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Evolving sustainable energy policy in Nagano Prefecture, Japan:

The path towards a 100% renewable energy region.

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Abstract: The “Nagano Prefecture Sustainable Energy Strategy” was established in 2013 to encourage companies and individual households to shift towards more energy-conserving practices and to increase renewable energy against climate change. In line with the Paris Agreement, which aims to limit the global temperature increase within this century to below 2 degrees Celsius, and the declaration made after the Nagano “Local Renewables Conference 2017”, Nagano Prefecture aims to become a “100% renewable energy region”, and promote energy saving and reusable energies on a local level. We believe people’s lives, local economies and the environment can be improved with good local policies, the actions of citizens, and new ideas.

1. Introduction: Why Nagano Prefecture promotes renewable energy and energy saving

After the 2011 Great East Japan Earthquake and nuclear incidents in Fukushima, Japanese local governments recognised the limit of a centralised, fossil fuel-based energy system and started to play a significant role in leading the shift towards a low-carbon society that takes advantage of local and renewable energy sources.

Facing the risk of climate change on a worldwide scale, Nagano Prefecture, located near the centre of Japan, established the “Nagano Prefecture Sustainable Energy Strategy: the Third Nagano Prefecture Climate Change Policy 2013-2020” in February 2013. This new strategy integrated the Climate Change Policy and the Sustainable Energy Policy in Nagano to realize a low-carbon society.

2. Strategy for achieving the goals

In the Strategy, Nagano Prefectural government has set five main targets to create a low-carbon society with sustainable energy while attaining economic growth and reducing energy consumption at the same time.

The prefecture set short-, medium- and long-term goals to be achieved in each of the five targets: “Greenhouse Gas Emissions”, “Final Energy Consumption”, “Maximum Power Demand”, “Renewable Energy Introduction”, and “Capacity of Renewable Power Generation Facility”.

The Strategy should reduce total greenhouse gas (GHG) emissions by an estimated 10% in

FY 2020, 30% in FY 2030, and 80% in FY 2050 compared to levels in FY 1990. Furthermore, final energy consumption reduction is estimated at 15% in FY 2020, 30% in FY 2030 and 40% in FY 2050, compared to FY 2010. The amount of renewable energy introduction required is 21.9 GJ in FY 2020, 30.4 GJ in FY 2030, and 46.2 GJ in FY 2050 in Nagano Prefecture.

Nagano Prefecture introduced several additional local policy measures on national level policies to attain these ambitious targets.

Fig.1 Five targets and energy self-sufficiency rates in the Strategy of Nagano

Fiscal Year	1990	2020	2030	2050
Total GHG emissions: Mt-CO2 eq.	14.7	- 10%	- 30%	- 80%
Fiscal Year	2010	2020	2030	2050
Final energy consumption: Mtoe	4.8	- 15%	- 30%	- 40%
Maximum power demand: GW	3.0	- 15%	- 25%	- 45%
Renewable energy introduction: GJ	11.2	21.9	30.4	46.2
Renewable energy generation capacity: GW	0.1	1.5	2.0	3.0
Renewable energy self-sufficiency rate to the final energy consumption: %	6.0	13.9	23.4	41.3
Capacity rate of renewable energy generation facility to the annual max. power demand: %	58.6	124.3	162.9	284.2

* The base year is FY 2010 except for the Total GHG emissions.

3. Renewable energy and energy saving expansion initiatives

Nagano Prefectural government has started to encourage companies and individual households to shift towards more energy-conserving practices at a local level by following the “Energy Saving Support Systems” that were introduced in the revised Nagano Prefecture Climate Change Ordinance in March 2013.

- **Plan for reducing GHG and report system for industry:** Companies and factories are required to submit a three year plan for reducing GHG in their business activity to the prefectural government, and the prefecture provides advice on the activities in the plan. After evaluating the results at the end of each planning period, the prefecture rewards the best business operators who have been making the most effort to increase operational efficiency and shift to more energy-efficient equipment.
- **High energy-saving building system:** Companies, factories, and individual households are required to consider construction of energy saving buildings that utilise renewable sources of energy and have high energy performance when they plan to build buildings or houses. This system is vital to further reduce GHG emissions by the construction industry,

and has been adopted in the construction of over 80% of new building projects since the system began.

