

Japan's Energy Efficiency Policies Toward Decarbonization

Ministry of Economy, Trade and Industry (METI), Japan

Agenda

- 1. Domestic and international trends in energy demand-side policies**
- 2. On energy conservation and decarbonization**
- 3. Initiatives for dissemination and promotion**

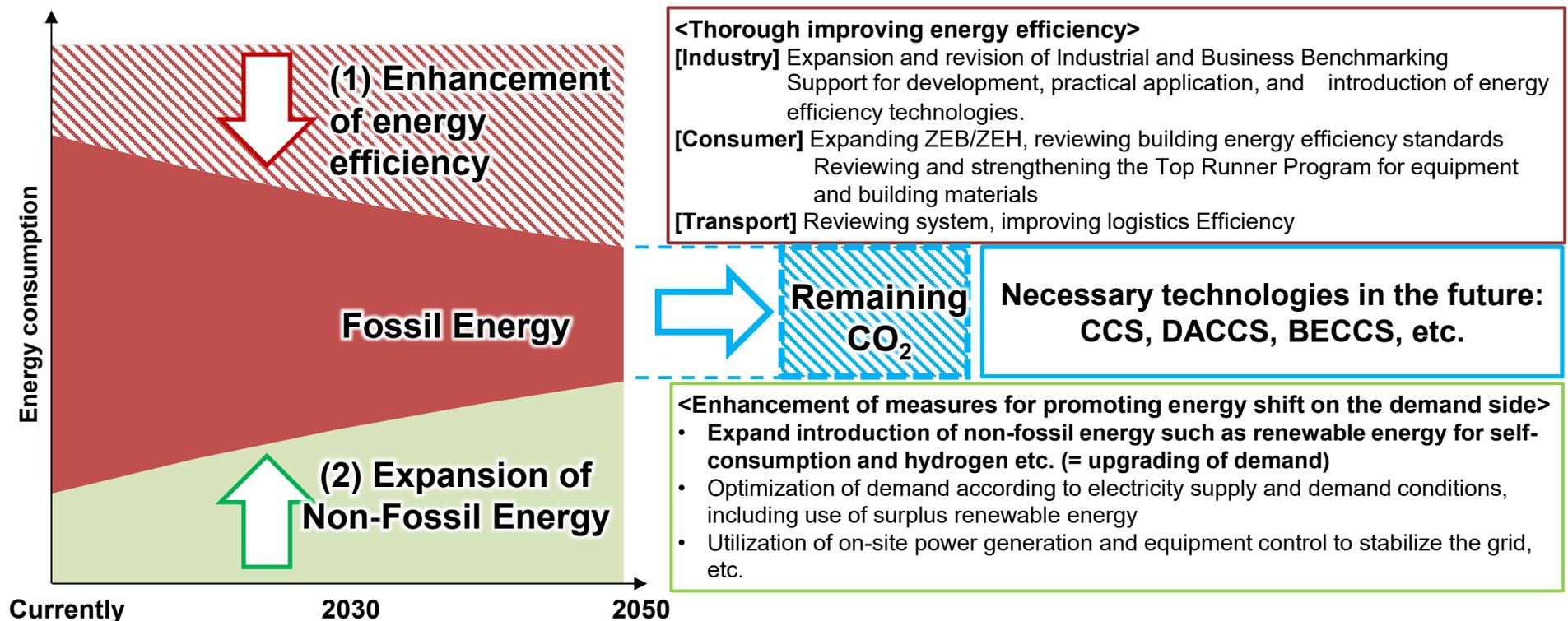
Agenda

- 1. Domestic and international trends in energy demand-side policies**
2. On energy conservation and decarbonization of buildings
3. Initiatives for dissemination and promotion

Approach direction toward carbon neutrality on demand side

- Based on the 2050 carbon neutrality target, it is also necessary to not only **thoroughly improve energy efficiency (1)**, but also **enhance measures for expanded introduction of non-fossil energy (2)** such as non-fossil electricity and hydrogen toward 2030 on the way.

Picture of and approach direction toward carbon neutrality on demand side



Overall perspectives of energy demand-side policies

(7th Strategic Energy Plan)

Targets

- Looking ahead to FY2040, first the specific policies shown in the FY2030 energy supply-demand outlook, etc. should be steadily implemented.
- Additionally, while confirming the policy progress conditions, etc., measures should be implemented to further specify and review the required policies based on a comprehensive review of technical innovation standards, the international situation and the progress of digital transformation (DX) and green transformation (GX).

Course of actions

- The importance of thorough energy conservation is unchanging. Going forward, in addition to improving thoroughly energy efficiency, the percentage taken up by electrification and the conversion to non-fossil fuels will also become even larger as demand side measures to be implemented to realize the emission reduction measures by 2050.
- The rise in costs following decarbonization, etc. should be limited as far as possible, and the economically reasonable measures should be prioritized.

Thorough implementation of energy conservation

- Proceed to make improvements in energy efficiency without reducing economic activities.
- Respond to the increase in electricity demand due to the development of DX and GX. (Data centers, etc.)
- Enhance discontinuous technical development and measure implementation to improve further energy efficiency.
- The “first step” for taking decarbonization measures is energy conservation for many small and medium-sized enterprises and households. Promote decarbonization as an opportunity for energy conservation.

Electrification and conversion to non-fossil fuels

- While proceeding to implement electrification, proceed with the conversion of fuels to natural gas, etc. and the utilization of hydrogen, CCUS, etc. in fields that electrification is difficult.
- In order to realize a drastic manufacturing process conversion focused on high energy-consuming industries, proceed with the equipment investments, supply chain building, etc. systematically.
- Promote demand response (DR) and proceed seamlessly.

Support

Equipment renewal support, energy diagnoses, technical development support, human resource development, support system building, etc.



Implementation of activities which unify regulations and support

Regulations

Top Runner Program, target setting, periodical reporting, information disclosure, compliance obligations, etc.

