ASSESSING THE INVESTMENT CLIMATE FOR CLIMATE INVESTMENTS

A Comparative Clean Energy Framework for South Asia in a Global Context

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PREFACE

One of the strong messages that came out of the recent UNFCCC Climate Change Conference of Parties in Durban (COP 17) was that the private sector has to play an important role if we are to globally move towards a low carbon, climate resilient – or 'climate compatible' – future. However, private investment will only flow at the scale and pace necessary if it is supported by clear, credible, and long-term policy frameworks that shift the risk-reward balance in favor of less carbon-intensive investment.

The private sector also needs information on where to invest in clean energy in emerging markets, and it needs policy support to lower investment risk. Barriers to low carbon investments often include unclear and inconsistent energy policies, monopoly structures for existing producers, stronger incentives for conventional energy than clean energy, and a domestic financial sector not experienced in new technologies.

With the long-term goal of promoting and accelerating the implementation of climate mitigation technologies, this study aims to facilitate the development of a policy framework for promoting sustainable investment climates for climate-friendly investments in South Asia and elsewhere. A key aspect of the study is also a pilot initiative for the construction of Climate Investment Readiness Index (CIRI) for several countries. CIRI is a tool to systematically and objectively evaluate the enabling environment for supporting private sector investment in climate mitigation or low carbon technologies.

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ABBREVIATIONS

AEDB	Alternative Energy Development Board (Pakistan)
BEE	Bureau of Energy Efficiency (India)
BPDB	Bangladesh Power Development Board
BLY	Bachat Lamp Yojana (India)
CCGT	Combined Cycle Gas Turbine
CDM	Clean Development Mechanism
CEB	Ceylon Electricity Board
CFL	Compact Fluorescent Light
CIRI	Climate Investment Readiness Index
CLASP	Collaborative Labelling and Appliance Standards Program
CO_2	Carbon Dioxide
CPWD	Central Public Works Department (India)
CSP	Concentrated Solar Thermal Power
CUF	Capacity Utilization Factor
DB	Doing Business
DFCC	Development Finance Corporation of Ceylon
DISCOMS	Distribution Companies (India)

DNES	Department of Non-conventional Energy Sources (India)
EAA	Energy Administration Authority (Pakistan)
EC	European Commission
ECA	Energy Conservation Act (India)
ECBC	Energy Conservation Building Code (India)
EE	Energy Efficiency
EIA	Environmental Impact Assessment
ELIB	Efficient Lighting Initiative of Bangladesh
ENERCON	National Energy Conservation Centre (Pakistan)
EPC	Engineering, Procurement and Construction
ESC/Escert	Energy Savings Certificate
ESHA	European Small Hydropower Association
ESMAP	Energy Sector Management Assistance Programme
EU	European Union
FiT	Feed-in Tariff
GHG	Greenhouse Gases
GRIHA	Green Rating for Integrated Habitat Assessment
HVDC	High Voltage Direct Current
IAB	Investing Across Borders
ICA	Investment Climate Assessment (World Bank)
IDCOL	Infrastructure Development Company Limited (Bangladesh)
IEA	International Energy Agency
IFC	International Finance Corporation
IPP	Independent Power Producer
IREDA	Indian Renewable Energy Development Agency
IRR	Internal Rate of Return
JNNSM	Jawaharlal Nehru National Solar Mission (India)
LECO	Lanka Electric Company (Sri Lanka)
LEDs	Light Emitting Diodes
MENA	Middle East and North Africa
MEPS	Minimum Energy Performance Standard
MNRE	Ministry of New and Renewable Energy (India)

MoP	Ministry of Power (India)
NAMA	Nationally Appropriate Mitigation Action
NAPCC	National Action Plan on Climate Change (India)
NEA	OECD Nuclear Energy Agency
NEPRA	National Electric Power Regulatory Authority (Pakistan)
O&M	Operation and Maintenance
OECD	Organisation for Economic Co-operation and Development
PAT	Perform, Achieve and Trade
PPA	Power Purchase Agreement
PSPS	Private Sector Perception Surveys
PUCSL	Public Utilities Commission of Sri Lanka
PV	Photo Voltaic
PwC	Pricewaterhouse Coopers
RE	Renewable Energy
REB	Rural Electrification Board (Bangladesh)
REC	Renewable Energy Certificate
RERED	Renewable Energy for Rural Economic Development (Sri Lanka)
RET	Renewable Energy Technology
ROI	Return on Investment
RPO	Renewable Purchase Obligation
RPS	Renewable Portfolio Standards
SAR	South Asia Region
SDA	State Designated Agencies (India) for implementation of energy conservation measures.
SEDA	Sustainable Energy Development Agency (Bangladesh)
SLSEA	Sri Lanka Sustainable Energy Authority
SPV	Solar Photovoltaic
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
VAT	Value-added Tax
WAPDA	Water and Power Development Authority (Pakistan)
WS	Weighted Score

EXECUTIVE SUMMARY

Mitigating climate change while addressing development needs will involve a massive scale-up of investments in Renewable Energy (RE) and Energy Efficiency (EE). Most of these climate investments will come from the private sector, which will be the main driver of low-carbon growth in both developing and developed countries—provided that countries have the right investment climate for climate investment.

The enabling environment for climate investment in each country depends on a variety of factors. These include macroeconomic determinants such as a functioning bureaucracy and banking system; as well as a narrower set of policy determinants such as renewable energy targets, mandatory standards, preferential power tariffs, waiver of import duties, and other fiscal incentives. While the exact mix of policies, regulations and incentives will depend on country-specific circumstances, the fact that they exist sends the right signal to climate investors, by providing them with legal certainty and lowering their costs and risks. Policies, Regulations and Incentives also help to level the playing field for climate investors in the face of market realities that tend to favor the continued use of carbon-intense energy sources, such as support for fossil fuels and the high costs of renewable energy technologies.

Purpose of the Study

This study aims to support the Bank's long-term goal of accelerating the adoption of clean energy technologies, by facilitating the development of a policy framework for promoting climate-friendly investment in South Asia. Its specific objectives are to:

- Systematically and objectively evaluate and compare the enabling environments for private sector investment in clean energy technologies.

- Construct a Climate Investment Readiness Index (CIRI) for South Asian countries, which will form the basis for CIRIs for other countries and regions. The CIRI will capture the multitude of incentives and barriers—technical, financial, market, regulatory—to clean energy investment, with the aim of facilitating comparisons of the readiness of different countries to support such investment. The CIRI will provide greater sectoral/industry details than that provided by the current investment climate assessments.

Approach

The study outlines some of the main findings from a regulatory survey of South Asian countries—India, Pakistan, Bangladesh, Nepal, Sri Lanka and the Maldives—and assigns scores for the presence of important enabling policies, regulations, incentives and institutions, thereby providing a snapshot of how each country fares in terms of the preconditions necessary for attracting climate-friendly investments. The study also compares the CIRI scores of those countries with the scores of other developing and developed countries, to assess how each region fares relative to other countries.

Key Findings

Renewable energy and energy-efficiency frameworks in South Asia are relatively new, and are expected to evolve and develop further. The impact of these frameworks on clean energy investment has been mixed. India shows a greater degree of sophistication as compared to its neighbors; and India's 2003 Electricity Act can be strongly correlated with specific increases in private sector investment inflows. In other countries, the policies, regulations and incentives as well as institutional capacities are at early stages of development.

There are also differences in the nature of specific policies, regulations and incentives, which reflect the technical and economic needs, realities and priorities of each country. In the predominantly rural countries of Nepal and Bangladesh, the lack of grid connectivity has prompted investors to focus on off-grid renewables rather than grid-connected preferential tariffs or an electricity grid code. In India, the size and diversity of the population provides opportunities to develop different renewable energy sources, while smaller countries may need to emphasize sources that are more easily tapped, such as small hydro (Nepal) or solar photo voltaic (PV) (Maldives). Pakistan, which is burdened with political and security-related issues, attempts to attract investors by making the power purchaser (i.e., the utility) rather than the investor cover risks of resource variability, such as lower-than-benchmark mean wind speeds (for onshore wind) or water flows (for small hydro).

Sub-federal policies, regulations and incentives are an important consideration for investors in India as electricity is subject to both central and state legislation. While India's federal system creates a complexity of laws and policies that can be confusing to investors, it also provides for regulatory autonomy for different states, which can then compete to attract investors by improving their policy, regulatory and incentive frameworks.

The private sector consultations revealed the need for effective implementation or enforcement of policies, regulations and incentives. In addition to various country-specific issues and challenges, described in detail in the study, the private consultations revealed a broad range of critical factors that are important to all energy investors. These can be categorized under the "10 Cs" of doing climate business: (i) *Clarity and Coherence* in

policies/laws on clean energy; (ii) *Consistency* in terms of policy implementation across sectors and regions within a country; (iii) *Commitment and Credibility* of policies and on the part of governments; (iv) *Clearances* that are speedy, especially with regard to environment and land acquisition; (v) *Capacity* of agencies to ensure compliance with targets, laws and policies; (vi) *Compliance* of utilities and other entities with specific RE policies and other contractual arrangements, such as Power Purchase Agreements (PPAs); (vii) *Coordination* across the multitude of agencies involved in the clean energy sector (regulatory, implementing, distribution, etc.), to ensure that clean energy policies are implemented consistently and efficiently; (viii) *Collateral* to ensure easy financing options and mechanisms for renewable energy projects; (ix) *Connectivity*, including access to grids and transparent rules, procedures and standards for grid connectivity; and (x) *Cartography*, or accurate mapping of renewable energy resources and potential sites.

On the CIRI, India, as expected, scores high for the presence of critical cross-cutting and sector-specific policies, regulations and incentives. Only in wind-specific policies, regulations and incentives does Pakistan score (at 6 out of 6) above India (at 5 out of 6) due to the additional presence of income tax holidays. India is the only country that has deployed tradeable instruments to enable entities to fulfill their obligation to purchase renewable energy. Pakistan scores higher than Sri Lanka for the presence of policies, regulations and incentives in all sectors. In solar PV, on a scale of 10, the scores for India, Pakistan and Sri Lanka are 9.5, 7 and 5, respectively. For onshore wind, they are 8.5, 8 and 7; for small hydro, they are 8.5, 7 and 5.5; and for biomass, they are 8.5, 6 and 5.5. As noted in the report, a higher CIRI score based on the presence of policies, regulations and incentives does not necessarily mean that a country is attracting higher levels of investment, or even that it offers a better climate for renewable energy investors. A high CIRI score merely indicates that a country has put in place more policies, regulations and incentives to attract investors. Whether these policies, regulations and incentives actually contribute to creating a more attractive investment climate depends on a number of factors, including effective implementation of policies, regulations and incentives.

Globally, India's high scores for solar PV and onshore wind compare favorably with those of China (8.5 for solar PV and 9 for onshore wind). Pakistan is not far behind. European countries such as Germany and Spain, which are traditionally dominant in wind power and solar PV, score lower in both these sectors (Germany scores 6.5 for both solar PV and wind while Spain scores 7.5 for both sectors) than countries such as the Philippines (10 for both solar PV and onshore wind) and even India. One obvious reason is that countries that are not well-endowed in renewable energy resources, do not have an attractive market, or are early entrants, may thus need to offer more incentives to make it worthwhile for the private sector to establish a presence. As the market develops and costs of RE deployment come down, countries can then make do with fewer incentives. Once again, this highlights the fact that countries with lower sector-specific CIRI scores may either fall into the category of more mature markets (as in the case of Europe), which may need to rely on fewer incentives to attract wind investments, or else that of immature or very early-stage markets. Rapidly growing and emerging countries generally reflect higher sector-specific CIRI scores. A higher score can also reflect recognition of the potential of renewables by proactive policy makers and their desire to attract investment as quickly as possible.

India scores high with regard to the presence of policies, regulations and incentives for both small hydro and biomass (8.5 for both), whereas the lower scores of Pakistan (7 for small hydro and 6 for biomass) and particularly Sri Lanka (5.5 for both) are similar to those of a number of Latin American and many Asian countries (consolidated scores ranging

from 4 to 6.5 in these sectors). Japan, surprisingly, has scores similar to those of Sri Lanka in many RE sectors (ranging from 5.5 in small hydro, onshore wind and biomass to 6.5 for solar PV). Once again this reflects the fact that the Japanese market may not require the presence of certain types of incentives (perhaps owing to higher prevailing electricity prices). Reliance on cheaper alternative forms of energy (such as oil and gas in Russia) and nuclear (Japan) may also have a role in explaining its CIRI scores which are lower than many Asian and Latin American countries, despite a higher level of wealth.

CIRI scores for energy efficiency reveal that, within the South Asian region, India is well ahead in terms of relevant policies, regulations and incentives as well as institutional structures. As EE initiatives get underway in the other South Asian countries and more mandatory standards are introduced, the climate for diffusion of energy-efficient appliances will certainly improve. Still, India—due to the sheer size of its market, coupled with economic growth and imperatives for energy conservation, energy security and Greenhouse Gas (GHG) reductions—is likely to maintain its profile as the most attractive market for energy-efficient products in South Asia. Pakistan and Sri Lanka obtain much lower scores, at 3.5 and 8, respectively. These are absolute scores and not a 10 point scale as is used for RE CIRI scores.

