5. Support for individual challenges (1) (fuel price [1])

○ Preparation of plans for promoting energy-saving and other measures to promote the shift to management resistant to the effects of sharp fuel price rises, under which compensation is provided to production areas striving to cut the use of fuel by more than 15% if fuel prices rise by a set standard (115% of average of prices in five of the past seven years)

In addition, (1) special low temperature measure to lower the trigger benchmark price when the monthly temperature falls below the average-year temperature and (2) special soaring price measure that is implemented in the case of a rise of more than 20% from the previous year's average price.

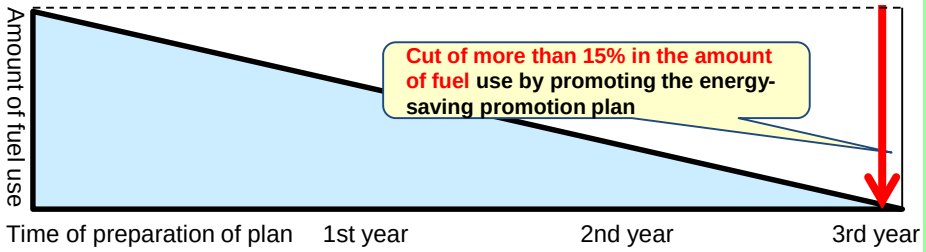
Basic approaches to address steep fuel price rises

Shift management resistant to steep fuel price rises

○ Preparation of plans to promote energy-saving and other measures to create a safety net in production areas striving to cut more than 15% in the use of fuel to stabilize management by easing effects of steep fuel price rises that cannot covered by energy-saving efforts alone.

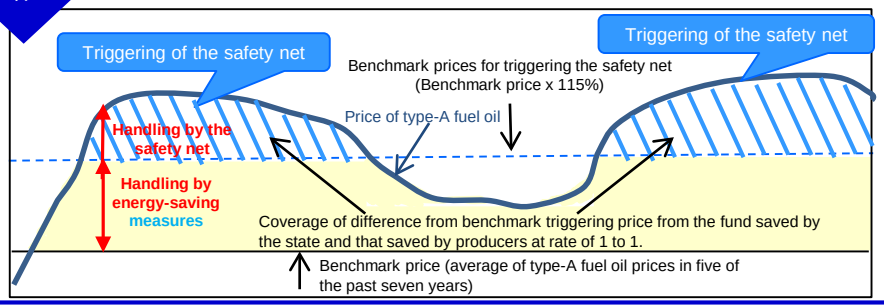
Preparation of plans to promote energy-saving and other measures in production areas

Example: Setting a reduction target for fuel use (more than 15%) and programs to attain the target
*In case of greenhouse horticulture and other production area launching measures



Support

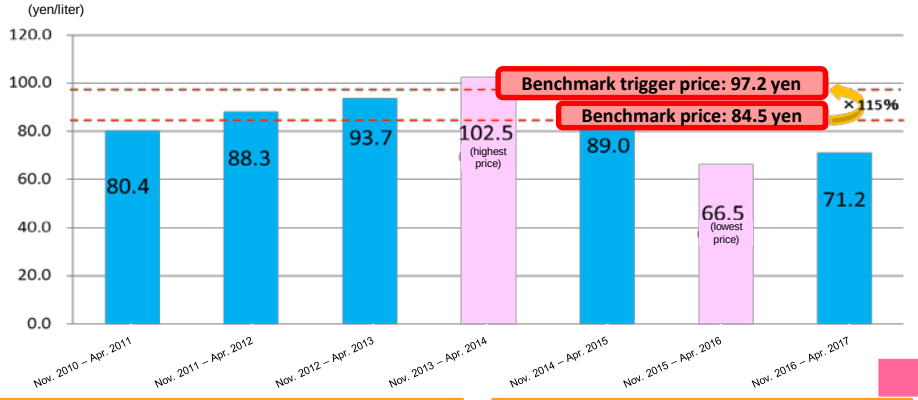
Support for creation of a safety net (subsidy rate: 1/2)



(Key points of countermeasures)

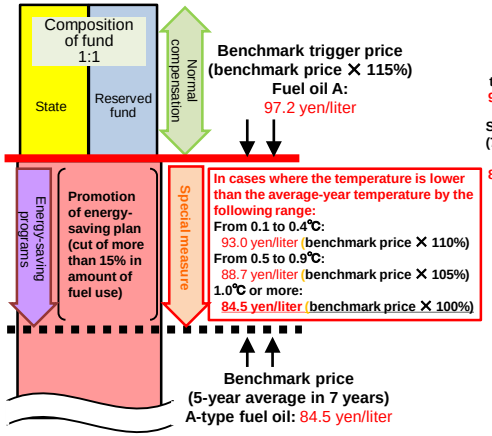
(Point 1) Benchmark prices for triggering the safety net

Using the average of type-A fuel oil prices in five of the past seven years or excluding two years of the highest and lowest prices as a benchmark, 115% of the benchmark serves as a benchmark triggering price.