Policies in the Industry sectors (7th Strategic Energy Plan)

- To promote investment in facility renewal, we **will provide seamless support for multi-year investment plans**. In particular, we **will encourage the introduction of high-efficiency equipment, significant energy savings across factories and business sites, electrification and shift to nonfossil energy, and optimization of operations using digital technology**.
- Regarding SMEs, in order to uncover potential needs for decarbonization, **energy audits will be strengthened**, and a system **will be established to support their efforts to improve energy efficiency in the region in cooperation** with financial institutions and energy efficiency support organizations.
- In order to enhance the support system, we **will also work to secure human resources who can provide advice on energy efficiency**.
- We **will consider institutional measures to encourage the use of digital technology, taking into account the progress of DX, including AI** to promote further energy efficiency by using digital technology to visualize energy consumption.
- With regard to periodic reporting under the Energy Efficiency Act, **efforts will be made to expand the number of businesses that actively disclose information**. In addition, from the perspective of expanding energy efficiency efforts, **the regulatory targets of the Energy Efficiency Act will be appropriately reviewed**. Furthermore, in order to strongly promote shift to non-fossil energy and DR, we **will advance studies, including institutional measures, while paying attention to the potential for adopting non-fossil energy in factories and other sites**.

Policies in the Transport sectors (7th Strategic Energy Plan)

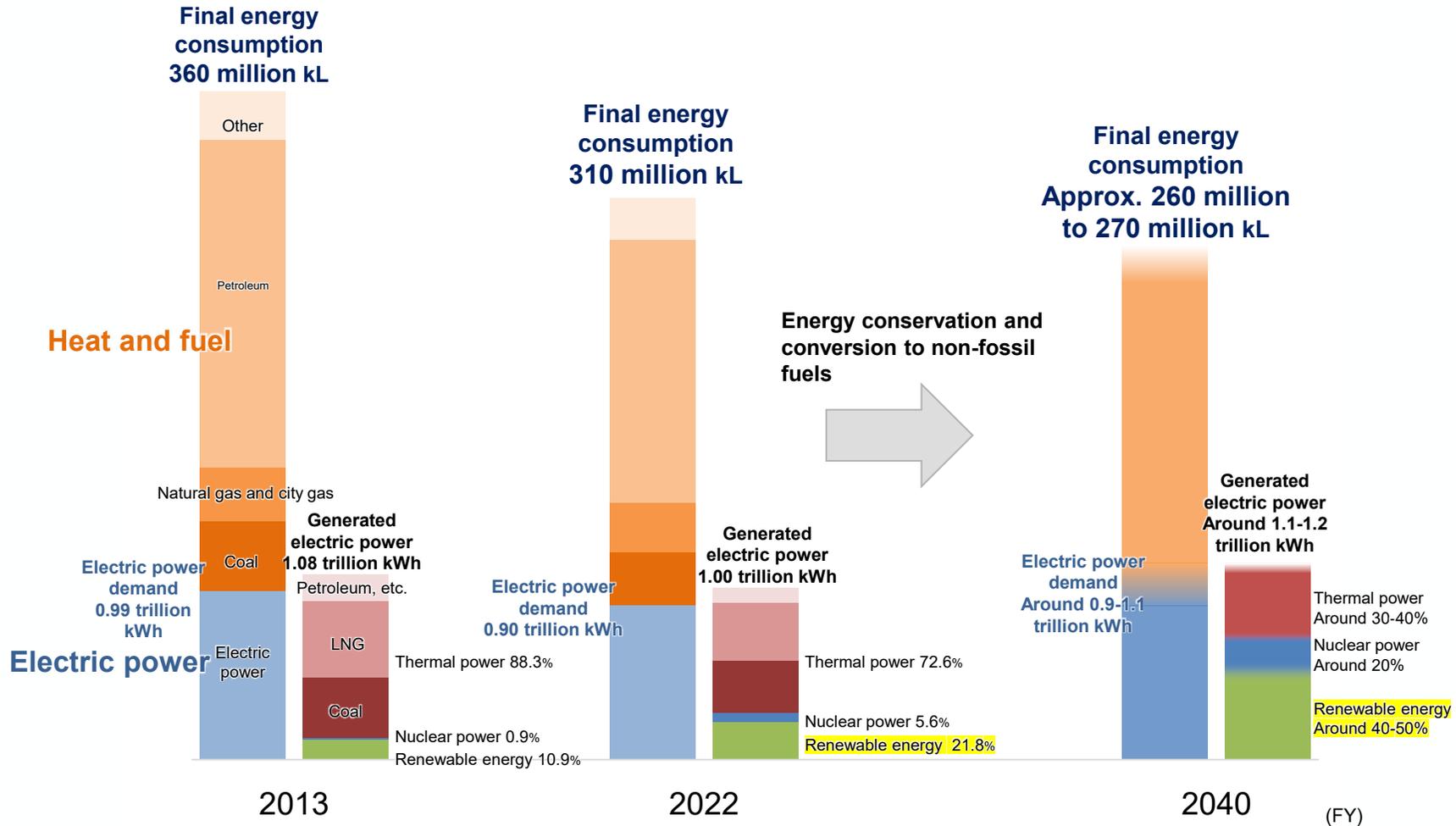
- We are pursuing a variety of options toward carbon neutrality, aiming to achieve zero CO2 emissions throughout the life cycle of automobiles by 2050.
- For passenger cars, the goal is to achieve 100% of electrified vehicle sales (electric vehicles, fuel cell vehicles, plug-in hybrid vehicles, and hybrid vehicles) by 2035. As for small commercial vehicles of 8 tons or less, we aim to achieve 20–30% of electrified vehicle sales by 2030 and 100% electrified and decarbonized fuel vehicles such as those using e-fuels by 2040. For large commercial vehicles over 8 tons, aiming to introduce 5,000 vehicles in the 2020s as a first step, and set the 2040 electrification target by 2030, taking into account the progress in technology development and cost reductions for hydrogen, e-fuels and other alternatives.
- To this end, comprehensive measures will be taken, including promoting the introduction of electrified vehicles and the development of charging infrastructure with a target of 300,000 plugs by 2030. Regarding fuel efficiency regulations for passenger cars, a system will be introduced to evaluate off-cycle technologies that are not reflected in WLTP tests, while further improving energy efficiency under fuel efficiency standards with a target for FY2030.
- With regard to storage batteries, which are essential for electrification, the Government will provide support for the domestic localization and technological development of manufacturing infrastructure for storage batteries, components/materials and manufacturing equipment, aiming to establish a domestic production base of 150 GWh/year by 2030 at the latest. In addition, the reuse of vehicle-mounted storage batteries and the development of facilities for supplying electricity from vehicles will be promoted to contribute to the effective use of renewable energy.
- For commercial vehicles, support will be provided for the introduction of vehicles to transport businesses and consignors that have established plans in conformity with the targets set by the Government for the ownership and use of non-fossil energy vehicles. Moreover, consideration will be given to expanding the targets set by the Government.