CIRI scores for EE broadly appear to have a positive correlation with levels of development. This is indicated by high scores received by countries such as Japan and Australia, as well as emerging countries such as Brazil and Mexico in Latin America. China, however, scores very high, reflecting the realization among its policy-makers of the need to save energy, given the higher energy intensity of its economy and increasing reliance on fossil fuel imports. India, however, does not fare as well, despite its high CIRI scores. While India has put in place a sound regulatory framework and sophisticated measures (such as tradeable EE certificates), it scores much lower than China, Thailand and the Philippines in Asia and Brazil and Mexico in Latin America. Its situation is comparable to that of Indonesia in Asia and Argentina in Latin America, and it performs better than Egypt, South Africa, Peru and even Malaysia. The main reason for India's lower score is the comparatively low number of lighting and electrical appliances covered by mandatory labeling schemes or Minimum Energy Performance Standards (MEPS). In the case of Pakistan and Sri Lanka, a near absence of mandatory minimum energy performance standards, coupled with missing critical energy efficiency framework indicators such as energy-efficiency targets and a lack of energy-efficient green building codes, explain their very low scores.

CIRI scores based on the presence or absence of policies, regulations and incentives, however, do not reveal the full picture as far as investment climate attractiveness is concerned. CIRI scores do not, for instance, convey the attractiveness of the power purchase tariff or its stability (i.e., how long the preferential tariff will be available), although both are important variables in determining private sector investments in renewable energy. Many countries in the developing world, including those in South Asia, have only recently started introducing policies, regulations and incentives, so it may take a while before the degree of stability can be properly ascertained. Private sector perceptions regarding the attractiveness of a particular policy, regulatory and incentive environment can only be gauged through further interactions with the private sector, including through systematic surveys.

Going forward, there is a need to develop a deeper CIRI to meaningfully capture the attractiveness of a particular policy, regulatory and incentive climate, including effective implementation and enforcement. The CIRI consolidated scores only benchmark the

readiness and attractiveness of the regulatory environment for investments in renewable energy and diffusion of energy-efficient products. In order to obtain a more meaningful measure of country attractiveness, it may be necessary to further deepen the CIRI and construct new indices based on private sector perceptions of the attractiveness of the various policies, regulations and incentives, and the effectiveness of implementation. Subsequently, a deeper CIRI may be used to rank how countries fare in creating a sound investment climate for doing climate business. Building on interaction and synergies with existing World Bank Group initiatives such as Doing Business (DB) and Investing Across Borders (IAB), as well as external initiatives such as Ernst and Young's RE Attractiveness Indices, the process of deepening the CIRI will be taken up in the next phase. IADB/Bloomberg's Climate Scope, the recent American Council for an Energy-Efficient Economy (ACEE) report ranking countries on energy efficiency and the World Energy Council (WEC) energy policy index

The real effectiveness and value of CIRI lies in its contributions to:

i. *Transparency,* by providing readily accessible factual information on renewable energy and energy efficiency laws and regulations and the state of their implementation.

ii. *Identification of weak spots* in a country's investment climate for climate investment, by clearly identifying areas of policy implementation where a country needs to improve.

iii. *Reform* of investment climates, spurred by an index-based benchmarking.

iv. *Better evaluation and understanding* by governments as well as donor agencies regarding which clean energy and energy efficiency promotion policies may or may not work in different country contexts.

v. *Better targeting of external assistance,* based on the identification of key investment-related barriers to RE and EE. This could also potentially help influence the nature and direction of assistance channeled under the auspices of the United Nations Framework Convention on Climate Change (UNFCCC) through the Green Climate Fund and Technology Mechanism.

vi. *An independent means of verifying* Nationally Appropriate Mitigation Actions (NAMA) of countries related to clean energy and energy efficiency.

Over a period of time, it may be possible to draw a correlation between individual and a collective group of CIRIs—their evolution and implementation and the flows of private sector investments into the renewable energy and energy efficiency sectors in a country. The lessons from such an exercise may indeed prove invaluable. The CIRI could also eventually be developed into a living, internet-based interactive tool and dashboard that can provide investors, policymakers and donors with a reliable measure of the friendliness of a country's investment climates for climate investments and how it is developing.


1 CONTEXT AND OBJECTIVES

Context

Climate risk management is fundamental for preserving and enhancing development progress in many developing countries. Successful mitigation efforts by the global community will reduce the burden of adaptation. At the same time, adaptation to aggravating climate risks, and low-carbon growth options, are often directly linked to national development priorities such as Energy Efficiency (EE), Renewable Energy (RE), sustainable livelihoods, and environmental protection; as well as to business opportunities such as strengthening the resilience of infrastructure to climate variability.

The South Asia Region (SAR) is highly vulnerable to climate change, due in large part to the highest absolute number of people at risk and the highest incidence of poverty in the world. Climate threats are made all the more severe by a degrading resource base (e.g., damaged and depleted aquifers, degrading forests and soils). While vulnerability to climate change is high, the region has also recently emerged as a contributor to greenhouse gas emissions. Increased energy consumption, fueled by a relatively high economic growth, has been accompanied by rising Greenhouse Gas (GHG) emissions. On average, emissions have risen at about 3.3 percent annually in the region since 1990—more rapidly than in any other region except the Middle East.

With economic growth a priority in all SAR countries, climate action can result in multiple commercial, developmental, and environmental benefits. Lessons from the Clean Energy Investment Framework and many longstanding World Bank and International Finance Corporation (IFC) engagements show that the best entry points for client dialogue and program development on climate change arise from the synergies between development progress and opportunities to invest in EE, renewable energy, and

other low-carbon projects. The scope for cost-effective, pro-development investments in EE and, increasingly, RE—especially against the background of impending energy crisis—is particularly broad.[1] The Government of India, for example, is beginning to shift its economic growth strategy to include technology and management options that will reduce GHG generation while maintaining social and economic development objectives.

Technology transfer has been identified as one of the key pillars of the Bank's Climate Change Strategy. The pillar emphasizes promotion of research and the wider adoption of clean technologies. The strategy also suggests that development, deployment, and diffusion of new technologies are critical to enabling developing countries to meet the challenges of climate change. The Bank can play a supportive and catalytic role in this process.

The magnitude of the resources needed to finance access to and implementation of environmentally sound technologies and processes, is such that the bulk must be provided through private sources, with donors and the public sector serving in a catalytic and/or facilitating role. The success of these efforts is highly dependent on countries establishing an enabling environment for private sector investment in climate-friendly technologies and services, and on the development of endogenous capacities to adopt, operate, and maintain these technologies. The private sector will be a key driver of the transition to climate-friendly technologies; and both foreign and domestic investors will base their decisions on their assessment of how risky or difficult it will be to make an investment in a given country using a given technology, and how these risks or difficulties will add to their costs.

Challenges

Generic Investment Barriers

One overarching challenge to attracting private investment in clean technologies is a strong and believable government commitment to changing the trajectory of carbon emissions. Investors also look for political and macroeconomic stability, an educated workforce, adequate infrastructure (transportation, communications, energy), a functioning bureaucracy, rule of law, and a strong financial sector. Investors also need ready markets for their products and services. If a country restricts foreign investment in its power sector, this will likely affect investments in renewable power generation as well.

General economic and trade openness is also important to clean technology investors, who may depend, like investors in many other sectors, on supply chains for goods and services that are globally dispersed. Enabling power producers to access goods and services rapidly, at world market prices, will have an impact on the costs of investment and ultimately on energy costs. Trade facilitation measures that help speed up the movement of goods at customs will also favorably impact the clean energy sectors. The presence of sound policies and institutions to promote competition and curb anti-competitive practices, while beneficial to private investment in general, particularly benefit renewable energy investors, as access to networks and the degree of buying power exercised by utilities are important for grid-connected power.

1. In 2007, only 20 percent of the overall investments in renewables were in developing countries {Bloomberg New Energy Finance and UNEP 2008}.

Clean Energy-specific Investment Barriers

There are also a number of barriers specific to clean energy investment. These may include market conditions such as prices for electricity and fossil fuels, or the presence of carbon and energy-related taxes. Countries with binding GHG emissions targets and norms may provide a more favorable and predictable investment environment for RE and EE, as both will be required to meet emissions-related targets, particularly in rapidly growing economies.

Other barriers can include a lack of clear guidance on future energy policy (lack of signals); monopoly structures for existing producers, with a lack of purchase agreements or Feed-in Tariffs (FiT) for independent producers; lack of fiscal incentives for clean energy production; weak environmental regulation and enforcement; subsidies for conventional energy sources; and a domestic financial sector that has little experience with new technologies.[2] The state and quality of grid-related infrastructure, as well as ease of access to the grid, are also critical for renewable energy generation, particularly because of its intermittent nature in many cases. A market with a grid that is ill-equipped to absorb the renewable energy generated, or to cope with fluctuations in generation, may discourage investment even if other factors are favorable. Investment in grid capacity must therefore precede or at least go hand-in-hand with the scale-up of renewable energy investments.

All of these conditions and barriers have a greater impact on renewable energy investments than on other types of private sector investments. What makes the renewable energy sector distinctive? The sector is highly capital intensive, with high levels of up-front equipment-related costs and long payback periods—as long as 10 years in some cases. While fuel costs (except in the case of biomass) are not an issue, renewable energy in most cases has to compete with much lower generation costs enjoyed by fossil fuels. It also involves a greater degree of technological uncertainty and dependence on the availability of variable resources that cannot be controlled such as sunshine and wind. For example, capital costs for wind power plants can be more than five times those for plants fired by natural gas (conventional combined cycle). The total costs of renewable energy plants are thus more than 50 percent higher.[3]

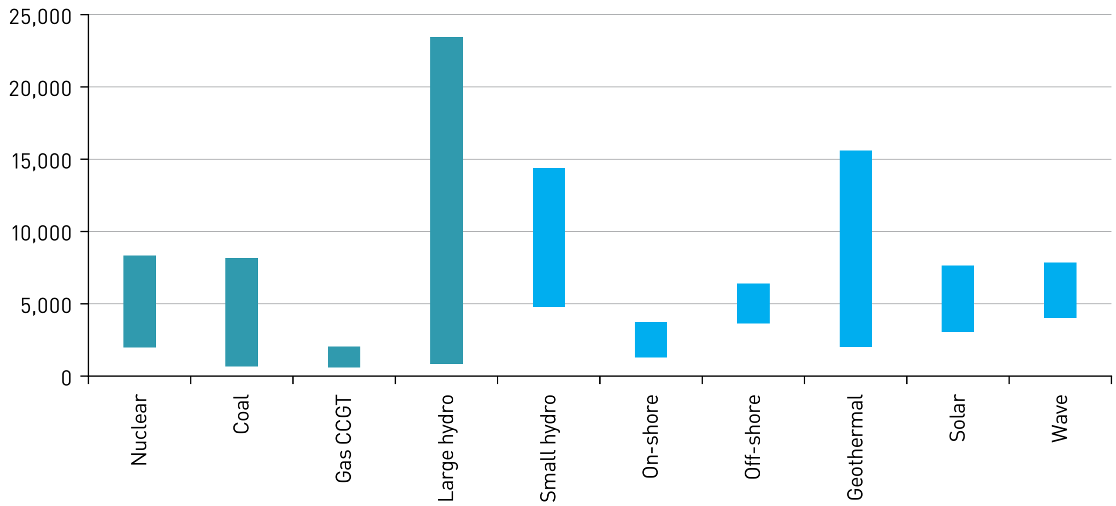
Market and technological realities, as well as subsidies provided by governments to fossil fuels, already tilt the playing field against renewables. In addition the environmental and health-related harm from fossil fuel use—and conversely, the benefits arising from renewable energy use—are not reflected in energy-pricing decisions. These attributes are in the nature of public goods that may not be priced by market forces. Renewable energy requires strong policy, financial, and regulatory intervention and support in order to become established and enjoy market viability within a certain period of time. This holds even truer in a developing country context, where millions of people do not have energy access. Even those who do have access may be unable to pay the higher prices that renewable energy generation entails, if government support is absent. Similarly, when energy and electricity prices are low or subsidized, the incentives to adopt energy-saving measures and invest in energy-efficient appliances may be less. Many EE investments are also characterized by higher up-front costs. Despite long-term gains through energy savings, such costs may also dissuade energy consumers from investing in EE measures or purchasing

2. Coseby 2008. Clean Energy Investment, IISD.

3. The World Bank, 2011, *Improving the Investment Climate for RE: A Guide for Practitioners of Investment Climate Reform*.

energy-efficient appliances. Governments then need to introduce regulations and mandates such as standards and labeling requirements, and may choose to mandate the purchase of energy-efficient equipment in certain cases. They may also need to provide subsidies or grants for the purchase of energy-efficient appliances. A survey of literature from the Bank Group as well as other institutions clearly underscores the fact that policy regime is the major determinant of renewable energy investments worldwide. The absence of conducive policies and regulations therefore create unique barriers for clean energy investors.

