OECD POLICY GUIDANCE FOR INVESTMENT IN CLEAN ENERGY INFRASTRUCTURE

Expanding access to clean energy for green growth and development

An OECD report to the G20, with contributions by the World Bank and UNDP.

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This document aims to provide host country governments with guidance on the policy options that are available to make the most of investment opportunities in clean energy infrastructure, drawing on the collective expertise of the climate and investment communities among others. The document identifies issues to consider in several areas including: investment policy; investment promotion and facilitation; competition; financial markets; and public governance. It also addresses cross-cutting issues, such as the implications of regional co-operation and of international trade for investment in clean energy infrastructure.

The Policy Guidance for Investment in Clean Energy Infrastructure was developed by the OECD Investment Committee and the Working Party on Climate, Investment and Development (WPCID) of the Environment Policy Committee. It has been discussed at several meetings and benefited form substantial contributions by the World Bank, UNDP and various OECD bodies including, inter alia, the OECD Development Assistance Committee and the Secretariats of the Committees on Financial Markets, Competition and Public Governance.

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BACKGROUND TO THE POLICY GUIDANCE FOR INVESTMENT IN CLEAN ENERGY INFRASTRUCTURE

This document intends to inform policy-makers on ways of enhancing investment in clean energy[1] infrastructure, especially in developing and emerging economies. It focuses on the role that they can play in scaling up private sector investment and shifting it from conventional sources of energy to clean energy.

The *Policy Guidance for Investment in Clean Energy Infrastructure* is a non-prescriptive tool that builds on several policy instruments developed by the OECD Investment Committee and the Environment Policy Committee over recent years.

In its structure and rationale, the Policy Guidance draws on the *OECD Policy Framework for Investment* (PFI), the most comprehensive multilaterally-backed instrument to date for improving investment conditions. Elaborated in 2006, the PFI addresses some 82 questions to governments in 10 policy areas to help them design and implement sound policy measures to create a truly attractive, robust and competitive environment for domestic and foreign investment. The *Policy Guidance for Investment in Clean Energy Infrastructure* adopts a similar approach by providing policy-makers with a set of issues to consider for strengthening their enabling environment for investment in the clean energy sector.

The *Policy Guidance for Investment in Clean Energy Infrastructure* also builds on the OECD Investment Committee's efforts aimed at enhancing private sector participation in infrastructure, including work developed in co-operation with other parts of the OECD. This is an area that has fostered important Committee work in recent years, most notably since the adoption of the *OECD Principles for Private Sector Participation in Infrastructure* in 2007. In 2009 the 24 *Principles* were tailored to the water sector by the *Checklist for Public Action in the Water Sector*, which developed practical guidance to help governments and other stakeholders assess and improve the framework conditions for private investment in water and sanitation infrastructure. Likewise, the *Policy Guidance for Investment in Clean Energy Infrastructure* defines the main specificities of the clean energy sector that bear on the co-operation between the public and private sectors, identifies key policy issues for consideration by governments throughout the design and implementation of policy measures for clean energy investment, and draws on a wide range of available tools and practices from OECD countries and developing and emerging economies.

The Policy Guidance also draws on the recent paper *Towards a Green Investment Policy Framework: the Case of Low-Carbon, Climate-Resilient Infrastructure*, developed jointly with the Environment Policy Committee in 2012 (Corfee-Morlot *et al.*, 2012). The latter provides a conceptual policy framework and examples of good practice for integrating domestic investment and climate change policies, so as to help catalyse investment in low-carbon, climate-resilient infrastructure across the board in developed and developing countries. Drawing on these elements and building on the structure of the PFI, the *Policy Guidance for Investment in Clean Energy Infrastructure* focuses specifically on investment in clean energy infrastructure, and in particular with a view to addressing the needs of developing and emerging economies.

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1 "Clean energy" as defined in this paper includes the following sectors: solar, wind, hydro, geothermal, marine, biomass and waste-to-energy, biofuels and energy smart technologies (such as smart grids, energy efficiency and electric vehicles).

The *OECD Declaration on International Investment and Multinational Enterprises* (reviewed in 2011) also provides foundations for the recommendations of this Policy Guidance – in particular the Declaration's provisions on national treatment and on international investment incentives and disincentives. Finally, in addition to the tools developed by the OECD Investment Committee, the *Policy Guidance for Investment in Clean Energy Infrastructure* relies on instruments elaborated by other OECD Committees, including the *Guidelines for Corporate Governance of State-Owned Enterprises* released by the Corporate Affairs Committee in 2005, and the *Recommendations for Public Governance of Public-Private Partnerships* adopted by the Public Governance Committee in 2012.

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EXECUTIVE SUMMARY

1. Investments in clean energy infrastructure will need to be scaled up significantly in the coming years to support the broader development, economic and climate agenda. Given strains on public finances, engaging private sector capital will be key. Several obstacles, resulting from market and government failures – including fossil-fuel subsidies, the lack of supportive policies as well as outstanding barriers to international trade and investment – still hamper investment in renewable energy. A key challenge for host-governments to catalyse investment flows in clean energy is to design and implement clear and predictable domestic policy frameworks.

2. The Policy Guidance for Investment in Clean Energy Infrastructure aims to assist governments in identifying ways to engage private enterprises in financing and developing clean energy infrastructure. It thus provides policy-makers with a list of issues to consider for enhancing private investment in clean energy infrastructure, particularly in the following areas: investment policy; investment promotion and facilitation; competition; financial markets; and public governance. It also addresses other policy areas and cross-cutting issues (*e.g.* regional co-operation for promoting clean energy infrastructure) (see table ES.1).

Table ES.1 Areas covered by the policy guidance for investment in clean energy infrastructure

Policy areas	**Questions/issues for policy-makers' consideration**	**Overall objective**
1. Investment policy	• Non-discrimination of foreign versus domestic investors • Intellectual property rights • Contract enforcement	The quality of investment policies directly influences the decisions of all investors, be they small or large, domestic or foreign. Transparency, property protection and non-discrimination are investment policy principles that underpin efforts to create a sound investment environment for all.
2. Investment promotion and facilitation	• Carbon pricing and removal of fossil-fuel subsidies • Long-term policy goals • Policy incentives for investment • Licensing • Policy coherence and co-ordination	Investment promotion and facilitation measures, including incentives, can be effective instruments to attract investment provided they aim to correct for market failures and are developed in a way that can leverage the strong points of a country's investment environment.
3. Competition policy	• Electricity market structure • Non discrimination in access to finance • Competition authority	Competition policy favours innovation and contributes to conditions conducive to new investment. Sound competition policy also helps to transmit the wider benefits of investment to society.
4. Financial sector development	• Access to finance • Specific financial tools and instruments • Strengthened domestic financial markets	Well-functioning financial markets can strongly contribute to enhancing investment opportunities for both domestic and foreign investors.
5. Public governance	• Regulatory quality of the electricity market • Multi-level governance	Regulatory quality and public sector integrity are two dimensions of public governance that critically matter for the confidence and decisions of all investors and for reaping the development benefits of investment.
Cross-cutting issues	• Regional co-operation • Public-private partnerships (corporate governance) • Trade policy	

Source: Adapted from OECD (2006), *Policy Framework for Investment*, OECD Publishing, Paris.

3. While it covers a broad spectrum of issues, the *Policy Guidance for Investment in Clean Energy Infrastructure* does not exhaust the range of questions to consider for enhancing clean energy investment, nor does it follow a "one-size-fits-all" approach. Countries at different stages of technological and economic development will find different issues more relevant to their specific situation. Every context is different and the Guidance will thus need to be adapted to the needs of each individual country. Its ultimate goal is to serve as a policy tool-kit, and as a basis for multi-stakeholder dialogue on ways of increasing private investment in clean energy infrastructure, particularly for the purpose of broadening energy access.

1. Investment Policy

4. The core of an enabling investment environment, whether in clean energy or in any other sector, is the promotion of investment policy principles such as non-discrimination, investor protection and transparency. As the energy sector is generally more restricted to foreign direct investment (FDI) than others, particular emphasis should be given to assess the extent of foreign ownership restrictions in clean energy, and evaluate their economic and environmental impact. Given the importance of political, regulatory and financial risks for clean energy investments, contract enforcement is critical. In addition, the site-specific nature of renewable energy resources calls for substantial efforts aimed at securing stable and reliable access to land.

Promoting equal treatment of foreign and domestic investors in clean energy

To what extent does the clean energy sector face higher barriers to foreign investment than other sectors of the economy?
Do foreign investors face limiting constraints such as local content requirements? If so, what are the objectives behind these measures and is the government evaluating alternative ways of achieving these objectives?
What steps is the government taking to assess and remove measures that limit foreign investment?

Intellectual property rights

What steps is the government taking to protect intellectual property rights for clean energy technologies?
What steps is the government taking to facilitate patenting of innovations in clean energy? Has it set up a 'fast-track' system to reduce the time for patent application?

Contract enforcement and land rights

What steps is the government taking to ensure that contracts between clean energy producers and their partners are enforced? Are judgements publicly available?
What steps is the government taking to facilitate access to land for renewable energy deployment?

2. Investment Promotion and Facilitation

5. Domestic and international investment in renewable energy is still constrained by market and government failures. This includes a weak environmental policy backdrop that fails to sufficiently price fossil-fuel externalities such as GHG emissions and local air pollution, and can favour investment in carbon-intensive energy infrastructure projects vis-à-vis clean energy ones. Governments will need not only to improve domestic investment conditions, but also to promote and facilitate clean energy investments, including through shifting investment incentives away from conventional energy towards clean energy. This will require taking a range of co-ordinated actions including: removing fossil-fuel subsidies while taking care to minimise possible adverse effects on the poorest segments of the population; pricing carbon emissions; setting robust and credible long-term objectives in favour of clean energy; providing investors in clean energy projects with well-designed, well-timed, well targeted and time-limited

incentives; facilitating licensing for clean energy projects; and, last but not least, ensuring that clean energy policies are aligned and co-ordinated with the broader national policies.

Removing fossil-fuel subsidies and pricing carbon

What steps is the government taking to remove inefficient fossil-fuel subsidies?

- *Are the level and efficiency of these subsidies monitored on a regular basis? What steps is the government taking to phase out the subsidies in a gradual and transparent manner?*

Have carbon emissions been priced?

- *What steps is the government taking to ensure that the price of carbon emissions is set in a transparent, credible and predictable manner?*
- *Is there a market mechanism (tax or cap-and-trade systems) to price carbon?*
- *Is the system properly designed? How is the price level determined? Is the carbon price high enough?*

Has an emissions trading system for carbon been set up?

- *If so, how is the government dealing with the allocation of emission rights?*

Is there an intention to link the domestic carbon market to other carbon markets? If so, how is the government approaching the issue of fungibility of carbon credits?

Long-term goal setting to promote clean energy investments

Has the government set long-term carbon emission reduction objectives? If so, what kind of objectives, and are they linked to international agreements?
Has the government set targets for the deployment of renewable energy? If so, how have these been defined?

Policy incentives for investments in clean energy infrastructure

What financial and regulatory incentives is the government providing to promote investment in power generation from clean energy, including independent power production? Is the support well-targeted and time limited? Are policies regularly reviewed?
What financial and regulatory incentives does the government provide to transmission operators for the extension and improvement of the of the electricity grid?
What steps is the government taking to ensure that policy support is clear, credible and coherent?
Is the regulation easily accessible and understandable to all investors?
What steps is the government taking to ensure that policies and regulations are enforced?

Licensing of renewable energy projects

What steps is the government taking to facilitate the business licensing process for renewable energy projects?
Has a 'one-stop shop' been established for investment promotion, and if so does it have the adequate authority and technical capacity to facilitate the issuance of permits?

Policy coherence, policy co-ordination and policy monitoring

What steps is the government taking to make clean energy policies part of a broader national infrastructure, energy, environment and climate strategy framework?
Is procurement for new clean energy generation part of a long-term grid infrastructure development strategy?
Are the long-term clean energy objectives backed with capacity-building strategies?

What steps is the government taking to monitor the deployment of clean energy infrastructure and the achievement of clean energy objectives? Are supportive policies adjusted in view of progress?

3. Competition Policy

6. Clean energy infrastructure investments often take place in a situation of imperfect competition where a state-owned enterprise (SOE) is the incumbent. Policy-makers aiming to increase investment in clean energy infrastructure will therefore have to consider ways of creating a level playing field between independent power producers (IPPs) and SOEs, as well as between SOEs and other network operators. A first step is often to work with the state-owned energy utility to design and implement clean energy policy and technology solutions, including legislation for independent power provision. As a second step governments may consider embarking on more extensive structural separation of the power sector, whereby multiple actors are encouraged to engage not only in power generation, but also in transmission and distribution. As detailed below, the desirability and effectiveness of such an approach depend on a variety of factors, including domestic market size. The related costs and benefits need to be carefully assessed ex-ante. Establishing a more level playing field for private participation in electricity markets will also require that IPPs be guaranteed equal treatment; and that competition authorities and sector regulators possess the appropriate resources and independence to effectively enforce regulation.

Promoting the effective separation of the power sector

How far has the government engaged in the structural separation of the power sector?

What steps is the government taking to ensure that independent power producers can choose to whom they sell their power?

How does the government ensure that producers of renewable energy benefit from non-discriminatory access to the grid, and that access is guaranteed and enforced?

How are connection costs allocated among actors? What steps is the government taking to reduce barriers to entry for renewable energy producers?

Is investment in the grid open to private investment?

Is a wholesale energy market in place? If so, how does the government ensure that it can accommodate an increase in renewable energy generation?

Creating a level playing field between public and private investors in clean energy infrastructure

Do private developers benefit from non-discriminatory access to finance?

What steps is the government taking to ensure that the SOE and private actors have equal opportunities with regards to energy procurement?

When using tenders, how does the government ensure absence of discrimination among bidders?

- *If preferential treatment is given to the SOE or a given class of actors, is the rationale clearly explained?*
- *How does the government ensure that the bidders have not rigged their bids?*

Competition authority

Is there a competition authority?
Is the competition authority provided with enough resources and technological knowledge to appropriately address the challenges of competition in the electricity sector?
Are responsibilities between the competition authority and the energy regulator clearly structured, so as to enhance policy coherence and guarantee the independence of both bodies?

4. Financial Market Policy

7. To deliver clean energy infrastructure, developers need access to affordable long-term finance. In some countries however, access to long-term finance is constrained by shallow and illiquid financial markets. Accessing international capital markets can also be difficult for many developing countries. These challenges can be further exacerbated for clean energy infrastructure projects, as lenders may be reluctant to lend due to an insufficient knowledge of local markets and a higher technology risk. Ensuring access to affordable finance will require developing country governments, in particular, to combine a short-term strategy of facilitating access to international financing and a longer-term approach. The latter would need to address the full range of risks and limitations that increase the cost of financing for clean energy, including: the shallowness of the domestic financial market; key informational, social or behavioural risks related to clean energy financing; and the limited number of financial products that are available and suited to the sector's financing needs.

Facilitating access to finance

How is clean energy infrastructure currently financed?

Can foreign and domestic investors access domestic long-term financing at an affordable rate?

What steps is the government taking to facilitate access to international capital markets, and to attract long-term international financing? Is the government pursuing an international investment grade sovereign rating?

Targeted incentives

Is the government providing targeted financial support to renewable energy projects? Is this support time-limited and appropriately targeted?

What steps is the government taking to attract institutional investors in clean energy infrastructure investment?

Strengthening domestic financial markets

What steps is the government taking to develop and strengthen its domestic financial markets?

5. Public Governance

8. Considering the number of policy areas and public authorities potentially involved in the effort to effectively leverage investment in clean energy infrastructure, good public governance is an essential enabling factor. This section highlights some of the areas of public governance that are particularly relevant for promoting investment in clean energy infrastructure. Some of these issues, such as the governance of electricity markets, are specific to the energy sector. Others, like land planning and co-ordination between different territorial levels of governance, are more general to infrastructure policy but require particularly careful consideration in the clean energy context.

Governance of the electricity market

What steps is the government taking to ensure the independence of the electricity market regulator – including budgetary independence from line ministries, and appointment of top management that is free from political pressures?

Electricity network planning and deployment

What steps is the government taking towards mapping its energy resources?

- *If mapping has been undertaken, how does government use it to inform power generation and network planning, and co-ordination between the different territorial authorities?*
- *Are the results of the mapping available to all stakeholders?*

What steps is the government taking to co-ordinate deployment of the electricity grid with that of clean energy generation?

Co-ordination between different levels of governance

What steps has the national government taken to align national and sub-national policies that could have an impact on investment in clean energy infrastructure?

How does the government co-ordinate the development of clean energy infrastructure between its national and sub-national authorities?

Is the government tapping into the potential for cities and metropolitan regions to facilitate clean energy investment?

6. Other policies and cross-cutting issues

Regional co-operation

How is the government engaging with its regional partners to deepen regional financial markets?
Is a regional approach being used to facilitate the extension of the energy grid?
What steps is the government taking towards the regional integration of national electricity markets?

Making and implementing the choice between public and private provision for clean energy infrastructure

What is the experience of the SOE in promoting clean energy?
When engaging in public-private partnerships, how does the government ensure best value for money?
Are there a clearly defined legal framework and a body of regulations for both public procurement and PPPs, facilitated by adequate implementation capacity in the public sector?

Clean energy and the World Trade Organisation

How actively is the government engaging in international discussions and negotiations around trade and clean energy technologies?

INTRODUCTION

9. *Achieving universal access to modern energy services by 2030 – i.e. on time to achieve the UN Secretary General's "Sustainable Energy for All" objective – will require increasing annual investment by more than fivefold, from USD 9.1 billion (in 2009) to USD 48 billion* (IEA, 2011d). Without these investments, one billion people will still be without access to energy by 2030 (IEA, 2011d), principally in Sub-Saharan Africa (SSA). *Sustaining growth in emerging markets will also require substantial investment in energy infrastructure.* By 2050, emerging economies are expected to account for nearly 40% of total global GDP, leading to a considerable expansion in energy demand (OECD, 2012b). Nearly 90% of the increase in global energy demand over the next two decades will indeed be driven by non-OECD countries (IEA, 2011d). As a result, almost two-thirds of the total energy infrastructure financing needs (USD 38 trillion between now and 2035) will be in non-OECD countries (IEA, 2011d).

10. *Historically, the challenge of meeting a rising demand for energy has mostly been met with fossil fuels*. Fossil fuels dominate both the energy mix and power generation in nearly all regions (IEA, 2011c).[2] This dominance – particularly in countries that are not well endowed with fossil resources – is the result of historical factors (*e.g.* lock-in effect of infrastructure choices, low energy prices during the 80s-90s), but also of market distortions that have disproportionately advantaged fossil fuel, including fossil-fuel subsidies as well as the absence of full-cost pricing of environmental externalities associated with fossil fuel use.

11. *Meeting the climate change mitigation challenge requires shifting investments from carbon-intensive to low-carbon infrastructure.* In the absence of policy action, carbon emissions associated with current global trends in energy development are most probably leading the world towards a temperature increase of 3-6ºC by 2100. This would have major environmental consequences, including the more frequent occurrence of extreme weather events which will affect developing countries the most. It would also have economic consequences. The potential cost of inaction on climate change could be as high as 14% of average world consumption per capita in 2050, according to some estimates (Stern *et al.*, 2006; OECD, 2012b). In addition, the longer the energy transition is delayed, the higher the transition costs will be for the countries which continue to invest in electric power generation based on fossil fuels (OECD, 2012b). Delaying action would also potentially entail higher environmental risk and vulnerability to climate change impacts, which will require adapting to inevitable climate change (OECD, 2012b). There is hence a need to invest in clean energy infrastructure – That is, investment that will enhance the generation of electricity from renewable sources (including solar energy, wind energy, hydro-electricity, geothermal power, and biomass) and increase energy efficiency.

2 In the OECD as a whole, fossil fuels represented over 80% of total energy consumption in 2010. In Asia, coal made up 51% of the total primary energy supply and 68% of the electricity production mix in 2009. In the Middle-East, energy consumption has multiplied fourteen-fold over the last three decades and oil and gas represent the near totality of the energy supply. In Africa, despite large hydropower potential, the power sector is dominated by fossil fuels. Meanwhile, Latin America has the highest share of hydropower in its electricity mix (66%) despite a dominance of fossil fuels in the total energy mix; IEA, 2011c.

12. *The transition to a low-carbon economy also creates opportunities for developing countries.* First, too strong a reliance on fossil fuels exposes energy-importing countries to greater vulnerability to fluctuations in commodity and energy prices, thereby hampering their energy security.[3] Second, moving towards more renewable sources in the national energy mix could also relief budget pressure for countries that subsidise fossil fuels, as the cost of fossil-fuel consumption subsidies is expected to increase by 60% in the next decade in emerging and developing countries (IEA, 2011d). Third, it could also facilitate cost-effective access to energy in rural and remote areas, as renewable energy generation is more decentralised than fossil fuel power generation. Fourth, it could foster international investments in host countries. 2010 marked the first time in history in which developing countries as a whole attracted more investment in utility-scale electricity generation by renewable energy than developed ones (REN21, 2011).

13. *The benefits of investing in clean energy could gradually outweigh the cost, depending on country context. Clean energy* technologies have displayed exceptionally favourable learning curves over the last decade.[4] The benefits gained from investments in clean energy infrastructure will be specific to each country. For oil-importing countries, investing in clean energy infrastructure will increase energy security while also reducing the exposure of public budgets to fluctuations in the price of energy. For countries with a relatively small stock of infrastructure capital in the energy sector, it could allow them to leap-frog to clean energy technologies and avoid the lock-in effects of carbon-intensive infrastructure. For countries which are already attracting clean energy investments, it represents an opportunity to position themselves in the international value-chains of a rapidly growing sector.

