

PART I
Chapter 2

Greening Growth

Following a period of modest economic growth, Japan's economy was severely hit by the 2008-09 global economic downturn. The anti-crisis fiscal stimulus package included several environment-related measures. Reforming the tax system, expanding environmentally related taxes and removing environmentally harmful subsidies could help fiscal consolidation without hampering economic recovery. The long-term strategy to 2020 outlines a green growth path, and sees eco-innovation as the link between environmental improvement, economic growth and social progress. Japan is a leader in environmental and climate-related technologies and is promoting the development of green markets and employment. The declining and ageing population represents a new challenge for both economic and environmental policies.

Assessment and recommendations*

Japan's export-driven economy slowed significantly in 2009 as a consequence of the *global economic downturn*. The government responded with a large-scale fiscal stimulus and a long-term growth strategy. *Environment-related measures accounted for some 16% of the overall anti-crisis package*. Support to energy efficiency, renewable energy technologies and related research and development (R&D) constituted the core of the "green" stimulus measures, reflecting emphasis on the transition to a low-carbon society. However, as in many other countries, Japan's stimulus package included *measures that can have negative environmental impacts and distort competition*, such as support to the car industry and agricultural production, and discounts on highway tolls. "Green innovation" is one of the six pillars of the 2009 *New Growth Strategy to 2020*. Although still at an initial stage of definition, the Strategy appears to include the main elements of the 2009 *OECD Declaration on Green Growth*.

The private sector has a growing role in providing environmental infrastructure and services. *Pollution abatement and control expenditure in the business sector increased during the review period, partially offsetting the decline in public expenditure*. According to some studies, Japan holds the third largest share of the global market of environmental goods and services. *Employment in environment-related enterprises has doubled since the previous review and accounts for 95% of total (public and private) environmental employment*. The eco-business is expected to expand further, providing for additional job opportunities in the sector. Some Japanese financial institutions have also started to provide environment-related financial services.

Eco-innovation is a core element of Japan's environmental policy and part of the government's strategy to contribute to economic growth and social progress. Japan is a world leader in environment- and climate-related technological innovation, and is a pioneer in some new green technologies, such as green information and communication technologies. *Government expenditure for environment- and climate-related R&D increased considerably during the review period*. However, it still represents a relatively low share of the public R&D budget; by expanding direct public investment in basic R&D, the government would share the risk of developing new technologies with the private sector and further accelerate innovation. The private sector, especially the manufacturing industry, is considered a driver of eco-innovation. *Performance targets, such as the Top Runner Programme, have contributed to technological improvement*. Nonetheless, these performance targets should be assessed in terms of their level of ambition, capability of inducing breakthrough innovations and cost-effectiveness.

* Assessment and recommendations reviewed and approved by the OECD Working Party on Environmental Performance at its meeting on 4 May 2010.

Japan has promoted the diffusion of cleaner goods in both the public and private sector. *Green public procurement* has been mandatory since 2001, although only for central government institutions, which has helped to enlarge the market of some eco-products. Japan should consider the financial implications of its green purchasing policy and make sure that it targets goods and services with the highest potential environmental returns. Information on environmental performance of products is made available through a variety of *eco-labels*. Japan provides *fiscal support to businesses and households* to invest in energy saving and pollution control equipment. Incentive schemes are in place to encourage purchases of energy efficient household appliances (e.g. the Eco-Point Programme) and vehicles. However, rewarding energy-efficient or environmentally friendly products strains the public budget and is less cost-effective than internalising environmental impacts in the price of goods and services.

Revenue from *environmentally related taxes* increased by 6% during the review period, although its share in total tax revenue decreased. The taxation system has been “greened” to some extent, for example with the introduction of a coal tax and tax breaks for fuel-efficient vehicles. These tax incentives have contributed to renew the vehicle fleet with more efficient and smaller vehicles. The earmarking of vehicle and road fuel taxes for road construction and maintenance was removed in 2009. However, the tax rates on energy products, including transport fuels, have not changed since the previous review and remain among the lowest in OECD. There is no evidence that fuel taxes have substantially contributed to reduce energy consumption from transport in Japan. There is scope to broaden the use of environmentally related taxes, given the relatively low tax-to-GDP ratio and the low share of indirect taxes in total receipts. In general, environmentally related taxes can generate revenue that, depending on the economic circumstances, can help fiscal consolidation through deficit reduction and/or be used to reduce other taxes or to finance government expenditure, including environmental expenditure. The tax reform foreseen in 2011 is set to include environmentally related tax measures.

Phasing out *environmentally harmful subsidies* should be a central part of a comprehensive environmental fiscal reform, with a view to increasing cost-effectiveness of policy measures and to reducing pressure on the public budget. Japan removed subsidies to domestic coal production and reduced support to agricultural producers. Nonetheless, support to agriculture remains high and mostly linked to production. Japan continues to subsidise business activities related to fossil fuels for securing a stable energy supply, such as exploration and refining, and to exempt fuels used in several sectors from excise duties. As emphasised in the previous two *OECD Environmental Performance Reviews*, businesses often benefit from government financial assistance to meet environmental targets, thereby deviating from a consistent application of the polluter-pays-principle.

Income inequality and relative poverty have slightly decreased since 2000, although they remain higher than in the mid-1990s. The impacts of environmentally related taxes and charges on low-income households are an emerging issue and should be further explored. The *decline and ageing of Japan's population* create new challenges for the design of environmental policies and the planning of environmental, energy and transport infrastructure. *Regional inequality* in Japan is relatively low in comparison with other OECD countries, and the majority of the population enjoys good quality environmental services. However, disparities remain between large metropolitan areas and small and medium-sized cities, for instance concerning accessibility of public transport services, domestic gas supply and wastewater treatment plants.

Recommendations

- Evaluate the impact of the *New Growth Strategy to 2020* on the environment, as well as the net contribution of environment-related sectors to growth and employment.
- Review *transport-related taxation and pricing*, with a view to directly linking taxes on the purchase and ownership of vehicles to their fuel efficiency, and to better targeting pollution related to vehicle use through fuel taxes and road pricing.
- *Mainstream environmental considerations in the 2011 tax reform*, with a view to broadening the use of environmentally related taxes and reducing incentives and subsidies that have perverse environmental effects, or that contravene the polluter-pays-principle.
- Speed up the implementation of *green public procurement* in local governments, while ensuring its environmental effectiveness, economic efficiency and compliance with competition rules.
- Further expand public direct investment in basic R&D in *environment- and climate-related technologies*; analyse the effectiveness and dynamic efficiency of current *performance targets* (e.g. the Top Runner Programme) in inducing eco-innovation.
- Strengthen the analysis of the *social-environment interface* as a support for decision-making, including the distributional impacts of environmental policies and the impacts of demographic and other social trends on the environment.

1. Fiscal policy and the environment

1.1. From economic recovery to recession

Japan is the OECD's *second largest economy* in terms of GDP. While losing relative ground in the last two decades, Japan's GDP per capita was still slightly above the OECD average in 2008.¹ Japan is one of the largest merchandise exporters. High- and medium-high-technology industries, such as transport equipment, electronics and chemicals, make up the largest share of manufacturing and exports.

After the so-called "Lost Decade" of the 1990s, a prolonged period of economic stagnation and deflationary pressures, *Japan's economy started to recover in 2002*. Between 2000 and 2008, it grew by 10.6%, a rate much below the OECD average (18.6%). The recovery was mainly the result of a surge in exports caused by the low value of the Japanese currency, increased US demand, and stronger integration with other Asian countries. China is now Japan's main single country trade partner. However, domestic demand was weak: average nominal wages decreased as the number of lower paid, non-regular workers increased, household income remained stagnant and public expenditure contracted as part of the fiscal consolidation plan. General price levels slowly declined, a phenomenon not seen in any other OECD country during that period. Hence, the economic expansion primarily benefited the export-oriented manufacturing sectors and large firms, whereas the rest of the economy, which depends more on domestic demand, lagged behind.

The 2008 global economic slowdown and the simultaneous rise in the value of the yen sharply reduced the volume of exports. Consequently, the Japanese economy contracted by 1.2% in 2008 and declined by 5.2% in 2009, the sharpest fall in economic activity since the Second World War. The crisis had a severe impact on unemployment, and the unemployment rate was above 5% in 2009. Japan also faces greater deflationary risks than other OECD countries. The budget deficit (excluding one-off factors) is projected to climb

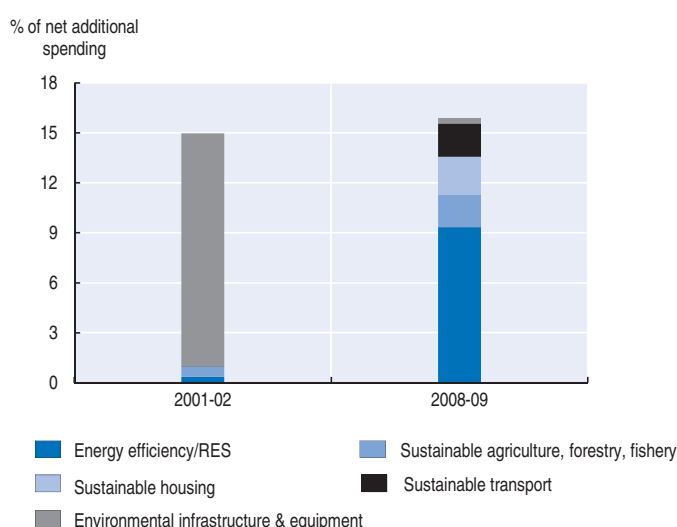
from 3% of GDP in 2007 to about 9% in 2010. Japan shoulders a very large debt-to-GDP ratio. At 167% in 2007, it was the highest gross government debt among OECD countries, and it could rise to over 200% of GDP in 2011 (OECD, 2010a).

During the economic downturn, Japanese authorities acted quickly to stabilise the financial markets, stimulate the economy, increase social security and prepare for future growth. Between August 2008 and April 2009, the government launched *four stimulus packages*. The stimulus totalled JPY 132 trillion (about USD 1.3 trillion) for 2008-09, or 4.7% of 2008 GDP. It was the second largest stimulus effort in G7 countries and was based on additional public spending (4.2% of GDP) (OECD, 2009a). The additional spending consisted mainly of: transfers to firms and households; investment in social infrastructure, education and technology; and active labour market policies.

