Hokkaido Electric Power and Nuclear Power

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Hokkaido Electric Power Co.

Table of Contents

Table of Contents

What is an electric power company?

A company that makes and delivers electricity to customers

Any kind of electricity? ⇒NO

Delivering high quality, inexpensive electricity

For what?

No power failure. Stable voltage and frequency.

To enrich Hokkaido

The Significance of Working for Hokkaido Electric Power Company

A company that makes you feel "for Hokkaido

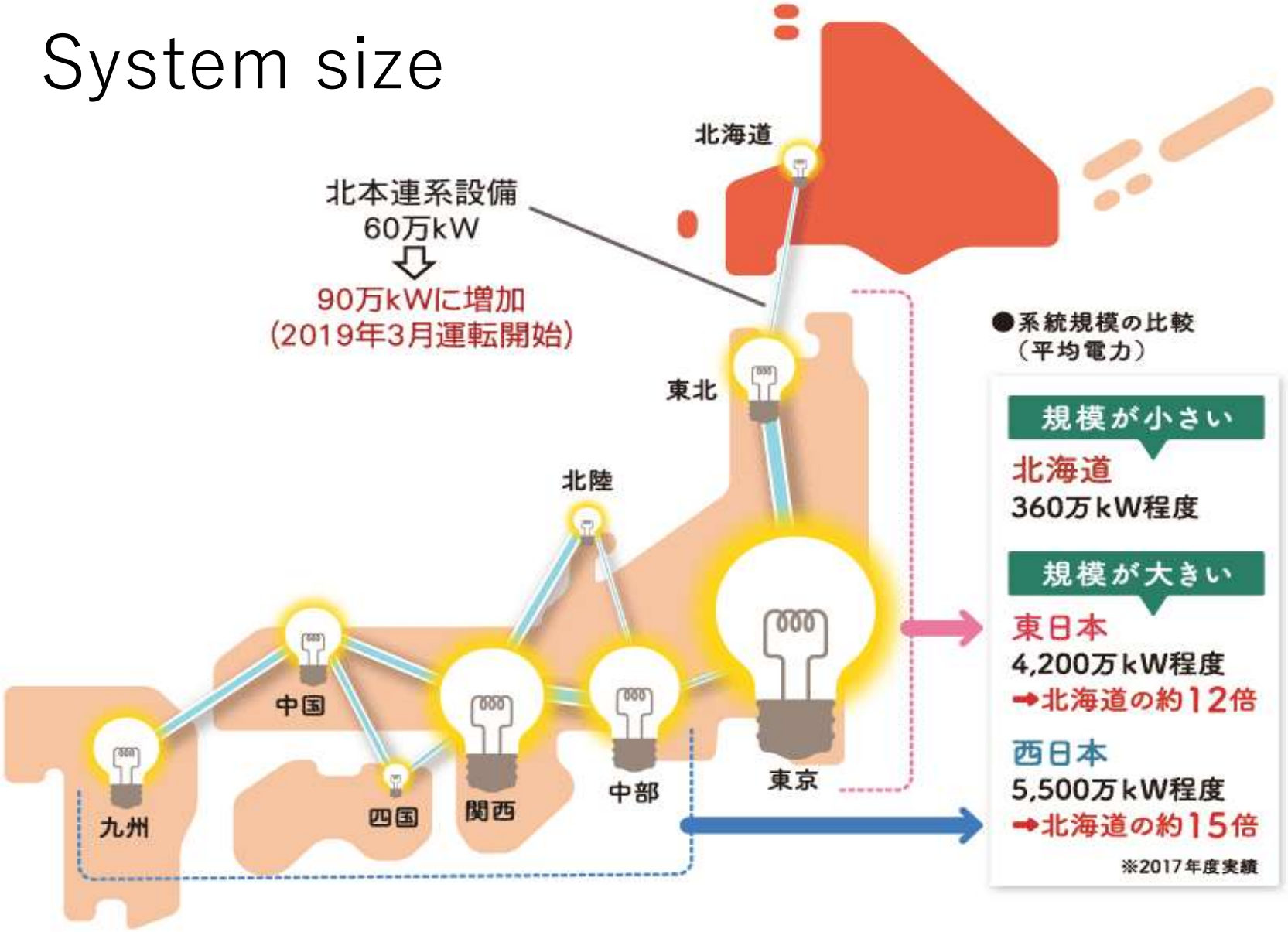
May 1, 1951 Established

Head office building of Hokkaido Electric Power Company at the time of its establishment

	設立時（1951年5月1日）(A)		現在※（2021年3月31日）(B)		倍率(B)/(A)
資本金		330百万円		114,291百万円	346.3 倍
総資産額		5,425百万円		2,001,650百万円	369.0 倍
供給設備	箇所	認可出力	箇所	認可出力	
水力発電所	50	240,458kW	56	1,651,485kW	6.9 倍
火力発電所	6	71,430kW	12	4,634,610kW	64.9 倍
汽力	5	71,000kW	6	3,900,000kW	54.9 倍
コンバインドサイクル	–	–	1	569,400kW	–
ガスタービン	–	–	1	148,000kW	–
内燃力	1	430kW	4	17,210kW	40.0 倍
原子力発電所	–	–	1	2,070,000kW	–
地熱発電所	–	–	1	25,000kW	–
太陽光発電所	–	–	1	1,000kW	–
合計	56	311,888kW	71	8,382,095kW	26.9 倍
送電線亘長		4,020km		8,462km	2.1 倍
配電線亘長		18,914km		68,350km	3.6 倍

※現在の資本金および総資産額は連結決算値、供給設備は北海道電力(株)および北海道電力ネットワーク(株)の合計値、送電線亘長および配電線亘長は北海道電力ネットワーク(株)の数値である。

System size



Source: Our Company

Production | Distribution | Sales

5,000 employees

Various fields of work

ほくでん

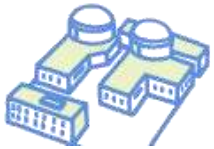
ほくでんネットワーク

Production

Circulation

Sales

Thermal power station



Nuclear power plant

Hydroelectric plant

Power line

Transformer substation

Power line

Customer

Engineering department
(Power transmission, substation and grid operation)

Power distribution unit

Thermal Power Unit

Nuclear Energy Business Management Division

Hydraulics Department
(Electricity and Civil Engineering)

Public Works Department
(Civil engineering and construction)

Support **Spread**

ほくでん

Information and Communication Department

ほくでんネットワーク

Communications Network Office

Planning Department, Corporate Planning Office

Institute for general research

General affairs department

General Energy Division

Environment Room

Personnel and Labor Relations Department

Material Department

Secretariat

(Recent Topics)

■ Recognized for four consecutive years by the Ministry of Economy, Trade and Industry and the Japan Health Council as **a company that excels in health management**, as a "White 500" corporation [March 2023] => Here

Health management

Strategically implement health management from a managerial perspective, based on the belief that efforts to maintain and promote employee health are an investment that will increase profitability and other benefits in the future.

