

EXECUTIVE SUMMARY AND KEY RECOMMENDATIONS

The second-largest economy in the IEA, Japan is a world leader in progressing energy and environmental policy. The country is actively engaged in the international policy-making process and is committed to guiding the world's economies along a sustainable and secure energy pathway. In the environment arena, Japan has led by example, committing to meeting its own climate change targets while urging global action for the long term. It has also shown leadership in the Asia-Pacific region, helping to drive technology transfer and collaboration with its neighbours – helping expand energy efficiency and, as a result, increasing energy security and reducing greenhouse gas emissions. With its 2008 presidency of the G8, Japan is resolved to continue to elevate the issues of climate change and energy efficiency.

There is much to praise in Japan's domestic energy policies. It has a well-developed and robust energy R&D programme, to which significant government resources continue to be devoted. In fact, its commitment to energy R&D spreads benefits beyond Japan. The country is also steadfast in its commitment to nuclear energy as a major component of its energy mix, extracting the significant benefits of this greenhouse gas-free generation source. Its nuclear industry is also prominent globally, supplying the international market with state-of-the-art technologies. Similarly, Japan's renewables industry, particularly solar photovoltaics, and its electronics industry supply the world with cutting-edge technologies that reduce global greenhouse gas emissions and increase global energy security. Turning to fossil fuels, the country is a pioneer in the industry with strong policies to ensure security of supply and a well-developed infrastructure that has laid the foundation for the global trade in liquefied natural gas. The country makes energy security through energy diversity a top priority. It also helps underpin a secure oil supply for IEA countries by holding much more than its required share of oil stocks. Finally, the IEA sees that enhanced competition can bring to Japan important benefits such as global competitiveness and security of supply. To that end, we are pleased to note the efforts the country is now making towards liberalising its gas and electricity markets.

One policy area that deserves particular notice is energy efficiency. The government puts tremendous effort into increasing energy efficiency in the country and has established some innovative policies, including the Top Runner programme for product efficiency. The programme drives domestic efficiency, but also spurs international gains given Japan's position as a major exporter of electronics and vehicles. Notably, it is designed to continue to

place pressure to improve energy efficiency, and thus has a built-in mechanism to drive energy improvement over the long term without continued policy negotiation. In general, we commend the government for its strong leadership in energy efficiency and urge it to continue to refine and improve the programme. Japan's commitment to energy efficiency helps underpin global gains in energy efficiency.

Building on this strong progress, this report explores areas of energy and environmental policy where improvements can be made to ensure that Japan's policies fully balance the "3 Es" of sound energy policy – Energy security, Environmental sustainability and Economic efficiency. As in all countries, further progress can be made, and given the strong leadership Japan continues to show, the country is up to the task. In describing the challenges that Japan faces, three themes emerge – the need to complement existing voluntary measures and regulations with stronger policies in some areas; the need to enhance market signals and create the right incentives in the economy; and the need for more integration of its internal energy markets. Improvements in these areas have many benefits, most notably long-term, stable security of energy supply and the ability to cost-effectively reduce greenhouse gas emissions. At the same time, we urge the country to continue its strong leadership in the area of international collaboration and technology transfer.

CONTINUING INTERNATIONAL LEADERSHIP AND TECHNOLOGY COLLABORATION

Recently, Japan has been an active member of the Asia-Pacific Partnership on Clean Development and Climate (APP), in particular playing a leading role in the steel and cement sectors by taking a sectoral approach, which aims to identify the energy conservation and CO₂ reduction potential of each country. Japan is promoting the application of this approach as an effective tool for setting objective and fair targets. Japan also regards energy conservation as a means for simultaneously solving issues in relation to energy security, the strengthening of competitiveness of the national economy and climate change. The country has demonstrated leadership in the Asia-Pacific region, such as at the East Asia Summit and Asia-Pacific Economic Co-operation (APEC), by setting individual goals and formulating action plans voluntarily for improving energy efficiency. Moreover, Japan has been encouraging the transfer of know-how and technical knowledge in the field of energy efficiency. With its 2008 presidency of the G8, Japan is working to raise the profile of the issues of climate change and energy efficiency. It has already done so through the recent launch of the *Cool Earth Promotion Programme* at the World Economic Forum in Davos in January 2008. In this programme, Japan advocates that in order to reduce global greenhouse gas emissions by half by 2050, technological innovation is critical in coping with climate change.

