

Annex59
Lessons learned from Alternative Fuels Experience

Japanese case studies

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**Organization for the promotion of
low emission vehicles**

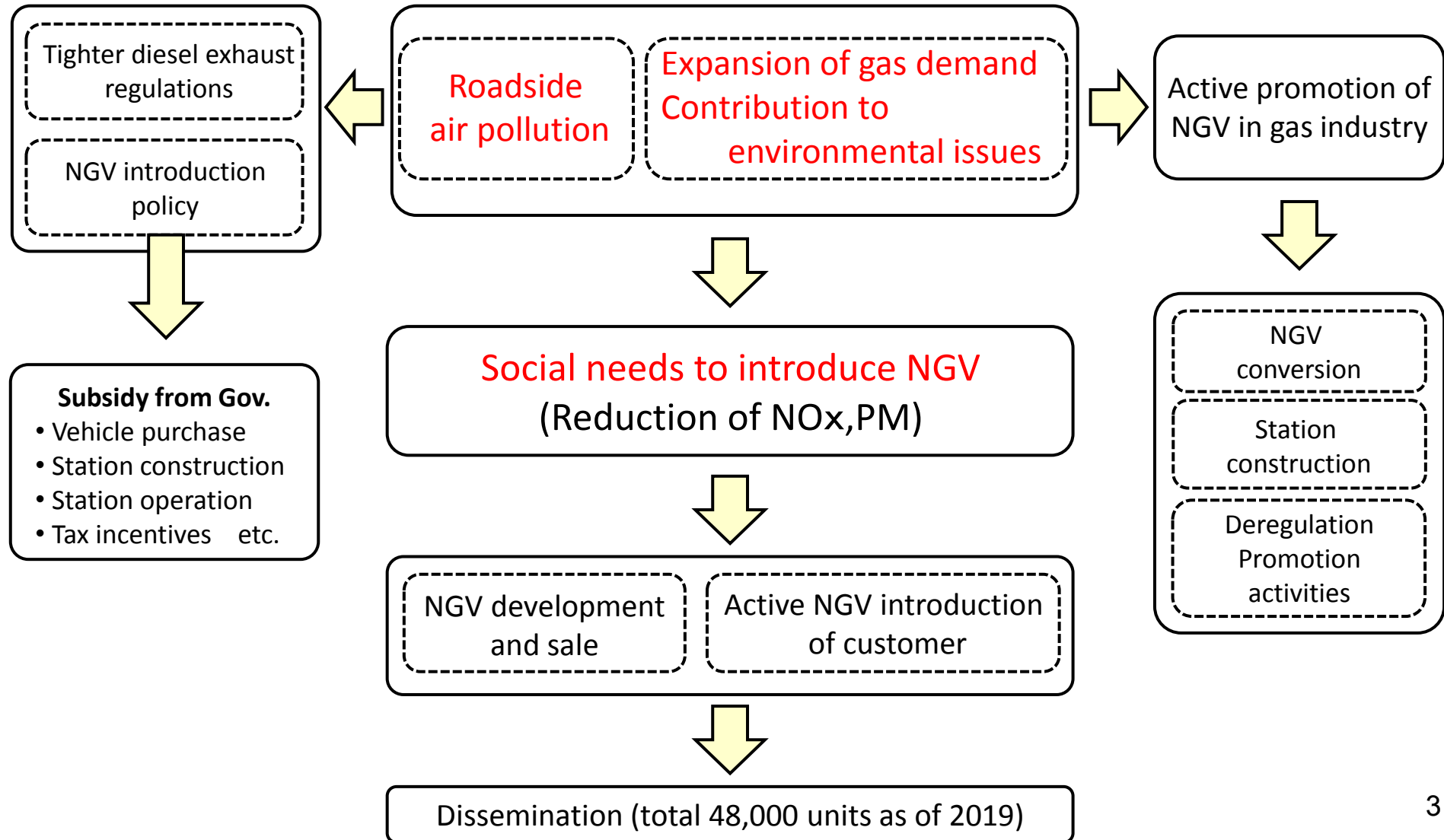
Two alternative fuels were investigated

- Natural gas
- Low blend biofuels (Bio Ethanol and Bio Diesel)

