

Session V AIM/Enduse Modelling

Strategic Database and Indicators

Go Hibino
Fuji Research Institute Corporation

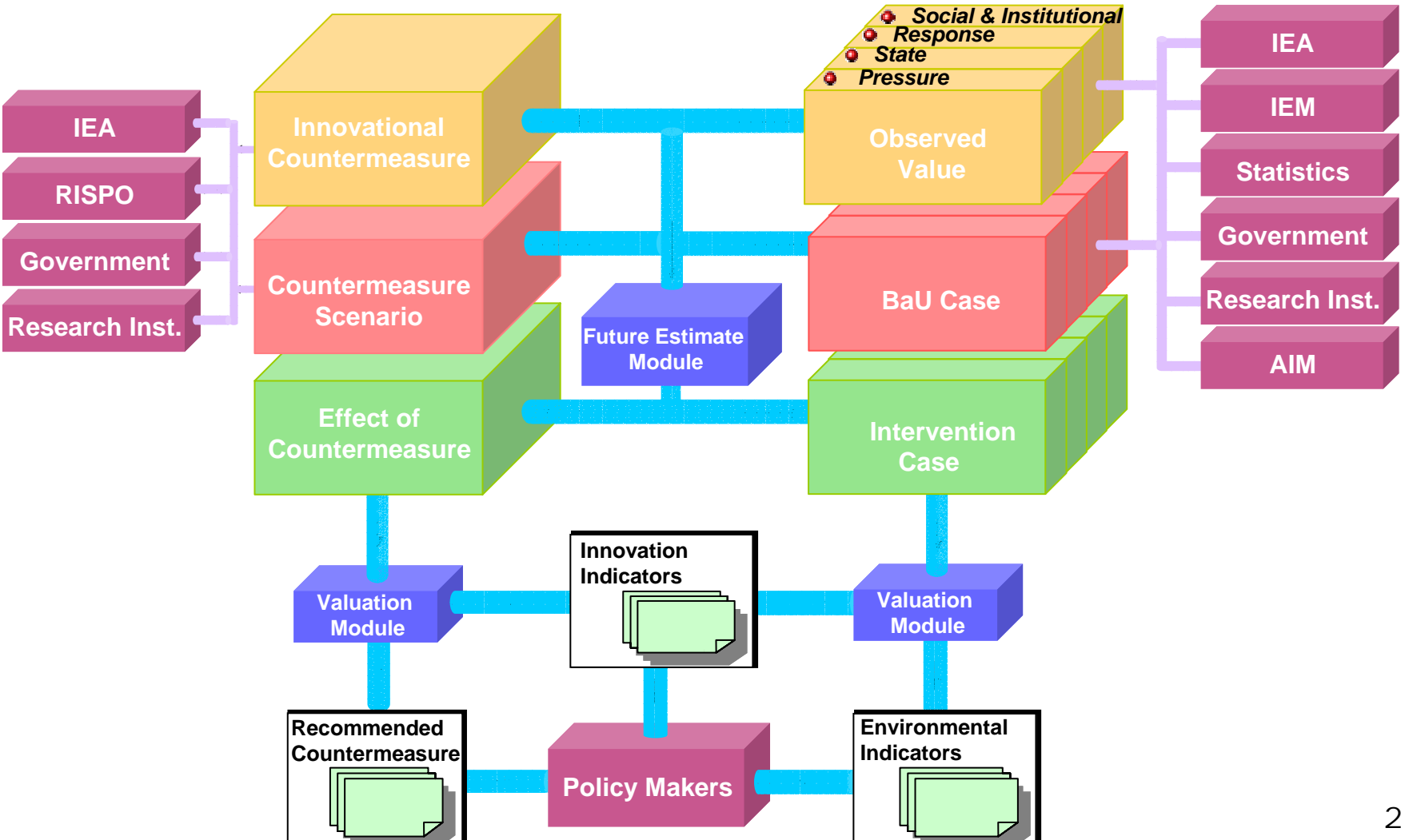
The 8th AIM International Workshop
13-15, March 2003

At Ohyama Memorial Hall

Strategic Database and Indicators

a. Innovational Countermeasure Database

b. Country Inventory Database



Innovational Countermeasure

Innovational Countermeasure Datasheet

Countermeasure Classification

901810

Fuel cell

Countermeasure Code/Name

50100101

Fuel cell vehicle

Countermeasure Abstract

A fuel cell vehicle is powered by an electric motor running on electricity generated by a fuel cell stack using hydrogen as its energy source. The principal methods for supplying the hydrogen include those in which it is stored directly onboard the vehicle and those in which a reformer is used to convert methanol or gasoline into hydrogen. There are also various methods for storing hydrogen onboard the vehicle.