14. *The financing needs of this low carbon transition are substantial.* In a recent study, IEA estimates that achieving a low-carbon energy sector will require an additional cumulative investment of USD 36 trillion by 2050, of which USD 7.35 trillion in the power sector (IEA, 2012). The same study shows that the benefits of achieving a low-carbon energy sector outweigh the costs in the long-run, resulting in net savings of USD 5 trillion. Mobilising the additional investments required, however, represents a financing challenge, particularly for developing countries. In fact, many developing countries are already facing an infrastructure financing gap. In Africa, for example, the estimated funding gap in the power sector represented 71% of investment needs in 2009 (Foster & Briceño-Garmendia, 2010). The investment gap is also high in the South Asian power sector, with countries like Bangladesh facing an estimated gap of more than 60% over the period 2011-2015 (ESMAP, 2009).

15. *Public financing alone will not be enough to meet these investment needs.* At the national level, budget constraints are already preventing developing countries from filling their funding gap for energy infrastructure investment; and the latter is likely to widen as a result of the increase in energy demand. At the international level, the financial crisis is likely to affect the efforts of donors to increase Official Development Assistance in general and in the energy sector in particular.[5]

16. *Engaging in a clean energy transition therefore requires leveraging private investment.* This includes both national and international private financing. In fact, many developing countries still have shallow domestic financial markets, preventing them from closing the infrastructure gap by themselves.

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3 Over the last ten years, the oil-import bill of oil-importing Least-Developed Countries (LDCs) has quadrupled to reach 5.5% of their GDP.

4 Solar PV for example has seen a 75% drop in prices since 2008, bringing the cost of PV down to USD 0.90/W installed at the start of 2012; UNEPFI, 2012; BNEF, 2012.

5 Total ODA disbursements to developing countries in the energy sector amounted to USD 866 million in 2010: a substantial increase from the 2006 levels (USD 52 million) but a small amount compared to the investment needs; OECD's Aid Activity Database, 2010.

17. *It will also require that public financing be used to catalyse private investment in clean energy infrastructure, without crowding out private finance.* At the project level, this can be achieved by providing guarantees as well as other financing mechanisms (e.g. investment funds, export credit, etc.) that will reduce financing costs for private developers. While such public support at the project level is important and can help overcome some of the project risks, it is unlikely to suffice for mainstreaming and scaling up foreign and domestic private investment in energy infrastructure to the levels required. Rather than relying only on a project-based approach, what is needed is a framework approach, whereby appropriate investment regimes and institutional frameworks pave the way for optimising private sector participation in clean energy infrastructure investments. High financing costs are ultimately a function of a range of risks and impediments that may be more acute in emerging markets, including not only financial and sovereign risks, but also: shortcomings in domestic clean energy policy; a lack of transparency in permitting; and the frequently poor credit profile of the domestic utility/off-taker. Policy-makers can ultimately lower financing costs by systematically addressing such risks (UNDP, 2013).

18. *The choice between clean energy and conventional energy is crucial and will require strategic thinking*. The very lengthy operational lifetimes of energy infrastructure and long time lags between planning and implementation for infrastructure investment make investment in a given form of energy infrastructure hard to reverse, with highly significant long-term implications for energy management and future resilience to climate change. With a view to facilitating this crucial choice, the *Policy Guidance for Investment in Clean Energy Infrastructure* aims to assist governments in identifying ways to engage private enterprises in developing and financing clean energy infrastructure.

19. While it covers a broad spectrum of issues, the *Policy Guidance for Investment in Clean Energy Infrastructure does not follow a 'one-size-fits-all' approach*. Countries at different stages of technological and economic development will find different issues more relevant to their specific situation. Every context is different and the Guidance will thus need to be adapted to the needs of each individual country. Its ultimate goal is to serve as a policy tool-kit, and as a basis for multi-stakeholder dialogue on ways of increasing private investment in clean energy infrastructure, particularly for the purpose of broadening energy access.

20. The next section provides policy-makers with a list of issues and key questions to consider for enhancing private investment in clean energy infrastructure, particularly in the following areas: investment policy; investment promotion and facilitation; competition policy; financial markets; and public governance. It also addresses other policy areas and cross-cutting issues (such as regional co-operation for promoting clean energy infrastructure).

1. INVESTMENT POLICY

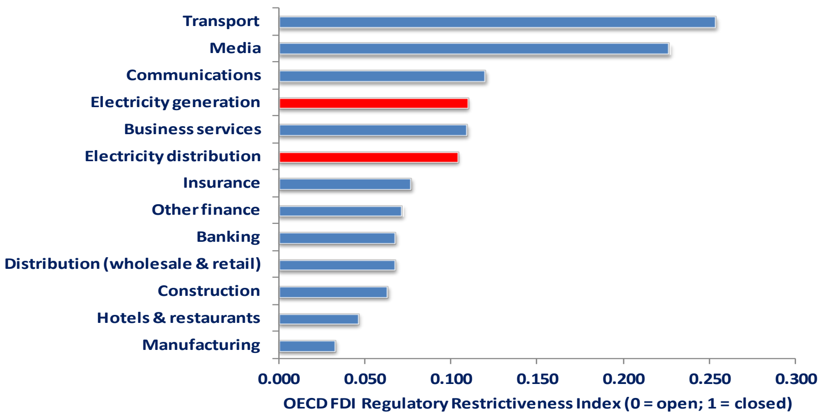
21. The core of an enabling investment environment, whether in clean energy or in any other sector, is the promotion of investment policy principles such as non-discrimination, investor protection and transparency. As the electricity sector is generally more restricted to foreign direct investment (FDI) than others, particular emphasis should be given to avoiding foreign ownership restrictions in clean energy. Since the latter is in many cases R&D-intensive, the deployment of clean energy technologies also requires strong protection for intellectual property rights. Given the importance of political, regulatory and financial risks for clean energy investments, contract enforcement is equally critical. In addition, the site-specific nature of renewable-energy resources calls for substantial efforts aimed at securing stable and reliable access to land.

Promoting equal treatment of foreign and domestic investors in clean energy

1.1 To what extent does the clean energy sector face higher barriers to foreign investment than other sectors of the economy? What steps is the government taking to remove barriers to foreign investment?

22. *Restrictions on foreign direct investment (FDI) in the electricity sector in general and in clean energy in particular are likely to result in sub-optimal flows of investment*, limit the transfer of know-how and hamper the deployment of renewable energy and energy efficiency technologies. Empirical evidence gathered by the OECD and the World Bank shows consistently that the electricity sector is generally less open to foreign equity ownership than other sectors of the economy (Figure 1.1).

Figure 1.1 OECD FDI Regulatory Restrictiveness Index[6] for secondary and tertiary sectors

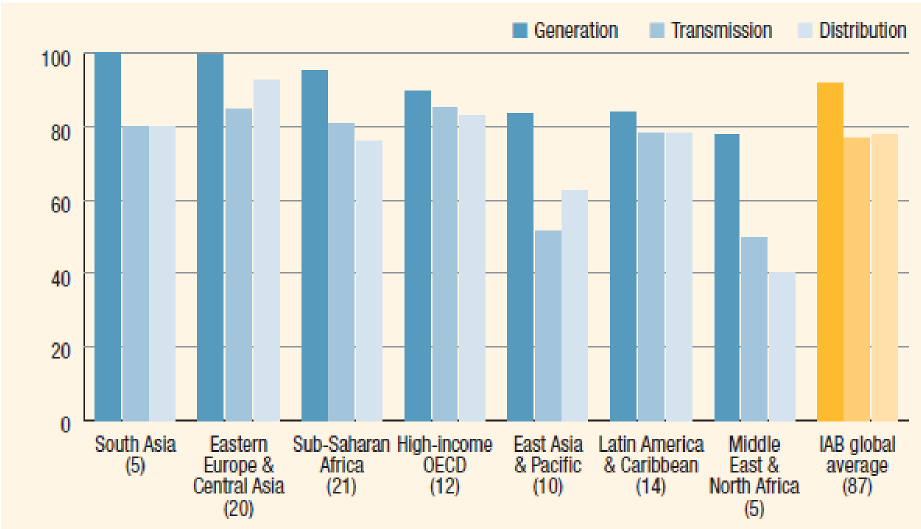


Source: Adapted from OECD FDI Regulatory Restrictiveness Index database, April 2012.

6 Measures taken into account are limited to statutory restrictions which discriminate against foreign investors, without assessing actual enforcement. State ownership and state monopolies are not scored. Restrictions to FDI are evaluated on a 0 (open) to 1 (closed) scale. The scores presented represent the average of sectoral scores of the 55 countries (ten non-OECD and 34 OECD members) covered by the index, as of April 2012.

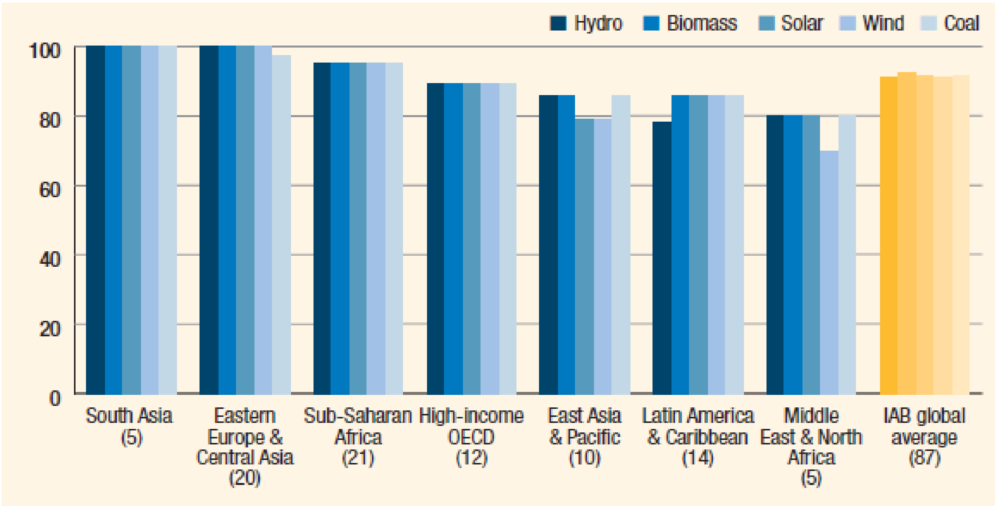
23. *While the overall picture of the electricity sector is characterised by fairly high levels of FDI restrictions, electricity generation is generally more open to foreign equity participation than transmission and distribution*. The relatively greater openness of electricity generation to FDI is understandable insofar as most countries have started unbundling their power sector by liberalizing generation while maintaining – under the "Single Buyer Model" – the control of transmission and distribution by a vertically integrated utility. This greater liberalisation of electricity production (Figure 1.2) might explain why most regions are significantly open to foreign capital participation in alternative energy (Figure 1.3). Exceptions involve countries where both domestic and foreign private investors are totally or partially excluded from electricity generation – including from renewable energy sources.

Figure 1.2 Foreign ownership allowance in electricity generation. transmission and distribution[7]



Source: IFC (2010), *Investing Across Borders*, International Finance Corporation (IFC), World Bank Group, Washington, DC (Foreign Equity Ownership Index, 100= full foreign ownership allowed).

Figure 1.3 Most regions welcome FDI in alternative energy



7 This graph covers generation of electricity from solar power, wind-power, hydro-power, and biomass; however other forms of alternative energy, such as geothermal power and hydro-electric dams, are not included.

Source: IFC (2010), *Investing Across Borders*, International Finance Corporation (IFC), World Bank Group, Washington, DC (Foreign Equity Ownership Index, 100= full foreign ownership allowed).

24. *Achieving the structural separation of the energy sector (see Chapter 3) and opening the electricity generating industry to independent power producers (IPPs) is a first step towards facilitating private investment in clean energy infrastructure*. This applies for both domestic and foreign investment. In addition to the mainstream restrictions on freedom of entry and establishment highlighted by the OECD *FDI Regulatory Restrictiveness Index* and the World Bank *Investing Across Borders* (IAB) Report, governments may put in place other discriminations regarding access to the full range of support policies that promote clean energy investment (see Chapter 2). In certain countries foreign investors need to limit their equity in clean energy projects to certain thresholds in order to benefit from feed-in-tariff (FiT) policies or secure access to investment certificates (SEDA, 2012). Minimum investment size thresholds for securing investment certificates can discourage investment by smaller foreign and domestic enterprises, despite the high innovative potential that many small-scale investors can bring. Differentiated access to finance can also impede effective competition between foreign and domestic investors, as well as between SMEs and larger foreign and domestic companies (see Chapter 3). Specific care should indeed be taken not to exclude small-scale investors (both foreign and domestic) from clean energy infrastructure projects either: development of diversified off-grid energy infrastructure, as well as small feed-in infrastructure, will be driven by this type of investor. In addition to regulatory restrictions to FDI, personnel requirements[8] or other forms of local content requirements for manufacturing can also be imposed on clean energy investors (OECD, 2013a).

1.2 Do investors in a given country face domestic incentives measures and policies such as local content requirements (LCRs)? Are those measures are likely to restrict investment? What are the objectives behind these measures and is the government evaluating alternative ways of achieving these objectives?

25. *For many governments, the job creation potential of clean energy investment is politically attractive*, as is the opportunity to enhance their manufacturing production capacity and to improve their national companies' (often owned or supported by government) international competitiveness. This has led both OECD and non-OECD countries to discriminate between national and foreign investors in several different ways.

26. *Trade or trade-related measures, regulations and domestic incentive measures that are likely to impose restrictions on investment in clean energy infrastructure, may adversely affect the choice of technology and undermine fiscal sustainability*. First, a strong local content requirement or high import tariff may prevent rapid and diversified deployment by making the latter dependant on the capacity and quality of the local supply chain. Second, it limits the ability of investors to benefit from potentially less expensive equipment that may be produced elsewhere, and increases the level of support required through public financing. Third, it exposes investors to technology risk as they often have to use technology from new manufacturers. This creates indirect revenue risk, and exposes developers to higher-cost debt as lenders may be reticent to lend to such projects. Fourth, trade-related investment measures (TRIMS) such as local content requirements are now being challenged under World Trade Organisation (WTO) rules and can be subjected to substantial anti-dumping and/or countervailing duties (Bahar *et al.*, 2013; OECD, 2013a). These risks send negative long-term signals which discourage investment. Finally, differentiated treatment

[8] Measures taken into account are limited to statutory restrictions which discriminate against foreign investors, without assessing actual enforcement. State ownership and state monopolies are not scored. Restrictions to FDI are evaluated on a 0 (open) to 1 (closed) scale. The scores presented represent the average of sectoral scores of the 55 countries (ten non-OECD and 34 OECD members) covered by the index, as of April 2012.

limits the possibilities for regional co-operation in the development of renewable energy infrastructure (see section on other policies and cross-cutting issues).

27. *Measures aimed at protecting local manufacturing may actually be inefficient for promoting clean energy jobs and generating value creation*. In the case of protective measures for solar technology for example – currently a contentious issue within the WTO – manufacturing represents less than 40% of the total jobs associated with the sector. From an employment perspective, it may be more efficient for the government – and for public budgets – to provide clear policy incentives for technology deployment rather than placing discriminatory measures on manufacturing. Likewise, such measures do not necessarily increase value-added in the sector: nearly 70% of the value created (in USD/MW installed) in the US solar industry is for instance generated after the manufacturing phase (EEW&NRDC, 2012). Yet despite the many potential economic inefficiencies of local content measures, discriminatory barriers – both tariff and non-tariff – are still prevalent in both OECD and non-OECD countries. To attract foreign as well as domestic private investors to clean energy infrastructure projects, governments will need to phase out these measures in a clear and transparent manner.

Intellectual property rights

1.3 What steps is the government taking to protect intellectual property rights for clean energy technologies?

28. *The level of protection of intellectual property rights (IPRs) plays an important role in investment decisions*. This is particularly true for clean energy investments as the technologies involved are both research and capital-intensive and investors will want to be able to capture the benefits from their technological innovations. At the same time, IPRs can be perceived as an obstacle to the transfer of clean energy technologies from developed and emerging economies to developing countries.

29. *Most of the research on how IPRs affect technology transfer in clean energy remains inconclusive so far* (OECD, 2012f; Haščič *et al.*, 2010; UNEP, EPO, ICTSD, 2010), partly because information is not readily available and methodologies are not necessarily comparable. The analysis of the impact of IPR regimes on technology innovation and transfer in clean energy is a relatively young field of research in which comprehensive empirical and econometric analyses have only recently been undertaken.

30. *The importance and impact of IPRs on the transfer of technology are likely to be context specific.* In remote rural locations of low-income countries for example, the need to expand energy access requires the rapid deployment of well-known renewable energy technologies, for which IPR protection might be less critical. In fact, recent OECD work has shown that in the case of African markets very few climate mitigation and adaptation technologies are actually protected under IP regimes (Haščič *et al.*, 2012).

31. *By contrast, a strengthening of the IPR regime is likely to play a positive role in emerging economies.* When considering energy from waste and biomass, solar panels, fuel cells, as well as ocean, hydroelectric, geothermal and wind turbines, emerging economies went from 5% of global patenting in the late 1990s to 20% of global patenting in 2008 (Copenhagen Economics , 2009). China is responsible for much of this growth, but when expressed as a percentage of total patent activity, a number of other emerging and developing economies were amongst the top five inventor countries in fields like hydro-marine power (Brazil, India) and solar PV (India, Thailand) (Haščič *et al.*, 2010; OECD, 2012f).

32. With two thirds of the patenting in clean energy technology being submitted by foreign companies (OECD, 2012f; Haščič *et al.*, 2010; UNEP, EPO, ICTSD, 2010), consolidating the IPR regime could give more incentives to foreign developers to transfer technologies to these emerging markets. Emerging countries could also encourage resident innovation (i.e. patenting by national firms) through

strengthening their IPR regimes. Patenting by national firms has shown strong growth recently (+33% over the last decade) and can play a non-negligible role in fostering local innovation. In China for example, nearly 40% of the clean energy patenting in 2008 was due to resident innovation (Copenhagen Economics, 2009). An important recent trend has been the growth of international research co-operation in climate mitigation innovation, For example there is a high rate of international co-invention between South Africa and Europe (biofuels and wind), India-US (solar PV, wind) and China-US (solar PV) (Haščič *et al.*, 2010; OECD, 2012f).

1.4 What steps is the government taking to facilitate patenting of innovations in clean energy? Has it set up a 'fast-track' system to reduce the time for patent application?

33. *In view of the scale and growth of demand for energy, it may be useful for developing countries to consider setting up a 'fast-track' process for patenting clean energy technologies*. Interesting models for such a 'fast-track' process include the US's Green Technology Pilot Program that allowed reducing by 6 the time needed for patent final disposition (Ciardullo, 2012). When designing such programmes however, care needs to be taken to achieve a balance with respect to: 1) the tension between quantity and quality of patents received; and, 2) the tension between quantity of patents and the administration's ability to manage the incoming flow of requests.

34. *At the same time, it is important for governments to keep in mind that IPRs are only one part of the picture of clean energy infrastructure development*. First, not all clean technologies are patented or have expensive IPR rights. Second, even for IPRs for process technologies, there are other ways around the direct buying of the rights. For example, by means of a licensing contract[9] the owner of an intellectual property right agrees with a partner on the payment of a fee for the use of the patented technology. Table 1.1 below presents the results from a survey of 160 organisations (public, private, and academic) on the role of macroeconomic factors in deciding to engage in licensing and other collaborative intellectual property agreements with developing countries. As highlighted by the table, while a quarter of the respondents identified IPR protection as a compelling reason for an agreement, more than 40% identified favourable market conditions (44%) and a favourable investment climate (40%) as significantly attractive conditions. Improving conditions with respect to these other factors can therefore also help attract investment in clean energy.

Table 1.1 Respective weight of macroeconomic factors in deciding to engage in licensing and other collaborative intellectual property agreements with developing countries

	Protection of IP	Scientific capabilities, infrastructure & human capital	Favourable market conditions	Favourable investment climate
Not a factor	18% (of all respondents)	13%	16%	15%
Basic condition for doing business, but not a driving factor	28%	37%	26%	27%
Significantly attractive condition, would encourage negotiation	29%	37%	44%	42%
Compelling reason for agreement	25%	13%	14%	16%

The population surveyed included 160 organisations representing actors from public, private, and academic bodies.

Source: UNEP, EPO, ICTSD (2010), *Patents and Clean Energy: Bridging the gap between evidence and policy*, UNEP, EPO, ICTSD.

9 See section on investment promotion and facilitation for more details.

Contract enforcement and land rights

1.5 What steps is the government taking to ensure that contracts between clean energy producers and their partners are enforced? Are judgements publicly available?

35. *Most clean energy infrastructure projects, in particular large scale ones, require a set of complex and often interlinked contractual arrangements*. Considering the numbers of risks faced by clean energy generation projects (e.g. completion risk, technology risk, revenue risk, supply risk, weather risk, etc.) the ability of the different actors – both national and foreign – to enforce contracts is crucial. The inability to do so will affect both the risk and the cost of clean energy projects. Similarly, with regards to energy efficiency, it is crucial for energy service companies that their counterpart can be forced to comply with its obligations under the service contract. The transaction cost of litigation can also disproportionately affect small investors. In African countries for example, the costs of bringing a claim to court for small and medium businesses is on average half the value of the claim (Dahou, Haibado, & Pfister, 2009). Similarly, judgments should be made publicly available as these can help inform investors on how issues, notably those related to competition (see competition section), are being dealt with within the country.

1.6 What steps is the government taking to facilitate access to land for renewable energy deployment?

36. *Most renewable energy plants demand more surface per MW installed than their fossil-fuel counterparts*. High-quality geothermal steam and some hydro-electric plants, which are likely to have a small m2/MW ratio, are the exception. As a result, renewable energy plants often require the company leading the project to engage with more than one landowner. This is especially true of large-scale utility projects – which so far have dominated renewable energy investment in developing countries (UNEPFI, 2012). Clean energy power plants also frequently need to be located near the natural resources that they utilise. In a developing country context, this may require engaging with actors who do not necessarily have formal property rights to the land that they occupy, particularly in remote rural areas.

