Environmental Goods and Services Sector (EGSS)

Economic and Employment Impact Assessment Using Input-Output Analysis for Japan

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Overview of EGSS

➤ Definition of EGSS

EGSS consists of activities which produce goods and services to measure, prevent, limit, minimise or correct environmental damage to water, air and soil, as well as problems related to waste, noise and eco-systems. – by OECD/Eurostat (1999)

➤ Why does EGSS exist?

- Needs for cleaning-up the pollution, disposal of wastes and recovering the damage resulted from rapid economic growth;

- Needs for addressing global environmental issues such as climate change due the planetary boundaries of our earth;

- Needs for better air and water quality and improved natural environment due to higher income levels;

- Needs to reduce energy/material use due to the high volatility of world mark price of energy and basic materials.

Motivations

➢ Green economy as a means to deliver sustainable economic growth

➢ EGSS as the centrepiece to achieve paradigm shift from conventional to green and low-carbon growth

➢ Requirements for the evidence on the effectiveness of environmental policy and green investment decisions

Green Economy in Japan

➢ **Definition of green economy in Japanese context**

"an economic system which promotes sustainable growth while improving human well-being, by pursuing economic growth and the environmental conservation in tandem, properly utilizing and conserving natural resources and ecosystem services" (in the Input to the Rio+20 Outcome Document, Government of Japan, 2011).

➢ **Japan at a crossroads in choosing G&D policies**

2011 Triple Disasters and multiple econ. and demographic challenges

Green Economy Policies in Japan

➢ **Strategy for a Sustainable Society (2007)**
Becoming a Leading Environmental Nation in the 21st Century in the areas of climate change, biodiversity, sustainable material cycles, environmental and energy technologies and resource utilization.

➢ **Strategy Towards a Low Carbon Society (2008)**
KP Target Achievement Plan

➢ **New Growth Strategy (2010)**
From supply side measures to demand-driven policies fostering demand and job creation.

➢ **Comprehensive Strategy for the Rebirth of Japan (2012)**

➢ **Innovative Strategy for Energy and the Environment (2012)**

New Growth Strategy (2010): Seven strategic/priority areas

Demand side	Supply side
Green innovation	Science, technology and IT
Life innovation	Employment and human resources
Asian economic integration	Financial sector
Tourism and local revitalization	

Source: Government of Japan (2010).

Target and components of Green Innovation strategic area

Target for 2020:

- *To generate new demand of JPY 50 trillion*

- *To create 1.4 million new jobs by green technologies development and diffusion.*
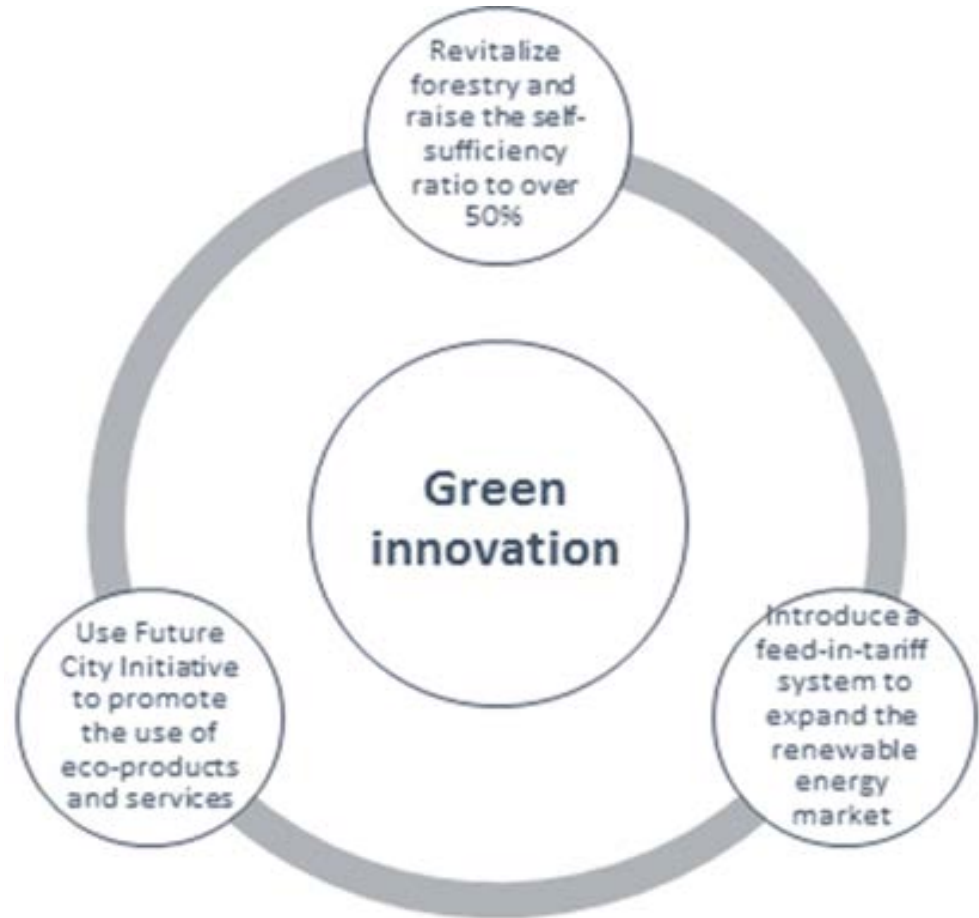
Source: Based on Government of Japan (2010).

