A Roadmap for Affordable and Clean Energy(Goal 7) - Japan's case -

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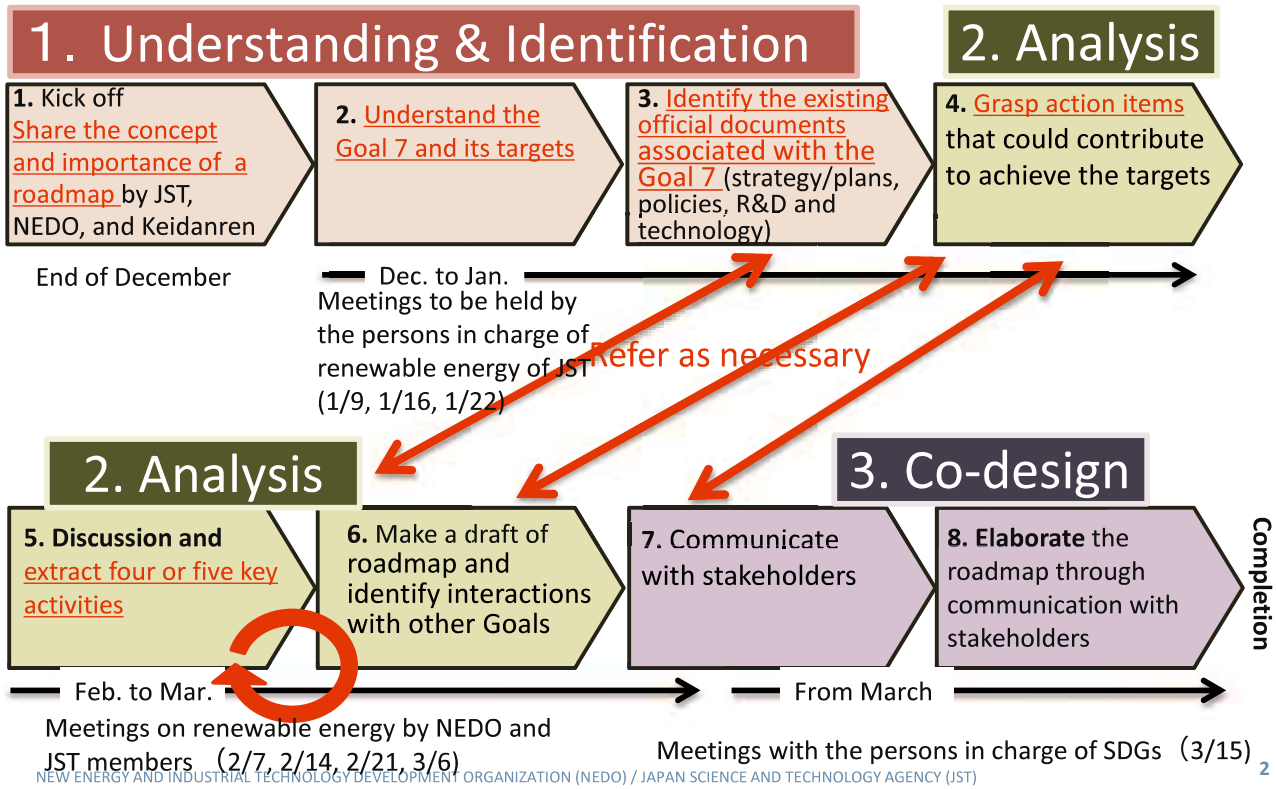
The Process for Creating a Roadmap(Clean Energy)



1. Understanding & Identification

Basic Concepts about Making the Roadmap for Goal 7

1. Consistency with official documents

- **Characteristically there are official documents** on energy policy.
- The amount of renewable energy to be 22-24% in 2030, and energy efficiency by 35% higher compared with 2012.

