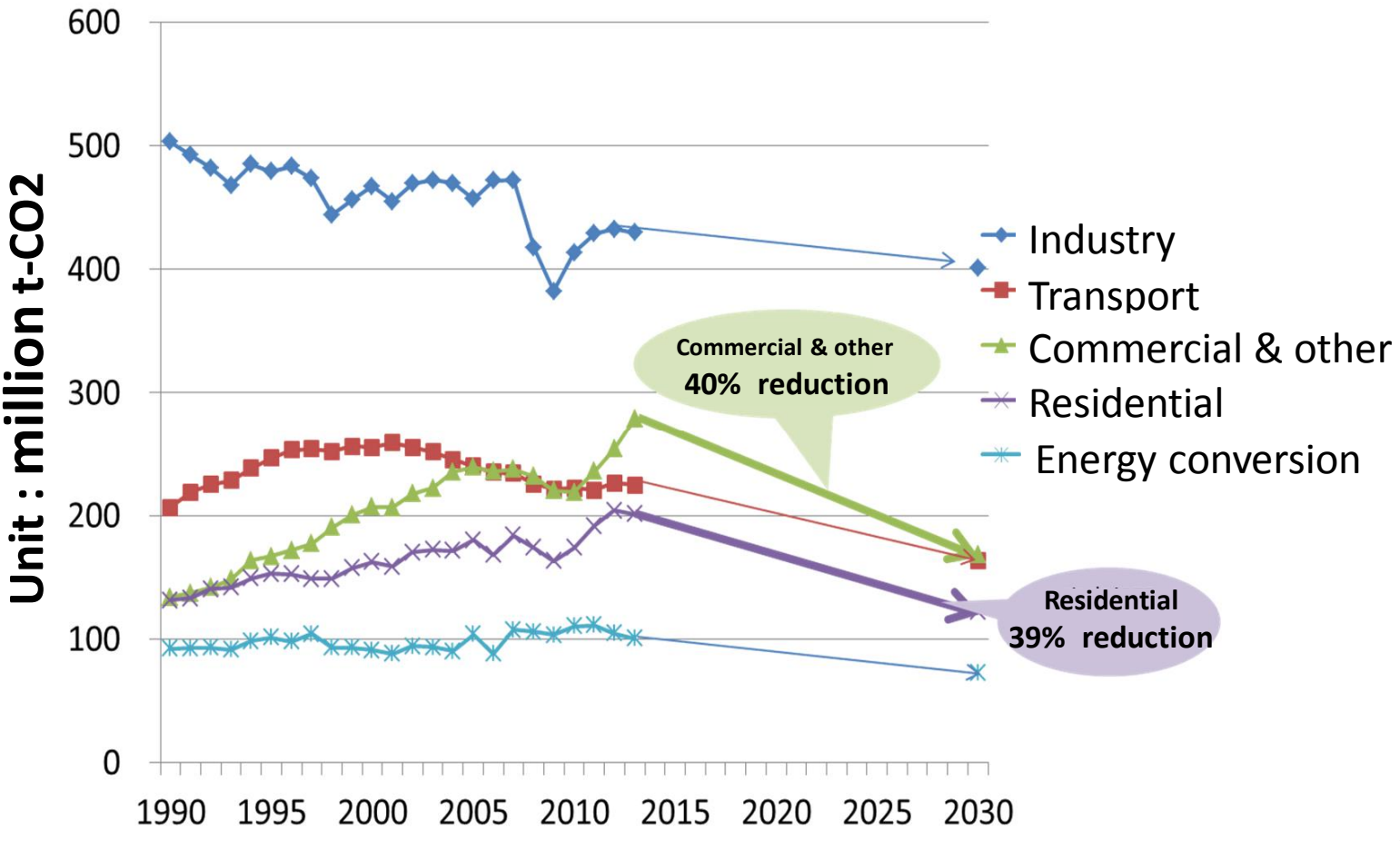
	From FY2013（from FY2005）
Energy-originated CO2	▲21.9% (▲20.9%)
Other GHGs	▲1.5% (▲1.8%)
Removals	▲2.6% (▲2.6%)
GHG reductions	**▲26.0% (▲25.4%)**

※JCM and other international contributions

○For JCM, though not being used for the buildup of reduction target, the international emission reductions and removals by FY2030 of 50 – 100 million t-CO2 (accumulated) is estimated through the government projects conducted within the annual budget, aside from the contribution of private-based projects.

○As international contribution, beside JCM, the global emission reduction of at least 1 billion t-CO2 by FY2030 is estimated through the diffusion of superior technologies due to the initiatives in industry.

Japan's INDC（Intended Nationally Determined Contributions）



The Action 50-80
From the Paris Agreement

The Action 50-80 from the Paris Agreement
～The 11 action for Earth's future ～

- COP21 Adopts Paris Agreement (December, 2015). 2016 is the year when the world makes a new start.
- It is necessary to make a concrete action for 80% reduction by FY2050 from now for the future .
  The Ministry of the Environment, Japan will lead the world to realize the innovation of the social strcture.

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◎Let's start action of earch level!! ～Revision of "Act on Promotion of Global Warming Countermeasures" as starting point～

- Individual actions at household【1】
- Regional action【2】
- Action at the global【3】

FY2030 26% reduction

◎Let's create the future by the low-carbon technologies and the low-carbon investment!!

- Creating the future low-carbon technologies for supporting daily life【4】
- Promoteing the low-carbon investment【5】

FY2050 80% reduction

◎Let's develop sustainable society!!