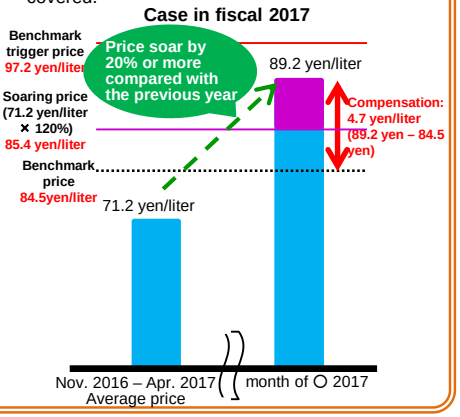
(Point 2) Special low-temperature measure

When the temperature in the year concerned falls below the average-year temperature, the benchmark trigger price is lowered in stages.



(Point 3) Special soaring temperature measure

When the fuel price rises above the average of prices during the previous year's warming season by more than 20% and also above the benchmark price, the difference from the benchmark price is covered.



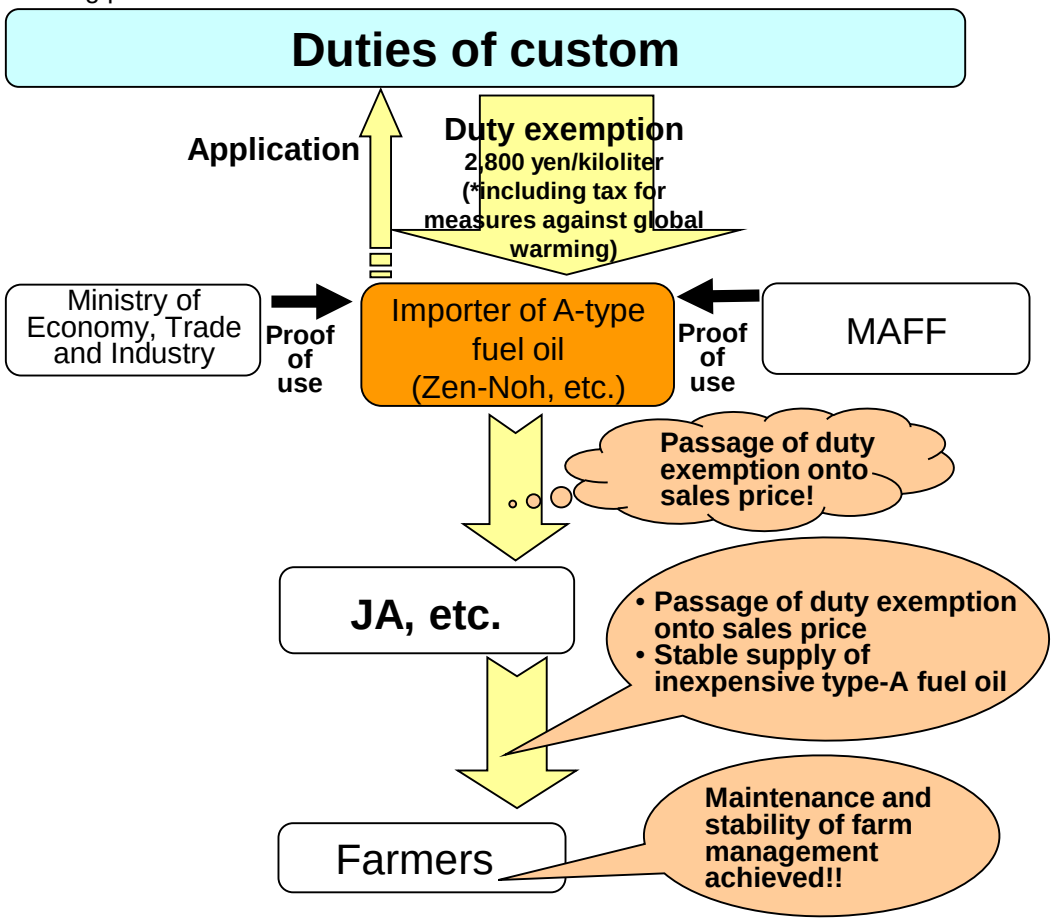
Shift to management resistant to sharp fuel price rises