With this perspective, the government will focus on R&D investment in the environmental and energy sectors, injecting about USD 30 billion into these sectors over the next five years. The government also states that it is necessary to establish a framework for accelerating technological development and sharing the resulting achievements through close partnership with the IEA and other relevant parties. The IEA encourages Japan to continue its international leadership on climate change as this can help foster important dialogue for the future. We also appreciate Japan's efforts to diffuse energy-saving technology in Asian countries, including China and India, by dispatching energy-saving experts, accepting trainees and supporting energy-saving projects. The country's good work to enhance technology transfer in the Asian region – thereby helping lower global energy demand – is a model for other countries and the IEA urges it to continue.

COMPLEMENTING EXISTING VOLUNTARY MEASURES

Japan's government has strong energy and environmental policies in place. Among these policies, there is strong emphasis on voluntary approaches, particularly with industry, as this is seen to allow greater flexibility and less government involvement. Many countries rely on voluntary agreements with industry and Japan's programme is notably comprehensive. In many cases, in fact, the voluntary approaches are voluntary in name only and the success rate has been very high – companies that commit to trying to meet the standard or requirement always do. This is the case with the Keidanren agreements with industry, where companies have an excellent record of fulfilling their goals. In general, however, there is room to complement the existing voluntary measures with other policies. This is true most notably in the housing sector, where the largely voluntary approach leaves room for efficiency improvements. Though some of the benefits of stronger building codes take longer to materialise owing to slow building stock turnover, the housing sector offers one of the largest opportunities for efficiency gains and greenhouse gas emissions reductions. Therefore we are pleased to see the recent efforts to specify energy efficiency standards that apply to a greater share of large buildings. Nevertheless, most other IEA countries have recognised the effectiveness of standards in improving energy efficiency in buildings and have made these standards mandatory.

Strengthened regulations could also benefit the gas and electricity sectors, where some of the rules in place may not be strict enough to achieve the necessary result, though they are in the process of being revised. In both the natural gas and electricity sectors, the incumbent utilities do not yet seem to have sufficient incentives to level the playing field for smooth energy trading. In the electricity sector, clearer requirements on third-party access would enhance competition. Moreover, there should be strong rules governing the balancing market and allocation of inter-regional transmission capacity.

In the nuclear sector, the clarity in the organisation of the safety regulator could be improved as such clarity is critical for public support of nuclear power. The IEA does not doubt the independence of the Nuclear and Industrial Safety Agency, but it is important that the public and investors are also convinced. In short, perception is important and more needs to be done to clarify and highlight this independence. In addition, the lack of irrefutable clarity on regulatory independence may lead regulators to be overly conservative as a means to counter the public's perception – ultimately undermining the economics of more efficient operation of nuclear facilities.

FURTHER ENHANCING MARKET SIGNALS AND INCENTIVES

Enhancing the existing policies and complementing the voluntary ones does not require imposing cumbersome regulations. Creating market signals throughout the economy is the clearest way of driving sustainable policy outcomes, but one that does not require imposing strict regulations. Particularly with respect to climate change goals, putting a value on greenhouse gas emissions in the economy will naturally drive consumer choices towards technologies and behaviours with lower emissions. Consumers need market signals to make the right choices. In some cases, standards and other policies can be the more appropriate way to drive energy policy. Sectoral approaches could also be a part of the overall policy mix. In addition, taxes, emissions trading schemes and other market-based policies could create the right signals and encourage the more efficient use of resources throughout the economy. Such signals are also necessary to help balance measures to reduce CO₂ emissions and ensure that reductions are undertaken in the parts of the economy where the costs of doing so are lowest. Thus we are pleased to see the voluntary trading scheme currently in place as well as discussion of a proposed carbon offset scheme aimed at reducing greenhouse gas emissions from small and medium-sized enterprises. Building on these efforts, the government should work to create a market signal for greenhouse gas emissions that spreads throughout the economy.