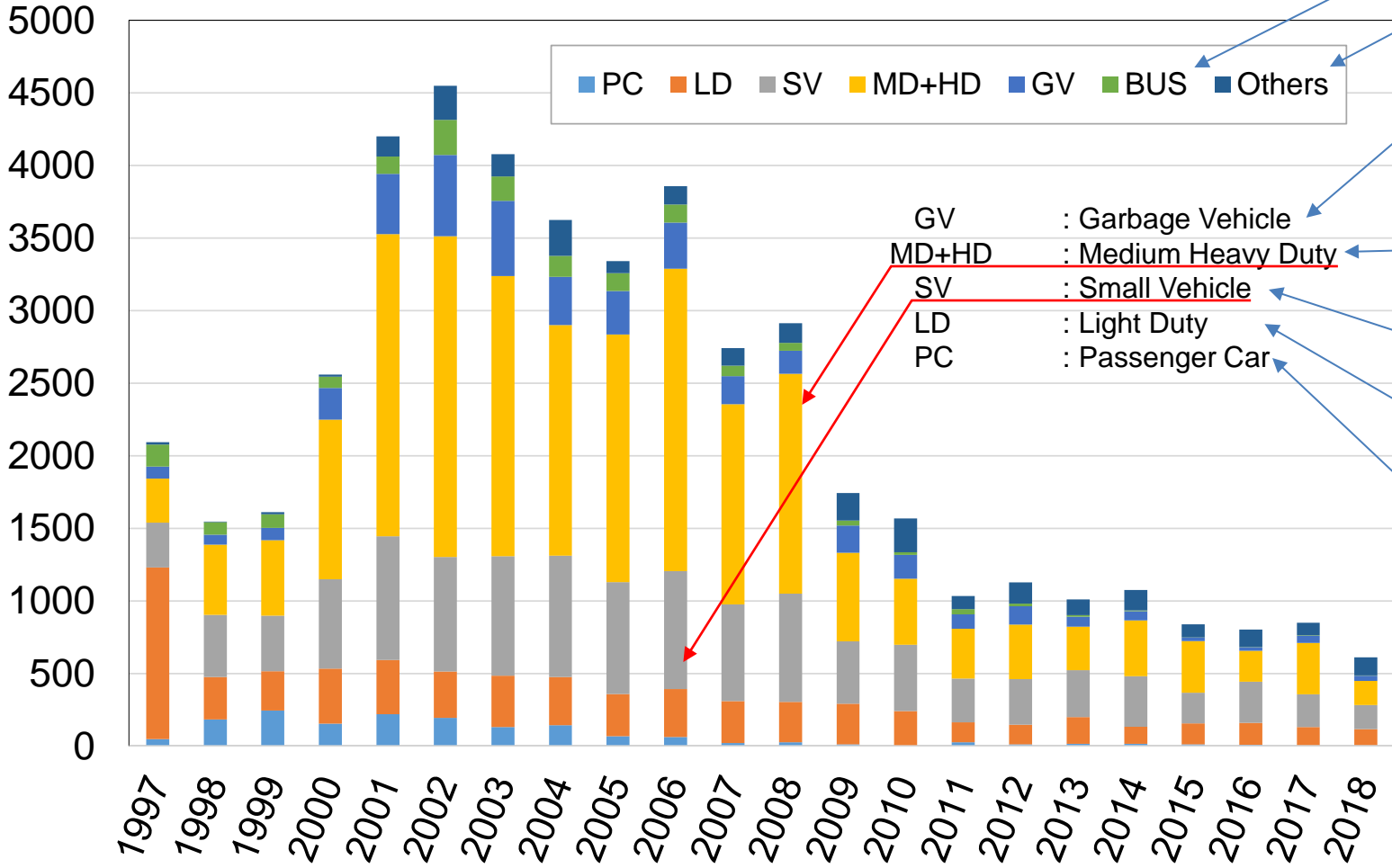
Ten groups were interviewed

- Natural gas: 6
(2 university professors, a gas industry (2 companies, 1 organization),
1 automobile manufacturer)
- Low blend biofuels: 4
(3 university professors, 1 researcher)

Main background



Sales number of NGVs



GV : Garbage Vehicle
 MD+HD : Medium Heavy Duty
 SV : Small Vehicle
 LD : Light Duty
 PC : Passenger Car



Result of market introduction

- + A certain number of NGV became popular because of the growing awareness of improving the atmospheric environment in society.
- + However, the advance of the technology to improve the emissions from diesel vehicles has reduced the superiority of NGV, and their use has stagnated.