5. Support for individual challenges (1) (fuel price [2])

- It is necessary to stabilize management through cuts in the burden on greenhouse horticulture farm households by supplying fuel oil for agricultural, forestry and fishery use stably at as low a price as possible and also to secure a stable supply of agricultural, forestry and fishery products.
- Implementation of exemption from oil and coal tax (2,800 yen/KL) related to imports of type-A fuel oil for agricultural, forestry and fishery use and of refund of amount (2,800 yen/KL) equivalent to oil and coal tax related to type-A fuel oil for agricultural, forestry and fishery use (special measures extended for three years for fiscal 2017 to 2019)

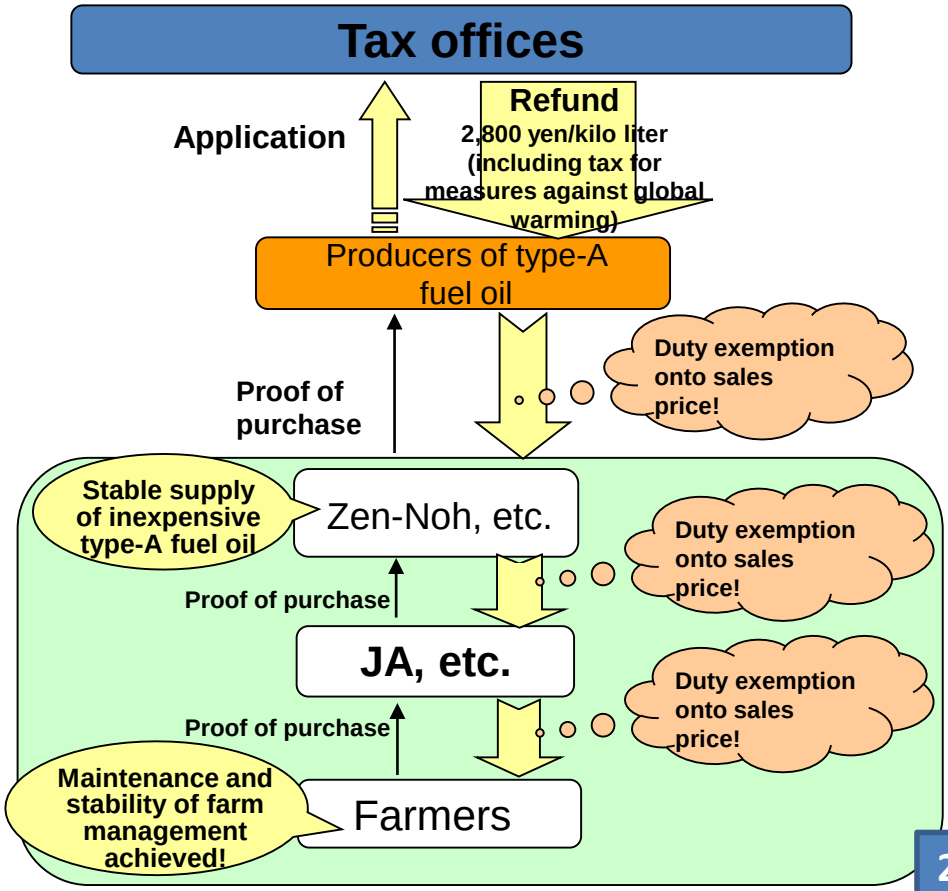
○ In case of type-A fuel oil imports for agricultural use

Importers (Zen-Noh, etc.) are exempted from oil and coal tax and pass it onto selling price for farmers



○ In case of domestic type-A fuel oil for agricultural use

If type-A fuel oil, produced in Japan from crude oil, with oil and coal tax already levied, is used in agriculture, an amount equivalent to oil and coal tax is refunded to producers who pass the exemption onto sales prices for farmers.



5. Support for individual challenges (2) (insects for pollen mating (honeybee))

○ Honeybees are used for pollen mating for strawberries, melons, water melons, etc. and their effects in Japan (use inside facilities) are estimated at about 73 billion yen.