Fields

Transformation sector - Automobile

Saving/Reduction for Pressure

1)	Energy	Oil		100	%
2)	Air	NOx			%
3)					%
4)					%

Increase Pressure

1)	Energy	H2		1)	80	%
2)						%
3)						%
4)						%

Average Lifetime

10 years

Investment cost

10,000,000 US\$/(GJ or kg)

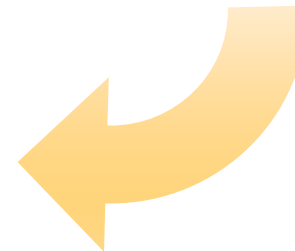
O+M cost

US\$/(GJ or kg)

Developer

Toyota <http://www.toyota.co.jp/en/index.html>
 Honda <http://world.honda.com/>

Sector	Object of Environmental Burden Reduction	Technology Classification	Technology Name	
Agriculture, Forestry and Fisheries	Agricultural production improvement	Bio-technology	Improvement of organic farming efficiency by microorganisms Fodder production from microorganism protein Production of 5-amino phosphorus acids from organic wastes using photosynthesis bacillus and application to herbicides and growth modifiers Medicine production (especially scopolamine)	
		Other technologies	Multifunctional and multieffect natural food materials Agricultural production improvement using insects	
		Other technologies	Productivity improvement of dairy and beef cattle Improvement of rice paddy water management methods Promotion of decomposition of rice plant straw Addition of fatty acid calcium to dairy cattle feed	
	Methane emission control	Other technologies		
	Mining	-	Biotechnology	Bioremediation
	Manufacturing (design phase)	-	Information technology	Database for sharing information on design of products for green design and Computer control for efficient use of resources Production system (factory boutiques) tailored to consumer demand to Efficient use of resources and reduction of transportation demand by supply
Other tech.			Inverse manufacturing	
Monitoring	-	Information technology	Monitoring, observation, and information-dissemination technology related Real-time public display of emissions and density via the Internet Systems corresponding to Pollutant Release and Transfer Register (PRTR)	
		Other technologies	Animal living situation monitoring by microtransmitters Marine pollution status tracking by satellite radar Tropical forest reduction and desertification status tracking by satellite	
		Policy	Estimation and public dissemination of local environmental burden	



Observed Value

List of item

Pressure	Energy Air Water Waste Wood Food Landuse ...
State	Air quality Water quantity Water quality Soil quality Ecosystem ...
Response	Renewable energy Removal device Recycle system Environmental tax ...
Social & Institutional Capacity	GDP Population Technology Lifestyle Transportation Education Governance ...

Inventory sheet

	-	1990	2000	2010	2020	2030	-
Steel							
Chemical							
Non-metallic							
Non-ferrous							
Transport eqp.							
Machinery							
Mining							
Food							
Paper							
Wood							
Construction							
Textiles							
Agriculture							
Commercial							
Residential							
Trasportation							
Non-specified							
Non-specified							
Non-specified							



Statistics

Government

Research Inst.

BaU Case

List of item

Pressure	Energy Air Water Waste WoodFood Landuse ...
State	Air quality Water quantity Water quality Soil quality Ecosystem ...
Response	Renewable energy Removal device Recycle system Environmental tax ...
Social & Institutional Capacity	GDP Population Technology Lifestyle Transportation Education Governance ...

Inventory sheet

	-	1990	2000	2010	2020	2030	-
Steel							
Chemical							
Non-metallic							
Non-ferrous							
Transport eqp.							
Machinery							
Mining							
Food							
Paper							
Wood							
Construction							
Textiles							
Agriculture							
Commercial							
Residential							
Trasportation							
Non-specified							
Non-specified							
Non-specified							



AIM

Government

Research Inst.