A considerable part of the additional spending was environment-related, in an attempt to link the anti-crisis measures to the long-term goal of promoting green growth and a transition to a low-carbon society (Box 2.1 and Figure 2.1). In early 2010, the Diet approved another supplementary budget, which explicitly acknowledged the environment as one of the three pillars of Japan's response to the crisis, together with employment and economic growth.

The fiscal stimulus and large public investment partially offset the negative impacts of lower employment and wages on domestic demand. This, together with a rebound in exports, helped Japan to arrest the economic recession in the second half of 2009 and slowly recover (OECD, 2009b). Fiscal stimulus cannot continue for long, however, considering Japan's large budget deficit and government debt. Once a recovery is in place, *Japan should reduce the stimulus and move towards fiscal consolidation*, implementing spending reductions and a broad tax reform (OECD, 2009a). The upturn will need to rely primarily on private domestic demand, given the uncertainty of export markets. The New Growth Strategy, approved in December 2009, appears to be moving along these lines, as well as incorporating green growth features (Box 2.2).

Figure 2.1. **Environment-related investment in stimulus packages,^a 2001-02 and 2008-09**



a) Data cover three stimulus packages in 2001-02, and four stimulus packages in 2008-09.

Source: Ministry of Finance and OECD calculations.

Box 2.1. The environmental dimension of fiscal stimulus packages

During the review period, Japan implemented *large stimulus packages* containing additional fiscal spending in 2001-02 and 2008-09. The 2008-09 fiscal stimulus is much larger than the previous one, with a higher weight of net additional spending and lower tax cuts. The composition of net spending is also different, with a lower share devoted to public investment (OECD, 2009a).

Direct environment-related investment and fiscal incentives are estimated at nearly JPY 2.9 trillion (USD 28 billion), equivalent to 0.57% of 2008 GDP and to 16% of the 2008-09 fiscal stimulus (considering the four packages approved between August 2008 and April 2009). While this share is only slightly higher than in 2001-02, the composition of the “green” stimulus differs greatly (Figure 2.1). The bulk of the 2001-02 environment-related stimulus consisted of public investment in environmental infrastructure and equipment, mainly waste and wastewater infrastructure development. This kind of investment accounted for only 2% of green investments in 2008-09. The *promotion of energy efficiency, renewable energy sources and related R&D* represents the core (some 60%) of the 2008-09 “green” anti-crisis measures, reflecting the emphasis Japan is putting on the transition to a low-carbon society. The remaining green component is almost evenly shared among support to sustainable housing (i.e. improvement of quality and energy efficiency of residential buildings), sustainable transport infrastructure (i.e. railways and local public transport), and rural development, including support to the *Satoyama Initiative* (Chapter 7).

The *green measures in the 2008-09 stimulus packages* include: i) tax reductions for fuel-efficient and cleaner vehicles (Section 1.2); ii) “eco-point” system to reward purchases of energy-saving home appliances (Section 1.3); iii) tax incentives for investments in energy-saving and renewable energy facilities, including the possibility to claim immediate depreciation of their costs; iv) tax incentives for R&D, especially for small and medium-sized enterprises; v) capital grants and tax incentives for businesses and households that install photovoltaic panels and energy-efficient appliances; vi) a feed-in tariff to support photovoltaic energy (Chapter 5); vii) tax incentives and capital grants for energy efficient renovation of residential and public buildings (including schools); viii) support for energy efficiency and biomass reuse in agriculture; ix) forest maintenance, such as thinning, to enhance GHG absorption capacity (Chapter 5); and x) support for green investments at local level, through the Local Green New Deal Funds.

This kind of investment is likely to have a more immediate impact on economic activity than traditional infrastructure projects (OECD, 2009a). However, some measures included in the stimulus packages can have *negative environmental impacts* and should be carefully assessed for consistency with environmental objectives. These measures include:

- transfers to highway companies to compensate them for the *temporary reduction in highway* tolls until the end of 2010, which are intended to reduce travel and logistics costs and to stimulate domestic demand (Box 2.3);
- subsidies for the *automobile industry* in the form of car-scraping incentives (Section 1.3);
- investments in *road construction*, airports and fishery infrastructure (e.g. ports); and
- *additional support to farmers* to expand production of rice, barley and beans, as well as measures to stimulate domestic demand for agricultural, forestry and fishery products, e.g. requiring schools to serve such products more frequently.

In January 2010, the Diet approved *another supplementary budget*, which diverts about JPY 7.4 trillion allocated in the previous budgets to new spending measures. All the environment-related measures were confirmed and partly extended, including the “eco-point” system for home appliances, subsidies for low-emission vehicles, and support for the renovation of buildings (with the introduction of a housing “eco-point” scheme). However, the 2010 regular budget includes some measures that are potentially harmful to the environment, including increased support for agricultural production, further discounts on highway tolls, and a provision for lowering motor fuel taxation in case of oil price peaks.

Box 2.2. Japan's New Growth Strategy: towards green growth?

In December 2009, the Cabinet approved *Japan's New Growth Strategy*. It outlines a model of growth based on domestic demand, innovation, and stronger economic integration of Japan in the Asia region, as well as less dependence on heavy public investment in infrastructure. The Strategy takes into account the challenges of climate change and Japan's ageing population. As a result, it identifies the environmental and health sectors, together with increased leisure time and tourism, as the main sources of demand and, hence, as the key drivers of future growth and job creation. In particular, the promotion of "green innovation", i.e. innovation in the environment and energy sectors to achieve a low-carbon society, is one of the six basic policies, as indicated below. Greening the tax system is one of the instruments that will be used to promote green innovation.

Basic policy	Objectives to 2020	Priorities
Become a leader in environment and energy through "green innovation"	Generate market value of over JPY 50 trillion and 1.4 million jobs in environment-related sectors; reduce global GHG emissions by at least 1 300 MtCO ₂ eq by promoting Japanese technology worldwide.	<ul style="list-style-type: none"> Renewable energies and innovative technologies. Zero-emission residential and commercial buildings. Comprehensive policy package to achieve a low-carbon society, including regulatory reforms and greening the tax system.
Health leader strategy through "life innovation"	Create market value of about JPY 45 trillion and 2.8 million jobs in health-related sectors.	<ul style="list-style-type: none"> R&D in pharmaceuticals, medical and nursing care technologies. Expand the availability of accessible housing for elderly and disabled people. Strengthen medical and nursing care services.
Economic strategy for Asia	Establish a Free Trade Area of the Asia-Pacific (FTAAP); take advantage of Asia growth opportunities.	<ul style="list-style-type: none"> Roadmap for reaching the FTAAP agreement. Promote international adoption of Japanese safety standards. Public-private support for sustainable transport and environmental infrastructure. Make Haneda Airport an international hub; "open skies" agreement; port infrastructure. Revise regulations that obstruct flows of people, goods, and capital.
Promote a tourism oriented nation and local revitalisation	<ul style="list-style-type: none"> Increase annual number of foreign visitors to Japan to 25 million, for JPY 10 trillion of market value and 560 000 jobs. Revitalise urban and under-populated areas. Increase the self-sufficiency rate for food to 50% and for timber to over 50%; increase agriculture, forestry, fisheries, and food product exports by a factor of 2.5, to JPY 1 trillion. Double the market of existing housing; reduce the share of insufficiently earthquake-proof housing to 5%. 	<ul style="list-style-type: none"> Ease tourist visa requirements for citizens of Asian countries. Increase use of paid vacation time. Use private finance initiatives and public-private partnerships to provide infrastructure in urban areas. Introduce an individual household income support system for farmers; promote partnerships among agriculture, commerce and industry. Revitalise forests and forestry, e.g. through biomass use. Improve the market of existing housing. Earthquake-proof renovation of buildings.
Strategy for a science and technology oriented nation	Increase public and private investment in R&D to over 4% of GDP; increase the number of Japanese world leading universities and research institutions; expand ICTs.	<ul style="list-style-type: none"> Reform universities and public research institutions; ensure full employment for those who complete doctoral courses. Reform systems and rules to foster innovation. Provide "one-stop" government services; reform regulations to encourage ICT use.
Employment and human resources	<ul style="list-style-type: none"> Halve the number of "freeters";^a rectify M-shaped female employment; increase the number of job-card holders to 3 million;^b increase the minimum wage; shorten working hours and increase utilisation of paid vacation time. Achieve a sustainable increase in the birth rate; attain the world's top level of academic achievement. 	<ul style="list-style-type: none"> Increase the employment rate of young people, women, the elderly, and the disabled. Improve assistance to job seekers and the unemployment insurance system; expand the job-card system to include vocational qualification. Expand childcare services; make childcare leave more flexible. Improve the quality of education. Improve the social environment to ensure the safety of children.

a) "Freeter" is a Japanese expression for people between the age of 15 and 34 who lack full time employment or are unemployed (excluding students), live with their parents and earn some money with low skilled and low paid jobs.

b) Under the job-card system, businesses provide training to part-time and low-skilled workers and issue them with job cards that contain a record of their training, evaluation and employment.

Although very broad, the Strategy appears to include the main elements of the 2009 OECD Declaration on Green Growth: green investments, R&D, low carbon infrastructure, tax instruments, co-ordination of labour market with education policies, and international co-operation.

1.2. Greening the tax system

Japan's tax system differs from that of many OECD countries in several respects. In particular, the tax revenue to GDP ratio is one of the lowest in the OECD area (28.3% in 2007, compared to the OECD average of 35.8%). Revenues from indirect taxes on goods and services, including those on energy and transport, account for a much lower share of tax receipts than the average for the other OECD countries (18% of tax receipts in 2007, compared to 30.9%).²

As in all OECD countries, environmentally related tax revenues largely consist of revenues from taxes on energy use and vehicles. Japan imposes a multiplicity of such taxes, some of which are collected at local level. Revenues from environmentally related taxes (in real terms) have increased by about 6% since 2000 and accounted for 1.7% of GDP in 2007. This share is in line with the OECD weighted average, although well below the OECD Europe average (Figure 2.2), and it has slightly decreased since the previous review. Revenues from environmentally related taxes accounted for 5.9% of total tax receipts in 2007, down from 6.3% in 2000. This share is above the OECD weighted average, though it ranks in the lower half of OECD countries (Figure 2.2). Energy taxes play a relatively minor role in Japan compared with other major economies, accounting for less than 60% of environmentally related tax revenue (Figure 2.2).