Figure 1.1 Ranges of investment costs for renewable energy technologies and fossil fuels (USD/kWe)

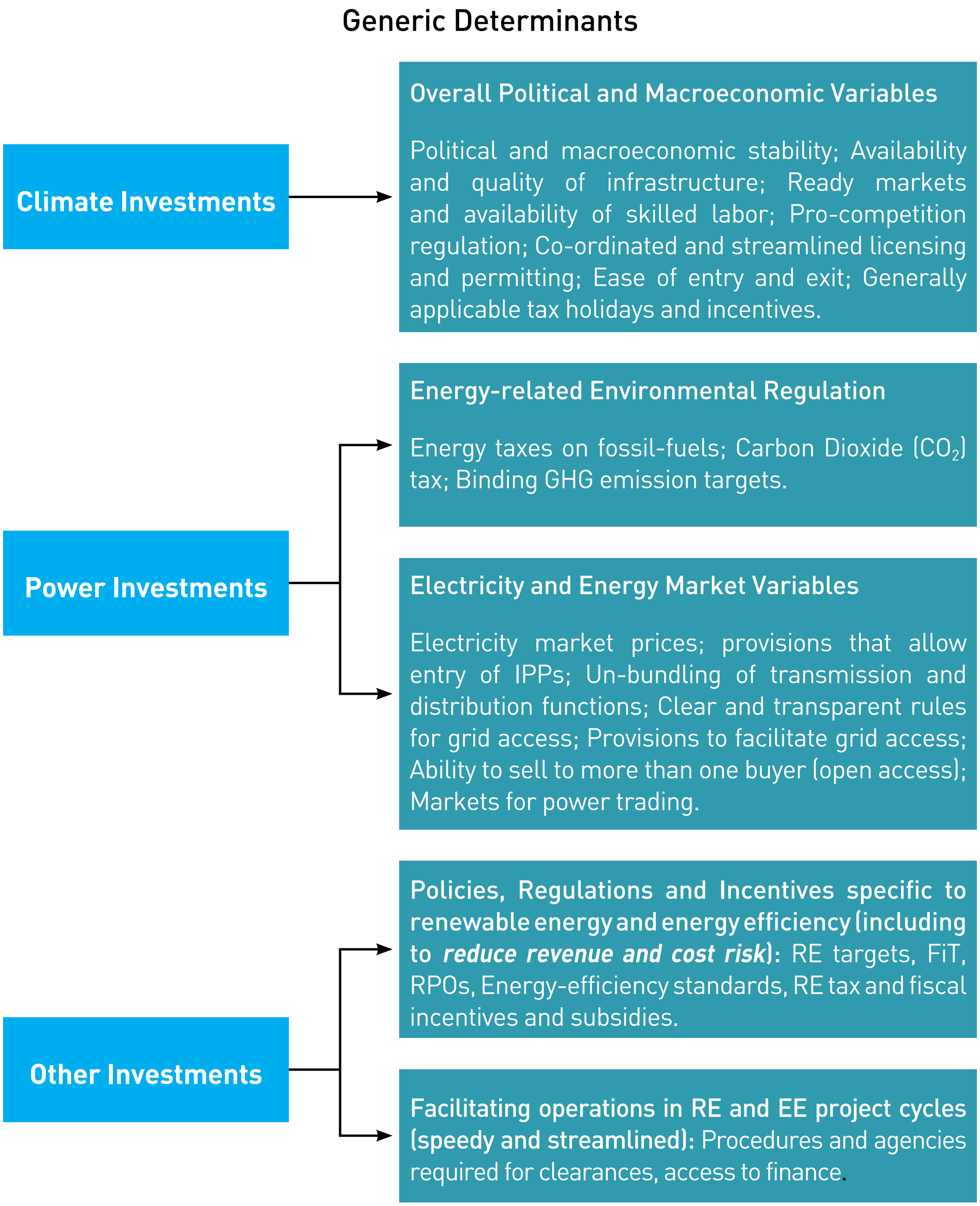


Sources: World Bank, 2011, Improving the Investment Climate for Renewable Energy: A Guide for Practitioners of Investment Climate Reform; and IEA & NEA, 2010, Projected Costs of Generating Electricity.

Note: Combined Cycle Gas Turbine (CCGT) stands for combined cycle gas turbine. Small hydro is a hydroelectric with capacity of less than 10 megawatts. Values are based on costs in 2009 for 190 projects in 21 countries to be commissioned in the next five years. Values are indicative because data are limited for some technologies.

The types of policy barriers will differ from country to country, a function of the many factors that shape national energy policies, including history, politics, and geography. The opportunities and obstacles will also vary significantly from country to country, and diagnostic studies could help to identify the full range of potential actions that are needed to help make clean energy investment more attractive to both domestic and foreign investors (Figure 1.2 provides an illustration of differences between generic investments barriers and those that are more specific to climate investments).

Figure 1.2 Determinants of climate investments (renewable power and energy efficiency) vs. other investments



Objectives and Expected Outcomes

With the long-term goal of promoting and accelerating the implementation of climate mitigation technologies, this study aims to facilitate the development of a policy framework for promoting sustainable investment climates for climate-friendly investments in South Asia. The objective is twofold:

- Systematic evaluation and comparison of the enabling environments in SAR countries for supporting private sector investment in climate mitigation technologies.

- Creation of a **(CIRI)** for South Asian countries and comparison with other countries globally. CIRI is an attempt objectively compare countries and markets in terms of their preparedness and maturity to move into the arena of climate-friendly investments. The CIRI goes beyond the more country-focused investment climate assessments and is the first such initiative that covers both renewable energy as well as energy efficiency.[4]

While the opportunities and obstacles will vary significantly from country to country, the new policy framework and CIRI will help country-level policymakers to identify the full range of actions needed to make clean energy investment more attractive to both domestic and foreign investors.

The index will also help these policymakers understand the institutional, regulatory, and legislative systems that need strengthening; how deficiencies in these systems may impede the flow of private investment in climate-friendly technologies; and the potential impact of various actions. The index will also aid countries in assessing their progress toward a low-energy/carbon growth path, and inform assistance and cooperative efforts.

Further, the quantitative data and benchmarking provided by the index could help to stimulate policy debate, by exposing potential challenges and identifying where policymakers might look for lessons and good practices. These data also could provide a basis for analyzing how different policy approaches and reforms could contribute to broader desired outcomes in addition to climate mitigation, such as competitiveness, growth, and greater employment and incomes.

The framework for promoting climate investment will:

1. Provide valuable information to help guide and target private sector investment in clean energy and energy efficiency in developing countries.
2. Help developing country policy-makers to better understand the key elements of their enabling environments, as well as the barriers to investment that need to be addressed.

After outlining its research methodology, the study lays out the findings for SAR—India, Pakistan, Sri Lanka, Bangladesh, Nepal, and Maldives—including findings on some of the key technical and economic drivers of private investment in renewable energy projects, and on the role of policy and regulation. This is followed by a review of the policy landscape (policies, regulations, and incentives) for renewable energy and energy efficiency in the countries. CIRI index scores for select South Asian countries, based on the presence or absence of these policies, regulations and incentives are then compared with index scores for a mix of countries in Asia, Africa and Latin America. The comparison includes both high GHG-emitting countries and those that have proactively introduced policies, regulations and incentives for renewable energy and energy efficiency. The study then presents an assessment of the realities on the ground as perceived by private investors, as well as key issues and challenges highlighted during the consultations with private sector actors in the region. The study concludes by laying out the next steps required to create a better understanding of factors that create a sound investment climate for renewable energy and energy efficiency.

4. Annex D compares CIRI with other similar indices.

APPROACH AND METHODOLOGY

The study framework rests on the following key methodological pillars:

i. Evaluation of the technical and economic drivers of private sector investment in renewable energy.

ii. Country-specific reviews of the regulatory frameworks for renewable energy and EE.

iii. Consultations with the private sector to identify the main barriers and challenges related to clean energy investment.

iv. Assignment of CIRI scores to countries based on the existence of policies, regulations, and incentives for renewable energy and EE.

These pillars are described in more detail after the following section. A fifth pillar, aimed at deepening the CIRI based on private sector perception surveys, will be taken up subsequently.

Definitional Scope and Parameters for the Study

Renewable Power Generation, Not Renewable Power Equipment Manufacturing

The study seeks to build comparable country-specific indices to compare investment climates for renewable energy investments. The definition of renewable energy investments is confined to investments in renewable power generation, and does not include manufacturing of renewable energy equipment. This is because a number of investment determinants may be similar for renewable power generation investments, as well as for *diffusion* of renewable energy equipment (as distinct from manufacturing), in all countries. By contrast, manufacturing usually requires a particular combination

of factors which may not be possible or desirable to replicate in every country. The focus on clean electricity generation will enable the parameters of research and consultations to be clearly defined, and will ensure that as far as attracting technology manufacturing is concerned (as opposed to technology flows), the study remains country neutral.

Diffusion of Energy-efficient Products, Not Manufacturing

Similarly, the study seeks to build indices to compare investment climates for the diffusion or sales of energy-efficient equipment—as distinct from investment climates for manufacturing various energy-efficient appliances. Implicit in this approach is a recognition that while the diffusion of energy-efficient appliances is a worthwhile objective for all countries from a climate-change mitigation perspective, not every country may have the capacity to undertake the manufacture of these products.

Emphasis on Grid-connected Power

For purposes of the study, renewable energy is defined as grid-connected renewable power generation, except in cases where the descriptive sections of country regulatory frameworks also include regulations and incentives for off-grid power generation. The focus on grid-connected power generation provides an easier basis for comparing policies, regulations and incentives and their effectiveness in both developed countries (where most populations are connected to the grid, and expansion of renewable power is fed into the grid) and developing countries (where most electric supply expansion, particularly for urban centers, is also slated to be grid-driven).[5] Further, the extension of the electricity distribution grid is often the cheapest way to reach new consumers and increase access rates. By contrast, off-grid technology options—mini-grids or individual systems—are often more appropriate to supply populations living in areas far from an existing grid, or where demand is too low to justify the fixed cost of extending the grid. Further, according to a recent World Bank study,[6] while a purely economic assessment of grid extension or an off-grid solution in a specific case could easily be carried out, a government's decision to expand electrification is based on many country-specific political, social, and economic factors, including equitable regional development. In most countries, between 80 to 95 percent of underserved communities are targeted to receive electricity supply through grid extension.

In addition, grid-access related indicators that are an important determinant of investments in grid-connected renewable energy systems do not play a role in determining off-grid investments; rather, the difficulty or non-viability of grid extensions may encourage off-grid investors. Further, typically off-grid solutions are often government or NGO-driven and supported by government or donor funding aimed at ensuring electricity supply to rural and economically backward areas. In many if not most cases, they do not typically attract private sector investment flows, which is the focus of this report. However this focus on grid-connected power does not in any way imply non-recognition of the importance of renewable off-grid solutions wherever this is required and makes economic sense.

5. The exceptions are Sub-Saharan Africa and large parts of South Asia.

6. World Bank, Addressing the Electricity Access Gap, Background Paper for the World Bank Group Energy Sector Strategy, June 2010.

Overall Investment Determinants vs. Determinants Specific to Investments in Renewable Energy and Energy Efficiency

As highlighted above, both foreign and domestic investors will consider a number of aspects of the investment climate when making decisions to invest in clean energy and energy efficiency. Investors look for such things as political and macroeconomic stability, an educated workforce, adequate infrastructure (transportation, communications, and reliable energy supply), a functioning bureaucracy, rule of law, a strong finance sector, and ready markets for their products and services. These variables are already captured for comparative purposes by tools such as the World Bank's DB and Investing IAB initiatives.[7]

For the purposes of the study, only those variables more specific and pertinent to investments in RE and EE are considered. These are variables related to policies, regulations and incentives that (i) reduce both up-front and operational costs for private sector players through various tax incentives, loans and subsidies; (ii) create assured demand to a certain extent through measures such as Renewable Purchase Obligations (RPOs); and (iii) provide an attractive revenue stream through preferential tariffs, including FiT. A package of such measures can contribute to generating an attractive Internal Rate of Return (IRR) for clean energy investors. Other measures, such as subsidies for the purchase of energy-efficient appliances and equipment, and the presence of mandatory or voluntary EE standards, can also contribute to creating an attractive environment for EE investments and the general acceptance of energy-efficient appliances. Obtaining a comprehensive and accurate picture of a country's investment climate for RE and EE will require consideration of these broader macroeconomic determinants together with the sector-specific ones. It will also entail an assessment of how effectively the applicable policies are implemented.

Sectoral Scope

Specific **renewable power sectors** that are the primary focus of the study include solar photovoltaic, onshore wind, small hydro and biomass. The decision to exclude Concentrated Solar thermal Power (CSP) as well as offshore wind was based on the fact that both sectors are still confined only to a handful of countries. CSP projects, for instance, have largely been confined to Spain and the United States, and only recently are projects being launched or planned in other countries such as Australia, China, India, and others located primarily in the Middle East and North Africa (MENA) region. CSP works best in specific geographical locations with high insolation, while solar PV can be deployed in a wider range of climatic zones. Investments in CSP projects may also depend much more than solar PV on factors such as easy availability of land and access to water. Thus, to facilitate easy comparability of investment climates across a larger group of countries, it was decided to focus only on grid-connected solar PV-based power generation. The study, however, recognizes that CSP will play an important role in renewable energy investment profiles in a number of countries in the future.

Similarly, in the hydro sector, the study considers only investments in small hydro, because the issues raised by large hydro are more complex and quite different to those raised by small hydro and other newer renewable energy technologies. Small hydro is

7. See more on the World Bank's DB project at http://www.doingbusiness.org/ and IAB project at http://iab.worldbank.org/

defined differently in various countries, with upper limits ranging from 5 MW to 50 MW. Accordingly, when reviewing regulatory frameworks as well as assigning scores based on policies, regulations and incentives, the study uses the country-based definitions.[8]

For **energy efficiency,** the study focuses on three key sectors—lighting, appliances, and building codes–which are the main focus of EE policies and regulations worldwide. Within lighting and appliances, the focus is not on particular technologies, but on assessing the existence of policies, regulations and incentives more broadly, as well as the *number of appliances* in each country covered by mandatory standards. For voluntary standards, countries receive a nominal CIRI score of one, and the score is not affected by the number of appliances that could potentially be covered. In the case of building codes, rather than trying to select certain types of codes, the scoring is based on whether the codes are *mandatory* or have *mandatory elements.*

Why Not Other Sectors?