Comprehensive Strategy: 2020 targets

2020 goals for Green policy area

- Increase percentage of the next-generation vehicles in the new car sales to 50%

- Electric Vehicles (EVs): Installation of 2 million ordinary chargers and 5,000 rapid chargers

- Achieve 50% (approximately 10 trillion yen) market share for Japanese companies in the global storage batteries market

- Standardization of net zero energy housing and development of net zero energy commercial buildings

- Renovation and upgrading of existing building stock

- 100% compliance rate with energy-saving standards for all new housing

- Total floor area of environment-friendly real estate: 10 million m^2

Source: Taken from NPU (2012).

EGSS in Japan

➤ MOEJ conducted annual surveys on the market size of environmental industry (2010).

➤ Main purposes: (i) making policies for the promotion of environmental industries; and (ii) promoting the investment in environmental industries to help achieve the New Growth Strategy.

➤ 2010 survey followed the 1999 OECD's EGSS classification.

➤ From 2011, MOEJ re-classified Japan's EGSS to reflect both the latest development and specific situation of environmental industries in Japan.

Four categories of EGSS in Japan

No	EGSS category 1 Environmental Pollution Prevention	EGSS category 2 Measures against Global Warming	EGSS category 3 Waste disposal and effective utilization of resources	EGSS category 4 Conservation of natural environment
1	Air pollution control equipment and facilities	Renewable Energy	Waste treatment and effective use of resources	Water resource use
2	Sewage, waste water treatment equipment and facilities	Energy-saving vehicles	Waste disposal and recycling services	Sustainable foresty
3	Soil, water purification equipment and facilities	Energy-saving appliances	Reform or renovation	Sustainable agriculture and fisheries
4	Noise, device for vibration prevention and facilities	High efficiency water heater	Lease and rental	Biodiversity, eco tourism and others
5	Environmental measurement, analysis, monitoring equipment and facilities	Saving energy consulting	Used and reuse goods	
6	Other environmental pollution prevention products, equipment and facilities	Others	Recycled materials	
7	Sewage, waste water treatment services		Others	
8	Soil, water purification services			
9	Environmental analysis. Measurement, monitoring and asssessment			
10	Environmental education, environmental finance and consulting, etc			

Source: http://www.env.go.jp/policy/keizai_portal/B_industry/1-1.bunruikaitei.pdf

