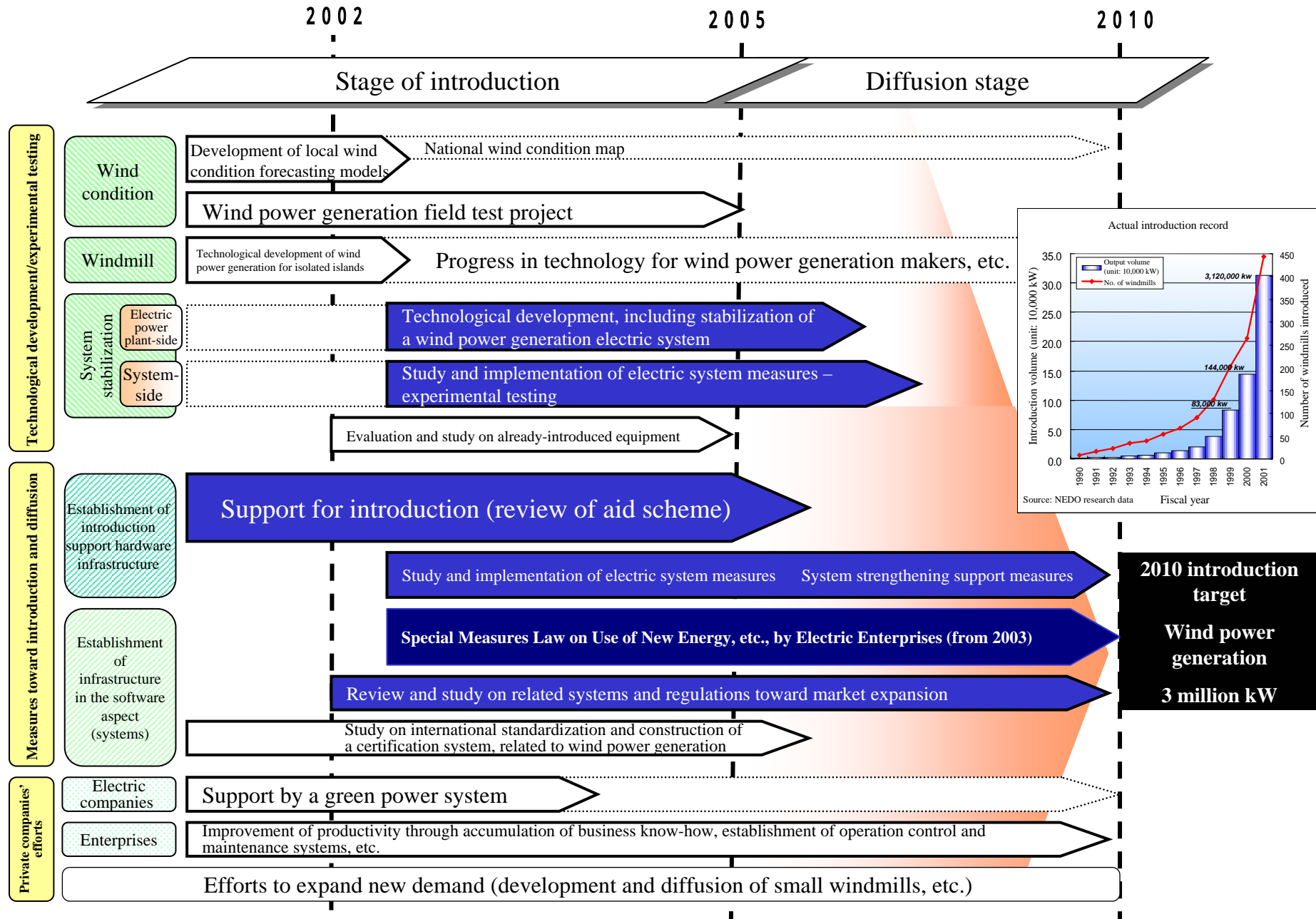
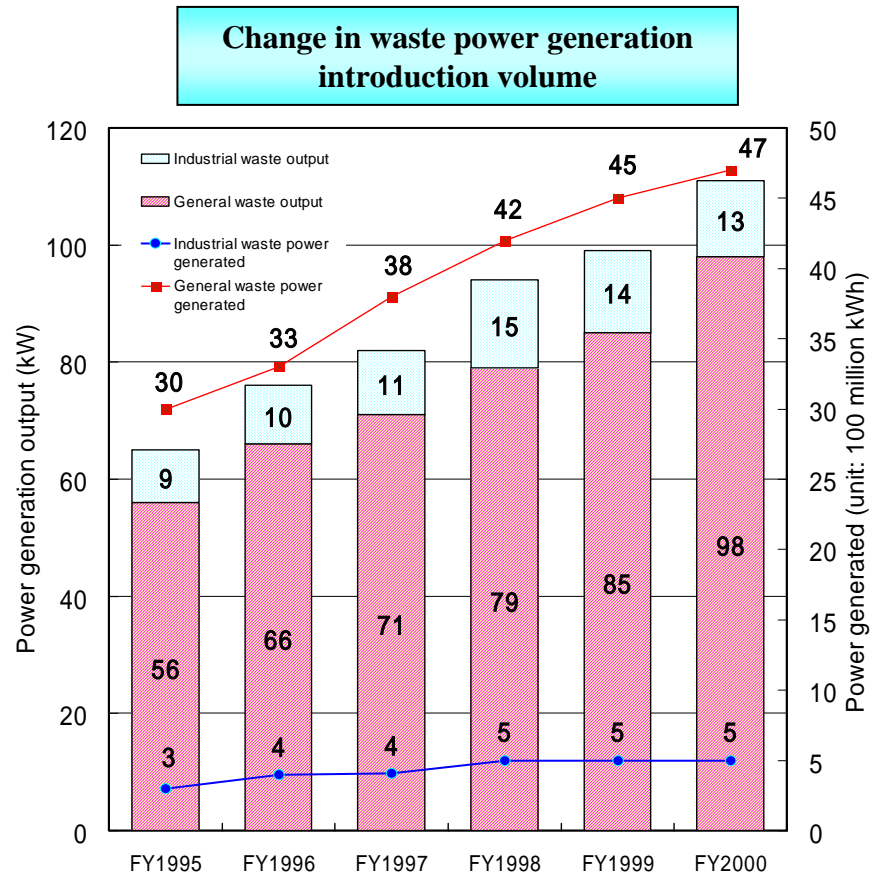