A number of other sectors such as transportation, agriculture, and forestry are also crucial from the perspective of attracting climate-friendly investments. The study focuses on the RE and EE sectors, however, because these are the sectors where private sector investment activity is particularly strong. Further investments in these sectors could also improve the investment climate for, e.g., clean transportation technologies such as electric vehicles. Electricity is an input for almost every sector of economic activity, and access to electricity is also one of the most daunting development challenges.[9] A switch to more renewable energy sources would also reduce the carbon footprint of end-use sectors as well. In addition EE investments are widely known as the area that offers the greatest short-term gains in terms of GHG mitigation at the lowest possible cost. Due to its positive externalities—economy-wide as well as from a climate change mitigation perspective—in addition to attracting a high degree of private sector activity worldwide, these two sectors were considered prime-candidates for assessing investment climate readiness. However, the findings from the study and application of indexing tools to renewable power and EE will also help develop similar tools that could benchmark the readiness of other sectors such as agriculture and forestry (that would clearly have an impact on GHG emissions, but where private investment flows may be more difficult to attract) based on appropriate indicators.

Geographical Focus

The geographical focus of this first climate investment study is the South Asia region. However, for the purposes of comparing regulatory aspects of the enabling environment for climate investments in South Asia with other parts of the world, the study also looks at the presence of policies, regulations and incentives in other developing countries.

In terms of study outputs, a distinction has been made with regard to the countries selected. The country-specific regulatory reviews on RE and EE include India, Pakistan, Sri Lanka, Nepal, Bangladesh, and the Maldives. However, with regard to scoring policies, regulations and incentives for the construction of indices, only India, Pakistan, and Sri Lanka are taken

8. There is no internationally accepted definition of small hydro. Various countries set different upper limits, with a maximum of 50 MW. The European Small Hydropower Association (ESHA) and the European Commission (EC) support a definition with an upper limit of 10 MW.

9. Citations for World Bank and IFC assessments.

into account, because these countries have regulatory frameworks for grid-connected RE, and because investments on the ground, particularly in India, are relatively much more advanced. In Nepal, Bangladesh, and the Maldives, by contrast, most renewable energy development activities have been off-grid and reliant on government-led initiatives or external development assistance.

Countries outside SAR were selected as comparators for India, Pakistan, and Sri Lanka based on a combination of their higher absolute GHG emissions as compared to other countries in their regions, and their proactive introduction of policies to promote RE and EE.

In India with both federal and state-level policies, regulations and incentives for RE and EE, this diversity has been captured in the country-specific reviews. However, it has been considered as a single unit for the purposes of scoring the presence or absence of policies, regulations and incentives. At the same time, the presence of a policy environment even at the state or sub-federal level in India is taken as the presence of a policy, regulatory and incentive for the country as a whole, for the purpose of scoring. This is because investors are presumed to review relevant state-specific policies, regulations and incentives before making a decision to invest in India. Another reason for not considering state-specific policies, regulations and incentives separately is because certain trade-related indicators, such as customs duty concessions, can be compared only at the country level. Further, many states in India have similar policies, regulations and incentives for RE generation, at least on paper. However, an assessment of policies, regulations and incentives alone may not reveal much about the investment climate friendliness of different states, so it is desirable to compare state-level performance in terms of the actual speed and effectiveness of policies, regulations and incentives implementation. This will be done during the next phase of the study.

Explanation of the Methodological Pillars

Evaluation of the Technical and Economic Drivers of Private Investment in Renewable Energy

This pillar aims at understanding the key technical and economic drivers of and constraints to private sector investment in solar, wind, biomass, and small hydro, based on worldwide private sector experience. A paper was commissioned to study drivers and constraints that (i) have a critical influence on the IRR of an RE power producer; and (ii) may not directly influence the IRR but are nevertheless important. The paper also examined both generic and sector-specific factors that affect investors' costs and revenues.

In addition, interactive consultations were held with various private sector companies to reflect the diversity of experiences of companies in the sector—global presence, big vs. small, domestic vs. foreign, focused only on RE generation or also active in non-RE related sectors, horizontal and vertically integrated companies vs. purely independent power producers.

Country-Specific Reviews of Regulatory Frameworks for Renewable Energy and Energy Efficiency

A review of regulatory frameworks for clean energy and energy efficiency is important because policies, regulations and incentives that that exist on paper provide the initial signals to private investors about the country's investment climate. The presence of a sound institutional and regulatory framework is a basic pre-requisite for countries wishing to

attract investment in RE. The lack of a level competitive playing field for private investment in sustainable energy typically implies that governments will need to intervene by means of sustainable energy policies, including financial incentives. Policies that help lower the cost for RE (including the cost of grid-related equipment and associated technologies) will increase the possibilities for scaling up deployment of sustainable energy. Similarly regulations, standards, and incentives that promote greater diffusion of energy-efficient products and construction practices in buildings will encourage greater deployment of energy-efficient products.

The study reviewed existing policies, laws, regulatory and institutional frameworks for RE and EE in the six target countries. The review covered laws and regulations affecting both grid-connected and off-grid energy; no RE or EE sector was excluded as long as a country had relevant policies or laws affecting that sector.

Consultations with the Private Sector to Identify the Main Barriers and Challenges to Investment

The existence of well-developed policies and regulatory frameworks, however, may not suffice to attract private investment in RE and EE, particularly where there is no implementing legislation. In some cases, the private sector may perceive that implementation and enforcement are weak, or that a country lacks supportive policies to ensure the transparency and predictability of regulatory frameworks. Another weakness could be the lack of access to supporting infrastructure such as electricity grids or motorable roads. To better understand the various factors governing private sector decision-making, consultations with key firms involved in renewable power generation and renewable equipment manufacture/deployment was conducted for India, Pakistan, Sri Lanka, Nepal, and Bangladesh. These consultations provided a cross-section of views on what the private sector perceived as important investment conditions on the ground, and highlighted the need for effective enforcement or implementation of existing policies, regulations and incentives.

Following an initial brainstorming consultation with experts and representatives from the World Bank, private sector actors, and research institutions in Washington DC, a series of one-off consultations were held in South Asia to get a sense of what the private sector viewed as the key opportunities and constraints arising from the prevalent RE investment climate in specific countries. Consultations consisted of (i) informal group meetings and discussions organized at the World Bank office in New Delhi and in Chennai, and Colombo; (ii) bilateral meetings with firm representatives; and (iii) participation in external conferences in New Delhi and Mumbai[10] where RE firms presented their views and opinions. Where face-to-face meetings or consultations were not logistically possible, as for Pakistan, Nepal, and Bangladesh, discussions took place by telephone. The companies asked not to have consultation results attributed by name.

Assigning CIRI Scores Based on Country Policies, Regulations and Incentives

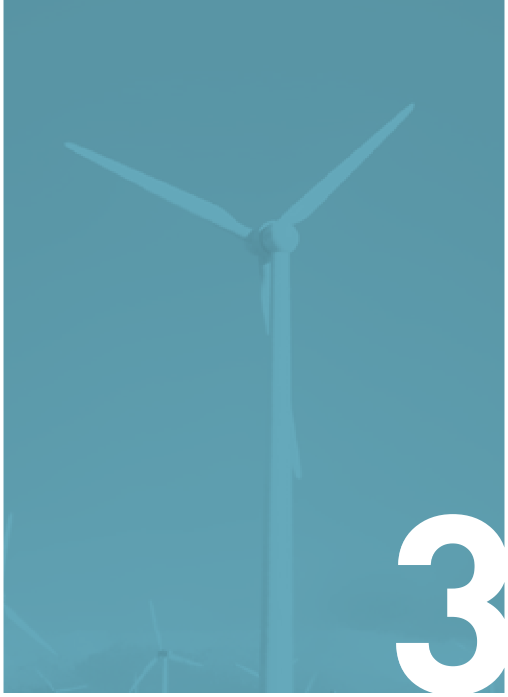
The study also included an exercise to score a select group of SAR (India, Pakistan, and Sri Lanka) and comparator countries based on the presence or absence of key variables related to policies, regulations, and incentives for RE and EE. Indicators were selected

10. External conferences include *RenewCon 2010*, Mumbai, 26-27 August 2010, *Delhi International RE Conference* 2010 (DIREC2010) 27-29 October, Greater Noida, India and *Rajasthan: A Solar Component Manufacturing Hub*, organized by the IFC, Hotel Taj Mahal, New Delhi.

based on an extensive survey of literature on some of the main policies, regulations and incentives that countries have introduced to attract investment in these sectors, as well as in consultation with the private sector. The total score value for each country obtained by addition of the scores has been taken as the consolidated country-specific CIRI score. For both RE and EE, two types of indicators were selected. The first comprised **cross-cutting policies, regulations and incentives** that would broadly affect the investment climate in renewables or EE. The second category included policies, regulations and incentives specific to a sector, such as solar PV or small hydro (for renewables) or lighting and appliances (for EE).

Deepening the Climate Investment Readiness Indices for RE and EE Based on Private Sector Perceptions

The CIRI consolidated score only benchmarks the readiness and attractiveness of the regulatory environment for RE and EE investments. In order to obtain a more meaningful measure of the investment climate for doing climate business, it may be necessary to deepen the CIRI or construct new indices based on private sector perceptions of a country's policies, regulations and incentives and the effectiveness of implementation.



3

TECHNICAL AND ECONOMIC DRIVERS FOR PRIVATE INVESTMENT IN RENEWABLE ENERGY

This section focuses on the key technical and economic drivers of and constraints to private sector investment in the solar, wind, biomass, and small hydro sectors, based on worldwide experience. The drivers and constraints are grouped in two categories: (i) those that have a critical influence on the producer's IRR; and (ii) others that are important but may not directly influence the IRR.

Critical Factors Affecting Revenues

Revenues from an RE power project are determined by two factors: (i) the number of units of electricity generated; and (ii) the price per unit. While the former is determined by factors such as technology and siting of the power project, the latter is determined mainly by regulatory support. A more in-depth analysis of these factors is provided below:

a. Regulatory support

Regulatory support makes RE competitive with conventional energy forms and ensures that the unit price brings adequate returns. The most commonly used support mechanisms are FiT and RPO. Some countries also use RPS.

- A feed-in-tariff, also known as a preferential tariff, is a policy instrument to promote RE. Under the FiT mechanism, the RE producer is guaranteed grid access and a preferential price per unit of electricity generated under a long-term Power PPA. Such tariffs are typically offered for a long period of time (20-25 years). From an investor's perspective, the guaranteed price and duration of support ensures a stable return over that period.

The FiT is usually determined in one of several ways.

- *Setting a preferential tariff that remains constant for a fixed number of years, usually without revision.* Such tariffs are based on various considerations such as capital cost and IRR. They are usually specific to different RE technologies such as solar PV, onshore wind, and biomass. Countries may also allow private developers to apply for a project-specific tariff on a case-to-case basis.

- *Keeping the IRR constant for investors while periodically reducing the tariffs.* This periodic reduction, also known as **digression**, is directly linked to the cost of operating the system for a period of time. For example, a project developer installs a solar PV system in 2010 and gets a FiT that yields an IRR of 16 percent. If the cost of operating the system falls by 10 percent in a year, the FiT will be reduced by a proportionate amount during that period so that the IRR does not change.

- *Reverse bidding* is an approach in which regulators come up with a reference FiT and ask qualified project developers to offer discounts to the reference tariff. Those offering the highest discounts (i.e., the lowest price per unit of electricity) get the projects. This is a very transparent way of allocating projects; however, aggressive reverse-bidding and undercutting can lead to non-viability of these projects. While it helps the regulator discover the lowest price, it minimizes the producer's profits.

The RPO/RPS and REC are other mechanisms to promote RE power projects. In case of an RPO, the regulatory agency requires the utility companies and other large buyers to purchase a certain percentage of their total electricity from RE sources. An RPS requires electric utilities and other retail electric providers to supply a specified minimum amount of customer load with electricity from eligible RE sources.[11] When these obligations are backed by strong enforcement mechanisms, including penalties in case of non-compliance, it ensures demand for RE and leads to better pricing for RE developers.

Since RE is a distributed source of energy, it is likely that generation happens far from the place of consumption. In such a scenario, the obligated entities might not be able to purchase RE power. To address this issue, some countries use a mechanism called a renewable energy certificate (REC), which allows an RE generator to split the electricity into two attributes—physical electricity and a green certificate. While the former can be sold to any customer at standard electricity prices, the latter can be sold in trading exchanges to get additional revenue. This ensures an attractive return to the RE generator.

b. Financial health of power purchasers (private utilities, government utilities, others)

An investor does not decide to invest in a particular project based only on a favorable regulatory environment. The financial health of the buyers is equally important. If a government or private utility signs a PPA with the RE generator but is unable to pay because

11. http://www.epa.gov/chp/state-policy/renewable_fs.html

of lack of funds, the viability of the RE generator—and the confidence of investors—is adversely affected. For example, the Government of Spain came up with an attractive FiT policy for solar systems in 2007 and signed PPAs with several developers. In 2008, the country's finances were badly affected by the global financial crisis, and Spain imposed retroactive cuts to the FiTs. This created huge losses for many investors and crippled investor confidence in the Spanish RE sector.

c. Site selection

Site selection also has a critical impact on RE production and revenues. Some of the relevant aspects of site selection are:

- irradiation levels/shading effects for solar.
- wind speed/topography for wind.
- the availability of biomass.
- terrain-head difference for small hydro.