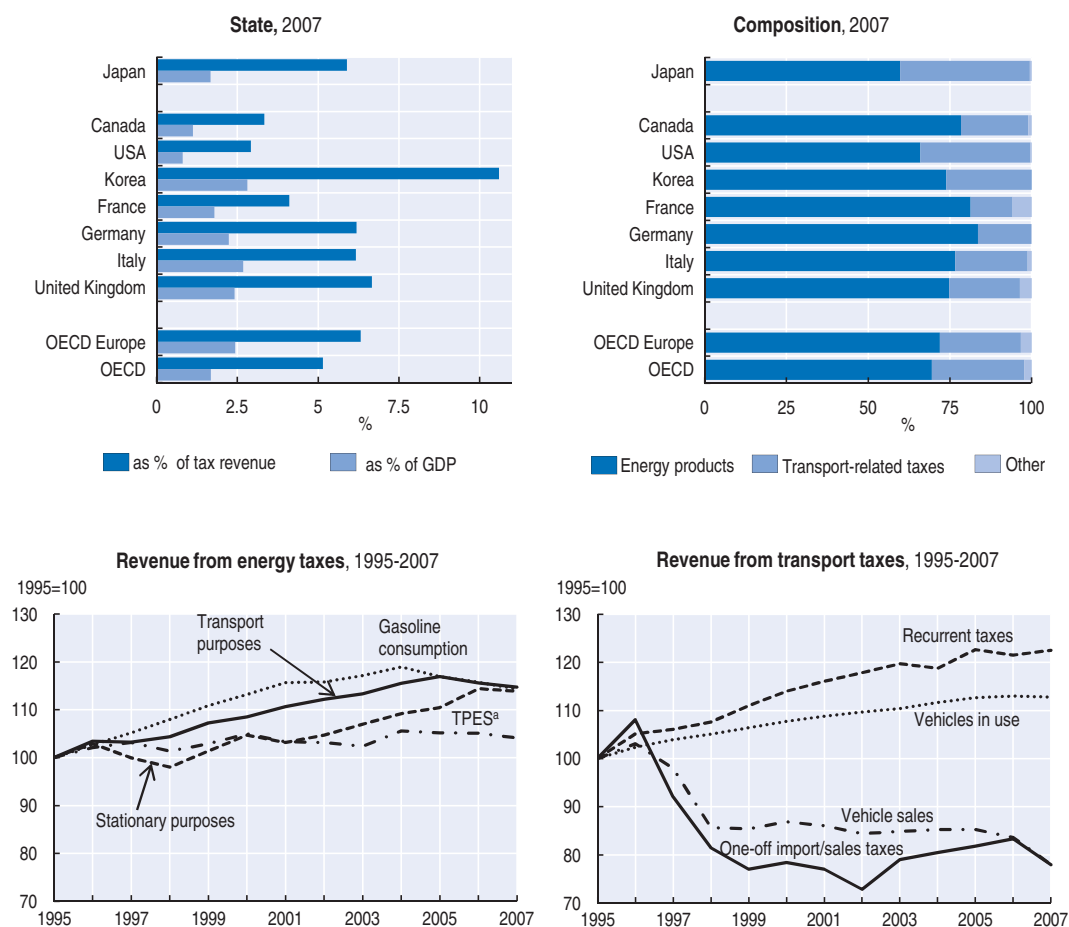
Taxes on energy products

Tax rates on energy products are lower in Japan than in a number of other OECD countries, notably European countries, and have remained virtually unchanged (in nominal terms) since the previous review (Table 2.1). Exceptions include the extension of the petroleum tax to coal in 2003 and the increase of the tax rate on natural gas and liquefied petroleum gas (LPG), which partly corrected for the uneven tax burden on various fossil fuels (IEA, 2003). This, combined with the growing share of coal and natural gas in total primary energy supply (TPES), has led to an increase in revenues from energy taxes for stationary purposes (Figure 2.2), despite a rather stable TPES (Chapter 5).

Taxes on fuels for transport purposes account for some 83% of the revenue from energy-related taxes. Japan's taxation of transport fuels stands out among OECD countries in a number of ways. Japan is one of the few OECD countries taxing aviation fuel used on domestic flights. Gasoline and diesel taxes – and prices – are well below those of most OECD countries (Figure 2.3). In 2008, taxes accounted for 27% of the diesel price and 40% of the gasoline price, compared to a range of 48-58% of the diesel price and 59-65% of the gasoline price in the G8 European countries.³ Bioethanol blended gasoline benefits from tax exemption on its bioethanol content (up to 3%).

While fuel prices have increased since 2003, in line with world oil prices, tax rates have remained unchanged in nominal terms and their impact on transport decisions has thus been negligible (Figure 2.3). Yet, passenger demand appears to be sensitive to fuel prices: passenger traffic by car continued to grow in the early 2000s and started to progressively decrease, as did gasoline consumption, when fuel prices rose (Figure 5.8). The gasoline tax represents over 65% of the revenue from transport fuel taxes, due to the dominance of gasoline vehicles in the fleet (Chapter 5). Consequently, revenues from fuel taxes largely follow the trend in gasoline consumption (Figure 2.2). The response of Japanese consumers to the rise in fuel prices, exacerbated by the 2008 oil price peaks, shows that a higher and better targeted fuel taxation, e.g. on the basis of fuel carbon content, would offer an incentive for

Figure 2.2. Environmentally related taxes



a) Total primary energy supply.

Source: OECD-EEA Database on Economic Instruments for Environmental Policy; OECD-IEA (2009), *Energy Balances of OECD Countries*; Ministry of Land, Infrastructure, Transport and Tourism; Japanese Automobile Manufacturers Association.
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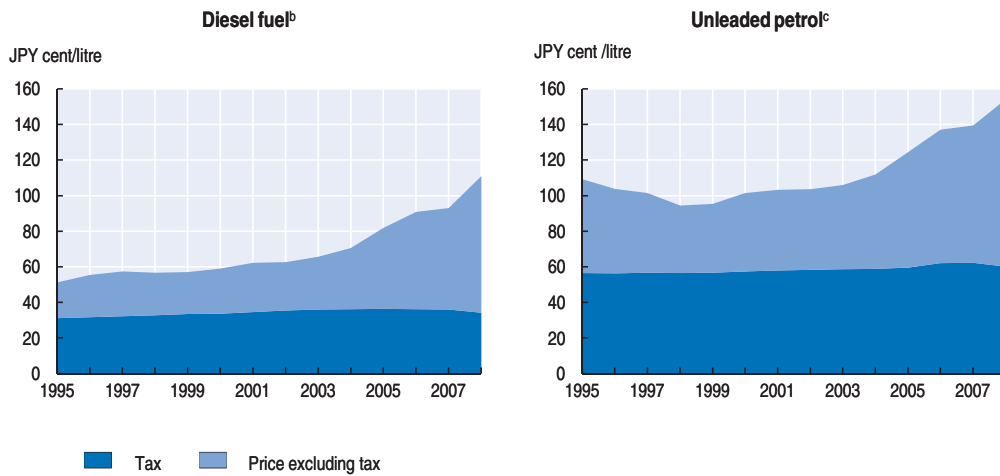
Table 2.1. Energy-related taxes, 2001 and 2009

		2001	2009	Exemptions
Gasoline tax	On unleaded gasoline			Aviation, diplomats, heating, gasoline used as solvent for rubber and as raw material for petrochemicals.
	Gasoline tax	48.6 JPY/l	48.6 JPY/l	
	Local gasoline tax	5.2 JPY/l	5.2 JPY/l	
Delivery tax	On delivery of:			Agriculture, forestry, fishing, mining.
	Light oil	32.1 JPY/l	32.1 JPY/l	
	Diesel fuel	32.1 JPY/l	32.1 JPY/l	
LPG tax	On LPG used for transport purposes	17.5 JPY/kg	17.5 JPY/kg	Exports; LPG used as heating fuel or in manufacturing.
Petroleum and coal tax	On natural gas, imported LPG	0.72 JPY/kg	1.08 JPY/kg	Exports; fuel oil used in agriculture, forestry or fishing; naphtha and gaseous hydrocarbons used as raw materials for production of petrochemicals and ammonia.
	On crude oil, imported petroleum products	2.04 JPY/l	2.04 JPY/l	
	On coal	–	0.70 JPY/kg	
Aviation fuel tax	On aviation fuels	26 JPY/l	26 JPY/l	Central and local governments, international air transport.
Power-resource development tax	On sale of electricity	0.445 JPY/kWh	0.375 JPY/kWh	

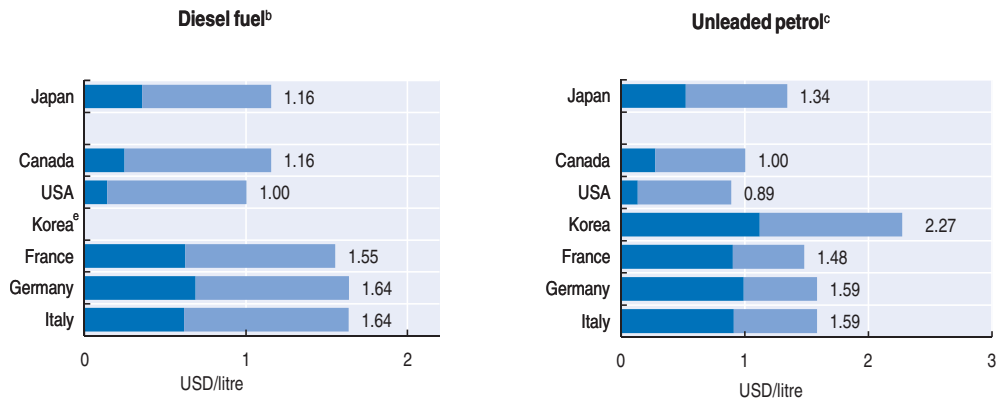
Source: Government of Japan.

Figure 2.3. Road fuel prices and taxes

Trends in Japan,^a 1995-2008



State,^d 2008



a) At constant 2005 prices.


b) Automotive diesel for commercial use.

c) Unleaded premium (RON 95); Japan and Korea: unleaded regular.

d) Diesel fuel: at current prices and exchange rates; unleaded petrol: at current prices and purchasing power parities.

e) Data not available.

Source: OECD-IEA (2009), Database of End-use Prices.

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buying smaller and more fuel-efficient cars, driving shorter distances and shifting to public transport. However, in its 2010 budget, the government announced that fuel taxation would be reduced in case of new oil price spikes.