■ First company headquartered in Hokkaido **to be certified as a DX** (Digital Transformation) company under the DX (Digital Transformation) certification system established by the Ministry of Economy, Trade and Industry. February 2022] ⇒Here

DX Certification System

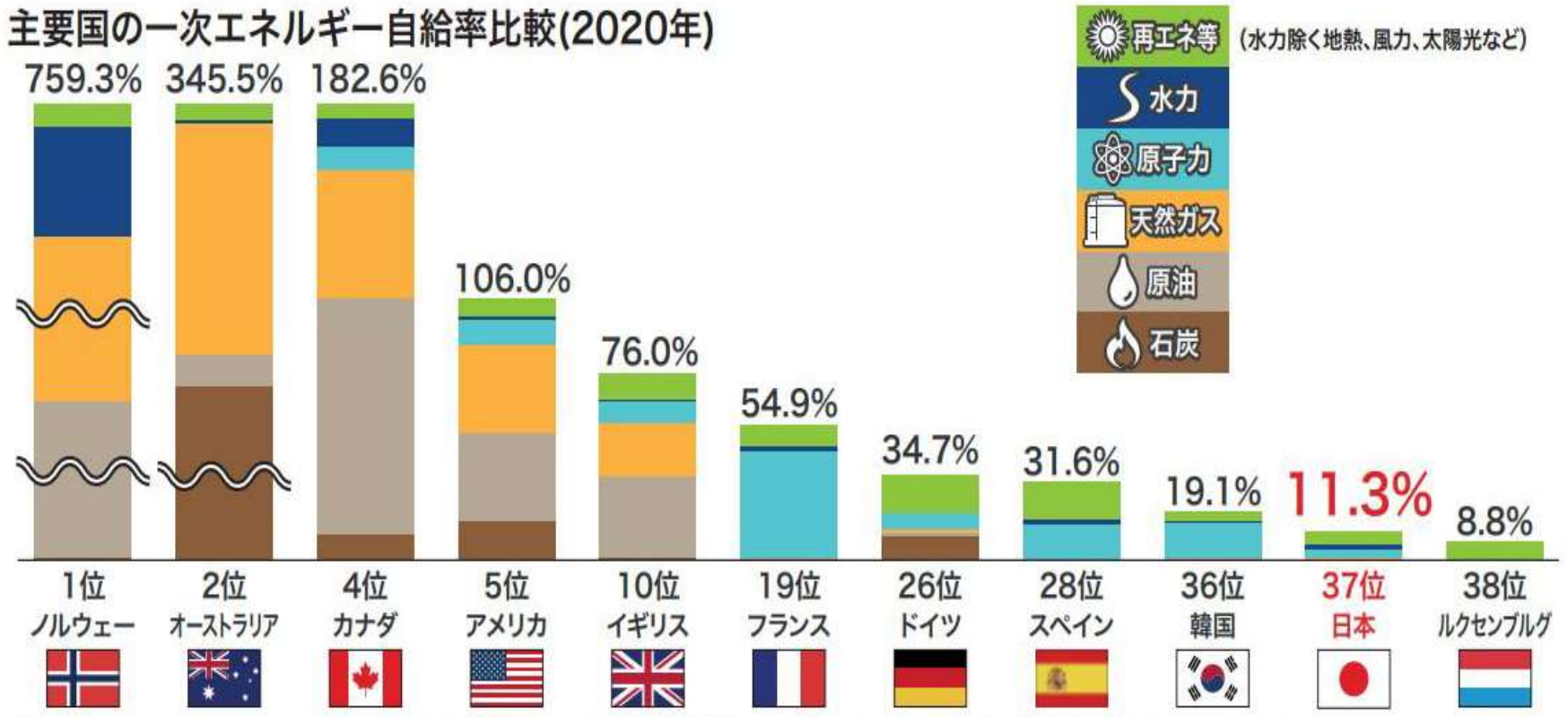
The Ministry of Economy, Trade and Industry (METI) has established the DX-Ready certification system based on the Act on Promotion of Information Processing in order to encourage companies to voluntarily engage in DX-related activities.
The Ministry of Economy, Trade and Industry (METI) has established a system to certify companies that have been confirmed to be "DX-Ready" in accordance with the Act on Promotion of Information Processing in order to encourage companies to voluntarily engage in DX initiatives.

Table of Contents

The key phrase is "high quality and low price.

Japan, a country without natural resources (1/3)

- **Japan's energy self-sufficiency rate is only 11.3%, which is low compared to other developed countries.**
- **The use of nuclear power, which can be a quasi-domestic energy source, will reduce the risk of overseas procurement of energy resources.**



Source: Agency for Natural Resources and Energy website

Japan, a country without natural resources (2/3) - Ukraine crisis

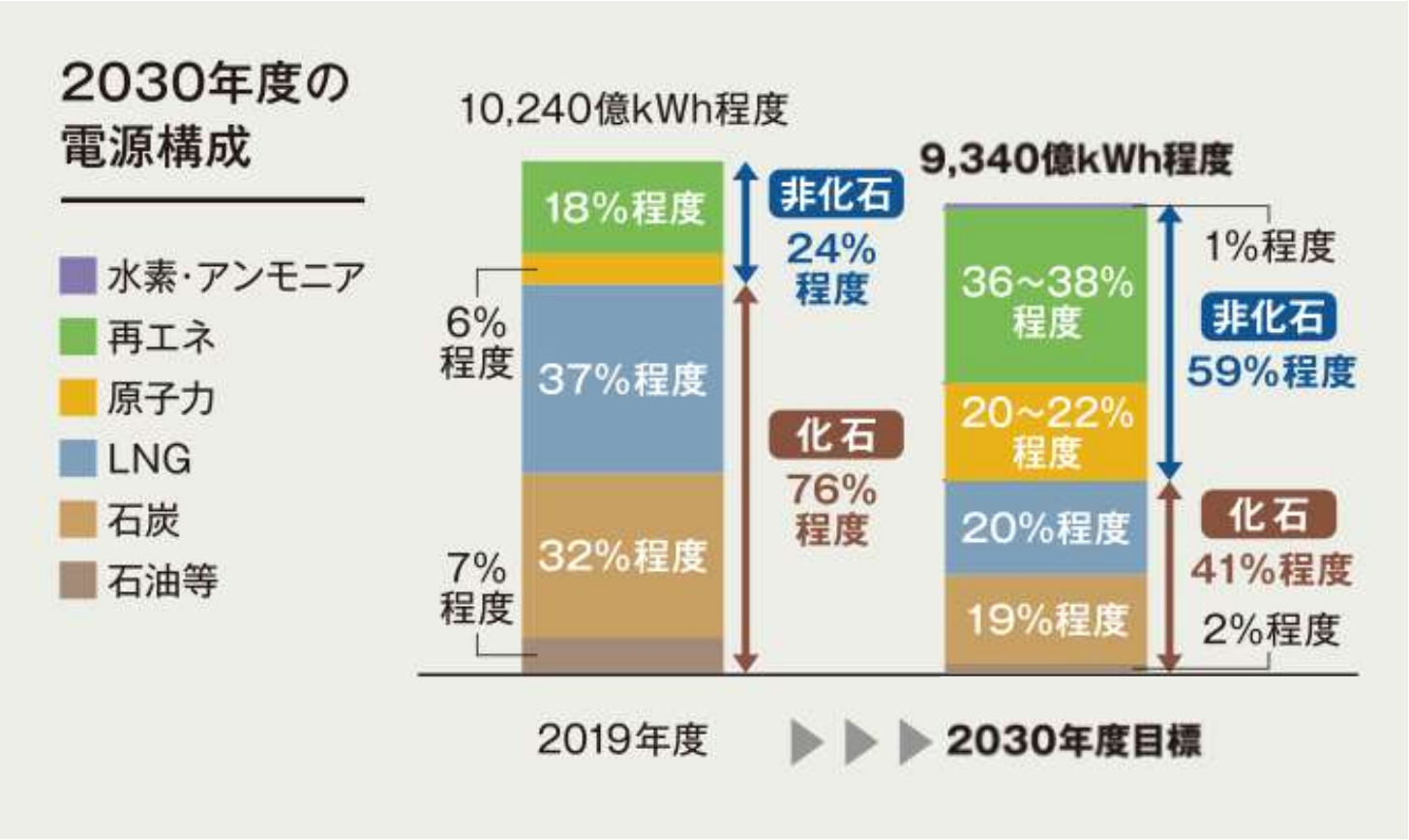
(Derived from: SBI Certificates HP Crude Oil (WTI Crude Oil first 1 year)