- Developing the long-term low GHG emission development strategies【6】

Conclusion of the Paris Agreement【7】

Mitigation
- The Plan for Global Warming Countermeasures【8】
  - Global warming measures in the field of electricity production【9】

Adaptation
- Adaptation plan to the influence of the climate change【10】

Monitor the influence of Climate Change【11】

Overview of the Plan for Global Warming Countermeasures

Cabinet decision on May 13, 2016

The Plan for Global Warming Countermeasures

- **Japan's sole general plan for global warming prevention; in order to promote global warming countermeasures comprehensively and strategically.**
- **Decided by the Cabinet on May 13, 2016**
- **Prescribes the targets of emissions reduction and removal of GHG, the basic matters on measures to be taken by businesses and the public etc., and policies to be implemented by the National Government and Local Government.**

< GHG reduction target >

■ Japan's GHG emission reductions target

- 26% by FY2030 (25.4% compared to FY2005)
- More than 3.8% reduction by FY2020 compared to FY2005

■ planning period

- From date of cabinet decision (May 13, 2016) to FY2030

Basic Direction of GW Countermeasures Promotion

○ Direction of Japan's global warming Countermeasures

Japan takes the lead in taking global warming countermeasures, based on scientific findings, in an internationally coordinated manner.

Actions to achieve mid-term target (reduction target by FY2030)

Japan takes steady steps to achieve the mid-term target of **26.0% reduction by FY2030 compared to FY2013 (25.4% compared to FY2005)** through domestic emission reductions and removals assumed to be obtained.

Strategic actions towards long-term goal

Based on the Japan **aims to reduce greenhouse gas emissions by 80% by 2050 as its long-term goal**, while pursuing the global warming countermeasures and the economic growth at the same time..

Actions toward global GHG reduction

The Government demonstration of innovative technologies
Also, Japan makes full contribution to global reduction of GHG emissions utilizing its leading technologies.

○ Basic concept for global warming countermeasures

- Integrated improvements of the environment, economy and society
- Steady implementation of measures listed in Japan's INDC
- Response to Paris Agreement (consideration of long-term and strategic actions)
- Enhancement of R&D and contribution to global GHG emissions reduction through Japan's leading technologies.
- Transformation in consciousness of all actors, evocation of action and enhancement of collaboration
- Emphasis on PDCA cycle

✓ Under the Paris Agreement all Parties should strive to formulate and communicate long-term low GHG emission development strategies.
✓ Japan continues to consider its long-term and strategic actions.

L2-Tech - JAPAN Initiative

Leading Low-carbon Technology)

L2-Tech JAPAN Initiative

- **Ministry of the Environment (MOE) announced "L2-Tech Japan Initiative" in March 2014. This initiative aims for the promotion of large-scale emissions reduction of energy-originated CO2 and the establishment of low-carbon society, by compiling information on leading low-carbon technologies (L2-Tech),and spreading them at home and abroad so that they will be used as reference,or target at the time of introduction of such technologies.**

Technologies in the L2-Tech List are classified into six fields

- **Industry and commercial (common to sectors)**
- **Industry (sector-specific manufacturing equipment etc.)**
- **Transportation**
- **Residential**
- **Energy : renewable energy,cogeneration system,fuel cell,etc**
- **Waste treatment and recycling**

L2-Tech Standard for Supporting the Best

➢ **L2-Tech Standard = Commercialized Best efficient equipment**

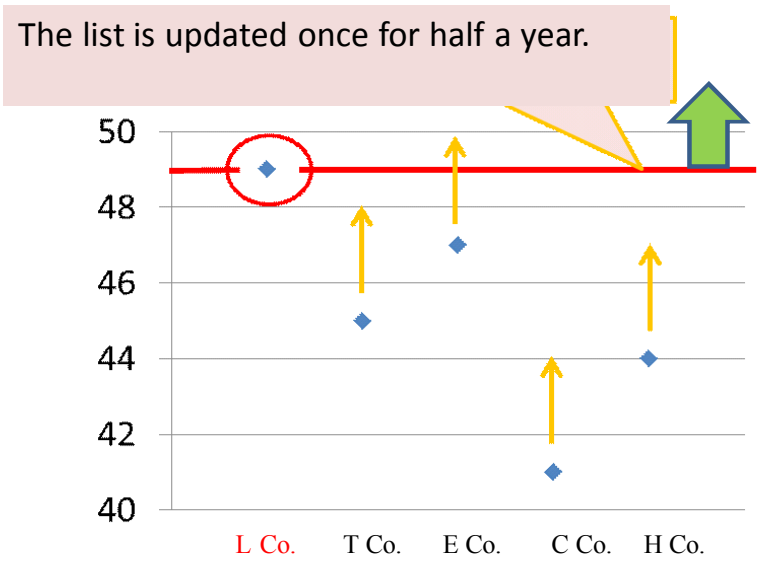


Image of the "Pursuit of Best Type"

Structure of information on technologies and products in L2-Tech

- **L2-Tech List is the list of equipment and instruments regarded as important for CO2 reduction by MOE.**
- **L2-Tech Certified Product List is the list of products of L2-Tech List presenting highest CO2 reduction efficiency in the year**

Equipment and instruments that contribute to low-carbonization (worldwide)

Select important ones

【L2-Tech List】

Includes equipment and instruments superior in CO2 reduction for attaining target of 80% reduction by 2050

Standard evaluation is settable

【L2-Tech Standard List】

Indicates highest performance of "superior products" commercialized as L2-Tech Standard

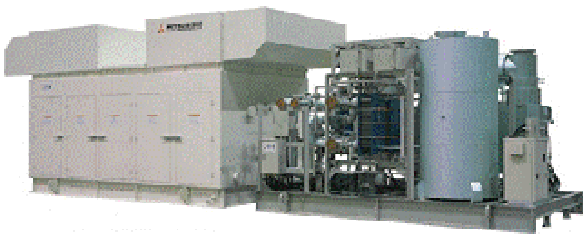
Certify products used in equipment and instruments

Products certified by MOE as presenting highest CO2 reduction efficiency

【L2-Tech Certified Product List】

Reference：L2-Tech level vs High Efficiency Standard (HES)

Cogeneration unit



This is the cogeneration system to generate electric power through engine, turbine and fuel cell, using gas, oil and hydrogen as fuel, and at the same time to use heat. The heat can be used in the factory and workplace as heat source (steam and hot water) and in heating/cooling system and hot water supply. By using heat and electricity without waste, it will be possible to utilize energy most efficiently.