Policies in the Transport sectors (7th Strategic Energy Plan)

- **To promote the low carbonization and decarbonization of gasoline** used in internal combustion engines toward achieving carbon neutrality by 2050, **we aim to begin supplying low-carbon gasoline with a maximum bioethanol concentration of 10% by FY2030 and strive to begin supplying low-carbon gasoline with a maximum bioethanol concentration of 20% from FY2040.** In addition, development and expansion of compatible vehicles will be undertaken. **The introduction of biodiesel will be promoted.** Furthermore, **e-fuels will be utilized with the aim of achieving commercialization within the first half of 2030s.**
- **In the logistics sector, we will promote a new modal shift utilizing various modes of transportation** such as rail, ship, aviation, and double articulated trucks, as well as the decarbonization of logistics facilities.
- **In the shipping sector, the Government will work to support the development of domestic production systems for zero-emission ships and related vessels,** and promote their deployment, taking into account international trends, including those led by the International Maritime Organization (IMO), as well as technological developments.
- **In the aviation sector,** public-private partnerships **will be advanced for the introduction of sustainable aviation fuel (SAF), improving flight operations** through further sophisticated air traffic control, introduction of new technologies into aircraft and equipment, energy efficiency improvements in airport facilities and vehicles, and development of airports as renewable energy hubs.
- **In the railway sector, efforts will be made toward social implementation of fuel cell railcars and the introduction of biodiesel fuel.**
- **In the port sector,** decarbonization **will be advanced by introducing hydrogen-fueled cargo handling equipment and by using certification system** to objectively assess decarbonization progress.

Reference: Outlook for energy supply-demand in FY2040 (Related materials)

Outlook for energy supply-demand (Image)



Note: The left graphs show the final energy consumption, while the right graphs show the generated electric power amounts. The electric power demand is this value minus the transmission and distribution losses and the on-site electric power amounts.

Reference: Discussions relating to energy efficiency and conservation at international meetings

- At COP28, it was agreed to “double the global average annual rate of energy efficiency improvements”.
- In the G7 Leaders’ Statement in June (2024), energy efficiency was recognized as the “first fuel” in the clean energy transition.

G7 Leaders’ Statement (Puglia Summit in Italy, June 2024)

We welcome the commitments, as set forth in COP28, to triple global renewable capacity and double the global average annual rate of energy efficiency improvements by 2030. Energy efficiency and conservation is the “first fuel”, and the conversion to clean energy is an indispensable element.

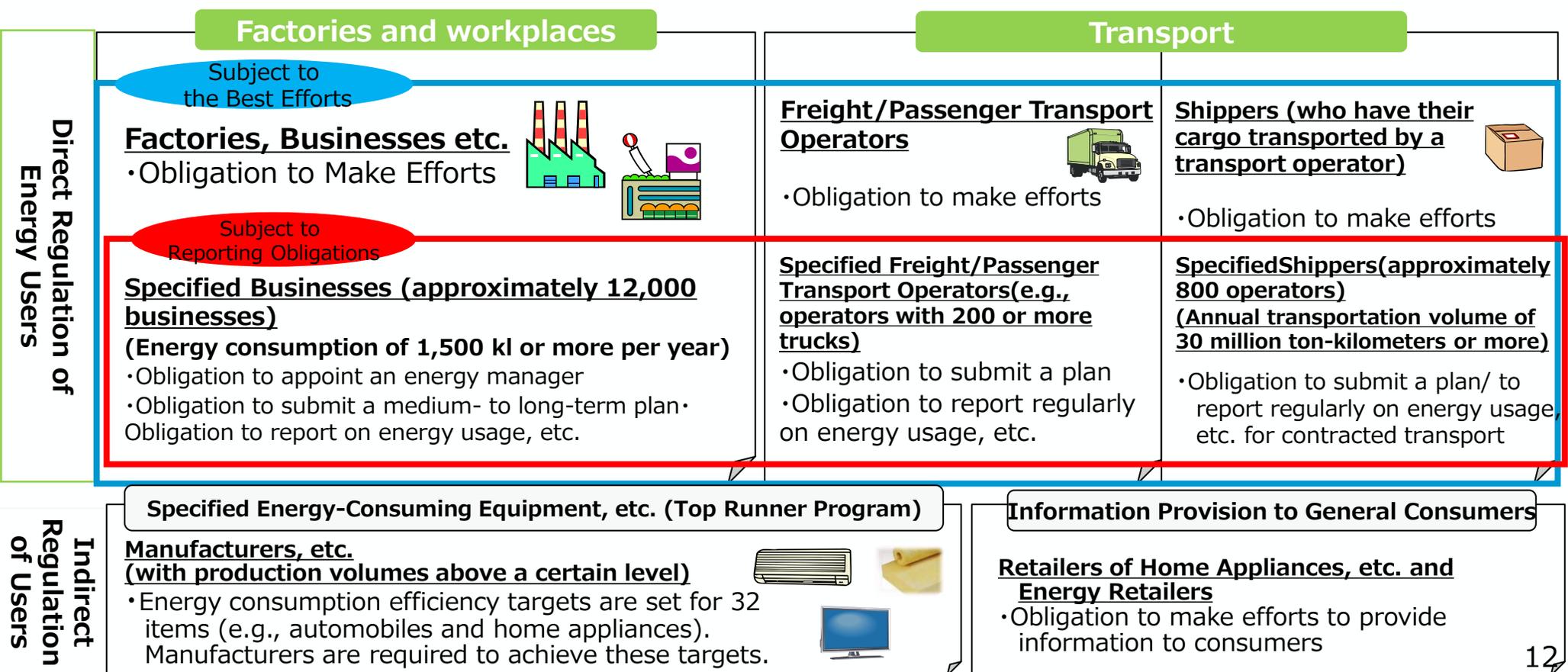


Agenda

1. Domestic and international trends in energy demand-side policies
- 2. On energy conservation and decarbonization**
3. Initiatives for dissemination and promotion