- **Appliance energy efficiency labelling system:** All home electric appliance retailers are required to put energy efficiency labels on home electric appliances sold at their shops, such as air conditioners, televisions, and refrigerators.

In order to reduce GHG emissions from the public facilities in Nagano Prefecture more effectively, the following energy saving projects were added into the “Fifth Nagano Prefecture Action Plan 2016 – 2020”.

- **Cooperation with ESCO:** Nagano Prefecture introduced energy efficient equipments in the public buildings through ESCO scheme.
* ESCO: The private company installs energy-saving equipment and make returns on their investment by saving energy costs.
- **LED lighting system for public facilities:** In order to reduce electricity usage for lighting, the prefectural government promotes the use of LED lighting devices in all public facilities run by Nagano Prefecture.

The prefecture supports the promotion of renewable energy businesses based on local partnerships with the initiative programmes listed below.

- **Programmes for promoting locally-orientated renewable energy business:** Subsidies for locally-based renewable electricity and heating projects are provided to support city and village administrations, NPOs, SMEs, and citizens’ groups in cooperation with local bank investment.
- **Joint projects with “Shinshu Renewable Energy Network”:** A public-private partnership network that provides a cooperative relationship between NPOs, communities, companies, universities, and local governments, and aims to incubate locally based renewable energy projects in Nagano, promoting information sharing and activities such as hosting seminars.

Under the framework of Japan’s feed-in tariff scheme for renewable energy, which started in 2012, returns of investments from long-term feed-in tariff schemes is legally guaranteed by the Japanese government to convert renewable energy into local benefits. Due to high tariff rates, the electric power supplied by renewable energy has dramatically increased, especially that from photovoltaic power generation.

To avoid conflict over landscape and environmental damages caused by large-scale solar power plants, Nagano government introduced “Environmental Impact Assessment System” on large-scale solar power plants and released the “Guideline manual for evaluation and

management of solarpower plants for local governments” in June 2016. The manual aims to reduce negative environmental impact caused by building large-scale solar power plants.

Concerning considerations of adaptative measures, technical and policy initiatives that encourage cooperation between industry, educational institutions, and government administrations are necessary to monitor and predict the impacts of climate change in the long term.

- **The Climate Change Monitoring Network** aims to establish a highly-accurate measurement and research system to predict the impacts of global warming in a wide range of sectors. It provides a platform that promotes the sharing of information and studies concerning climate change impact among related organisations and researchers.
- **The Climate Change Adaption Platform** aims to share impact predictions with developers to improve technology, production, and services for adaption.

Nagano Prefecture held seminars and workshops to discuss the impact of climate change. Information sharing and considerations of adaptative measures have been conducted among experts on agriculture, disaster prevention, and biodiversity.



Preparatory meeting for the establishment of the “Climate Change Adoption Platform” on 25th October 2016

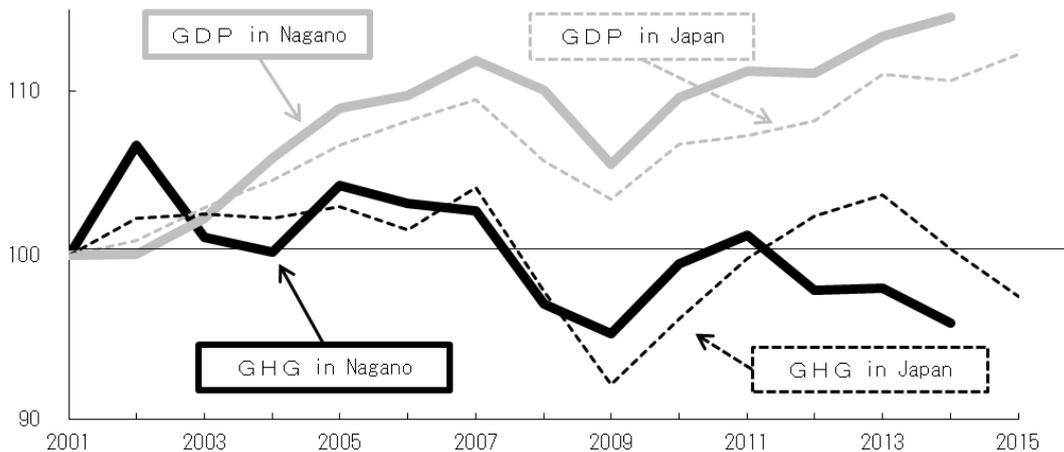
4. Progress of the Nagano Prefecture Sustainable Energy Strategy

To achieve a low-carbon society with sustainable energy, we aim to reduce energy consumption and GHG emissions while achieving economic growth.