◆L2-Tech level

【Gas engine type】

Generation efficiency	%
～10kW	31.5
10kW～100kW	34.0
100kW～500kW	41.6
500kW～1000kW	41.8
1000kW～3000kW	45.6
3000kW～	49.5

【Gas turbine type】

Generation efficiency	%
～3000kW	28.4
3000kW～5000kW	30.4
5000kW～7000kW	39.3
7000kW～10000kW	34.3
10000kW ～	40.9

【Fuel cell type】

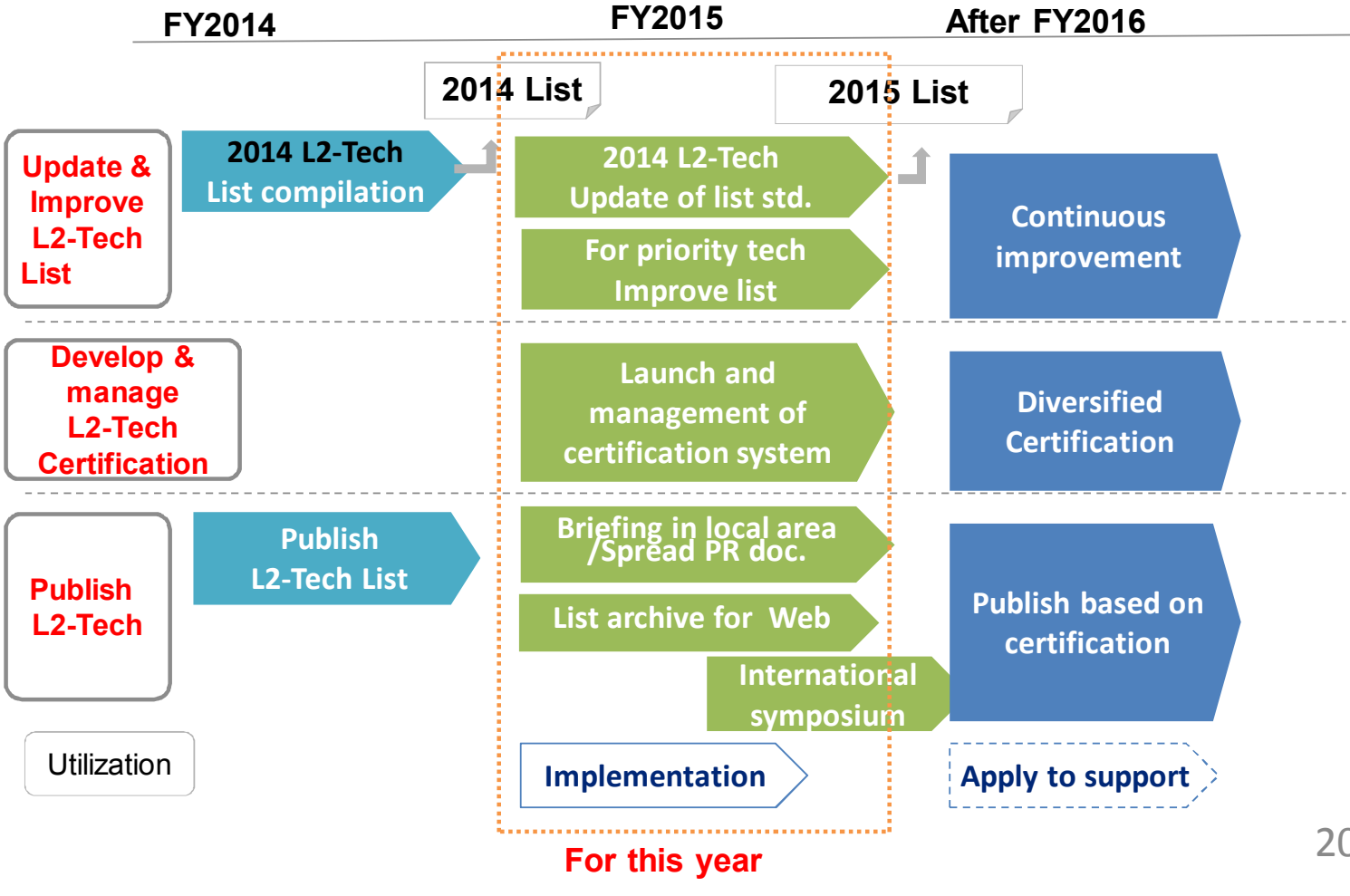
Generation efficiency[%]	42.0%

L2-Tech Certification System

- Certifying equipment and instruments which meet L2-Tech standard, the highest level,
  - ➢ spreading information at home and abroad
  - ➢ thoroughly promoting the development, introduction and distribution.

- Applicants are invited through public invitation.
- Applied products are investigated by the examination and investigation committee consisting of academic experts and experts of industry groups.
- L2-Tech certified products are announced by MOE based on the results.