The government has been discussing the introduction of a carbon tax for several years and has signalled its intention to introduce such a tax as part of a comprehensive tax reform scheduled for 2011. In 2009, the Ministry of the Environment (MOE) proposed a tax of JPY 1 064 (USD 10) per tonne of CO₂ on fossil fuels, including transport fuels. This is a

relatively low level compared to similar taxes applied in other countries (e.g. Finland and Sweden) and to the average price of a CO₂ allowance in the EU emissions trading system (Chapter 5). Under the proposed carbon tax scheme, the gasoline tax would be simultaneously reduced, so that the final tax rate, including the carbon tax, would be comparable to the minimum rate applied in the EU. Moreover, relief measures for specific industries would be considered. While such exemptions would help moderate the potential impacts of the carbon tax on the international competitiveness of Japanese industries, they would create uneven abatement incentives across sectors and should therefore be transitional and targeted to the most exposed sectors. A carbon tax could complement a new mandatory emissions trading system, thereby extending carbon pricing to households, offices and transport (Chapter 5).

The revenue from most energy-related taxes is earmarked for several purposes.⁴ Earmarking revenue from transport fuel and vehicle taxes for road construction and maintenance was removed in 2009. For several years, the rates of these taxes had been based on the financial requirement for road work. The removal of earmarking is thus a positive step that allows these taxes to be better designed to meet environmental goals, primarily climate change goals. In general, earmarking tax revenue reduces the flexibility of fiscal decisions and, therefore, overall efficiency, and should be limited to the extent possible.

Vehicle taxes

Japan imposes taxes on the purchase and ownership of motor vehicles at prefectural and national levels. None of these taxes is directly based on the environmental performance or fuel efficiency of vehicles.⁵ Nonetheless, during the review period, tax breaks were introduced to favour the purchase of more environment-friendly vehicles (Table 2.2). As from 2001, the automobile tax was reduced by 25-50% depending on a vehicle's fuel efficiency and exhaust emission levels, and it was increased by 10% for old vehicles.⁶ The tax break was extended in 2009 to the acquisition tax and the motor vehicle tonnage tax.

Table 2.2. **Tax incentives for fuel-efficient and low-emission vehicles**

Type of vehicle	Fuel efficiency	Emissions performance	Incentives		
			Automobile tax	Acquisition tax ^a	Motor vehicle tonnage tax ^b
Alternative-energy next generation vehicles	Electric (including fuel cell), plug-in hybrid, clean diesel, hybrid and natural gas vehicles that meet certain performance requirements		50% reduction	Exempted	Exempted
Passenger cars	Compliant with 2010 standards +25%	Emissions down by 75% from 2005 standards	50% reduction	75% reduction	75% reduction
	Compliant with 2010 standards +10%	Emissions down by 75% from 2005 standards	25% reduction ^c	50% reduction	50% reduction
Heavy-duty vehicles	Compliant with 2015 standards	Compliant with 2009 standards	–	75% reduction	75% reduction
		NO _x or PM emissions down by 10% from 2005 standards	–	50% reduction	50% reduction

a) From 1 April 2009 to 31 March 2012.

b) From 1 April 2009 to 30 April 2012, with reductions applicable once only, at the time of the mandatory vehicle inspection.

c) Discontinued in April 2010.

Source: Ministry of Land, Infrastructure, Transport and Tourism.

The so-called “next generation vehicles”, including hybrid and plug-in hybrid, electric, clean diesel and compressed natural gas cars, are fully exempted. These tax breaks are set to be phased out in 2012.

Revenues from the acquisition tax decreased sharply in the second half of the 1990s, with both the decline of vehicle sales and the shift to small and mini cars. Revenues rebounded in 2002 with the introduction of the automobile tax break, which boosted sales of more expensive standard-size, albeit more fuel-efficient, cars. Revenues from recurrent taxes (automobile and motor vehicle tonnage taxes) have slightly decreased in nominal, though not in real, terms since 2002-03, with the growing number of small and fuel-efficient vehicles in the fleet. The vehicle stock has continued to increase until recently (Figure 2.2).

Other environment-related taxes

Several local authorities have introduced a landfill tax for disposal of industrial waste (Chapter 6). Some 0.5% of environment-related tax revenue is generated by a levy on SO_x emissions linked to the 1973 Law Concerning Compensation for Pollution-Related Health Damage. The purpose of the levy is to secure funding for compensating victims of air pollution certified by 1987 (OECD, 2002). The levy rate is set *ex post*: the financial requirement for health damage compensation (i.e. the revenue requirement) is shared among emitters proportionally to their 1982-86 emissions (60% of the revenue) and current annual emissions (40% of the revenue). Only installations that were active as of 1987 are deemed responsible for air pollution and are charged. The levy is thus more an instrument to enforce environmental liability than an economic incentive. Its burden on emitters is fading, as is the revenue. While it contributed to the uptake of SO_x abatement equipment in the 1980s, it is doubtful that it has played a role in curbing emissions in recent years (OECD, 2010b).

Other tax incentives

Japan provides *fiscal support* to both households and businesses. Households can claim tax credits for the purchase of new houses meeting energy efficiency standards and for the installation of energy efficient equipment, such as heat insulation materials and solar panels. Similarly, businesses can benefit from tax credits or special depreciation rates on investment costs for improving energy performance and controlling pollution. Tax credits are also given for investment in R&D (Section 2).

Assessment

Japan plans to carry out a *comprehensive review of the tax system* by 2011, which will include a review of environmentally related taxes and consider the reinforcement of such taxes. A number of fiscal incentives have been introduced to make the tax system more environment-friendly, notably in the case of vehicle taxes, as recommended by the 2002 OECD *Environmental Performance Review* (EPR) (Table 2.3). However, *tax breaks to subsidise environment-friendly vehicles* are generally less efficient than charging the polluting dimension of road transport. Such tax breaks represent expenditure for the government, in terms of foregone fiscal revenues, as was the case with the automobile tax. Moreover, they can contribute to increasing vehicle use, which can potentially offset the technical efficiency gains. Hence, the environmental effectiveness of these measures is questionable, e.g. in terms of reducing emissions of greenhouse gases or air pollutants.

Table 2.3. **Actions taken on the 2002 EPR recommendations for economy-environment integration**

Recommendations	Actions taken
Continue to <i>restructure environment-related taxes</i> in a more environmentally friendly way.	MOE established an Expert Committee to discuss potential effects of the carbon tax. Japan introduced tax incentives to favour more environment-friendly vehicles (see below).
Review and further develop the system of <i>road fuel and motor vehicle taxes</i> , with a view to promoting more sustainable modes of transport, to internalising environmental costs, while paying attention to the demand for transport infrastructure and to introducing more flexibility in the allocation of the revenue.	Taxation of road fuels has remained unchanged. Japan has introduced tax breaks for motor vehicle taxes to link them to fuel efficiency and exhaust gas emissions of vehicles, including heavy-duty vehicles. The earmarking of vehicle and road fuel taxes to road construction and maintenance was phased out in 2009.
Continue to <i>reduce sectoral subsidies</i> that have negative environmental implications. Strengthen efforts to buy and use " <i>greener goods</i> " (e.g. via green procurement policies and the green consumer movement) so as to promote more sustainable production and consumption patterns.	Japan phased out subsidies for domestic coal production in the early 2000s. Support to farmers has decreased. Green public procurement requirements have been mandatory for central government institutions since 2001. The Eco-Mark certification programme has been extended and several other eco-labels apply. Several incentive schemes are in place to favour the purchase of cleaner products, including vehicles and electric appliances.
Review <i>distributional implications</i> of proposed market-based instruments for environmental management and sustainable development.	No actions taken.
Assess the impact of changes in <i>technology and lifestyle</i> (e.g. the impact of information/communications technology, increased recreation time, retirement) on environment and nature, taking into account related changes in patterns of settlement, transport, production and consumption.	Some reports, including the White Papers issued by MOE and MLIT, describe the interactions between the environment, on the one hand, and social, demographic and settlement changes, on the other.

Source: OECD, Environment Directorate.

Higher oil prices have largely helped to moderate passenger traffic by car since 2003, and might have well been the primary incentive to shift to cleaner vehicles. Overall, Japan needs to redirect taxation from purchase and ownership of vehicles to their use and associated pollution load, i.e. through better targeted fuel taxes and road pricing (Box 2.3). Any remaining taxes on vehicles should be directly linked to their fuel efficiency and environmental performance.

Japan needs to reform its tax system to come to grips with urgent, and potentially conflicting, objectives: raising tax revenues to cope with high public debt and growing social spending resulting from an ageing population, while promoting economic growth and addressing widening income inequality (Jones and Tsutsumi, 2008). The OECD recommended raising the consumption tax rate and broadening the base of direct taxes by reducing allowances and deductions (OECD, 2009a).⁷ Broadening the use of indirect taxes on the consumption of goods and services that are potentially harmful to the environment, e.g. through a carbon tax, can also contribute to reaching these goals. Such taxes would generate revenues that can help the government with fiscal consolidation and/or be used to partly reduce taxes on households and businesses, thereby promoting economic growth. The regressive nature of such taxes should be addressed through *ad hoc* social benefit schemes. The introduction of other taxes, such as on air and water pollutants, could also be considered. Japan needs to streamline its current environmentally related taxes, with a view to reducing overlapping tax bases and administrative burden, as well as improving the fiscal autonomy of local governments. The current municipal tax on immovable property could also be redesigned to offer incentive towards energy efficient housing.

Box 2.3. Road pricing

In addition to fuel and vehicle taxes, Japan applies a flexible and rather complex system of road pricing for its nearly 9 000 kilometres of motorways. The network is self-financed through the “toll-pool” system, which allows cross-subsidisation between profitable and unprofitable motorways, and prices are very high (OECD, 2005a). Lower rates apply to light vehicles and motorcycles. Discounts of 30 to 50% apply to motorway tolls at off-peak times and for long-distance use. To divert traffic from congested roads running through residential areas, a discounted toll applies on some urban stretches of motorways (so-called “environmental road pricing”). The 2008-09 anti-crisis package introduced further discounts on road tolls during weekdays and a flat rate of JPY 1 000 on weekends, aiming to stimulate travel and tourism. Furthermore, in its 2010 budget, the government approved the expansion of toll discounts on a pilot basis, with a view to progressively eliminating all road tolls. Overall, despite high prices, the toll system encourages long-distance driving, including over routes that are very well served by fast trains. The measures recently approved would strengthen this incentive, whereas an appropriate implementation of the polluter-pays-principle would require road pricing to reflect both the distance travelled and the environmental performance of vehicles.