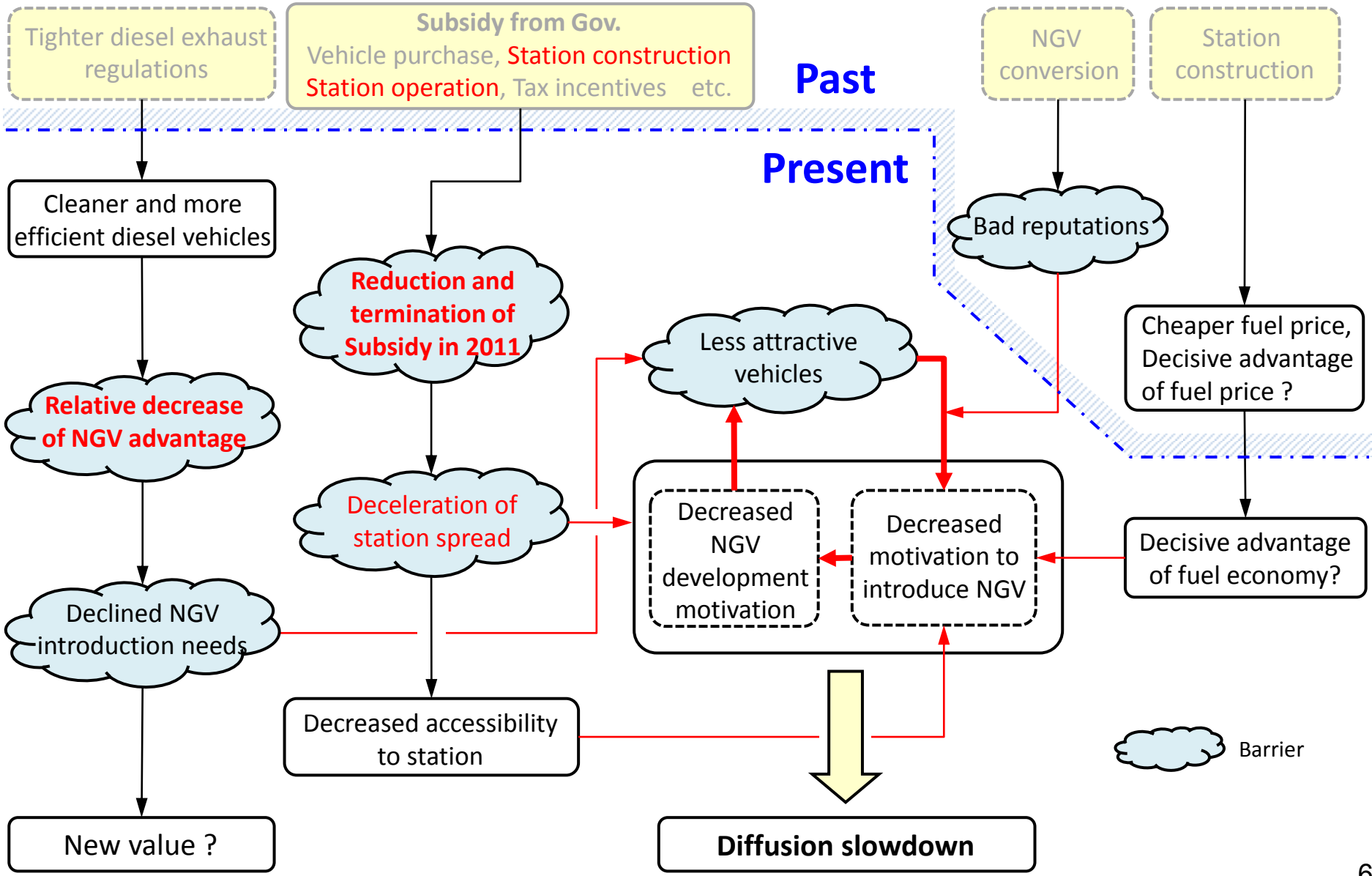
Estimated factors for market introduction

- + There are various factors that have led to the market introduction of NGV as follows.
 - a. The society (for example, transportation companies, shippers, automotive manufacturers, and government etc.) has a high awareness of improving the air pollution.
 - b. Generous government incentives (subsidies for purchases, infrastructure construction, etc.) have been promoted for social needs.
 - c. The use of existing diesel vehicles has partly been regulated to improve the atmospheric environment, and the spread of NGV has increased.

Country specific situations

Since oil crisis of the 1970s, imports of natural gas as one of the alternative fuels to oil have greatly increased to reduce oil dependency, making it a large and stable fuel in Japan. Therefore, it is considered to be an important fuel from the viewpoint of ensuring energy security.