L2-Tech Initiative Roadmap



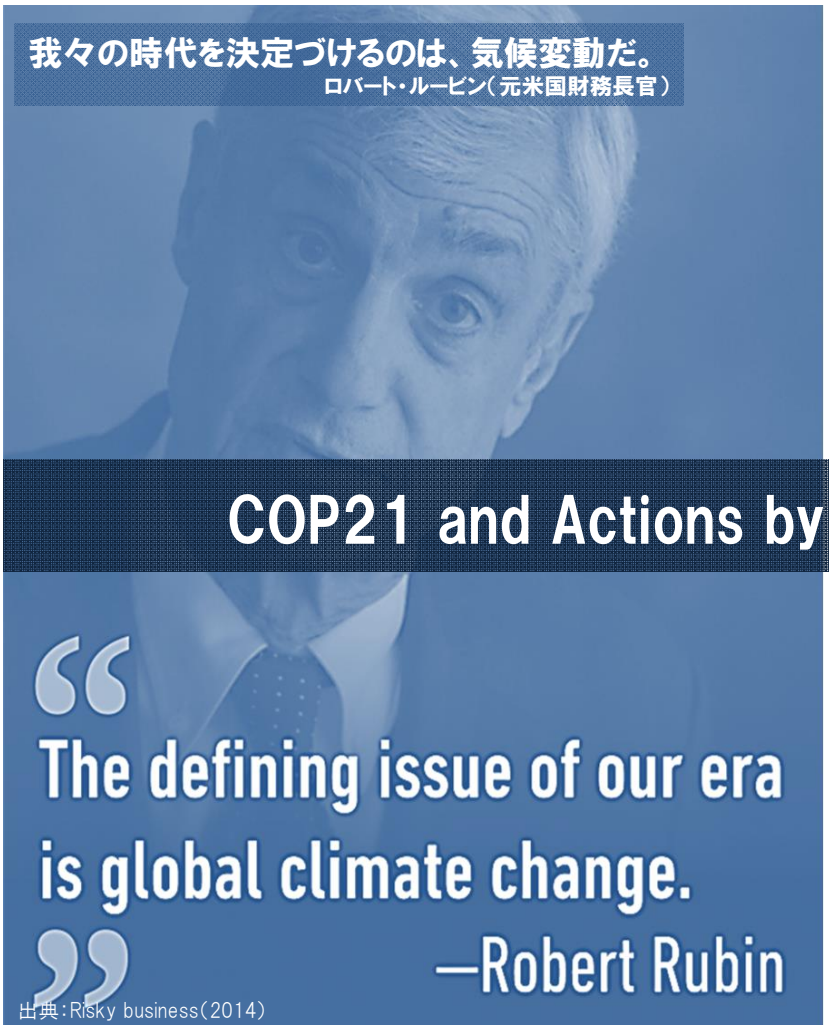
Main activities so far and future plan regarding L2-Tech

- “FY2014: L2-Tech List” published in March 2015
  （Type of Technology and Level of L2-Tech standard）

March, 2014	MOE announced ”L2-Tech・JAPAN Initiative”
December, 2014	Published “FY2014: L2-Tech List (draft)”
March, 2015	Published “FY2014: L2-Tech List”
October, 2015	Published “FY2015 Summer: Certified product List (316products)”
January, 2016	Published “FY2015: L2-Tech List”
March, 2016	Published “FY2015 Winter: Certified product List (1, 377products)”

Ministry of the Environment
Government of Japan

Thank you for your attention ！



出典：Risky business（2014）

COP21 and Actions by Businesses

Masamitsu Sakurai
Chairman of Japan-CLP
(Special Advisor of RICOH)

Paris Agreement
- A historical point of transition-

① Limiting temperature rise well below 2℃, seek for 1.5℃

② “Net zero” GHG emission

③ “Ratchet and stock taking mechanism”

出典：Paris Agreement Article 2，3，4

CEOs and Investors gathered in Paris for COP21

- In spite of terrorist attacks, a huge number of business leaders and investors have gathered in Paris.
- CEOs from various sectors, from heavy industry to ICT.

Example of CEO participants (among others)

【エネルギー/重電等】 アクシオナ、ABB、シーメンス、ENGIE（仏：電気ガス）、ENEL（伊：電力）、RWE（独：電力）、Statoil（ノルウェー：石油）、Vattenfal（スウェーデン：電力）EDF（英：総合エネルギー）、Total（仏：石油）、BP、シノペック（中国：石油）、中国国家電網公司、Himin Solar（中国：太陽光）, CLP（香港：電力）、ドバイ電力水公社、Vestas（風力世界最大手）、 等
【製造業】シュナイダーエレクトリック、エリクソン、Delta Electronics、BMW、ルノー日産、Tesla 、Danfoss、Avery Dannison（米：素材）、New Holland Agriculture、Royal DSM（蘭：化学）、ラファージュホルシム（仏：セメント）、APRIL（インドネシア：製紙）、ミシュラン、ノボザイム、パタゴニア、ケロッグ、イケア、マーズ、ユニリーバ、ペプシコ、コカコーラ、ナチュラ（伯：化粧品）、等
【IT他】グーグル、グーグルX、フェイスブック、BT、Autodesk、SolarCity、等
【金融・機関投資家】アリアンツ、クレディ・スイス、CalPERs,バンクオブアメリカ・メリルリンチ、AP2,AP4（スウェーデン年金基金）, イングランド銀行、欧州投資銀行、AXAグループ、ノルウェー中央銀行、ノルウェー年金基金、ムーディーズ、CDP、DBL Investorsなど。

Proactive actions by businesses at COP21

1. Policy recommendation
2. Declare ambitious commitments
3. Dialogues on de-carbonized economy

1. A coalition of business groups sent clear message to policy makers

- **Business groups working with thousands of the world's most influential businesses and investors had dialogues with the Ministers**
- **Through policy recommendations, they have supported the historical agreement**

1. Net zero greenhouse gas emissions well before the end of the century
2. Strengthen commitments every 5 years
3. Enact meaningful carbon pricing
4. New and additional climate finance at scale
5. Transparency and accountability to promote a race to the top
6. National commitments at the highest end of ambition
7. Adaptation to build climate resilient economies and communities
8. Pre-2020 ambition through Workstream 2

Source：We Mean Business "The Business Brief"

High level dialogue between CEOs and Government Leaders
Topic: Carbon Pricing and businesses commitments
COP21 official business event

写真 UN Global Compact

2. Declarations of ambitious commitments

"Emission reduction throughout the entire supply chain (Science Based Target)"

Kellogg CEO

Example of commitments

- Science Based Target
- 100% Renewable
- Internal Carbon Pricing
- Responsible Policy Engagement
- Changing Business Portfolios

Source: UN Global Compact Caring for Climate

3. Dialogues on De-carbonized economy

"Financing and technology are both already available for drastic emission reduction"
"What we need is a policy which mobilizes and disseminates them, and that is carbon pricing"

Chairman
Bank of America MR

写真：Energy for Tomorrowより

“Transition always creates winners and losers. Those who does not change will be Losers”

9

“Transition is inevitable. The issue is how we adopt to the transition” （TOTAL CEO）