Turning back to the electricity sector, stronger market signals would also help enhance energy security. In its current state, the partial liberalisation of the sector risks undermining the regulatory certainty that companies require to make the large, capital-intensive investments in new electricity capacity, particularly nuclear capacity. Rather than trying to ensure that policy priorities are met in a partly regulated and partly competitive market, it can be more efficient, transparent and secure to ensure policy objectives through direct incentives, such as by reflecting the value of low-CO₂-emitting energy sources. The combination of stronger regulations and proper market incentives and price signals would also lead to better performance of the electricity capacity, including nuclear capacity, resulting in higher capacity factors overall. It

would also create a framework for competition to develop, giving confidence to market participants to enter and invest in the market.

BETTER INTEGRATING INTERNAL ENERGY MARKETS

As discussed, enhanced competition in Japan's gas and electricity markets could help further improve energy security, which would be accomplished by greater physical and market integration throughout the country. Owing to the historical development of the electricity grid in Japan, the power sector has ten vertically integrated utilities covering all its geographic regions. The regions are integrated, but interconnections are generally weak and regulations do not sufficiently encourage inter-regional trade. In the gas sector, the country has grids centred near LNG import terminals. The trunk pipeline networks of these grids are not fully interconnected across the country.

In the electricity sector, the benefits of greater reliance on trade across regions are clear. Long-standing power system operations rely on trade to enhance system security; the larger a regional grid, the greater the options for managing system load by relying on this larger suite of resources to either increase or decrease total supply. Within an adequately regulated framework and with independent system operations, the right incentives would be in place to ensure efficient sharing of resources across jurisdictions. This would help enhance system security in Japan – which already has very high system reliability compared to world levels – in a more cost-effective manner. In the gas sector, there are clearly costs for greater interconnections across the rugged geography of Japan. Nevertheless, commendably, the government has put in place fiscal policies to encourage greater integration, enhancing competition. However, as currently structured, a more integrated system is more likely to materialise if incumbents are given the right incentives.

Better integration of the electricity network also affects renewables deployment. As in all countries, Japan faces the challenge of securing an electricity grid with greater amounts of intermittent renewables, particularly wind. Growing experience and new research from the international community suggests that grids are able to handle higher levels of renewable resources than previously thought. Nevertheless, greater integration can be more easily managed if there is a larger, more integrated grid with more liquid trade of electricity. This will be particularly important in Japan, where the country currently has relatively low levels of renewables deployment. Not only is it important to set more ambitious targets for renewables, taking into account the natural and geographic conditions in Japan, but it is also critical to continue to streamline and harmonise market rules on grid interconnections in general and on the connection of renewables to the grid while continuing to pay due attention to the effects of increased intermittent sources on the network.

KEY RECOMMENDATIONS

The government of Japan should:

- ▶ *Continue to take a leadership role in the global dialogue on energy and the environment, building on the success of Japan's domestic efforts to improve energy efficiency, such as through sectoral approaches, and to develop low-carbon energy technologies.*
- ▶ *Maintain the country's global prominence in energy technology development and transfer.*
- ▶ *Complement existing energy and environmental policies with stronger options, including sector-specific benchmarks, standards, regulations, taxes and trading schemes, and continue to strengthen regulations for gas and electricity markets.*
- ▶ *Enhance the role of market signals in the economy, in part by strengthening the value on greenhouse gas emissions, in order to further improve energy security and environmental sustainability.*
- ▶ *Continue to work to create more integrated gas and electricity markets, particularly in light of the benefits on security of supply and renewables deployment.*