Market size of environmental industries in Japan
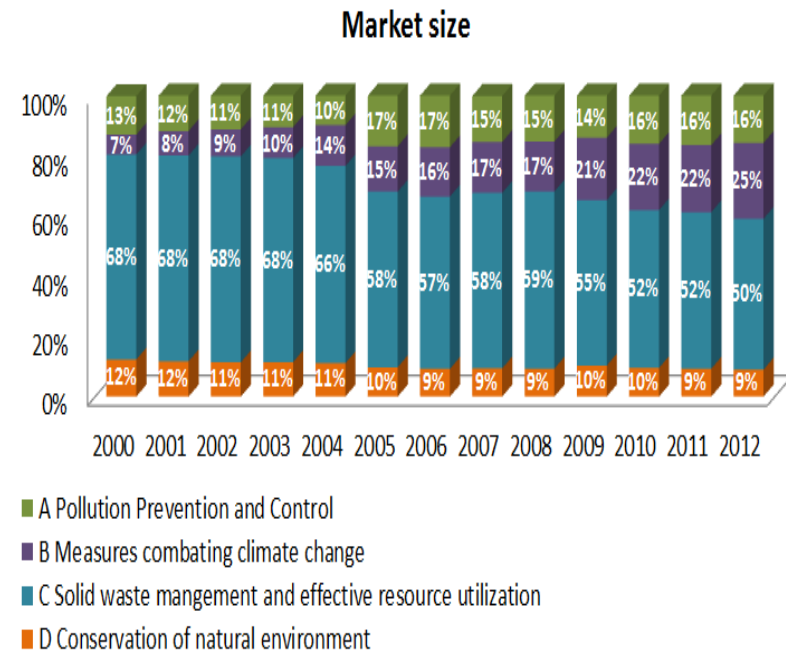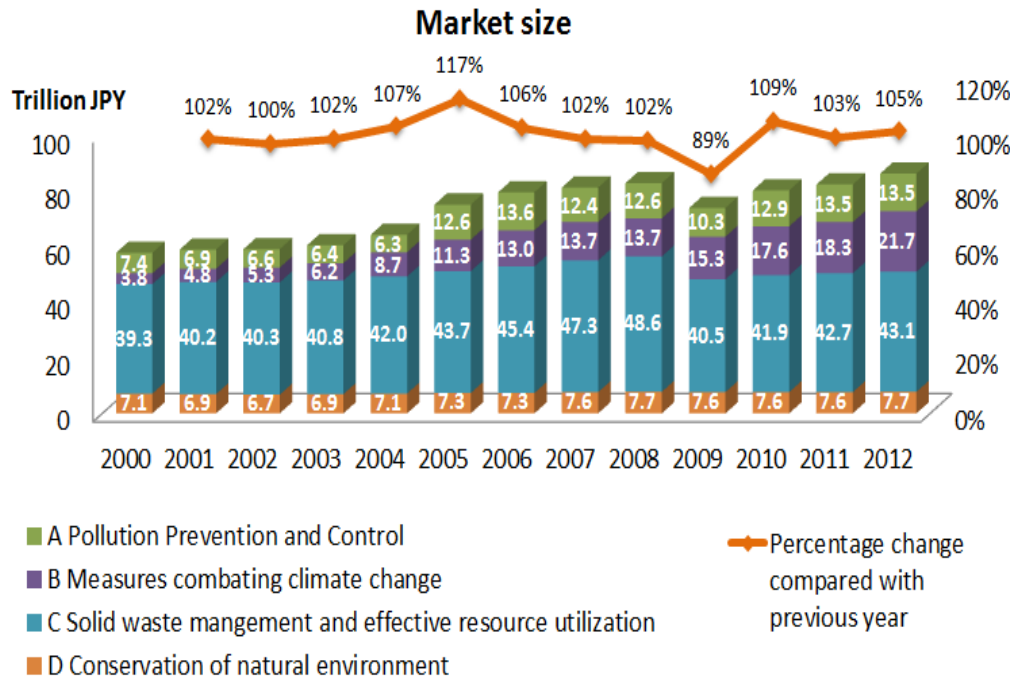
In 2012, the market size of EGSS in Japan valued at JPY 86 trillion. Estimated value-added is about JPY 37 trillion, accounting for 8% of the nominal GDP in 2012. Imports was JPY 2 trillion and exports was JPY 9 trillion.

Source: Author compilation based on the statistical data of MOEJ (2014).

Employment in environmental industries in Japan

In 2012, the employment was 2.4 million people.