In developed countries, adequate surveys, studies, and resource mapping have been done and reliable data is available for an investor to predict revenues fairly accurately. However, in many emerging economies and in most of the developing world, the data are not sufficient to confidently predict the power output for a particular location over a period of time. This makes the investment decision more difficult, since if the projections prove wrong, the returns will be badly affected. This also contributes to the reluctance of commercial banks to lend for project financing.

d. Technology

Selection of the appropriate technology will have a positive impact on the efficiency of output and the long-term performance of the system. Some important technology considerations have emerged from consultations with private operators and investment experts.[12]

- *Solar PV* – crystalline silicon output is higher for the same area as compared to thin film technology.
- *Wind turbines* – turbines with taller masts and larger diameters produce more output than smaller turbines.
- *Biomass* – gasification-based technology has scale constraints (up to only about 2 MW) whereas combustion-based technology has no such limits.
- *Small hydro* – while hydro turbines have existed for more than a century, a number of innovations have given them higher power output while requiring significantly less maintenance. While the newer turbines have a 10 to 15 percent higher capital cost, they could result in much higher project returns, given the long project lifetimes.

12. These considerations of course have been gathered from consultations with private-sector and investment experts and do not reflect the views of the Bank or possibly other private-sector stakeholders and manufacturers. It is also important to bear in mind that given the evolving nature of these technologies these considerations may also alter in future.

Other Factors Affecting Revenues

A number of other factors also affect revenues. These include:

e. Vendor and contractor selection

Selection of the right vendor, as well as the right Engineering, Procurement and Construction (EPC) contractors, to prepare the site and install the equipment, also impacts revenue. Selecting a vendor known for its quality products (e.g., Vestas for wind turbines, Q-Cells for PV modules) will reduce breakdowns and downtime, resulting in little variation between projected and actual revenues from generation. Selecting an EPC contractor with a credible record of project management will help ensure that the installation is completed and commissioned in a timely manner, thereby reducing the chance of delayed revenue realization and cost escalations.

f. System degradation

Another important factor that impacts revenues is the performance of the system over 20-25 years. If the system degrades more rapidly than expected, leading to progressively reduced power generation, profitability will be affected. For example, in case of solar PV, thin film PV modules have a faster degradation rate than the more robust crystalline silicon modules.

g. Transmission and distribution losses

These losses are usually caused by grid-inefficiencies (which can be exacerbated over longer transmission distances) as well as power theft. Certain technologies such as High-Voltage Direct Current (HVDC) cables can help significantly reduce transmission-related losses over longer distances but are usually more expensive.

h. Effective monitoring and control

Electricity generation from a remote RE farm, especially solar PV and wind, depends on both uncontrollable factors, such as wind speed or cloud cover; and controllable factors such as malfunctions of fuses or turbines. An effective monitoring system will enable the timely diagnosis of problems and help to minimize downtime.

i. Carbon trading

An additional revenue stream for the project developer is carbon trading under the UNFCCC's Clean Development Mechanism (CDM). Trading under current guidelines is valid until the end of 2012. With the recent agreement at COP 17 in Durban to extend the Kyoto Protocol beyond 2012, the CDM has received a new lease of life and will continue to be a source of additional revenues for RE projects.

j. Co-products and by products

Renewable power sources such as biomass enable a power producer to valorize not just power but also co-products such as charcoal or a digester effluent which serves as a soil nutrient. Waste heat can also be deployed for useful purposes, thus increasing the overall efficiency and profitability of the system.

Critical Factors Affecting Costs

All forms of renewables, except biomass, entail a huge up-front fixed capital cost but negligible Operation and Maintenance (O&M) costs. Further, RE projects are usually shielded against the risks of inflation and supply shortages that typically affect coal-based or oil-based power plants. Some of the major factors impacting costs are given below.

a. Capital costs

The most important cost driver is capital cost, consisting primarily of EPC, of which the largest component is equipment:

- *Engineering cost* refers to every aspect of system design—site surveys, soil testing, preparation of engineering drawings, validation of the plan by experts.
- *Equipment cost* constitutes the bulk of the project cost. Depending on the sector, purchases can include wind turbines, hydro turbines, PV modules and inverters, or biomass gasifiers. Some measures such as local content restrictions aimed at promoting indigenous equipment manufacturing can increase capital costs by reducing the competitiveness of less expensive imports thereby leading to escalation of input costs for the project.
- *Construction cost* includes the cost of civil construction, electrical construction, approvals and clearances, erection and commissioning.

b. Fiscal incentives

Fiscal incentives are designed to bring down the cost of expensive RE systems. They can take several forms:

- *Capital subsidies* reimburse the project developer for a certain percentage of the capital cost. For example, in India, off-grid solar PV projects of up to 100 kW are eligible for a capital subsidy of 30 percent. This improves the return on investment and can accelerate the adoption of RE.
- *Tax benefits* of various types. *Credits* for constructing RE systems are often used during times of recession to stimulate growth in the sector and increase employment. Credits can be either short or long term. *Accelerated depreciation* allows the project developer to show higher depreciation upfront, thereby improving the project IRR. Certain countries also provide *tax holidays* for a fixed period, typically about 10 years.
- *Duty concessions* are another way to incentivize investors. Many countries reduce or waive import duties on equipment required for an RE facility.

c. Replacement of parts

Over the lifetime of an RE project (20-25 years), important parts might need replacement. For example, inverters on solar PV systems, which contribute about 10 percent of total system cost, have to be replaced approximately after 10 years of operation.

d. Cost of raw materials

For biomass-based power generation, the availability of feedstock is an important factor impacting the profitability of the project. Since biomass is a commodity, raw material costs

can fluctuate, and it is important for the project developer to have a long-term strategy for procuring biomass at a relatively stable price and hedge against any huge inflation.

e. Financing cost

Financing cost, manifested mainly in the form of interest rates, impacts the equity IRR for a project. The financing cost is determined by many factors, including:

- *The project's debt/equity ratio* (i.e., the relative share of interest-bearing loans to share capital infused).
- *Track record of the promoter.* A promoter with a good track record for quality, timely delivery, and sound finances will generally pay less interest than one who is new or does not have a good track record.
- *Project risk,* tied to factors such as access to and rights over land where the project is located, the financial health of the power purchasing entity, and predictability of the regulatory framework, among others.
- *Prevailing interest rates in a country.* Interest rates in the OECD countries are presently at historic lows, whereas those in emerging economies such as India are relatively very high. Thus it may make sense for an investor to raise money from the OECD countries for projects in emerging economies.

Other Factors Affecting Costs

a. Land costs

Land cost can be a critical factor in regions close to urban areas and in countries with high real estate values. It can also be a critical factor where the proposed site already earns revenues for the land holder (e.g., a farmer with fertile land). In other cases, especially in developing countries with large stretches of arid land, land accounts for only a small percentage of the overall cost. However, it is expected that as the cost of land continues to rise, it will account for a greater share of overall project cost.

b. O&M cost

In all forms of renewable energy except biomass, the annual O&M expenses form only a small percentage of the capital cost (ranging from 1 percent to 5 percent). This category of expenses includes:

- Periodic maintenance.
- Qualified manpower.
- Insurance.

c. Inflation

Except in the case of biomass-based power, inflation contributes a negligible percentage of the total cost. As noted above, most of the cost for other renewables is an up-front capital cost, with very little cost for inputs (consumables, manpower, services) over the project life. In the case of biomass, however, the feedstock is a commodity and is subject to inflation, which will impact the cost of operating the power plant.

d. Costs towards infrastructure development (power evacuation cost)

In some cases, the nearest grid is far away from the power plant location. In this case, depending on local rules and regulations, the project developer may have to fully or partly contribute to the development of power evacuation infrastructure. This can add significantly to the overall cost.

e. Opportunity costs in case of grid instability

As more RE is fed to the grid, the grid can become unstable due to the variability in RE generation (e.g., solar power is generated only during day time; wind power generation depends on wind speeds, which can be intermittent with little or no options for effective storage). A sudden surge in electricity added to the grid can lead to its collapse, which means that the RE generator may have to stop generating electricity during these times. Since the RE generator gets paid only for electricity put into the grid, any grid collapse leads to unrealized revenues and can be considered an opportunity cost. These risks can be addressed through mechanisms to control, plan, and monitor transmission systems and by scheduling outages from RE sources. India's Indian Electricity Grid Code is one such regulatory measure.

f. Foreign exchange hedging costs

This cost occurs mainly at the erection and commissioning phases, when a few months' delay in the delivery of imported equipment can increase the cost significantly because of exchange rate variations.

g. Licensing and permitting fees

The costs of regulatory compliance contribute only a small part of the total cost, but can vary from country to country. In countries with strict environmental protection rules, project developers have to comply with many regulations. Compliance costs can be relatively high in some countries {e.g., the European Union (EU)}, but much lower in others (e.g., Africa) not counting any costs from rent extraction. But off course we are not counting here the costs from rent extraction.

Energy Efficiency

The rate of diffusion of energy-efficient technologies has been widely studied in the international literature. Factors that are likely to prove important in affecting the diffusion of energy-efficient technologies include appliance labeling schemes, energy efficiency standards for buildings, industry, and transportation and opportunities for financing energy-efficient appliances, and electricity prices.

One explanation for the slow initial rate of technology penetration is that heterogeneous consumers receive different benefits from a technology (Bhattacharya and Cropper, 2010). As the cost of the technology falls, more consumers receive positive net benefits and adopt the technology. If benefits are normally distributed across consumers, the rate of adoption will follow an S-shaped curve (Jaffee et al. 2003). This suggests that higher energy prices or lower capital costs should increase the rate of technology adoption. Empirical evidence from the United States suggests that higher energy prices have encouraged the adoption of energy-efficient room air-conditioners, central air-conditioners, and gas water-heaters (Newell et al. 1999). There is, however, evidence

that decreases in capital costs have had a larger effect on adoption than corresponding increases in operating costs (Jaffe and Stavins 1994; Hassett and Metcalf 1999). This suggests that either myopia (i.e., high discount rates) or capital market constraints have played a role in technology.

Lack of information is another barrier. Since there are information externalities in this case—adoption by one person conveys information to non-adopters—governments can provide information about energy efficiency by requiring that appliances and machinery be labeled to show their energy usage and that efficiency claims be certified. Agency problems and lack of knowledge of the life-cycle benefits of energy-efficient technologies are also often cited as a rationale for energy efficiency standards.

4

AN OVERVIEW OF POLICY, REGULATORY AND INSTITUTIONAL FRAMEWORK FOR CLIMATE INVESTMENTS IN SOUTH ASIA

Detailed country reports were prepared between June 2010 and May 2011 on the policy and regulatory frameworks and institutions governing RE and EE in six South Asian countries—India, Pakistan, Sri Lanka, Bangladesh, Nepal and Maldives. This section provides a series of observations and broad conclusions drawn from these reviews.[13]

RE and EE Frameworks in South Asia are in the Early Stages of Development

Comprehensive RE and EE regulatory frameworks are relatively new developments in the South Asian context, although there may have been specific policies and incentives governing individual sectors (such as wind in India since the mid-1980s). Their relatively recent introduction means that their implications for attracting investment will take some time to be understood. A number of laws and regulations also exist in draft form or are pending approval before the cabinet or parliament, particularly in Pakistan, Bangladesh, Nepal and Maldives, and further policies, regulations and incentives can be expected to evolve. Annex A, Tables A-1 and A-2, show the years when key policy and regulatory initiatives were introduced.

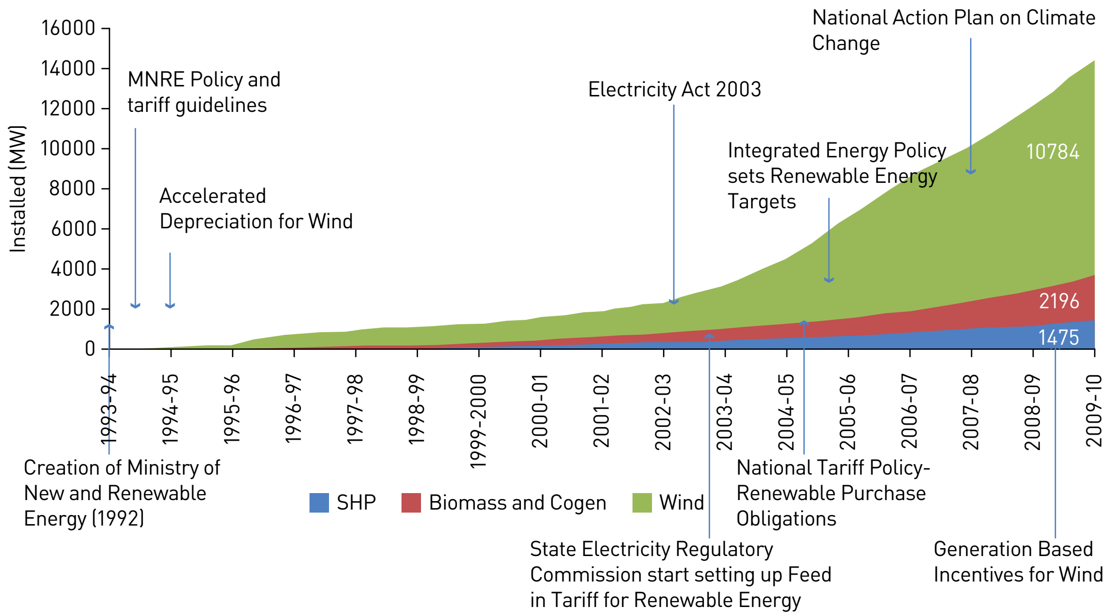
Previous analysis by Price water house Coopers (PwC) for the World Bank reveals a mixed impact of various policy and regulatory initiatives in India[14] (Figure 4.1). The study notes that efforts specific to the wind sector in the mid-1990s—accelerated depreciation, preferential

13. Detailed Country Reports will be made available upon request.

14. Unleashing the Potential of RE in India, South Asia Energy Unit Sustainable Development Department and Energy Sector Management Assistance Programme (ESMAP). The World Bank, 2010.

tariffs, resource mapping, and the landmark umbrella Electricity Act 2003—have had the most tangible impact on wind sector growth in that country.

