

Development and Transfer of Low Carbon Technology in Asia-Pacific Region

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Outline

- Vision for Asia-Pacific development in the future
- Typology of technology cooperation: definition
- Needs for technologies to achieve target of low carbon development/emission reduction
- Current Status: indicators, facts, and observation
- Effectiveness/adequacy assessment
- Potential to enlarge cooperation

Vision for Asia-Pacific Development in the Future

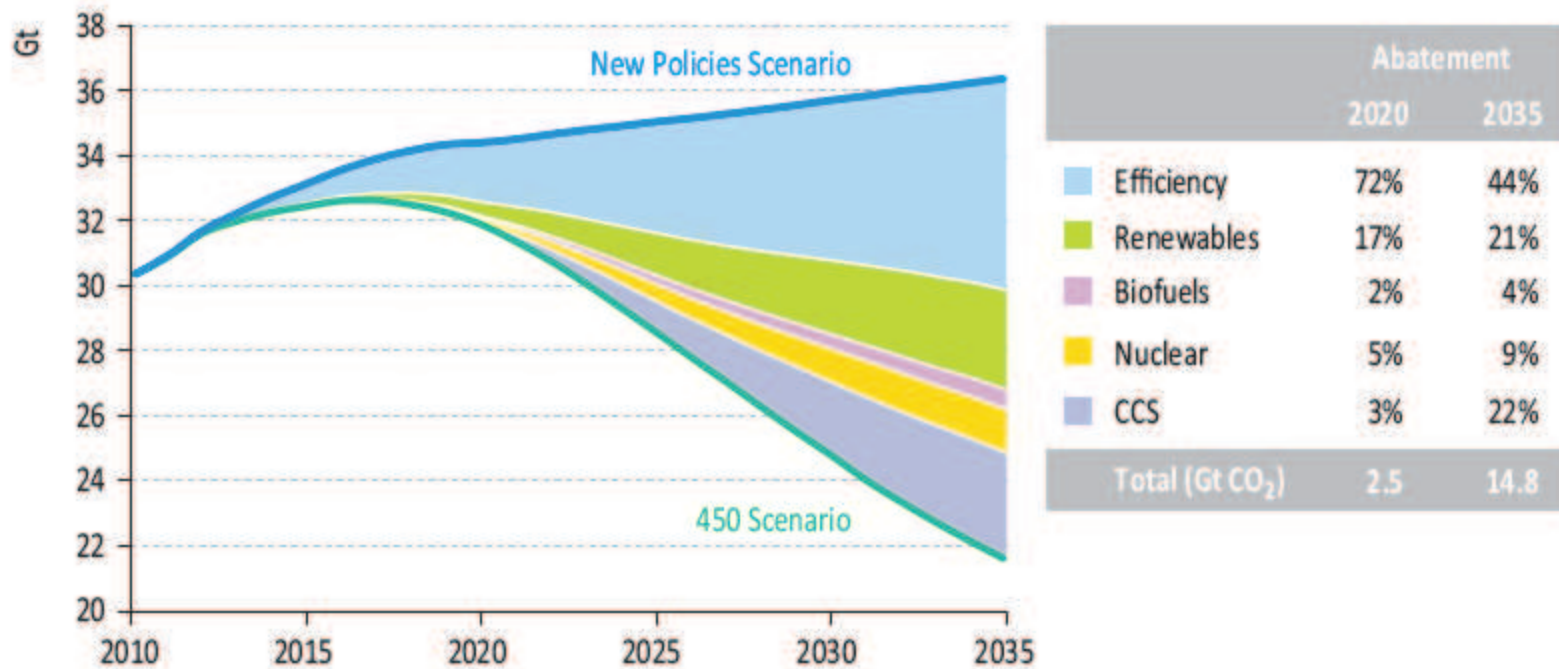
- Higher percentage of population, GDP, energy use/demand, and emission potential
- Towards knowledge or resources based economies?
- Central place(s) for innovation?
- Achievement of delinking carbon emission from development
- Transition towards low carbon pathway

Typology of technology cooperation

- Market based spillover effects of tech transfer, via:
 - International trade of IP, commodities, and services
 - FDI and
 - Technical assistance
- Innovative mechanism to address global externality/public goods, e.g., UNFCCC process
 - IPR and know-how as an offset of emission reduction
 - Policy instruments to integrate technologies as tools to address global climate externality for better enabling environment
 - Innovative mechanism to finance low carbon technologies; and
 - Combine the roles of market mechanism and public policies and PUBLIC and PRIVATE

Needs for technologies to achieve target of low carbon development I

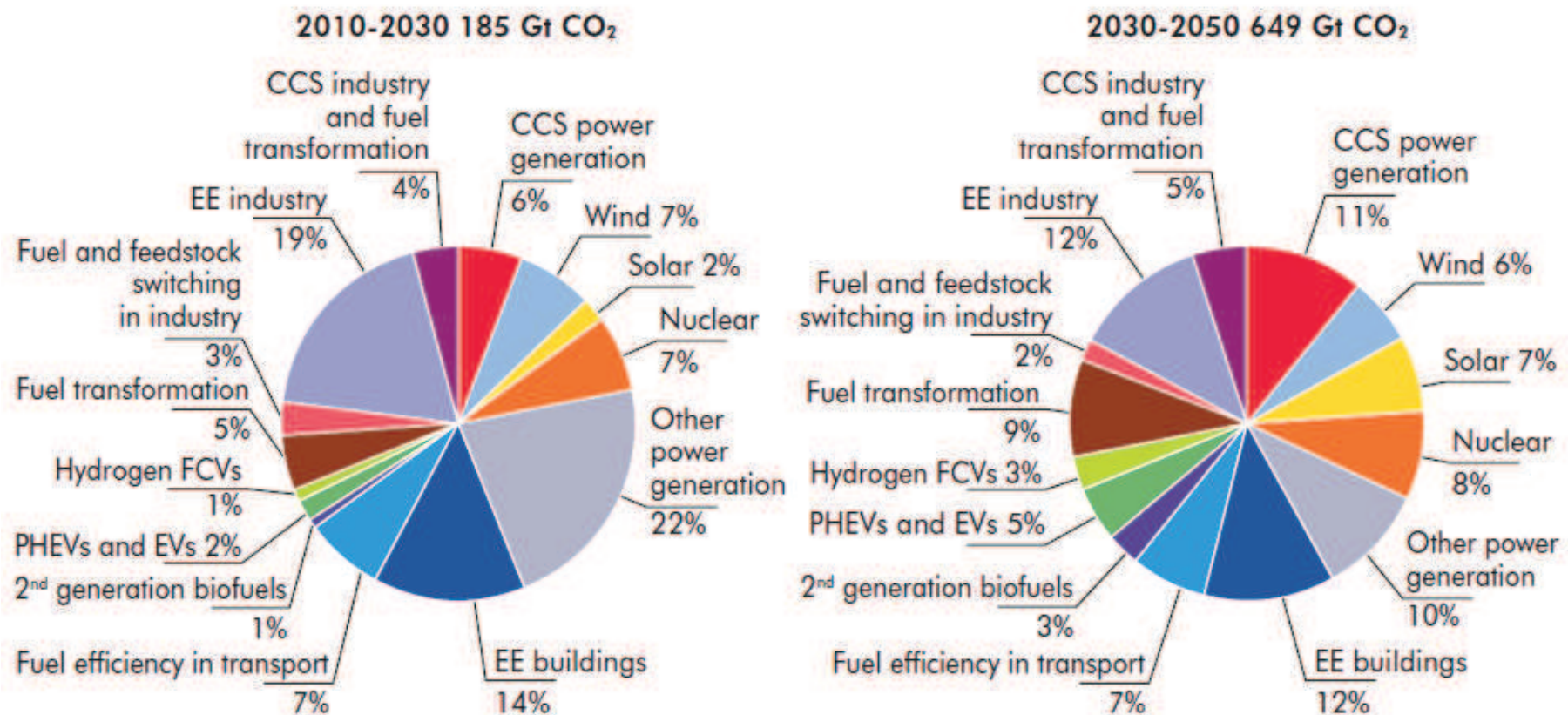
World energy-related CO₂ emissions abatement in the 450 Scenario relative to the New Policies Scenario



Source: IEA, World Energy Outlook, 2011

Needs for technologies to achieve target of low carbon development II

The BLUE Map scenario portfolio of technologies and their contributions to CO₂ emissions reductions



EE: energy efficiency; EVs: electrical vehicles; FCVs: fuel-cell vehicles.

Source: IEA, Energy technology perspectives, 2010

Needs for technologies to achieve

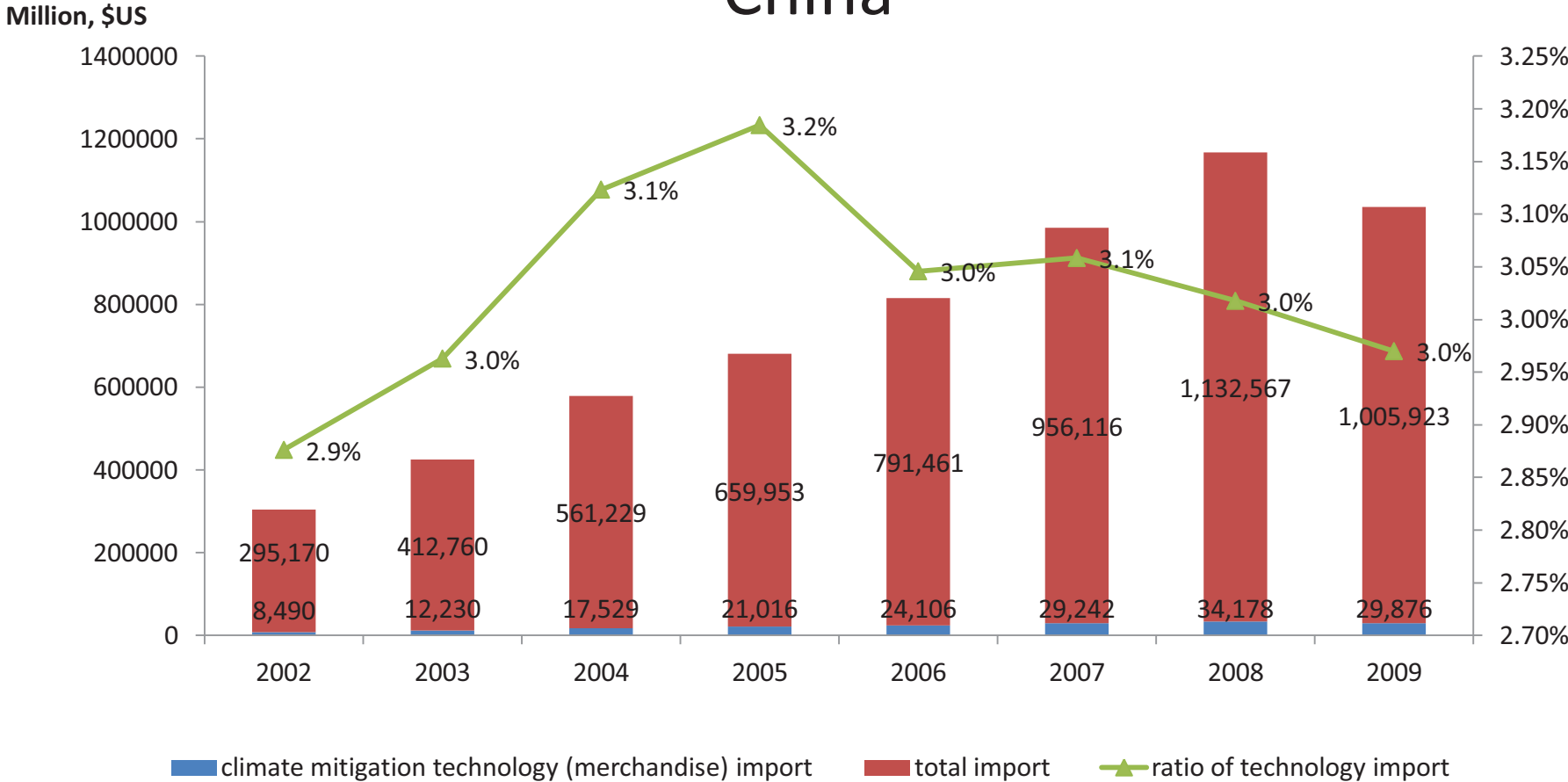
	Deployment & Diffusion (Near term)	Demonstration (Medium-term)	R&D (long term)
Power	USC; On-shore Wind power technology; 3rd generation large-scale Advanced pressurized water reactor; Geothermal- Conventional; High-efficiency natural gas fired power generation;	Coal Integrated Gasification Combined Cycle (IGCC); Off shore wind power; Solar Photovoltaic; Geothermal-Enhanced; 2nd Biomass;	Low cost CO2 capture and storage; Nuclear fusion; CSP; Power storage; Smart grid; 4th nuclear generation; Solar nanotechnology photovoltaic; Hydrogen production, storage and distribution; Fuel Cell
Steel	CDQ; CCPP; CMC; Power, heat and fuel recovery; Coal Injection of Blast Furnace; Energy management center;	COREX; FINEX; Advance EF; Smelting reduction technology; Waste Plastic Injection;	Direct Casting; CO2 capture and storage;
Transport	Enhance fuel economy of vehicles by improved engine/ transmission/ matching technology; Develop advanced diesel vehicles; Improve railway electrification; Aviate fuel economy management;	Hybrid vehicles; Enhance fuel economy of transport system by information & intelligent systems Improved road network;	Fuel cell vehicles; Electric-motor vehicles; Optimizing the construction and integration of transport capacity;
Cement	NSP cement kiln technology, especially the automatic control device and the overall operation level; Low-temperature cogeneration technology;	Eco-cement Alternative fuels and cement clinkers;	CCS;
Chemical	New type catalyst; Large-scaled Synthetic Ammonia equipment; Optimize structure of raw material for Ethylene;	Alternative fuels and raw materials;	CCS;
Buildings	Green Lighting; Technologies and materials of heat-insulation of external walls and roofs; Advanced efficiency electric devices ;	District energy system; Heat pump system; supervising and Monitoring of building energy consumption technologies; Heat- electricity-coal gas triple co-supply system	Energy storage technology ; Zero-emission buildings Building integrated photovoltaic solar power system; Advanced city plan;