1.3. Subsidies

The government provides various types of financial assistance to businesses and households. Subsidies to businesses included in the 2008-09 stimulus packages amounted to some 0.5% of GDP, the fourth highest GDP share for such subsidies among OECD countries (OECD, 2009c). Businesses often benefit from government financial assistance to meet environmental targets, also under negotiated agreements (Chapters 3 and 5), thereby undermining a consistent application of the polluter-pays-principle. Besides straining the public budget, some support measures can have harmful environmental effects, as they affect production and consumption decisions. Japan needs to regularly review its subsidy policies to verify that the benefits are higher than the associated costs, including environmental costs. Removing perverse subsidies should be a central part of a comprehensive environmental fiscal policy reform, with a view to increasing the cost-effectiveness of policy measures, which are particularly important during times of economic crisis. As recommended in the 2002 OECD EPR, Japan has taken some steps to reduce environmentally harmful subsidies (Table 2.3).

Subsidies to promote environment-friendly products

Like other vehicle-producing countries, Japan introduced support measures for its car industry as part of the 2008-09 anti-crisis policy package. The so-called *Green Vehicle Purchasing Promotion Programme* provides subsidies for purchasing new fuel-efficient cars and heavy goods vehicles to replace old ones. Eligible vehicles need to comply with the 2010 fuel efficiency standards. However, purchases not associated with scrapping old vehicles can also benefit from a subsidy, albeit lower, if the new vehicle exceeds the 2010 standards by at least 15%. The government has allocated approximately JPY 370 billion (about USD 3.7 billion) to the programme, expecting an increase in sales of up to 690 000 vehicles. The programme is set to terminate in September 2010.

The *Eco-Point Programme* was launched in mid-2009 to encourage purchases of energy-efficient household appliances, namely TV sets, air conditioners and refrigerators. Consumers are awarded “eco-points” for the purchase of these products depending on

their energy performance, with or without scrapping old appliances. The “eco-points” can be used to buy other goods and services nationwide. The government covers the costs of the programme (some JPY 232 billion), which is set to end in December 2010.

These incentive schemes have softened the impact of the economic crisis on the automotive and electric appliance sectors. However, they distort the market by discriminating among manufacturing sectors and consumers, namely low-income households who cannot afford to buy new products. From an environmental perspective, *rewarding the purchase of energy-efficient goods is not a cost-efficient way to reduce environmental impacts*. These incentives encourage the use of subsidised products. The Japanese experience shows that despite the improved energy efficiency of electric appliances, overall electricity consumption in the residential sector has increased (Chapter 5). Moreover, the environmental impacts over the whole lifecycle of a product should be considered, including the increased demand for steel.

Energy subsidies

Japan offers financial support for energy efficiency programmes, renewable energy sources, and related research and development. In 2008-09, this support averaged some JPY 465 billion (about USD 4.7 billion) per year.⁸ In the early 2000s, Japan phased out its *subsidies for domestic coal production*, following a restructuring programme of the coal industry.⁹ However, Japan still subsidises other *fossil fuels* (Table 2.4), and exempts from excise duties fuels used in agriculture, forestry, fishery, mining, petrochemicals, manufacturing, and for heating purposes (Table 2.1).

Table 2.4. **Energy subsidies, 2007**

Subsidy	Purpose	Budget amount for 2007 ^a (JPY million)
Natural gas exploration subsidy	Promote natural gas exploration by mining companies	907
Subsidy for oil refining technology programmes in oil-producing countries	Promote joint research with oil-producing countries on oil refining technologies	9 925
Oil prospecting subsidy	Support geological surveys abroad	1 812
Oil refining rationalisation subsidy	Assist the development of advanced oil refining technologies	12 457
Oil product quality assurance subsidy	Support analysis of petroleum products and development of analysis techniques	1 898
Subsidy for structural reform measures for petroleum product distribution	Assist business diversification and other structural reform measures by oil distributors	12 442
Large-scale oil disaster prevention subsidy	Support the construction and maintenance of oil fences and their transport in emergencies	800
Promotion of natural gas use subsidy	Help private firms convert coal-burning facilities to natural gas-burning ones	6 005

a) Financial year.

Source: IEA (2008).

Fisheries support

Government financial transfers to fisheries have continued to decline, from about USD 2.8 billion in 2000 to USD 2.2 billion in 2005. Nonetheless, Japan remains the largest provider of governmental support to this sector among OECD countries. This support is linked neither to production nor to investment in new vessels, which have the greatest potential to reduce fish stocks. Japan provides direct payments for fleet reduction (for scrapping vessels and surrendering licenses), as well as interest subsidies for the renewal of small fishing vessels, mainly to improve fisheries management and work safety.

Some 70% of government financial transfers to fisheries are for coastal infrastructure construction (e.g. fishing ports, coastal roads) (OECD, 2009d). While these subsidies do not increase fishing effort, they constitute payments to the construction industry and can provide incentives to invest in unnecessary or unprofitable infrastructure, especially at a time when the fisheries sector is declining (Chapter 7).

Agricultural support

Agriculture is a highly protected and low-productivity sector in Japan. Total support to agriculture, including general services such as education, marketing and infrastructure, decreased during the review period. It accounted for about 1% of GDP in 2006-08, which is in line with the OECD average.

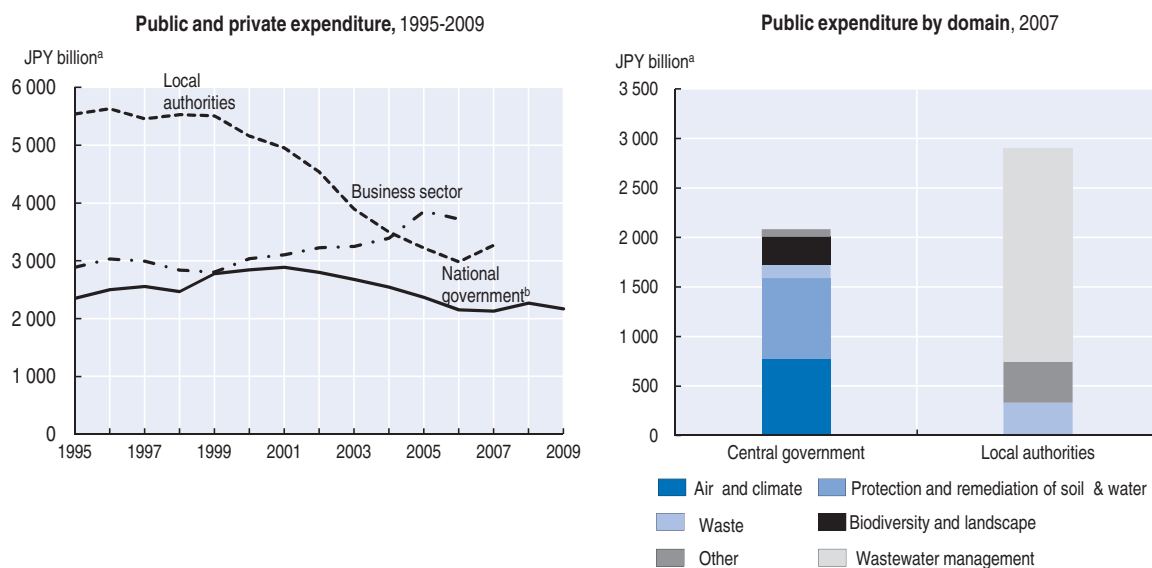
Support to farmers also decreased from 58% of gross farm receipts in 2000-02 to 49% in 2006-08.¹⁰ However, support to farmers in Japan remains twice the OECD average. Moreover, support linked to production (i.e. to levels of input or output) accounts for nearly 95% of support to producers, far above the OECD average (55%). This kind of support is generally distortionary and environmentally harmful, since it stimulates production and input use, with negative impacts on the use of water, land, fertilisers and pesticides. While administered prices of some agricultural products, including rice, were abolished during the review period, market price support still accounts for 85% of agricultural support.¹¹ Rice continues to be the most heavily supported commodity. As a result, Japanese consumers pay almost twice the world market price for agricultural products. Japan needs to reduce its high level of support, moving away from support to production and towards direct support to farmers. Improving the composition of support could bring benefits to farmers, consumers and the environment (OECD, 2009e).

Japan has introduced direct payments for *environmentally friendly farming* that requires halving the use of chemical fertilisers and pesticides (Chapter 7). However, these payments account for only 0.5% of total payments to farmers, a very low share compared with agri-environmental payments in other major OECD economies. Further efforts are needed to make agricultural support conditional on meeting appropriate environmental standards, as recommended in the 2002 OECD *Environmental Performance Review*.

1.4. Environmental expenditure

Public pollution abatement and control (PAC) expenditure represented about 1.2% of GDP in 2007, down from 1.7% in 2000.¹² Also the share of public expenditure devoted to environmental protection has steadily declined since 2000, reaching 3.4%. Expenditure has been scaled down in all sectors, with the exception of those related to climate change. Most of Japan's public expenditure on environmental protection is spent at local level, by prefectures and municipalities, although with substantial financial transfers from the central government. Fiscal autonomy of local authorities is indeed low. PAC expenditure by the central government has decreased by 24% in real terms since 2000, while local expenditure has decreased even more, by 37% (Figure 2.4). These trends partly reflect the increasing role of the private sector in financing and managing environmental infrastructure and services, particularly in the waste sector (Chapter 6). Indeed, private PAC expenditure has increased by 22% since 2000.

Investment represented about 38% of public PAC expenditure in 2007, down from 55% in 2000. Despite this decline, *environmental investment* still represents 15% of Japan's overall gross capital formation, the highest share among OECD countries. This reflects an ongoing,

Figure 2.4. **Pollution abatement and control expenditure**

a) At constant 2005 prices.
b) 2009: provisional budget.

Source: Ministry of the Environment and OECD calculations.

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large-scale investment plan to fill Japan's environmental infrastructure gap, especially in sewerage and wastewater treatment facilities (Chapter 3). As a result, wastewater management still accounts for over 70% of public PAC expenditure at local level (Figure 2.4). On the other hand, the weight of the waste sector has slightly decreased, showing that progress has been made in developing waste treatment infrastructure and outsourcing municipal waste management to the private sector (Chapter 6). At the central level, growing attention to climate change has resulted in an increasing share of public expenditure, comparable to the share allocated to prevention and remediation of water and soil pollution, which had traditionally been higher in Japan (Figure 2.4).