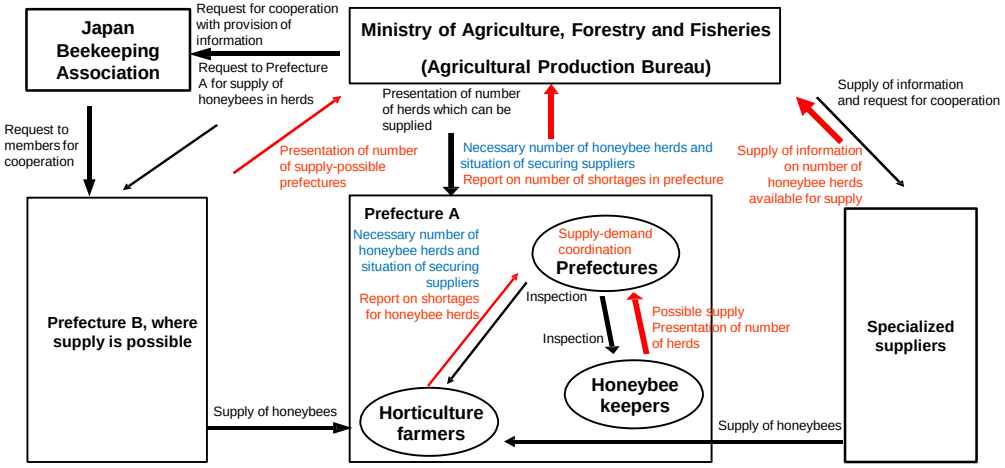
○ The Ministry of Agriculture Forestry and Fisheries created a supply-demand coordination system between horticulture farmers and honeybee keepers in fiscal 2009 to adjust supply and demand, when a honeybee shortage for pollen mating is expected, by sharing information on the prefectures in which supply is possible. But supply-demand balance has grown tighter due to damage caused by natural disasters and unseasonable weather conditions in recent years, so programs to achieve stable honeybee securement are necessary.

○ Situation of honeybee use for pollen mating in greenhouse horticulture of vegetables

Section of use	Total area (ha)	Ratio (%)
Area of greenhouse horticulture of vegetables (total)	39,635	
Of which, area of honeybee use	7,795	19.7
Area of strawberry cultivation	3,970	
Of which, area of honeybee use	3,553	89.5

Source: Ministry of Agriculture, Forestry and Fisheries, “Situation of Facilities Installed for Horticulture”

○ Supply-demand coordination system for pollen mating honeybees



○ Examples of damage caused by natural disasters


Hive boxes swept away by a typhoon

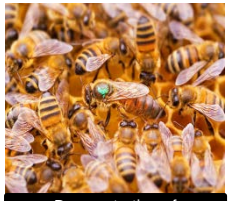

Hive boxes destroyed by earthquake

○ Support for stable procurement of honeybees for pollen mating

Support (from 2018) for expenses related to programs between horticulture production areas and honeybee keepers to prevent a shortage of honeybees for pollen mating (preparation of plans for cooperation between horticulture farmers and honeybee keepers, technology to ease damage using yellow hornet repellent, long-term sanitary utilization technology using biodegradable plastics as frames for hive boxes, technology for high-speed breeding of queen bees, technology to create an appropriate environment within a greenhouse, technology to prevent mite damage, technology to reduce dissipation in winter, efficient retreat from damage, etc.)


Preparation of plan for cooperation between horticulture production areas and honeybee keepers


Demonstration of technology for use of honeybees to raise the survival rate when they are returned to lenders


Demonstration of technology to produce honeybees at low cost

5. Support for individual challenges (2) (insects for pollen mating (bumblebees))

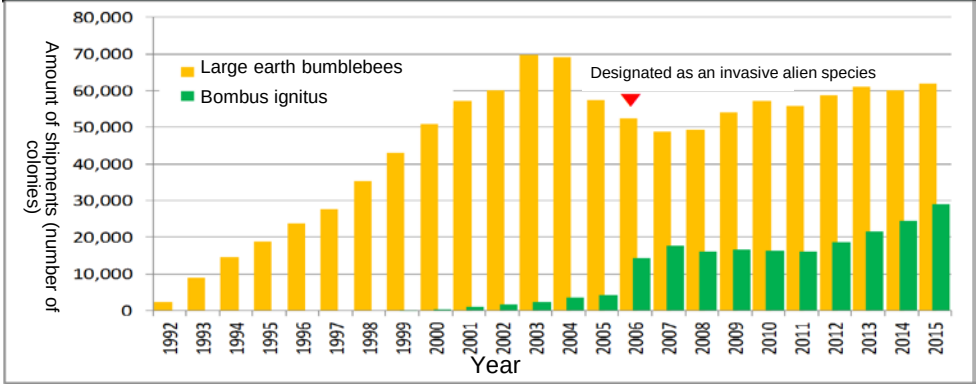
- Bumblebees are used for pollen mating for tomatoes and other produce grown inside facilities. Their economic effects in Japan (for use inside facilities) are estimated at about 5.3 billion yen.
- Bombus terrestris were designated as an invasive alien species in 2006 and the raising and keeping of them are banned in principle. The new introduction of them is also banned. If authorized by the Minister of Environment, raising and keeping them is possible as an exception.
- Shipments of Bombus terrestris have remained level since their designation as an invasive alien species, while the number of indigenous-breed bumblebees used has maintained a certain level. Bombus ignitus bumblebees have been found to be little different from Bombus terrestris in function.
- Based on these facts, the Ministry of Agriculture, Forestry and Fisheries and the Ministry of Environment decided in 2017 on the policy of using an alternative to Bombus terrestris and to accelerate the shift to an alternative to large earth bumblebees under the target of halving the use of Bombus terrestris by 2020.