Source: UNDP China and PECE, 2010

CURRENT STATUS: TRADE OF CLIMATE-FRIENDLY TECHNOLOGIES

Trends in Import of Climate Friendly Technologies

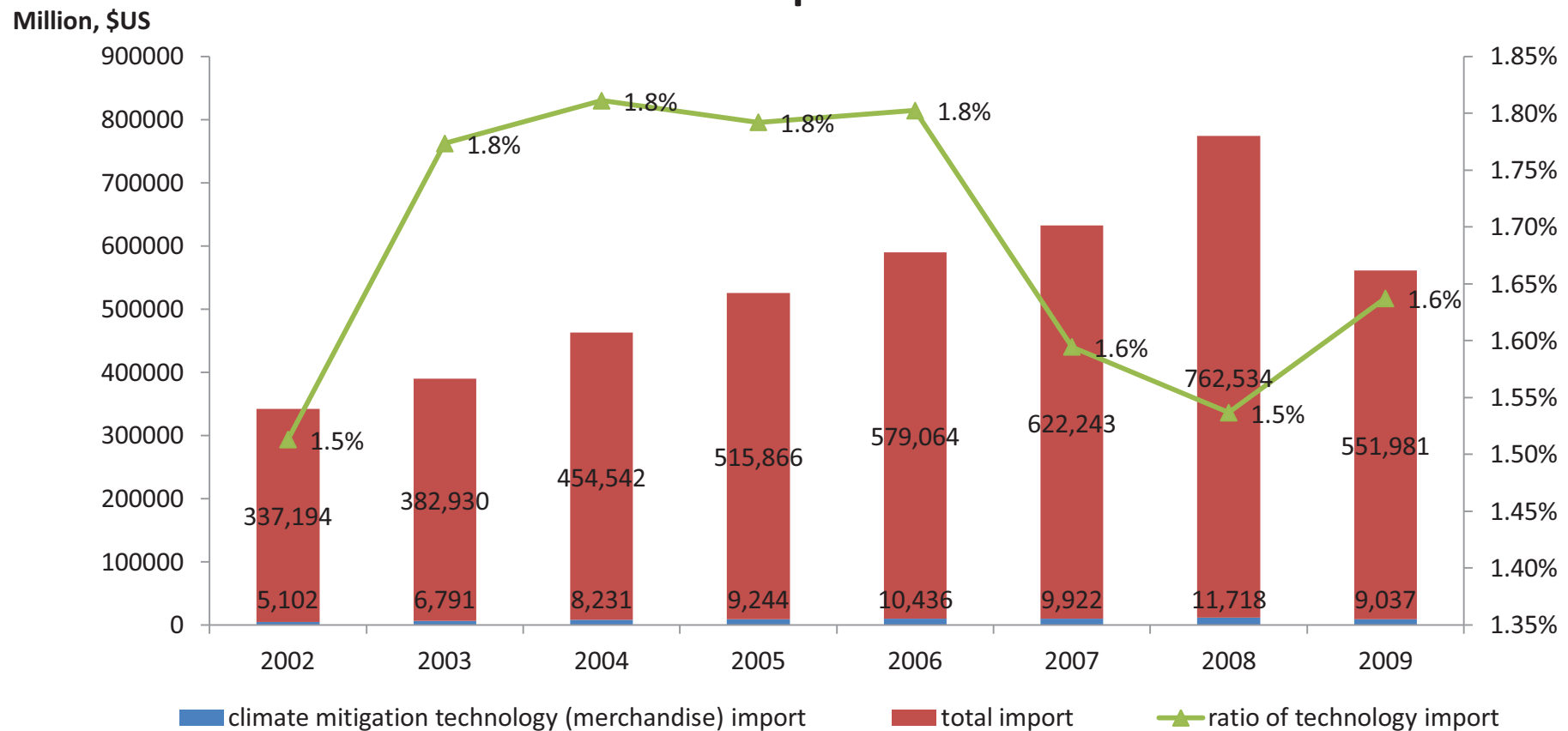
China



Sources: World Bank Standard List of Climate-Friendly Technologies(43 List)
WTO, Tariff Analysis Online database

Trends in Import of Climate Friendly Technologies

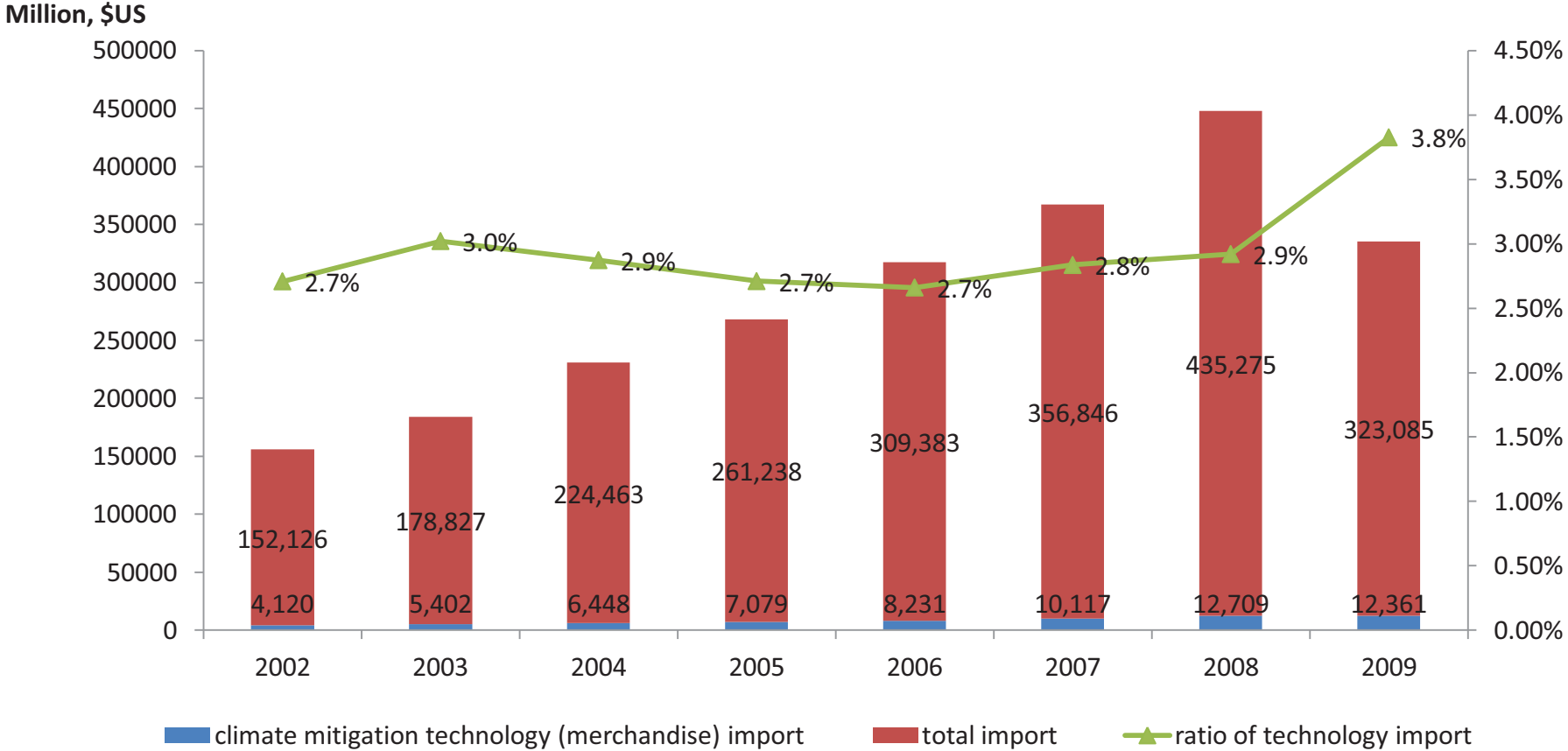
Japan



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WTO, Tariff Analysis Online database

Trends in Import of Climate Friendly Technologies

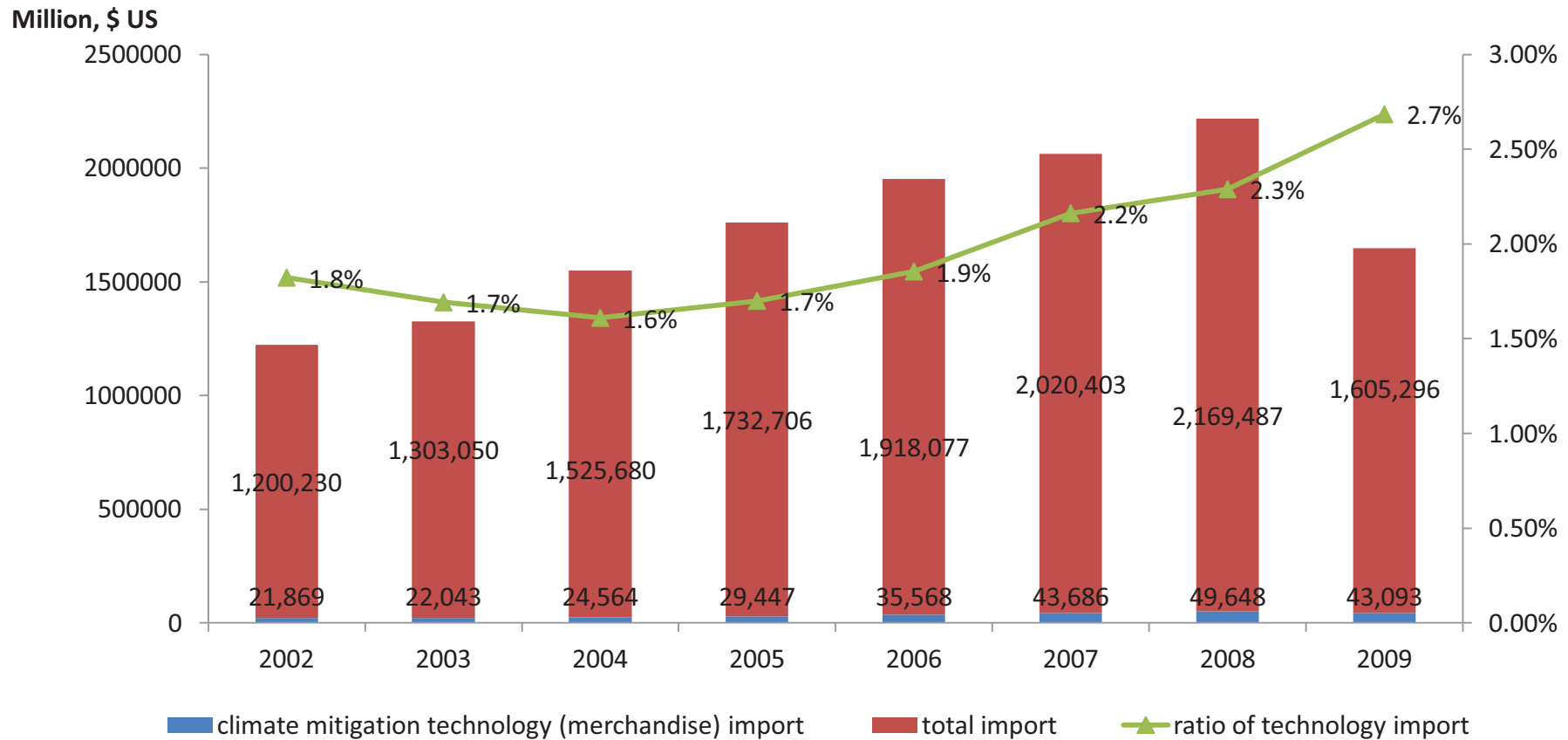
Korea



Sources: World Bank Standard List of Climate-Friendly Technologies(43 List)
WTO, Tariff Analysis Online database