2. Promoting eco-innovation and environment-friendly products

2.1. Policy framework

The promotion of eco-innovation is a key feature of Japan's environmental policy and the main link between economic, industrial and environmental policies. *Japan's definition of eco-innovation* goes beyond the development and application of environmental technologies, to embrace the social aspects of technological progress and its impacts on quality of life. This concept of eco-innovation implies broad structural changes in the economy and society (OECD, 2009f).

The key features of *Japan's approach to eco-innovation* are close co-operation with the private sector and active involvement of consumers to promote lifestyle changes. The manufacturing sector has heavily invested in eco-innovation, which is seen as a factor of competitiveness. At the same time, the government has put in place a number of measures to stimulate demand for environmental technologies and products, such as tax incentives for cleaner vehicles (Section 1.2), the Eco-Point Programme (Section 1.3), and the green public procurement policy (Section 2.4). Japan has also supported exports of environmental technologies through

international co-operation activities. Examples include 3Rs (reduce, reuse, recycle) initiatives in Asia (Chapter 6) and official development assistance, which is often provided at more concessional terms when tied to Japanese technology (Chapter 4).

Several *strategic policy documents* include eco-innovation as an objective.¹³ The 2009 New Growth Strategy identified “green innovation” as one of the six growth drivers to 2020 (Box 2.2). Several ministries are involved in promoting eco-innovation, often in co-operation. In particular, the Ministry of the Environment (MOE), the Ministry of Economy, Trade and Industry (METI) and the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) and their affiliated institutions. METI has a general responsibility in industrial and R&D policies, including overseeing the New Energy and Industrial Technology Development Organisation, which co-ordinates and manages R&D activities, including environment-related R&D. The Council for Science and Technology Policy, established in 2001, is an advisory body to the Cabinet Office that ensures co-ordination among different ministries.

2.2. Research and development in environmental technologies

Financing environment-related R&D

Japan is one of the OECD leaders in R&D, with R&D expenditure well above the average. In 2007, public and private R&D expenditure accounted for 3.4% of GDP, up from 3% in 2000. The business sector funds and carries out over 78% of R&D, the highest share among OECD countries. High- and medium-high-technology industries, such as transport equipment, electronics and chemicals, accounted for some 80% of Japan’s exports of manufactured goods in 2007. Japan’s number of patent applications is among the highest in the world.

Central government outlays for R&D for *environmental purposes* have slightly increased, although remaining below 1% of the overall government R&D budget, a relatively low share by OECD standards.¹⁴ According to the annual Survey on Research and Development conducted by Japan’s Statistics Bureau, 10% of large enterprises invested in environment-related R&D in 2007, and environment accounted for nearly 6% of their R&D budget.¹⁵ Over 70% of these enterprises were in the manufacturing sector.

Government outlays for *energy R&D* accounted for 13.7% of the public R&D budget in 2008, the highest share among OECD countries. Japan’s public R&D outlays on “green energy” (including renewables, hydrogen and fuel cells technologies, energy efficiency, and carbon capture and storage) have considerably increased and are the second highest among OECD countries in absolute terms. However, these expenditures represent some 25% of the energy R&D government budget, the lowest share among OECD countries, reflecting large private sector expenditure in this field (Chapter 5).

Japan’s environmental R&D efforts have been moving from traditional pollution control technologies to climate-related and *non-traditional “green technologies”*. In particular, Japan is a pioneer in “green information and communication technologies” (ICTs), acknowledging their potential contribution to higher efficiency in energy and resource use (OECD, 2009f).¹⁶

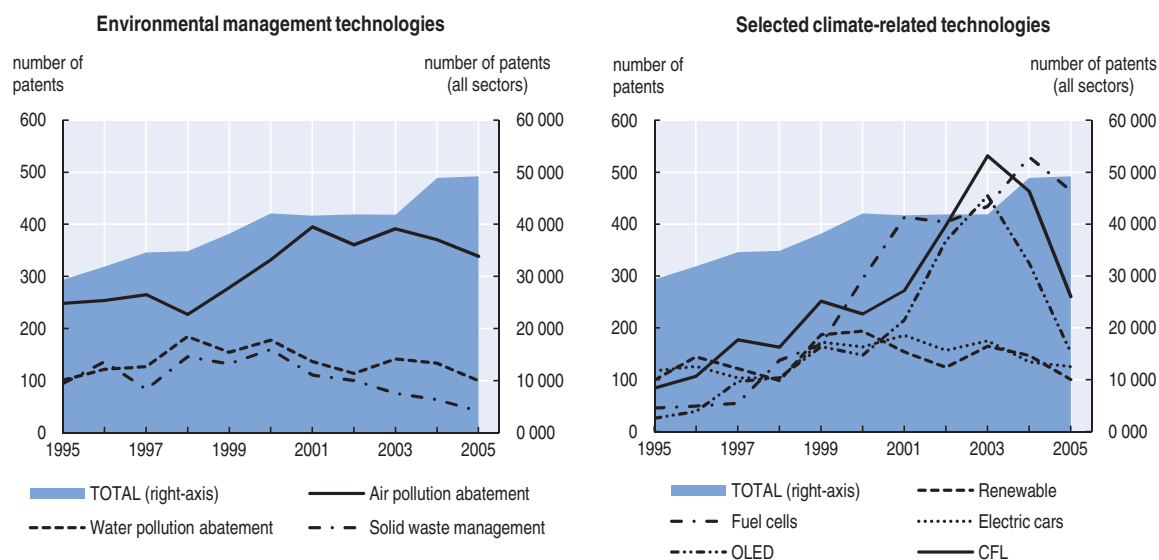
Japan has launched a number of initiatives to promote R&D in *environmental technologies*, such as the Global Environment Research Fund and the Global Environment Research Programme, managed by MOE. In the last few years, the funded research projects have focused on climate change mitigation, adaptation and carbon sinks. The 2008 *Cool Earth Innovative Energy Technology Programme* sets priorities for 21 energy- and climate-related technologies, for which development road maps are being established. Businesses investing in environmental R&D, as in other R&D fields, benefit from special tax treatment.

Tax subsidies for R&D have increased since 2000 (OECD, 2007). Nonetheless, direct government investment in basic R&D for environment- and climate-related technologies should increase to share the risk with the private sector of developing new technologies and to further accelerate innovation (OECD, 2009a).

Patents in environmental technologies¹⁷

Japan accounted for around 30% of world inventions in *air, water and waste management technologies* over the 2000-05 period. Patent applications in these areas represented 1.3% of overall Japanese inventions, a relatively low share compared to other countries (OECD, 2009g). Patents in air pollution control technologies represented nearly 65% of all environmental management innovations. Their number increased rapidly until 2001 and then tended to stabilise (Figure 2.5). Explanations include the introduction in the late 1990s of stricter standards on dioxins emissions from waste incineration and the sharp increase in related public investment (Chapter 6).¹⁸ Although not easy to track, negotiated agreements with industrial facilities may have provided some incentive to innovate (Chapter 3). Innovations related to solid waste management and water pollution control technologies reached a peak in 1998-2000 and have declined since, in line with worldwide trends (OECD, 2009g).¹⁹

Figure 2.5. **Environmental patents**



Source: EPO/OECD Worldwide Patent Statistical Database.

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The high level of investment in R&D has helped Japan become a leader in *climate-related technologies* (OECD, 2009a).²⁰ The number of patent applications for some of these technologies is growing faster than for traditional environmental management technologies, or for technologies in other sectors (Figure 2.5). This development is in line with trends in other Kyoto Protocol Annex I countries (OECD, 2009h), and can be partly explained by the increase in public expenditure for related R&D, especially for fuel cells, energy-efficient lighting, solar energy and bio-energy. Although this is difficult to assess, the Top Runner Programme targets on fluorescent lights, TV sets and computers agreed in the late 1990s (Section 2.3) might have contributed to spur innovation in light emitting diode technology (LED), organic LED,²¹ and compact fluorescent lamps (CFL). The Keidanren Voluntary Action

Plan on the Environment, launched in 1997, might also have played a role. On the other hand, the recent decline in the number of patents for renewable energy technologies seems to indicate that the Renewable Portfolio Standard, introduced in 2003 to promote renewable electricity, has not induced substantial innovation in that sector (Chapter 5).

Environmental Technology Verification Programme

The *Japan Environmental Technology Verification Programme (J-ETV)* was launched in 2003 and, following a pilot phase, has been fully operational since 2008. It aims to make environmental technologies more attractive for investors and consumers, thereby facilitating their wider use. In order to benefit from the J-ETV, target technologies need to be at a relatively advanced stage of development and deal with environmental problems for which no regulation exists. Technology manufacturers and distributors can voluntarily apply for verification after paying a fee that partially covers the costs of the process. Verified technologies can then use the J-ETV label.

MOE co-ordinates the J-ETV Programme, approves the technology testing protocols, and maintains the database of verified technologies. The “verification organisations”, which include local governments, public corporations and non-profit organisations, carry out the verification process and report to MOE. The criteria for selecting verification organisations have not been particularly strict, and the independence and technical skills of verification organisations need to be strengthened. Promoting the J-ETV label in export markets would make the verification programme more attractive for technology manufacturers.

During the pilot phase (2003-07), the J-ETV Programme’s annual budget was between JPY 200 and 250 million; 157 technologies were verified in 10 technology fields, such as organic wastewater treatment at small facilities and volatile organic compound (VOC) abatement for small factories. At the end of the pilot phase, some 65% of participating companies declared that they had obtained, at least partially, the benefits they had expected from the programme for their business activities.

2.3. Performance targets

Japan has a long-standing tradition in implementing performance targets to improve the environmental performance of production processes and products. In 1998, Japan introduced the *Top Runner Programme*, which is a system of dynamic energy efficiency targets for a variety of products, ranging from vehicles to household electric appliances. Targets are set at the level of the best performing model on the market. Manufacturers are directly involved in target setting. It has been effective in promoting technological and energy efficiency improvements of such products, although the overall impact on energy savings and related costs remain unclear (Nordqvist, 2006). While the programme does not call for public financial support, a number of measures are in place that contribute to achieving Top Runner objectives, including fiscal incentives for purchasing products that meet or exceed the programme’s targets (Sections 1.2 and 1.3).²²

Other measures, including market-based instruments, might be more cost-effective in producing more rapid eco-innovation. The Top Runner Programme focuses on realistic levels of energy efficiency, thereby encouraging incremental improvements rather than breakthrough innovations. The “top runners”, i.e. firms with the most energy-efficient products at the start of a target cycle, do not need to invest further (OECD, 2009a). Moreover, since compliance is assessed by comparing performance in the base and target years, target setting does not take account of potential technological improvements that would

occur in the absence of the programme, or of developments already available but commercially untapped (Nordqvist, 2006). Comparing performance in the target year with baseline projections would be more appropriate (IEA, 2008).