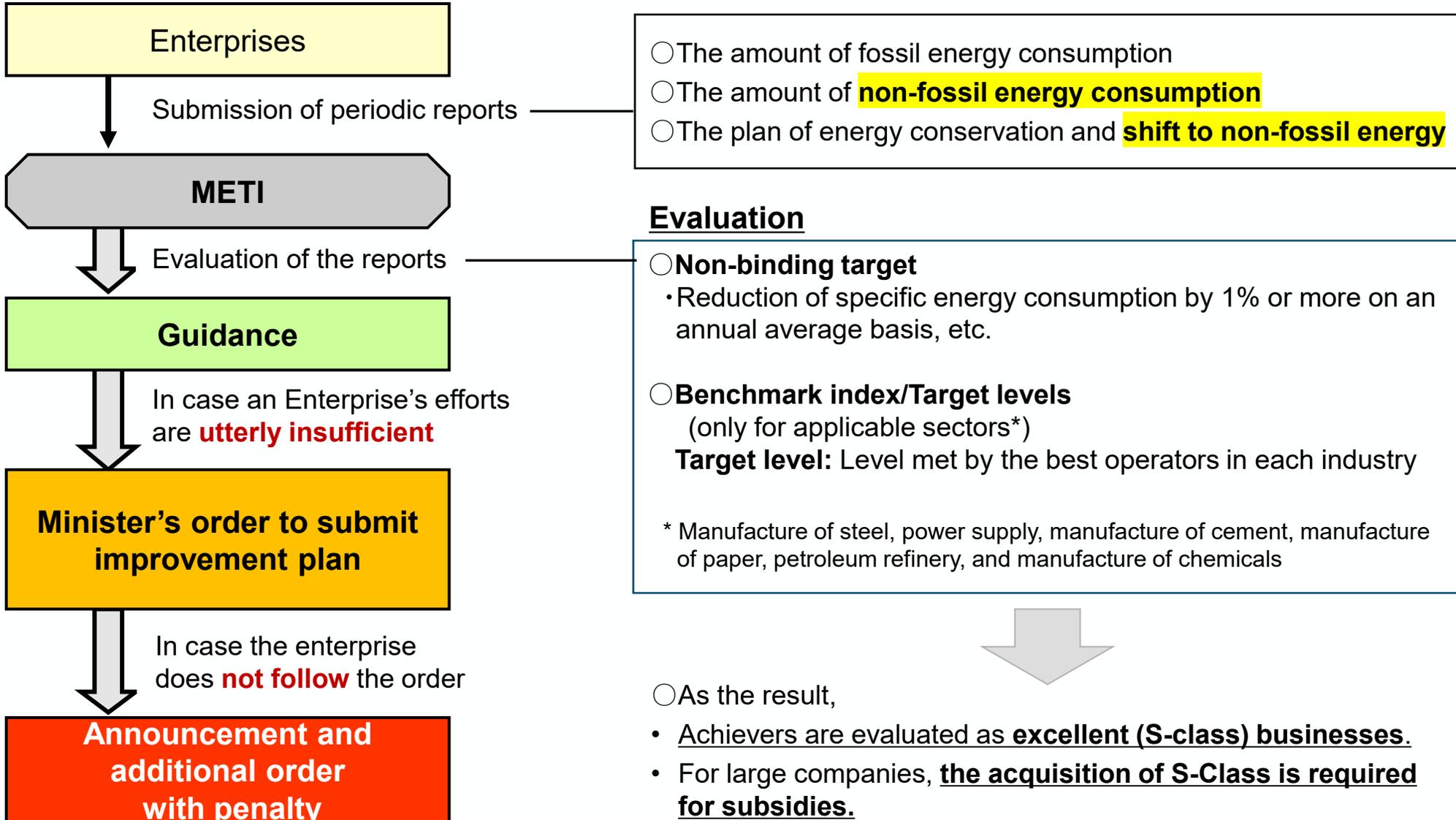
Overview of the Energy Conservation and Non-Fossil Energy Conversion Act (Energy Efficiency and Non-Fossil Energy Conversion Act)

- In "Act on Rationalizing Energy Use" & "Act on the Promotion of Development and Introduction of Alternative Energy", **To provide plant owners, transportation companies, and shippers with judgment criteria that should serve as a guideline when implementing initiatives related to energy conservation and non-fossil conversion** (e.g., energy consumption efficiency improvement target (1% per year) and non-fossil conversion targets for each industry) and guidelines for optimizing electricity demand. In addition, **businesses larger than a certain size will be required to report their energy usage status, and if their energy conservation efforts are insufficient, they will be given guidance and advice and instructions to create a rationalization plan. Provide guidance, advice, and recommendations will be made if non-fossil conversion efforts are insufficient.**
- Manufacturers of specified energy consuming equipment, etc. (automobiles, home appliances, etc.) are required **to set targets for the energy consumption efficiency of their equipment and to achieve them. In addition, The recommendations will be made if efficiency improvements are insufficient.**



*Provisions related to buildings will be transferred to the Building Energy Efficiency Act from fiscal year 2017.