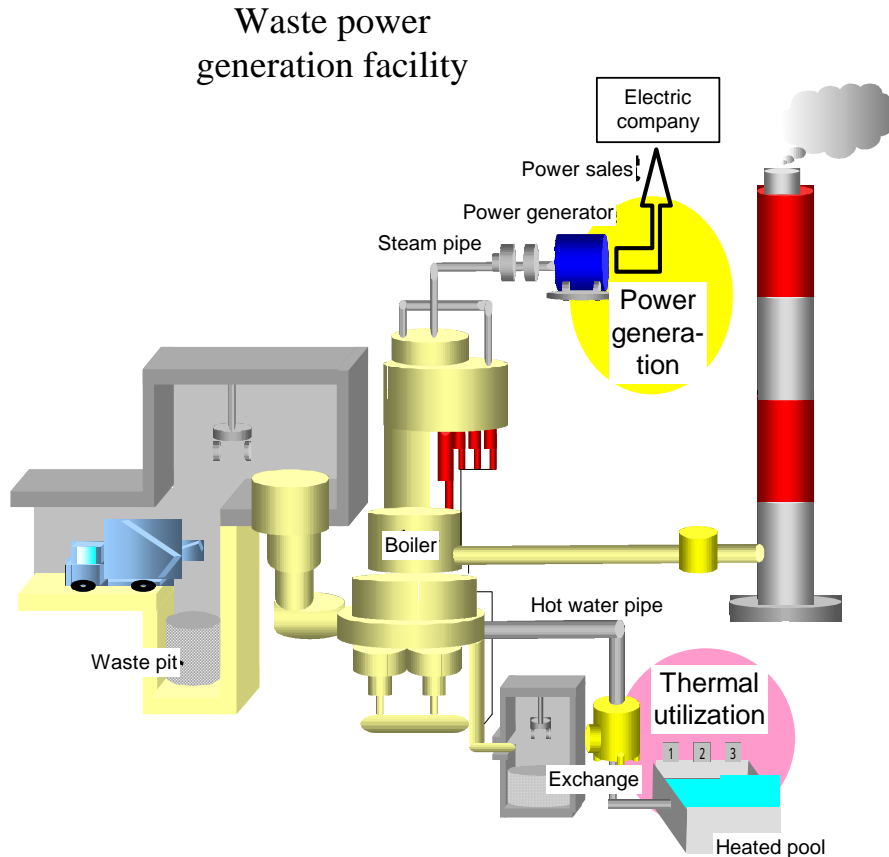