Trends in climate mitigation technology merchandise import and its proportion

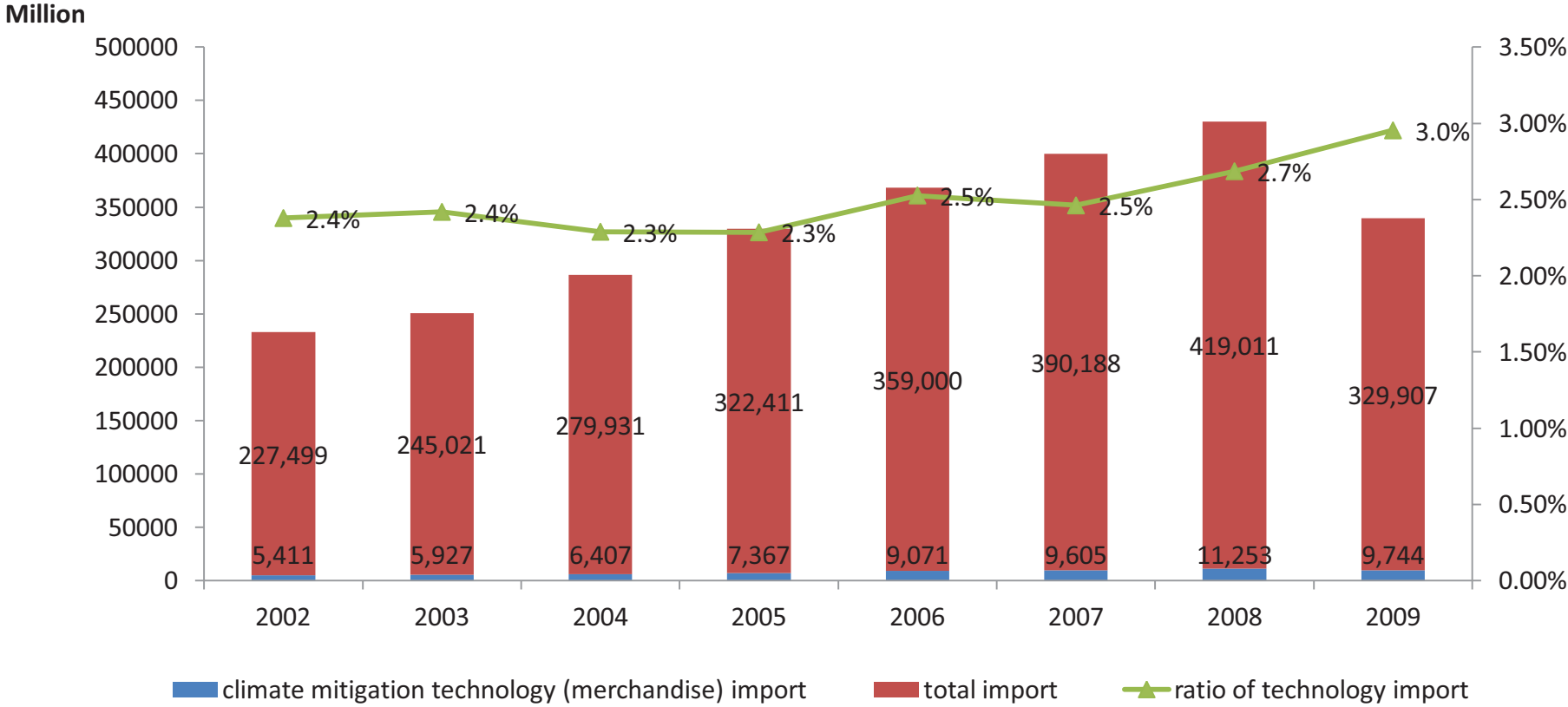
United States



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WTO, Tariff Analysis Online database

Trends in Import of Climate Friendly Technologies

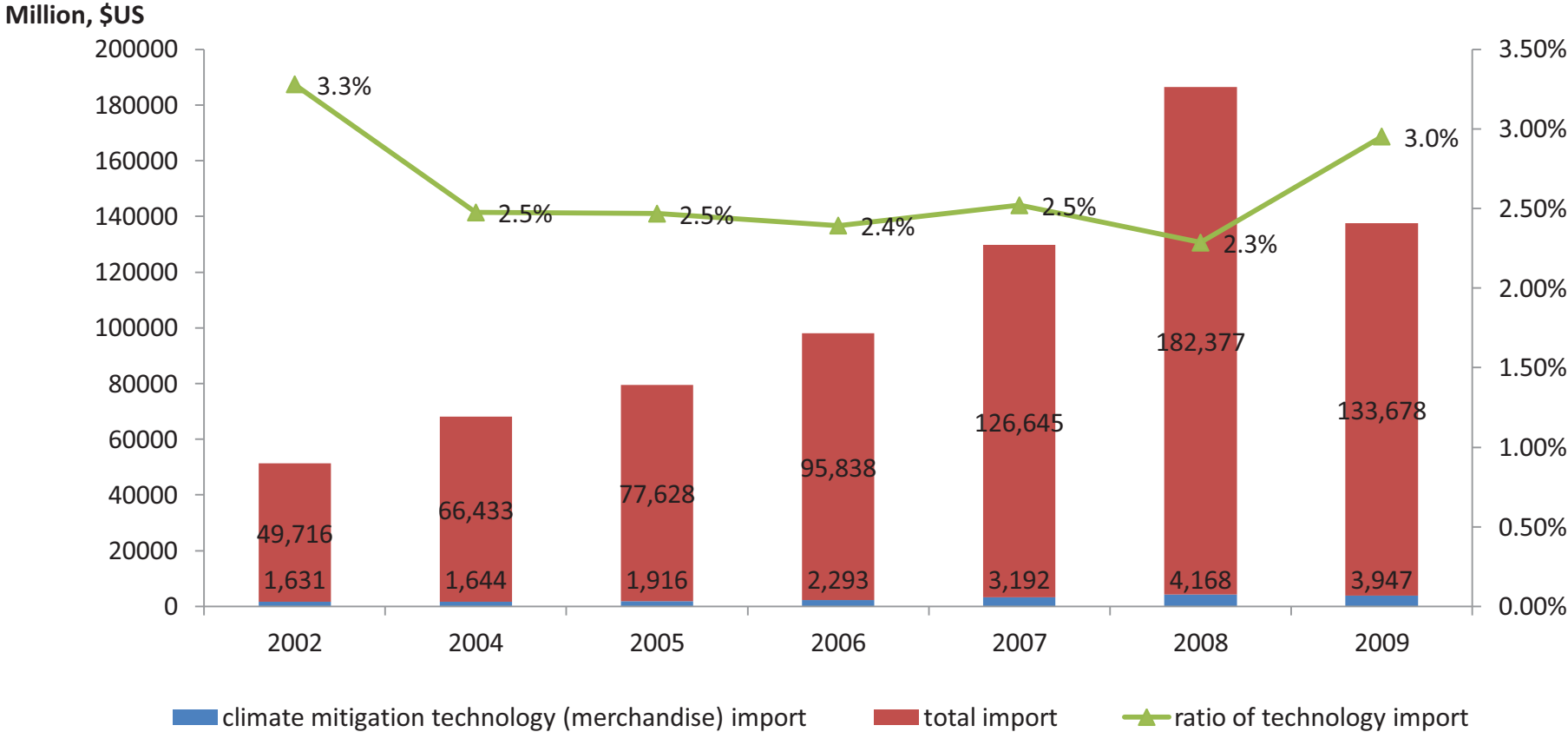
Canada



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Trends in Import of Climate Friendly Technologies