Situation of using bumblebees for greenhouse production of vegetables

Section of use	Total area (ha)	Ratio (%)
Area of greenhouse vegetable production (total)	39,635	
Area of bumblebees used	2,905	7.3
Area of tomato cultivation	6,971	
Area of bumblebees used	2,665	38.2

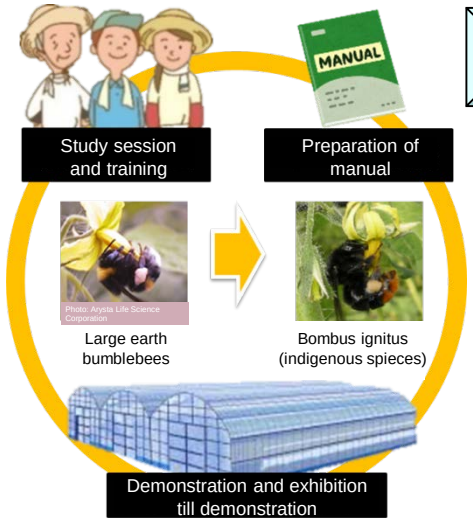
Source: Ministry of Agriculture, Forestry and Fisheries, “Situation of Facilities Installed for Horticulture”

Changes in shipments of bumblebees



Policy of using an alternative to large earth bumblebees

- In Hokkaido, Bombus ignitus is not used, and the use of indigenous species (Bombus hypocritia sapporoenis) is demonstrated. The shift to them is being promoted since the demonstration.
- Outside Hokkaido, Bombus ignitus has been used under due management.
- Bumblebees are properly treated after use so that they do not fly into fields because they, even the indigenous species, have artificially uniformized genes.



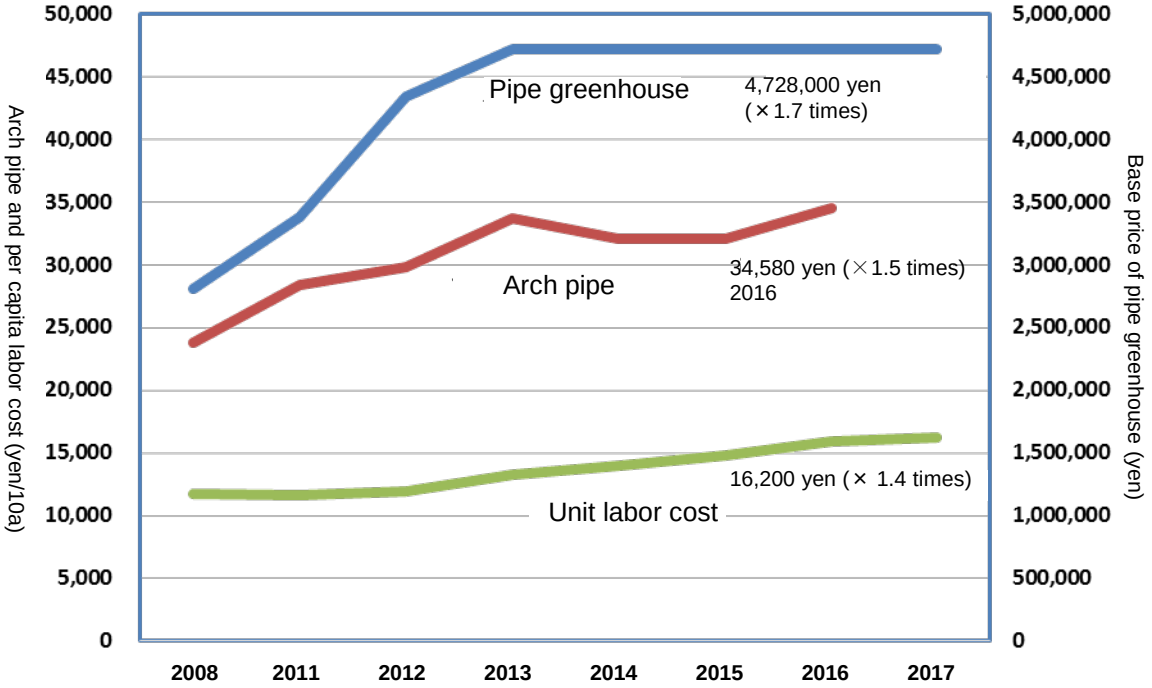
Support for increase in use of bumblebees of indigenous species

The Ministry of Agriculture, Forestry and Fisheries has supported demonstrations (since 2017) needed for the shift to bumblebees of indigenous species in horticulture production areas promoting planned efforts to half the use of Bombus terrestris.