Scenario on Introduction and Expansion of Wind Power Generation



What Is Waste Power Generation?

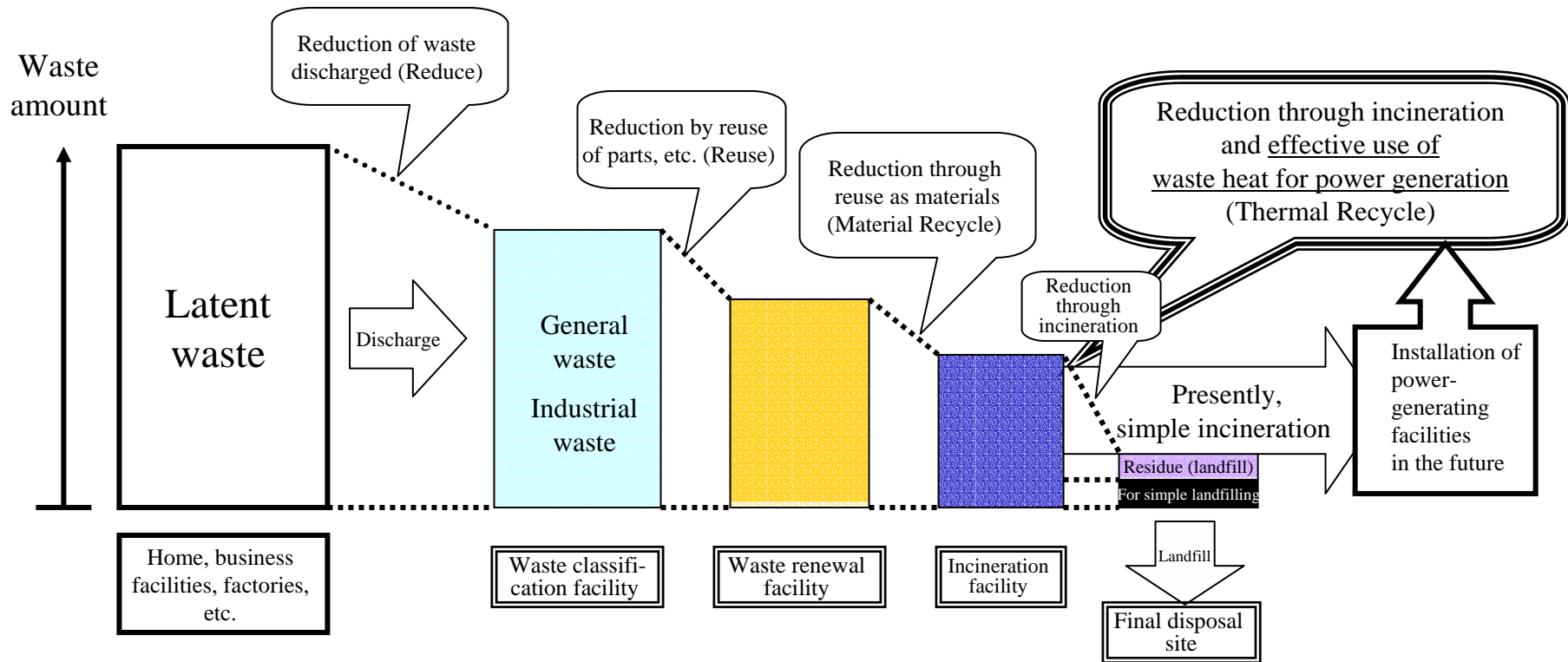
Power generation using heat from waste incineration. Can be combined with thermal utilization.