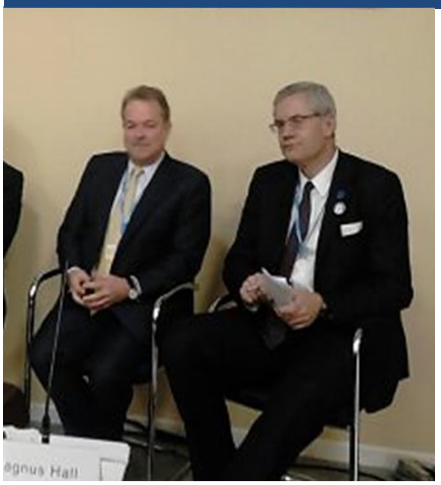
- Energy companies reexamine their energy portfolios
- Shift from coal/petroleum to gas and renewable
- Asked governments to introduce carbon pricing

写真：Energy for Tomorrow

“We should not make excuses for lack of policies. We take action first, the policy would follow”

写真：World Climate Ltd

Important role of Businesses：Policy Engagement



“Industrial groups prefer “status quo” by it’s nature.
We can not expect them to lead transition”
AGL CEO

“We need to talk with politicians to make a transition”
Vattenfall CEO

“We join other proactive business coalitions when conventional industrial groups are not keen on making a transition”
Unilever CSO

写真：UN Global Compact, Japan-CLP事務局

Institutional Investors take actions on climate risks

- We have decided to withdraw from coal business （CalPERS）
- Information on climate risk has been increasing. We are now de-carbonizing our investment portfolios（AP4）
- We evaluate consistency of companies' climate actions from emission reduction, R&D, Policy engagement, and so on （CDP）

Bank of England　　AP4 CEO

CalPERS

写真：World Climate Summit

Proactive CEOs' View

- Understanding climate science
- Acknowledging that "a transition is inevitable"
- Understanding "the cost & risk of inaction"
- Taking proactive leadership
- Seeking for "first mover's advantage"

A gap exists between Japanese business leaders

Expectation for Businesses is substantial

"Ultimately, business is the one who can make transition happen"

John Kerry
Secretary of USA

写真:UN Global Compact 15

Role of Japan on Post COP21

- Paris Agreement sends clear signal（2℃,1.5℃、Net Zero）
- Paris Agreement requires each country for differentiated but significant efforts for transition.
- Japan, as one of the developed countries which has accumulated emissions, have certain responsibility.
- Expectations for Japan, for its economic and technological capacity and its value for co-existence with nature

On this occasion, Japan can become the top runner in a transition to de-carbonized society

Role of Businesses

- Business is the substantial actor from their actual GHG reduction
  - ✓ Businesses are directly/Indirectly responsible for about 80% of GHG emissions
  - ✓ Primal actor of technological/business model innovation
  - ✓ Decoupling of climate risk and economic development is realized by proactive business society which regards transition as a business opportunity

- Commitments and leadership of business leaders
  - ✓ Long term goal consistent with Paris agreement
  - ✓ Develop business strategy and implementation plans
  - ✓ Innovation of business management which obtain both profit and GHG reduction ➔ Genuine environmental corporate management
  - ✓ Proactive policy engagement

Why Japanese business are not proactive on climate action?

- Are we not remained in the argument such as “Too dry to squeeze blood from stone” ”Climate action is cost, not an opportunity”
- Few business Leaders seriously faces inevitable climate change?
- CEOs doesn’t have access to information on drastic changes of overseas business transition?
- Proactive opinions are often behind the passive attitudes/argument of conventional industrial groups?

Coalition of willing necessary in transition period

- It seems difficult to expect conventional industrial groups to take initiative toward de-carbonization

  ➔ They tend intrinsically to be passive to changes

- Business coalition of willings have been playing significant roles to address these issues.

What is Coalition of willing ?

- Objective/Role:

  Those who share the same will gather on the issue where business have important role to play, and send clear signal to policy makers and lead transition by taking initiatives.

- Primal Actors:

Business Leaders/ Companies which regard transition as business opportunities with aim to become first mover and take advantage in next era

- Past Outcomes

  Supported and encouraged policy makers on significant agreement (at COP21)

Business coalition of willing take a lead toward de-carbonization

INVESTOR PLATFORM FOR CLIMATE ACTIONS

Source：CLG HP, WEF HP, The Green Market Oracle, WMB HP, IPCA HP

Business are expected to be proactive

Summary

- Climate Change is inevitable
- Delay of actions reduce our choices
- Businesses to take a lead
- Innovation is the key factor
- We should not wait for policies
- Create coalition of willing

and start now!

German-Japanese Symposium on Technological Challenges to Combat Climate Change – Low Carbon Technologies in Germany and Japan
May 18, 2016

Long-term Challenges and Strategies

Prof. Hironori Hamanaka
Chair, Board of Directors
Institute for Global Environmental Strategies

IGES
Institute for Global Environmental Strategies

Outline

- Ensuring effective implementation of the Paris Agreement
  - A hybrid of top-down and bottom-up approaches
  - The need to link short-term NDCs and long-term strategies for deep cuts in GHG emissions toward de-carbonization
- Knowledge available from de-carbonization scenario analysis
- Major long-term challenges toward deep de-carbonization
  - Energy system transformation toward de-carbonization
  - Strong policy signals for accelerating energy efficiency improvements
  - Early actions to avoid lock-in of high-carbon infrastructure
- Strategies

Paris Agreement as a Hybrid of Top-down and Bottom-up Approaches

Top-down approach based upon scientific knowledge
- ✓ 2℃/1.5℃ goal (Art.2)
- ✓ Global peaking of GHG emissions ASAP, and a net zero emissions in the second half of this century (Art.4.1)

Gap between (12-14 Gt-CO2e in 2030, UNEP Gap Report)
- Emission path consistency with the 2℃ goal
- Emission levels under the current INDCs

Bottom-up approach reflecting political reality
- ✓ Nationally determined contributions (NDCs)

Paris Agreement as a Hybrid of Top-down and Bottom-up Approaches

Top-down approach based upon scientific knowledge
- ✓ 2℃/1.5℃ goal (Art.2)
- ✓ Global peaking of GHG emissions ASAP, and a net zero emissions in the second half of this century (Art.4.1)

How to fill the gap?