2. Collaboration among various stakeholders

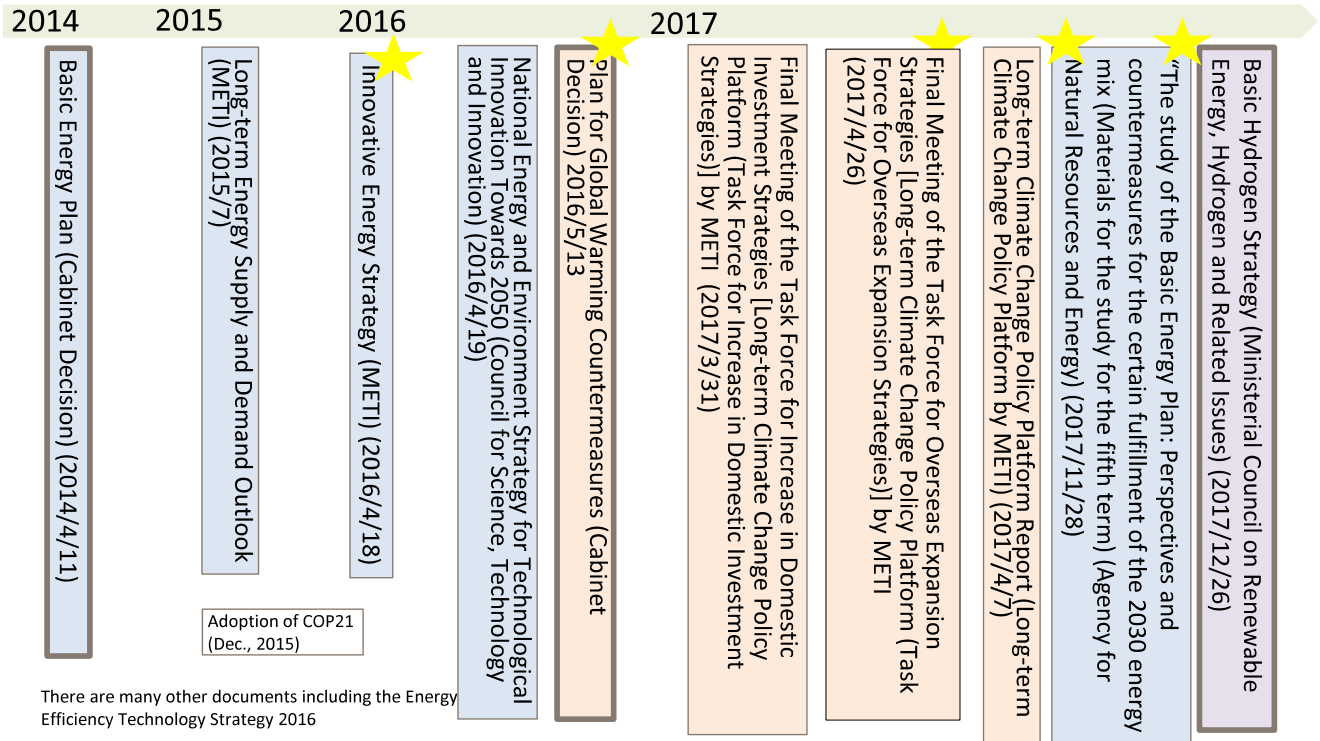
- **Combine research activities/industrial activities (business model/standardization) with social activities (regulations/improvement of systems).**
- Importance of **the national understanding** from the viewpoints of citizens.

3. Appropriate dissemination to the world

- Including international contributions (provision of customized technologies for each country) based on **Japan's major projects (R&D/activities overseas)** .
- **Collaboration between domestic and overseas activities**

1. Understanding & Identification

Identify major official documents



There are many other documents including the Energy Efficiency Technology Strategy 2016

Outline of Activities

Goal 7	Targets	1) R&D	2) Technological introduction - demonstration - business model	3) Diffusion -policy dialogue -systems -investment
Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all	7.1 By 2030, ensure universal access to affordable, reliable and modern energy services 7.2.1 **Renewable energy** share of total energy consumption 7.3.1 **Energy intensity** measured in terms of primary energy and GDP 7.a.1 Mobilized amount of United States dollars per year starting in 2020 and accountable towards the $100 billion commitment 7.b.1 Investments in energy efficiency as a percentage of GDP, and the amount of foreign direct investment in financial transfers for infrastructure and technology to sustainable development services	1) Next generation energy (floating offshore wind power type, ocean energy), calculation and control of power output including hydrogen generation, and its power generation and storage systems	2) Energy controlled by IoT, local production of energy systems for local production and local consumption, and demonstration of power-to-gas	3) Incentives and social receptivity 3) International standardization
		1) Process improvement, combined with equipment and energy management	2) Energy controlled by IoT, zero energy of housing/buildings	3) Improvement of systems: fostering awareness 3) Activities for standardization
		1) International collaboration/joint R&D: R&D system by the whole government and effecting investment from the industrial world	2) Support introducing renewable energy	3) Improvement of systems

A Roadmap for Clean Energy

Overseas / Domestic

2018 — 2022 — 2026 — 2030

7.1 Overseas expansion

【*Clean Energy Global Network（CEGN）*: improvement of access to clean energy】

1) Clean energy carrier and system simulation

2) **Economic efficiency,** Global expansion

Vision

increase **of the transported amount of clean energy**

7.2 Expansion of renewable energy

【*"Chisan-Chisho"energy system*: local production for local consumption】

1) Expansion of renewable energy **(solar and wind power) as infrastructure**
2) Synergy effects with **disaster prevention/poverty** etc.