37. *Thus, although land property issues are not related to clean energy per se, inadequate property registration systems can nevertheless increase the transaction costs associated to clean energy investments*. Options to reduce total processing time for regularising property rights include the following: setting up one-stop-shops for registration (e.g. Ghana); facilitating co-ordination between the different institutions involved in the property registration process (e.g. Ethiopia); or linking agencies electronically (e.g. Peru) (World Bank, 2012a). It should also be noted that the best location in terms of availability of natural resources (such as hydro-electric power, geothermal energy, wind or solar energy) can also be on land which the local population already uses for other economic activities or for subsistence. While clarity and certainty over access to land are essential for the developers, governments also need to ensure that land concessions are undertaken in such a way as to protect the most vulnerable members of the population. Important elements in this regard include prior mapping of the natural renewable resources (see public governance section) and prior consultations with the different stakeholders.

2. INVESTMENT PROMOTION AND FACILITATION

38. In order to manage the energy transition, governments will not only need to enhance investment policy, but also to promote and facilitate clean energy investment, including through re-orienting investment incentives away from conventional energy towards clean energy. This will require a range of co-ordinated actions including: removing fossil-fuel subsidies; pricing carbon; setting robust and credible long-term objectives in favour of clean energy; establishing clear and stable regulations; providing clean energy investors with well-designed and well-timed incentives; facilitating licensing for clean energy projects; and, last but not least, ensuring that clean energy policies are aligned and co-ordinated with broader national policies

Removing fossil-fuel subsidies and pricing carbon

2.1 What steps is the government taking to remove inefficient fossil-fuel subsidies?

- *Are the level and efficiency of these subsidies monitored on a regular basis?*
- *What steps is the government taking to phase out the subsidies in a gradual and transparent manner?*

39. *In addition to being costly, fossil-fuel subsidies are inefficient*. That is to say, they are more costly than they need to be to achieve the stated objectives of policy. Fossil-fuel consumption subsidies in emerging and developing economies amounted to USD 523 billion worldwide in 2011 (IEA, 2012).[10] In OECD countries, budgetary support and tax expenditures benefitting the production or use of fossil fuels amounted to more than USD 80 billion, according to a recent inventory by the OECD (OECD, 2013b). Fossil-fuel subsidies impose a huge cost on the public budgets of developing countries, notably energy importing ones, and expose national budgets to energy price fluctuations. While these subsidies are often motivated by the need to provide energy access to the poorest part of the population, recent IEA analysis suggests that only 8% of these subsidies actually reach the poor (IEA, 2011d).

40. *Fossil-fuel subsidies also keep fossil fuels artificially attractive and reduce incentives to invest in clean energy and energy efficiency*. Reforming environmentally-harmful subsidies is essential for carbon pricing to be effective (Corfee-Morlot *et al.,* 2012). The artificial competitive advantage granted to conventional energy by fossil-fuel subsidies makes encouraging clean energy technologies even costlier, as more extensive support is required to put the latter on a competitive footing. Removing fossil-fuel subsidies can therefore simultaneously increase the competitiveness of clean energy technologies by "getting the prices right" and improve countries' fiscal balances through reduced public expenditures and increased tax revenues.

41. *Considering that the cost of fossil-fuel consumption subsidies is expected to increase by 60% in the next decade* (IEA, 2011d), *governments should take steps today to reform these inefficient and costly policies*. They should also implement more efficient ways to facilitate transport and energy access for the

10 Petroleum subsidies accounted for more than half of the total USD 523 billion in 2011.

poor via targeted redistribution programmes, such as social safety nets, cash transfers, and life-line subsidies. The resources spared by removing or reducing fossil-fuel subsidies could be usefully redirected towards such programmes, and could also be used to guard against perverse impacts in terms of increased use of firewood or charcoal. Nonetheless, the reform of fossil-fuel subsidies should be gradual, agreed in a transparent manner and open to stakeholder consultation. Recent experiences where the reform of fossil-fuel subsidies led to social protest point to the importance of prior planning and proper consultation before undertaking the reforms. The gradual phasing-out of fossil-fuel subsidies will need to run in parallel with other measures facilitating energy access to the poor, so as to guarantee that the most vulnerable members of the population can absorb the increase in energy costs resulting from the removal or reduction of subsidies.

2.2 Have carbon emissions been priced? What steps is the government taking to ensure that the price is set in a transparent and predictable manner? How is the price level determined?

42. *Putting a clear, credible and long-term price on carbon emissions across the economy through market-based instruments such as emission trading schemes or carbon taxes can achieve multiple benefits.* First and foremost, pricing carbon is a necessary step in addressing climate change as it internalises the externalities associated with using carbon-intensive technologies, thereby making clean energy technologies more attractive financially. Second, when implemented through a market-based mechanism, such as emission trading (see Box 2.1) schemes or carbon taxes, carbon pricing can help steer investment towards the most cost-effective mitigation options. Moreover, tradable offset credits can provide carbon-related revenue to investments in other sectors or other countries outside of an emissions cap. Third, a carbon price can encourage clean energy patenting and innovation (OECD, 2012f). Fourth, it may generate revenues for government, although experience has shown that the level of such revenues can vary significantly with carbon price (discussed further below).

43. If a market-based mechanism is used to price carbon emissions, it should be introduced in a transparent and predictable manner, and designed to be resilient to price volatility and other broader macroeconomic changes. At the level of a power plant, uncertainty about the nature and level of the carbon pricing regime creates a "real option of waiting". For example, the value of keeping a carbon-intensive technology rather than investing in a cleaner technology can reach 8-25% of the capital costs of a coal-fired power plant, making replacement a challenge if carbon pricing is not clear and predictable (Blyth, 2010).

Box 2.1 Market-based mechanisms for pricing carbon

Market-based mechanisms for carbon regulation can include cap-and-trade mechanisms (featuring the setting of a carbon emissions cap and *ex ante* issuance of allowances or permits), carbon taxes (comprising the setting of a fixed price for emissions), and crediting mechanisms (with credits issued *ex post* for emissions reductions achieved below a baseline). Their characteristics can vary substantially, e.g. they can be legally binding (e.g. EU ETS) or non-binding (e.g. Japan voluntary ETS), apply at different scales (international, national, local), cover different sectors, and have different provisions for verification and non-compliance. Different models are being tested throughout the world, from international and legally-binding trading mechanisms (e.g. the EU ETS) to voluntary, project-scale crediting ones (e.g. the Gold Standard). Several developing countries are testing market approaches, such as the seven distinct regional ETS pilots in China.

Source: Prag, A. and G. Briner (2012), "Crossing the Threshold: Ambitious Baselines for the UNFCCC New Market-based Mechanisms", *OECD/IEA Information Paper*, OECD/IEA Publishing, Paris,

44. *The level of the carbon price will determine the degree to which carbon finance can support clean energy projects through offset projects outside of the capped sectors or countries.* The supportive role that carbon finance can play in clean energy project financing has been well documented (OECD,

2011a; OECD, 2009a). When well designed, carbon finance mechanisms can increase project revenues, potentially lowering the cost of debt for developers or the cost of compliance for entities covered by cap-and-trade systems. The CDM was designed to meet two objectives, namely to help Annex I Parties to cost-effectively meet part of their emission reduction targets under the Kyoto Protocol and to assist non-Annex I Parties in achieving sustainable development (UNFCCC, 2012). So far, however, uncertainty around the future of the Kyoto Protocol combined with oversupply and low demand for Certified Emissions Reductions (CERs) from the Clean Development Mechanism have resulted in low carbon prices and limited this leveraging role. [11] As of June 2012, the total investment in registered or soon-to-be-registered CDM projects was estimated to be at USD 215.4 billion (between 2004 and 2012), a limited contribution to total climate change mitigation finance. Despite their strong mitigation potential, as of March 2013 energy efficiency projects only represented 10% of the emissions reductions achieved through the Clean Development Mechanism[12] .

2.3 Has an emissions trading system for carbon been set up?

- *If so, how is the government dealing with the allocation of emission rights?*
- *Is there an intention to link the domestic carbon market to other carbon markets? If so, how is the government approaching the issue of fungibility of carbon credits?*

45. *Emission trading schemes are becoming an important tool in the climate policy portfolio.* In the last 10 years, almost all Annex I Parties have either established or strengthened existing trading schemes and are in some way participating in either national or international carbon markets (OECD 2012b; Prag *et al.*, 2012). The EU ETS (a regional mechanism) is the largest trading system at the international level in terms of traded volumes, accounting for around 97% of allowances traded worldwide in 2011 (World Bank, 2012). National trading systems covering various proportions of total greenhouse gas (GHG) emissions have also been established (or are soon to be established) in New Zealand, Switzerland, Norway, Australia, Japan and Korea. This is also the case at the subnational level (the Western Climate Initiative (WCI) in Quebec and California, as well as the Regional Greenhouse Gas Initiative in the US, Alberta in Canada and New South Wales (see Prag *et al.*, 2012 for a full overview). .

46. Emerging economies are starting to experiment with carbon pricing mechanisms. In May 2012, the Republic of South Korea signed into law a carbon emission trading scheme. Similarly, China, as part of its 12^{th} Five Year Plan, is setting up seven pilot domestic carbon markets at the provincial and city level, with a view to expanding this to a national scheme later in the decade (Chatterton, 2012; FORES, 2012). Moreover, countries such as Chile, Brazil, Costa Rica, Columbia, Mexico and India are also currently exploring the option of market mechanisms for carbon regulation[13] (C2ES, 2012; World Bank, 2012c).

47. *There are several issues that need to be considered in order to increase the environmental effectiveness and economic efficiency of permit trading.* For a crediting mechanism, this will require appropriate and careful definition of the baseline with respect to which credits are issued (Prag and Briner, 2012). For a trading system with *ex ante* permits, this requires the carbon emissions cap – which defines the overall supply of permits – to be set at an ambitious but realistic level (see next section on long-term

[11] The low demand for credits is due to weak targets in Europe and other developed countries, in a context of low emissions levels due to the financial crisis.

[12] UNEP Risoe CDM/JI Pipeline Analysis and Database, March 1st 2013.

[13] See the Partnership for Market Readiness for detailed case studies and technical notes on market design and implementation, www.thepmr.org/.

objectives). Governments should also strive to auction permits whenever possible in order to minimise unnecessary windfall profits.[14]

48. A market-based approach can also allow linking of the domestic carbon market with other carbon emission trading and/or crediting schemes. This can allow countries to access offsets, thereby lowering the cost of stronger mitigation efforts. This requires fungibility of the carbon credits: delivered credits must be recognised as equivalent by all relevant market regulators. As not all markets will necessarily use the same accounting methodology, achieving international standards (including for what constitutes a tonne of emitted greenhouse gas) is particularly important. Similarly, reporting guidelines should be made compatible across carbon markets. The GHG Protocol and ISO standard 14064 could be used in this regard (see next section for more details on reporting systems). Although such standards are increasingly used by governments when establishing carbon emissions reporting systems, they are not sufficient to allow common design of emission trading systems (Prag *et al.*, 2012; Kauffmann, Tébar Less, & Teichmann, 2012).

Long-term goal setting to promote clean energy investment

2.4 Has the government set long-term carbon emission reduction objectives? If so, what kind of objectives? Does the level of ambition reflect the nature of the challenge as stated in international agreements?

49. *Establishing long-term carbon emission reduction objectives is a necessary step to address climate change and contribute to the global mitigation effort.* National GHG emission reduction objectives can powerfully complement carbon trading mechanisms, as the trading cap can be embedded in the national objectives, thus helping to enhance the credibility of the system (though it is the cap of the emissions trading system itself that drives the price of the carbon allowances: the more stringent the cap, the higher the price of carbon and therefore the stronger the incentive to invest in clean energy infrastructure). Long-term emission reduction objectives can take different forms, such as reduction of GHG emissions with respect to a given historical emissions level (e.g. the EU and other developed countries), reduction of emissions intensity (*e.g.* CO_2 per unit of GDP) or limiting emissions relative to "business-as-usual" projections. Care should be taken when defining the appropriate benchmark for emission reduction objectives, as their respective outcomes in terms of GHG emissions and carbon price vary substantially. Additionally, the degree to which these long-term emission reduction objectives are part of an internationally-binding agreement will influence clean energy investment decisions – and also potentially access to international finance. For example, international agreements such as the Kyoto Protocol are correlated with increased innovation in mitigation technologies (Haščič *et al.*, 2010).

50. *Long-term carbon reduction objectives should be accompanied by an emission-reporting system to facilitate tracking and measuring progress*. Emission reporting schemes can pave the way for implementation of carbon pricing. In Australia, mandatory corporate GHG reporting commenced two years before the establishment of a national carbon price, which helped to minimise data problems prior to carbon pricing coming in (Prag *et al.*, 2012). As noted in Kauffmann *et al.* (2012), governments will face challenges in designing GHG emission reporting schemes, including: "[collecting] information without putting an excessive burden on companies, achieving policy coherence and co-ordination [of legislation] (e.g. integrating carbon reporting with other reporting requests), and putting in place the right incentives to motivate companies to act on their emissions". Key steps to address these challenges include: using standard methods of measurement (e.g. GHG Protocol); streamlining regional and local reporting schemes with the national scheme; aligning the frequency of GHG reporting with that of financial reporting to

[14] This was the case during the first phase of the EU ETS where emissions allowances were freely given out, leading to an oversupply of ETS and thus low carbon prices.

provide a stronger signal to investors; and establishing the reporting scheme in an inclusive and transparent manner to ensure buy-in from all stakeholders.

2.5 Has the government set targets for the deployment of renewable energy? If so, how have these been defined?

51. *Alongside long-term carbon emission reduction objectives, governments can set targets for the deployment of renewable energy*. The latter must be set with careful consideration for any possible overlaps or conflicting interactions with other economic and financial incentives for clean energy development. In fact, recent analysis on the use of tradable quotas for carbon reduction and renewable energy deployment seems to show that renewable energy support policies do not automatically result in improved performance against carbon reduction targets if there already exists an efficient and binding emission trading scheme. Renewable energy targets can nevertheless: contribute to the carbon emission reduction effort prior to the establishment of carbon pricing schemes; help overcome market, informational and regulatory barriers; and provide learning effects which reduce the costs of renewable energy generation (Fischer and Preonas, 2010). In the energy sector, these targets can be designed in relative terms (e.g. share of renewable energy in the energy mix) or in absolute terms (e.g. total capacity of renewable energy to be installed). Renewable energy targets are being increasingly adopted by developing countries. As of early 2012, over 60 developing countries had renewable energy targets and policies in place to support clean energy investment (REN21, 2012).

52. *National or sub-national targets for renewable energy development, as with carbon reduction objectives, can also provide powerful signals to investors in clean energy infrastructure*. Mexico for example saw a 348% rise in renewable energy investment in 2010 following the increase of its renewable energy targets from 3.3% to 7.6% in 2009 (REN21, 2011).

53. *To be credible, renewable energy targets need to be ambitious but also realistic, fully budgeted, and time-bound.* Governments should not be technology-specific; and ambitious objectives should be accompanied with quantified intermediate milestones that will provide investors with a sense of how fast the renewable energy markets are expected to develop. For example, India's National Solar Mission, which sets the objective of reaching 20 GW of solar energy by 2022, is using a phased approach with different cumulative capacity objectives (1.1 GW by 2013, 4 GW by 2017, 20GW by 2022) (IEA/IRENA, 2011). Policy-makers should also consider to what extent these targets can be enforced – that is, whether they are mandatory, and if so whether penalties for non-compliance have a sufficiently deterrent effect. The achievement of targets also needs to be monitored and reassessed on a regular basis to ensure that clean energy infrastructure growth is sustained (see questions on policy coherence below).

Policy incentives for investments in clean energy infrastructure

2.6 What financial and regulatory incentives is the government providing to promote investment in clean energy-based power generation, including independent power production? Is the support well-targeted and time limited? Are policies regularly reviewed?

54. In addition to removing market-distorting subsidies that favour fossil fuels and pricing carbon, transitional policies providing direct but time-limited financial support to clean energy-based power generation can help level the playing field between conventional energy and clean energy investments. As of 2012, the transitional financial support mechanism most used globally remains the feed-in tariff (FiT) system (Bahar *et al.*, 2013; REN21, 2011), whereby a price is guaranteed for every kWh of renewable energy supplied to the grid. Usual parameters affecting the tariff include the type of technology, the capacity installed, the date at which the capacity is installed and the length of time during which the tariff is provided. However, the form and nature of the FiT differs from country to country.

55. *Feed-in tariffs can be a powerful tool for deploying renewable energy, but have their drawbacks.* On the one hand, setting the price too high can lead to over-investment and a surge in electricity prices. The resulting reaction from government is often a retroactive readjustment of the tariff, which increases policy risk and uncertainty for investors. Governments can hedge against a surge in investment by setting a capacity cap above which any additional investment will not benefit from the FiT. On the other hand, setting the price too low will not induce the expected investment flows. The price needs to be accurately calculated, and clarity needs to be given to investors as to when and on what basis the price of the tariff is susceptible to change (e.g. to adapt to changes in input costs, speed of deployment, achievement of targets, geographical differentiation, etc.). Setting the right price is a complex exercise, with the rapidly decreasing cost of the technologies, and particularly in young markets where government capacity in the design of FiTs may be low and there may be asymmetry of information between regulator and companies.

56. *This has led some countries to use tenders to promote investment in renewable-energy generation*. Partly as a result of their experience with fossil-fuel technologies, developing countries tend to have greater experience in using traditional procurement methods than with support mechanisms specific to clean energy. If used in combination with long-term power purchasing agreements (PPAs), tenders can be an alternative way to attract private investment in clean energy. In Brazil, for example, the use of reverse auctions for wind energy (with 20-year PPAs) resulted in winning bids for which tariff rates were 42% lower than previously established feed-in-tariffs. Because reverse auctions help reveal price, they can also be used for off-grid or mini-grid projects, in which case they can be combined with subsidies based on connection rates or the level of guaranteed prices (Bahar *et al.*, 2013; IEA, 2011d; Muller, Marmion, & Beerepoot, 2011). Especially for procuring entities that lack technical capacity or experience in the renewable energy field, however, tenders can be risky. Governments should therefore design tenders with a view to guaranteeing competitive neutrality and minimising the risks of fraud and bid rigging (see Chapter 3 on competition).

57. *When choosing to implement a FiT, attention should also be given to who bears the costs of the measures.* An attractive feature of the FiT is that it can be designed so as to pass most of the cost on to consumers, thereby limiting costs to public budgets. A side-effect of such an option, however, is that a surge in investment can suddenly push the electricity price up. In Germany the share of the FiT in residential electricity bills thus went from 6% in 2009 to 14% in 2012 (UNEPFI, 2012). Prices for consumers can on the other hand be lowered in situations where the relative cost of electricity generation from renewable energy sources compared to fossil fuels is cheaper, or where the FiT scheme does not provide a premium price above the electricity market price.

58. *Passing through the cost to consumers is mostly an issue of 'ability to pay' in developing countries*. Even in developed countries where consumer 'willingness to pay' has traditionally been the pricing benchmark, the progression of energy poverty as a consequence of the economic crisis is rendering the extent of cost pass-through increasingly dependent on 'ability to pay'. If policy-makers opt for a premium price rather than a fixed price FiT policy whereby most of the premium cost is passed on to consumers, the poorest part of the grid-connected population may end up paying a relatively higher share of its income towards the support of renewable energy. One way around this tension is to set a threshold above which consumers see the tariff reflected in their bill. This threshold can be set with respect to consumption (kWh/year) or income (USD/year). In Malaysia for example, it is set at 200 kWh per month per household, resulting in 44% of the customers having to pay the FiT, but also being able to afford it (IEA/IRENA, 2011). Alternatively (or together with the payment threshold, as is the case in Malaysia) a cap can be set in capacity terms, above which the FiT will no longer be provided. This limits the overall cost of policy support.

59. *Tradable green certificates (TGCs) can also be used to support clean energy investments.* To date mostly used in developed countries, this is a market-based mechanism which involves exchanging

certificates derived from electricity production from renewable energy sources. The certificates are usually used in connection with renewable portfolio standards[15] – so as to generate the demand for TGCs. The price of support for TGCs is set by a market mechanism, unlike for FiTs where it is set *ex ante*. As a result TGC price can fluctuate over time. However, as administrative costs for TGCs can be higher than for FiTs, actors may require capacity building before engaging in such markets.

60. *It is unclear whether FiTs or TGCs are more cost-efficient in purely economic terms.* Economic performance will also depend on other parameters, including how close the technology comes to competing with fossil fuel technologies and its stage of market development. Studies by the IEA show that, "differences in impact and cost-effectiveness among the various economic support systems tend to be smaller than the differences among countries that have the same system" (IEA, 2011a). In other words, ensuring that the tool is used in the correct context matters just as much – if not more – than the choice of the policy support tool itself. Recent OECD analysis seems to show, however, that price-based support schemes such as FiTs and premiums might be more positively correlated with investors' ability to raise private finance than quota-based schemes (renewable energy certificates, obligations and targets) (Cardenas-Rodriguez *et al.,* 2013 forthcoming).

61. Other – more volatile – fiscal options exist to support investments in clean energy infrastructure. These alternatives include: capital grants, tax rebates, and accelerated depreciation. When used in combination with FiTs or TGCs, they can stimulate clean energy investment.[16] However, because of their fiscal nature, these mechanisms can create uncertainty for investors as they are influenced by national budget fluctuations and political priorities. For example the on-and-off nature of the US's Production Tax Credit for wind energy between 1999 and 2004 led to surges in investment before each tax period, followed by considerable drops – of 73 to 93% of investment value – immediately after (American Wind Energy Association, 2011). These fiscal measures, moreover, reward installation of capacity rather than production, which does not encourage investors to locate clean energy generation in the most optimal geographical locations (according to resource availability and grid location). When using such fiscal measures, governments should therefore consider the extent to which they allow for an optimal and co-ordinated deployment of clean energy generation (see Section 2.8). There is also a danger of such fiscal support measures becoming embedded in the expectations of operators and investors, further distorting the investment incentives in the energy sector.