The GDP of Nagano Prefecture presented a 13.9% increase in FY 2013 while GHG emissions decreased by 5.9%, compared to the base year of FY 2001. Compared to the rest of the nation, trends of GDP and GHG emissions in Nagano Prefecture have been moving further

apart than the rest of Japan. The decoupling of economic growth and energy consumption began in Nagano in 2012 as shown below.

Fig.2 Comparison of GDP and GHG emissions between Nagano Pref. and nationwide

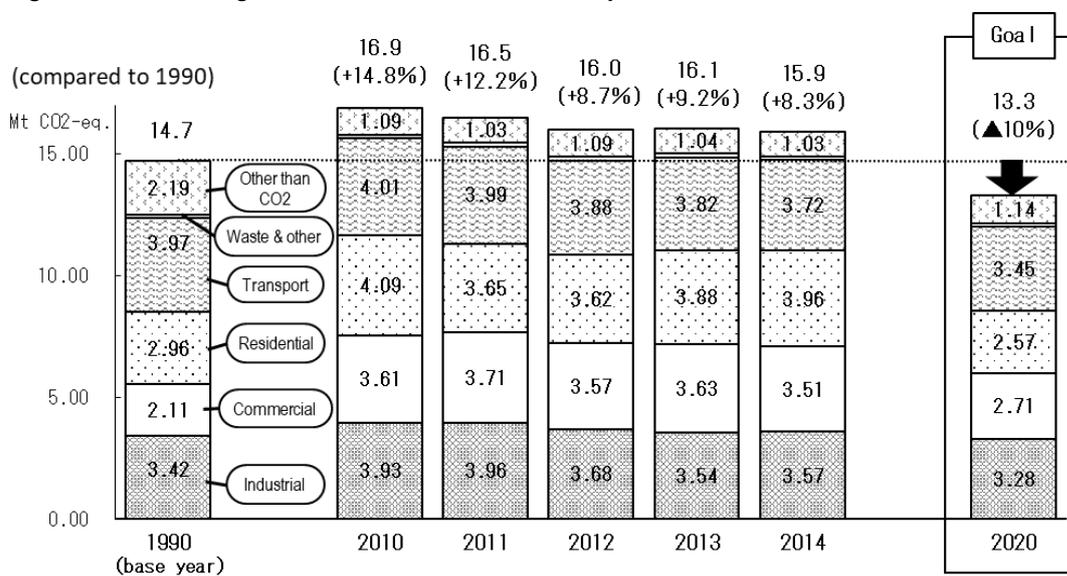


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* CO2 emission factor is based on the brake-specific emission in each FY.

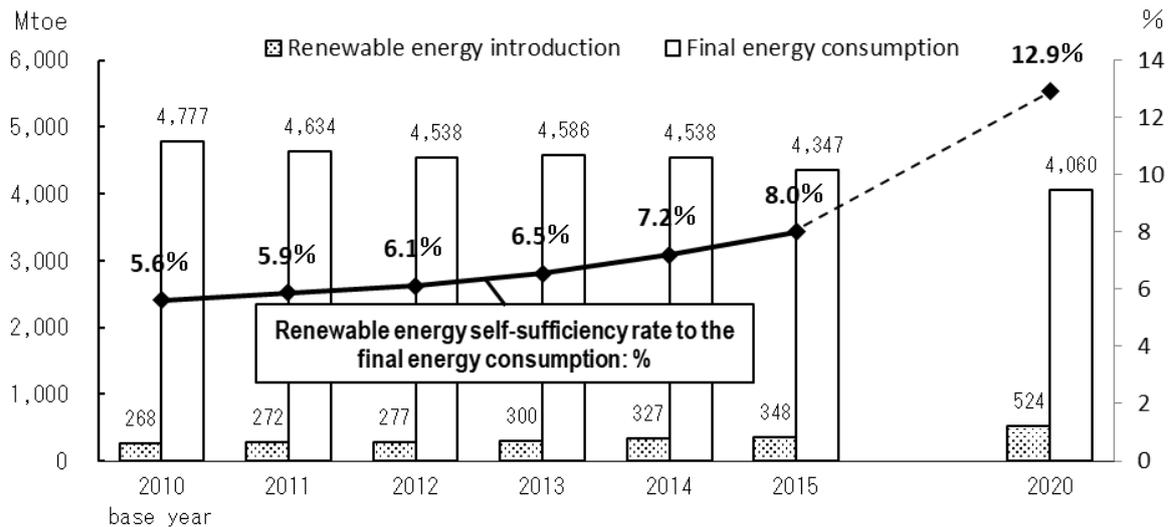
The total GHG emissions in FY 2014 amounted to 15.9 Mt-CO₂ eq., representing a declining trend in emissions from FY 2011, but looking at sector-by-sector trends, there are no remarkable changes seen in the commercial and residential sectors. However, emissions in the industry and transport sectors have been slightly decreasing year by year thanks to companies' significant efforts to meet the target reduction of 10% by FY 2020.