5. Support for individual challenges (3) (Cost of building a greenhouse [1])

- Greenhouse prices have sharply increased in Japan in recent years against the backdrop of rises in material prices and labor cost.
- In greenhouse horticulture, the cost of building greenhouses needs to be lower as facility expenses account for more than 10% of farm management expenses.

The prices of greenhouses for agricultural use in Japan



Base price of a pipe greenhouse has risen by a factor of roughly 1.7 compared to 10 years ago.

Ratio of facility expenses to farm management cost

	Farm management cost (in 1,000 yen)	Ratio of facility expenses
Greenhouse horticulture of vegetables	620	13%
Greenhouse horticulture of flowers	1,563	12%
Open-field cultivation of vegetables	238	5%
Cultivation of fruits	291	7%
Cultivation of rice	103	6%

Facility expenses account for a large portion of farm management cost

Source: Ministry of Agriculture, Forestry and Fisheries, "Statistics on Type-by-Type Agricultural Management" (2015)

* Base price of a pipe greenhouse and price of arch pipes: Prices are quoted from greenhouse maker's catalogue (Arch price is for a set of 20 pipes)
  Price of arch pipes is not listed due to unavailability in the 2017 catalogue.
* Unit labor cost: Ministry of Land, Infrastructure, Transport and Tourism, "Public Works Design and Unit Labor Cost (Ordinary Workers)" (Unit cost in Kumamoto Prefecture)

5. Support for individual challenges (3) (Cost of erecting greenhouse for agricultural use [2])

○ To cut the cost of erecting greenhouses for agricultural use based on "Programs to Reinforce Competitiveness of Agriculture," (1) Preparation of a guidebook for introducing weather-resistant greenhouses, (2) Development and dissemination of technology to cut the cost of weather-resistant greenhouses, and (3) Promotion of self-building of pipe greenhouses, etc. will be promoted.

Furtherance of excessively large space by leaving strength and specifications to makers

To shift the design standard for weather-resistant greenhouses from "industry standards" to "Guidebook for Farmers."

○ Preparation of a guidebook in 2018 to enable farmers to strengthen greenhouses and specifications matching their own management.
(Before the guidebook, a leaflet was prepared in fiscal 2017 to sort out in simple terms ideas for choosing necessary strength.
At the time of preparation, rules for wind resistance, snow resistance, weight resistance, and other issues of concern for greenhouses were relaxed.

Exploration, development and dissemination of information of cost-cutting technology.

○ Preparation of a low-cost technology catalogue and collection of examples of low-cost cases through exploration of technologies, including regional small and midsize makers (convening of technology proposal session) in fiscal 2017
○ To demonstrate and establish a greenhouse capable of cutting the cost of building a greenhouse per se and interior facilities by 30% from the current level by fiscal 2019 (project to reinforce the management unit under the fiscal 2016 supplementary budget)

30% cut in cost of erecting a weather-resistant greenhouse

◎ Prevention of over specifications and dissemination of high quality and low-cost greenhouses for agricultural use through farmers' selection
◎ Establishment of technology capable of cutting materials cost and building cost combined by 30% through innovation

High building cost

Promotion of self-construction of pipe greenhouses by agricultural corporations and JA working groups

○ Preparation of a self-building manual for farmers by Zen-Noh in fiscal 2017

20% cut in cost of erecting pipe greenhouses

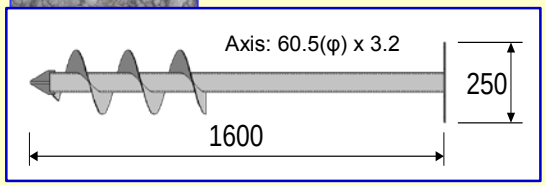
◎ Cut (20%) in building cost by self-construction

(Reference) Specific programs to cut the cost of improving facilities

○ Example of technological development (technology revealed at a technology proposal session)

- Cut in building cost by means of the pile foundation method

(Features)
Construction period is shortened and direct driving piles eliminates the boring work and formwork needed in groundwork



Technology catalogue is posted on the Ministry of Agriculture, Forestry and Fisheries website
http://www.maff.go.jp/j/seisan/ryutu/engei/onshitsu.html

○ Leaflet for farmers

- Preparation of leaflet in fiscal 2017, sorting out ideas in plain terms for selecting needed strength

➢ Strength resistant to strong wind (wind-resistance design value)