Bottom-up approach reflecting political reality
- ✓ Nationally determined contributions (NDCs)

"Ratchet-up" mechanism
- Each Party shall communicate a NDC **every five years**, and **successive NDC** will represent a **progression** beyond the current NDC (Art.4.2, 4.3)
- **Long-term low greenhouse gas emission development strategies**, mindful of 2℃/1.5℃ goal (Art.4.19)
- **"Global stocktake" every five years** of which outcome shall inform Parties in updating and enhancing their actions and support (Art.14)
- **Transparency** of each Party's actions and support (Art.13)

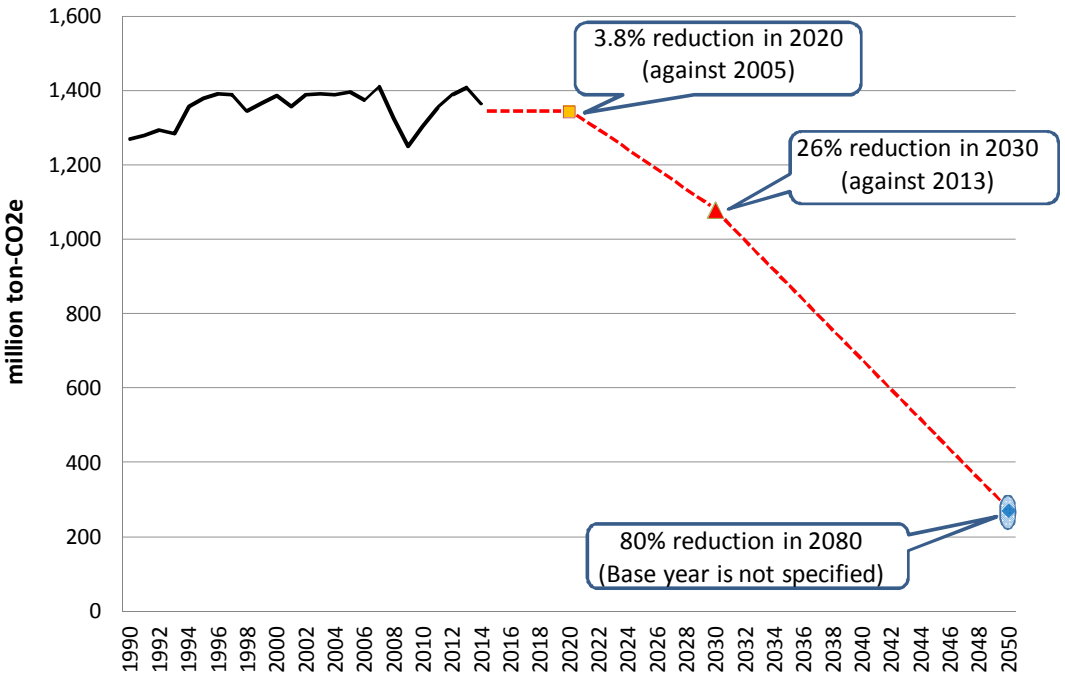
Linking Short-term NDCs and Long-term Strategies

Recent Development

- **U.S.-China Joint Presidential Statement on Climate Change** (Sep. 25, 2015)
  "The United States and China underscore the importance of formulating and making available mid-century strategies for the transition to low-carbon economies, mindful of the below 2 degree C global temperature goal".
- **U.S.-Canada Joint Statement on Climate, Energy, and Arctic Leadership** (10 Feb 2016)
  "As we implement our respective INDCs, the leaders also commit to, in 2016, completing mid-century, long-term low greenhouse gas emission development strategies pursuant to the Paris Agreement and encouraging this approach with members of the G-20".

How will the US formulate its long-term low GHG emission development strategy and link the strategy with its successive NDC (2030 emissions reduction target) in a coherent manner?

Japan's GHG Emissions Trends and Short/Mid/Long-term Targets/Goal



Global Warming Measures Plan

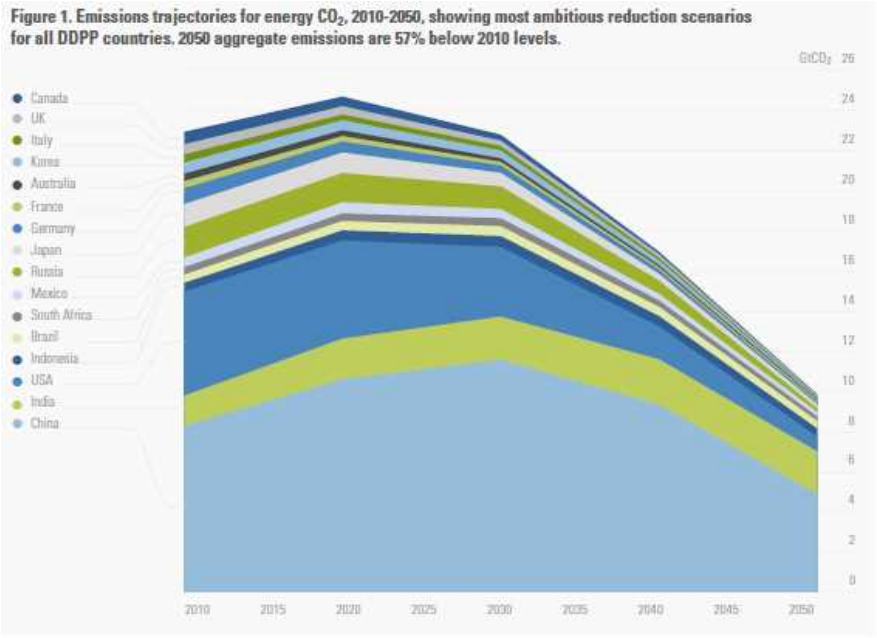
- 2020 target
- 2030 target
- 2050 aspirational goal

In this summer, MOEJ will start discussion about **long-term vision for achieving 80% reduction**.

Basis for **long-term low GHG emission development strategy**

Can it be used for updating of the 2030 target in 2020?