Note 1) Industrial waste includes biomass portion, but not waste related to the pulp and paper-making industry.

Note 2) This tally does not include portion generated by super waste power generation.

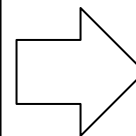
3R Concept and Waste Power Generation in the Basic Law on Promoting the Formation of a Recycling-Oriented Society



(Background)

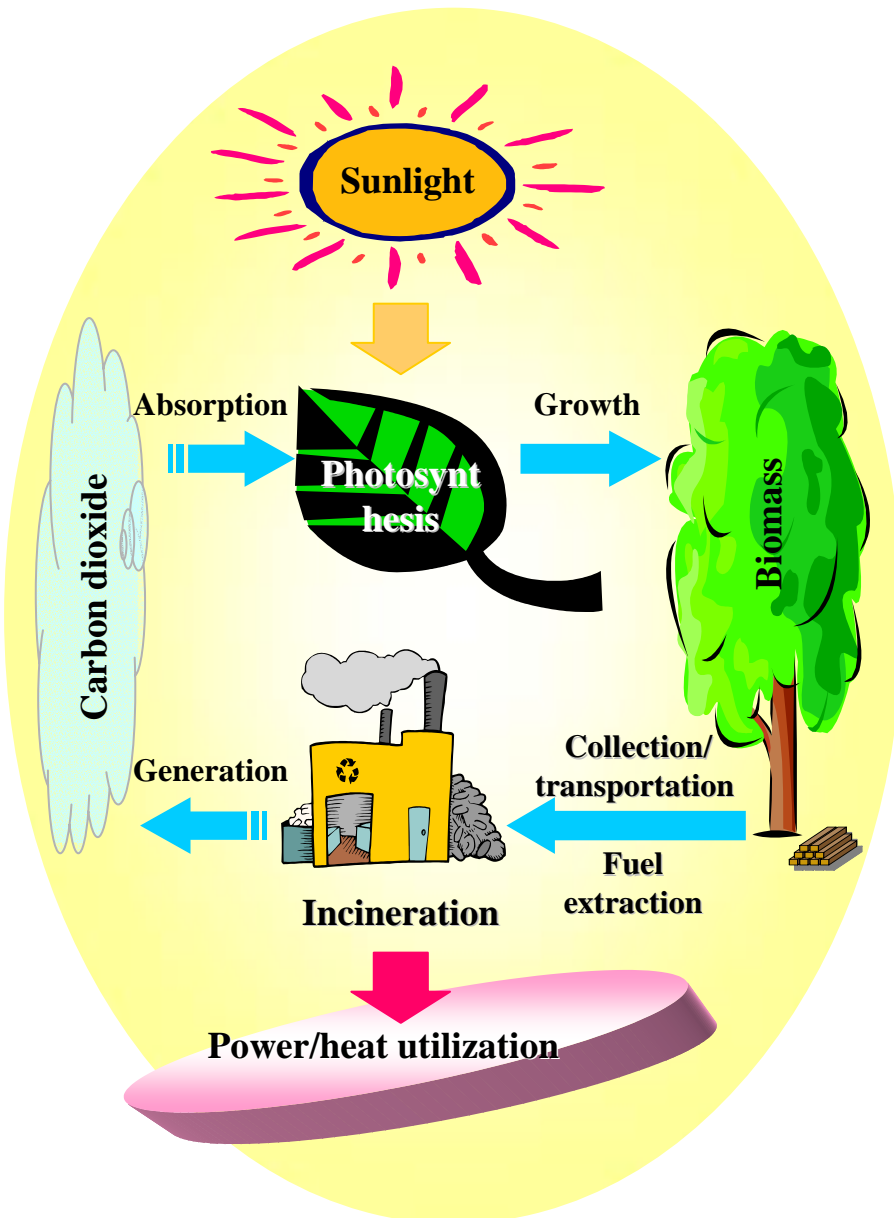
- Introduction of new energy from the viewpoint of global warming control
- Serious shortage of final waste disposal sites
- Realization of a sound economy and society with reduced environmental impact