Current situation & Barriers



+ Key factors for success

Greater awareness of air pollution improvement in society (transportation companies, shippers, automobile manufacturers, government etc.).

- Main barriers

In a free competition market, after the environmental performance of conventional vehicles improved, there was little reasons/motivation to provide customers attractive products with advantages regarding the performance and practicality of natural gas vehicles over conventional vehicles.

Lessons learned in this case:

In a free competition market, it is very important to provide attractive products to customers in a timely manner according to the needs of society.

Otherwise, it will be necessary to introduce a strong policy in a regulatory way.

Main background

COP3 held in Kyoto (1997.12)

Increasing environmental awareness

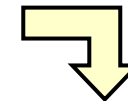
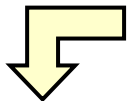
Recycling

Local production for local consumption of energy

Regional promotion



Utilization of biofuels for automotive fuel



High concentration
(B100)

Low blend
(B5, E3 (ETBE))

The annual consumption of automotive fuels in 2018

| Automotive fuels | Fuel consumption (2018) | | Ratio |
|------------------|-------------------------|---------------|---------------|
| All | — | 2,726 PJ | 100 % |
| Gasoline | 48,846,328 kL | 1,630 PJ | 59.79 % |
| ETBE | 1,940,000 kL | 54.7PJ | 2.01 % |
| Diesel fuel | 25,584,245 kL | 973 PJ | 35.70 % |
| LPG | 1,323,415 kL | 66.3 PJ | 2.43 % |
| Natural gas | 44,076 km ³ | 1.82 PJ | 0.07 % |

*Biodiesel is not described because it is very small.

Result of market introduction

The most widespread case is ETBE made from bioethanol for a gasoline base material. However, the amount is about 0.69% of the fuel for vehicles in energy basis, and other cases of market introduction are almost converged, so it cannot be said that it has spread enough.

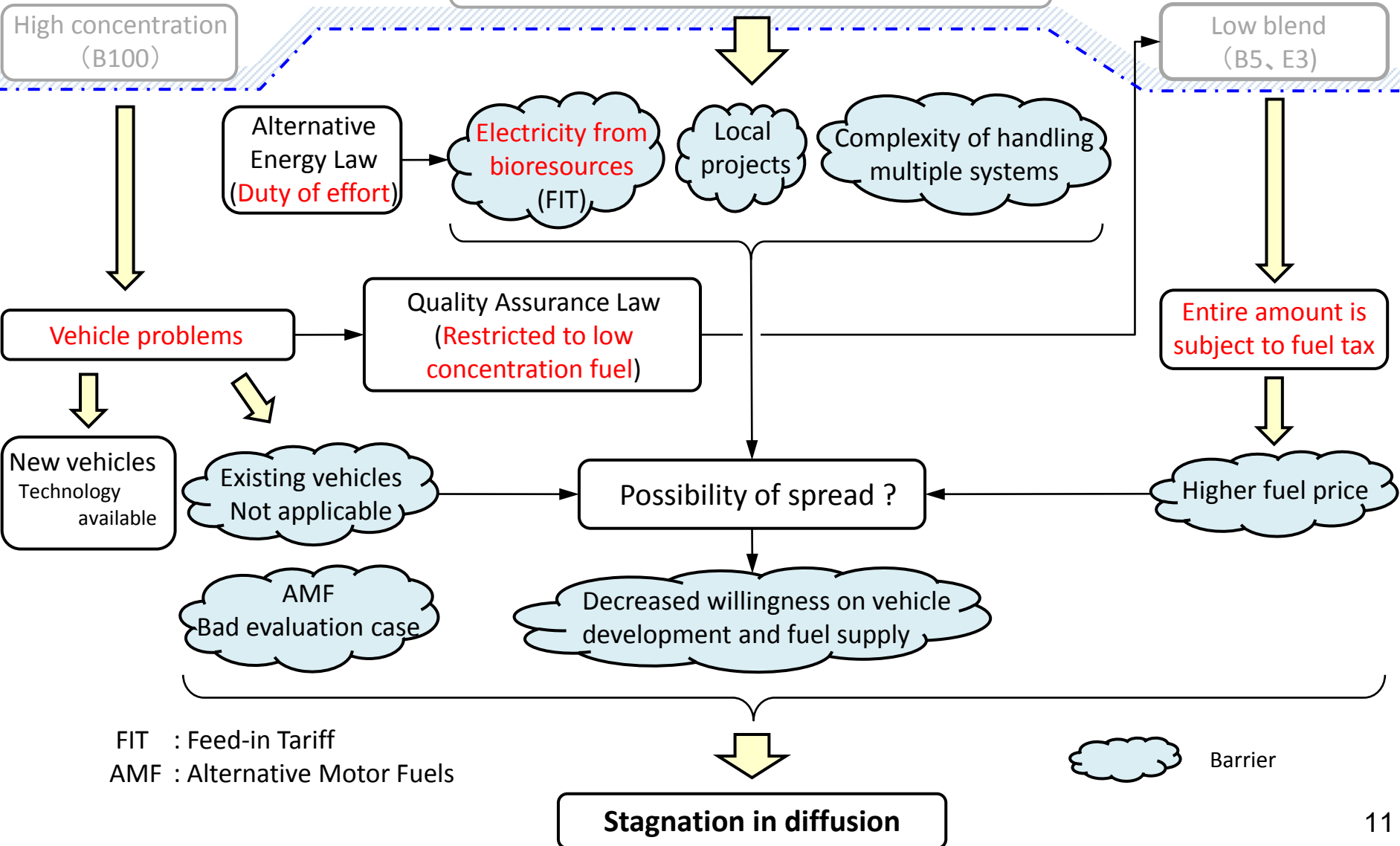
Estimated factors for market introduction