2.7 What financial and regulatory incentives does the government provide to transmission operators for the extension and improvement of the electricity grid?

62. *The majority of energy infrastructure investment in developing countries will involve the installation of new infrastructure rather than replacing the existing one*. This is in part a consequence of the need to provide energy access as well as to respond to the increase in energy demand. The share of these new investments in emerging countries like India and China could be over 60% of their total investment in the physical energy network (IEA, 2012). This need of new infrastructure can provide fresh impetus for regulation that is directly relevant to small scale, decentralised generation. As opposed to megaprojects, multiple small-scale investments will require a systems approach to regulation and grid development that is decentralised and can adapt to a variety of circumstances and technologies. Progress in roll-out will need to be incremental so that lessons and evidence can be drawn from practice and incorporated on an ongoing basis.

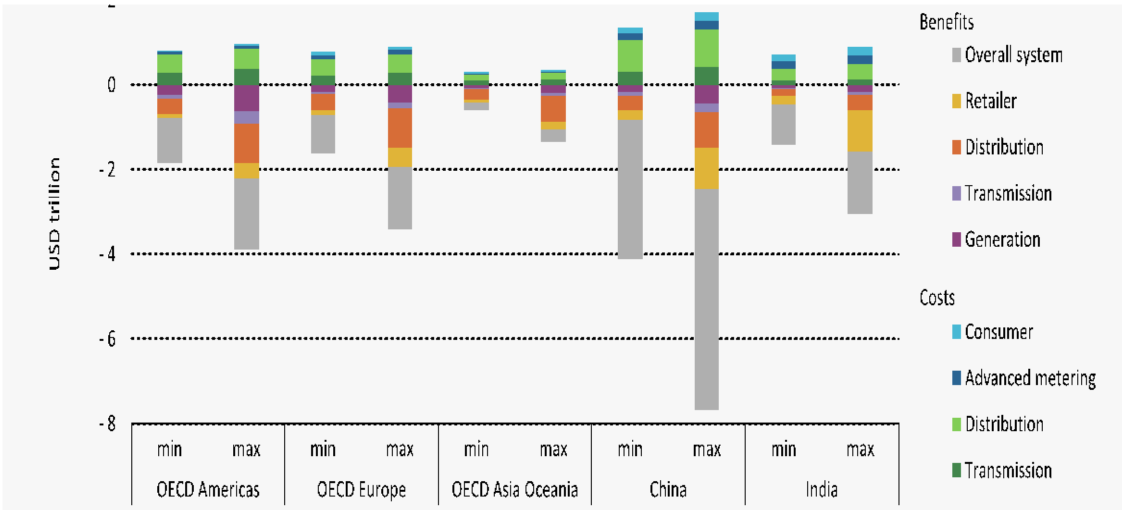
15 Renewable Portfolio Standards require utilities to have a given percentage of their electricity produced by renewable energy sources.

16 For example the 100 000 roof programme in Germany combined capital grants with FITs.

63. *This constitutes an opportunity for developing countries to leap-frog by investing in "smart grid" technology at the outset.* Investment in a smarter grid (which is more adaptive, augmented with information technology, and has a greater element of decentralisation) constitutes a net benefit, which can reach twice the level of the initial investment (IEA, 2012). However, those who make the investments are not necessarily able to capture all the benefits as these are spread throughout the system (see Figure 2.1 below). Targeted incentives towards transmission and distribution system operators may therefore be required to trigger investment aiming at extending or improving the efficiency of the grid. One of the few countries that does provide this type of incentive, Vietnam, grants tax exemptions for grid development.[17] Similarly, Germany recently changed its tariff regulation to provide an incentive for development of efficient grids. Putting in place a clear, well formulated grid code for renewable energy and improving current grid management are also very helpful first steps (UNDP, 2013).

64. *When choosing the incentive, attention should be given to the balance between quantity and quality*. A tax exemption for example tends to promote quantity, whereas efficiency-based rewards frequently put a higher premium on quality. In countries where extension of the grid is a priority, a quantity-oriented approach may be more suited at first – although since early projects will condition the further development of the grid, care needs to be taken not to "lock-in" inefficient infrastructure by emphasising quantity alone. This brings policy-makers back to the crucial choice between promoting investment in clean versus conventional energy. As implementation progresses and renewable generation increases, a re-orientation of incentives to promote improvements in grid quality will become increasingly necessary to accommodate a larger share of clean energy generation.

Figure 2.1 Benefits and costs of investment in smart grids.



Source: IEA (2012), *Energy Technology Perspectives 2012*, IEA/OECD Publishing, Paris.

2.8 What steps is the government taking to ensure that policy support is clear, credible and coherent? Is the regulation easily accessible and understandable to all investors?

65. *Investors frequently suffer from the absence of clear, coherent, credible and long-term supportive policies.* This is particularly important from an investor's perspective since energy infrastructure is a fixed, long-lived and illiquid asset. High long-term visibility of the policy signal is particularly important for

17 Grid development projects there can be tax exempted for up to four years, followed by up to 50% reduction in income tax for nine years; GTDT, 2012.

clean energy infrastructure: lower visibility increases the chances that a conventional power plant will be refurbished rather than replaced by a clean energy power plant (Blyth *et al.*, 2010). Longer-term financial support reduces financing costs for renewable energy projects (Varadarajan *et al.*, 2011). Past experience with feed-in-tariffs (e.g. Czech Republic, Spain) or tax credits (US) also shows that an advantageous support that is not sustained over the long-term or is provided on an "on-and-off" basis increases policy risk, thereby creating uncertainty and risk aversion rather than sustaining investment (see Fig 4).[18] Finally, regulation must be easily accessible and understandable to all investors (for instance through investor access to an on-line internet portal).[19]

2.9 What steps is the government taking to ensure that policies and regulations are enforced?

66. *Long-term policy support is necessary but not sufficient.* In India for example, despite enthusiasm over the National Solar Mission, the private sector has voiced concerns over the poor enforcement of Renewable Purchase Obligations at state level (WEF, 2011a). As of 2010, only four states had met their obligations and only three penalties for non-compliance were enforced (Remme, Trudeau, Graczyk, & Taylor, 2011). Enforcement of regulation is of course a crucial part of establishing an environment conducive to clean energy investment – as is the ability of the private sector and civil society organisations to challenge government when regulations are not enforced. The decentralised nature of clean energy production and provision also requires carefully managed relationships with local authorities for effective enforcement (see governance section for co-ordination between different levels of governance).

Licensing of renewable energy projects

2.10 What steps is the government taking to facilitate the business licensing process for renewable energy projects? Has a 'one-stop shop' been established for investment promotion, and if so does it have adequate authority and the technical capacity to facilitate the issuance of permits?

67. *As investment increases thanks to the policy incentives, government will be faced with increased demand for licensing of renewable energy facilities*. It is therefore important for licensing authorities to be able to process applications quickly and efficiently. For both large and small-scale projects, the time taken to develop a project or obtain a permit can be quite significant, leading to high transaction costs. The delay between development and construction can last up to five years for large-scale utility renewable projects (Kalamova, Kaminker, & Johnstone, 2011). For small-scale projects, transaction costs related to approval processes can be high both in relative and in absolute terms. For example, in 2008, the average waiting time needed to develop small scale PV projects in EU countries could reach 50 weeks, 50% of which was often due to waiting for the permit (IEA, 2011a).

68. *In such situations, streamlining operations by setting up a 'one-stop-shop' (OSS) for renewable energy facilities can help facilitate administrative and permitting procedures*. This can also help ensure that licensing procedures are transparently and consistently applied. In order to secure time savings, the OSS must have the necessary authority to issue permits. Otherwise, the OSS would be forced to refer back to other authorities for every authorisation, increasing co-ordination costs and potentially obstructing permit delivery.[20] Nonetheless for developing countries, the benefits of a fully autonomous and specialised

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18 As a result of a boom in solar PV between 2008 and 2010 (from 65 MW to 2 GW), Czech republic decided to cut all tariff for ground-mounted PV plants that were not connected to the grid (effective of March 2011). Spain, while it has maintained the tariff set in 2007 decided in 2010 to cap the amount of annual hours rewarded by the Feed-in-tariff and more recently to cut all FITs for new projects.

19 See Malaysia's Sustainable Energy Development Authority portal for example: www.seda.gov.my/

20 Before it was reformed, the Italian Autorizzazione Unica required authorisations from up to 50 other administrative bodies to validate permits for renewable energy. By contrast in Germany, streamlining

permitting agency for clean energy will have to be weighed against the associated administrative costs and human resource requirements.

69. *Facilitating permitting for small-scale renewable energy supply in developing countries can also be an interesting option to provide energy access in remote rural areas,* as well as better to engage small enterprises and rural communities in the renewable energy industry. Following passage of the Energy Act of 2003, in India some state governments decided to facilitate permitting for decentralised energy production under 1MW. Provided that the project used locally available resources and cost-efficient proven technologies within environmental defined norms, they could benefit from automatic approval for land use, pollution clearance and safety clearance (Niez, 2010).[21]

Policy coherence, policy co-ordination and policy monitoring

2.11 What steps is the government taking to make clean energy policies part of a broader national infrastructure, energy, environment and climate strategy framework? Is procurement for new clean energy generation part of a long-term grid infrastructure development strategy? Are the long-term clean energy objectives backed with capacity building strategies?

70. To ensure policy coherence, policy incentives should be designed with a view to achieve long-term objectives (as defined within a national climate strategy, or aligned with the broader goal of engaging in a green growth path). The 11th and 12th Five Year Plans of the Chinese government, for instance, recognise energy management to be one of the country's main developmental priorities, and set clear quantitative targets that are to guide all related incentives and policy reforms in the country. The targets are in turn taken up by the State Environmental Planning Agency (SEPA), and by Environmental Protection Bureaus (EPBs) at the provincial level. Such an overarching strategy for energy management is important in the interest of policy coherence, and for fostering greater investor confidence in the credibility and durability of the investment incentives.

71. Similarly, tenders for power generation should be part of a long-term infrastructure development strategy. The use of a tendering process for clean energy infrastructure procurement is very much a learning-by-doing exercise, both for the public and the private sectors. From the public sector perspective, there may be an interest in starting with a few tenders of limited capacity, or in limiting the size per bidder so as to avoid committing too much too fast.[22] Under such "one-shot" tendering circumstances however, actors can be reluctant to bid as the learning and transactions costs of bidding cannot be amortised over time. Integrating tenders within a long-term infrastructure strategy can help improve visibility over the pipeline of upcoming projects and increase willingness of investors to participate in the bidding process; this would in turn allow for more competitive bidding and result in lower tendered prices (see competition section for more details on tenders).

72. Finally, greater investments in clean energy infrastructure will also mean greater needs for skilled labour as the infrastructure is deployed (See Chapter 6 for more details on public-private partnerships). Governments should therefore ensure that the appropriate human resources and capacity development programmes (in construction, operation and maintenance of clean energy infrastructure, management of the

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permitting procedures reduced waiting times for small scale PV licensing to 10 weeks total; Corfee-Morlot *et al.*, 2012.

21 The developer is however held liable for any safety issue or infractions that may arise; Niez 2010.

22 This was for example the case for the Indian National Solar Mission in India which started with maximum of 5MW per bid and a total of 150MW maximum per bidder; EEW&NRDC, 2012.

processes for tendering and permitting, co-ordination within government and interaction with the private sector, as well as technology and skills upgrading) are put in place.

2.12 What steps is the government taking to monitor the deployment of clean energy infrastructure and the achievement of clean energy objectives? Are the supportive policies adjusted in view of progress?

73. *Whichever form is chosen for clean energy supportive policies, it is crucial that these be monitored and evaluated on a regular basis and in a transparent manner*. This is all the more important given that renewable technologies have shown a high learning rate. During 2011, prices of PV modules dropped by another 45%, reaching USD 0.90/W installed at the start of 2012 (BNEF, 2012).[23] Overall, this amounts to a 75% drop in prices since 2008 (UNEPFI, 2012). On the one hand, lower cost of production for clean technologies is an opportunity to increase the ambition of the overall long-term clean energy objectives. On the other hand, if support mechanisms are not readjusted in light of drops in production costs, the system can experience a sudden surge in investment, leading to increased costs to public budgets. In 2011 PV cost reductions thus generated over-deployment in countries which subsequently readjusted or cut their tariffs (e.g. UK, Spain, Germany), leading to increased uncertainty for investors. Frequent and prior consultations with the private sector as well as transparent decision-making and intelligent, adaptive FiT degression rates, are therefore crucial both to minimizing the costs of incentives on public budgets and to reducing policy uncertainty.

74. *Appropriate monitoring and reporting procedures will also need to be put in place*. These can allow for timely tracking of deployment of clean energy infrastructure. They can also help the government track the success rate of clean energy projects, which can guide future support to clean energy technologies as well as strengthen the business case for presentation to national banks. Finally, much as for generation deployment, expansion of the network will need to be monitored and evaluated over time to guarantee that the grid is able to accommodate an increasing share of clean energy generation.

[23] Wind, a more mature technology, has also experienced a reduction in costs, albeit at a slower learning rate of 7%, going from EUR 2 per W installed in 1988 to EUR 0.93 in 2012; BNEF, 2012.

3. COMPETITION POLICY

75. The deployment of clean energy projects can be accelerated if energy markets are subject to effective competition, with appropriate incentives and conditions provided for competing firms. However clean energy infrastructure investments often take place in a situation of imperfect competition where a state-owned enterprise (SOE) is the incumbent. Policy-makers aiming to increase investment in clean energy infrastructure will therefore have to consider ways of creating a level playing field between independent power producers (IPPs) and SOEs, as well as between SOEs and other network operators, and between national and foreign private actors. In particular it will be important for governments to effectively separate the power sector and encourage multiple actors to engage in power generation, transmission and distribution; guarantee equal treatment across the electricity sector (from generation to distribution); and grant competition authorities the appropriate resources and independence to effectively enforce regulation.

Promoting the effective separation of the power sector

3.1 How far has the government engaged in the structural separation of the power sector?

76. *For developing countries, the benefits of unbundling the electricity sector go beyond deployment of clean energy infrastructure*. Most developing and emerging countries still have substantial state ownership in their power sectors. While many countries (such as Mexico) have managed to attract private developers in clean energy infrastructure while maintaining vertically integrated monopolies, structural separation can help create more space for private investment. Unbundling the power sector involves separating power generation, distribution and transmission functions – all of which have traditionally been included in vertically integrated power companies. If carefully managed and adapted to country and market specificities, structural separation of the power sector can serve several socio-economic goals:

- First and most basically, it can relieve capacity shortages at the generation level; this is often a central justification for authorising private actors to engage in independent power production under a 'single-buyer' model (see below).

- Second, unbundling the power market and opening it to private actors can enhance rural electrification. Small-scale independent power producers can provide decentralised energy services to the most remote populations and may have more flexibility to adapt their operations to energy demand patterns than vertically-integrated SOEs.[24]

- Third, by opening competition in the power sector, unbundling provides more space for clean energy technologies to enter the market and can therefore stimulate changes in the national energy mix.

For the above reasons and as highlighted by the *OECD Recommendation Concerning Structural Separation in Regulated Industries*, while structural separation is not always necessary or the best response

[24] See section other policies and cross-cutting issues on how to decide on public versus private procurement.

to vertical integration of firms, in many cases it can be an economically efficient one in both short and longer terms (OECD, 2011b).

77. *Nonetheless embarking on structural separation must be preceded by careful evaluation of associated benefits and costs*. Indeed "forcing" competition via structural separation can otherwise have significant costs (both financial and efficiency-based). Determining whether and what form of separation is appropriate in a particular market must take into account the following factors (among others): the presence of economies of scale and scope (notably whether there is sufficient market size to justify the co-existence of multiple providers and distributors); the rate of technological innovation in the sector; the possible trade-off between competition and efficiency (as vertically integrated firms may be better able to maximise benefits and minimise costs along the supply chain); and the likely impact on levels of investment (for instance, although structural separation can result in increased investment by new entrants into the competitive portions of the sector, there is a risk that such large-scale market reform generates uncertainty regarding network ownership, thus deterring otherwise desirable investment in the market – as occurred in Poland's wind generation sector).

78. *Unbundling can create more space for investment in clean energy within the national electricity network*. Clean energy infrastructure investments have often thrived in liberalised energy markets. The decentralised nature and the smaller generation capacity of clean energy projects compared to their fossil fuel counterparts, makes independent power production well-suited for mainstreaming clean energy technologies. In the areas of transmission and distribution, increased competition can also render the national energy network more flexible, increasing its capacity to accommodate both on- and off-grid renewable energy. Unbundling can also provide the government with better and more transparent information on the performance – notably financial – of its public utility (see Chapter 6 for more details). On the other hand policy-makers must also keep in mind that small-scale clean energy generators may face specific size and technology challenges that prevent them from being structurally separated themselves; this duality for instance led New Zealand to amend its 1998 Electricity Industry Reform Act (which requires full ownership separation between electricity lines, and generation and retailing) so as to exempt renewable energy and small-scale producers.

3.2 What steps is the government taking to ensure that independent power producers can choose to whom they sell their power?

79. A first step towards the establishment of a competitive electricity market is often the shift from a fully vertically integrated monopoly to that of a 'single-buyer-model' whereby independent power producers (IPPs) contract with a national utility. This model is widespread in many African, Asian and Eastern European countries, as it enables governments to keep strategically important transmission and distribution functions in state hands. As noted by the World Bank's Private Sector and Infrastructure Network, the model however has limitations – in some cases it has opened avenues for corruption, weakened payment discipline, and imposed large contingent liabilities on governments (Lovei, 2000). Moreover IPPs in a single-buyer model are not free to engage in power purchasing agreements with other potentially interested buyers, which can lead to economic inefficiency and increases the risk of abuse of market power by the single buyer.[25]

80. When using the single buyer model, proper due diligence and evaluation of needs should be undertaken to prevent higher costs for the government. Lack of such diligence can lead to substantial losses to the public purse, as government is expected to step in if the "single-buyer" (or state-owned transmission

[25] In India for example, some IPPs in states that had a surplus production had to sell it at lower prices to the state-owned buyer who in turn sold it at a premium to consumers in other states; Infrastructure Committee of India, 2009.

and distribution company) cannot honour its obligations to the independent generators (Lovei, 2000). This fiscal risk is further enhanced for clean energy generation as the latter is likely to be subsidised at the beginning of the transition from conventional energy to clean energy (see investment promotion and facilitation section). Governments should therefore undertake careful benefit-cost analysis to justify the subsidy levels and financial analysis to ensure that the liberalisation process is fiscally sustainable, and provides sufficient – yet affordable – stimulus for the participation of clean energy investors. The design of clear procurement rules or of standard power purchasing agreements (which can be adapted to better accommodate clean energy IPPs) is also necessary to protect consumer interests. Otherwise, in the absence of competition in the transmission and distribution stages, there is a risk that the distributor might pass an excessive fraction of the energy purchase costs through to its customers.[26]

3.3 How does the government ensure that producers of renewable energy benefit from non-discriminatory access to the grid, and that access is guaranteed and enforced?

81. *Access to the grid is often a considerable barrier to entry faced by renewable energy producers*. Econometric studies show that providing regulated third party access to the grid can help increase investment in electricity infrastructure (Araujo, 2011). This is especially important for renewable energy power developers, as uncertain grid access increases project risk and delayed connection affects a project's cash flow. Even after regulatory liberalisation has been fully implemented, private actors may face difficulty in securing access within a reasonable timeframe. Thus, it is important from an investor's perspective that both open *and* rapid regulated access to the grid be guaranteed. In Germany or Mexico for example, on top of the regulated third party access, renewable energy producers benefit from a preferential connection (GTDT, 2012). Enforcing open and rapid access is particularly important as many electricity market systems are highly concentrated, and dominant incumbents may have a strategic incentive to complicate or delay access for competitors.

3.4 How are connection costs allocated among actors? What steps is the government taking to reduce barriers to entry for renewable energy producers?

82. *Connection costs can pose another barrier to entry in the generation sector.* Mechanisms that allocate the entirety of the costs of interconnection and network upgrades to the generator ("deep cost allocation") can be prohibitively costly for investors in clean energy generation, and therefore constitute a barrier to entry. By contrast, only allocating the costs of the enabling facilities to the generator ("shallow pricing") will be attractive for developers but can constitute a challenge for the transmission operator (Madrigal & Stoft, 2011). The same argument goes for issues related to regulation of network pricing (see Table 3.1). Both connection costs and network pricing may pose higher barriers for clean energy than for conventional energy technologies, as most renewable resources may not necessarily be located close to the grid network. Governments should therefore consider affordable ways to limit or compensate the burden of connection on the renewable energy generator, while also taking fiscal constraints into account.[27]

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[26] In Tanzania, the state-owned utility company TANESCO has passed through an excessive fraction of purchase costs to consumers, causing electricity tariffs to rise by 70% between 2008 and 2012. In response the energy sector regulatory agency (EWURA) is now developing its own method for tariff calculation, which should subject TANESCO's choice of tariff to greater scrutiny.

[27] Whether or not a country can adopt the shallow pricing approach will depend on many factors, including: the extent to which renewable energy is connected to the grid; the status and quality of the infrastructure; the ability of the national transmission system operators to absorb costs; and the ability of the consumers to absorb a tariff increase.

Table 3.1 Transmission cost structure: Country examples

Transmission Cost Structure	Existing types of regulation	Impact on RE producers	Example
Connection costs allocation	Can go from almost no cost to the generator (also known as "super-shallow" charging) to costs including both the connection and transmission lines (also known as "deep charging").	Everything else being equal, the lower the cost to the generator, the more attractive the business model, In situations where renewable resources are far from the grid, a "deep-pricing" allocation may deter investment.	UK has a super-shallow policy; Brazil allocates the system extension to the generator but not the network upgrades (shallow pricing); Mexico allocates all costs to generators (deep pricing).
Network pricing	Can be allocated homogenously between actors irrespectively of usage ("postage stamp allocation"), based on usage or distance ("usage based regulation"), or combination of both (whereby different zones have different regimes).	"Usage-based" can favour fossil fuel generation as these can be located closer to the grid.	Panama and Brazil have usage flow regulation, while the Philippines use postage-stamp regulation.