(formation of a recycling-oriented society)



Use of waste
power generation

What is Biomass Energy?



What is biomass?

Organic matter from animals and plants, except for fossil resources, that is usable as energy source

Significance as energy

- (1) Biomass is carbon-neutral renewable energy, and additional CO₂ will not be emitted if the balance of discharge of CO₂ is considered through fixed CO₂ use, by fostering biomass at the same time with utilization.
- (2) Diversification of energy sources can be promoted by newly using biomass, which has never been used.

Problems to conquer

- (1) Its generation distribution is wide and thin, and the energy density per capacity is low, resulting in a great load for resource collection and transportation.
- (2) Facilities tend to be of small scale and dispersed, and it is difficult to enhance efficiency and reduce cost through scale merit.

Classification of biomass resources

Major energy use forms

(Dry type)

Woods-related

Wooden biomass

Forestland
brushwood
Lumber waste
material

Agriculture, livestock, and fishery-related

Agricultural residue

Husk
Corn
Chaff
Straw

Construction waste materials-related

Construction
waste materials

(Direct incineration)

Making into chips,
pellets, etc.,
followed by
incineration in a
boiler.

(Moist type)

Food industry-related

Bagasse

Food industry
wastewater
Food waste

Seafood processing
residue

Bagasse

Livestock feces and urine

Cow, pig, bird droppings
and urine

Fishery residue

Household-related

Sewage sludge
Human waste

Kitchen waste

(Biochemical conversion)

Production of
methane, methanol,
hydrogen, etc.,
through fermentation
technology, etc.

(Others)

Paper-making factories- related

Black liquid, waste
material

Cellulose
(used paper)

Sugar, starch

Sweet potato starch

Colza
Palm oil (palm)