- **Last February Energy prices rose across the board following Russia's invasion of Ukraine.**

(Source: TRAIDINGCONOMICSHP Coal Futures 1 year)

Japan, a country without natural resources (3/3) - Toward 2030

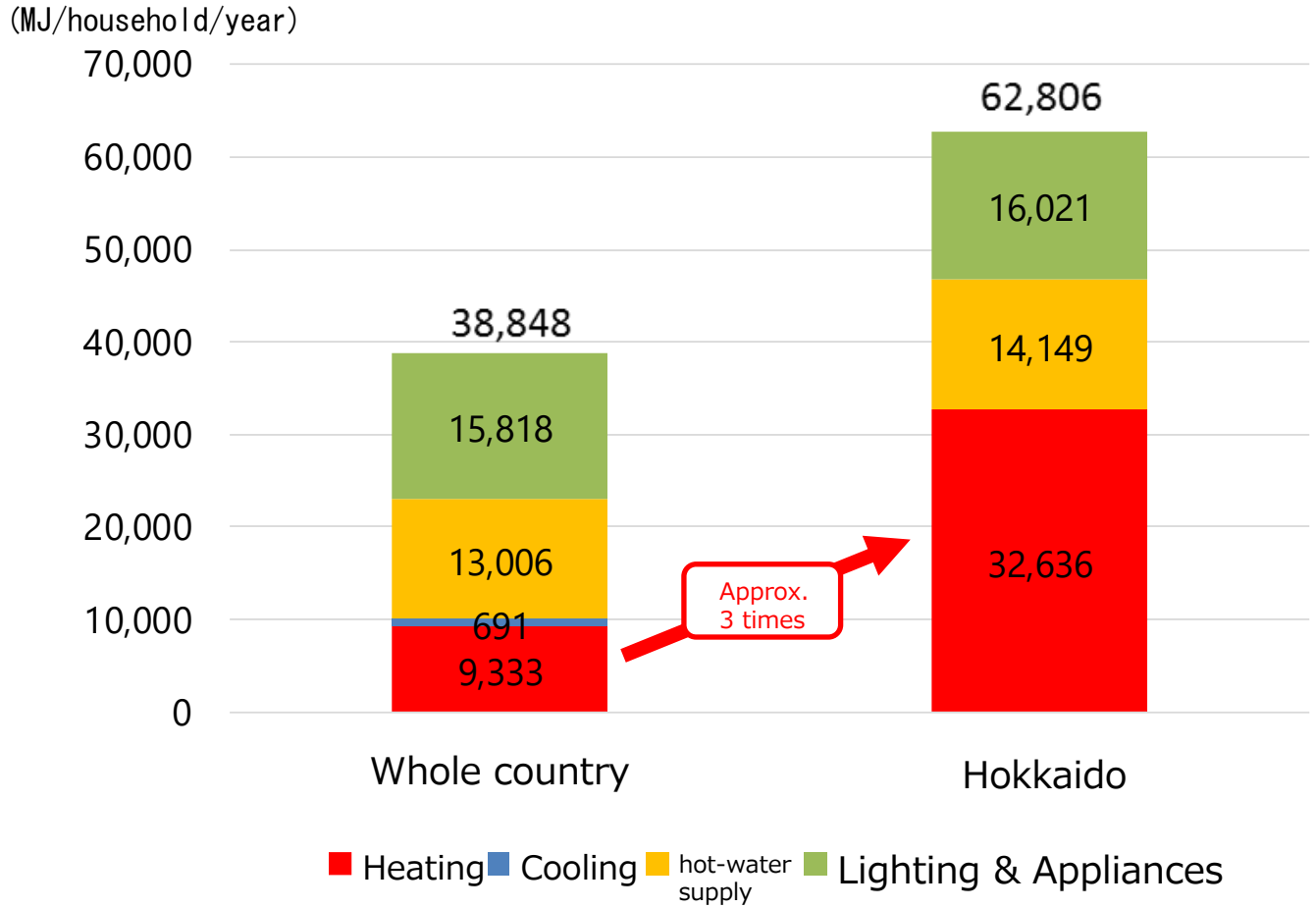
- **The government's Basic Energy Plan sets a goal of increasing the ratio of non-fossil power sources, including nuclear power, by 2030.**
- **Expanding the use of nuclear power will reduce excessive dependence on fossil fuels and contribute to a stable supply of electric power.**



Source: Partially edited from Enelog Focus Vol. 49, Federation of Electric Power Companies of Japan
Targets for FY2030 are based on the Sixth Basic Energy Plan (approved by the Cabinet in October 2022).

Energy situation in Hokkaido (1/3)

- Energy consumption per household is similar for hot water, lighting, appliances, etc., but greater for heating (about 3 times greater).

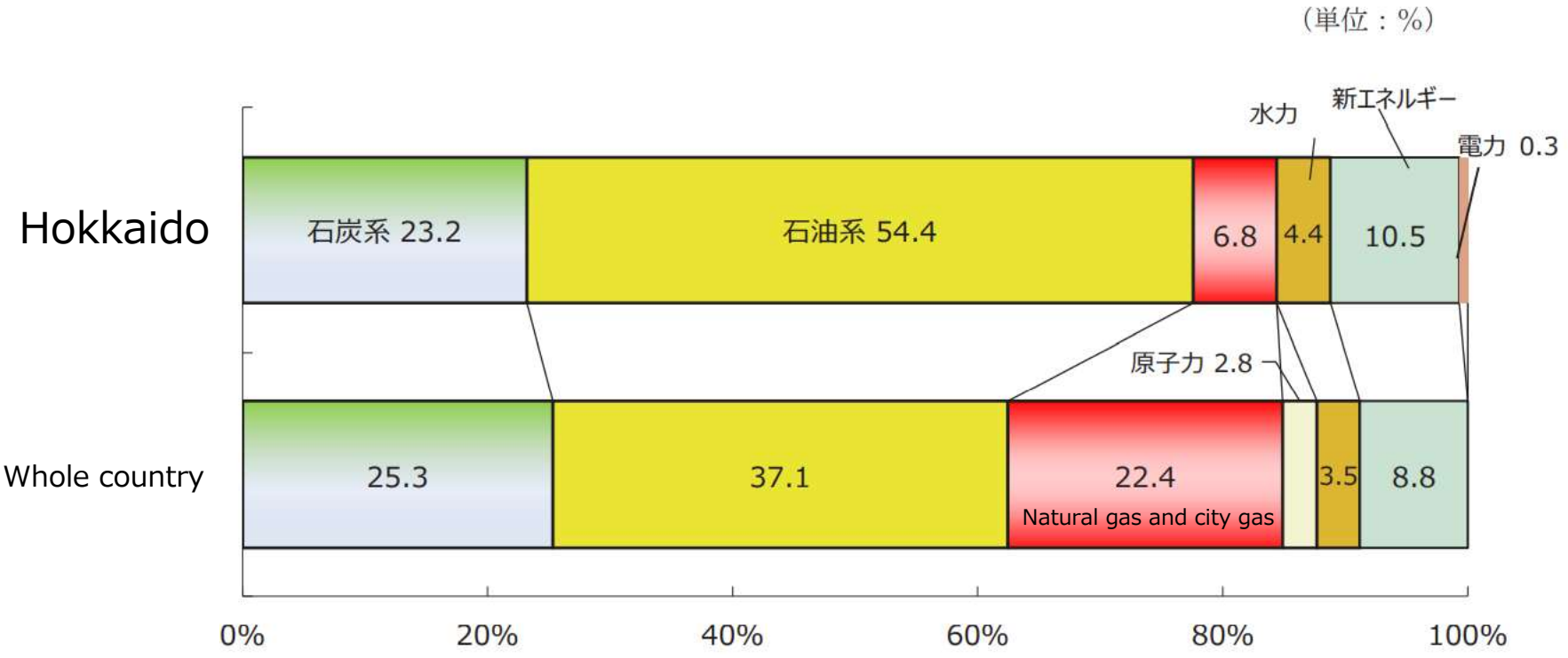


Energy Consumption per Household by Use (FY2017, Hokkaido and Nationwide)

Source: Jyukankyo Research Institute, "Annual Report on Household Energy Statistics.