Source: Author compilation based on the statistical data of MOEJ (2014)

Research questions

➤ **How large are the total impacts both directly and indirectly (the multiplier effects) that are generated from EGSS? Whether they can deliver the outcomes for achieving the 2020 targets for new demand and new job creation?**

➤ **Whether the EGSS performs better in terms of output and employment than economy-wide average when Japan prioritized EGSS as the new engine of economic growth?**

➤ **Will a shift in the investment in EGSS help achieve the dual goals, economic growth and environmental conservation, of a green economy?**

Methodology

➢ **Correspondence of EGSS sector classification and IO sector classification**
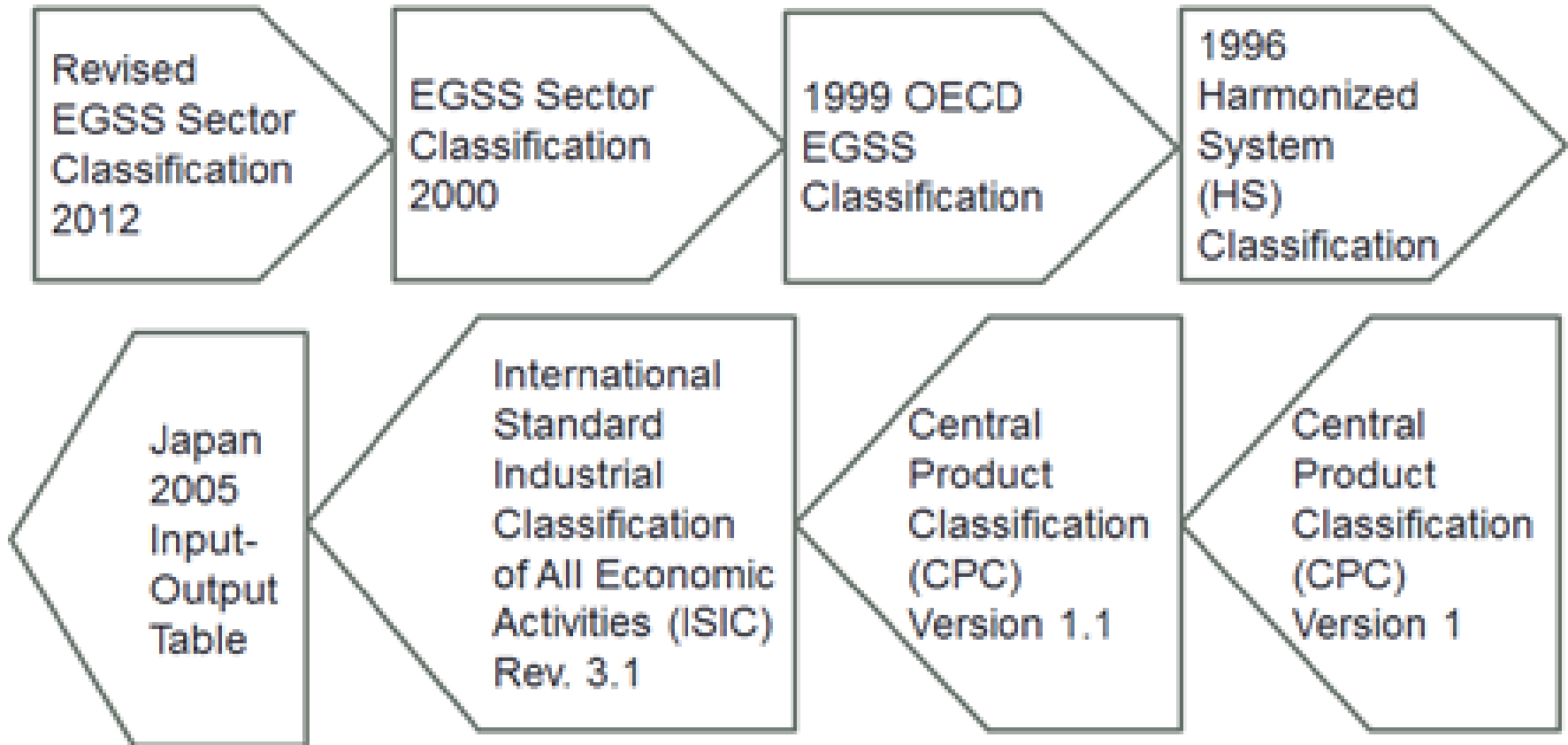
Methodology