Source: Madrigal, M.. and S. Stoft (2011), "Transmission Eexpansion for Renewable Energy Scale-Up Emerging Lessons and Recommendations", *Energy and Mining Sector Board Discussion Paper*, World Bank Group, Washington, DC.

3.5 Is investment in the grid open to private investment?

83. *Off-grid generation aside, clean energy production can only develop fully if the grid is able to follow*. Increasing the output of renewable energy will pose challenges for the electricity supply network, including how to upgrade and reinforce the backbone network, managing congestion, and ensuring that sufficient electricity will be available even when the renewable sources are not active (OECD Competition Committee, 2010). Achieving a rate of grid deployment compatible with that of renewable generation also poses the challenge of financing the extension: transmission system operators may not necessarily have the financial capacity to extend the grid at a sufficiently high speed and quality.[28] In such cases it may be interesting for governments to involve the private sector in financing the network infrastructure required to accommodate renewable energy generation. Different approaches exist. While in Brazil generators elaborate a bottom-up plan for the grid extension prior to competitive bidding, under Mexico's "Open Seasons Procedure" private actors pay upfront for the transmission network required for accommodating renewable energy projects – and additional investments are included in the federal electricity commission's official budget, which owns and operates the network.

3.6 Is a wholesale electricity market in place? If so, how does the government ensure that it can accommodate an increase in renewable energy generation?

84. *The development of well-designed wholesale markets in the electricity sector can support the deployment of renewable energy.* In addition to reducing costs of generation, wholesale markets increase the flexibility of the electricity network and allow for a more cost-efficient allocation of power generation. Indeed whereas renewable energy generation is subject to fluctuations (including dependence on weather and time of day), demand must always be satisfied. As the OECD Competition Committee highlights, this intermittent generation therefore raises the challenge of how to maintain the balance of supply and demand

28 Other important issues relate to, inter alia: whether or not the planning is done in a co-ordinated manner with incoming flow of renewable generation projects and whether the planning is done in a way that reflects natural resource endowments. These are treated in the public governance section of this report.

when renewable supply varies (OECD Competition Committee, 2010). A more flexible allocation of power production can enhance the ability of the electric system to accommodate high shares of renewable energy. This is an advantage of wholesale markets over power purchasing agreements, which – despite their convenience – reduce the flexibility of the power park to adjust rapidly to sudden increases in renewable energy production.

85. *Shorter 'gate closure' times can also help level the playing field between conventional energy and clean energy*. Many factors enter in the choice of which technology will be used to match supply with demand (e.g. cost of production, ability to ramp up or down the power supply, etc.). The gate closure time, namely the time at which transactions are stopped on a market, also has some impact. The longer the gate closure, the more difficult it is for producers of clean energy technologies such as wind or solar energy to accurately predict how much they will be able to produce. Reducing the gate closure time (e.g. from 1 day to 2 hours) can therefore contribute to levelling the playing field between clean and conventional energy technologies.

86. *A smarter and more efficient grid can also play a strong supportive role in the proper functioning of the wholesale markets.* As mentioned previously, smart grids increase the efficiency of the system as well as its ability to accommodate a larger share of fluctuating clean energy generation. Smart grids and smart meters encourage more efficient consumption decisions, as they increase the responsiveness of consumers to wholesale electricity market conditions. In particular, smart grid technology and communication systems can help to reduce consumer demand when supply is constrained, notably, by allowing pricing to vary over the course of the day based on wholesale costs. This has two implications for wholesale markets. First, the efficiency of the grid allows markets to accommodate a larger number of small-scale generators, allowing for more transactions, making the wholesale markets more functional, and increasing their liquidity. Second, 'smart' and responsive grids are better able to accommodate a larger share of fluctuating clean energy production, and ease the task of balancing market supply with demand (IEA, 2011b).

87. Once a wholesale market has been created, it may also be interesting for governments to open the retail part of the power sector to competition. Doing so will allow customers to freely choose their suppliers (either directly or through the choice of the retailer). This creates a stronger responsiveness of demand (to supply) both in terms of pricing and in terms of sources of energy.[29] Opening of the power retail sector can be well complemented by the use of smart grids, which increase demand responsiveness and can therefore significantly reduce the scope for exercise of market power (OECD Competition Committee, 2010). For countries where energy demand is rapidly increasing, a combination of smart grids with open power retail markets could permit the linking of efforts in demand side energy management with those promoting the supply of clean energy. Nonetheless, establishing a wholesale market will require that the domestic electricity market be large enough to accommodate multiple generators. Some countries may also face capacity constraints (e.g. technical ability of the market operator) in establishing and managing wholesale markets.

Creating a level playing field between public and private investors in clean energy infrastructure

88. In parallel to liberalizing their energy markets, governments should also ensure that a level playing field be established between private actors and the SOE as well as between foreign and national actors in the electricity sector.

[29] In several European countries, customers (including at the household level) now have the opportunity to choose to purchase 100% green power.

3.7 Do private developers benefit from non-discriminatory access to finance?

89. *Opening the market to competition is necessary but not sufficient.* Many commercial banks in developing countries are still cautious about financing renewable energy projects, in part because they lack familiarity with the nature of the technologies involved. In such situations, large companies such as SOEs may have a competitive advantage, as they can finance projects on their balance sheets. Additionally, state-owned or state-controlled banks may be encouraged to lend to some project developers rather than others, in particular SOEs as these may benefit from implicit state guarantees. This discriminatory access to finance can take place regardless of the SOE's capacity (compared to that of private actors) to develop clean energy projects.

90. *Governments should therefore ensure that there is no-discrimination between actors regarding access to finance*. Not doing so may undermine the very benefits of having achieved a liberalised electricity market. In addition to the different financing means detailed in the financial market policy section of this report, monitoring performance of projects and making such information publicly available to both banks and investors on a regular basis can reduce the wariness of commercial banks vis-à-vis off-balance sheet renewable energy projects. India's Ministry of New and Renewable Energy is, for example, currently testing a computer software application to monitor and report on progress of selected projects under the National Solar Mission (EEW&NRDC, 2012).

3.8 What steps is the government taking to ensure that the SOE and private actors have equal opportunities with regards to energy procurement?

91. To ensure fair competition in an open electricity market, governments will have to level the playing field between the SOE and private actors. Competitive procurement such as tendering can be a useful option for developing countries in this regard. As mentioned previously, tendering can also help reduce the level of financial support needed by clean energy producers (see Chapter 2).

92. *Tenders must be carefully designed to ensure that the tendering process brings more benefits than costs.* In addition to being clear and transparent, tenders should consider several dimensions related to the quality of the bid, in addition to price. Of particular importance for clean energy infrastructure projects will be the experience of the given applicant with the clean technologies that the government aims to deploy, since clean energy projects involve complex technologies and contract relationships. More experienced bidders are therefore more likely to propose reliable prices, with lower risks of delays or failure to comply.[30] Some countries (such as South Africa, see Table 3.2) have accordingly adapted their bidding criteria to focus on technologies that have already been used and proven, or by requiring previous experience in undertaking similar projects domestically or abroad.

30 The absence of such experience criteria in India's National Solar Mission might be behind the substantial delays in implementation experienced by half of the 28 PV projects selected in 2012.

Table 3.2 Example of technical requirements for bidding in clean energy (South Africa)

Sector	Minimum capacity (MW)	Max capacity (MW)	Experience
Onshore wind	1	140	Developer must have worked on 2 projects of comparable scope and duration (although this is not restricted to the renewable energy sector.
Solar PV	1	75	The inverter type must have been used in two commercial projects for 24 months with 95% technical availability/ The module type must have used in two commercial projects for 12 consecutive months with 95% technical availability.
STEG	1	100	The solar concentration system, heat receiver, heat transfer fluid and handling system, electrical generation system, cooling system and thermal storage system (if applicable) must have been used in 2 commercial projects for at least 24 months or 36 months for a demonstration project.
Biomass	1	10	The fuel handling systems, fuel conversion and prime mover technology must have been operating at a technical availability of 75% for 12 consecutive months
Biogas	1	10	The proposed anaerobic digestion concept must have been in use for at least 24 months and operated at similar scale for the project. Prime mover technology must have been in use for at least 12months with 80% technical availability.
Landfill gas	1	10	Prime mover technology must have been in use for at least 12months with 80% technical availability. Gas booster and flare equipment must have been in use for at least 12 months in 2 different commercial landfill gas projects and have been shown to comply with the South African requirements for safety and environmental performance.
Small hydro	1	10	The proposed turbine and generator manufacturer must have supplied similar equipment in 2 different hydropower projects at a scale greater than 1 MW and operating for a period of at least 24 months.

Source: Goldie-Scot, L. (2011), "South Africa decides to give wind and PV a tender embrace", *Clean Energy Research Note*, Bloomberg New Energy Finance (BNEF).

93. In choosing such criteria, the government must however be careful not to discourage and limit the innovation potential (and associated cost reductions) that tenders can bring. Indeed while technology or experience-specific bidding criteria can help governments better assess the bidder's past performances as well as the adequacy of the bids themselves, such requirements may restrict market entry and hamper competition. Thus, to best benefit from tenders, governments should first clearly identify the objective behind the tender based on due diligence and needs assessments. Bid design should also minimise opportunities for bid rigging (see question 3.9).

3.9 When using tenders, how does the government ensure absence of discrimination among bidders?

- *If preferential treatment is given to the SOE or a given class of actors, is the rationale clearly explained?*
- *How does the government ensure that the bidders have not rigged their bids?*

94. In setting up bid evaluation criteria, governments of developing countries will have to define how the SOE fits into the picture. Alongside opening the clean energy infrastructure market so as to increase competition, governments often want to develop the SOE's ability to compete in that market. Resolving this challenge often involves a mix of partially opening the market and keeping a share of it for the SOE. In South Africa for example, only 50% of the planned new generation capacity was covered by outside tendering, and the remaining 50% was reserved to Eskom. As much as possible however, the SOE should compete with private actors on the same grounds and criteria of evaluation. Moreover if preferential treatment is given to the SOE or to a particular class of actors during tendering, it should be justified as clearly in the public interest rigorously defined and clearly explained to the bidders. Bidding requirements should also ensure non-discrimination between national and foreign actors, as discriminatory criteria go against the very economic efficiency gains that the tender procedure aims to achieve.

95. *Early detection of bid rigging practices can reduce the risk of inefficient procurement.* As suggested by the OECD Recommendations on Fighting Bid Rigging in Public Procurement (OECD, 2012c), important elements in preventing rigging include:

- Promoting competition by maximizing the number of bidders,
- Using sealed bids procedures to prevent communication between bidders,
- Including in the tender a warning on the sanctions for bid rigging and require the bidders to sign an attestation that the bid submitted is "genuine, non-collusive, and made with the intention to accept the contract if awarded.",
- Training procurement officials on the risks and costs of bid rigging and on how to detect collusive practices; and
- Ensuring that competition authorities are collaborating with the procurement officials with respect to tender structure.

Competition authority

96. Once liberalisation reforms have been implemented and a level playing field is established, there needs to be an authority that ensures compliance with the principles of competition and competitive neutrality.

3.10 Is there a competition authority? Is the competition authority provided with enough resources and technological knowledge to appropriately address the challenges of competition in the electricity sector?

97. Once the electricity market has been opened, the enforcement of competition in the sector should be the responsibility of an adequately resourced competition authority. Without vigilant and effective enforcement of competition law by the competition authority, there is a risk that public monopolies become replaced by private ones. If unchecked, mergers and acquisitions in the electricity sector can reverse the benefits of unbundling, and lead to a highly concentrated market. It is therefore important for competition authorities to monitor merger and acquisitions or transfers (M&A&T) in the market. For this it is crucial that the competition authority possess enough resources and skilled staff to suitably monitor and enforce competition regulations in the electricity sector. In the case of privatisation or unbundling of vertically integrated energy providers, the competition authority also has a role in ensuring that the privatisation process itself is adequately carried out and that private bidders are not, for instance, offered market exclusivity.

3.11 Are responsibilities between the competition authority and the energy regulator clearly structured, so as to enhance policy coherence and guarantee the independence of both bodies?

98. *In addition to sufficient resources, competition authorities require adequate political support and independence* to function effectively, in particular when they must challenge vested interests – such as monopolistic private firms, or state-owned firms that fall under the regulatory authority of other parts of government. The latter configuration is very common in utility provision, including in energy where regulators are responsible for tariff-adjustments, regulatory enforcement, and policy advocacy in the sector.

Depending on the country, authority over market power issues in the electricity sector can therefore be the domain of the competition authority or of both the energy regulator and the competition authority.[31]

99. *In such situations, clear roles and responsibilities for each public agency need to be defined,* and it is important for the competition commission to rank relatively high within the hierarchy of governmental units. Indeed, not all decisions of sector-specific regulatory authorities are neutral or beneficial for competition. Recognising this potential conflict of interest, the General Guidelines of Competition Commission of Mauritius (CCM) for instance enable the CCM to denounce restrictive practices and impose remedies if enterprises comply with regulatory decisions in a manner that distorts competition while more competitive alternatives exist. Similarly in its 2012 *Competition Report*, the Turkish Competition Authority (TCA) reports that the ongoing unbundling of the national energy market will require enhancing the relationship and co-operation between the Energy Market Regulatory Authority and the TCA (ELIG, 2012). In developing countries, such allocation of responsibilities will need to reflect the respective technical and human resources capacity of the relevant agencies, to ensure that anti-competitive cases can be appropriately dealt with.

100. *The independence of the competition authority should also be safeguarded,* for instance by requiring that the authority reports to – and receives feedback on – its activities from independent oversight committees (see governance section on independence of regulators). Evidence of political intervention in competition cases can considerably erode the authority and credibility of the authority. Independence can also enhance the quality of policy advice that the competition authority can provide to government, especially to warn of any possible trade-offs between competition and other policy objectives.[32] In these ways, competition authorities can help guide government towards policies that can reach an intended long-term objective (for instance supporting clean energy investment and mainstreaming clean energy production within the national energy market) with a minimum adverse impact on competition in that market.

31 In Chile the Antitrust Court and National Economic Prosecutor are responsible for enforcing anti-trust regulations in the electricity sector; in the US, the Electricity Regulatory Commission, the Federal Trade Commission and the Department of Justice’s Antitrust Division have authority; GTDT, 2012.

32 For example the Turkish Competition Authority has warned that successful unbundling of the energy market would require decreasing the switching costs among generators, transmitters and distributors, in order to safeguard effective competition; EBRD, 2011.

4. FINANCIAL MARKET POLICY

101. To deliver clean energy infrastructure, developers need access to affordable long-term finance. In some countries however, access to long-term finance is constrained by shallow and illiquid financial markets. Accessing international capital markets can also be difficult for many developing countries. These challenges can be further exacerbated for clean energy infrastructure projects, as lenders may be reluctant to lend due to insufficient knowledge of local markets and a higher technology risk. As a result in many developing countries, IPPs can only secure loans at prohibitive rates. Ensuring access to affordable finance will require developing country governments in particular to combine a short-term strategy of facilitating access to international financing and increasing support by national and multilateral development banks with a more long-term focus on strengthening domestic financial markets and increasing the range of financial products that are available and suited to clean energy financing needs. More generally, de-risking policy schemes that bring down the interest rate on capital lending are key to catalysing renewable energy and energy efficiency investment.

Facilitating access to finance

4.1 How is clean energy infrastructure currently financed?

102. *The means of financing energy infrastructure varies among developing countries.* In some countries, like Brazil or China, bank lending has played a predominant role, with state-owned and/or national development banks being the main sources of long-term financing. In China for example, banks hold around 80% of the total loan portfolio for infrastructure (Walsh *et al.*, 2011). Similarly, Brazil's national development bank (BNDES) has played a key role in financing renewable energy.[33] By contrast, in Chile and the Republic of Korea, capital markets are the main sources of finance. India lies somewhere in the middle, as not only bank lending but also access to capital markets play an important role in infrastructure financing (Walsh*et al.*, 2011).

103. *The benefits of having access to both domestic and international capital markets can be substantial for electricity companies*. This is especially the case where clean energy is concerned, as projects tend to be upfront capital-intensive with low operating costs thereafter. The Republic of Korea's electric company KEPCO (which represents 87% of the country's generating capacity) has made use of equity markets[34] to diversify its capital structure as well as of both domestic and global capital markets to diversify its debt (Walsh *et al.*, 2011). A similar approach is found in Chile where private owned electrical companies have financed their debt with both local and foreign currency bonds (Walsh *et al.*, 2011). [35] It is noteworthy that while access to capital markets coincided with privatisation (of both electricity and

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33 BNDES financing reached USD 3.1 billion in 2010, twice the level of 2007; REN21, 2011.

34 By regulation, government should own at least 51% of the shares; Walsh, Park, & Yu, 2011.

35 Domestic bond issuance by electricity providers is long-term in the case of Chile (10-30 years) whereas KEPCO often issues short-term bonds (approximately 5 years).

pension funds) in Chile, it was not a necessary condition for accessing capital markets (KEPCO is vertically integrated and a majority of shares are held by the government).

4.2 Can domestic and foreign investors access domestic long-term financing at an affordable rate?

104. *Access to domestic long-term financing for clean energy infrastructure projects remains limited in many developing countries*. Indeed the degree to which countries are able to leverage resources for clean energy infrastructure financing depends not only on the real and perceived risks associated with the clean energy sector, but also on the health and depth of their financial sector. There are several factors that can lead to scarcity of long-term domestic finance in many developing countries. These include the following: lack of competition in the banking sector; shallow domestic financial markets; banks lacking technical expertise to properly evaluate the risks of such projects; aversion to lending to new actors, such as innovative SMEs; and banks' preference for short-term maturities. These challenges are particularly acute in Africa, where bank loans with long maturities are very rare (20-year loans are available in only six of 24 African countries included in a 2009 World Bank cross-country analysis); interest rates are excessively high (in three of these six countries the loan interest rate was above 20%); and infrastructure-related bonds are issued in only a few countries (Irving & Manroth, 2009).

105. *Small and medium-sized enterprises (SMEs) involved in clean energy face exacerbated problems of access to finance*. Being too large for micro-finance and too small to benefit from commercial or international financing, SMEs are having trouble accessing finance to invest in clean energy (Hamilton, 2010). This seems to be the case for both renewable energy (Blyth & Savage, 2011) and for energy efficiency projects (UNEP, 2009) and is further compounded by the fact that the costs of due diligence have a disproportionate impact on smaller projects.

106. *To address these challenges governments have different options at their disposal.* Several of these (mitigating project risk with sovereign guarantees; pursuing sovereign credit rating; providing investors with funding by national and multilateral development banks; and providing direct lending to renewable energy projects) are detailed in the questions below. In addition, improving the transparency of clean energy financing and reducing information asymmetries can also facilitate investor access to finance for clean energy projects. For example, wider sharing of details on the successful financing of projects can improve the capacity of local banks to deal with clean energy projects and technologies; and sharing information gained by tracking the successful deployment of clean energy infrastructure projects can enhance the confidence of private sector lenders (see question 2.12 on monitoring).

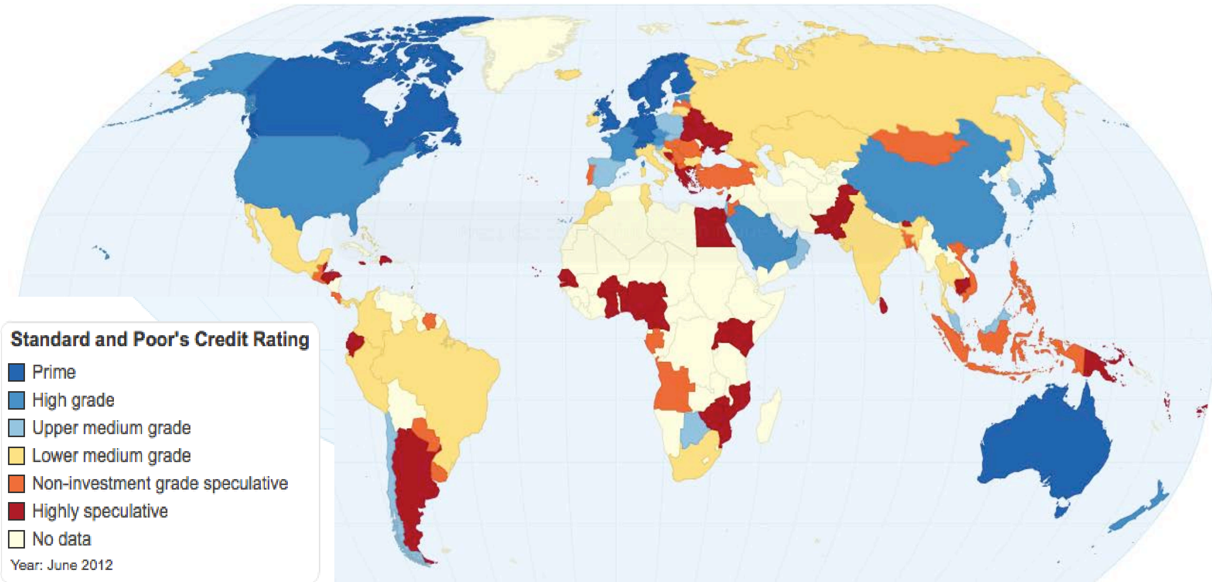
4.3 What steps is the government taking to facilitate access to international capital markets, and to attract long-term international financing? Is the government pursuing an international investment grade sovereign rating?

107. Because of limited access to domestic financing, many energy infrastructure projects will have to rely – at least in part – on borrowing from international sources in foreign currency. Since revenues are generated in local currency however, energy projects will often be exposed to currency risk. It is therefore important that projects be secured against this risk. Mitigating options include: partial credit guarantees (PCG); currency risk coverage provided by private insurers and/or export credit agencies; and syndicated loans – which by definition will allow for at least part of the debt to be financed locally, thereby reducing currency risk of the total debt package.