Energy situation in Hokkaido (2/3)

- Hokkaido's structure is dependent on petroleum for winter heating demand, etc.

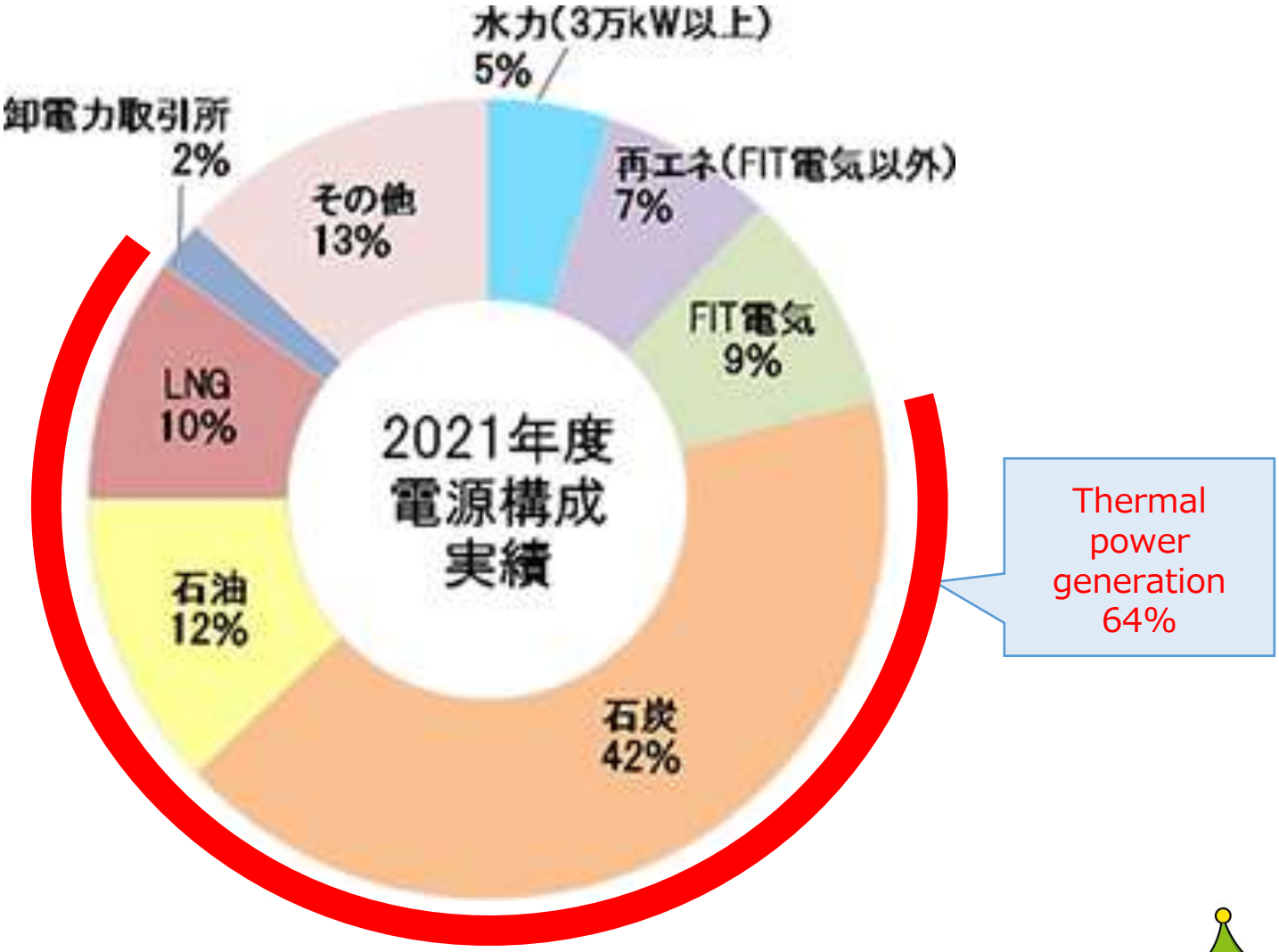


Composition of total primary energy supply (FY2028)

Source: Hokkaido Economic Handbook 2021, Hokkaido, Japan

Energy situation in Hokkaido (3/3)

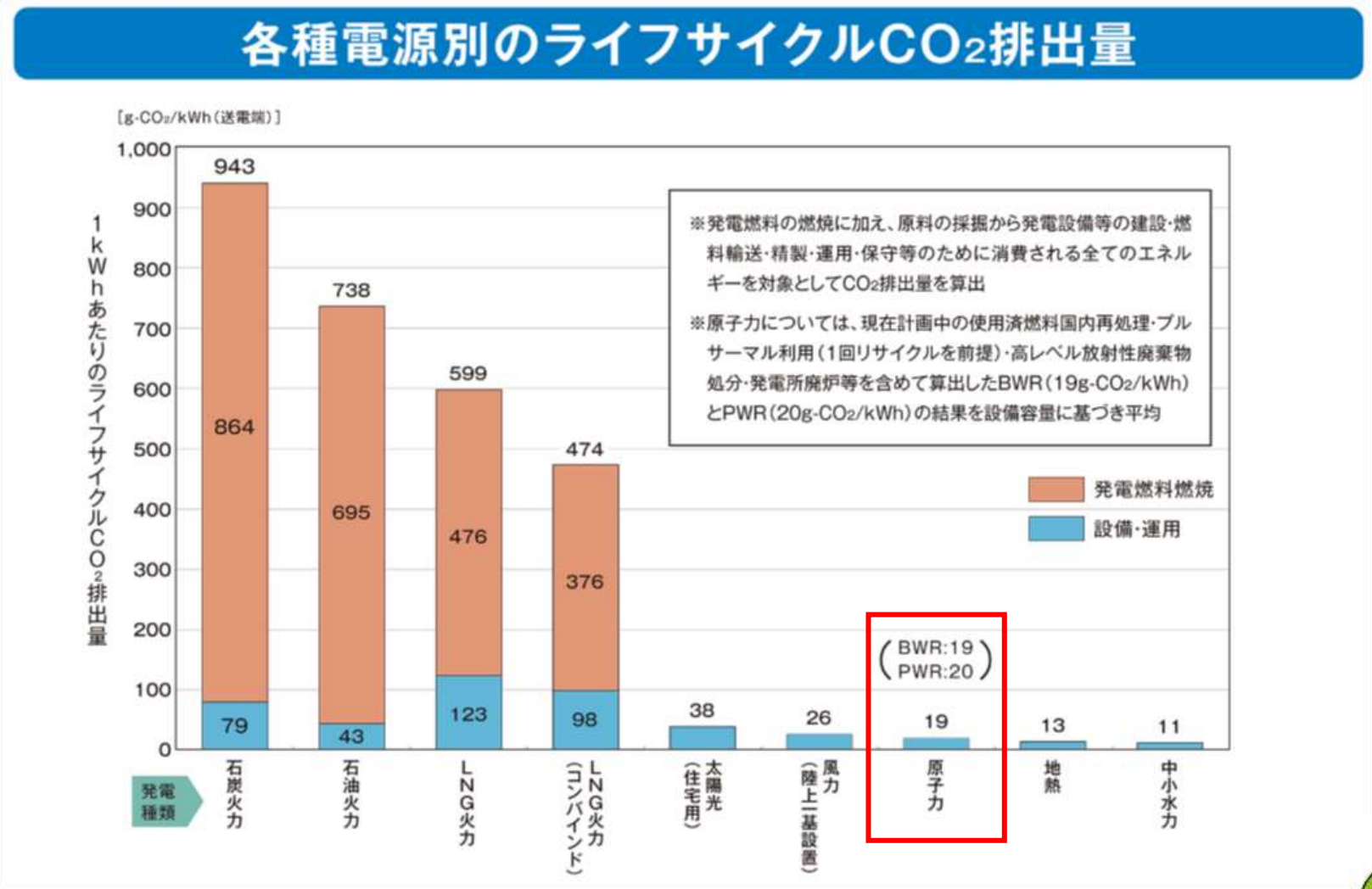
- **Nuclear power has been shut down and thermal power generation now accounts for about 60% of total power generation**