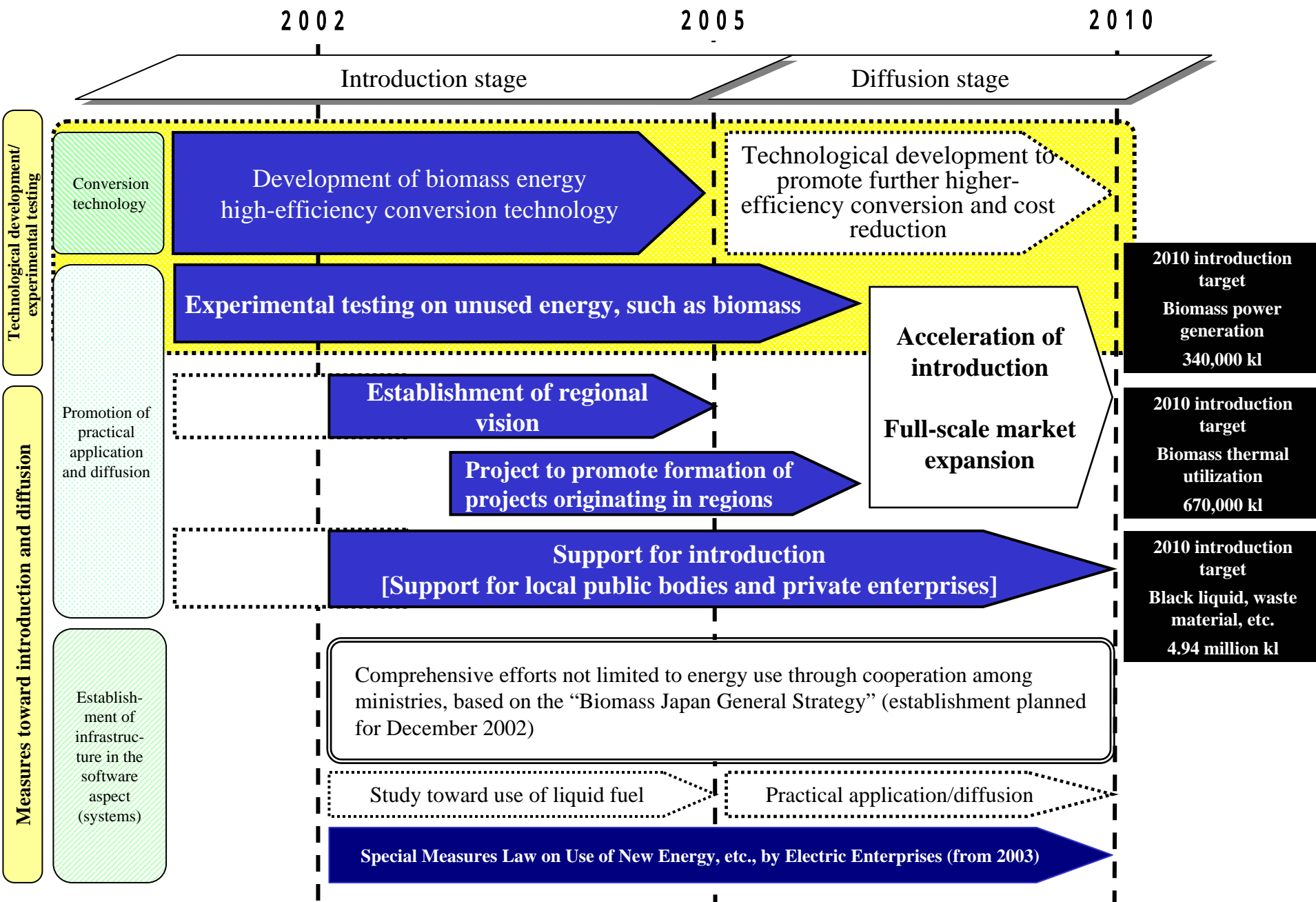
Waste edible oil

(Thermochemical conversion)

Fuel production through
gasification,
esterification, and
pulping, by high-heat
and high-pressure
processing.

Power generation/thermal utilization, etc.

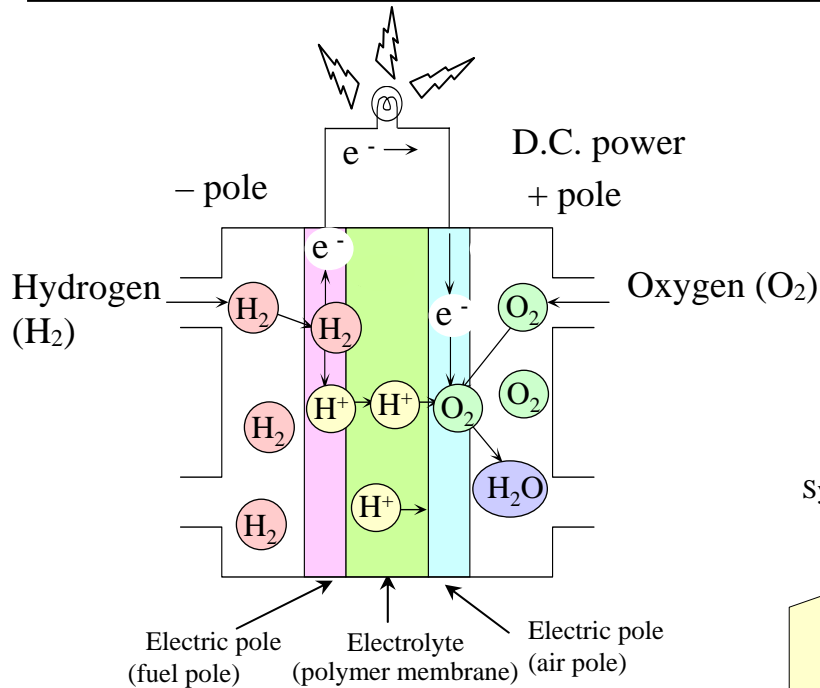
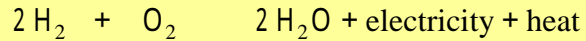
Scenario on Introduction and Expansion of Biomass Energy