Figure 4.1 Key legislation and increases in renewable energy capacity in India, 1993/94–2009/10



Source: *PwC analysis for World Bank from Unleashing the Potential of RE in India,* South Asia Energy Unit Sustainable Development Department and ESMAP. The World Bank, 2010.

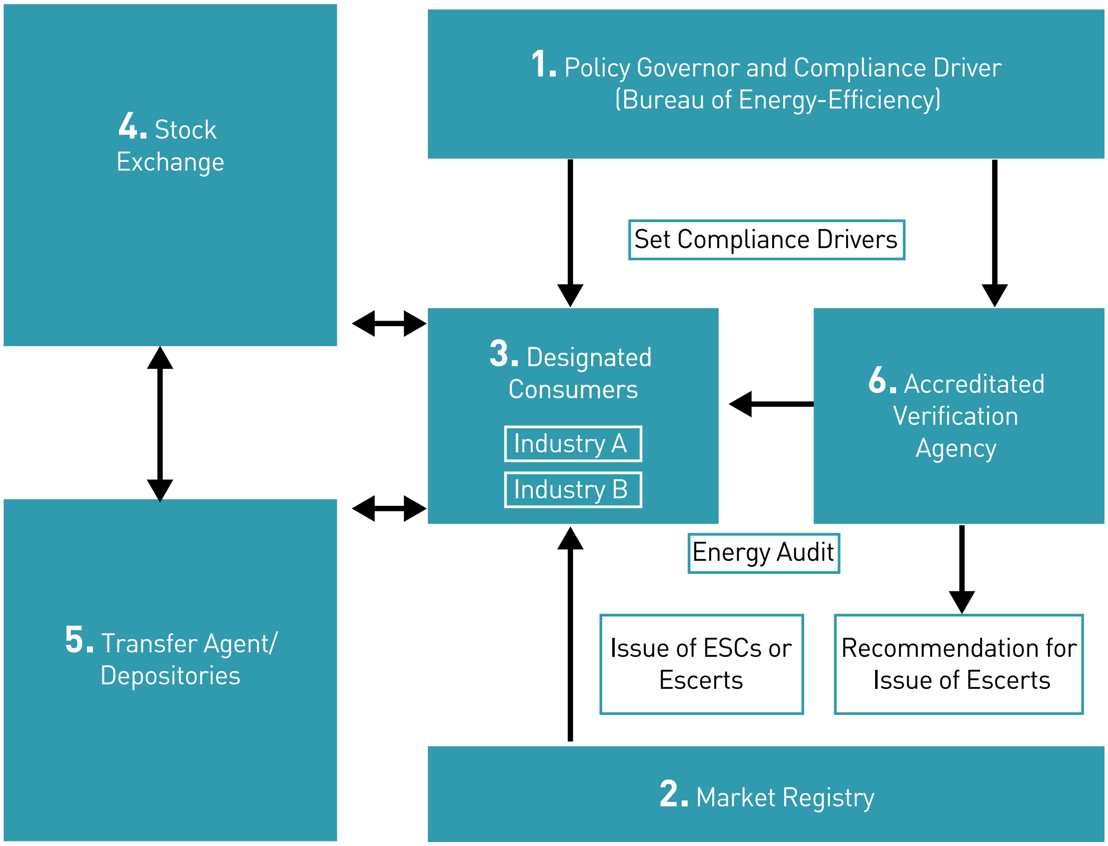
Regulations and Institutions in South Asia are at Very Different Stages of Development

As shown in Annex A, Tables A-1 and A-2, India dominates the region, with the largest number of national-level policies, regulations and incentives covering all key RE sectors as well as EE. There are also a large number of state-level schemes. India uses sophisticated policy instruments such as RPOs and RECs for renewable energy; as well as a proposed market-based mechanism—a Perform, Achieve, and Trade (PAT) scheme for EE. By contrast, Nepal and Maldives still do not have specific legislation for either RE or EE.

Figure 4.2 illustrates how the PAT would work to make EE improvements in energy-intensive large industries and facilities more cost effective, through certification of tradeable energy savings. The scheme is the most important component of India's National Mission for Enhanced EE—a program under India's National Action Plan on Climate Change (NAPCC). While it has yet to be implemented, the scheme shows a high degree of promise.

The PAT scheme would assign EE improvement targets to the country's most energy-intensive industrial units. Units that achieve savings in excess of their targets will receive Energy Savings Certificates (ESCs or Escerts) issued by market registries. They could then sell the ESCs to underperforming units, which would use them to meet their targets. Stock exchanges would facilitate buying and selling of these certificates.

Figure 4.2 Institutional mechanism for the PAT scheme in India



Source: CAMCO, CII and ABPS Infra, *Analysis of the potential of Mandatory Trading in energy saving certificates to drive energy efficiency in the Indian industrial sector*, accessible at http://115.113.225.49/webcms/Upload/Mandatory%20Report_Final.pdf

SAR also shows a wide variation in the sectoral distribution of policies, regulations and incentives, based on the prevalence of different types of RE projects in each country. Bangladesh, Nepal and Maldives, for example, have only donor-funded off-grid initiatives in solar and biomass, so there has been no occasion for specification of RE tariffs across sectors.

Solar policies, regulations and incentives are quite well developed in India, particularly since the introduction of the Jawaharlal Nehru National Solar Mission (JNNSM) initiative and various state-level schemes. India is, at the time of writing, the only South Asian country to have prescribed preferential tariffs for solar energy. Other countries such as Pakistan have prescribed preferential tariffs for wind power, co-generation and small hydro projects, but not for solar or grid-connected biomass. Preferential tariffs for RE have been available in Sri Lanka for electricity produced from mini-hydro, wind, biomass (dendro[15]), biomass (agriculture and industrial waste), municipal waste, and waste heat recovery; however, the country as yet has no such tariffs for solar production.

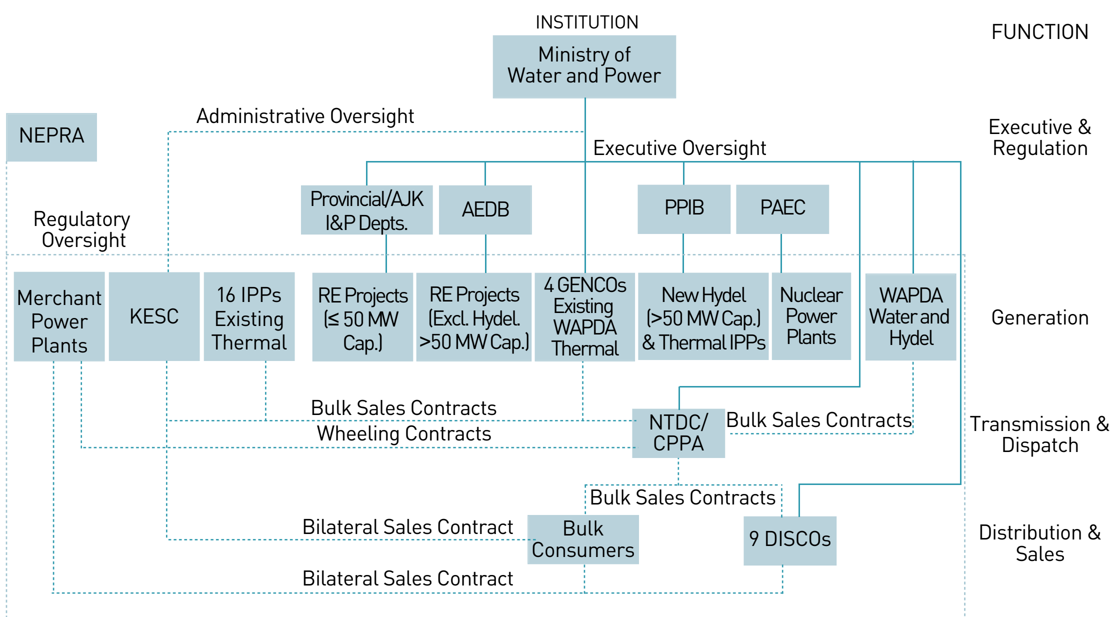
15. Biomass (dendro) refers to sustainably grown firewood.

Countries also Show Considerable Variation in their Capacity to Implement Policies and Regulations

India appears to have well-developed institutions to regulate RE generation. The Ministry of New and RE (MNRE) was initially established as the Department of Non-Conventional Energy Sources (DNES) in 1982 and renamed the Ministry of Non-Conventional Energy Sources (MNES) in 1992, and MNRE in 2006. India is the only country in the world, at the time of writing, to have a dedicated Ministry for New and RE.[16] The Indian RE Development Agency (IREDA) is the financing arm of the MNRE, which secures funds to be provided as grants or loans to end-users, manufacturers and entrepreneurs. Apart from MNRE, which is spearheading the development of RE in India, other significant institutions include central and state electricity regulatory commissions, which are responsible for tariff setting, sale and distribution of electricity; National Load Dispatch Centres at the central level; state agencies to regulate RECs; and power exchanges where these certificates are traded.

Pakistan's Alternative Energy Development Board (AEDB), under the Ministry of Water and Power, plays a similar role in RE development. The other key RE institution is the National Electric Power Regulatory Authority (NEPRA). Additionally, Pakistan has state-level agencies that support implementation of RE policies either on their own or in collaboration with AEDB. The Water and Power Development Authority (WAPDA) is in charge of hydro power development. Other agencies involved in regulating the country's RE sector are shown in Figure 4.3.

Figure 4.3 Institutional organization of Pakistan's energy sector



Note: *Provincial/AJK I&P Depts. also responsible for non-RE projects of ≤50 MW capacity. KESC is a vertically-integrated utility engaged in power generation and distribution.*

Source: *Policy for Development of Renewable Energy for Power Generation Employing Small-Hydro, Wind, and Solar Technologies*, Government of Pakistan, 2006.

16. www.mnre.gov.in

Sri Lanka has a similar set of institutions. The Sri Lanka Sustainable Energy Authority (SLSEA), established pursuant to the SLSEA Act of 2007, functions as a part of the Ministry of Power (MoP) and Environment. It has the authority to issue permits for on-grid and off-grid RE projects for the generation and supply of power. The Public Utilities Commission of Sri Lanka (PUCSL) was established by Act No. 35 of 2002 as a multi-sector regulator of certain physical infrastructure industries in the country, and plays a key role in RE development in Sri Lanka. The Ceylon Electricity Board (CEB) also plays an important role, as the entity that enters into power purchase agreements with RE developers.

In smaller countries such as *Bangladesh* and *Maldives*, units or departments dedicated to RE policymaking or financing are still in the process of being established. A Sustainable Energy Development Agency (SEDA) was contemplated under Bangladesh's RE Policy of 2008, but has yet to be established. The Bangladesh Power Development Board (BPDB), however, has been playing a significant role in the commissioning of RE projects in the wind and solar sectors.

Significantly, tradeable RE certificates, and the power exchanges to enable trading in such certificates, do not exist in the region outside of India.

Both *India* and *Pakistan* have separate institutions for implementing RE and EE initiatives. India's EE institution is the Bureau of EE (BEE) and Pakistan's is the National Energy Conservation Centre (ENERCON). In *Sri Lanka,* RE and EE efforts are headed by a single institution, the SLSEA; while *Bangladesh, Nepal* and *Maldives* have no specific institutions to administer EE initiatives. In Bangladesh, the Power Division, MoP, Energy and Mineral Resources and BPDB have been undertaking a series of measures designed to improve EE. In Maldives, the draft Maldives Energy Bill 2010 proposes to establish a National EE Division within the Energy Department for promotion of EE measures.

Differences in Countries' Policies, Regulations and Incentives Reflect Technical and Economic Realities, Needs and Priorities

Unlike those SAR countries where grid-connected RE efforts are underway, the focus in Nepal, Bangladesh and Maldives has so far been on the development and expansion of off-grid RE sources. This is a reflection of the technical and economic realities, needs and priorities of these three countries, all of which are characterized by populations largely in remote areas (rural in Bangladesh, mountain villages in Nepal, islands in Maldives); and by utilizing lower levels of technological development and private sector activity than other South Asian countries. As a result, most RE development activities are driven by government and external development assistance from the World Bank, UNDP, the EU, and USAID, rather than by private sector activity.