Source: Hokkaido Electric Power Co.

Re-energy and nuclear power needed to achieve carbon

- **Emissions from nuclear power are significantly lower than those from coal-, oil-, and LNG-fired power, and comparable to those from renewable energy sources such as solar and wind power.**



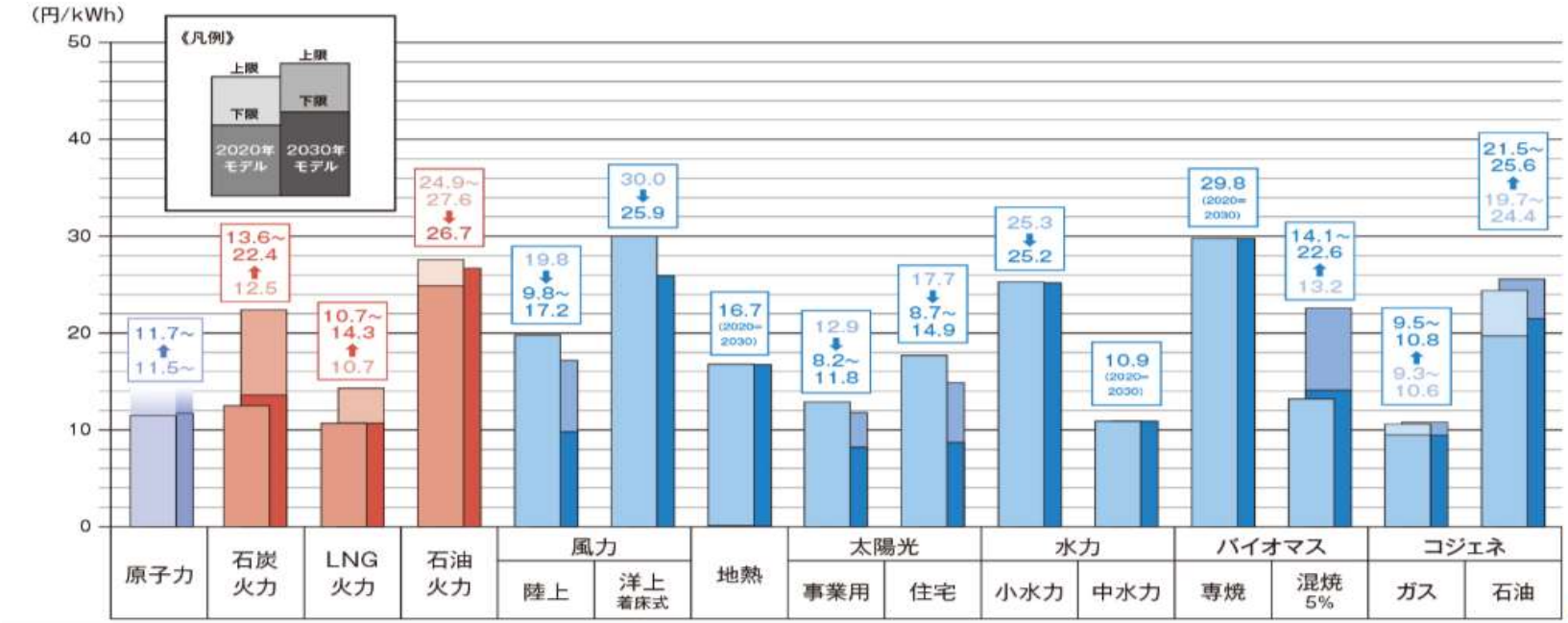
Source: Nuclear Culture Foundation, "Nuclear Power and Energy Drawings.

Power Generation Costs by Source

- **Coal-fired and LNG-fired power generation costs are high when fuel cost increases are factored in.**
- **Renewable energies (wind and solar) are costly due to issues such as grid stabilization. Policy to foster renewable energy infrastructure through feed-in tariffs to compensate for construction costs, etc.**

- **Nuclear power is less sensitive to fuel prices, but given the risk of accidents, there are social costs.**

1kWhあたりの発電コスト

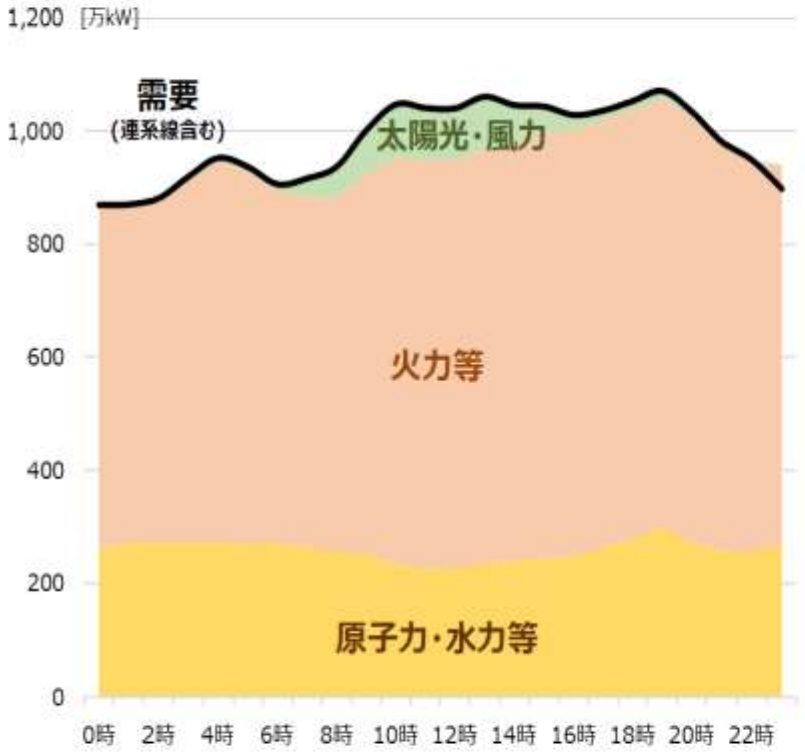


Source: Nuclear Culture Foundation, "Nuclear Power and Energy Drawings.