Knowledge available from de-carbonization scenario analysis : DDPP (Deep Decarbonization Pathway Project)

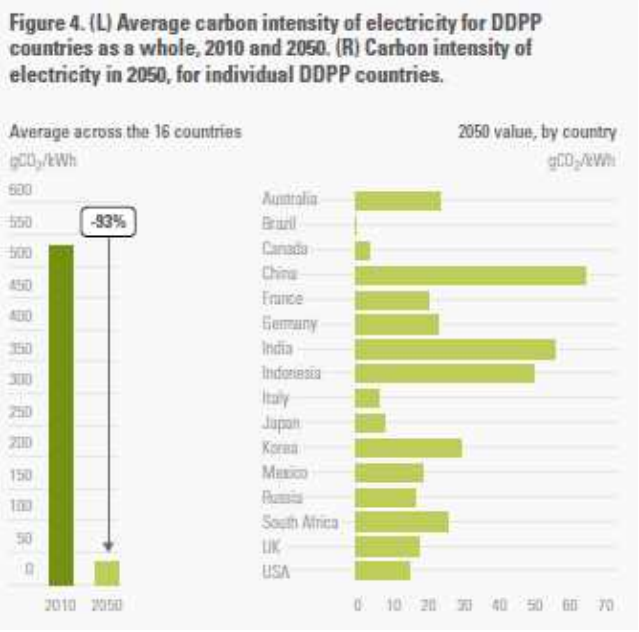


Deep de-carbonization scenario analysis conducted by DDDP shows that **deep de-carbonization of world's 16 highest emitting economies** is **technically possible** and **can accommodate expected economic and population growth**.

Across all scenarios, **by 2050 energy-related CO_2 emissions** for the 16 countries were **reduced by 48-57% below 2010 levels**, and cumulative emissions are not inconsistent with the 2℃ limit.

Source: Pathways to deep decarbonization, 2015 report, executive summary, DDPP, IDDRI, SDSN, 2015

Knowledge available from de-carbonization scenario analysis : DDPP (continued)



All deep de-carbonization pathways incorporate "three pillars" of energy system transformation:
energy efficiency and conservation, decarbonizing electricity and fuels, and switching end uses to low-carbon supplies.

Energy efficiency reduced the energy intensity of GDP by an average of 65%.

In all DDPs, electricity becomes nearly carbon free by 2050.

Much of the direct combustion of fossil fuels in end-use equipment is replaced by decarbonized electricity.

Source: Pathways to deep decarbonization, 2015 report, executive summary, DDPP, IDDRI, SDSN, 2015

Knowledge available from de-carbonization scenario analysis : Pathways to deep de-carbonization in Japan

Illustrates **deep de-carbonization pathways for Japan,** and assesses the feasibility to achieve **80% GHG emission reduction from 1990 levels by 2050.**

Methodology**: AIM/End-use model of Japan** was used.

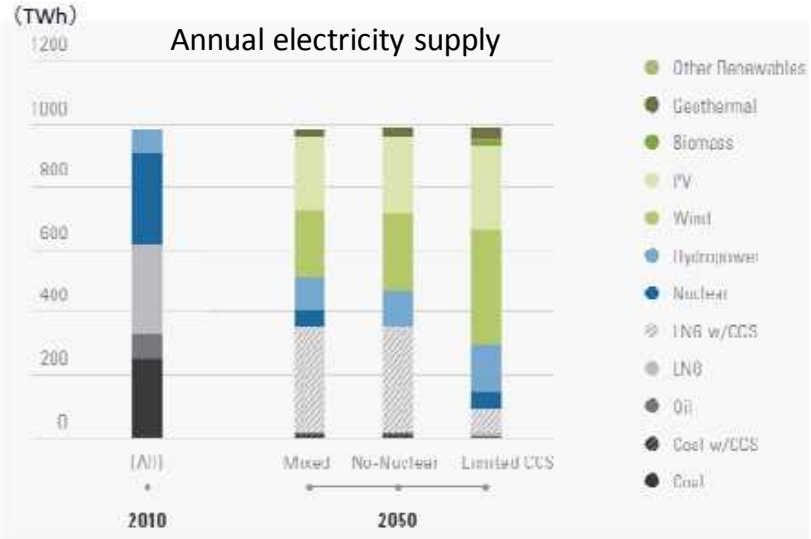
Three deep de-carbonization scenarios:

- Mixed scenario
- No-nuclear scenario
- Limited CCS scenario

In all scenarios, **total final energy demand decreased by more than 50%,** and **energy-related CO_2 emissions by more than 80%** by 2050 from 2010 levels respectively.

Source: http://deepdecarbonization.org/wp-content/uploads/2015/09/DDPP_JPN.pdf

Knowledge available from de-carbonization scenario analysis : Pathways to deep de-carbonization in Japan (continued)

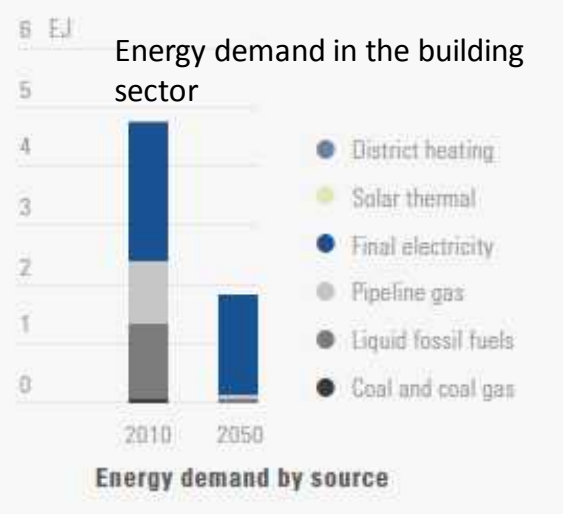


In all scenarios, **carbon intensity of electricity falls to nearly zero** in 2050 by large scale deployment of renewable energy and/or natural gas with CCS.

Solar PV and wind power provide up to 75% of electricity supply during daytime (from 10am to 3pm). In order to integrate intermittent supply from these power sources, electricity supply and demand are assumed to be balanced every 3 hours in a day.

Source: http://deepdecarbonization.org/wp-content/uploads/2015/09/DDPP_JPN.pdf

Knowledge available from de-carbonization scenario analysis : Pathways to deep de-carbonization in Japan (continued)



Energy demand in the building sector

In all scenarios, **final energy demand in the building sector is reduced by approximately 60-70%** in 2050 from the 2010 level.