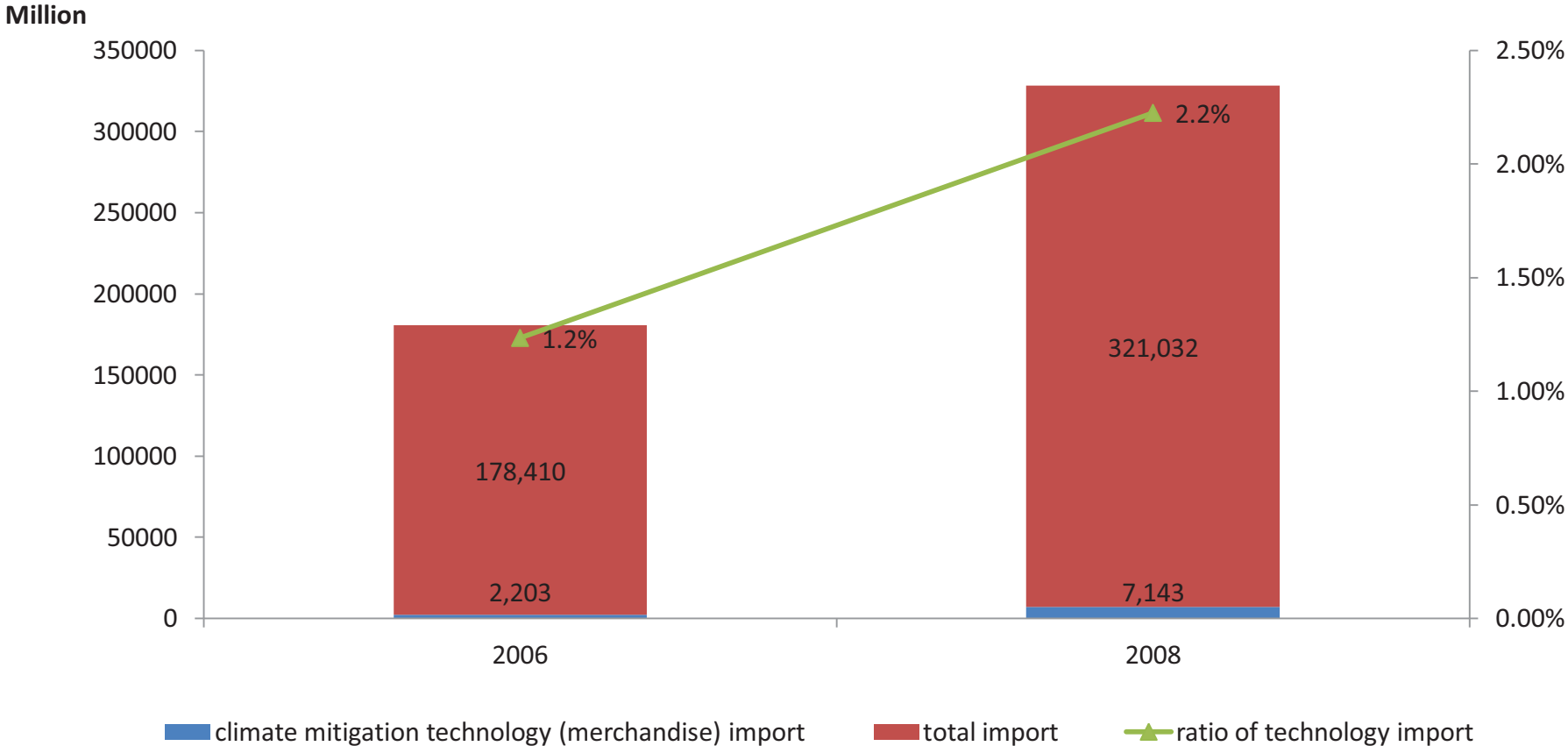
Brazil



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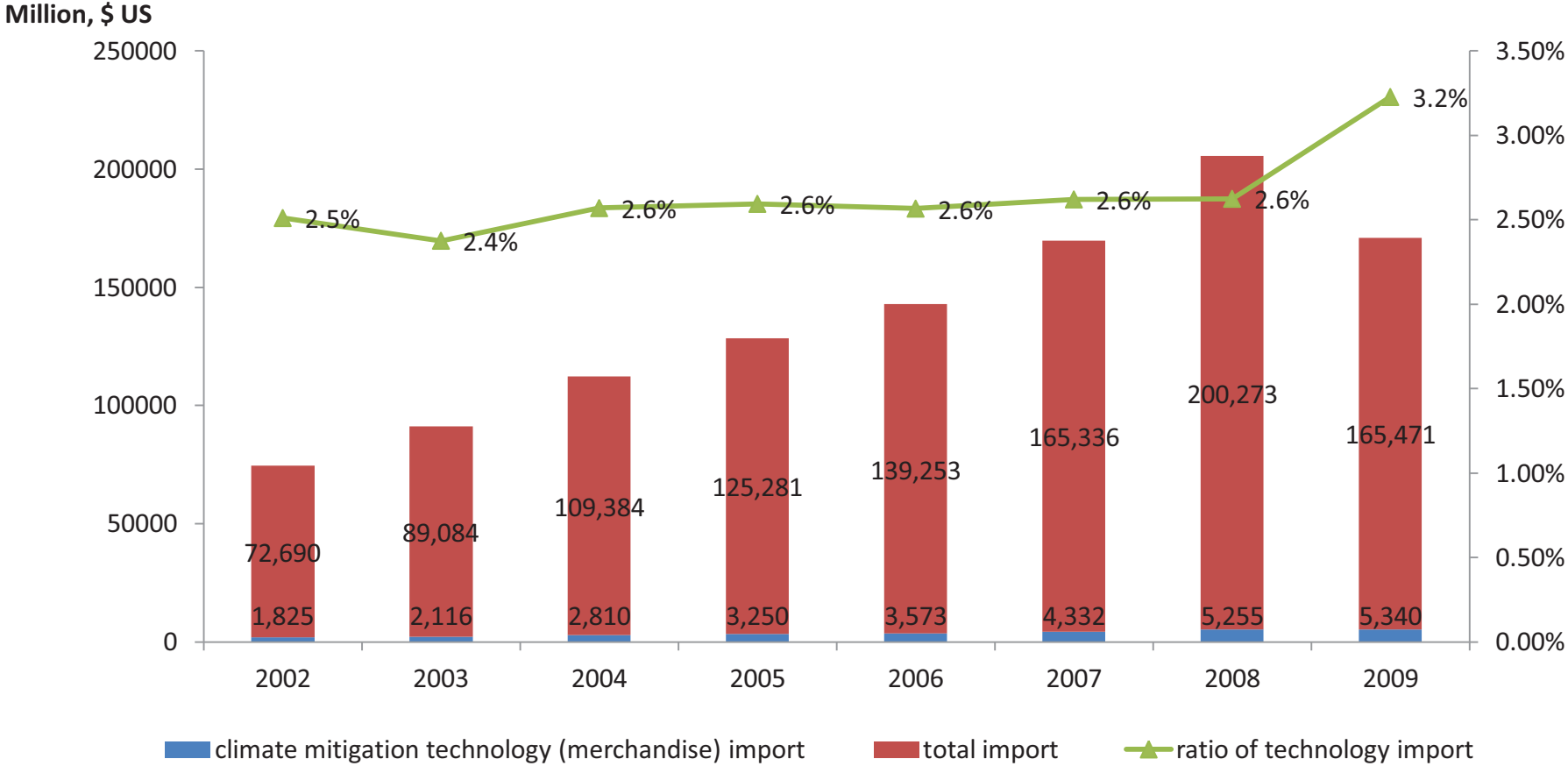
India



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Trends in Import of Climate Friendly Technologies

Australia



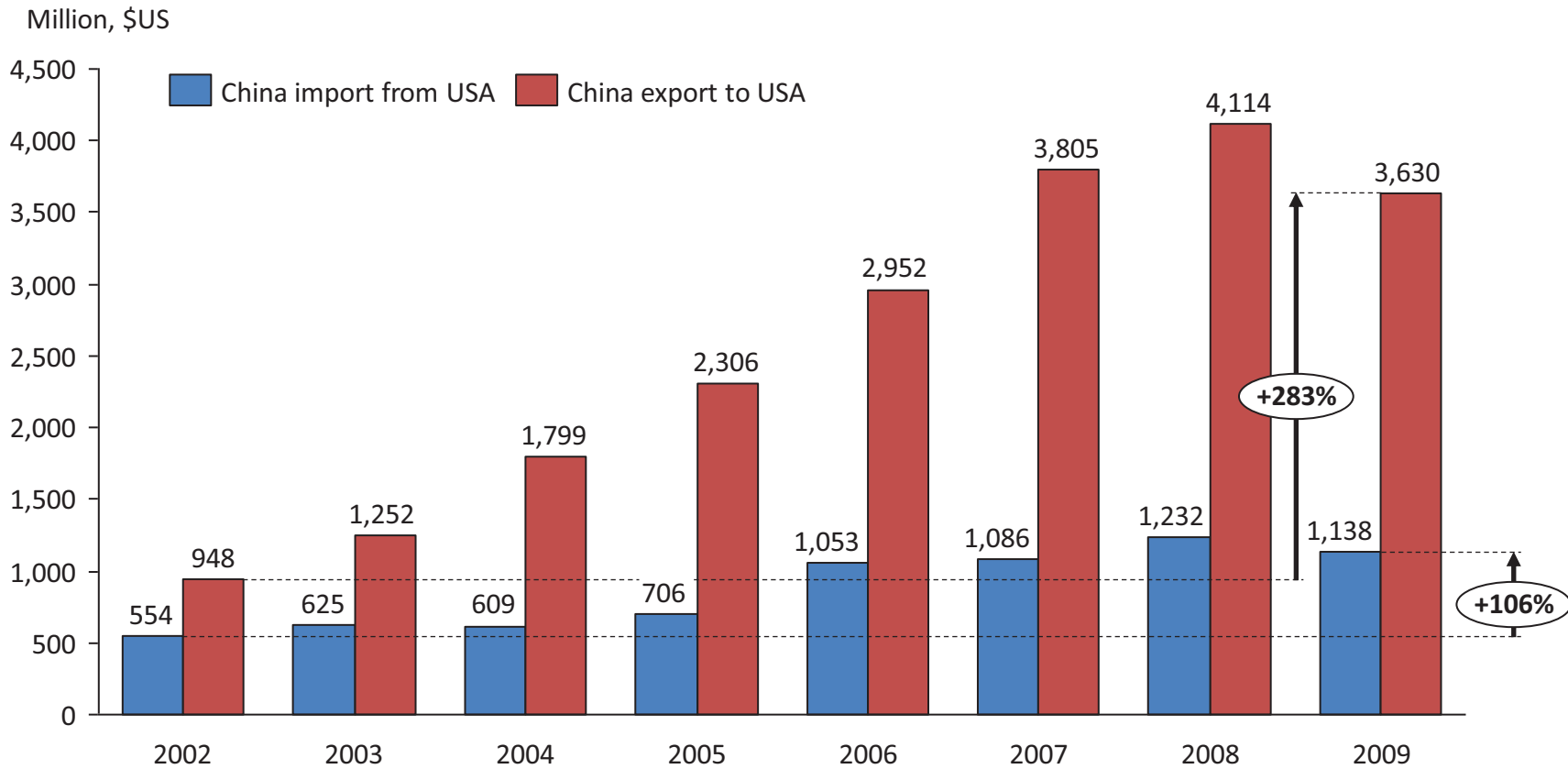
Sources: World Bank Standard List of Climate-Friendly Technologies(43 List)
 WTO, Tariff Analysis Online database

CURRENT STATUS: TRADE OF CLIMATE-FRIENDLY TECHNOLOGIES

- Definition of the range of Climate Friendly Technologies (CFT): exercise by the World Bank with standard list
- The CFTs only account for 1.8 (Japan) – 3.8 % of major economies' total merchandise imports, very limited in the traditional trade share
- These shares slightly decreased in China and Japan in 2009, while increased steadily in other Asian Pacific major economies during 2005 - 2009

Trade of Climate Friendly Technologies between Major Economies

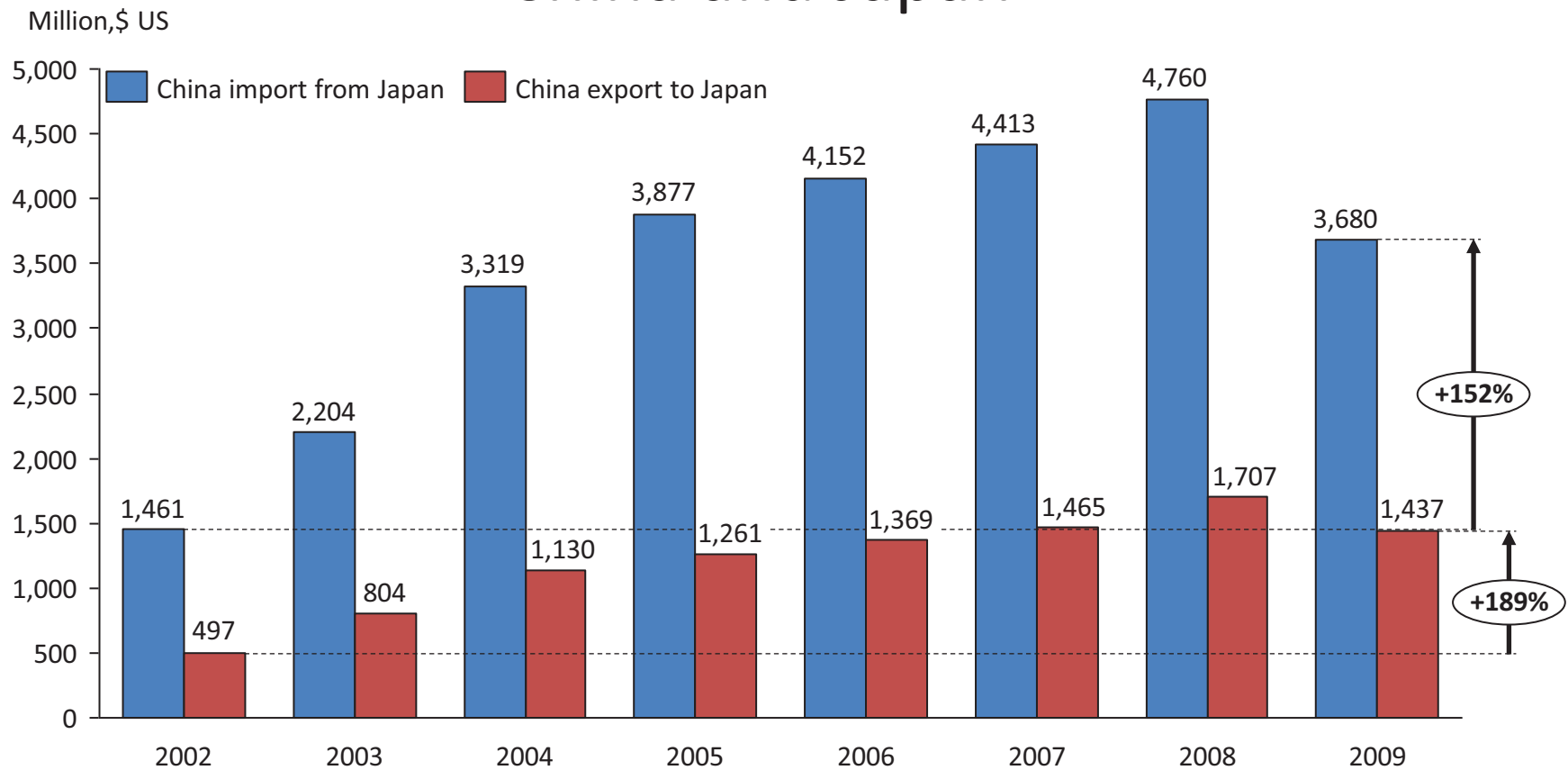
China and United States



Sources: World Bank Standard List of Climate-Friendly Technologies(43 List)
WTO, Tariff Analysis Online database