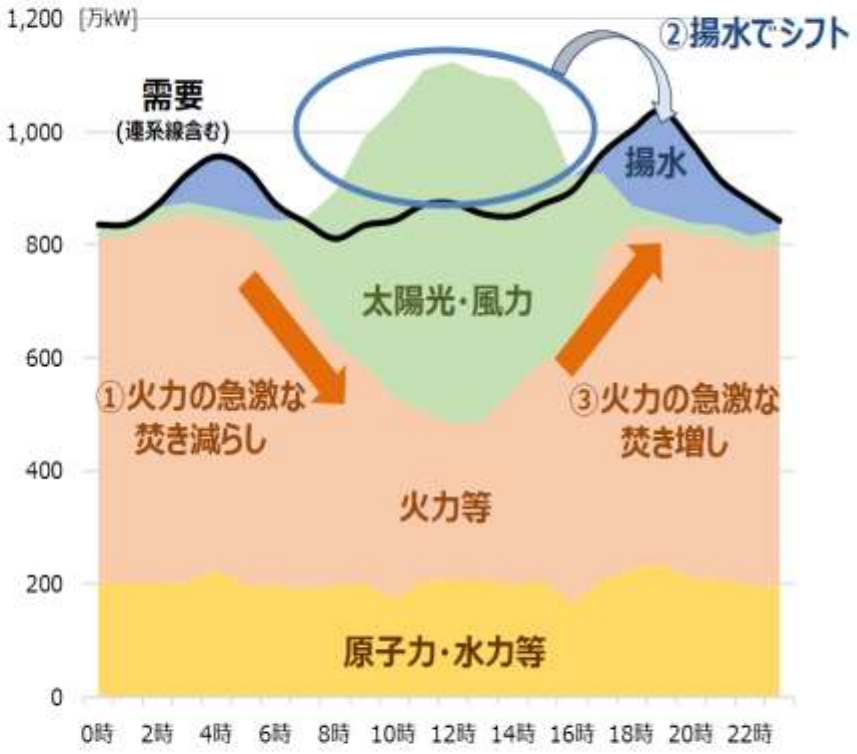
Can we stop thermal power generation altogether?

⇒Adjustment of supply and demand requires thermal power and other regulating forces

再エネ比率が低い場合のイメージ



再エネ比率が高い場合のイメージ



(Source : National Resources and Energy Agency, General Resources Investig Committee, Basic Policy Subcommittee, August 26, 2019)

出所）九州電力 エリア需給実績より作成（再エネ比率が低い場合は2016年6月4日、高い場合は2018年5月3日の需給）

Summary

Why does Hokkaido Electric Power Company do nuclear power?

- Our mission is to deliver quality, inexpensive electricity to our customers.
- Japan imports 92% of its resources. Especially in Hokkaido in particular is highly dependent on fossil fuels.

- Nuclear power and renewable energy can make a significant contribution to reducing O2 emissions and achieving a recycling-oriented social environment.
- Renewable energy is relatively expensive and nuclear power has a price advantage.
- Renewable energy is affected by nature and weather, making stable supply difficult.

Table of Contents

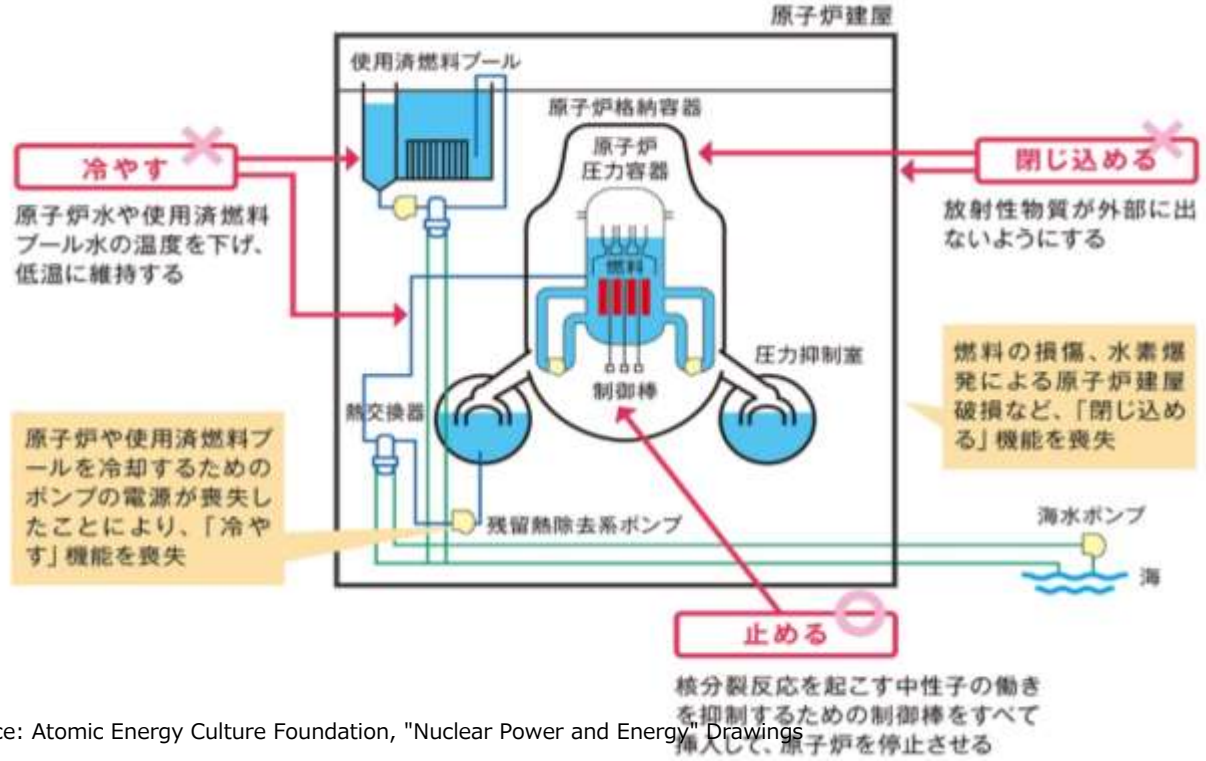
Tomari Power Station Overview

Type of reactor: Pressurized Water Reactor (PWR)
Fuel type: Low-enriched uranium
Electricity output: Unit 1: 579,000 kW (started operation in 1989)
Unit 2: 579,000 kW (started operation in 1991)
Unit 3: 912,000 kW (started operation in 2009)