➢ **Data and sources**

No.	Data description	Source
1	Market size of EGSS (based on the 2012 Revised Japan's Environmental Industry Classification)	MOEJ, 2014
2	Employment in EGSS (based on the 2012 Revised Japan's Environmental Industry Classification)	MOEJ, 2014
3	2000 IO table (104 sector)	Ministry of General Affairs of Japan
4	2005 IO table (108 sector)	Ministry of General Affairs of Japan
5	80 sector IO tables (2009-2012)	Ministry of Economy, Trade and Industry (METI)
6	Employment data for 2000 IO 104 sectors	Ministry of General Affairs of Japan
7	Employment data for 2005 IO 108 sectors	Ministry of General Affairs of Japan
8	104 sector-occupation employment matrix (2000)	Ministry of General Affairs of Japan
9	108 sector-occupation employment matrix (2005)	Ministry of General Affairs of Japan

Methodology

> ## Revised statistical classification of Japan's EGSS

Level I:	4 categories
Level II:	17 categories
Level III:	35 categories
Level IV:	207 categories

Methodology

➢ **Multiplier analysis**

- Economy-wide output impacts

$$X = (I - (I - \hat{M})A)^{-1}F = BF$$

- Economy-wide employment impacts

$$E = \hat{e}BF$$

- Output impacts from EGSS

$$x_i = b_{i,j-k}f_k$$

- Employment impacts from EGSS

$$e_i = \hat{e}_i b_{i,j-k}f_k$$

Methodology

> **Data used for multiplier analysis**

Years	Output multiplier calculation $b_{i,j-k}$	Employment ratios calculation $\hat{e}_i$	Final demand ratio calculation r_{i-k}	Market size of EGSS x_k	Occupation distribution ratios $o_{i,s}$
2000-2004	2000 IO table (104 sector)	Employment data for 2000 IO 104 sectors	2000 IO table (104 sector)	Yearly statistical data.	104 sector-occupation employment matrix for 2000 IO 104 sectors
2005-2008	2005 IO table (108 sector)	Employment data for 2005 IO 108 sectors	2005 IO table (108 sector)	Yearly statistical data.	108 sector-occupation employment matrix for 2005 IO 108 sectors
2009	2009 IO table (80 sector)	Employment data for 2005 IO 108 sectors	2009 IO table (80 sector)	Yearly statistical data.	108 sector-occupation employment matrix for 2005 IO 108 sectors
2010	2010 IO table (80 sector)	Employment data for 2005 IO 108 sectors	2010 IO table (80 sector)	Yearly statistical data.	108 sector-occupation employment matrix for 2005 IO 108 sectors
2011	2011 IO table (80 sector)	Employment data for 2005 IO 108 sectors	2011 IO table (80 sector)	Yearly statistical data.	108 sector-occupation employment matrix for 2005 IO 108 sectors
2012	2012 IO table (80 sector)	Employment data for 2005 IO 108 sectors	2012 IO table (80 sector)	Yearly statistical data.	108 sector-occupation employment matrix for 2005 IO 108 sectors

Results: Comparison of direct and economy-wide output impacts

Trillion JPY   **2000**
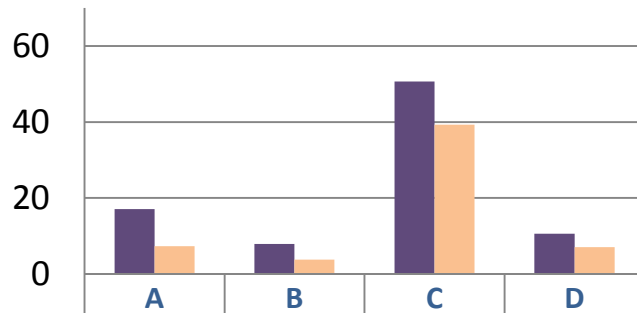
	A	B	C	D
■ Economy-wide output impacts	17.09	7.90	50.59	10.58
■ Market size of EGSS	7.39	3.85	39.33	7.11