Trade of Climate Friendly Technologies between Main Economies

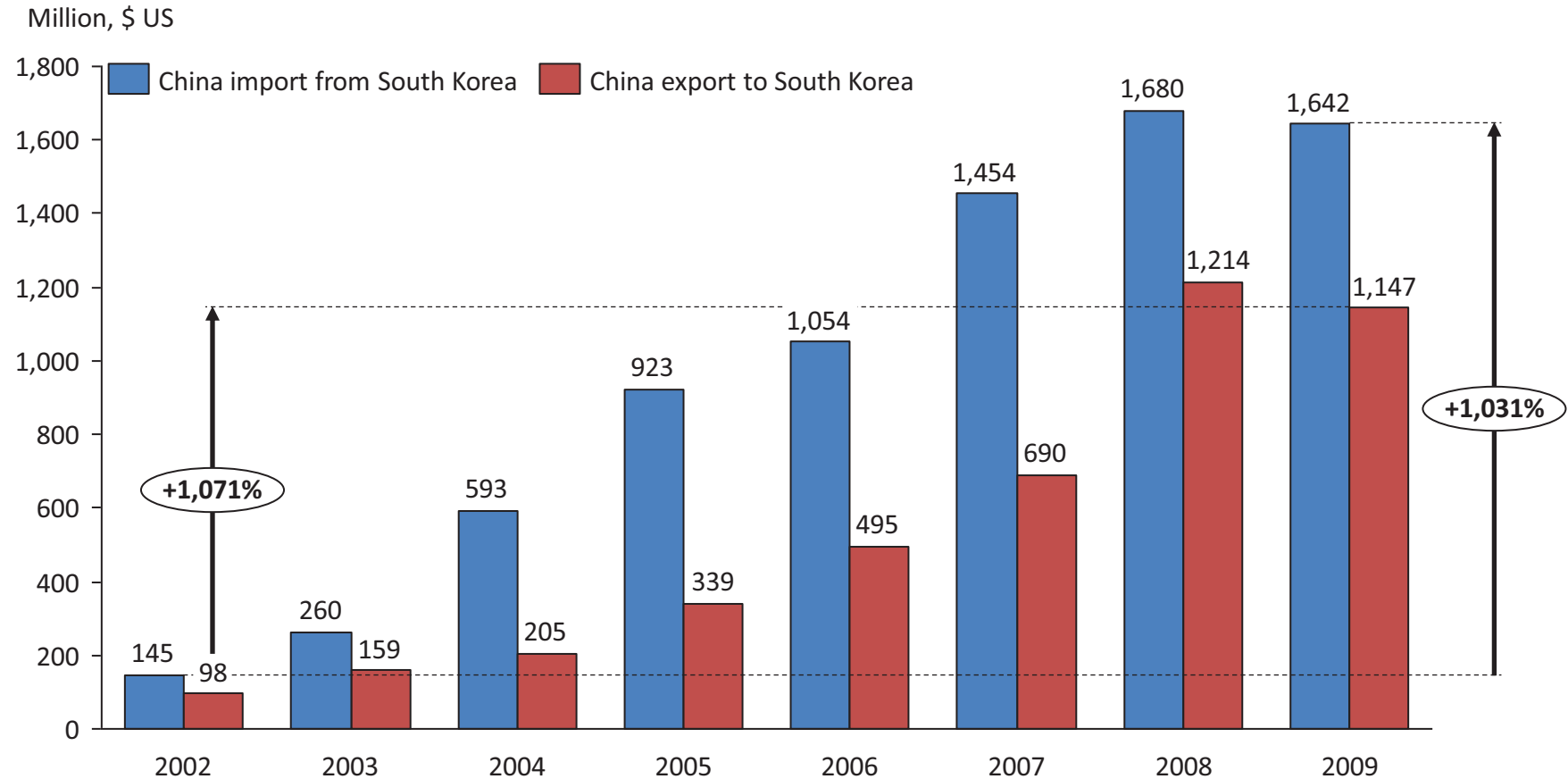
China and Japan



Sources: World Bank Standard List of Climate-Friendly Technologies(43 List)
WTO, Tariff Analysis Online database

Trade of Climate Friendly Technologies between Main Economies

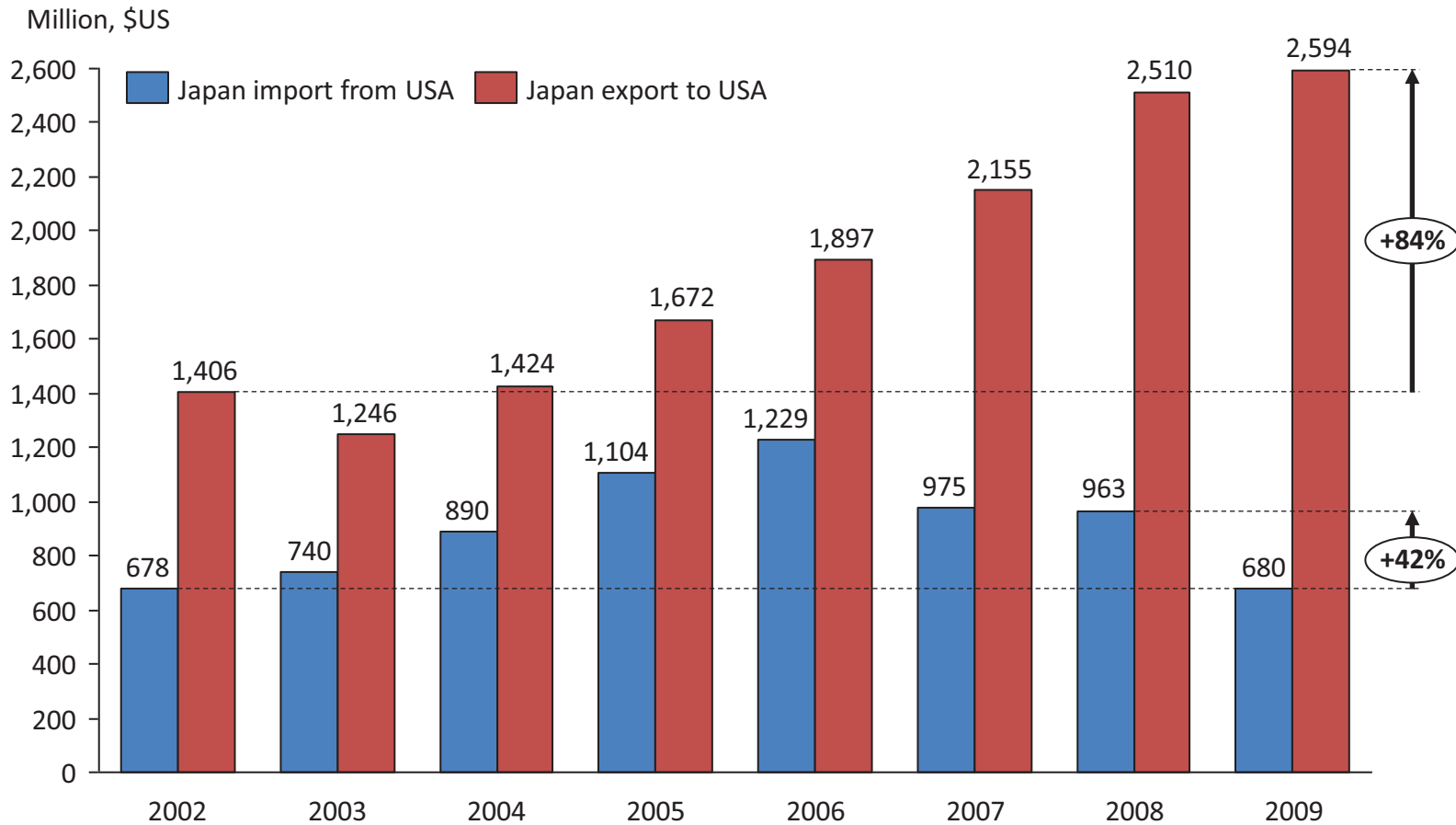
China and South Korea



Sources: World Bank Standard List of Climate-Friendly Technologies(43 List)
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Trade of Climate Friendly Technologies between Main Economies

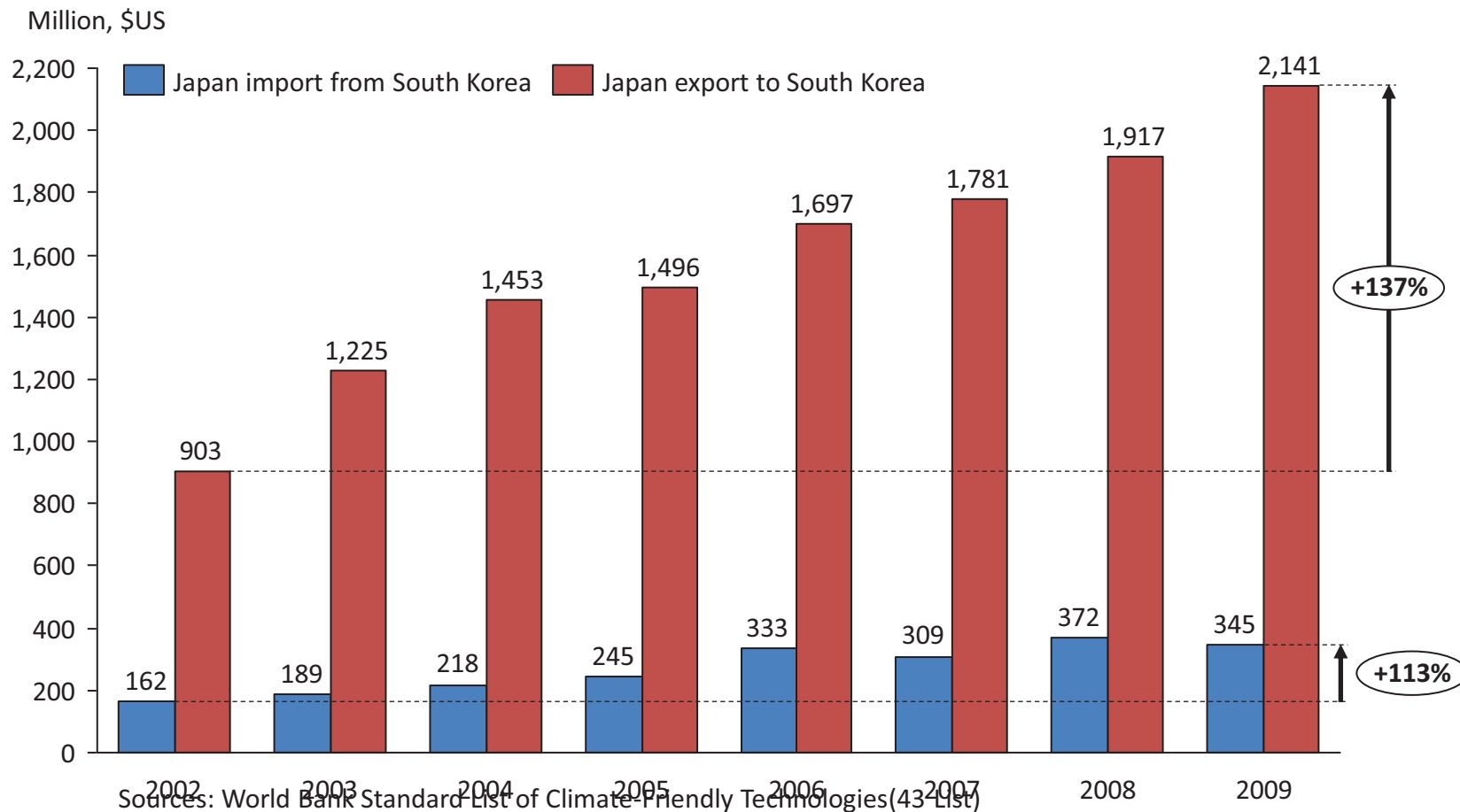
Japan and United States



Sources: World Bank Standard List of Climate-Friendly Technologies(43 List)
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Trade of Climate Friendly Technologies between Main Economies