写真：北海道電力泊発電所

Overview of the Accident at Fukushima Daiichi Nuclear Power Station

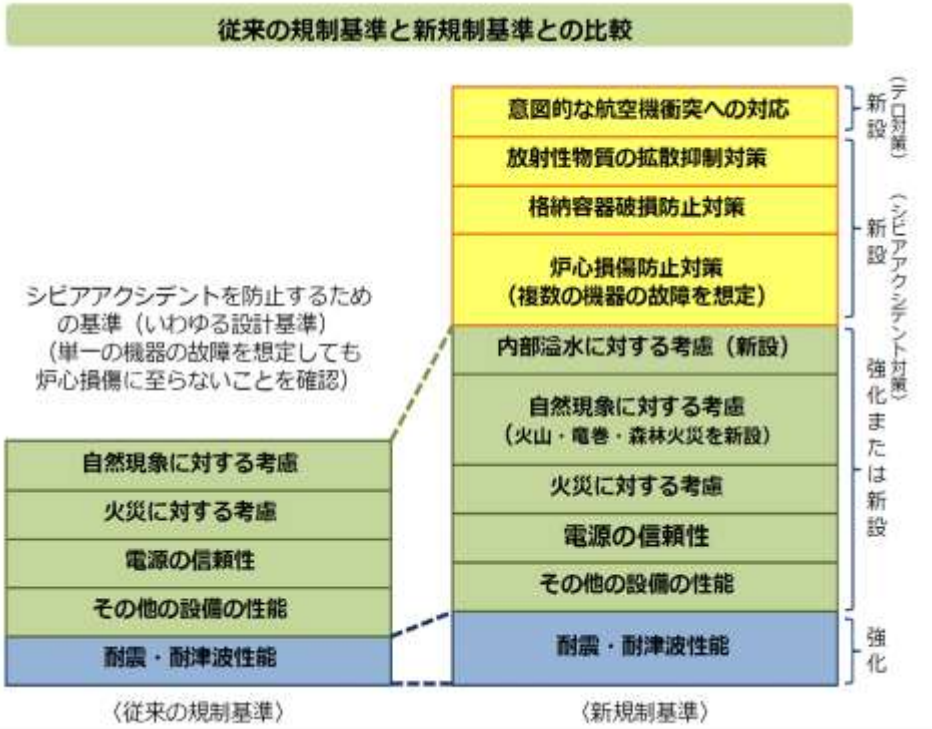
- Earthquake tremors are detected and the reactor automatically shuts down.
- External power supply was lost, but the emergency diesel generator on site automatically started up.
- Fuel was cooled, but tsunami hit about 50 minutes after the quake.
- The tsunami made it impossible to supply power from the emergency diesel generator. The power supply from the emergency diesel generator became unavailable due to the tsunami.
- The pumps to cool the fuel lost power and the fuel melted. Hydrogen is generated and explodes in the upper part of the reactor building. Hydrogen was generated and exploded in the upper part of the reactor building. Radioactive materials were released into the environment.

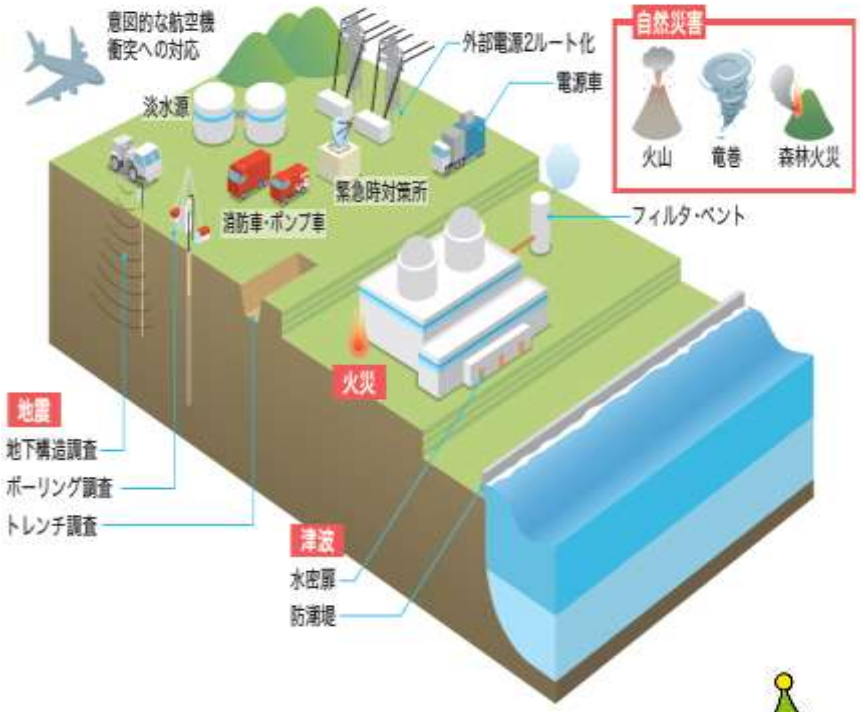


Source: Atomic Energy Culture Foundation, "Nuclear Power and Energy" Drawings

Overview of New Regulatory Standards

- The new regulatory standards went into effect in July 2013, based on lessons learned from the accident at the Fukushima Daiichi Nuclear Power Plant and overseas findings.
- The new regulatory standards significantly strengthen or newly establish existing regulatory standards, as well as establish "measures against ~~In addition, the new standards aim to further improve safety by~~ establishing "measures against severe accidents" and "measures against terrorism".





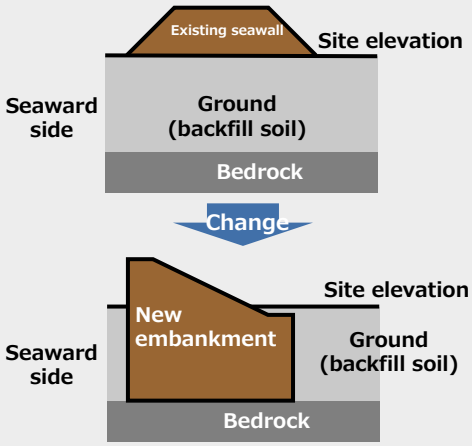
Source: Nuclear Regulation Authority of Japan, etc.

Safety measures at Tomari Power Station (seawall, watertight door)

- New seawalls are placed on solid bedrock as tsunami protection measures.
- Watertight doors were installed at the building entrances and at the entrances to critical equipment areas to prevent tsunami intrusion.

Layout of new seawall

Design of new seawall



To further enhance safety, a new seawall 19 meters above sea level is placed on solid bedrock

Watertight door (Building entrance)

Watertight door (Entrance to area with critical equipment)

Safety measures for Tomari Power Station (seismic reinforcement)

- To ensure safety against earthquakes, we properly evaluate the shaking caused by the largest possible earthquake and implement seismic reinforcement work based on this evaluation.

Seismic reinforcement of administrative offices

Seismic reinforcement of piping

Safety measures for Tomari Power Station (securing power supply)

- To prevent a serious accident such as core damage, it is necessary to keep the fuel cool.
- It is important to secure water to cool the fuel, pumps to inject the water, and power sources to operate the pumps.
- Further measures are being taken to ensure that the power supply needed to cool the fuel is not interrupted.

External power source
(received from power lines)

Emergency diesel generators (Two each in Units 1, 2, and 3 since construction)

Compliance with new regulatory standards

Multiplexed external power supply for Unit 3

6 units of alternative emergency power supply (permanently installed)

Deployment of 8 portable alternative power supply vehicles

Safety measures for Tomari Power Station (securing cooling water)

- To prevent serious accidents such as core damage, it is necessary to keep the fuel cool
- In addition to the power supply, it is important to secure "pumps" and "water sources" to supply water continuously to cool the fuel.
- To prevent the loss of the fuel cooling function, multiple and diversified pumps and water sources are being secured.