Trillion JPY   **2012**
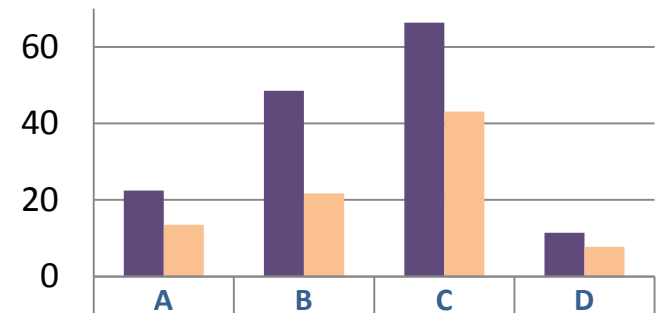
	A	B	C	D
■ Economy-wide output impacts	22.44	48.49	66.29	11.39
■ Market size of EGSS	13.51	21.72	43.09	7.73

Output Multipliers	A	B	C	D	EGSS average	Economy wide average
2000	1.97	2.12	1.72	1.84	1.86	1.70
2012	1.52	2.28	1.78	1.71	1.91	1.65

In 2012, among all EGSS sectors, eco-cars (3.05) and eco-driving related facilities (2.91) had the highest output multipliers. The building sector (reform and repair) had the largest indirect output impacts.

Results: Comparison of direct and economy-wide employment impacts

2000
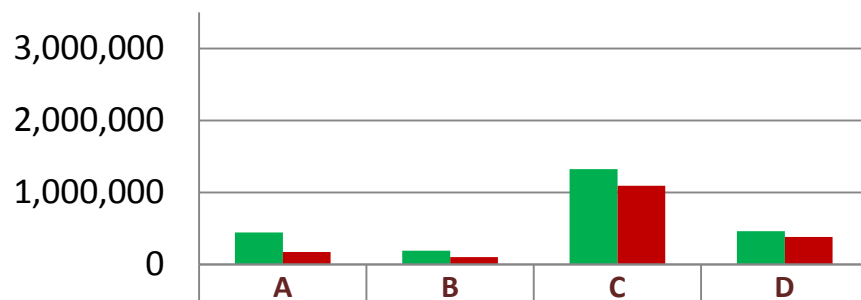
Persons

	A	B	C	D
■ Economy-wide employment	446,046	189,629	1,325,482	461,190
■ Employment in EGSS	172,764	103,661	1,093,705	381,423

2012

Persons

	A	B	C	D
■ Economy-wide employment	314,130	1,091,045	1,903,995	599,063
■ Employment in EGSS	155,365	424,580	1,338,506	514,638