Japan and South Korea

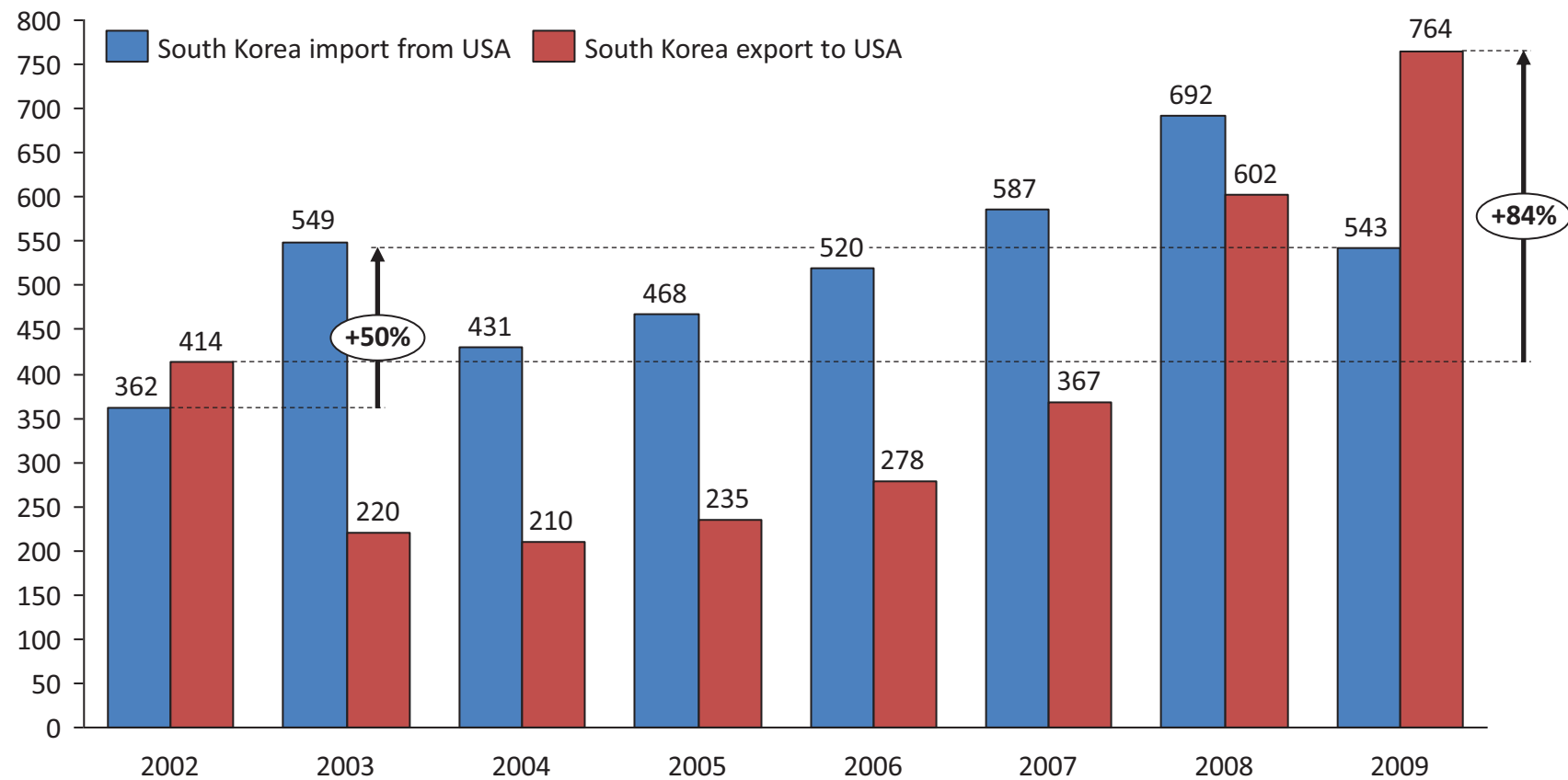


Sources: World Bank Standard List of Climate-Friendly Technologies (43 List)
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Trade of Climate Friendly Technologies between Main Economies

South Korea and United States

Million, \$ US

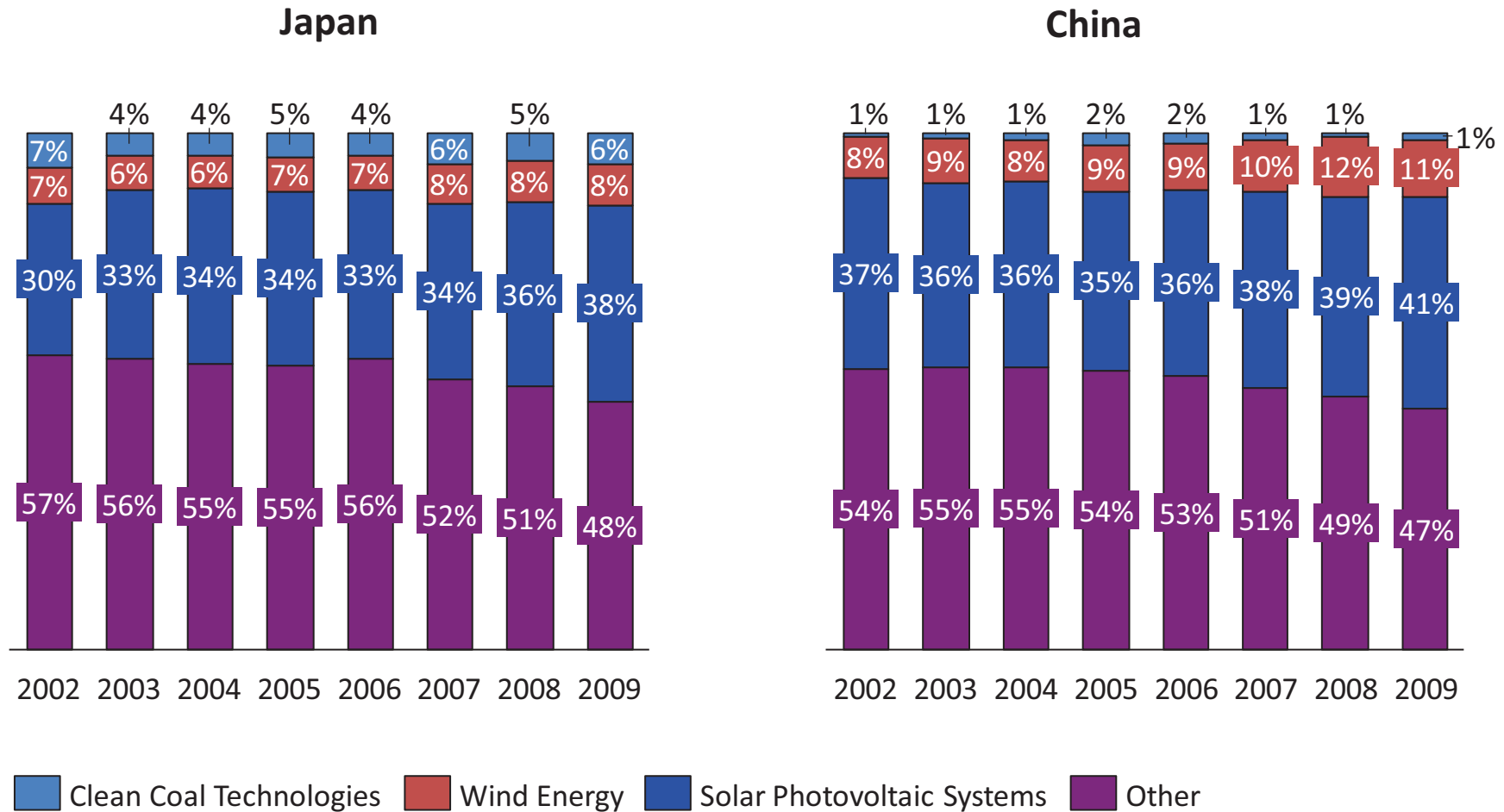


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Trade of Climate Friendly Technologies between Main Economies

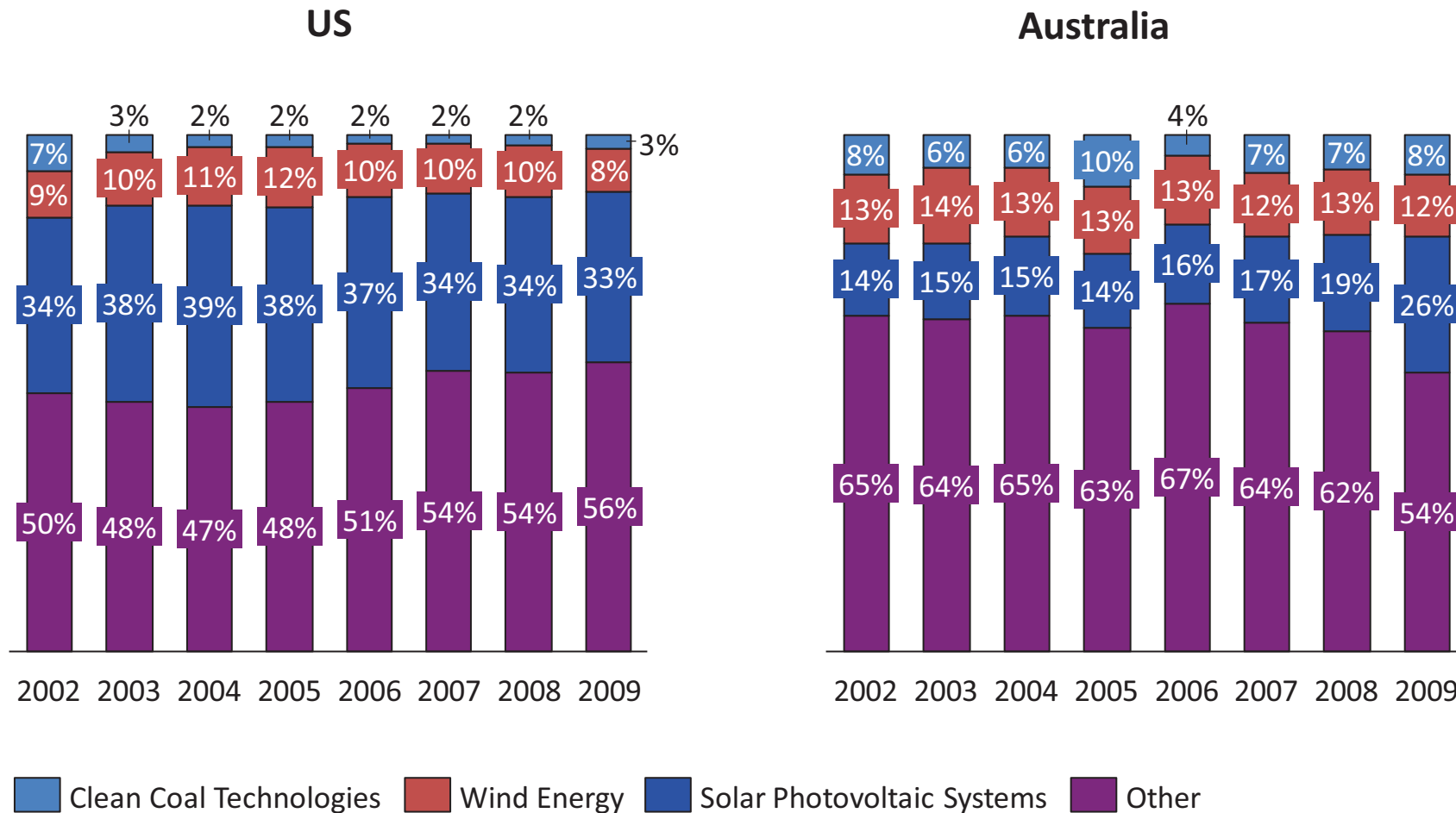
- China was a net importer from Japan and South Korea and a net exporter to the United states.
- United states was the biggest importer from China, Japan and South Korea.
- Japan was the biggest net exporter and the advantage was enlarging.