In many cases, performance targets are negotiated with the industrial sector within the framework of *voluntary agreements*, such as the Keidanren Voluntary Action Plan on the Environment for the control of GHG emissions (Chapter 5). Often, as in the Top Runner Programme, these performance targets are accompanied by a “name-and-shame” mechanism: the names of under-performing companies are disclosed to the public. This mechanism puts the brand image of companies at risk, representing an incentive for eco-innovation in Japan that is probably more effective than the stringency of environmental regulations. According to an OECD survey conducted in 2003, fewer than 5% of facilities in Japan felt that environmental policies were very stringent, and more than 65% found them to be not particularly stringent (Johnstone et al., 2007).

2.4. Promoting green products

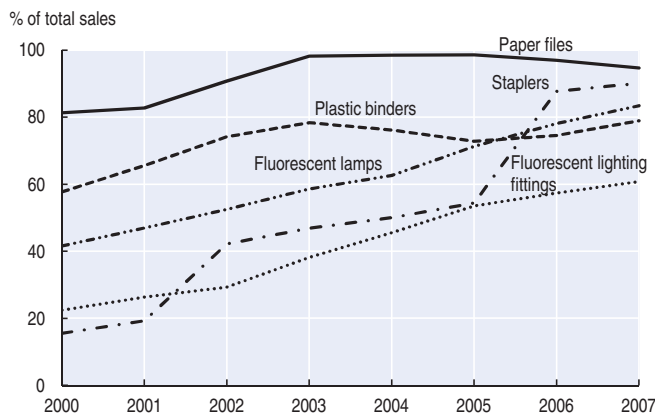
Green public procurement

Japan had introduced a green public procurement policy before the adoption of the 2003 OECD Recommendation on “Improving the Environmental Performance of Public Procurement”. The 2001 Law for the Promotion of Procurement of Eco-Friendly Goods and Services (Law on Promoting Green Purchasing) requires all governmental institutions to develop green procurement policies, define annual targets for the purchase of selected eco-products, and annually report to MOE. The 2008 *Basic Policy for the Promotion of Procurement of Eco-Friendly Goods and Services* represents the framework for green procurement at the national government level. It defines evaluation criteria for 246 categories of products and services, up from 152 in 2002, including for materials and equipment used in public works construction. In 2007, Japan extended the green purchasing requirements also to the procurement of services.²³

However, green public procurement requirements do not apply to the local level. Nonetheless, many *local authorities* have voluntarily implemented similar measures and subscribed the Green Purchasing Network’s guidelines. Further extending the green purchasing requirements to local governments would enhance the effectiveness of the policy, in particular since a large share of public expenditure is invested locally. In expanding its green purchasing policy, the government should make sure that tendering procedures are transparent and competitive, and do not discriminate among potential suppliers.²⁴

More than 90% of products and services procured by central government agencies meet the required environmental criteria. This outcome was achieved with minor increases in public expenditure. Since the introduction of the green public procurement policy, the *market shares of eco-friendly products* widely used in the public administration have substantially increased (Figure 2.6). According to MOE’s estimates, the national government’s green purchasing policy resulted in a reduction of carbon dioxide (CO₂) emissions by 89 500 tonnes in 2006, which is equivalent to the amount of CO₂ emitted by a town of 42 000 inhabitants. The overall costs to the Japanese economy of achieving such emission reductions should be assessed and compared with the costs of alternative policy measures.

Figure 2.6. Sales of selected eco-products, 2000-07



Source: Surveys of selected national associations (File and Binder; All Japan Stationary; Japan Luminaires; Japan Electric Lamp Manufacturers).

Eco-labelling

The Japanese Environment Association (JEA), under MOE's aegis, manages the Japanese environmental product certification system, the *Eco-Mark Programme*. The label is assigned to products that have lower environmental impacts than similar products over their whole life cycle, from material extraction to disposal. Manufacturers who are awarded the Eco-Mark pay an annual fee that is proportional to product sales.

As of 2007, 4 617 products were awarded the Eco-Mark in 47 product categories. JEA aims to achieve 6 000 certified products in 51 categories by 2012. The market share of Eco-Mark products has increased. According to some estimates, the use of certified products has led to some decreases in CO₂ emissions, resource consumption and waste disposal. Obtaining the Eco-Mark has become the norm for major manufacturers, which suggests that the awarding criteria need to be constantly revised to ensure that the environmental impact of a labelled product is substantially lower than average.

Many other certification programmes exist. For instance, an energy efficiency label is associated with products that achieve Top Runner targets, and a uniform energy conservation label applies to some home appliances (Chapter 5). Many companies have also launched their own eco-labels. However, criteria for awarding the labels may differ greatly. Japan should consider streamlining the overall eco-labelling system to improve reliability, send clear messages to consumers and reduce possibilities of falsification.²⁵

3. Expanding environment related markets and employment

The global and Japanese markets for environmental goods and services have expanded in the last decade and are expected to grow faster in the future. According to some estimates, the value of the global market for environmental goods and services, including renewable energy technologies and low carbon activities,²⁶ was about USD 1.6 trillion in 2007-08. Japan accounted for 6.3% of this global market, the third largest share after the US and China (Innovas Solutions, 2009).

In the second half of 2008, overall Japanese exports suffered from declining global demand, but exports of environmental products grew by over 35% compared to the same period in 2007 (Nitta, 2009). According to a survey conducted by the Japanese External Trade Organization in 2009, some 18% of Japanese manufacturing businesses were

producing and exporting environmental products, especially waste treatment devices, eco-paints and adhesives, photovoltaic cells and other renewable energy technologies, electric, hybrid and fuel cell vehicles, and wastewater treatment equipment (JETRO, 2009). The latter drove export growth in 2008. East Asia, particularly China, is the main export market for Japanese environmental products and technologies, followed by Europe.

In 2003, MOE estimated the market size and employment of environmental businesses.²⁷ According to this study, the *eco-business turnover* was JPY 30 trillion (USD 280 billion) in 2000 and will nearly double by 2020 (Table 2.5). The 2009 New Growth Strategy aims at enlarging the environment and energy-related markets by an additional JPY 50 trillion (USD 530 billion) (Box 2.2). Resource management, broadly defined and including housing renovation and repair, was estimated to account for two-thirds of the market in 2000; environmental protection, mainly wastewater treatment facilities and provision of waste services, accounted for the remaining third.

Table 2.5. Market sizes and employment potential of the environmental goods and services sector^a

	Market size (JPY billion)			Employed		
	2000 ^b	2010 ^c	2020 ^c	2000	2010 ^c	2020 ^c
Pollution management, <i>of which:</i>	9 594	17 943	23 706	296 570	460 479	522 201
Air pollution control	642	3 166	5 169	8 971	39 306	53 579
Wastewater management	4 818	5 821	5 831	59 099	62 353	54 224
Waste management	3 614	7 736	11 126	211 859	330 006	378 035
Cleaner technologies and products	174	453	609	3 108	10 821	13 340
Resources management, <i>of which:</i>	20 177	28 830	34 061	468 917	648 043	700 898
Recycled materials	7 878	8 744	9 404	201 691	211 939	219 061
Renewable energy	163	929	929	5 799	30 449	28 581
Energy conservation and energy management	727	4 883	7 868	13 061	160 806	231 701
Other ^d	10 794	13 720	15 275	218 436	219 059	195 655
Total	29 944	47 227	58 376	768 595	1 119 343	1 236 439

a) Private sector only.

b) The figures for the market size in the year 2000 use varying fiscal year definitions.

c) Forecast.

d) Includes: repair of machinery, furniture, etc.; housing renovation and repair, and urban greening.

Source: MOE (2003).

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In the MOE study, environment-related *employment* was estimated at 769 000 in 2000, equivalent to 1.2% of total employment, and was expected to grow by 46% in 2010 and reach 1.2 million employed by 2020. The largest growth in employment and market value was expected in the energy sector and in the manufacturing sector for air pollution control equipment (Table 2.5). More recent estimates indicate that employment in private environment-related businesses had already reached 1.4 million in 2006, compared to about 76 500 employed in the public environmental administration (MOE, 2009). Initiatives such as the *Eco-Town Programme* to improve resource and waste management have positively contributed to local development and employment, supporting industrial restructuring in favour of environment-related sectors (Chapter 6). In 2008, the government launched similar initiatives – the “Eco-Model City Projects” and the “Biomass Towns” – to stimulate a local development based on climate-related activities and biomass energy (Chapter 5).

The 2009 New Growth Strategy expects to double employment in environment-related businesses by 2020 (Box 2.2). Overall, the transition to a green economy will require industrial restructuring and, therefore, a reallocation of labour resources across sectors. *Net employment effects should be carefully assessed*; labour market and education policies should take into account the new skills and competences that will be needed to adjust to greener technologies, production processes and working methods.

Involving the financial sector

Japanese financial institutions have seized the opportunity offered by the growing interest in the environment to provide *targeted financial products*, such as low-interest loans for environmental investments or ISO 14001 certification of enterprises. Formerly public financial institutions have taken the lead. In 2004, the Development Bank of Japan (DBJ) launched a system of environmental rating of companies' activities, which assesses the companies' efforts to reduce their environmental impact, and adjusts the terms of financing accordingly. In 2002, a Shoko Chukin Bank investment fund was established to finance environment-related investments in small and medium-size enterprises (SMEs). Several private financial institutions are also increasingly providing this kind of service, and have broadened their target customers from large corporations to SMEs (Ito, 2006). Some local governments have co-operated with local banks to increase the availability of funds for environmental investments; the Environmental Finance Project launched by the Tokyo Metropolitan Government is an example.

The Japanese stock market has promoted some *eco-funds*, which invest in environmentally responsible companies, and are often combined with socially responsible investment funds (so-called Eco-SRI funds). Around 25 such funds were available as of July 2006. While in 2006, Eco-SRI funds accounted for only 0.4% of all investment funds in Japan, their net asset value had grown by more than 50% in about one year, indicating increased interest among investors (Ito, 2006).