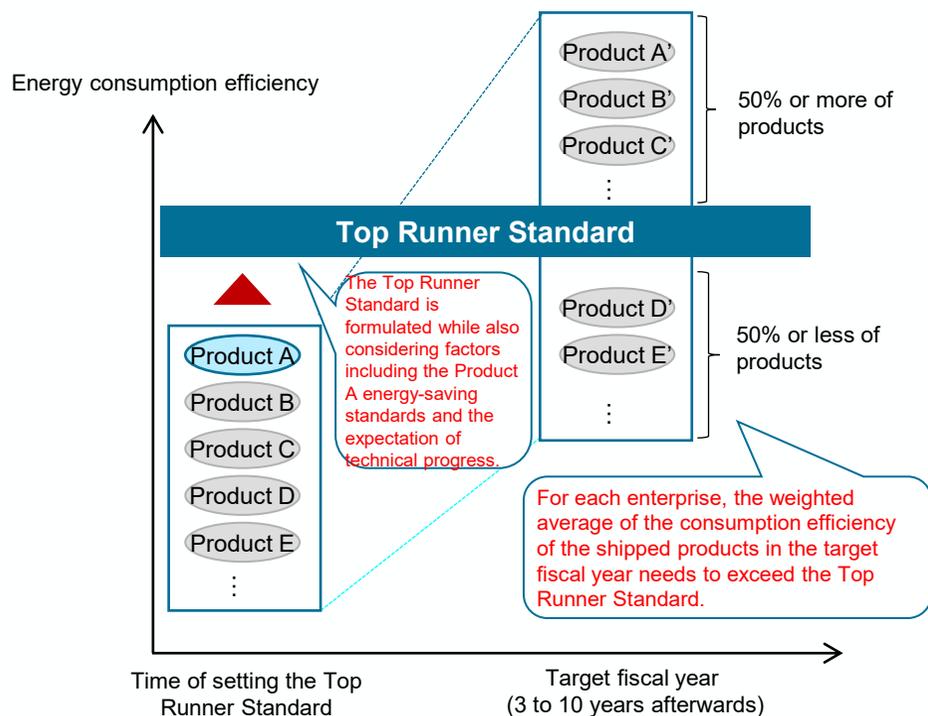
Energy Conservation Act: (1) Reporting obligation for large-scale enterprises



Regulations: Regulations for manufacturers of energy-saving equipment (Top Runner Program)

- The Energy Efficiency and Conservation Act **gives the target energy consumption efficiency of the equipment, etc. to manufacturers, etc.** of equipment and construction materials, and **encourages them to achieve the target.** Additionally, **they have to show the energy consumption efficiency, etc.** The target equipment, etc. has been expanded to include 32 items, which cover 70% of household energy consumption.
- In addition, targeting the **retail business operators, etc.** which sell the equipment, etc., there is a **requirement to provide the energy-saving information** of the equipment. (Best effort obligation stipulation)

Top Runner Program system



Example of labeling obligations for manufacturing and importing business operators

Model name (Ordered model name)	Light source color	Globe type (Color)	Rated input voltage [V]	Rated consumption power [W]*	Rated input current [A]	Total luminous flux [lm]	Energy consumption efficiency (lm/W)	Rated lifetime (h)	Category name
	Warm white	Resin milky white	100	4.9	0.064	485			
	Natural white	Resin milky white	100	4.4	0.075	485			

The model name, category name, consumed electric power, etc. are shown in catalogs, etc.

Example of labeling system for retail business operators

Standardized energy-saving label (Electric refrigerator)

The label features 'Energy-saving Performance' with 2.7 stars. It includes the '省エネ基準達成率' (Energy-saving rate) of 84% and '年間消費電力量' (Annual electricity consumption) of 330 kWh/year. The 'Annual estimated electricity cost' is shown as 8,910 yen. The label also includes the manufacturer's name and the model name.

Multi-tiered evaluation points

The points are shown in 41 tiers from 5.0 to 1.0 in order from the highest energy-saving performances of the product in the market. The stars ★ are shown corresponding to the multi-tiered evaluation points.

Energy-saving label (Energy-saving labeling system)

Annual estimated electricity cost, etc.

In order to show the energy consumption effect in an easily understood way, the annual estimated electricity cost, etc. is displayed.

* The electricity cost estimation units are calculated using ¥27 (including tax) for each 1 kWh.

Energy efficiency budget projects for the transportation sector

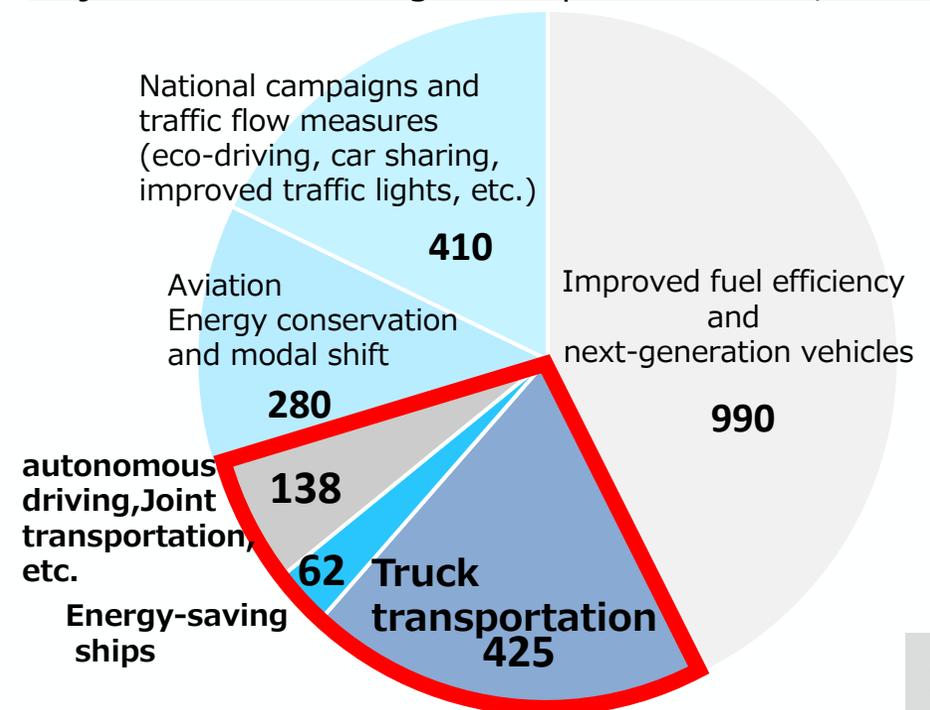
- The Sixth Strategic Energy Plan projects **the reduction of approximately 62 million kL of final energy demand in fiscal 2030**, based on assumptions such as 1.4% economic growth, through the implementation of thorough energy-efficiency measures.
- **Subsidies to the transportation sector including ships and automobiles**, will promote improvements in energy consumption efficiency in the transportation sector through measures such as improving transport efficiency in the supply chain and truck transport, and promoting the spread of energy-efficient ships.
- **Thereby contributing to the achievement of 6.252 million kL of the transportation sector's 2030 energy-saving target of approximately 23 million kL.**