The Third Conference of the Parties to the Framework Convention on Climate Change (COP3) in December 1997 was an opportunity to foster the domestic use of biofuels to reduce CO₂ emissions. In addition, it is thought that the momentum of local production and local consumption of energy in the background of recycling of waste cooking oil and of regional development was a factor to introduce biofuels.

Country specific situations

Although there is a possibility that a certain amount of biofuel resources can be procured in Japan, there is no system for procurement in large quantities, and it is also hard to import a certain amount of bioresources which worldwide trade is small. Therefore it was difficult to disseminate it throughout the country.

Utilization of biofuels for automotive fuel



FIT : Feed-in Tariff
 AMF : Alternative Motor Fuels

 Barrier

Key factors for success and main barriers:

Japan relies on imports for most of its energy resources.

Therefore, in a free competition market, it has been difficult to disseminate biofuels in view of higher cost, difficulty to procure a certain amount of raw material of biofuels, and convenience of its use.

Lessons learned in this case:

In a free competition market, cost, supply stability, and convenience of alternative fuels are important compared to conventional fuels.

Summary

| | Natural gas | Low blended bio fuels |
|---|---|---|
| Estimated factors for market introduction | <ul style="list-style-type: none"> • The society has a high awareness of improving the air pollution. • Generous government incentives have been promoted for social needs. • The use of existing diesel vehicles has been regulated to improve the atmospheric environment. | <ul style="list-style-type: none"> • In December 1997, COP3 was held in Kyoto, Japan, and this was an opportunity to foster the domestic use of biofuels to reduce CO2 emissions. |
| Measures taken | <ul style="list-style-type: none"> • Vehicle purchase cost subsidy • Infrastructure construction subsidy • Station management subsidy • Various tax incentives | <ul style="list-style-type: none"> • Subsidy for biofuel infrastructure development, manufacturing facilities, etc. • Tax incentives |
| Today's market introduction status | The spread of NGV has been stagnant. | Just small amount of E3 (ETBE), B5 and B100 are on sale. |
| Key factors for success | <ul style="list-style-type: none"> • Greater awareness of air pollution improvement in society (transportation companies, shippers, automobile manufacturers, government etc.). | <ul style="list-style-type: none"> • At present, it is not widespread. |
| Key factors for main barriers | <ul style="list-style-type: none"> • After the environmental performance of conventional vehicles improved, there was little reasons/motivation to provide attractive products with advantages regarding the performance and practicality of NGVs. | <ul style="list-style-type: none"> • Japan relies on imports for most of its energy resources. And it has been difficult to disseminate biofuels in view of higher cost, difficulty to procure a certain amount of raw material of biofuels, and convenience of its use. |
| Lessons learned | <ul style="list-style-type: none"> • In free competition market, it is very important to provide attractive products in a timely manner according to the needs. Otherwise, it will be necessary to introduce a strong and regulatory policy. | <ul style="list-style-type: none"> • In a free competition market, cost, supply stability, and convenience of alternative fuels are important compared to conventional fuels. |

END

*Thank you very much
for your kind attention.*