4. Social dimensions

4.1. Distribution issues

Income inequality increased in the 1990s but has remained fairly stable since 2000, in line with the OECD average.²⁸ The proportion of the population in *relative poverty*, with income below one-half of the median household disposable income, has also slightly decreased since 2000, although it remains higher than in the mid-1990s. In the mid-2000s, it was nearly 15%, well above the OECD average of 10%. Several factors explain these trends, including the increasing share of the elderly in Japan's population, the growing proportion of non-regular workers in total employment, and the relatively low level of social spending as a share of GDP. Given the severe budget constraints, Japan should correct labour market dualism and better target social spending (Jones, 2007).

Energy and water charges accounted for 7.4% of household consumption expenditure in 2008, up from 6.7% in 2001, putting Japan in the upper half of OECD countries. While the share of water and sewerage charges in expenditure has remained constant, the share of energy has increased from 5.2% to 5.8%. This is closely linked to increased domestic electricity consumption (Chapter 5). Given the energy consumption patterns and the above-average electricity and gas prices, in Japan the energy bill represents a relatively higher share of domestic expenditure than in most OECD countries. Households also pay

disproportionally higher energy prices, especially for gas, than industrial customers (Chapter 5). Since energy and water represent primary needs, their cost clearly weighs down more on low-income household budgets.

The tax reform foreseen in 2011 is an opportunity to *address environmentally related taxation (and pricing) together with income distribution issues*, and to review cross-subsidies between different customer categories. The potentially negative impacts of environmentally related taxes on income distribution should be addressed by targeted compensation measures; tax exemptions for particular population groups should be avoided.

4.2. Accessibility of environmental, energy and transport services

Regional inequality in Japan has increased during the review period, although it has not reached the level of the early 1990s and remains relatively low in comparison with other OECD countries (OECD, 2009i).²⁹ Disparities remain between metropolitan and non-metropolitan regions – whose economy is more dependent on agriculture, public works and construction projects. Out-migration from rural regions persists. New trade relationships and the relocation of investments in the East Asia region are also likely to influence the spatial distribution of economic activity within Japan (OECD, 2005b).

Japan has heavily invested in *infrastructure development* to overcome natural barriers and improve accessibility across regions and between core and peripheral areas. For example, the high-speed rail network (the *Shinkansen*, or bullet train) has had a significant impact on reducing travel times between major urban centres.³⁰ Public investment has tended to be higher in regions with lower population density and income level (OECD, 2005b).

However, the *accessibility of core cities within each region*, i.e. the accessibility of urban services for rural periphery dwellers, differs widely across regions.³¹ Public transport services are less accessible in non-metropolitan regions and in urban areas with lower population density. This, together with urban sprawl, has resulted in a higher reliance on private car travel, especially in cities with up to 200 000 inhabitants (MLIT, 2008). Households in small cities spend 80% more for private transport (including fuel use, purchase and maintenance of vehicles) than households in major cities, and private transport accounts for 9.2% of their overall consumption expenditure, compared to 5.2% for major city dwellers.³² The 2009 New Growth Strategy aims, among other things, at revitalising peripheral urban areas through infrastructure development (Box 2.2). However, considering the tight budget constraints and the declining population of some areas, Japan should thoroughly assess costs and benefits of infrastructure investment, and involve private finance.

Progress has been made in developing *domestic gas supply infrastructure*, an area where Japan had lagged behind other OECD countries (IEA, 2008). Nonetheless, in 2008, households in medium-sized and small cities were still spending two and four times more, respectively, on fuels other than natural gas than households in major cities.³³

Virtually the whole Japanese population has access to safe *drinking water*. Over 70% of the population are now connected to public *wastewater treatment plants*, although gaps between large cities and medium- and small-sized cities still exist. Around 9% of the population, mostly in sparsely populated areas, use individual on-site treatment systems (*Johkasou*); some 10% of the population are estimated to be still using old *Johkasou* systems (so called *tandoku-shori*), which only treat flush toilet wastewater (Chapter 3). Overall, modern *waste treatment and recycling facilities* have been developed and ensure adequate waste services throughout the country (Chapter 6). Nonetheless, some problems persist in

rural areas and on small islands, where cases of illegal dumping of municipal waste have been reported. Also, waste recovery rates greatly differ across prefectures, varying from nearly 32% in Mie to about 10% in Osaka.

4.3. The environmental dimensions of ageing and depopulation

Japan's population is predicted to drop to some 100 million by 2050, from about 128 million in 2008. Japan has the highest ratio of people over 65 years old in the population (22% in 2008), and life expectancy at birth is among the highest among OECD countries. The *ageing of the population and depopulation* are already affecting rural areas and the ability to maintain natural ecosystems, including *satochi-satoyama* (Chapter 7). However, unlike most other OECD countries, these trends are no longer limited to rural areas.

The impact of these demographic trends on Japan's environment is complex. Population decline is expected to lead to a decrease in resource and energy consumption (MOE, 2006). However, the *number of households is projected to increase*, resulting in a decrease in household size from 2.55 people in 2005 to an estimated 2.37 people by 2025. This may well lead to greater resource and energy consumption and waste generation per capita, due to decreasing household economies of scale (*e.g.* less sharing of family-sized food and personal care products, water heating and electrical appliances). Aging is likely to exacerbate this phenomenon: a person over 60 years old and living alone spends on average 1.5 times more on water, electricity and heating than a young person (up to 34 years old) living alone.

Population decline and ageing are likely to negatively affect the *profitability of the current level of environmental services (e.g. waste and wastewater) and public transport infrastructure*. The elderly tend to rely more on private cars for travel, especially in non-metropolitan areas (MLIT, 2008). The decrease in the number of passengers travelling by public transport has already led to the elimination of some public transport routes and services in peripheral areas (Chapter 5).

Notes

1. In 2008, Japan's GDP per capita in purchasing power parity was USD 34 100 and the OECD average was USD 33 700.
2. The consumption tax rate is the lowest among OECD countries at 5%.
3. The tax rate on diesel includes the petroleum tax and the diesel oil delivery tax; the tax rate on gasoline includes the petroleum tax and the gasoline tax.
4. Revenue from the petroleum and coal tax is used to finance oil development and stockpiling, energy conservation and renewable energy source development; proceeds from the power-resource development tax are earmarked for promoting power source locations and R&D; and those from the aviation fuel tax are used to finance airport construction.
5. The prefectural acquisition tax is charged on retail price at the time of purchase; the prefectural annual automobile tax is based on engine size; and the national tonnage tax is imposed at the time of the mandatory periodical vehicle inspection on the basis of the weight and age of the vehicle, with reduced rates for "next generation vehicles".
6. Diesel cars older than 11 years and gasoline cars older than 13 years.
7. Japan applies exceptionally high corporate tax rates. The share of direct taxes (personal and corporate income taxes and social security contributions) in total tax revenue is relatively high compared to other OECD countries. Several studies show that for a given level of taxes, a higher incidence of direct taxes (especially on business activity) relative to indirect taxes is detrimental to economic growth (Jones and Tsutsumi, 2008).

8. Including about JPY 140 billion per year of financial support for the improvement of the environmental performance of businesses.
9. The main type of subsidy concerned coal consumption of electric utilities, whereby coal producers received subsidies to cover the difference between market prices and those established under domestic agreements.
10. Support to agriculture is measured in terms of Producer Support Estimate percentage, which expresses the monetary value of public transfers to producers as a percentage of gross farm receipts.
11. Market price support indicates the value of transfers resulting from any policy that leads to higher domestic market prices (*e.g.* tariffs, production quotas, administered prices).
12. This estimate is based on government expenditure classified as “Environment Protection” according to the Classification of the Functions of Government (COFOG).
13. For instance, the 2007 Strategy for a Sustainable Society in the 21st Century and the Third Basic Environment Plan (Chapter 1), as well as the Third Science and Technology Basic Plan.
14. The allocation of expenditures to specific objectives is determined on the basis of managerial intentions at the time of commitment of the funds. Given the uncertainty associated with basic R&D, this may be difficult to establish with confidence.
15. Large enterprises are those with a capital above JPY 100 million.
16. In 2008, METI launched the Green IT Initiative, with a focus on infrastructures and technologies for teleworking, intelligent transport systems, and home and building energy management systems.
17. Patent data on environment- and climate-related technologies are extracted from the *EPO/OECD Worldwide Patent Statistical Database (PATSTAT April 2009)*, according to the methodology presented in OECD (forthcoming 2010).
18. Patents in air pollution control refer only to stationary sources, though they may include innovations in the automotive industry linked to the tightening of vehicle emission standards.
19. Some technical difficulties in extracting aspects of energy recovery, material recycling and waste prevention may result in a downward bias in the data.
20. Over the 2000-07 period, Japan accounted for 67% of world patents in electric cars, over 60% in organic light emitting diode (OLED) technology, 50% in efficient lighting, some 45% in fuel cells, and over 30% in renewable energy technologies.
21. OLED is an energy saving technology that can be used, among other things, in television screens and computer monitors.
22. Compliance with the targets is assessed on the basis of the weighted average energy performance of a company's sales, and not on the individual products that are sold.
23. Law concerning the Promotion of Contracts Considering Reduction of Emissions of Greenhouse Gases and Others by the State and Other Entities.
24. OECD Council Recommendation on Improving the Environmental Performance of Public Procurement [C(2002)3].
25. In 2008, a number of Eco-Mark falsification cases occurred, including falsification of the percentage of waste paper pulp in recycled paper, inappropriate use of printing inks, and falsification of recycled plastic products. In response, the Eco-Mark Office strengthened its inspection activities.
26. Alternative fuels, carbon finance and building technologies.
27. Firms producing goods and services that measure, prevent, limit, minimize or correct environmental damage to water, air and soil, as well as problems related to waste, noise and ecosystems. This includes cleaner technologies, products and services that reduce environmental risk and minimize pollution and resource use. The estimate covers the domestic market only.
28. As measured by the Gini coefficient for disposable income.
29. As measured by the Gini index of inequality of GDP per capita across regions.
30. For example, the completion of the Kyushu *Shinkansen* between Shin-Yatsushiro and Kagoshima-Chuo in March 2004 has reduced the travel time between Hakata and Kagoshima-Chuo from 3 hours 40 minutes to about 2 hours 10 minutes.

31. Rural-to-urban centre travel time by land averages 90 minutes in Kanto, Kinki, and Chubu, two hours for Kyushu and up to three hours for southern cities such as Kagoshima and Miyazaki.
32. The composition of household consumption expenditure in small cities normally differs from that in large cities. For example, households in small cities spend less on rent for housing.
33. Mainly kerosene.

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