運輸部門におけるエネルギー使用合理化・非化石エネルギー転換推進事業費補助金 令和8年度概算要求額 62億円 (62億円)

資源エネルギー庁
省エネルギー・新エネルギー部
省エネルギー課

事業目的・概要	
<p>事業目的</p> <p>最終エネルギー消費量の約2割を占める運輸部門において、2030年省エネ目標や2050年CNを実現するためには、省エネの更なる深堀に加えて非化石エネルギーへの転換を図ることが重要。このため、サプライチェーン全体の輸送効率化や、トラック輸送や内航海運を対象に更なる省エネや非化石転換に向けた実証を行い、その成果を展開することで、効果的な取組みを普及させることを目的とする。</p> <p>事業概要</p> <p>(1) トラック輸送における更なる省エネルギー化推進事業 トラック事業者と荷主間における配車計画・予約受付と連携した高度な車両管理システムや、高輸送効率車両の活用等を通じた輸送効率化による省エネ効果の実証を支援。</p> <p>(2) 新技術活用によるサプライチェーン全体輸送効率化・非化石エネルギー転換推進事業 複数の事業者が連携して取り組む高度なデジタル技術を活用したサプライチェーン全体の効率化や、輸送計画と連携したEVトラックへの充電タイミング等の最適化による省エネ効果の実証を支援。</p> <p>(3) 内航海運革新的輸送効率化・非化石エネルギー転換推進事業 革新的省エネルギー技術等の導入による省エネ効果の実証に加え、非化石エネルギーを使用する船舶の導入に向けた実証を支援。</p>	<p>事業スキーム (対象者、対象行為、補助率等)</p> <p>(1) トラック輸送における更なる省エネルギー化推進事業</p> <p>国 (補助(定額)) → 民間企業等 (補助(定額, 1/2)) → 民間企業等</p> <p>(2) 新技術活用によるサプライチェーン全体輸送効率化・非化石エネルギー転換推進事業</p> <p>国 (補助(定額)) → 民間企業等 (補助(1/2)) → 民間企業等</p> <p>(3) 内航海運革新的輸送効率化・非化石エネルギー転換推進事業</p> <p>国 (補助(1/2)) → 民間企業等</p> <p>成果目標・事業期間</p> <p>令和6年度から令和8年度までの3年間の事業であり、令和12年度(2030年度)までに、本事業及びその波及効果によって運輸部門におけるエネルギー消費量を原油換算で年間約625.2万kL削減することを目指す。</p>

Major measures being developed [Unit: 10,000 kL]



Agenda

1. Domestic and international trends in energy demand-side policies
2. On energy conservation and decarbonization
- 3. Initiatives for dissemination and promotion**

Subsidies for energy conservation and converting to non-fossil energy

[The total amount including national treasury liabilities: ¥237.5 billion]
 * FY2024 supplementary budget amount: ¥60 billion

- In order to proceed to respond simultaneously to high energy costs and carbon neutrality, investments by enterprises are supported through four subsidy types comprising **(I) Energy conservation for entire factory**, **(II) Electrification and fuel switching of manufacturing processes**, **(III) Renewal with equipment selected from a list** and **(IV) Introduction of energy management systems**.
- This promotes the enhancement of energy conservation as the first step in the measures to implement GX, such as by **creating a small and medium sized enterprise investment promotion framework in type (I) subsidies**.

<p>(I) Factory and workplace type</p> <p>* Former A and B types</p>	<ul style="list-style-type: none"> ● Subsidy for measures to realize major energy conservation in an entire factory or workplace ● Subsidy rate: 1/2 (small and medium), 1/3 (large), etc. ● Maximum subsidy amount: ¥1.5 billion, etc. * Added a small and medium sized enterprise investment framework, etc. 	<p>[Flat pans] [Standing kilns] * Linking of several kilns to allow waste heat reuse.</p>  <ul style="list-style-type: none"> ● Previously, flat pans were individually heated to produce salt, but they were renewed with linked standing kilns. ● In order that the waste heat from the kilns could be reused as the heat source for the other kilns, the entire workplace equipment and design was reviewed. Energy conservation of 37.1% in three years is intended to be realized.
<p>(II) Electrification and decarbonization fuel conversion type</p>	<ul style="list-style-type: none"> ● Subsidy for renewal with equipment following electrification or conversion to a lower carbon fuel ● Subsidy rate: 1/2 ● Maximum subsidy amount: ¥300 million, etc. * Added a subsidy target for construction costs only for small and medium sized enterprises. 	<p>[Cupola type] * Using coke [Induction heating type] * Using electricity</p> 
<p>(III) Equipment unit type</p> <p>* Former C type</p>	<ul style="list-style-type: none"> ● Subsidy for renewal with equipment selected from a list ● Subsidy rate: 1/3 ● Subsidy maximum amount: ¥100 million * Energy-saving requirements were added. 	<p>[Commercial water heaters] [High efficiency air conditioning] [Industrial motors]</p> 
<p>(IV) EMS type</p>	<ul style="list-style-type: none"> ● Subsidy for introduction of an EMS ● Subsidy rate: 1/2 (small and medium), 1/3 (large) ● Maximum subsidy amount: ¥100 million * Energy-saving requirements were reviewed. 	<p>[Loss detection using visualization systems] [Optimum energy-saving operation using AI]</p> 