108. In the short term, only a limited number of developing countries can be expected to have access to international capital markets. Few developing countries have achieved investment grade sovereign ratings and some are still not rated, notably in Africa (see Figure 4.1). Achieving credit rating – even if below investment grade at first – may nevertheless be a good step towards attracting investment as it

signals openness and growing financial and budgetary transparency on the part of the government. An investment grade credit rating is however frequently necessary to be able to tap into the international capital markets at an affordable rate. For countries with less than an investment grade rating, risk mitigation tools such as PGCs can be an advantageous means of increasing the credit rating for particular operations such as bond issuance.

Figure 4.1 Standard and Poor's credit rating for each country (as of June 2012).



Source: Standard and Poor's (2012), "Standard and Poor's Credit Rating for each country as of June 2012.""

109. For many developing countries, national and multilateral development bank financing will therefore continue to play an important role over the short-to-medium term. Among the top four development banks providing financing in clean energy infrastructure, two are from developing countries (the Chinese Development Bank and Brazil's BNDES). These two banks respectively contributed to 16.7% and 12.9% of the total USD 268.8 billion that were invested in clean energy infrastructure over 2007-2011 (Louw, 2012).[36] Emerging countries have been the main recipients of these investments, with China, Brazil and India receiving respectively 17.8%, 13.6% and 2% of the total. The majority of other developing countries obtain development bank financing for clean energy projects from foreign or multilateral development banks, rather than from national banks (Louw, 2012).

Targeted incentives

4.4 Is the government providing targeted financial support to renewable energy projects?

110. Even where the commercial banking sector is developed and loans are available, access to finance for private developers in clean energy can remain difficult. In addition to being reluctant to lend to an emerging sector such as clean energy, commercial banks can also face limits on how much they can lend to the power sector. In India for example, most banks can lend a maximum of 15% of their loan portfolio to the power sector (Pearson, 2012). This cap increases the risk that clean energy projects may be crowded out by fossil fuel-based infrastructure projects – especially as coal generation capacity in India is

36 The top four development banks in terms of clean-energy financing over 2007-2011 were: KfW (USD 98.3 billion), Chinese Development Bank (USD 45.1 billion), European Investment Bank (USD 41.9 billion) and BNDES (USD 34.7 billion). Together they contributed 81.8% of the USD 268.8 billion.

expected to double over 2009-2020 (IEA, 2011d). In such circumstances, special provisions need to be introduced into banking regulation to promote clean energy projects, for instance, by differentiating the cap.

111. *Establishing direct lending to renewable energy projects could mitigate the perceived risk.* Another approach, albeit more costly for public budgets, would be to provide state guarantees for clean energy projects, thereby making commercial banks more prone to approve loans for clean energy projects. However such guarantees may be perceived as a sign that the regulatory environment is not transparent and stable enough to encourage investment. In the case of a non-investment grade country, the credibility of the guarantees may be undermined by a lack of confidence in the country's ability to honour the guarantee.

4.5 What steps is the government taking to attract institutional investors in clean energy infrastructure investment?

112. While banking sector provision of long-term finance has been tighter due to deleveraging and new financial regulations, institutional investors can potentially play an important role in energy infrastructure financing, provided the necessary conditions are in place. Although the experience of emerging economies, such as Chile, shows that institutional investors can positively contribute to infrastructure financing,[37] at the global level most investment from institutional investors has been indirect (i.e. via equity and debt of listed infrastructure companies, rather than direct investment in infrastructure). This is broadly the case across institutional investors, including investment funds, insurance companies, pension funds, and other forms of institutional savings. It is for instance estimated that less than 1% of pension funds' USD 28 trillion of assets are directly invested in infrastructure (Kaminker and Stewart, 2012; OECD 2011c). The degree to which pension funds might play an important role in financing clean infrastructure investment will also depend on the country context – in Brazil, for example, where BNDES is the largest supplier of long-term debt and equity financing, pension funds and capital market financing in general may play a more limited role in infrastructure development (Irving & Manroth, 2009).

113. To attract institutional investors in clean energy projects, the government needs to provide supportive policy environments that promote investment in clean energy. Recent OECD works show that institutional investors face many barriers to direct investment in clean energy infrastructure (D.Croce, Kaminker, & Stewart, 2011, Kaminker and Stewart, 2012), among which:

- Lack of clear, credible, coherent and long-term policy signals;
- Lack of carbon price and/or presence of harmful subsidies, which cause the mispricing of clean energy investment vis-à-vis existing, polluting technologies;
- Regulatory barriers (e.g. accounting and solvency rules);
- Lack of suitable investment vehicles – particularly collective debt instruments with suitable scale, satisfactory rating and liquidity; and
- Specific risks related to clean energy projects, including technology risk, which make it difficult to achieve investment grade rating.

114. Moreover, leveraging institutional investment into clean energy infrastructure not only requires enhancement of the business climate, but also targeted reforms of the laws and regulations that apply to

[37] In Chile pension funds played an important role in equity financing of privatised electricity companies in the 1990s; Walsh, Park, & Yu, 2011.

institutional investors. In much of SSA for example, institutional investors face limits on asset class and geographical exposure. In a context of illiquid and narrow financial markets, this often forces them to invest in short-term government securities – thereby leading to maturity mismatches.[38]

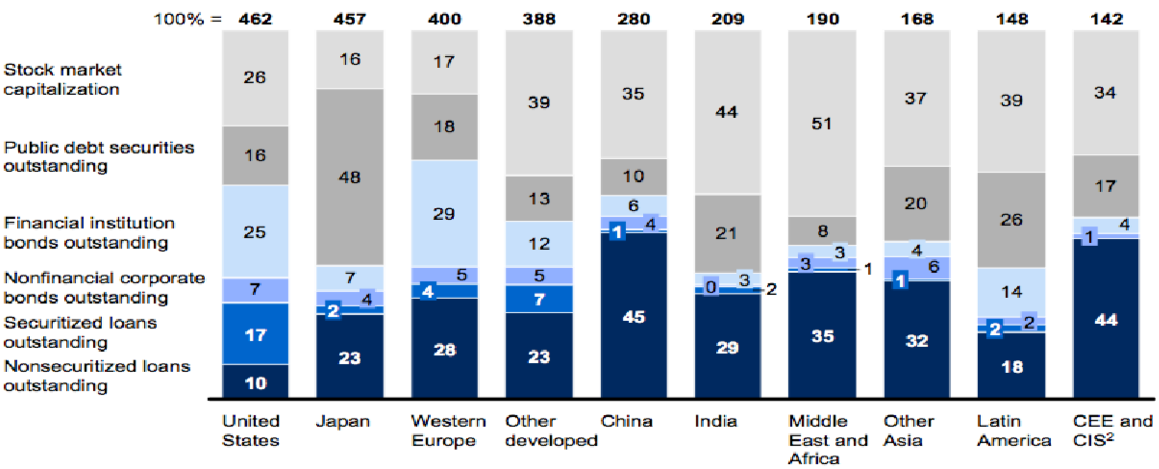
Strengthening domestic financial markets

4.6 What steps is the government taking to develop and strengthen its domestic financial markets?

115. *Domestic financial markets must be strengthened in order to support clean energy infrastructure financing*. This is true even of the countries that have access to international capital markets. Continued financial fragility and efforts to reduce this by increasing capital buffers (resulting from Basel III) are thought to be motivating many banks in OECD countries to reduce the amount of long-term debt on their balance sheets. If sustained, this trend could increase the risk of refinancing and pose challenges for the financial viability even of existing projects. Power-purchasing agreements may for instance be changed to reflect increased use of refinancing as a result. Additionally, market uncertainty may lead banks to adopt a more conservative stance, potentially reducing their portfolio of projects they perceive as risky (e.g. renewable energy and energy efficiency investments, and smaller-scale projects in general). This context may also induce higher loan market concentration. All of these factors combined could likely lead to a higher cost of lending. With reduced access to long-term loans, clean energy infrastructure developers may therefore increasingly have to rely on loans with shorter maturities – and thus bear higher refinancing risks.

116. *Strengthening domestic financial markets in the medium-to-long term will be country specific.* While the main source of financing in emerging markets is generally bank lending and equity markets, each country will have a different breakdown in terms of preferred source of financing (see Figure 4.2). For countries with highly concentrated banking sectors, increasing competition could help reduce costs of long-term finance and thereby lower barriers to the development of clean energy infrastructure projects. Governments should also keep in mind that different forms of clean energy will require different forms of refinancing and face different financing needs (for instance renewable energy projects, when compared to energy efficiency investments, do not require the same loan terms). Meanwhile the development of regional financial markets can broaden financing options for countries whose domestic capital and financial markets remain too narrow and shallow (see Chapter 6).

Figure 4.2 Financial depth (as per cent of GDP) for selected countries and regions, 2010



Source: Bank for International Settlements, in McKinsey Global Institute (2011), "Mapping Global Capital Markets. 2011".

38 As of July 2007, government short-term securities represented nearly 40% of total assets of the pension funds in Ethiopia, Kenya, Uganda, Cape Verde and Madagascar; Irving & Manroth, 2009.

5. PUBLIC GOVERNANCE

117. Considering the number of policy areas and public authorities potentially involved in the effort to effectively leverage investment in clean energy infrastructure, good public governance is an essential enabling factor. This section highlights some of the areas of public governance that are particularly relevant for promoting investment in clean energy infrastructure. Some of these issues, such as the governance of electricity markets, are specific to the energy sector. Others, like land planning and co-ordination between different territorial levels of governance, are more relevant to infrastructure policy in general, but require particularly careful consideration in the clean energy context.

Governance of the electricity market

5.1 What steps is the government taking to ensure the independence of the electricity market regulator – including budgetary independence from line ministries, and appointment of top management that is free from political pressures?

118. *A key step in attracting investment in a liberalised electricity market is the creation of an electricity market regulator*. As mentioned in the competition section, opening the electricity market to independent power provision can be very helpful in promoting private investment in clean energy generation. Keeping the energy market competitive and ensuring that the needs of end-users are met also requires careful regulation and oversight of the sector, both by a competition authority and a sector-specific regulator. Indeed econometric analysis of electricity reform in OECD countries suggests that establishing an independent energy regulator can have a positive effect on infrastructure investment in the electricity sector (Araujo, 2011).

119. The independence of energy regulators by law, but also in practice, is therefore an important dimension of a strategic framework for increasing investment in clean energy. Independence can be further reinforced by: granting the regulator more budgetary autonomy from line ministries; appointing top management with fixed-term employment contracts that are independent of the electoral cycle; and insulating the regulator's board, the commissions associated with the regulator, and any other agencies responsible for enforcing a level playing field (such as the competition authority – see Chapter 3) from political pressure. The responsibilities and authority of the energy regulator must also be clearly specified vis-à-vis other bodies with potentially overlapping functions.

120. In addition to strong regulatory commitment and transparency, the strong financial and technical capacity of the regulator itself is also essential to safeguard independence and guarantee effective regulatory enforcement.[39] Technical capacity is particularly important considering the technical complexity of clean energy technologies and the fact that the energy regulator may be in charge of defining standards

[39] Achieving this level of capacity has been a challenge in some cases, notably in Sub-Saharan Africa. According to Foster & Briceño-Garmendia, African energy regulators are both understaffed (as low as one employee) and severely under-financed (at most USD 3 million compared to 74 in the UK for example); Foster & Briceño-Garmendia, 2010.

for grid connections and PPAs. Such standards are of prime importance for increasing predictability and reducing risk for investors in clean energy generation.

121. *In many developing countries however, the situation of the energy regulator is one of only partial independence*. In Mexico for example, while the Energy Regulatory Commission is established by law and the members of the commission are appointed on a revolving basis, the agency does not have an independent budget and appointment (and revocation) is done by the President under advice of the Ministry of Energy. By contrast in Brazil, the National Electric Energy Agency is established by law, its financial autonomy ensured via supervision fees, and appointment by the President is subject to validation by the Senate (see Table 5.1).

Table 5.1 Examples of appointment methods for energy regulatory commissions

Country	Agency	Appointment
United States	Federal Energy Regulatory Commission	Established by law. Nomination by President with validation by Senate. Five-year terms. 5 commissioners per agency. No more than three commissioners per political party. Decisions are not subject to review by the president, congress, or Department of Energy.
Brazil	National Electric Energy Agency	Established by law. Financial autonomy ensured via supervision fee. Appointment by President with validation from Senate.
Mexico	Energy Regulatory Commission	Established by law. Members of the commission appointed on a revolving basis by the President under advice of the Ministry of Energy. Not budgetarily independent.
Chile	National Energy Commission	Chaired by a representative of the President. Executive Secretary may be removed at any time by the President of the Republic.
Israel	Public Utility Authority	Five members appointed by the government for a term of three years. Members can be re-elected for no more than two consecutive terms). Chairman appointed by the government for a term of five years (re-appointment possible for duration of four years)
Vietnam	Electricity Regulatory Agency of Vietnam	Part of the government structure. The agency is under the Ministry of Industry and Trade (the latter is established by the national assembly).

Source: Adapted from GTDT (2012), *Getting the deal through: Electricity Regulation 2012*.

Electricity network planning and deployment

5.2 What steps is the government taking towards mapping its energy resources?

- *If mapping has been undertaken, how does government use it to inform power generation and network planning, and co-ordination between the different territorial authorities?*
- *Are the results of the mapping available to all stakeholders?*

122. Mapping the geographical distribution of renewable energy resources is strategically important for achieving an efficient and cost-effective deployment of clean energy infrastructure. By providing the government with the spatial distribution of renewable energy resources, such mapping can guide an optimal allocation of generation projects and grid infrastructure. It can also help identify potential grid connection challenges and generally inform accurate network planning.

123. *Mapping can also help improve co-ordination between land use planning and clean energy infrastructure deployment.* Geographical mapping of resources would help identify which areas may require land-use adjustments to allow for deployment of clean energy infrastructure. This applies to both generation and grid infrastructure. Using this information to convert land use in advance of infrastructure deployment can help reduce the time needed by developers to acquire land use clearance. Similarly, mapping could help increase co-ordination between different levels of government (e.g. federal-state, central-local). Policy support to renewable energy should for instance be consistent and harmonised at both the federal and state level, so as to provide investors with coherent signals and incentives. Resource mapping can moreover inform policy design by central and local authorities, and help ensure that these policies are complementary rather than duplicative (see question 5.4).

124. *When mapping is undertaken, the results should be made available to developers.* The availability of such information is particularly crucial for potential investors as this will shed light on resource supply risks, thereby reducing their due diligence costs. To ensure non-discrimination between foreign and national investors, this information should be available in multiple languages, ideally in an electronic format so as to also be easily accessible from outside the country.

5.3 What steps is the government taking to co-ordinate deployment of the electricity grid with that of clean energy generation?

125. *In most developing countries, the electricity grid has been developing rapidly, mostly to accommodate increased power supply* (IEA, 2011d). However, the grid has not always been extended to accommodate clean energy generation. In fact, renewable energy resources may not necessarily be located close to the existing grid network. In developing countries where renewable energy has experienced particularly rapid growth – often in the form of large-scale projects – some of the generated power has therefore run into considerable connection delays. These delays create revenue risks for investors who cannot sell their production. To reduce this risk, some PPAs for renewable energy oblige the transmission operator to compensate any power produced (regardless of connection). Yet this can create financial strains to both parties when the grid is not able to follow – a dilemma which could be faced by one of the largest wind projects in Kenya (see Box 5.1).

126. Achieving optimal deployment of clean energy infrastructure will therefore require co-ordination between clean energy generation and grid infrastructure development. A national mapping of the renewable resources can be helpful in this context. First, it can provide important information on feasible geographical locations for clean energy generation. Second, it can identify synergies between generation expansion and deployment of the network, as well as implications for land planning and co-ordination between different levels of government. Another useful approach is to undertake “pro-active” planning of

the grid extension, whereby grid expansion and generation are planned together – as opposed to "reactive" planning where the grid is planned to answer the needs only of existing projects (Madrigal & Stoft, 2011). In Brazil for example, private developers are asked to collectively elaborate a planning proposal for the grid connection before they bid on upcoming renewable generation projects.

Table 5.2 Examples of co-ordinated planning of network extension with renewable energy generation.

Brazil	Private developers submit plans to interconnect renewable energy developers according to technical specifications provided by the national electricity regulatory agency. The agency then reviews and proposes tariffs. Developers confirm their interest. A call for tenders is then organised for energy contracts. Winners reaffirm their need for transmission services. Bidding is then organised for the transmission network. The winner obtains a concession for 30 years. Revenues are derived from network charges applied only to the renewable generators.
Philippines	Creation of a technical group involving the National Renewable Energy Board, the Energy Regulatory Commission and the transmission company. Planning is done based on interconnection requests of projects that have been validated. A minimum-cost solution is identified for the set of projects as a whole (as opposed to each project individually).
Mexico	Developers express interest in firm transmission agreements with the utility, specifying their location, size and expected time of operation. All projects are taken into account by the Federal electricity commission which then undertakes technical studies to evaluate lowest-cost solutions for connection. Plans and costs are shared with the developers, who in turn shoulder these costs equally among themselves and then have to confirm commitment by making a 5% up-front payment. Transmission costs of extension are then included in the official budget, at which point developers submit 25% of the payment. Finally the Budget is officially published and bidding for construction is done, following which developers have to submit 100% of the shared costs.

Source: Adapted from Madrigal, M.. and S. Stoft (2011), "Transmission Expansion for Renewable Energy Scale-Up Emerging Lessons and Recommendations", *Energy and Mining Sector Board Discussion Paper*, World Bank Group, Washington, DC.

Box 5.1. The importance of timing grid development with power generation - the example of the Lake Turkana Project

The Lake Turkana Wind project is one of Kenya's largest clean energy infrastructure projects. The power generation part of the project, estimated at USD 780 million, will generate 300MW of clean renewable energy thanks to 365 wind turbines. The project was developed by the Lake Turkana Wind Power (LTWPCo) company – a consortium of private and public investors – and lead finance is provided by a multilateral development bank. According to LTWPCo, it will represent the largest private investment in Kenya's history.

The counter party to LTWPCo in the PPA (20 years) is Kenya Power (50% state-owned). By law, it is obliged to buy the power from LTWPCo as soon as the plant starts operating. A multilateral agency ensures the investors against any default from Kenya Power. To be able to connect the power station however, a grid needs to be constructed; this is under the responsibility of Kenya Transmission Company (also state-owned) and will cost USD175 million (independently financed via bilateral public financing).

In the most ideal conditions the grid and power plant can be constructed in 23 and 26 months, respectively. However, should the construction of the grid be delayed, Kenya Power will face financial obligations towards LTWPCo without being able to actually sell the power, increasing the revenue risk of the generation project and putting its guarantors in a difficult position. Independent financing of grid and generation may be justified considering the scale of the investments. As this example shows however, it is crucial that grid and generation projects be co-ordinated to avoid a coupling of the risks between projects. Government must also play a facilitative and co-ordinating role between the different actors (both public and private) to reduce asymmetry of information between them.

Sources: World Bank project description; Lake Turkana Wind Power company website; and Mbugua, James: "World Bank agencies delay Lake Turkana wind project".

Co-ordination between different levels of governance

5.4 What steps has the national government taken to align national and sub-national policies that could have an impact on investment in clean energy infrastructure?

127. Regional (state or provincial) and municipal policies can either undermine or facilitate opportunities for clean energy investment, depending on how they are designed. Incentives for clean energy production vary from one state or province to another. For example, in the Chicago Tri-State metro-region, which straddles three US states (Illinois, Indiana and Wisconsin), different targets for the share of renewable sources of energy in the state energy mix, together with different criteria for deciding which projects qualify as renewable energy generation, undermine efforts to attract clean energy investments to the metro-region (OECD, 2012e).[40] In other cases, national laws may undermine local-level investments in clean energy. For example until 2010, Polish national policy prevented municipalities from taking ownership of waste generated by their inhabitants and businesses. This discouraged waste-to-energy investment, as potential investors were reluctant to contract with private firms for their waste (OECD, 2011). When promotion of clean energy infrastructure falls under the mandate of both national and sub-national authorities, attention should therefore be given to how respective policies interact, and in particular to ensuring that regulations at the national (or federal) level complement those at the local (or state) level.

128. Harmonisation of clean energy policy priorities must carefully consider the needs of rural regions, which are more likely to be home to larger-scale renewable energy generation. National policies to promote clean energy investment indeed need to take into account the impact of renewable energy deployment on host communities. It is important to adopt a territorial approach to renewable energy deployment to avoid distortions in land use and relative prices in host communities. Ideally, renewable energy policy should link energy production to other industries such as farming, forestry, and traditional manufacturing. Reducing the use of "spatially blind" incentives, which can generate unanticipated and undesirable distortions in local economies, and taking into account the characteristics and specific needs of host economies can make it easier to capitalise on the investment in renewable energy in terms of economic development. This, in turn, can facilitate local acceptance of rural clean energy projects, which can be critical to the success of the investment. Regional authorities can foster social acceptance in two ways: increasing understanding of renewable energy projects; and ensuring local benefits, as communities will more willingly accept some of the costs of renewable energy installations if they stand to gain from such investment. Focusing renewable energy development in rural regions on accumulated competencies is therefore strongly linked to gaining community acceptance (OECD, 2012d).

5.5 How does the government co-ordinate the development of clean energy infrastructure between its national and sub-national authorities?

129. Clearly defining roles and responsibilities between different levels of government is essential for efficient operation and maintenance of the infrastructure. Not doing so can lead to "grey areas" of responsibility, resulting in each actor shifting responsibility to other levels of government – ultimately to the detriment of the service and to deterioration of the infrastructure.[41] Governments should also make sure

[40] Illinois and Wisconsin require that 25% of the state's electricity be provided by renewable sources by 2025, whereas Indiana only has a voluntary target for a 10% share of renewable electricity by 2025. Also unlike in Indiana and Wisconsin, waste-to-energy projects in Illinois do not qualify as renewable energy generation; therefore municipalities cannot sell associated credits in renewable energy markets.