1) Utilization of **regional resources (biomass and heat etc.)**
2) **Economic efficiency, energy networks**

Biowastes Utilization system with Fuel Cell can bring about development of local communities in Mekong Delta.
(Source:JST(SATREPS))

the amount of renewable energy：**22-24% in 2030**

7.3 Energy saving

【*Energy/IoT technologies*: realization of Society 5.0】

1) Establishment/diffusion of **smart meters**
2) Utilization of data using IoT, **Energy management**

【*Top Runner*: expansion of energy efficiency】

Expand the **concepts** & provide **technology**

Energy saving labeling program
Retail stores attach the Uniform Energy Saving labels so that consumers can easily choose.
(Source:ANRE)

aiming to limit global warming to within 2℃, as in the Paris Agreement

17% energy saving in 2030 (compared with 2015)

Case Study: A Roadmap for Clean Energy

Vision

7.2 Expansion of renewable energy

【"*Chisan-Chisho"energy system*: local production for local consumption】

For Country A :

For the **regions with electricity not distributed**, the **local production for local consumption "*Chisan-Chisho" energy system*** of utilizing renewable energy, such as **photovoltaics and wind energy**, would be established to ensure stable electrical power supply for **lighting, cooking and water supply.**

Introduction of Renewable Energy as much as possible

For Country B :

1) Expansion of renewable energy **(solar and wind power) as infrastructure**
2) Synergy effects with **disaster prevention/poverty** etc.
1) Utilization of **regional resources (biomass and heat etc.)**
2) **Economic efficiency, energy networks**

the amount of renewable energy : **22-24% in 2030**

References

Resources

【Establishment of a clean energy global network (CEGN)】		
1)2)	Innovative Energy Strategy	• Specific measures • [4] Overseas expansion of the energy industry • Accelerate the creation of markets in emerging countries • Develop individual programs in emerging countries and strengthen assistance for the acquisition of projects
	Basic Hydrogen Strategy	• 4.1. Execute the low-cost use of hydrogen: utilize unused energy and renewable energy from overseas • 4.2. Develop an international hydrogen supply chain
	Strategic Energy Plan	• Section 9: Creating comprehensive energy companies through market integration and executing a growth strategy centered on energy • 3. Creation of new markets in the energy field and execution of a growth strategy through enhancement of international expansion Section 10: Comprehensive international energy cooperation
【An energy system of local production for local consumption】		
Domestic 1)2)3)	Innovative Energy Strategy	• Specific measures • [3] Establishing new energy systems • (3) Establishing an energy system of local production for local consumption
Domestic 2)3)	Fukushima Plan for a New Energy Society	• Smart community • 10. Promoting demonstrations to move toward smart communities *"Feasibility study on the commercialization of a local production for local consumption type energy system in cities and towns in Fukushima"
	Strategic Energy Plan	• Accelerating the introduction of renewable energy: Toward achieving grid parity over the mid-to long-term ・2. Promotion of use of renewable energy in distributed energy systems

Resources

【Energy IoT technology 5.0】		
1)2)3)	Innovative Energy Strategy	• Specific measures • [1] Thorough energy efficiency and conservation • (2) Enhancing energy savings in the fields of small and medium sized enterprises, houses and transportation *Including zero energy housing and buildings • [3] Establishing new energy systems • (2) Starting up an integrated energy system of renewable energy and energy efficiency *Including integrated control using IoT
	Plan for Global Warming Countermeasures	• Policies and measures for energy-originated CO2 • Intensive energy efficiency improvements in commercial sectors by using the building energy management system (BEMS) and energy saving diagnostics • Improving the energy efficiency of houses • Rigorous energy management by using the home energy management system (HEMS) and smart meters • Measures in traffic flow improvement *Including the promotion of automatic driving
	Fifth Science and Technology Basic Plan	• Chapter 2: Acting to create new value for the development of future industry and social transformation • (2) Realizing a world-leading "super smart society" (Society 5.0) • 2) Activities for realization • "Optimization of the energy value chain"
【Top Runner Program】		
Domestic1)2)	Innovative Energy Strategy	• Specific measures • [1] Thorough energy efficiency and conservation • (1) Expanding the scope of the targets of the Energy Efficiency Benchmark Program to all industries
	Plan for Global Warming Countermeasures	• Policies and measures for energy-originated CO2 • Improving the energy efficiency of equipment using the Top Runner program

1. Understanding & Identification

1.0 Selection of experts

・Establish a roadmap working team consisting of experts having knowledge in science, technology policies and the strategies of Goal 7.