Support through energy efficiency subsidies

- For many small and medium-sized enterprises, the first step in GX initiatives is energy efficiency. We will promote drastic investment in GX, with energy efficiency leading to direct benefits such as reduced utility costs.
 - The energy efficiency subsidy (GX) provided support (69.2 billion yen) to 219 companies (150 small and medium-sized enterprises). We plan to promote energy-efficiency investments (*) totaling 164.6 billion yen and achieve total energy savings of 168,000 kl/year (utility cost reduction effect: 17.15 billion yen/year) in the supplementary budget for FY2020.
- *Approximately 200 billion yen including related investments other than energy- efficiency investments
- In addition to energy efficiency, there are cases where this led to the development of new products and improved productivity. It contributes to strengthening the competitiveness of companies.

Case study : Great energy savings of factory were achieved through waste heat recovery.

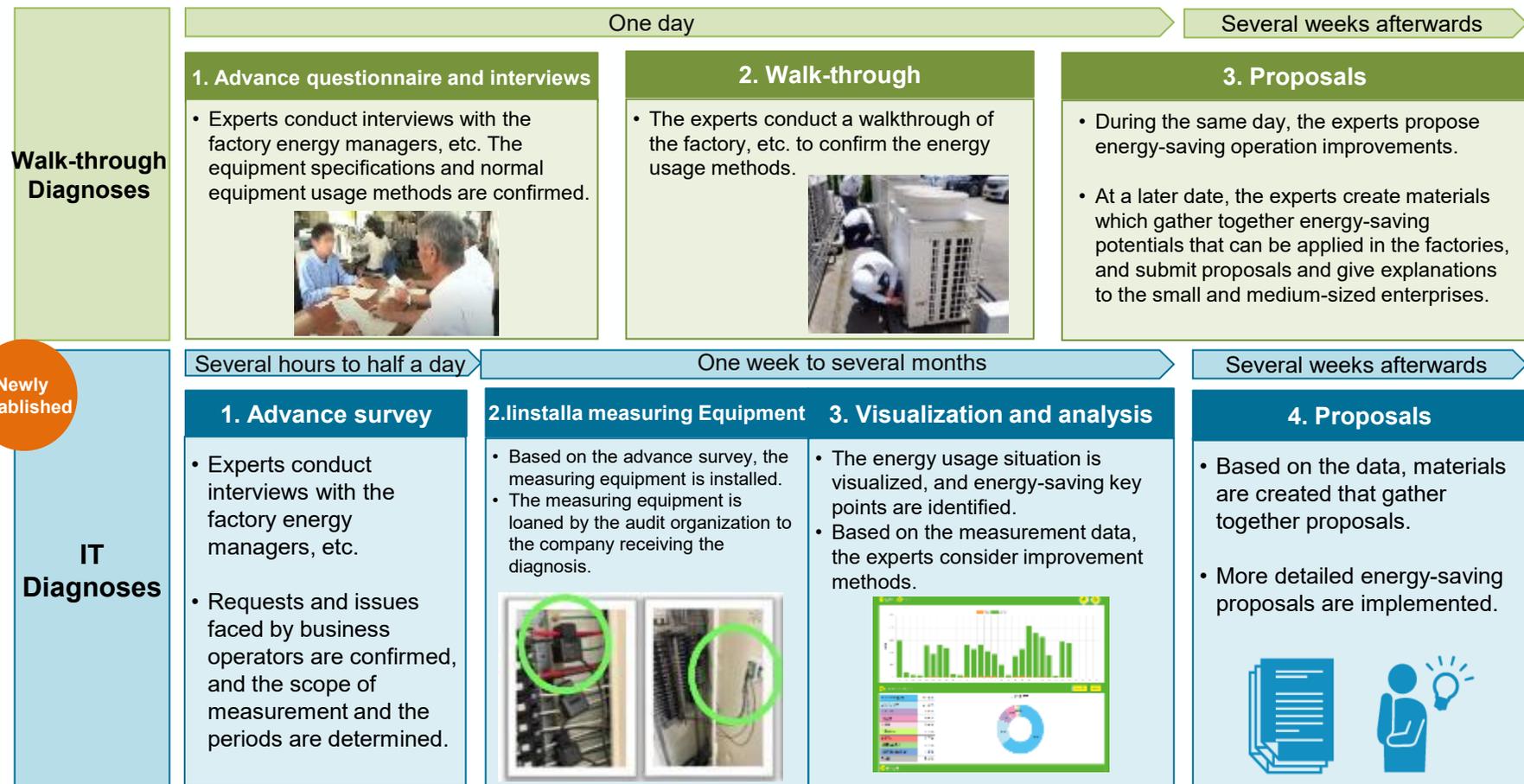
Achieve new product development and energy savings simultaneously by updating equipment



- ✓ In recent years, as demand for large tiles has expanded rapidly in the construction industry, large tiles made overseas have gained a cost advantage and there is a tendency to rely on imported products.
- ✓ Although they were not able to make the investment up until now, they used subsidies to install specialized equipment for large tiles (total investment of approximately 1.4 billion yen), and pursued designs and functions suitable for the domestic market.
- ✓ Finally, we optimized the manufacturing process (using waste heat from the firing kiln for the drying process, etc.) and achieved significant energy efficiency throughout the factory (cutting utility costs by approximately 18 million yen per year) and lead to stronger competitiveness.