[41] This was the case for example in China's "Township electrification Program" where transfer of responsibility for the operation and maintenance of off-grid systems was left undefined in the contracts; Niez, 2010.

that proper ex ante co-ordination between the different levels of authorities is established. In addition to facilitating land planning, ex ante co-ordination is also crucial in the case of rural electrification programmes which require full co-operation by local authorities. Brazil's "Luz Para Todos" electrification programme for instance achieved its rural electrification target by asking states to establish priority lists for electrification in their geographic areas (Niez, 2010).

130. *Co-ordination at the local level can also include local communities and non-governmental organisations (NGOs).* This approach can be particularly useful in remote rural areas where capacity of the local government is often limited. Involving local communities and NGOs can increase the sense of community ownership, and thereby stimulate community involvement in the maintenance of the infrastructure. It can also help improve bill collection rates, thereby reducing commercial losses for the private actor engaged in decentralised energy access (Niez, 2010). Last but not least, engaging with local communities must be well-aligned with the existing legal framework for access to land (including land-related dispute settlement and compensation rights), to mitigate the risk of any "land-grabbing" abuses.

5.6 Is the government tapping into the potential for cities and metropolitan regions to facilitate clean energy investment?

131. Cities and metropolitan regions can facilitate investments in clean energy by lowering barriers to adoption of clean energy technologies. Urban redevelopment projects provide a key opportunity for improving the local electricity grid. In Stockholm, the redevelopment of the Stockholm Royal Seaport into an eco-district has involved a PPP for grid improvements, under which the City of Stockholm is helping the private grid owner to identify the appropriate business model for grid improvements. This project is designed to increase the use of renewable energy sources, provide real-time consumption information, and allow for large-scale use of electric vehicles (OECD, 2013 forthcoming). Local-level legislation can be another key factor in creating the conditions for viable clean energy deployment. Regulatory changes requiring buildings within a designated zone to connect to the system allow district heating and cooling projects to realise widespread energy efficiency gains. Cities can also improve the conditions for distributed clean energy investments by providing low-interest loan programmes which enable property owners to install renewable energy technologies (in some cases repayable through property taxes, as in several US cities), or through ordinances requiring installation of renewable energies in new buildings (such as Barcelona's "Solar Thermal Ordinance") (OECD, 2010).

6. OTHER POLICIES AND CROSS-CUTTING ISSUES

Regional co-operation

132. For many developing countries, a regional approach to the promotion of clean energy can help leverage important economies of scale in the areas of financial markets, electricity markets, and in the joint development of generation, transmission and distribution infrastructure. Access to the long-term finance required for regional clean energy investments can for instance be considerably facilitated by tapping regional financial markets. These regional dimensions are therefore strongly interdependent.

6.1 How is the government engaging with its regional partners to deepen regional financial markets?

133. *Development and deepening of regional financial markets represent an opportunity for developing countries*. Regional financial markets can make long-term finance more accessible by allowing a wider base of investors to take part in the financing of infrastructure. This is particularly true of regions like Sub-Saharan Africa (SSA), where markets are often shallow and illiquid and where regional capital markets and the cross-listing of firms can potentially broaden financing opportunities. Regional integration of bond and equity markets can also support the growth of the corporate bond sector in Asia and heighten the increasingly important role of Asian equity markets globally.[42] Deepening capital markets through regional co-operation can be particularly useful for leveraging institutional investment in clean energy infrastructure, as most institutional investors still overwhelmingly invest in project bonds rather than in illiquid physical assets.

6.2 Is a regional approach being used to facilitate the extension of the energy grid?

134. A regional approach to grid development can bring substantial economies of scale for the development of clean energy infrastructure. In Africa for example, the benefits of a regional approach to infrastructure development are estimated to be around USD 2 billion per year in the power sector (World Bank, 2011). A regional approach could also facilitate the exploitation of the large hydropower resources of the continent (93% of which are still untapped), thereby triggering both economies of scale and saving nearly 70 million tons of CO_2 a year (Foster & Briceño-Garmendia, 2010). In addition, provided the interconnection capacity of the grid is strong enough, a regional approach to grid development can help accommodate a larger share of renewables in each country's energy mix. For example, Denmark's strong interconnection with the Nordic Power Pool market (equivalent to 80% of total peak demand) is able to accommodate a large share (20%) of wind energy in its annual electricity production (IEA, 2011b). Finally in addition to implying a larger absorptive capacity of the transmission and distribution grids for clean energy systems, large-scale regional integration can help address the intermittent nature of some renewables (such as wind or solar) by diversifying the sources of supply.

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42 In 2011, Emerging Asian countries accounted for 59% of global IPO market. An initiative was launched on April 2011 to facilitate cross-border trading between the Stock Exchanges of the Philippines, Singapore, Malaysia, and Thailand, for a capitalisation of more than USD 1 trillion; ADB, 2011.

6.3 What steps is the government taking towards the regional integration of national electricity markets?

135. *For countries with small electricity markets, a regional approach could help reap the benefits of further liberalisation.* As mentioned in the competition section, some countries may have too few actors in their electricity sector to be able to establish wholesale markets. If they have liberalised their electricity markets, these countries will most often be at the stage of the "single buyer model". Because this model mostly relies on power purchasing agreements, supply and demand cannot be adjusted in real time. A small market size makes it also difficult to spread the costs of maintenance across consumers, potentially resulting in weaker infrastructure and higher losses in transmission. By contrast a regional approach, if supported by well-maintained infrastructure, can help achieve the scale necessary to develop a wholesale market which could reduce cost of generation and allow greater cost recovery (Foster & Briceño-Garmendia, 2010).

136. However achieving a fully regional market requires not only enabling the transmission infrastructure to support more trade, but also more coherence among the countries' regulatory frameworks, as well as standardisation of their power contract structures.[43] This is a lesson that has been learned from experience with power pools. With respect to the contract structure, a first step for developing countries interested in building a regional market supportive of clean energy may be to ensure standardisation of their PPAs across the participating countries.

Making and implementing the choice between public and private provision for clean energy infrastructure

137. In designing and implementing the expansion of clean energy infrastructure, public authorities must make a crucial choice concerning the modalities for providing this infrastructure. Indeed government will need to choose between public and private provision or some combination of both, including by considering the use of public-private partnerships (PPPs). A wide set of important procedures and principles (such as benefit-cost analysis, or a review of alternative modes of delivery and of their impact across the full system of infrastructure provision) exist to help ensure that the choice of delivery will correspond to the most cost-effective option, i.e., one that provides the most value-for-money for taxpayers and end-users. This section identifies the criteria which may be considered in making this choice, including considerations for the governance of state-owned enterprises (SOEs), and the main challenges to implementation that public authorities may face if the PPP or private procurement routes are selected instead.

6.4 What is the experience of the SOE in promoting clean energy?

- Is the financial performance of the SOE stable enough to pursue the clean energy infrastructure targets as set out in the renewable energy strategy?
- Is information about the SOE's commercial activities and performance easily available?
- Has the SOE been structurally separated?

138. In many countries, new investments in clean energy infrastructure will often take place in a situation of imperfect competition with an SOE as the incumbent. As mentioned in the competition section, opening the electricity market to competition is the first step towards attracting private investment in clean

[43] Africa has started to engage in regionalising its electricity markets by establishing power pools, such as the South African Power Pool (SAAP) and the East Africa power pool (the latter is scheduled to begin market operations in 2013). However, due to poor quality of transmission infrastructure, lack of harmonised regulatory frameworks (e.g. regarding tariff setting) and lack of standardisation between PPAs, electricity trading between the countries of the power pools remains low; Foster & Briceño-Garmendia, 2010.

energy infrastructure, notably in the generation segment. This does not preclude SOEs from contributing to the investment effort in the rest of the electricity sector. The decision between public and private procurement for clean energy infrastructure in such a context must involve identifying and clarifying the capacity of the SOE to contribute to this effort.

139. Whenever the choice of the SOE is made, the OECD principles on competitive neutrality (OECD, 2012a) suggest that government should:

- Evaluate the comparative advantage of the SOE in providing the service;
- Design a compensation mechanism based on performance and accounted for in a transparent manner; and
- Monitor the performance of both the SOE and of other possible alternatives (e.g. private actors, co-operatives, etc.) on a regular basis.

140. A first step in evaluating the comparative advantage of the SOE is whether or not it has had previous experience in renewable energy and if so, how successful and cost-efficient it has been. Particular attention should be given to the financial soundness and stability of the SOE.[44] Weak financial health can limit the ability of the SOE to pursue clean energy infrastructure investment at the rate required by the country's national energy policy. This performance evaluation requires that the government have access to information regarding the cost structure and performance of the SOE activities pertaining to commercial power generation. Frequent reporting requirements and independent monitoring of the SOE can facilitate this access. SOEs can also be benchmarked against internationally recognised accounting standards, and performance and compliance with budgets can be required by law, as is done in Israel (OECD, 2012a).

141. However, in the context of vertically integrated structures, assessing performance based on commercial activities may be complicated by potential cross-subsidisation both between customers and across the supply chain.[45] Structural separation of the SOE can be a good step towards promoting sound financial operations and achieving more transparency in the cost structure of the SOE (OECD, 2012a).

6.5 When engaging in public-private partnerships, how does the government ensure best value-for-money?

142. When deciding on whether and how to engage with the private sector, attention should be given to value-for-money and adequate risk-sharing. As noted in the OECD Recommendation on Public Governance of Public-Private Partnerships (2012), the objective from the government point of view is to find the "optimal combination of quantity, quality, features and price (i.e. cost) expected over the whole of the project's lifetime". Of particular importance in this context will be the need to verify value-for-money and to compute a "public sector comparator" (PSC), which estimates the hypothetical risk-adjusted cost if a project were to be financed, owned and implemented by government. Market sounding (which includes evaluating the strength of the private sector market for the project, the private sector's capacity for achieving economies of scale, and its relevant expertise), as well as the potential for risk transfer within the PPP, are equally important calculations – especially for renewable energy projects. Indeed, the novelty of the technologies considered and the probable fluctuations in renewable energy supply (including dependence of generation on weather, seasons and time of day) have specific implications for managing project risk and accurately assessing market capacity. Table 6.1 lists the different risks faced by clean

44 In Sub-Saharan Africa only 75% of electricity costs are recovered, placing financial strains on SOEs; Foster & Briceño-Garmendia, 2010.

45 While in some cases cross-subsidisation between customers may alleviate pressure on the poorest part of the population when promoting clean energy (see Malaysia example in section 2), cross-subsidisation across the supply chain will always distort the playing field in the electricity market.

energy infrastructure projects, and Table 6.2 illustrates how different modes of allocating these risks can best be suited to various forms of PPP projects.

Table 6.1 Examples of risks faced by investments in clean energy infrastructure

		Traditional risks linked to infrastructure projects	**Additional risks linked to clean energy infrastructure projects**
Political, policy and regulatory risks	*Policy and regulatory risk*	Lack of long-term political commitment or policy certainty on infrastructure planning Tariffs regulations to increase fees with inflation fall behind schedule; High bidding costs involved in the procurement process (administrative cost) Fragmentation of the market among different levels of government.	Lack of long-term low-carbon development strategies; Trade barriers (tariff and non-tariff barriers) to-clean energy technologies or their inputs; Lack of political commitment or policy certainty over the stability of specific forms of support to clean energy investment, such as feed-in tariffs. Existence of fossil fuels subsidies that make other investments more attractive to investors. Unstable carbon price.
	Legal and ownership rights	Unknown future litigation, planning consents not granted, lease running out	Uncertainty about the legal status and property rights of carbon emissions permits
	Political and social risk	Opposition from pressure groups; corruption Short-term perspective of politicians, limiting infrastructure planning and investment	Additional forms of opposition to specific clean energy technologies or infrastructure, such as wind farms (on-shore and off-shore), geothermal plants or hydro-electric dams, or grid extension
	Currency risk	Lengthy investment horizon for infrastructure	Lengthy investment horizon for mitigation and adaptation projects that address the threat of climate change
Commercial, and technical risks	*Technological risk*	Risk of technology failure or under-performance relative to expectations.	Particularly high in the context of low levels of investment in clean energy as they generally involve new technologies. The level of risk will depend on the maturity of the technology and the track record of the technology provider.
	Construction risk	Delays in the completion of the project, the interface between the different contracts of subcontractors or stakeholders	Lack of expertise in the construction of clean energy projects.
	Operational risk	Ability of the management to operate the facility once completed; uncertainty regarding the costs of decommissioning at the end of the facility's life.	Lack of expertise in the operation of clean energy technologies.
	Environmental risk	Unforeseen environmental hazards linked to an infrastructure project; Weather risks affecting the availability of renewable-energy resources; Risk that a changing climate can adversely affect the proper functioning of the facility.	
Market risks	*Business risk*	More competitors entering; Change in consumer preferences and demand	Technological advances, Lack of familiarity with new clean energy technologies
	Reputation risk	Damage to a firm's reputation can result in lost revenue or destruction of shareholder value. Such damage may stem from local sensitivities and needs.	The climate context could mitigate the reputational risk though some clean energy technologies, such as wind, tide or carbon capture and storage (CCS) projects could face local stakeholder resistance.

Source: Adapted from Corfee-Morlot, J, V. Marchal, C. Kauffmann, C. Kennedy, F. Stewart, C. Kaminker and G. Ang (2012), "Toward a Green Investment Policy Framework: The Case of Low-Carbon, Climate-Resilient Infrastructure", *Environment Directorate Working Papers*, No. 48, OECD Publishing, Paris.

Table 6.2 Examples of different forms of public-private partnerships and how they allocate the risks and costs across the private (G) and public (P) actors

	Service contract	Management contract	Affermage/Lease	Concession	BOT	Joint venture	Divestiture
Asset ownership	G	G	G	G	P/G	G/P	P
Capital investment	G	G	G	P	P	G/P	P
Commercial risk	G	G	Shared	P	P	G/P	P
Operations/ Maintenance*	G/P	P	P	P	P	G/P	P

Source: OECD (2009), *Private Sector Participation in Water Infrastructure: OECD Checklist for Public Action*, OECD Publishing, Paris.

143. *Similarly, the fiscal implications of engaging in PPPs should be considered up front and cover the lifetime of the investment*. While PPPs can be an interesting option for implementing clean energy projects (see Box 6.1 on Cape Verde's Cabeolica wind project), their fiscal consequences must be carefully verified ex-ante. An affordability test, which assesses the impact of a PPP project on public budgets, can be computed by adjusting the PSC for risks and cost of capital. Addressing these fiscal implications is particularly important in the case of PPPs for clean energy infrastructure in developing countries for two reasons: first, because government may have to set aside public funds to support the clean energy infrastructure once it has started operating; and second, because pricing of the service has important implications for access to energy. On the one hand, full recovery of cost by the private actor raises the question of affordability for customers; yet on the other hand, setting tariffs too low can result in substantial losses, which may drain public budgets if the public sector steps in to provide subsidies. Governments will have to define, understand and evaluate both potential benefits and obligations (including fiscal implications) under each proposed PPP project. Poor fiscal evaluation prior to engaging in PPPs could otherwise endanger the creditworthiness of public utilities, thereby increasing the cost of debt for developers wishing to partner with them in PPPs.

6.6 Are there a clearly defined legal framework and a body of regulations for both public procurement and PPPs, facilitated by adequate implementation capacity in the public sector?

144. *The engagement with the private sector should be part of a wider and longer-term government PPP strategy* – as the example of the Cabeolica suggests (see Box 6.1). If PPPs are to reach a sufficient scale, clear regulations for PPPs, together with a pipeline of PPP projects and provisions for managing these projects in a transparent and accountable way, are essential. A clear and understandable institutional framework, including the roles and mandates of the different agencies involved (e.g. PPP units, supreme audit institution, sector regulators) should also be established. A clear and reliable legal framework for PPPs – together with transparent disclosure of bid assessment methods, such as computation of the PSC – provides an important policy signal to the private sector. Considering the technical complexities associated with clean energy technologies, it will also be important that the PPP unit possess the necessary technical and human resources capacity to accurately evaluate the risks, benefits and costs associated with PPPs in clean energy infrastructure. As poorly-implemented PPPs can generate high fiscal and socio-economic costs, it is of crucial importance that public authorities are well-equipped to assess infrastructure needs, and to negotiate sound and equitable infrastructure contracts on an equal basis with their private counterparts.

Box 6.1. Using PPPs to increase the share of renewable sources of energy in the energy mix: Cape Verde's Cabeolica project

Estimated at USD 90 million, Cape Verde's Cabeolica project is a public-private partnership between the government of Cape Verde (18%), the national utility Elektra (11%) and a multi-donor investment facility, InfraCo (71%). It is financed by the European Investment Bank and the African Development Bank, with subordinated loans from Finnfund, the Africa Finance Corporation and InfraCo.

The project will generate 28 MW of wind power at its peak, to be distributed across four strategic islands of the country: 10 MW in Santiago (where most of the industrial activity takes place), 6 MW in Sao Vincente (with the second largest population), 8 MW in Sal, and 4 MW in Boa Vista (the two important islands for tourism). With this new capacity, wind energy for the project is expected to provide 25% of the total power needs of the country. This will help improve energy security, as most of the country's energy is currently provided by diesel fuel and therefore heavily import-dependent (diesel fuel represents 11% of total imports). Water security also stands to benefit, as 92% of drinking water is produced via energy-intensive desalinisation plants.

The development of the project forms part of two government strategies. The first is a renewable energy target for the energy mix (50% by 2020). The second is the government's private-sector strategy, which targets infrastructure as a priority. In 2011, the Cabeolica project was elected the "Best Renewable Energy project" as part of the Africa Energy Awards. This example suggests that sound finances and a clear national strategy of PPP engagement need to be combined in order for PPPs in renewable energy to succeed. In addition, a sound legal framework for PPPs, and the capacity of the public sector to negotiate and monitor the performance of the PPPs on an equal footing with the private partner, is essential.

Sources: InfraCo website: www.infracoafrica.com/projects-capeverde.asp; Adam Brunn, "Case Study: Cape Verde Wind Farm PPP Project", EIB presentation, 2011. http://www.gtai.de/GTAI/.../EU/20111124-eu-seminar-adam-bruun.pdf

Clean energy and the World Trade Organisation

Clean energy infrastructure, here as in the rest of the *Policy Guidelines*, is understood as the construction of "hard infrastructure" – that is, renewable energy generation plants and more efficient transmission systems. By contrast, the manufacture of renewable energy equipment, which can entail many more trade-related concerns (including over local content requirements, for example), is not the focus. In the former case, one of the main concerns is that national treatment is respected.

6.7 How actively is the government engaging in international discussions and negotiations around trade and clean energy technologies?

145. The Doha Round of multilateral trade negotiations calls for "the reduction or, as appropriate, elimination of tariff and non-tariff barriers to environmental goods and services" (EGS). What constitutes an environmental good has not been defined, however. Meanwhile, the negotiations have become deadlocked over the modalities for pursuing trade liberalisation (Cosbey et al., 2010). However, there has been progress at the regional level. In September 2012, for example, leaders from Asia-Pacific Economic Co-ordination (APEC) economies resolved to reduce by the end of 2015 their applied tariff rates on 54 listed environmental goods to 5% or less. They vowed also to eliminate non-tariff barriers which distort trade in environmental goods and services, including in clean energy (Wilke, 2011).

146. At present there are still many grey areas in WTO rules relating to government support for investments in clean energy infrastructure. Combined with the discriminatory measures applied by both OECD and non-OECD countries, this has led to an increasing number of disputes being referred to the

WTO (see Box 6.2).[46] Such disputes not only increase policy risk, but also make it difficult to build on the benefits that trade can provide in achieving a speedy deployment of renewable energy.[47] While the outcome of some of the disputes relating to government support for clean energy was still uncertain at the time of writing, it is clear that support policies which can be subjected to WTO arbitration are unlikely to constitute a reliable policy signal for investors. To reduce trade policy uncertainty, governments should ensure that their policies are predictable and compatible with WTO rules. They should also follow actively the outcomes of the current trade disputes, as these are likely to establish jurisprudence regarding the WTO compatibility of clean energy support mechanisms.

Box 6.2. Examples of trade disputes over clean energy brought to the WTO

Trade tensions around the support policies to clean energy are re-emerging on the international scene. Below are some examples of the current disputes which have gone to the WTO for arbitration. Alongside these, both the EU and the United States have sought unilateral trade remedies to alleged dumping and subsidisation by foreign suppliers. An EC procedure was for example started in June 2008 on the initiative of the European Biodiesel Board, resulting in the imposition (under Commission Regulation in 2009) of a provisional anti-dumping duty on imports of biodiesel originating in the USA. Such duties levied by the EC have gone unchallenged to date.

US-China: As a result of growing tensions over allegations of dumping of solar panels by China, the US Department of Commerce (DoC) decided on 26 March 2012 to apply countervailing (CV) duties on imports of solar panels produced in China of between 2.9% and 4.73%. On 6 June 2012 the DoC also decided to impose CV duties on wind-turbine towers imported from China . On 25 May 2012, China requested consultations with the United States concerning the imposition of these countervailing duties. China challenges various aspects of certain identified countervailing duty investigations, including their opening, conduct and the preliminary and final determinations that led to the imposition of the CV duties. China also challenges the “rebuttable presumption” allegedly established and applied by the US Department of Commerce that majority government ownership is sufficient to treat an enterprise as a “public body”. As of 31 August 2012, the WTO’s Dispute Settlement Body (DSB) had not yet established a panel.

The Japan-Ontario and EU-Ontario disputes: in 2009, the Canadian Province of Ontario established a feed-in-tariff system that required that 50-60% of the project costs (goods, or labour, or both) originate in the Province. In 2010, Japan filed a complaint at the WTO on the grounds that Ontario’s policies were inconsistent with Canada’s obligations under the General Agreement on Tariffs and Trade (GATT) and the Agreement on Trade-Related Investment Measures (TRIMS). A year later, the EU lodged a complaint on similar grounds (ICTSD, 2012). In January 2012, the DSB established a panel to review the dispute. Australia, China, India, Japan, Saudi Arabia, Chinese Taipei and the United States reserved their third party rights. Subsequently, Brazil, El Salvador, Korea, Mexico, Norway and Turkey reserved their third-party rights. The panel report was issued in December 2012, and the Appellate Body report in May 2013. The latest report upheld complaints from the EU and Japan, deeming Ontario’s feed-in-tariff incompatible with WTO rules.