What is a Fuel Cell?

Principle of a fuel cell

A fuel cell generates power through chemical reaction between hydrogen and oxygen

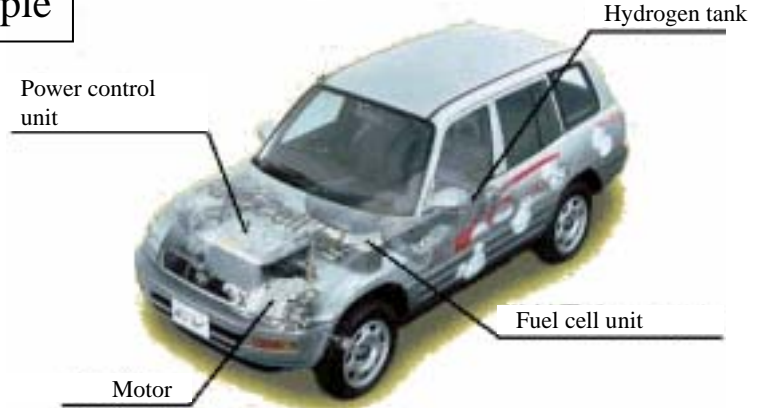


Characteristics of fuel cells

1. Highly efficient power generation
2. Excellent environmental features
3. Quiet
4. Applicability to various systems due to small size

Use example

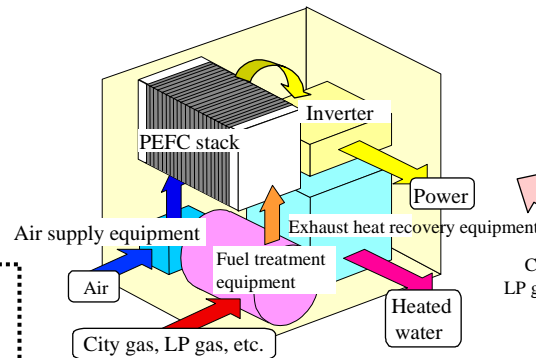
(1) Fuel cell-powered vehicle



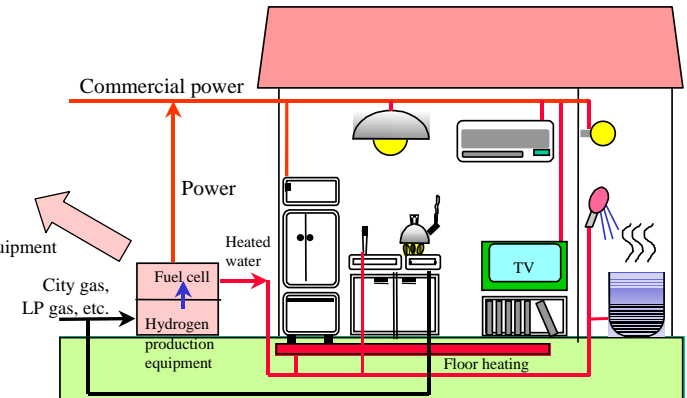
Environmentally friendly ultimate vehicle