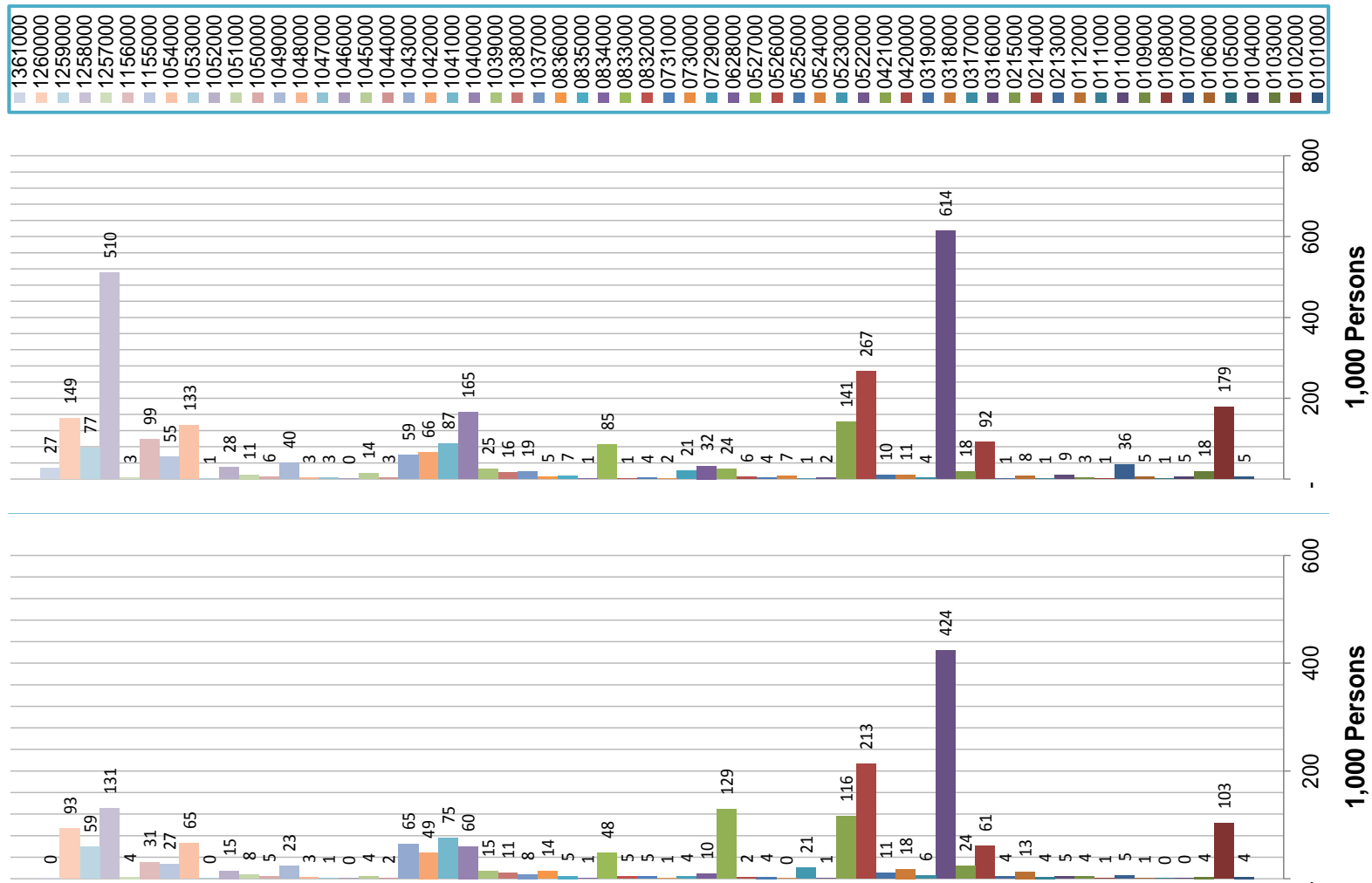| Employment multipliers	A	B	C	D	EGSS average	Economy-wide average
2000	1.81	2.50	1.45	2.05	1.68	1.561
2012	1.84	2.36	1.59	1.76	1.84	1.558

In 2012, among all EGSS sectors, eco-cars (9.3) and sulphur-free petroleum (6.5) had the highest employment multipliers. The building sector (reform and repair) had the largest indirect employment, engaging about 1 million persons.