The institutions in these countries have evolved to meet their particular needs. In Bangladesh, for instance, the Infrastructure Development Company Limited (IDCOL), established in 1997 and licensed as a non-banking financial institution, has played a significant role in bridging the financing gap for medium and large-scale infrastructure and RE projects. Similarly, the Rural Electrification Board (REB), a semi-autonomous government organization reporting to the MoP, Energy and Mineral Resources, was set up by a presidential ordinance in 1977, has undertaken some solar PV projects in the

rural areas of the country.[17] The Government, with support from the World Bank, has also launched the large-scale Efficient Lighting Initiative of Bangladesh (ELIB) to reduce peak loads. In other parts of the region where private sector activity may be limited, government and external aid efforts will also be required to kick-start the deployment of RE and launch EE initiatives.

India has the natural advantage of a diverse RE resource base, which enables it to attract investment and create policies, regulations and incentives in a variety of sectors. Other countries may provide greater opportunities for the development of a particular RE sector—for example, hydro power in the case of Nepal or biomass in Bangladesh. RE resources that are perceived to be less expensive to deploy are often the first to attract regulatory intervention. In Pakistan, for instance, up-front tariffs have been set for grid-connected wind but not for solar.

Box 4.1: Resource Variability Risk: A unique feature of Pakistan's Renewable Energy Policy

Pakistan's Short-term Renewable Energy Policy 2006 Document has a unique incentive for wind and small-hydro projects not found in other South Asian countries called Resource Variability Risk. The policy states that "…the risk of variability in wind speeds (for wind power projects) and water flows (for hydropower projects) shall be borne by the power purchaser" in the manner described in the document's annexure on Renewable Energy Technology (RET)-specific polices.

'Benchmark' electricity production levels based on mean availability of wind or water flow for the month shall be determined for each project location on the basis of independently monitored data. The Independent Power Producer (IPP) shall be ensured revenues corresponding to this benchmark level, including potential loss of corresponding carbon credits, even if the resource availability temporarily falls below this benchmark, provided that the reduced electricity production is not due to the fault of the IPP itself. If the actual wind speed is more than the Benchmark Wind Speed, (and capacity of the wind IPP available is equal to the Benchmark capacity level), the Wind IPP will be paid for energy generation corresponding to 'Benchmark Plus' (i.e., Benchmark Energy Production plus 10% of the value of energy generated above the benchmark; e.g., if the tariff is Rs. p/kWh, then the production up to the Benchmark Energy Production level will be paid at the rate Rs. p/kWh, and any additional production will be paid at the rate of 0.1 x Rs. p/kWh) as a production bonus, so that both the power producer and purchaser share the benefit of increased production.

However, in case the capacity of the wind IPP is not available wholly or partially (i.e., is less than Benchmark Capacity), the wind IPP is paid equal to the actual energy generated up to the Benchmark Energy Production level only. Hydrological risk is defined as the risk of variability of water flows, and therefore of the effective energy output of the hydro IPP. A monthly mean-flow benchmark is calculated and the principle adopted is that the hydroelectric generator (IPP) will be made immune to factors which are beyond its control (i.e., variability of water flow), but fully responsible for factors within its control (i.e., the availability of the plant).

17. http://www.reb.gov.bd/intro.htm

Sub-federal Policies, Regulations and Incentives are an Important Consideration in India

India is a country with a federal structure of governance. Pursuant to the provisions of the Constitution of India, electricity falls under the "concurrent" list, allowing both the central and state governments to legislate on the subject. As shown in Table 4.1, RE and EE initiatives in the country range from federal and state-specific tariffs for the RE sector to state-specific RPOs.

TABLE 4.1: RE Technologies as per CERC Tariff Regulations Norms for FY 2010-11

Particulars	Levellised total tariff (FY 2010-11) (Rs/kWh)	Benefit of Accelerated Depreciation (if availed) (Rs/kWh)	Net Levellised Tariff upon adjusting for Accelerated Depreciation benefit (if availed) (Rs/kWh)
Wind Energy Projects			
Wind Zone-1 (CUF- 20%)	5.07	(0.78)	4.29
Wind Zone-2 (CUF- 23%)	4.41	(0.68)	3.73
Wind Zone-3 (CUF-27%)	3.75	(0.58)	3.17
Wind Zone-4 (CUF- 30%)	3.38	(0.52)	2.86
Small Hydro Projects			
H.P., Uttarakhand, and NE States (below 5 MW)	3.59	(0.48)	3.11
H.P., Uttarakhand, and NE States (5MW-25 MW)	3.06	(0.43)	2.63
Other States (below 5 MW)	4.26	(0.57)	3.69
Other States (5 MW – 25 MW)	3.65	(0.51)	3.14
Solar Power Projects			
Solar PV	17.91	(2.96)	14.95
Solar Thermal	15.31	(2.46)	12.85
Biomass Power Projects			
Tariff ranges from Rs. 3.35/Mwh to Rs. 4.62/Mwh depending on the State in which the Project is located. The tariff applicable for most states is Rs. 4.10/Mwh.			

Some of the key EE measures at the federal and state levels are highlighted in boxes 4.2 and 4.3.

Box 4.2 : India—Key Measures at Central Level on Energy Efficiency

Buildings	
Energy Conservation Building Code, 2007 ("ECBC")	❖ In exercise of powers conferred under the Energy Conservation Act (India) (ECA), the Central Government has prescribed Energy Conservation Building Code, 2007. ❖ The ECBC sets minimum EE standards for design and construction of a non-residential building. Energy performance standards for the following building systems are included in the ECBC: building envelope, lighting, heating ventilation and air conditioning, service water heating, and electric power and distribution. ❖ ECBC is a voluntary code.[18]
BEE Star rating programme for office buildings[19]	❖ Star Rating Programme developed by BEE for office buildings in order to accelerate the EE activities in commercial buildings. ❖ It is based **on actual performance of the building,** in terms of specific energy usage (in kWh/sq m/year). ❖ It would rate office buildings on a 1-5 star scale, with 5-star labeled buildings being the most energy efficient. ❖ Initially, the programme targets warm and humid, composite, and hot and dry climatic zones for air-conditioned and non- air-conditioned office buildings, and will subsequently be extended to other zones and buildings. The programme is expected to create a demand-side pull for such buildings. ❖ Buildings having a connected load of 500 kW and above would be considered for this scheme.
Green rating system by GRIHA (Green Rating for Integrated Habitat Assessment)[20]	❖ GRIHA is a rating tool developed by The Energy and Resources Institute ("TERI"), and adopted by the MNRE as the National Rating System **("NRS")** for green buildings in India. ❖ The system has qualitative and quantitative assessment criteria to assess the performance of a building against certain nationally acceptable benchmarks. ❖ The rating would be applied to new building stock of varied functions – commercial, institutional, and residential.
Notification No. DGW/MAN/176 (Subject – Green Building Parameters) dated 16th March mandating that all Civil Public Works Department (CPWD) constructions shall be green[21]	❖ The notification provides that all CPWD constructions shall follow the green rating system of GRIHA. Guidelines regarding green buildings will be introduced in the CPWD Manual. ❖ The notification provides that whether the constructions undertaken by CPWD are to be certified as green or not shall be the prerogative of the client organization as it will involve third party inspections/reviews/registration etc. which will involve both cost and time; hence the client's assent to it shall be mandatory. It also states that such certification shall be taken by the client and the role of CPWD shall be that of a facilitator. Accordingly this aspect shall be built in the MoU with clients for every project specifically.

18. Action Plan for EE, 2009 by BEE.
19. Sushil Kumar Shinde launches Star Rating programme for office buildings to accelerate EE", PIB, February 25, 2009, http://pib.nic.in/release/release.asp?relid=47969&kwd=
20. http://www.grihaindia.org/index.php?option=com_content&task=view&id=14
21. http://www.cpwd.gov.in/newsitem/dgwman/MAN176.pdf

Box 4.2 : India—Key Measures at Central Level on Energy Efficiency

	❖ However, irrespective of the client's requirements, CPWD shall have internal certification by its own officers in accordance with GRIHA system.
MNRE scheme on energy efficient solar/green buildings (dated 5th February, 2009, and as amended on 25th July, 2009)[22]	❖ The scheme provides the incentives that shall be given to the building owners, architects, consultants who abide by the National Green Rating system developed by GRIHA. The scheme is confined at present to commercial and institutional buildings including housing complexes with built-up area of 2500 sq feet. ❖ The scheme will be implemented through State Nodal Agencies/ Municipal Corporations/ Govt. Bodies/reputed NGOs etc. ❖ 90% of the registration-cum-rating fee for GRIHA for projects rated 3 star having built area up to 5000 sq. m., and for projects rated 4 star having built-up area above 5000 sq. m. will be reimbursed by MNRE. ❖ One of the criteria under GRIHA is to meet 1% of total connected load for interior lighting and space conditioning through solar photovoltaics, and this will be supported through capital subsidy made available under MNRE's scheme on Solar Photovoltaic Systems/Devices for Urban Areas **[See Part II (B)].** ❖ A one-time incentive of Rs. 50 lakhs to Municipal Corporations and Rs. 25.00 lakhs to other Urban Local Bodies will be available to those who i) announce rebate in property tax for energy efficient solar/green buildings rated under GRIHA, ii) make it compulsory to get the new buildings under Government. and Public Sector rated under GRIHA and iii) sign an MOU with GRIHA Secretariat in the presence of MNRE officials for large scale promotion of Green Buildings in their area. ❖ The first 100 government/public sector buildings shall be exempted from paying registration-cum-rating fee in advance at the time of registration under GRIHA subject to specified conditions. ❖ Incentives to the tune of Rs. 2.5 lakhs for projects with upto 5000 sq. m. built-up area with minimum three (3) star rating and Rs. 5 lakhs for projects >5000 sq. m. built-up area with minimum four (4) star rating., will be provided to architects/design consultants in order to encourage them to use green architectural techniques, and get the buildings rated under GRIHA.
Household lighting	
Bachat Lamp Yojna to promote energy-efficient and high quality CFLs (launched by the MoP on 25th February, 2009)[23]	❖ The Bachat Lamp Yojna **("BLY")** is a scheme to promote energy-efficient lighting in India, and as previously mentioned, has been registered under CDM on April 29, 2010. ❖ It is designed as a public-private partnership between the GOI, private sector Compact Fluorescent Light (CFL) suppliers and state level electricity distribution companies (DISCOMs). The CFL suppliers would sell high quality CFLs to households at a price of rupees fifteen (Rs. 15) per CFL within a designated project area in a DISCOM region of operation. ❖ The CFL supplier will be chosen by the DISCOM through a due diligence process from a list of CFL suppliers empanelled by BEE.

22. http://mnre.gov.in/website-green-buildings/MNRE-scheme-green-buildings.pdf

23. http://pib.nic.in/release/release.asp?relid=47970&kwd

Box 4.2 : India—Key Measures at Central Level on Energy Efficiency

	❖ Only 60 Watt and 100 Watt incandescent lamps will be replaced with 11-15 Watt and 20-25 Watt CFLs respectively. BEE will monitor the electricity savings in each project area.[24] ❖ There are ***no mandatory requirements*** in India requiring the use of CFLs at the household level. Each household can get a maximum of four self-ballasted CFLs. CFLs distributed to the household would have an average rated life of 6000 hours and above.[25] ❖ *Four lakhs bulbs in Yamunanagar, Haryana; 3.5 lakhs bulbs in Vizag, Andhra Pradesh; and 4 lakh bulbs in Rajnandgaon District, Chhattisgarh have been distributed under the Bachat Lamp Yojana (BLY). Apart from these states a number of other states have shown interest in participating in BLY.* These include Andhra Pradesh, Assam, Punjab, Haryana, Maharashtra, Chhattisgarh, Kerala, Madhya Pradesh, Uttar Pradesh, Rajasthan, Orissa, Himachal Pradesh, Goa, Tripura and Karnataka.[26]
Appliances	
Standards and Labeling Scheme (18th May, 2006) by MoP[27]	❖ This scheme seeks to provide to the consumers an informed choice of about the energy- saving and cost-saving potential of relevant market products. The scheme requires display of energy performance labels on high energy end-use equipment and also lays down minimum energy performance standards. ❖ Mandatory for following equipments from January 7, 2010: a) Tubular Fluorescent Lamps, b) Room Air Conditioners, c) Distribution Transformer, d) Household Frost-Free Refrigerators. ❖ Voluntary for seven electronic items: direct cool refrigerator; induction motors, agricultural pump sets, ceiling fans, liquefied petroleum gas stoves; electric geysers; color TVs.