Fig.3 Trends in Nagano's total GHG emissions by sector



The final energy consumption has been declining in all sectors. In Nagano Prefecture, photovoltaics have dramatically increased due to the feed-in tariff scheme introduced in 2012, resulting in renewable energy self-sufficiency rates accounting for 8% in 2015.

Fig.4 Trends in Nagano's renewable energy self-sufficiency rates compared to the final energy consumption



5. Local Renewables Conference 2017 in Nagano

With the aim of achieving 100% renewable cities and regions, the Japanese Ministry of the Environment, Nagano Prefecture and ICLEI (Local Governments for Sustainability) hosted a special edition of the Local Renewables Conference Series in Nagano on 7th-8th September 2017. The conference was started by ICLEI and the City of Freiburg, Germany, and is organised biannually in Europe. In total, 765 participants from all over Japan, Germany, France, Denmark, and Taiwan gathered at the “Local Renewables Conference 2017”, which was held in Asia for the first time.

It offered a unique opportunity for local governments, energy service providers, business representatives and experts to meet, and it served as an important forum to share both domestic and international knowledge, experiences, and good practices. The “Nagano Declaration: Local leaders working together to achieve 100% renewable energy cities and regions” was presented by the local leaders as an outcome of the conference. The declaration indicates the commitment of mayors and governors of Japanese local governments who attended the “Local Leaders Summit” to take new action and enhance cooperation to achieve 100% renewable energy cities and regions.



Local leaders gathered at the Local Renewables Conference in Nagano on 7th-8th September 2017

6. Conclusion: Upcoming challenges in achieving 100% renewable energy region

After the conference, Nagano prefecture launched a review of the “Nagano Sustainable Energy Strategy” to build an energy-independent region by starting new initiatives in cooperation with local governments and communities, both at home and abroad.

To achieve a low-carbon society, new action programs have been started in order to enhance energy-saving buildings and businesses. The prefecture encourages residential builders to visit existing houses to measure their airtightness, and they consult individual households on how to renovate their houses for high energy performance. Experts will also give advice and propose improvement measures for environmental management systems in small- and mid-sized businesses by visiting companies and factories.

The “Solar mapping project” and “Prefectural roof lease project” are going to be added to the Sustainable Energy Strategy in order to further promote through a lending scheme of public building roofs, the installation of solar panels by owners of buildings and private companies which lease roofs.

Not only these recent projects but all actions shown in the Sustainable Energy Strategy have many elements in common with the Sustainable Development Goals (SDGs). For example, energy-saving buildings with high insulation performance are vital for residents to enjoy a comfortable, healthy lifestyle, and also help prevent global warming and revitalise the regional economy by reducing utility costs. All of these ambitious projects in the Sustainable Energy Strategy contribute to achieving the goal of 100% renewable energy cities and regions in the future, making every effort to overcome multiple complex problems related to the environment, economy, and society.

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THE NAGANO DECLARATION

LOCAL LEADERS WORKING TOGETHER TO ACHIEVE 100% RENEWABLE ENERGY CITIES AND REGIONS

We, the Mayors and Governors of Japanese cities and regions gathered at the Local Renewables Conference 2017 in Nagano on Friday 8 September 2017, are honored to hold the Local Renewables Conference in Japan for the first time.