1.1 Sharing recognition

・Share with members the concept of the society aimed at SDGs' Goal 7.

・Regarding Goal 7, confirm the Japanese government is engaged in various activities.

1.2 Understanding the current status

・Confirm Japan's attainment status and targets for renewable energy and energy efficiency.

・Discuss the targets and scope of activities for energy efficiency and renewable energy, which Japan is engaged in.

・List important policies, such as documents decided by the Cabinet, basic plans, basic strategy policies, technology roadmaps, and documents for overseas expansion.

・Check for gaps in the lists of important policies.

2. Analysis

2.1 Understand existing activities

・Use basic policies concerning renewable energy and energy efficiency from existing strategies, and understand the programs and technologies to be addressed.

・Confirm the deadlines for achieving the activities and the target values.

・For social implementation, organize them according to the separate phases of technological development, implementation and diffusion. Visualize the whole process.

2.2 Highlight activities attracting attention

・Extract noteworthy activities in terms of SDGs, international trends, and the concepts to be shared between developed and developing countries.

・Describe specific contents and milestones.

2.3 Relationship with other targets

・By referring to the ICSU's interlinkage report, describe the relationship with other SDG targets.

2.4 Case studies

・Regarding important activities, analyze previous studies.

4. Co-design

1) Dialogue with experts

2) Dialogue with the government

Relationship with Other Targets

Highlights of Activities Attracting Attention: A Roadmap

Overseas / Domestic

2018 — 2022 — 2026 — 2030

7.1, 7.a, 7.b Overseas expansion

【*Clean Energy Global Network（CEGN）*: improvement of access to clean energy】

1) **R&D and demonstration of clean energy carrier** and system simulation (e.g., hydrogen supply chain)

2) **Enhancement of economic efficiency** and optimization of CEGN

3) Global expansion and establishment of CEGN **international standardization** of transportation methods

7.2 Expansion of renewable energy

【*"Chisan-Chisho" energy system:* local production for local consumption】

1) **Grasp of supply and demand of energy** for regions using smart meters, and the establishment of predictive technologies

2) Expansion of **renewable energy(solar and wind power) as infrastructure** for daily life (water supply, lighting and air conditioning systems) in small regions

3) Expansion in medium to large sized regions and **synergy effects with other issues (disaster prevention/poverty etc.). Promotion of international standardization**

2) **Utilization of regional resources** (biomass, heat and solar) and technological development for energy management

3) **Improvement of economic efficiency with the best mix for regional resources** Optimal design and improvement of regional energy networks through government and private sector collaboration

7.3 Energy saving

【*Energy/IoT technologies:* realization of Society 5.0】

1) Establishment/diffusion of **smart meter technology Information gathering/big-data** for production facilities, lighting and air-condition by using sensor cameras

2) **Analysis, sharing, utilization of data** using IoT or AI, and **fostering human resources** in those fields

3) **Optimization of energy management and zero energy** of housing/buildings/regions

【*Top Runner:* expansion of energy efficiency】

1) Advertise and diffuse the concept of Top Runner to each country **Understand the situation** in each country and **support demonstrations**

2) **Expand the concept** that are suitable for each country Collaboration and provision of technology, and promotion of **international standardization**

1) **Expand the concepts from Top Runner in all industries** and identify the energy saving effects

2) **Devices working together** and zero energy for housing and buildings

Vision

Globally increase of the transported amount of clean energy.

the amount of renewable energy : **22-24% in 2030.**

aiming to limit global warming to within 2℃, as in the Paris Agreement

17% energy saving (compared with 2015) in 2030

1) R&D 2) Technological imports: demonstration, business mode 3) Diffusion: policy dialogue, international standards, investment/finance

Glossaries:
What is the Top Runner Program?

How to determine energy performance standards for machinery, equipment, and other items

- Minimum standard value system
- Average standard value system
- **Top Runner Program** /maximum standard value system

All machinery, equipment, and other items, are targeted to **exceed their standard values.**

All machinery, equipment and other items are targeted to **exceed their average values.**

- Targets are to exceed the performance of **the most energy-efficient machinery, equipment, and other items** on the market, at the time of the establishment of the standard values.
- Standard values are set considering potential technological improvements added as efficiency improvements.
- Based on the revised Rationalization in Energy Use Law of 1998.
- Target~~s~~ cars, household electronics etc.

Energy saving labeling program

Retail stores attach the Uniform Energy Saving labels so that consumers can easily choose.

Resources:
"Top Runner Program" （ANRE, March 2015）
"Naruhodo! Uniform Energy Saving Labels: The labels show you energy saving performance, March 2011 (ANRE)"