Sector Share of Import of Climate Friendly Technologies



Sources: World Bank Standard List of Climate-Friendly Technologies(43 List)
WTO, Tariff Analysis Online database

Sector Share of Import of Climate Friendly Technologies

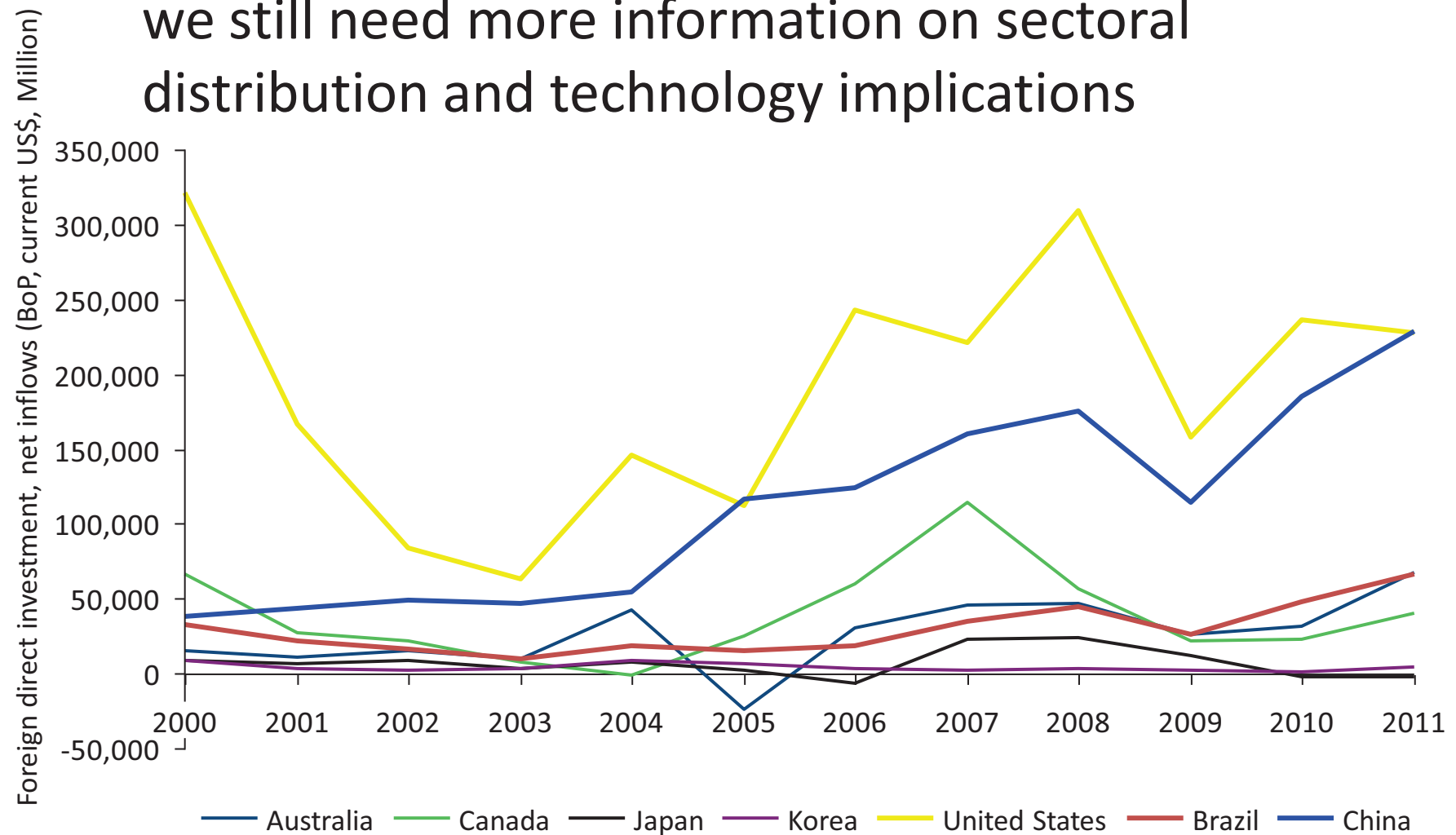


Sources: World Bank Standard List of Climate-Friendly Technologies(43 List)
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CURRENT STATUS: FDI

Trends in FDI:

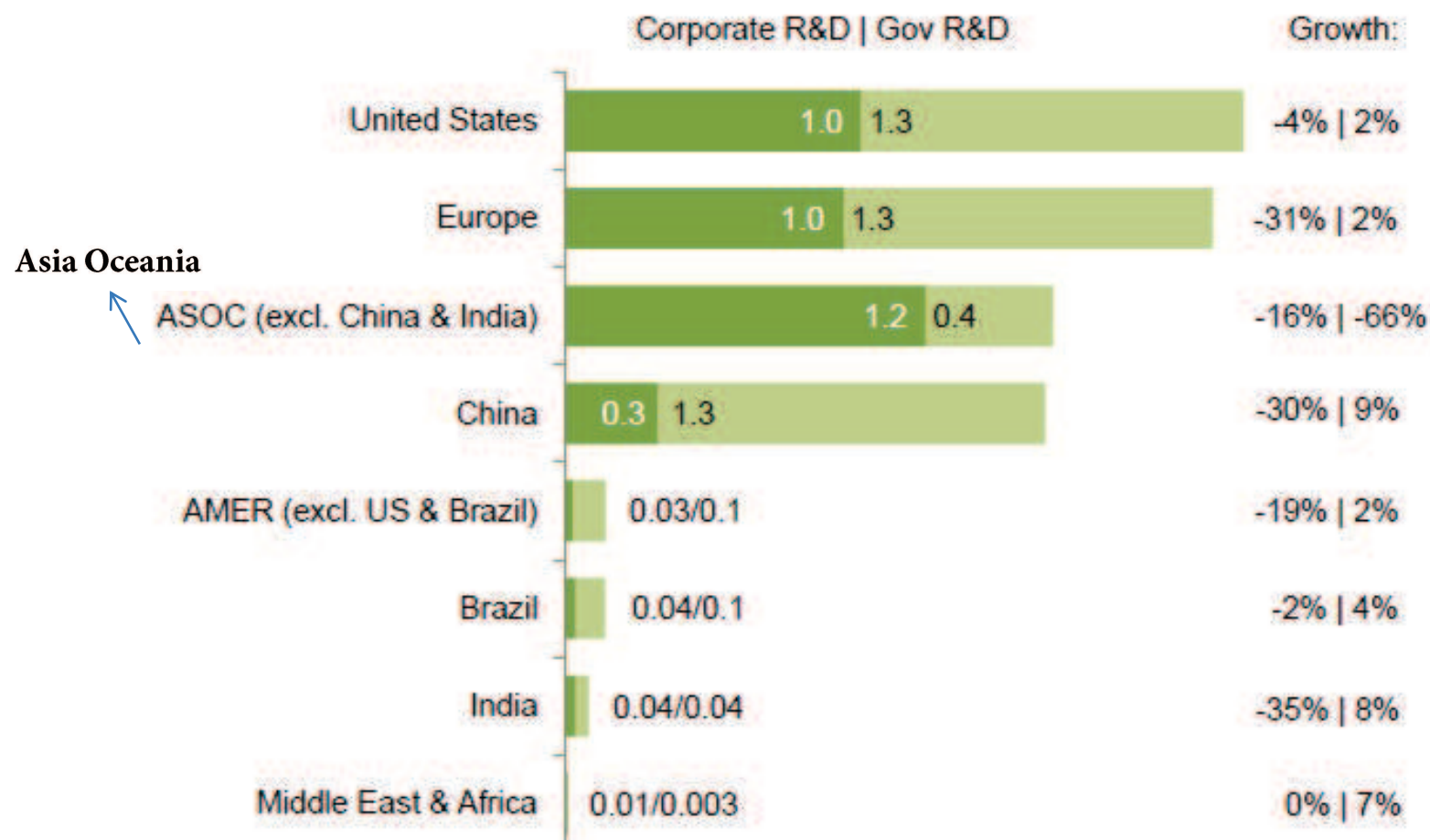
we still need more information on sectoral distribution and technology implications



Source: World Bank Data, 2012

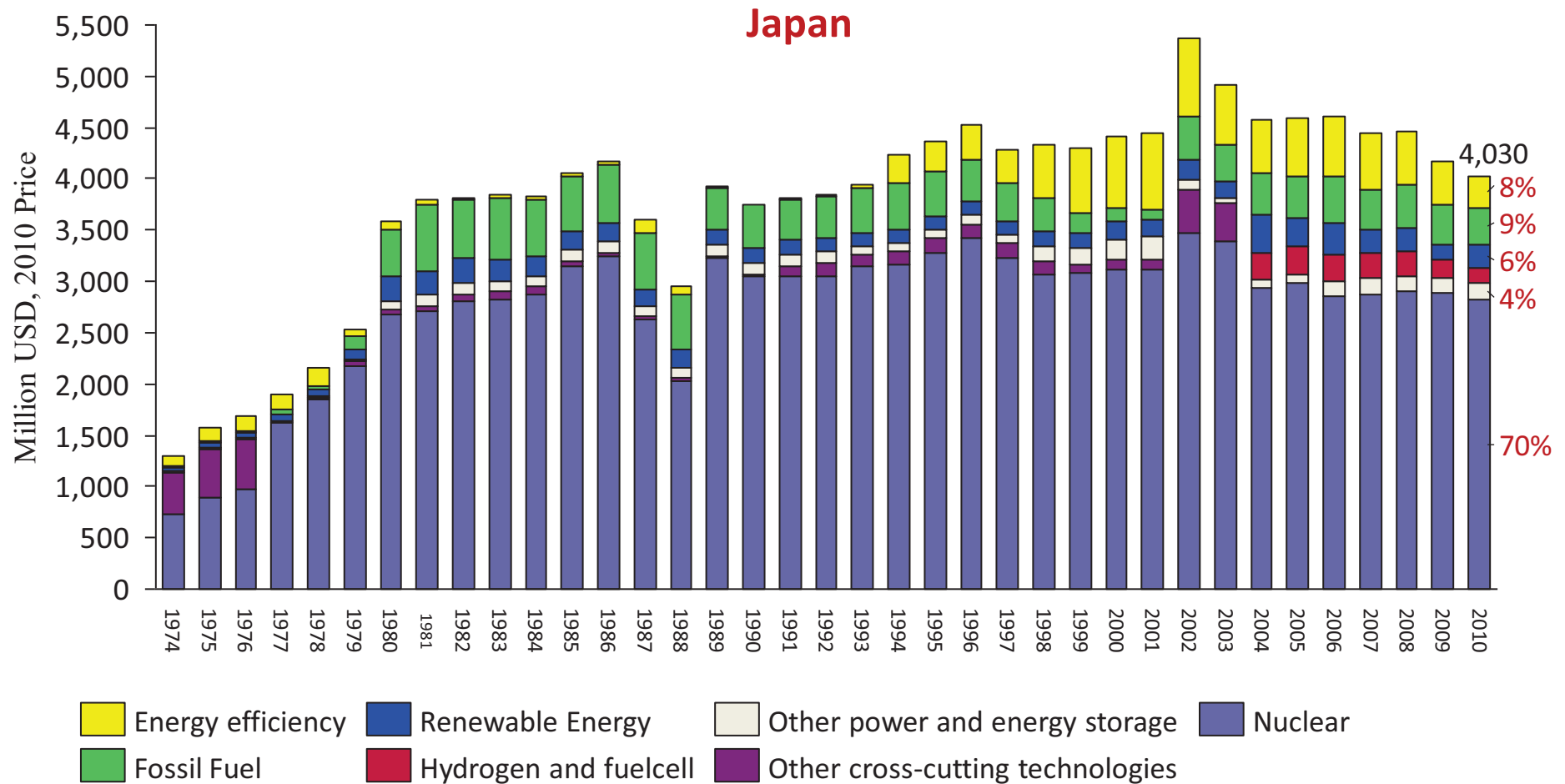
CURRENT STATUS: R&D

Corporate and Government R&D Investment in Renewable Energy by Region in 2011 and Growth in 2010, bln \$