(2) Household fuel cell

System composition example

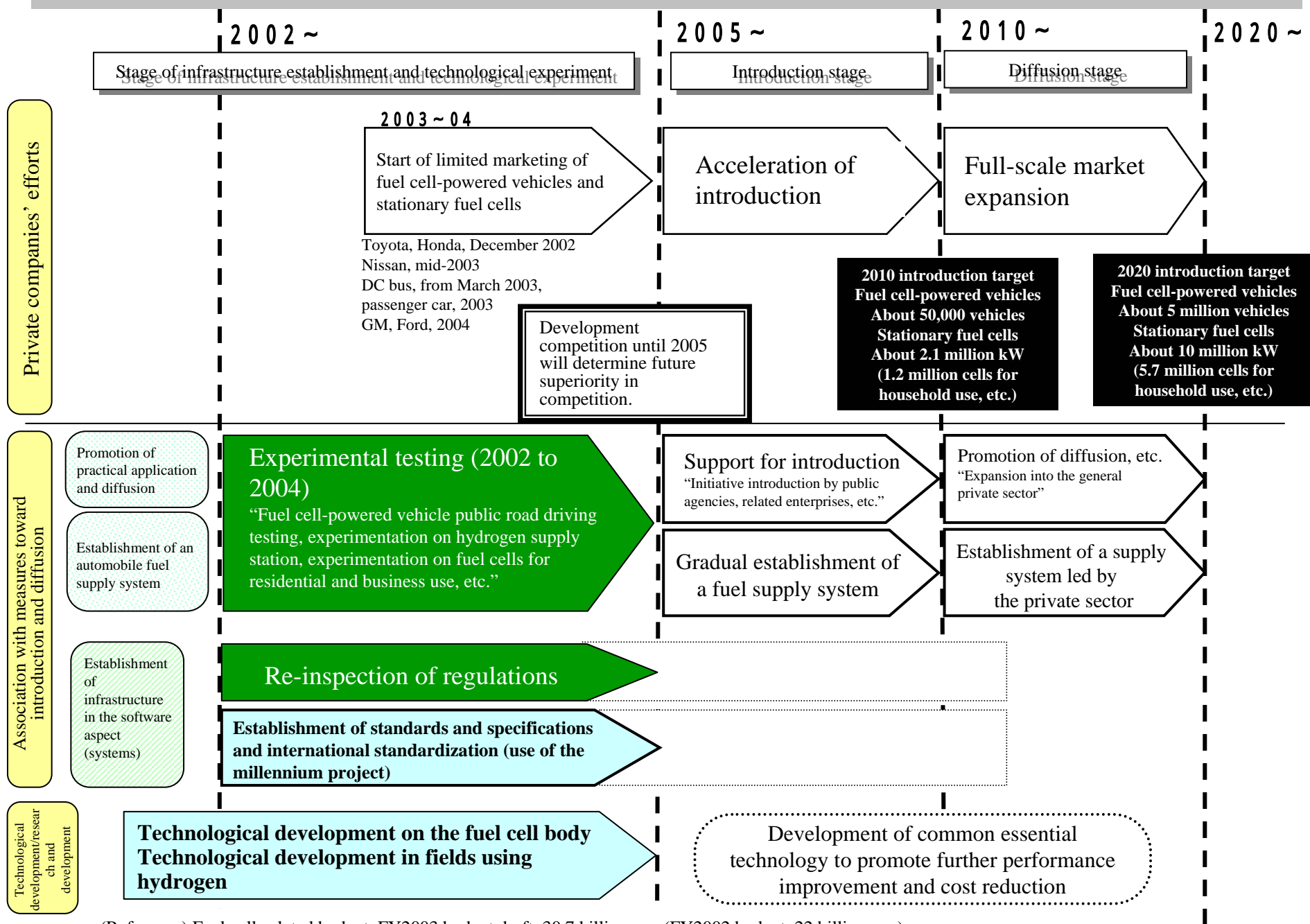


Installation image



Vanguard of the micro power revolution

Scenario on Introducing Fuel Cell-Powered Vehicles and Stationary Fuel Cells



(Reference) Fuel cell-related budget, FY2003 budget draft, 30.7 billion yen (FY2002 budget, 22 billion yen)