Countermeasure Scenario

Countermeasure Scenario

Countermeasure Scenario

Countermeasure Scenario			Baseline case
1)	B1-1 Scenario	Innovational technology scenario 1	B1
2)	B1-2 Scenario	Innovational technology scenario 2	B1
3)	B1-3 Scenario	Innovational technology scenario 3	B1
4)	B2-1 Scenario	Local resource scenario 1	B2
5)			

Countermeasure Combination

Countermeasure Cmb.								Countermeasure				Introduction rate			
1)	2)	3)	4)	5)	6)	7)	8)					2000	2010	2020	2030
✓	✓	✓						23065	Fuel cell vehicle	▼		0	10%	50%	100%
✓	✓	✓						38792	LED (Light-Emitting Diode) lighting	▼		0	10%	50%	100%
	✓	✓	✓					93804	Solar power system	▼		0	10%	50%	100%
	✓	✓						83653	Regenerative burner	▼		0	10%	50%	100%
		✓						47623	High-temperature heat-resistant gas turbine	▼		0	10%	50%	100%
		✓						47453	Fiber Reinforced Plastic for vehicle	▼		0	10%	50%	100%
								82163	Biodegradable reinforced plastic	▼		0	10%	50%	100%
								24641	Refrigerator with carbon dioxide refrigerant	▼		0	10%	50%	100%
								58432	Biomass power generation	▼		0	10%	50%	100%
			✓					68723	Fuel cell with hydrogen derived from biomass	▼		0	10%	50%	100%
			✓					89731	Wind power generation	▼		0	10%	50%	100%
			✓							▼					

Intervention Case

List of item

Pressure	Energy Air Water Waste WoodFood Landuse ...
State	Air quality Water quantity Water quality Soil quality Ecosystem ...
Response	Renewable energy Removal device Recycle system Environmental tax ...
Social & Institutional Capacity	GDP Population Technology Lifestyle Transportation Education Governance ...

Inventory sheet

	-	1990	2000	2010	2020	2030	-
Steel							
Chemical							
Non-metallic							
Non-ferrous							
Transport eqp.							
Machinery							
Mining							
Food							
Paper							
Wood							
Construction							
Textiles							
Agriculture							
Commercial							
Residential							
Trasportation							
Non-specified							
Non-specified							
Non-specified							

Effect of Countermeasure

Scenario		Redution			
B1-1		2000	2010	2020	2030
Pressure		Countermeasure			
Air pollutants					
Countermeasure					
23065	Fuel cell vehicle	0	10	10	10
38792	LED (Light-Emitting Diode) lighting	0	4	4	4
93804	Solar power system	0	4	4	4
83653	Regenerative burner	0	2	2	2
47623	High-temperature heat-resistant gas turbin	0	5	5	5
47453	Fiber Reinforced Plastic for vehicle	0	1	1	1
82163	Biodegradable reinforced plastic	0	5	5	5
24641	Refrigerator with carbon dioxide refrigerant	0	0	0	0
58432	Biomass power generation	0	0	0	0
68723	Fuel cell with hydrogen derived from biomass	0	0	0	0
89731	Wind power generation	0	0	0	0

Recommended Countermeasure

Sorting of Innovational Countermeasure

Environmental Issue

Global Warming

Criteria of sorting

Reduction potential

Ranking

Countermeasure	Potential	Cost
1) Fuel cell vehicle		
2) LED (Light-Emitting Diode) lighting		
3) Solar power system		
4) Regenerative burner		
5) High-temperature heat-resistant gas turbine		
6) Fiber Reinforced Plastic for vehicle		
7)		

- Global warming
- Air pollution
- Water pollution
- Waste
.....

- Reduction potential
- Marginal cost
- Ancillary benefit

- Local vitalization
- Contribution to international society
- Spill over into other technologies
- Promotion of shift to new life style

Asia-Pacific
Environmental
Innovation
Strategy Project
(APEIS)

Innovation from the Asia-Pacific
toward sustainable development

 Asia-Pacific
Environmental Innovation Strategy Project

Integrated Environmental Assessment Sub-Project

Environmental Indicators

Driving Force

Pressure

State

Reponse

Social and Insitutional Capacity