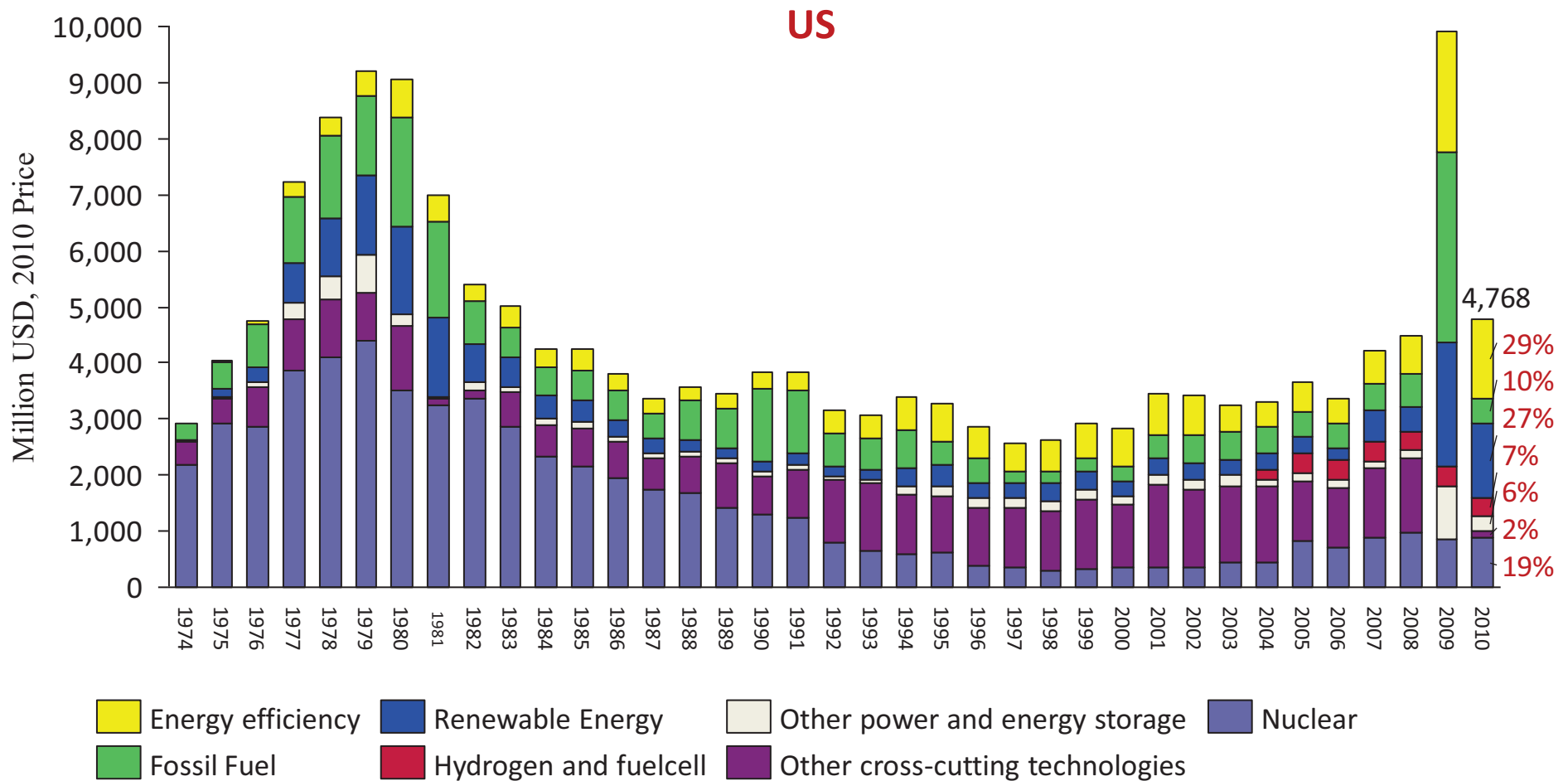
Source: Bloomberg, Bloomberg New Energy Finance, IEA, IMF, various government agencies

Country-Wide Trends in Energy Technology R&D



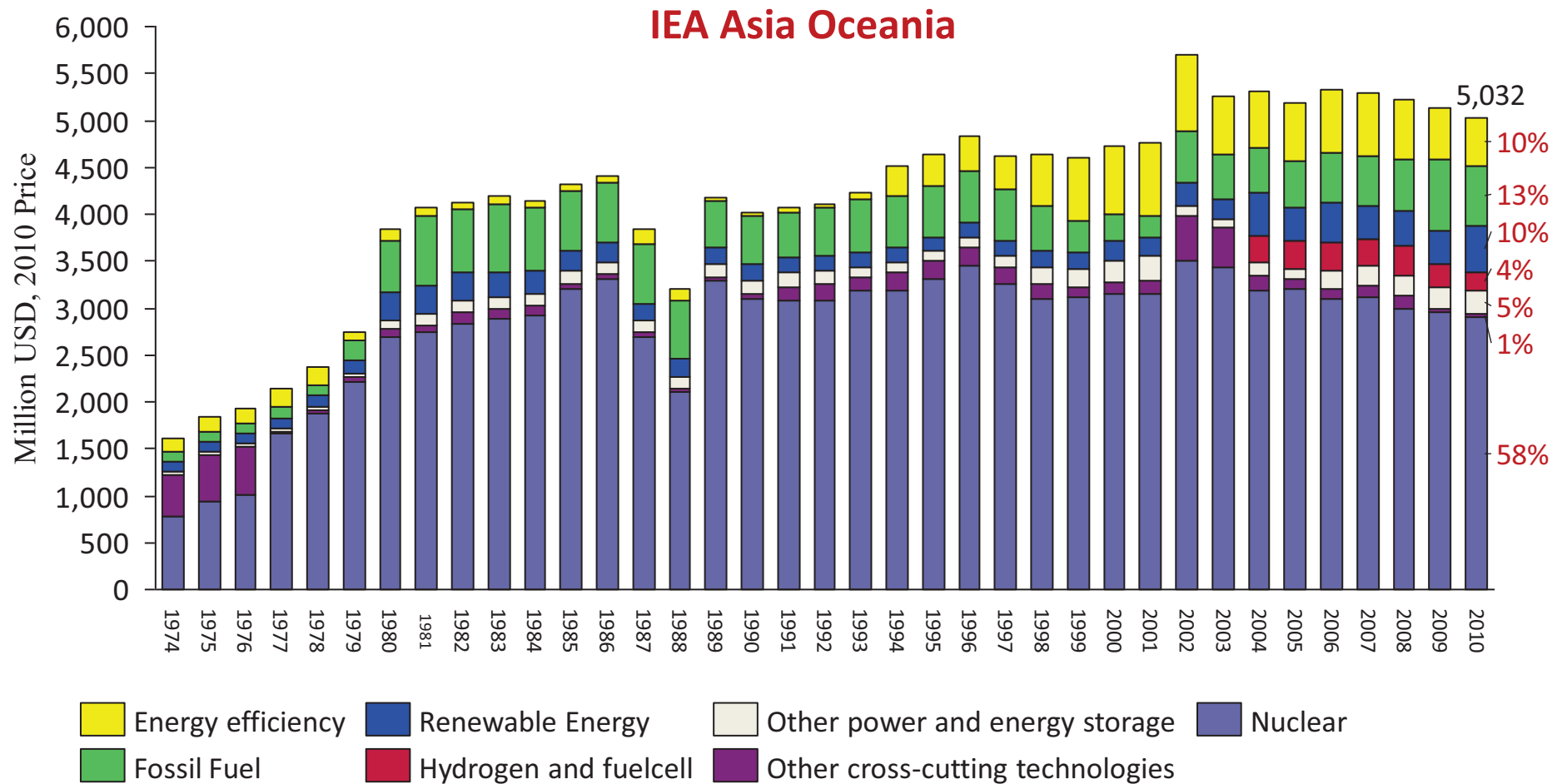
Source: IEA database, 2012

Country-Wide Trends in Energy Technology R&D



Source: IEA database, 2012

Country-Wide Trends in Energy Technology R&D



Source: IEA database, 2012

**CURRENT STATUS: TECHNOLOGY
COOPERATION IN ASIA-PACIFIC AREA**

Asia-Pacific Partnership on Clean Development & Climate(APP)

- A voluntary partnership to accelerate the development and deployment of clean energy technologies
- Launched in 2006 by Australia, Canada, China, India, Japan, Korea, and the US
- 8 sectoral Task Forces: Aluminum, Buildings and Appliances, Cement, Cleaner Fossil Energy, Coal Mining, Power Generation and Transmission, Renewable Energy and Distributed Generation, Steel
- As of July 2008, 123 projects have been endorsed
- Each task force has published several guidebooks to provide State-of-the-Art technology information and best practices

Asian and Pacific Center for Transfer of Technology (APCTT)

- Subsidiary body of the UN Economic and Social Commission for Asia and the Pacific (UN- ESCAP)
- Aim to disseminate technical information and the transfer of know-how in the Asia Pacific region
- The total value of TT contracts among SMEs facilitated by APCTT in 2006 was more than US\$ 60 million
- Developed a state-of-the-art Information Centre to provide technology information services
- Publish a bimonthly journal - Asia-Pacific Tech Monitor since 1983
- Publish bimonthly Value Added Technology Information Services (VATIS) Update series from the year 1993 to provide sectoral-oriented technological information

Asia-Pacific Economic Cooperation(APEC)

- Facilitate green growth through eliminating trade barriers and enhancing joint R&D
- Developing in 2012 a list of environmental goods, reduce applied tariffs to 5% or less by 2015,
- Eliminate non-tariff barriers to environmental goods and services, including local content requirements that distort trade and
- Help to lower the cost and facilitate the use of environmental technologies
- Established an Asia-Pacific Network for Energy Technology (APNet) to strengthen collaboration on energy research in the region

Technology Mechanism (TM) under UNFCCC

- Establish a TM in Cancun to facilitate the implementation of Article 4.1(c) and 4.5 of UNFCCC
- Consist of two components: a Technology Executive Committee (TEC) and a Climate Technology Centre and Network (CTCN)
- Have Determined the TOR of TEC and CTCN in Cancun and Durban
- Regional center and network in Asia-Pacific area
- Current agreements mainly are procedural. Substantive results are still under negotiation.

U.S.-China Clean Energy Research Center (CERC)

- Two governments jointly funded US\$ 150 million in 5 years
- facilitates joint R&D on clean energy technology by teams of scientists and engineers from the US and China, mainly in three sectors: Building Energy Efficiency, Advanced Coal and Clean Vehicles
- Create Technology Management Plans to provide framework to protect IP: a clear understanding of IP principles and administrative procedures, share the benefits of joint research
- Foster long-term research partnerships: staff and student exchanges, joint workshops

Technology cooperation between companies

- GE(US) and Mitsubishi(JP) cooperated with Dongfang Electric Corporation and Harbin Turbine Company on gas turbine technology
- POSCO(KR) has built several Joint Ventures with Chinese partners
- Westinghouse(US) sold AP1000 nuclear island to China in 2007
- GE(US) built a JV with Shenhua Group to advance the development and deployment of cleaner coal”technology solutions in China
- Japan International Cooperation Agency (JICA) has implemented over 50 tech cooperation projects, trained over 10000 experts in China

Questions: A matter of closing gap and assessing effectiveness and adequacy

- Is the current cooperation of D&TT adequate to ensure rapid and tangible diffusion of clean technologies against the target at mitigation of and adaptation to climate change?
- Where are the further potentials to improve current performance of government efforts and market mechanism?
- What policy and institutional innovations are needed to provide effective protection of global climate?

Potential to enlarge cooperation 1

- Shaping agreed conceptual framework:
 - Responsibility: CBDR and establish initial pool of fund and knowledge mainly based on public sectors
 - public fund as catalyst and seed funds
 - Incentive system via policy instruments (tax difference, subsidies, public investment, emission trading, deposit refund, venture capital, ...) targeting at markets of capital, carbon, and technologies
 - Leverage much more private fund

Potential to enlarge cooperation 2

- Information and knowledge sharing
- Enterprise engagement
- Deepen the UNFCCC talk while learning from diversified mechanism
- Joint study on cases covering major sectors, technologies, and market in the context of D&TT

Thank you for your attention!

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