The share of electricity increases from about 50% in 2010 to more than 90% in 2050. Building sector **CO_2 emissions reaches almost zero in 2050.**

Source: http://deepdecarbonization.org/wp-content/uploads/2015/09/DDPP_JPN.pdf

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Major long-term challenges of achieving deep de-carbonization

- Energy system transformation is crucially important in achieving deep de-carbonization. Electricity supply and demand need to be balanced in order to integrate large scale supply from solar PV and wind.
  - Accelerating energy efficiency improvements is another important pillar of energy system transformation. Providing policy signals such as regulatory and economic instruments, as well as relevant information, are important.
- Early actions to avoid lock-in of high-carbon energy and urban infrastructure help achieve robust pathways to deep de-carbonization.

Strategies to address challenges of achieving deep de-carbonization

- National vision/goals and strategies need to be established.
  - Transformational change in socio-economic structure is required.
  - Need to be integrated into policies addressing other challenges (depopulation, aging society, revitalization of local economies, etc.).
- Promoting public acceptance of deep de-carbonization pathways
  - Inclusive multi-stakeholder engagement process
- Developing policy framework to create enabling environments for non-state actors to take ambitious actions
  - Carbon pricing
  - Mobilizing innovative local actions and business models

Carbon pricing in Japan

❑ Carbon tax

- Central Environmental Council (CEC) suggested carbon tax as a key measure to meet the Kyoto Target (2003)

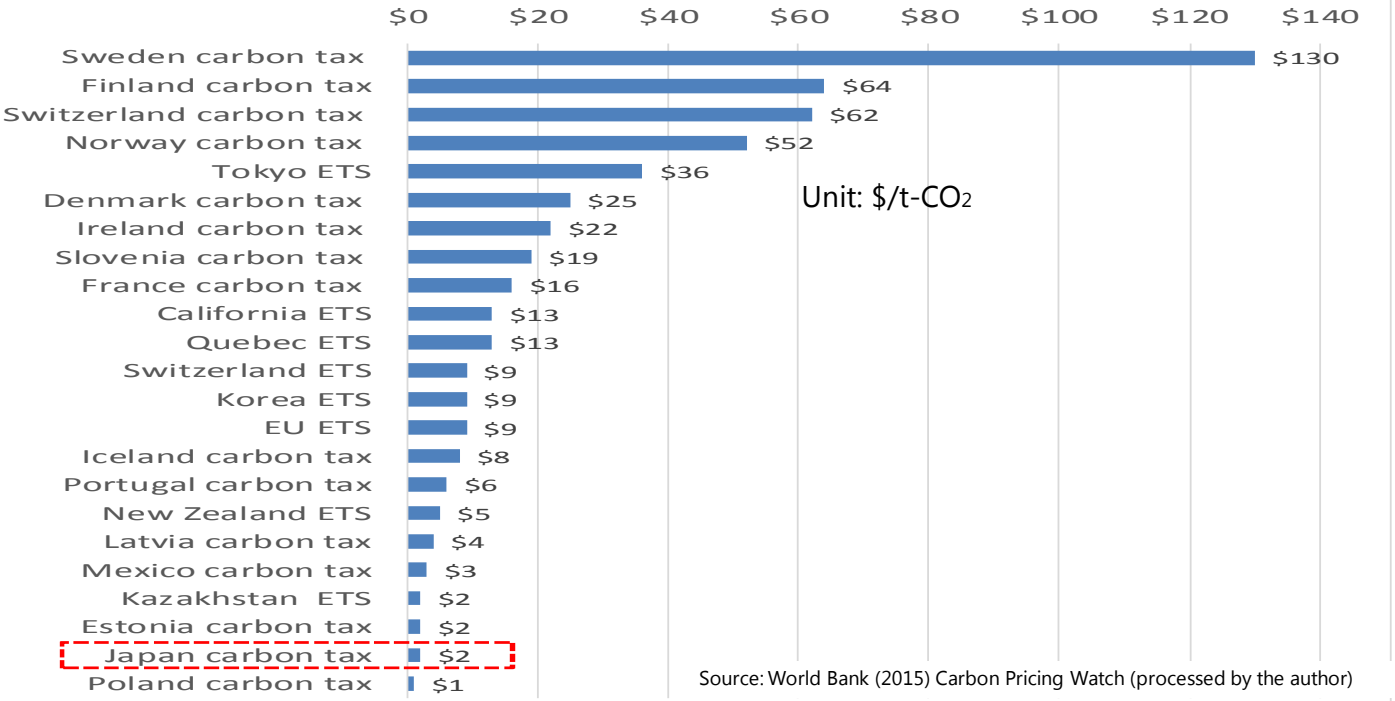
Benefits of carbon tax (CEC, 2003)

- ❖ Unique measure to **prompt all emitters** to take mitigation actions
- ❖ **Economically efficient** mitigation measure with minimum social cost
- ❖ **Lasting incentive effects** for mitigation/technology development
- ❖ **Announcement effects** for general public

❑ Carbon tax in Japan

- Since 2004 the Ministry of the Environment proposed carbon tax: Proposed tax rate: **JPY 655**/t-CO_2 (FY2005-2009), JPY 1064/t-CO_2 (FY2010), JPY 300/t-CO_2 (FY2011)
- Finally, in FY2012 carbon tax (tax for climate change mitigation) was introduced (tax rate from FY2016: **JPY 289**/t-CO_2)

Carbon pricing: international comparison



Source: World Bank (2015) Carbon Pricing Watch (processed by the author)

Need to fully exploit potential benefits of carbon pricing

- Potential benefits of carbon pricing, including economic efficiency advantage need to be fully exploited **in order for Japan to achieve deep de-carbonization pathway** including **80% reduction by 2050**.
- Benefits of effectively high rate of carbon pricing can be well demonstrated:
  - Carbon pricing can **smoothly steer low carbon choices of consumers**
  - Carbon pricing can **make low carbon business profitable,** create business opportunities and drive green investments.