Alternative containment Spray pumps

Deployment of 14 portable water pump vehicles

Deployment of two portable large-capacity seawater water pump vehicles

Tomari Power Station Safety Measures (Education and Training)

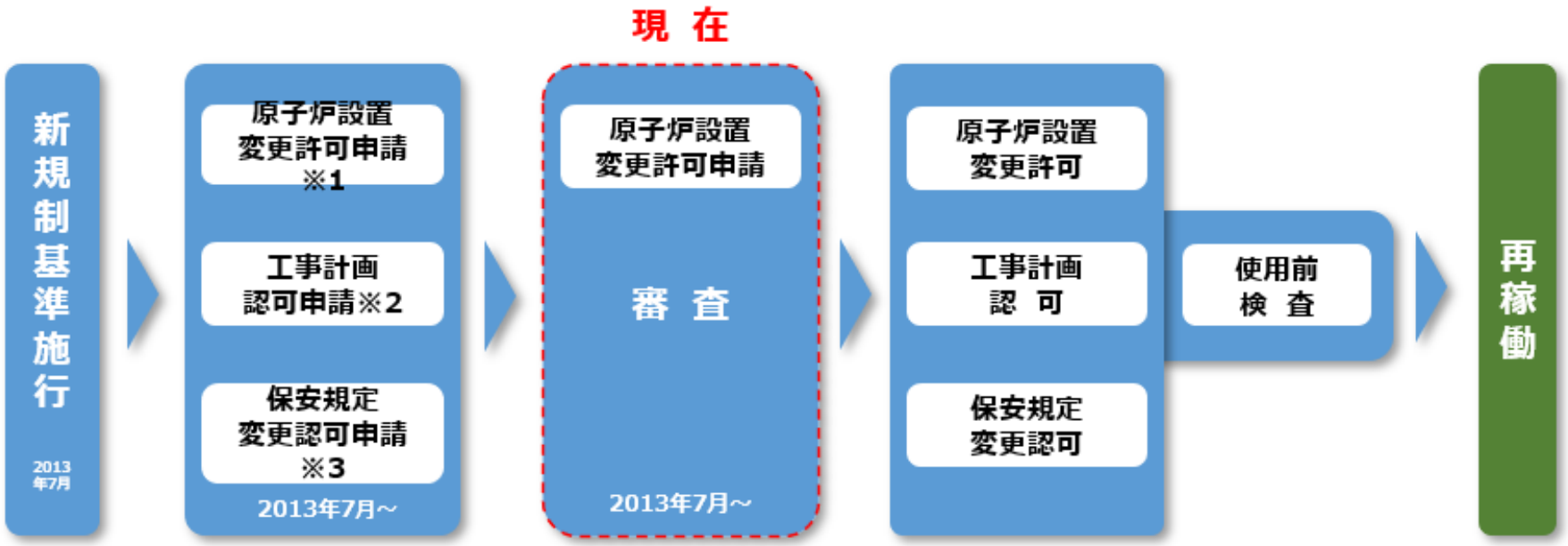
- We provide education and training for maintenance staff and operators, mainly in the form of practical skills, in an effort to develop human resources that will contribute to maintaining and improving the safe and stable operation of power plants.

Training of maintenance personnel

Operator Training

Flow of Conformity Assessment of New Regulation Standards

- Currently, priority is given to Unit 3, which is under review by the Nuclear Regulatory Commission, mainly for an "application for a license to modify the establishment of the reactor.



※1 Basic design policy for countermeasures against major accidents and evaluation of effectiveness of the countermeasures

※2 Detailed design details of facilities and equipment required for countermeasures against severe accidents, etc., based on the license for modification of the reactor installation.
(e.g., pump specifications and number of pumps)

※3 System for countermeasures against major accidents, etc., and procedures for operation and management of facilities, etc.

Status of Conformity Assessment of New Regulatory Standards

- The main items of examination are natural hazard assessment, such as earthquakes and tsunamis, and plant facility assessment.
- For the plant facilities, we will evaluate their impact based on the reference earthquake motion and the reference tsunami to be developed in the future.
- These explanations are to be implemented by April 2024.

	審査項目	主な説明事項
地震・津波等	地震	基準地震動の策定　概ね説明済み※1
	津波	基準津波の策定
	火山	火山活動の可能性評価 降下火砕物（火山灰）の層厚の評価
プラント施設	耐震設計方針 耐津波設計方針	防潮堤の設計方針、燃料等輸送船の漂流防止対策、 津波により防波堤が損傷した場合の影響評価　等
	設計基準対象施設 重大事故等対処施設	地震・津波の影響確認、 最新の審査知見の反映　等

※1「概ね説明済み」・・・原子力規制委員会から「概ね妥当な検討がなされている」との評価をいただいている

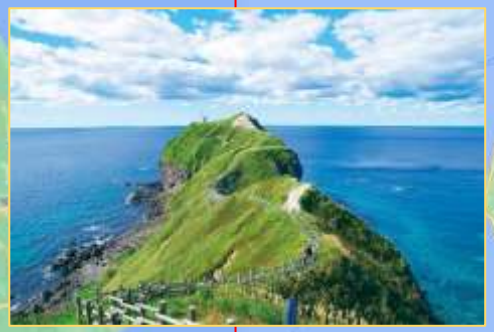
※2 降下火砕物（火山灰）層厚の影響を含む

Table of Contents

Nuclear power plants don't seem to have anything interesting to do in the countryside…

→<u>There's something unique about the countryside ！ ！</u>

Tomari Power Station Geography



Otaru

Yoichi

Tomari Power Plant

Sapporo

Kutchan/Niseko

Highway extension under construction

Sapporo is within an hour!

Play with nature!

Skiing/Snowboarding　Fishing Golf
Climbing Camping Hot Springs Sushi/
seafood ・・・・

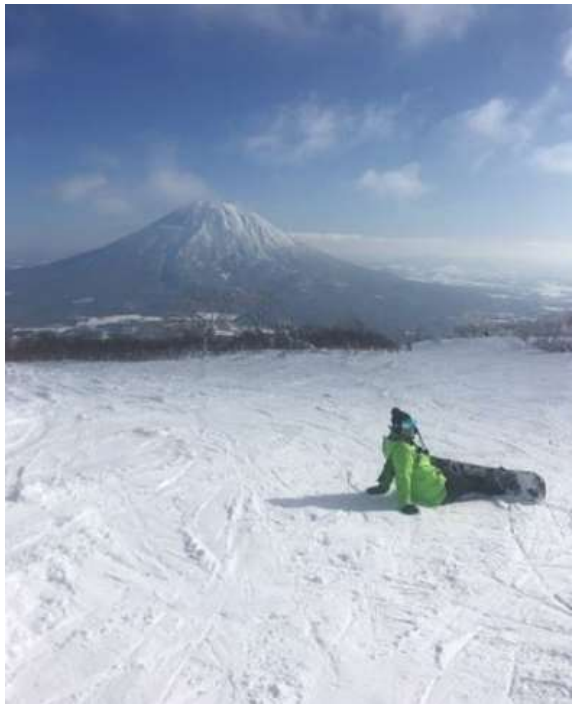


Table of Contents

To all of you (I'm afraid this is a personal thought...)

- **I am glad I chose a company in Hokkaido.**

  Good food, low cost of living, close to nature, cheap land (housing costs), cheap golf course nearby, cool summer, easy commute (close, no traffic), few typhoons, no rainy season
  Land (housing costs) is inexpensive, golf courses are nearby and inexpensive, I was able to buy a house close to my parents' house, it is cool in summer, commuting is easy (close, not crowded), there are few typhoons, and there is no rainy season.

In an even more pleasant miscalculation

✓ Internet penetration has eliminated information delays
✓ The "local handicap" of long ago, when you could get anything on Amazon Prime with free shipping, is disappearing.

- **I am glad I chose Hokkaido Electric Power Co.**
  - ✓ Meet people with whom you want to stay connected even after retirement
  - ✓ A job that makes me feel "for Hokkaido
  - ✓ I was able to experience both study abroad and secondment

- **On entering the workforce**

  - ◆ <u>One day at a time</u>
    Before you know it, you will be 50 years old in the blink of an eye.
    Working life is much longer than student life. Academic background is not meaningless, but the efforts you make after entering the workforce are far more important.
    You can still grow a lot!

  - ◆ <u>Valuing Human Relationships</u>
    No matter how good you are, if you can't communicate, you won't get the job done.
    Interaction with people outside the company is a good opportunity to check whether your common sense is the same as the world's common sense.

Thank you for your attention.