Argentina-EU: On 20 August 2012, Argentina filed a complaint at the WTO against the European Union over Spanish rules that Argentina argues discriminate against its exports of biodiesel. While the establishment of a panel to rule on this case was deferred in December 2012, another WTO complaint was filed by Argentina in May 2013, this time against measures that promote the use of energy from renewable sources and various support schemes for the biodiesel sector.

Sources: WTO. DISPUTE SETTLEMENT: DISPUTE DS437, available at: www.wto.org/english/tratop_e/dispu_e/cases_e/ds437_e.htm; WTO. DISPUTE SETTLEMENT: DISPUTE DS426, available at: www.wto.org/english/tratop_e/dispu_e/cases_e/ds426_e.htm; WTO DISPUTE SETTLEMENT: DISPUTE DS459, available at www.wto.org/english/tratop_e/dispu_e/cases_e/ds459_e.htm; European Bio-fuels Technology Platform (2009). Bio-fuels Policy and Legislation. Available at: www.biofuelstp.eu/legislation.html; (US Department of Commerce, 2012a); US Department of Commerce, 2012b

46 For example, the EU and Japan have issued a complaint under WTO regarding Ontario’s FIT policy; ICTSD, 2012.

47 Adding to this complexity is the political dimension of the Doha Round, where progress on environmental goods and services will be contingent on progress on agriculture.

BIBLIOGRAPHY

Araujo, S. (2011), *Has deregulation increased investment in infrastructure*? Firm-level evidence from OECD countries. *OECD Economics department working papers* (892).

Bahar, H., J. Egeland and R. Steenblik (2013) "Domestic incentive measures with possible trade implications", *OECD Trade and Environment Working Papers*, No. 2013/01, OECD Publishing, Paris.

Blyth, W. and M. Savage (2011), Financing Energy Efficiency: A Strategy for Reducing Lending Risk. *Chatham House. Energy, Environment and Resource Governance Programme Paper*.

Blyth, W. and Oxford Energy Associates (2010), The economics of transition in the power sector. *IEA Information Paper*, IEA/OECD, Paris.

BNEF (2012), *Q1 2012 Clean Energy Policy and Market Briefing*. Bloomberg New Energy Finance (BNEF).

Cardenas-Rodriguez M., I. Haščič and N. Johnstone (2013 forthcoming), "Inducing Private Finance for Renewable Energy Projects: Evidence from Micro-data", OECD, Paris.

C2ES (2012), *Market-based climate mitigation policies in emerging economies*, Center for Climate and Energy Solutions.

Chatterton, R. (2012), *Emissions trading in China – known unknowns.* Bloomberg New Energy Finance (BNEF), Carbon Market - Global Research notes. Bloomberg.

Ciardullo, J. (2012, March 14th), *Recent Developments in IP Law: What Every Green Tech Company Should Know*. Retrieved March 20th, 2012, from Columbia Center for Climate Change Law: http://blogs.law.columbia.edu/climatechange/2012/03/14/recent-developments-in-ip-law-what-every-green-tech-company-should-know/

Copenhagen Economics (2009), *Are IPR a barrier to technology transfer of climate change technology.* Copenhagen economics A/S and the IPR company IPS.

Corfee-Morlot, J, V. Marchal, C. Kauffmann, C. Kennedy, F. Stewart, C. Kaminker and G. Ang (2012), "Toward a Green Investment Policy Framework: The Case of Low-Carbon, Climate-Resilient Infrastructure", *Environment Directorate Working Papers*, No. 48, OECD Publishing, Paris.

Congressional Research Service; Peter Saundry, Editor. (January 2010, updated May 2012), *Overview of Greenhouse Gas Control Policies in Various Countries*. In Encyclopedia of Earth, Cutler J. Cleveland (Environmental Information Coalition, National Council for Science and the Environment, Washington, D.C.)

Della Croce, R., C. Kaminker and F. Stewart (2011), The Role of Pension Funds in Financing Green Growth Initiatives. *OECD Working Papers on Finance, Insurance and Private Pensions*. OECD.

Dahou, K., I. Haibado and M. Pfister (2009), Deepening Africa Financial Markets for growth and investment. *Ministerial and Expert Meeting of the NEPAD-OECD Africa Investment Initiative*.

EBRD (2011), *Renewable energy and energy efficiency: policy and regulation.*

EEW&NRDC (2012), *Laying the Foundation for a Bright Future. Assessing Progress Under Phase 1 of India's National Solar Mission.* Council on Energy, Environment and Water Natural Resources Defense Council .

ELIG (2012, March 27), *Turkey: Turkish Competition Authority Published A Competition Report On Eleven Sectors / Industries In Turkey*. Retrieved from Mondaq: www.mondaq.com/x/170430/Antitrust+Competition/Turkish+Competition+Authority+Published+A+Competition+Report+On+Eleven+Sectors+Industries+In+Turkey

ESMAP (2009), *The Impact of the Global Financial Crisis on Investments in the Electric Power Sector The Experience of India, Pakistan, and Bangladesh.* The World Bank, Energy Sector Management Assistance Program, World Bank.

Fischer C. and L. Preonas (2010), *Combining Policies for Renewable Energy: Is the Whole Less than the Sum of Its Parts*, Discussion Paper, Resources For the Future, Washington DC.

FORES (2012), China's Carbon Emission Trading: An Overview of Current Development. www.sei-international.org/mediamanager/documents/Publications/china-cluster/SEI-FORES-2012-China-Carbon-Emissions.pdf

Foster, V., & C. Briceño-Garmendia (2010), *Africa's Infrastructure: A time for Transformation.* The International Bank for Reconstruction and Development / The World Bank. World Bank.

Goldie-Scot, L. (2011), "South Africa decides to give wind and PV a tender embrace", *Clean Energy Research Note*, Bloomberg New Energy Finance (BNEF).

GTDT (2012), *Getting the deal through: Electricity Regulation 2012.*

Hamilton, K. (2010), *Scaling up Renewable Energy in Developing Countries: finance and investment perspectives.* Chatham House, Energy, Environment & Resource Governance Programme.

Haščič, I., J. Silva and N. Johnstone (2012), "Climate Mitigation and Adaptation in Africa: Evidence from Patent Data", *OECD Environment Working Papers* No. 50, OECD Publishing, Paris.

Haščič, I., N. Johnstone, F. Watson and C. Kaminker (2010), "Climate Policy and Technological Innovation and Transfer: an overview of trends and recent empirical results", *OECD Environment Working Papers* No. 30, OECD Publishing, Paris.

IEA, OPEC, OECD, World Bank (2011), *Joint report by IEA, OPEC, OECD and World Bank on fossil fuel and other energy subsidies: An update of the G20 Pittsburgh and Toronto Commitments.* IEA, OPEC, OECD, World Bank.

IEA/IRENA (2011), *Renewable Energy Policies and Measures Database*. Retrieved 2012, from www.iea.org/textbase/pm/?mode=re

IEA (2012), *Energy Technology Perspectives 2012*, IEA/OECD Publishing, Paris.

IEA (2011a), *Deploying Renewables: Best and Future Policy Practice*, IEA/OECD publishing, Paris.

IEA (2011b), *Harnessing variable renewables. A guide to the balancing challenge*, IEA/OECD publishing, Paris.

IEA (2011c), *Non-OECD Energy Balances*, IEA/OECD Publishing, Paris.

IEA (2011d), *World Energy Outlook 2011*. IEA/OECD Publishing, Paris.

IFC (2010), *Investing Across Borders*, International Finance Corporation (IFC), World Bank Group, Washington, DC.

Irving, J. and A. Manroth (2009), "Local sources of financing for Infrastructure in Africa. A cross-country Analysis". *Policy Research Working Paper*, the World Bank, Africa Region (4878).

Kalamova, M., C. Kaminker and N. Johnstone (2011), "Sources of finance, investment policies and plant entry in the renewable energy sector", *OECD Environmental Papers* No. 37, OECD Publishing, Paris.

Kaminker, C. and F. Stewart (2012), "The role of institutional investors in financing clean energy", *OECD Working Papers on Finance, Insurance and Private Pensions*, No. 23, OECD Publishing, Paris.

Kauffmann, C., C. Tébar Less and D. Teichmann (2012), "Corporate greenhouse gas emission reporting: A stocktaking of government schemes", *OECD Working Papers on international investment* (2012).

Louw, A. (2012), "Vital statistics of development bank funding for broad clean energy", *Clean Energy Research Note*, Bloomberg New Energy Finance (BNEF).

Lovei, L. (2000), "The single-buyer model. A dangerous path toward competitive electricity markets", *Public Policy for the private sector*, Private Sector and Infrastructure Network, World Bank, Washington, DC.

Madrigal, M. and S. Stoft (2011), "Transmission expansion for renewable energy scale-up emerging lessons and recommendations", *Energy and Mining Sector Board Discussion Paper*, World Bank Group, Washington, DC.

McKinsey Global Institute (2011), "Mapping Global Capital Markets. 2011", http://www.mckinsey.com/insights/global_capital_markets/mapping_global_capital_markets_2011

Muller, S., A. Marmion and M. Beerepoot (2011), "Renewable Energy: Markets and Prospects by Region", *IEA Information Paper*, OECD/IEA, Paris.

Niez, A. (2010), *Comparative studies in rural electrification policies in emerging economies*, IEA/OECD Publishing, Paris.

OECD (2013 forthcoming), *OECD Green Cities Case Study of Stockholm, Sweden*, OECD Green Growth Studies, OECD Publishing, Paris.

OECD (2013a), "Achieving a Level Playing Field for International Investment in Green Energy: A Scoping Paper", draft scoping paper, submitted to the Advisory Group on Investment and Development at its meeting on 19 March 2013, OECD, Paris.

OECD (2013b), *Inventory of Estimated Budgetary Support and Tax Expenditures for Fossil Fuels 2013,* OECD Publishing, Paris.

OECD (2012a), *Competitive Neutrality: Managing a level playing field between public and private businesses*, OECD Publishing, Paris.

OECD (2012b), *Environmental Outlook to 2050*, OECD Publishing, Paris.

OECD (2012c), *Recommendation of the Council on Fighting Bid Rigging in Public Procurement*, OECD Recommendations and Best Practices, OECD Publishing, Paris.

OECD (2012d), *Renewable Energy and Rural Development: Interim Report*, OECD Publishing, Paris.

OECD (2012e), *Territorial Review of the Chicago Tri-State Metro-Region*, OECD Publishing, Paris.

OECD (2012f), *Invention and Transfer of Environmental Technologies*, OECD, OECD Studies on Environmental Innovation, OECD Publishing, Paris.

OECD (2012g) *Energy and Climate Policy: Bending the Technological Trajectory*, OECD Studies on Environmental Innovation, OECD Publishing, Paris.

OECD (2012h), OECD FDI Regulatory Restrictiveness Index database, OECD.

OECD (2011), *National Urban Policy Review of Poland*, OECD Publishing, Paris.

OECD (2011a), *OECD Green Growth Studies: Energy*, OECD Publishing, Paris.

OECD (2011b), *Report on Experiences with Structural Separation*, OECD Competition Committee, OECD Publishing, Paris.

OECD (2011c), *Pension Funds Investment in Infrastructure: A Survey*, OECD Publishing, Paris.

OECD (2010), *Cities and Climate Change.* OECD Publishing, Paris.

OECD (2010, updated May 2011), *Electricity: Renewables and Smart Grids*, OECD Policy Roundtables, OECD Competition Committee, OECD Publishing, Paris.

OECD (2009a), *The Economics of Climate Change mitigation*, OECD Publishing, Paris.

OECD (2009), *Private Sector Participation in Water Infrastructure: OECD Checklist for Public Action*, OECD Publishing, Paris.

OECD (2006), *Policy Framework for Investment*, OECD Publishing, Paris.

Pearson, N.O. (2012), *Indian Banks Exposure to Coal Limits Lending to Solar, SBI Says*, Retrieved May 25, 2012, from Bloomberg.com: www.bloomberg.com/news/print/2012-04-26/indian-banks-exposure-to-coal-limits-lending-to-solar-sbi-says.html.

Prag, A. and G. Briner (2012), “Crossing the threshold: Ambitious Baselines for the UNFCCC new market-based mechanisms”, *OECD/IEA Information Paper*, OECD/IEA Publishing, Paris, http://oecd.org/environment/cc/50315387.pdf.

Prag, A., G. Briner and C. Hood (2012), “Making markets: Design and governance of carbon market mechanisms”, *OECD/IEA Information Paper*, OECD/IEA Publishing, Paris, http://oecd.org/env/cc/(2012)4%20-%20Market%20Mechanisms_AE%20(2).pdf.

Remme, U., N. Trudeau, D. Graczykand P. Taylor (2011), *Technology Development Prospects for the Indian Power Sector*, IEA/OECD, Paris.

REN21 (2012), *Renewable Energy 2012: Global Status Report*, REN21, Paris.

REN21 (2011), *Renewables 2011: Global Status Report*, REN21, Paris.

SEDA (2012), *Frequently Asked Questions on Feed-in Tariff (FiT)*. Retrieved July 2, 2012, from www.seda.gov.my: Sustainable Energy Development Authority Malaysia.

Standard and Poor’s (2012), “Standard and Poor’s Credit Rating for each country as of June 2012, http://chartsbin.com/view/1177.

Stern, N., S. Peters, V. Bakhshi, A. Bowen, C. Cameron, S. Catovsky, D. Crane, S. Cruickshank, S. Dietz, N. Edmonson, S.-L. Garbett, L. Hamid, G. Hoffman, D. Ingram, B. Jones, N. Patmore, H. Radcliffe, R. Sathiyarajah, M. Stock, C. Taylor, T. Vernon, H. Wanjie, and D. Zenghelis (2006), *Stern Review: The Economics of Climate Change*, HM Treasury, London.

UNDP(2013), *Derisking Renewable Energy Investment. A Framework to Support Policymakers in Selecting Public Instruments to Promote Renewable Energy Investment in Developing Countries*, UNDP, New York

UNEP (2009), *Energy Efficiency and the finance sector. A survey on lending practices and policy issues*, UNEP Financial Initiative.

UNEP, EPO, ICTSD (2010), *Patents and Clean Energy: Bridging the gap between evidence and policy*, UNEP, EPO, ICTSD.

UNEPFI (2012), *Global Trends in Renewable Energy Investment*, United Nations Environment Programme (UNEP).

Varadarajan, U., D. Nelson, B. Pierpont and M. Hervé-Mignucci (2011), *The impacts of policy on the financing of renewable projects: a case study analysis*, Climate Policy Initiative (CPI).

UNFCCC (2012), *Benefits of the Clean Development Mechanism 2012*, United Nations Framework Convention on Climate Change (UNFCCC).

Walsh, J., C. Park and J. Yu (2011), *Financing Infrastructure in India: Macroeconomic Lessons and Emerging Market Case Studies*, International Monetary Fund (IMF), Washington, DC.

WEF (2011a), *Financing Green Growth in a Resource-constrained World: Partnerships for Triggering Private Finance at Scale*, World Economic Forum (WEF).

World Bank (2012a), *Doing Business in a more Transparent World*, World Bank.

World Bank (2012b), *Global Development Finance. External Debt of Developing Countries*, World Bank.

World Bank (2012c), *Partnership for Market Readiness (PMR)*, www.thepmr.org/, accessed 18 March 2013.

ANNEXES

Annex 1: The Policy Framework for Investment

147. The Policy Framework for Investment (PFI) is the most multilaterally backed investment instrument. It has been developed by a task force comprising 30 OECD member countries and 30 non-members. It covers 10 policy areas and addresses some 82 questions to governments to help them design and implement policy reform to create a truly attractive, robust and competitive environment for domestic and foreign investment. The PFI is neither prescriptive nor binding. It emphasises the fundamental principles of rule of law, transparency and non-discrimination but leaves for the country concerned the choice of policies, based on its economic circumstances and institutional capabilities. One size does not fit all.

Table A.1 The policy areas of the Policy Framework for Investment (PFI)

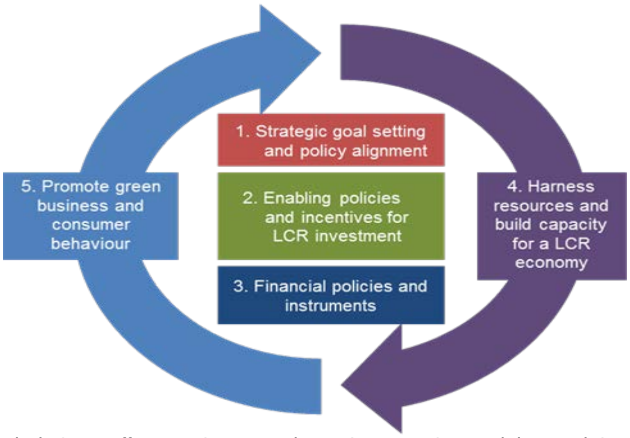
1. Investment policy	*The quality of investment policies directly influences the decisions of all investors, be they small or large, domestic or foreign. Transparency, property protection and non-discrimination are investment policy principles that underpin efforts to create a sound investment environment for all.*
2. Investment promotion and facilitation	*Investment promotion and facilitation measures, including incentives, can be effective instruments to attract investment provided they aim to correct for market failures and are developed in a way that can leverage the strong points of a country's investment environment.*
3. Trade policy	*Policies relating to trade in goods and services can support more and better quality investment by expanding opportunities to reap scale economies and by facilitating integration into global supply chains, boosting productivity and rates of return on investment.*
4. Competition policy	*Competition policy favours innovation and contributes to conditions conducive to new investment. Sound competition policy also helps to transmit the wider benefits of investment to society.*
5. Tax policy	*To fulfil their functions, all governments require taxation revenue. However, the level of the tax burden and the design of tax policy, including how it is administered, directly influence business costs and returns on investment. Sound tax policy enables governments to achieve public policy objectives while also supporting a favourable investment environment.*
6. Corporate governance	*The degree to which corporations observe basic principles of sound corporate governance is a determinant of investment decisions, influencing the confidence of investors, the cost of capital, the overall functioning of financial markets and ultimately the development of more sustainable sources of financing.*
7. Policies for promoting responsible business conduct	*Public policies promoting recognised concepts and principles for responsible business conduct, such as those recommended in the OECD Guidelines for Multinational Enterprises, help attract investments that contribute to sustainable development. Such policies include: providing an enabling environment which clearly defines respective roles of government and business; promoting dialogue on norms for business conduct; supporting private initiatives for responsible business conduct; and participating in international co-operation in support of responsible business conduct.*
8. Human resource development	*Human resource development is a prerequisite needed to identify and to seize investment opportunities, yet many countries under-invest in human resource development. Policies that develop and maintain a skilled, adaptable and healthy population, and ensure the full and productive deployment of human resources, help create a favourable investment environment.*
9. Infrastructure & financial sector development	*Sound infrastructure development policies address bottlenecks, which increase the cost of doing business and hamper private investment. Effective financial sector policies ensure scarce resources are channelled to the most promising projects.*
10. Public governance	*Regulatory quality and public sector integrity are two dimensions of public governance that critically matter for the confidence and decisions of all investors and for reaping the development benefits of investment. While there is no single model for good public governance, there are commonly accepted standards of public governance to assist governments in assuming their roles effectively.*

Source: Adapted from OECD (2006), *Policy Framework for Investment,* OECD Publishing, Paris.

Annex 2: The Green Investment Policy Framework

148. In the report "Towards a Green Investment Policy Framework: The Case of Low-Carbon, Climate-Resilient Infrastructure", the OECD has developed elements of good practices towards a domestic "Green Investment Policy Framework" to advise governments on how to create and improve domestic enabling conditions to shift and scale-up private investment in green infrastructure, to finance a transition to a low-carbon, climate-resilient economy and greener growth (Corfee-Morlot *et al.*, 2012). In most countries to date, environmental, land use and investment policies have functioned quite separately and sometimes worked against each other. This can undermine or slow investment in green infrastructure and development. Such a framework can guide domestic reforms to steer use of limited public funds while also enabling private investment to support a transition to green growth across relevant sectors and regions.

Figure A.2 Towards a Green Investment Policy Framework



Source: Corfee-Morlot, J, V. Marchal, C. Kauffmann, C. Kennedy, F. Stewart, C. Kaminker and G. Ang (2012), "Toward a Green Investment Policy Framework: The Case of Low-Carbon, Climate-Resilient Infrastructure", *Environment Directorate Working Papers*, No. 48, OECD Publishing, Paris.

The proposed policy framework is composed of five key elements (see Figure A.2), including:

1. **Goal setting and aligning policies across and within levels of government**. This includes clear, long-term vision and targets for infrastructure and climate change; policy alignment and multilevel governance, including stakeholder engagement;
2. **Establishing and reforming market policies to strengthen incentives and conditions for green investment**. This includes: sound investment policies to create open and competitive markets and to support investment principles such as non-discrimination and investor protection; investment promotion and facilitation through market-based and regulatory policies to put a price on carbon, remove harmful subsidies and correct market failures;
3. **Strengthening financial policies,** regulations, tools and instruments. It includes financial market policies to strengthen domestic financial markets and facilitate access to finance through innovative financial mechanisms. It also accounts for transitional investment promotion and facilitation measures such as policy incentives for investments (feed-in tariffs);
4. **Harnessing resources and building capacity**. This includes: R&D for green technology; skills development and institutional capacity building to support green innovation; investment promotion and facilitation measures such as licensing of renewable energy project projects and policy monitoring and enforcement; and climate risk and vulnerability assessment
5. **Promoting green business and consumer behaviour**. This includes information policies; corporate reporting and consumer awareness programmes; and public outreach.