We recognize that Japanese local governments are facing an era of population decline and slow economic growth. The social systems developed in the past that assume population growth and high economic growth no longer apply to modern needs, the consequence of which could have profound impacts on people's lives and local economies. With the Paris Agreement entering into force, the world has witnessed an important step towards the realization of a decarbonized society by the end of the century.

We are confident that, while population decline and slow growth may be tough challenges, people's lives and local economies can be improved with good local policies, citizen actions and new ideas. To make this a reality, local governments and citizens must work hand-in-hand towards a more sustainable future.

We believe that one of the key components to achieving this vision is renewable energy. Local economies will thrive by switching from imported, fossil fuel-based energy sources to more local sources of renewable energy. This will not only increase community income and local employment opportunities but will also improve quality of life by advancing a sustainable lifestyle that is rooted in the local environment and community.

Local Renewables Conference 2017, hosted by the Ministry of the Environment, Japan, Nagano Prefecture, and ICLEI – Local Governments for Sustainability, served as an important forum to share both domestic and international knowledge to make a switch towards this new path. In particular, the experiences and knowledge shared by cities and regions from abroad were extremely valuable. Local governments and local citizens that face similar challenges were able to share their experiences and hold a dialogue beyond national borders. We, participants from Japan, express our sincere gratitude to all participants from abroad.

We, the Mayors and Governors of Japanese cities and regions gathered today at the “Local Leaders’ Summit,” declare to take new action and enhance cooperation towards achieving 100% renewable energy cities and regions. With the support of the participants attending the Local Renewables Conference 2017, we commit to utilizing local renewable energy to overcome the challenges that we face, protect the livelihoods of our residents, and improve local economies. To reach these goals, we will enhance our cooperation with local governments and local communities, both at home and abroad.

Furthermore, we hope that more local leaders, not only from Japan but also from Asia and around the globe, will join us in this endeavor by supporting this declaration.

With hopes that today will be marked as a day and forum that paved a pathway towards a new, bright future.

8 September 2017, Nagano, Japan

再生可能エネルギー100%地域を目指す自治体首長による

長野宣言

「地域再生可能エネルギー国際会議」が、アジア及び日本で初めて開催されたことを誇りに思います。

日本の自治体は、人口減少と低成長の時代に直面しています。人口増加と高成長を前提にしてきた従来の社会制度が、次第に通用しなくなり、住民の暮らしや地域経済を根底から揺るがすおそれがあります。さらに、パリ協定の発効を受けて、今世紀後半の脱炭素社会の実現に向けて、世界は大きく舵を切りました。

しかし、人口減少と低成長が困難な課題であるとしても、これからの自治体の政策と住民の活動、新たな知恵によって、住民の暮らしや地域経済をより良くすることは可能だと、確信しています。それには、従来の延長線上をそのまま進むのではなく、自治体と住民が力を合わせ、新たな道を切り拓くことが必要です。

一つのカギが、再生可能エネルギーです。これまで地域外の化石資源に依存していたエネルギーを、地域の再生可能資源に切り替えることで、地域内の資金循環が拡大します。それは、地域の所得と雇用を増加させるだけでなく、環境と地域に根差した持続可能なライフスタイルを発展させ、住民の暮らしの質を向上します。

環境省、長野県、イクレイー持続可能性をめざす自治体協議会の共催による「地域再生可能エネルギー国際会議2017」は、そのための国内外の知恵を共有する場となりました。とりわけ、海外の自治体及び地域住民の知恵は、日本の自治体及び地域住民にとって、極めて有益でした。同様の課題に直面する自治体と住民が、国境を越えて、知恵を共有し、語り合うことができました。海外から参加していただいたすべての方に、日本に住む参加者は、心から感謝しています。

「首長サミット」に集う日本の自治体の首長は、再生可能エネルギー100%地域を目指して、新たな取組と連携の行動開始を宣言します。「地域再生可能エネルギー国際会議2017」に集い、この決意に共鳴するすべての参加者の賛同と応援の下に、再生可能エネルギーを活用して、直面する課題を乗り越え、住民の暮らしを守り、地域経済を活発にします。そのために、国内外の自治体及び地域住民との交流と協働を拡大します。

さらに、「首長サミット」の宣言に賛同する自治体の首長が、日本のみならず、アジア、そして世界中に増えることを期待します。

日本と世界の明るい未来を切り拓いた、一つの「日と場所」になることを祈念して。

2017年9月8日 長野にて