Location of building ~~erection~~ (example)	Return period			
	15 years	22 years	30years	43years
Mito City, Ibaraki Prefecture	① 28m/s	28m/s	② 29m/s	30m/s
Yokkaichi City, Mie Prefecture	③ 42m/s	44m/s	④ 46m/s	48m/s

A greenhouse with the strength to withstand strong winds, as mentioned above, is shown below as an example for reference. As it is no more than an example, necessary strength can be obtained by different specifications, such as the shape of greenhouses and diameters of poles (for example, changing the diameter of the pole under a chevron-shaped roof house)

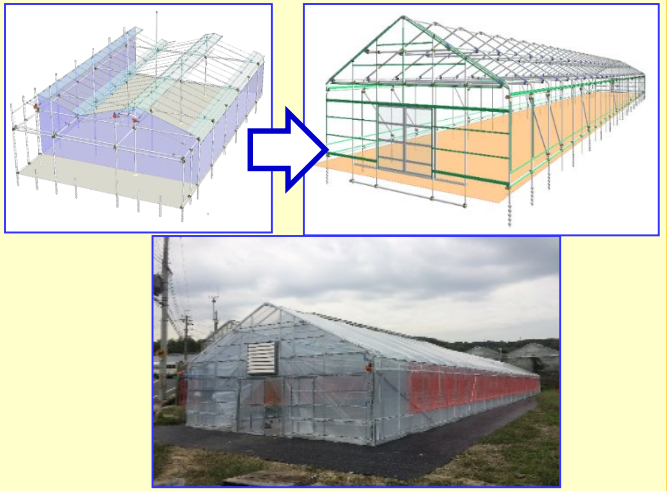
	①	②	③	④
Example of greenhouse specifications	Dome-shaped roof house	Dome-shaped roof house	Single chevron-shaped roof house	Single chevron-shaped roof house
Frontage and height of eave	7.2m、3.0m	7.2m、3.0m	8.0m、2.7m	8.0m、2.7m
Kinds of main aggregate	□-75*45*2.3	□-100*50*2.3	LH-150*75 *3.2*4.5	LH-200*100 *3.2*4.5
Strength	Low ⟷ High			
Price	Low ⟷ High			

*□ represents a square steel tube and LH means light wide flange beam

The leaflet is posted on the Ministry of Agriculture, Forestry and Fisheries website
http://www.maff.go.jp/j/seisan/ryutu/engei/attach/pdf/onshitsu-15.pdf

○ Studies on project to reinforce management unit (Technology introduced at technology proposal session)

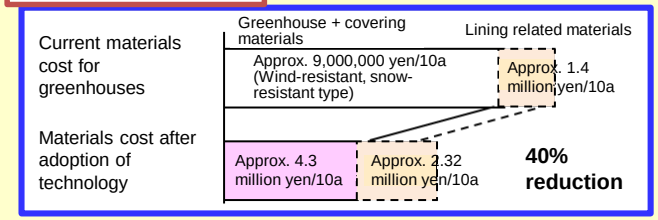
- Small-scale, low-cost greenhouse utilizing materials for construction scaffolding



(Features)
The utilization of general-purpose materials used to build construction scaffolding cut materials cost
Demonstration is underway to examine the cut in construction expenses and productivity

(2017 to 2019)

Expected effects



Increase in farmers' income and expansion of greenhouse horticulture market

(Attached table 1) Farm management model (Greenhouse horticulture (family-run))

Food, Agriculture, Rural Areas Basic Plan (March 2015)
Reference material (excerpt)

- Display of ways toward business expansion and income increase as a model of "efficient and stable farm management" by bearer of greenhouse horticulture
- Model of family-run greenhouse horticulture shows a gross revenue of 100 million yen through labor saving and an increase in unit yield by means of environmental control technology

Types of agricultural management	Vegetable cultivation (greenhouse horticulture)	Area covered	Across country

Key points of model

Family-run business seeking to expand operations and improve productivity by adopting environmental control technology, etc. and concluding direct sales contracts with actual users.

Outline of technology and program

- Labor saving and expansion of operations by adopting environmental control technology to automate temperature, humidity, and other adjustments.
- Sharp increase in amount of production (from 10.4t/10a to 35t/10a) by adopting high-yield products with high sugar content, a hydroponic system, long-term cultivation and the environmental control technology in ICT.
- Creation of local employment throughout the year by realizing year-round cultivation
- Cost reduction by adopting heat pumps and other energy-saving devices
- Conclusion of direct sales contracts and realization of stable management and sales route expansion by producing tomatoes of the quality demanded by consumers

Feature of management development

(Type of management)
Family-run (two people and 17 temporary employees)

(Scale of management and type of cropping)

Arable land under management	1ha
Vegetables subject to greenhouse horticulture	
Tomatoes	1ha
Settled planting	August
Shipment	From September to July of the following year