Energy diagnoses

- **Support for conducting energy diagnoses by experts** is enhanced, because many opinions are expressed by small and medium-sized enterprises that “We don’t know how we should specifically conduct diagnoses”.
- In addition to the diagnoses that were conducted previously, which focused on walkthroughs, a **newly established menu (IT diagnoses)** has been added, which supports the visualization, analysis and offering of proposals for the energy usage situation in each facility and process using measuring equipment.



Newly established

The Effects of energy-efficiency diagnosis

- Energy Efficiency assessments were implemented from fiscal year 2019 to fiscal year 2023. When all recommendations were implemented, the average energy savings was 13%. (Based on ECCJ data)

Manufacturing-A



- Low-pressure operation of air compressors
- Pipe leak prevention
- Pulsed air blower (repeated on/off cycles to reduce air consumption)

Cost reduction of ¥2.38 million/year,
energy consumption reduced by 21.4%

*When all recommendations from the energy efficiency assessment are implemented

Wholesale/retail company B



- Cleaning air conditioning indoor unit filters
- Optimizing refrigeration equipment temperature settings
- Reducing maximum power consumption through demand monitoring
- Installing display case curtains

Cost reduction of ¥ 975 thousand /year,
energy consumption reduced by 38.5%

*When all recommendations from the energy efficiency assessment are implemented

Manufacturing-C



- Heat loss is reduced by insulating the piping.
- Air nozzles are smaller, reducing compressor power consumption.
- Production equipment operating time is reduced by shortening preheating time.

Cost reduction of ¥4,265 thousand / year,
energy consumption reduced by 26.8%

*When all recommendations from the energy efficiency assessment are implemented

Welfare facility Company D



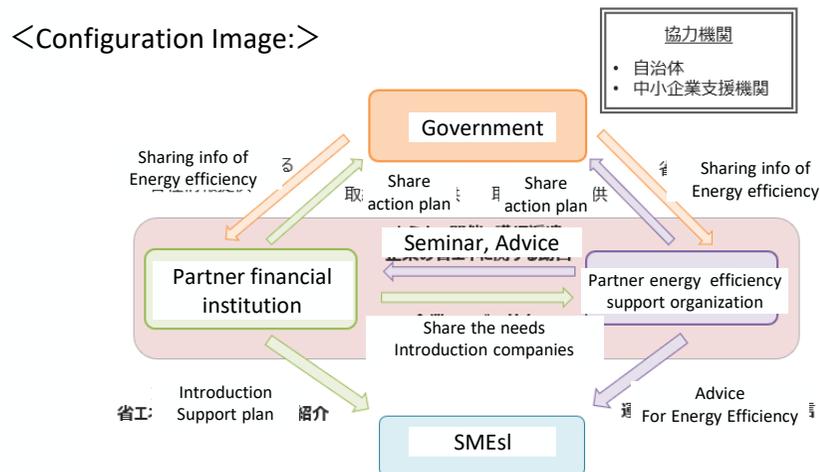
- Reduce air conditioning load by optimizing ventilation volume
- Update air conditioning equipment
- Reduce maximum power consumption by utilizing demand management devices

Cost reduction of ¥ 9,780 thousand /year,
energy consumption reduced by 37.2%

*When all recommendations from the energy efficiency assessment are implemented

Framework for regional cooperation to support energy efficiency in small and medium-sized enterprises

1. For small and medium-sized enterprises, the "first step" toward reducing energy costs and decarbonizing is energy efficiency.
2. As energy prices rise and decarbonization efforts in the supply chain accelerate, in July 2024, we launched the "Energy Efficiency Regional Partnership" as a framework for regional financial institutions, energy efficiency support organizations, etc. to collaborate in order to support the energy efficiency efforts of small and medium-sized enterprises etc. in the region. The aim is to build a support system in each region for energy efficiency diagnosis and utilization of energy efficiency subsidies.
3. The current number of partner institutions is 267. (207 financial institutions, 60 energy efficiency support organizations)* In participating, the partner financial institutions commit to appointing a responsible person at the executive level, actively promoting on their website, etc., and (2) the partner energy saving support organizations commit to collaborating with the partner financial institutions.



<Business support tool for financial institutions : Japanese >



Expanding the human resources with energy-saving knowledge

- Regarding the implementation of energy conservation and GX in small and medium-sized enterprises, etc., the **securing and training of persons who will give energy-saving technical guidance (energy-saving experts) is an urgent necessity.**
- Specifically, in each region it is necessary to 1. **expand the companies and organizations who will bear the core responsibility for conducting energy diagnoses,** and 2. **expand the human resources who will bear responsibility for conducting the diagnosis work in these companies and organizations.**
- In some prefectures, there are no local organizations to conduct the national energy diagnosis work, so activities are being implemented to contact each of the prefectural authorities and “**create systems in each region through which energy-saving (≈ GX) specialist guidance can be received**”.

(Measures newly implemented from the current fiscal year)

Implementation of training for developing the human resources with energy-saving knowledge

- In order that persons holding national qualifications who will become energy diagnosis practitioners can acquire the know-how required to allow practical diagnosis work, training in an E-learning format and a training program using actual equipment are prepared.
- Trainees who complete the training are issued with a training completion certificate.
- Follow-up is also provided to trainees after they complete the training, such as introducing them to diagnosis institutions.
(Forming a human resource loop)

Expansion of support for OJT (On-the-job training)

- Persons who have had no (or little) experience of conducting energy diagnoses are given expanded support to build up practical experience of diagnoses through OJT.
- Training costs are provided both to experts and semi-experts when experts conduct energy diagnoses accompanied by semi-experts and the experts provide guidance to the semi-experts while conducting the diagnoses.

Other

- The amount of secretarial work including answering inquiries, providing consultations and daily coordination will also increase following the expansion of energy-saving support items and active regions. The target expenses and subsidy costs will be reviewed in order that the required expenses can be suitably subsidized.
- Explanatory meetings will be held regarding the development and recruitment of energy diagnosis institutions and experts for manufacturing industry and energy-related business operators and the organizations commissioned by each prefectural global warming prevention activity promotion center.
- Expansion of the support systems for companies and organizations which will newly become energy diagnosis institutions.