Occupation distribution
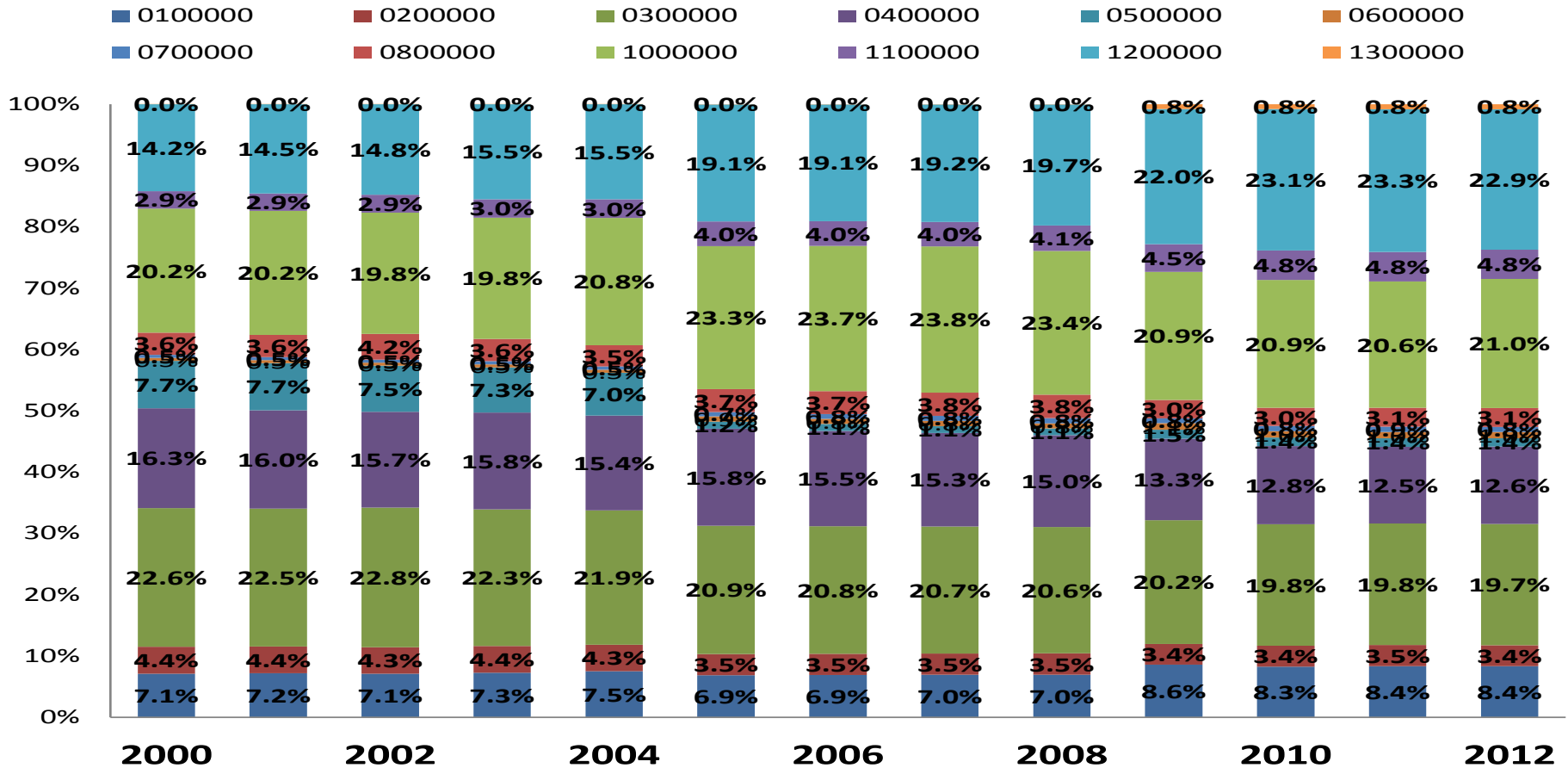
In 2012, workers in the extraction and construction (code 120) accounted for the largest share (23%) followed by machine operators (code 100, 21%). From structural change viewpoint, more workers were in the extraction and construction in 2012 compared with 2000, but less workers in the sales (code 040) and service sector (code 050).

Compared to the national average occupational distribution, EGSS-induced occupation have relatively less employment in professional/technical positions (010) and in sales and service sector (050), but much more engaged in engineering and manufacturing sector (010) and extraction and construction sector (120).

Conclusions (1)

➤ EGSS in Japan, accounting for 10% of total output and 8% of value added and providing 2.4 million jobs in 2012, is a key and potential area of economic growth.

➤ From economy-wide impact perspective, EGSS generated JPY 150 trillion and absorbed nearly 4 million workers directly and indirectly in 2012, which in some sense achieved the 2020 goals set by the 2010 New Growth Strategy.

➤ The higher average multipliers of EGSS, in terms of both output and the employment multiplier, than the economy-wide average levels, indicated that EGSS can be considered as a new engine and competitive edge of Japan's sustainable economic growth.

Way forward

➢ Impact analysis based on policy scenarios (e.g. FIT, government environmental expenditure, economic incentives on eco-cars and energy-saving electronic appliances, etc.).

➢ Projections of EGSS development for 2020 based on the market trend both domestically and overseas (particular in Asia).

➢ A complete EGSS-based IO analysis by sepaarting EGSS and non-EGSS and environmental effectiveness assessment.

Thank you!

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