(Results of estimation)

Gross revenue	105 million yen
Management expanses	93.4 million yen
Labor cost	21.5 million yen
Agricultural income	11.6 million yen
Income of main worker (per person)	5.8 million yen
Work hours by main worker (per person)	1,800 hours

(Reference) Feature of average worker primarily engaging in agriculture

(Type of management)
Family-run (2 people and 1 temporary employee)
(Scale of management and type of cropping)

Arable land under management	0.33ha
Vegetable subject to greenhouse horticulture	
Tomatoes	0.33ha
Settled planting	September
Shipment	From November to June of the following year

Topics of production technology

Long-term cultivation (tomatoes)

- Longer harvesting period than before and large increase in amount of production thanks to a hydroponic system using a high wire system

Compound environmental control system

- Pursuit of optimal growth environments and cost reduction through the combination of compound environmental control system and energy-saving equipment

- Implementation of direct contract sales to supermarkets, department stores, restaurants, sellers of home-meal replacements, etc.

(Attached table 2) Farm management model (greenhouse horticulture (run by corporation))

Food, Agriculture, Rural Areas Basic Plan (March 2015)
Reference material (excerpt)

○Model of corporation-type greenhouse horticulture shows gross revenue of 500 million yen utilizing ICT and regional energy at large-sized greenhouses

Types of agricultural management	Vegetable cultivation (next-generation greenhouse horticulture)	Area covered	Nationwide

Key points of model

Corporate management engaging in integrated next-generation greenhouse horticulture from production to coordination to shipment, combining local energy, such as wooden biomass, and cutting-edge technology

Outline of technology and program

- Labor saving by environmental control technology and expansion of operations by promoting amassment of farmland and securing deserted arable land and industrial parks, etc.
- Sharp increase in amount of production (from 10.4t/10a to 35t/10a) by adopting high-yield products with high sugar content, a hydroponic system, long-term cultivation and the environmental control technology in ICT.
- Creation of local employment throughout the year by realizing year-round cultivation
- Utilization of local energy, such as wooden biomass, to break away from the reliance on fossil energy (30% cut in use of fossil energy)
- Realization of stable management and securement of sales routes through direct contract sales (from 304 yen/kg to 350 yen/kg)

Feature of management development

(Type of management)
Management by corporation (4 people, 6 full-time employees and 82 temporary employees)

(Scale of management and type of cropping)

Arable land under management	4ha
Vegetables subject to greenhouse horticulture	
Tomatoes	4ha
Settled planting	August
Shipment	From September to July of the following year

(Results of estimation)

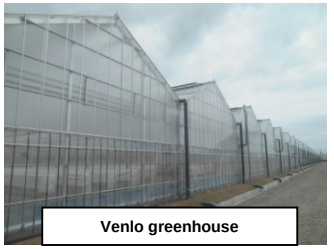
Gross revenue	490 million yen
Management expanses	434.5 million yen
Labor cost	123.6 million yen
Agricultural income	55.5 million yen
Income of main worker (per person)	13.9 million yen
Work hours by main worker (per person)	1,800 hours

(Reference) Feature of average worker primarily engaging in agriculture

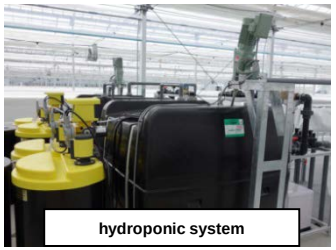
(Type of management)
Family-run (2 people and 1 temporary employee)
(Scale of management and type of cropping)

Arable land under management	0.33ha
Vegetable subject to greenhouse horticulture	
Tomatoes	0.33ha
Settled planting	September
Shipment	From November to June of the following year

Topics of production technology


Venlo greenhouse

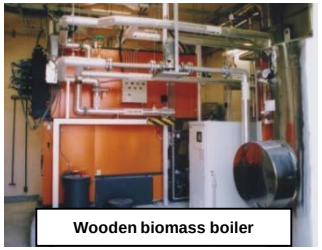

Roof window, curtain and cyclical fan

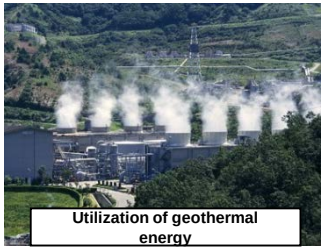

hydroponic system


Screen of an environmental control system

Compound environmental control system

○Control of temperature, humidity, CO2, amount of insolation, amount of fertilizer used, etc. by utilizing ICT


Wooden biomass boiler


Utilization of geothermal energy

○Breakaway from fossil energy by utilizing local energy, including wooden biomass