24. http://www.emt-india.net/CDM/BhachatLampYojna.pdf
25. Action Plan for EE, 2009 by BEE.
26. http://www.powermin.nic.in/JSP_SERVLETS/jsp/newsdis.jsp?id=650, as per the information given the Minister of State for Power in the Rajya Sabha dated 8th March, 2010.
27. http://220.156.189.23:8080/beeLabel/index.jsp

Box 4.3: Key Measures at the State Level on Energy Efficiency	
Delhi	❖ Delhi Transco Limited was notified as the SDA by the Government of Delhi on 28th July, 2006 for implementation of energy conservation measures in the state of Delhi. ❖ Some of the key measures that the Government of Delhi has undertaken towards EE are as follows: • Notification making the use of solar water-heater systems mandatory in institutions, hospitals, hotels, buildings with plot/area 500 Sq.m and above. In consultation with the MNRE and the manufacturers rupees six thousand (Rs. 6000) is given as rebate/incentive to domestic users of solar water-heater.[28] • Notification making mandatory the use of CFL and electronic chokes in all new buildings of Govt./Govt.-aided institutions/boards/corporations and replacement of defective incandescent lamps and chokes with CFL and electronic chokes in existing buildings.[29] • Notification making mandatory the use of ISI marked motor pump sets, power capacitor, foot reflex valves in the agriculture sector and all Govt./private sectors.[30]
Haryana[31]	❖ The Department of Renewable Energy is the notified SDA to coordinate, regulate and enforce the provisions of the ECA in the State of Haryana. ❖ Some of the key measures that the Government of Haryana has undertaken towards EE are as follows: Vide its gazette (extraordinary) no. 22/52/2005-SP dated 29-07-2005, the Government of Haryana adopted a series of energy conservation measures in the state, some of which are highlighted below: • Solar water-heating systems have been made mandatory in the following categories of buildings: • Industries where hot water is required for processing. • Hospitals and nursing homes including Government Hospitals. • Hotels, Motels and Banquet Halls. • Jail Barracks, Canteens. • Housing Complexes set up by Group Housing Societies and Housing Boards. • All residential buildings on a plot of size 500 sq.yds. and above falling within the limits of Municipal Committees/Corporations and HUDA sectors. • All Government buildings, residential Schools and Educational Colleges, Hostels, Technical/Vocational Education Institutes, DIETs, Tourism Complexes and Universities. • Use of new incandescent lamps in all new buildings/institutions constructed in Government sector/Government-aided sector has been banned and it has been made mandatory to replace all the defective incandescent lamps by CFL lamps when they require replacement. • Promoting use of ISI-marked pumps, power capacitors, foot/reflex valves in the state, and making the use of ISI marked pumps and accessories mandatory for all new tube-well connections.

28. Order No. F. No. 11(149)/2004/Power/2387 dated 28.09.06; http://www.dtl.gov.in/EnergyEfficiency/Energy_Savings_tips.pdf

29. F. No 11(149)/2004/Power, dated 28.09.2006; http://www.dtl.gov.in/EnergyEfficiency/Energy_Savings_tips.pdf

30. Notification dated 28.09.2006; available at <http://www.dtl.gov.in/EnergyEfficiency/Energy_Savings_tips.pdf>

31. See <http://www.hareda.gov.in/new_initiatives.htm and http://www.hareda.gov.in/energy.htm>

Box 4.3: Key Measures at the State Level on Energy Efficiency	
	• All the new buildings to be constructed in the Government/Government-aided sector to be based on energy-efficient designs, incorporating energy-efficient designs and RE technology devices with effect from June 30, 2006.
Maharashtra	Maharashtra Energy Development Agency (MEDA) is the notified SDA for implementation of the ECA in the state of Maharashtra. Some of the key measures taken for energy conservation in the state of Maharashtra are: ❖ Maharashtra Electricity Regulatory Commission (MERC) has passed an order making energy audit mandatory for cogeneration facility during every crushing season (once a year). The cogeneration facility entity shall appoint, at its own cost, an independent auditor for conducting the energy audit from among the panel of auditors prepared by MEDA, and the results of the audit shall be reported to the MERC by the utility/facility.[32] ❖ *Financial assistance scheme by MEDA for power generation and utilization from waste heat recovery*[33] was valid till March 31, 2009. It provided the following financial assistance to eligible industries[34] for preparation of DPRs for power generation, utilization of waste heat for heating of water and air: Rupees one lakh (Rs. 1, 00,000) per project or 50% of consultant fee for preparing DPR, whichever is less, for power generation. Rupees fifty thousand (Rs. 50,000) per project or 50% of consultant fee for preparing DPR, whichever is less, for other purposes such as heating. ❖ MEDA has reportedly developed a strategic action plan[35] for energy conservation activities in the state of Maharashtra and also developed preliminary designs of some energy conservation programs like a program for replacement of incandescent lamps with CFLs, a program for installation of capacitors for EE improvement in agriculture, and a program for energy efficiency in small and medium enterprises.
Andhra Pradesh[36]	❖ Non-conventional Energy Development Corporation of Andhra Pradesh Limited ("NEDCAP") is the SDA in Andhra Pradesh.[37] ❖ The Government of Andhra Pradesh provides incentives to owners installing solar heating and lighting systems/rain water harvesting/ recycling of waste water as per the Andhra Pradesh revised Building Rules, 2008.

32. Order dated 21.11.2003; http://www.mercindia.org.in/pdf/211103_Clarificatory_Order_bagasse_co_gen.pdf

33. http://www.mahaurja.com/PDF/ECON_WHR_program.pdf

34. The eligibility criteria were (i) the unit/facility should be located in Maharashtra, (ii) the unit/facility should be regular payer of electricity bill. (iii) the DPR should be prepared by the MEDA's empanelled consultant; (iv) In case of semi Govt./ Government undertaking/local self government buildings/buildings of Urban Local Bodies & Maharashtra Industrial Development Corporation (M.I.D.C.) supporting documents to clarify the undertaking of State/ Central Govt. is necessary; and (v) If the unit is already availing financial assistance from any Government organization for preparation of detailed project report study then the unit is not eligible for this assistance.

35. http://www.mahaurja.com/PDF/SAPlan.pdf

36. http://www.hmda.gov.in/EBRG/site/incentives.html

37. http://www.nedcap.gov.in

Box 4.3: Key Measures at the State Level on Energy Efficiency

	❖ The incentives are in the nature of rebates in property tax to owners or their successors-in-interest who construct the building/blocks by leaving more setbacks than the minimum as stipulated in the Andhra Pradesh revised Building Rules, 2008. ❖ A rebate of 10% in property tax is provided to persons who install and use solar heating and lighting systems.

Box 4.3: Key Measures at the State Level on Energy Efficiency

Kerala[38]	The Energy Management Centre (EMC)[39] has been notified as the SDA by the Government of Kerala in 2003. The EMC has been active in initiating a series of programs for promoting EE, some of which are highlighted below: ❖ Industrial energy conservation programs, which include research programs/ projects to examine the efficiency of energy use in selected manufacturing industrial enterprises in Kerala. ❖ Energy-efficient village program, wherein three villages from cultural regions were selected to be transformed into ideal energy saving villages by supplying households in these villages with energy-efficient equipment and gadgets. ❖ Energy clinic program to create awareness about energy conservation measures in the domestic sector. Under this program, EMC provides training to selected women volunteers to organize demonstration classes on energy conservation in different villages. ❖ Employment generation through energy conservation activities—EMC has developed a cost-effective thermal cooker called "*Thaapabharani*" which has the potential of saving up to eighty percent (80%) energy, irrespective of the fuel used in terms of firewood, kerosene or LPG while cooking. This device can be used for thermal storage for about 7-8 hours. EMC reports that the cooker is designed in such a way that it can be fabricated by rural women by using local resources, thereby leading to employment generation for rural women.
Karnataka	❖ Establishment of energy conservation fund[40]: ❖ To overcome financial barriers in implementation of EE activities, the Karnataka Government will establish an "Energy Conservation Fund", the rules relating to which have already been issued earlier in September 2007. An amount of Rs. 5 crores will be placed in this fund annually till 2014, and the fund will be used to facilitate growth of EE infrastructure, including that of energy service companies.

38. http://www.energymanagertraining.com/Journal/19112006/EnergyefficiencyinitiativesinGod%92sOwnCountryKerala.pdf.
39. http://www.keralaenergy.gov.in/emc_energy_efficiency.html
40. Para 12(iii), KREP.

Box 4.3: Key Measures at the State Level on Energy Efficiency

- KREDL is expected to develop criteria for obtaining funds for EE projects from the Energy Conservation Fund.
- Energy auditing:[41]
  - The KREP makes energy auditing and adoption of EE measures mandatory for all industrial and commercial installations of 600 KVA and above contract demand. KREDL is charged with the responsibility to monitor this.

    It directs all LT-2 and LT-4 consumers to adopt energy-efficient measures as specified in a Karnataka Government order dated November 13, 2007[42]. It further states that the energy department, and urban development and housing departments will develop proposals to amend the rules for mandatory use of solar water-heaters/CFLs/ LEDs etc., and accordingly, all the urban local bodies will make amendments in the bye-laws to enforce solar water-heating systems as per Karnataka Government order dated November 13, 2007.
  - Rebate in electricity bill for domestic users at the rate of Rs. 100 per month will be extended on installation of solar water-heaters.
  - EE and energy conservation measures have been made mandatory for all public utilities.

Investors need to be aware that both federal and state-level initiatives shape the investment climate in a country—indeed—they may create different investment climates within the same country. While this diversity of policy landscapes adds complexity, and may create issues of coordination and enforcement between the central and state governments, it also gives investors the opportunity to choose the right state for their investment, based on policies, regulations and incentives and firm profiles and their own priorities. For example, the federal JNNSM mandates the use of cells and modules manufactured in India for solar PV projects after 2011. However, this requirement is absent for solar schemes in the states of Gujarat and Rajasthan. These states also have incentives such as easy access to land, which have attracted a large number of investors.

Despite some drawbacks of the federal-state system, the existence of state-level policies allows certain states to pioneer RE development within their jurisdiction and create good regulatory models that other states can follow. The successful example of Tamil Nadu in the wind energy sector is highlighted in Box 4.4 next page.

41. Ibid, Para 12(iv).

42. The Government of Karnataka vide No. EN 396 NCE 2006 dtd. 13.11.2007 and corrigendum, No. EN 87 NCE 2008 dtd. 8.4.2008 notified the following under section 18, Energy conservation act 2001. (i) the Mandatory use of solar water heating systems. (ii) Mandatory use of Compact Florescent Lamp (CFL) in Government Buildings/aided institutions/Boards/ Corporations. (iii) Mandatory use of ISI mark Energy Efficient Motor pump sets, Power capacitor, Foot valves in Agriculture sector and (iv) Promotion of Energy Efficient Building design; <http://mnre.gov.in/pdf/Uniform%20Policy%20on%20Solar%20 Water%20Heating.pdf>

Box 4.4 The Tamil Nadu Wind Energy Sector Success Story

The Early Mover Advantage, and continued focus on wind resource assessment: The Tamil Nadu Energy Development Agency ('TEDA') started a wind resource assessment program with financial assistance from the MNRE and the TN State Government, way back in 1985-86. TEDA is reported to have set up a total of 69 stations in 16 districts, each covering a radius of 10 km. The study in each station lasted for one to two years with bimonthly data collection after which the stations were dismantled and installed in other places.[43]

For the first time in India, demonstration wind farms were set up in 1986 at Thoothukudi (TN), and were later extended to 7 other locations in 4 districts for a total capacity of 19 MW till 1993, with financial assistance from MNRE and TN State Government. These endeavors reportedly helped convince private investors about the potential and viability of wind power generation. The first private sector wind energy plant was established in 1990.[44]

The focus on micro survey of wind resources around selected potential sites and establishment of new wind-monitoring systems in TN continues and helps provide reliable data for selecting appropriate locations for windmills.[45]

Favorable topography: TN is blessed with topography favorable to harnessing of wind energy. It is endowed with three lengthy mountain passes on the Western Ghats mountain range (namely the Palghat pass in Coimbatore District, Shengottai pass in Tirunelveli District and Arelvaymozhi pass in Kanyakumari District) which receive heavy wind flows because of the tunneling effect during the South West Monsoon.[46]

43. See <http://www.teda.gov.in/page/Wind.htm>
44. See <http://www.teda.gov.in/page/Wind.htm>
45. See <http://www.tn.gov.in/policynotes/energy_2.htm>
46. See <http://www.tn.gov.in/policynotes/archives/policy2009_10/pdf/energy.pdf>

5

PRIVATE SECTOR PERCEPTIONS OF THE EXISTING POLICY REGULATORY AND INCENTIVE FRAMEWORK IN SOUTH ASIA

The existence of regulatory frameworks and incentives for RE and EE may not, by itself, lead to perceptions of an attractive investment climate. In addition to broader macroeconomic variables such as infrastructure, the availability of skilled labor, and market size, the effective implementation of existing laws and regulations is also important. Regardless of what exists on paper, investors need to get a sense from those actually involved in the business of producing and selling renewable power about the issues and challenges they face in a country.

Outlined below are the results from consultations held with private sector stakeholders—firms active in RE generation; select vertically integrated firms active in both power generation and manufacturing; and manufacturers and distributors of RE equipment—in India, Pakistan, Bangladesh and Sri Lanka. Due to time constraints and the diversity of the sector, similar consultations were not carried out with distributors of EE equipment; this could be done as part of a future study.

Cross-cutting Factors

The consultations revealed a broad range of critical factors—the "ten Cs"—that investors see as critical for doing climate business in every country. These are described below. Country-specific issues and challenges revealed by the consultations are discussed in the following section:

- **Clarity and Coherence.** Policies/laws on clean energy should be very clear and transparent as well as coherent. They should send a strong signal about the country's intention to move toward cleaner/low carbon energy options.
- **Consistency.** Policies have to be consistently implemented across sectors and regions of a country. In a federal structure, for example, the national standard should guarantee a minimum level of RE development, with states being allowed to set more aggressive targets if needed.

- **Commitment and Credibility.** For policies to be credible, governments should signal a long-term commitment to the RE sector, backed by a comprehensive and transparent regulatory and tariff structure.
- **Clearances.** Investors are often discouraged by the number of clearances required to set up, for example, a wind or solar farm. The approval process can be eased considerably by setting up a single-window clearance system or a no-objection based approval process for specific sectors.[47]
- **Capacity.** As countries ambitiously expand their clean energy portfolios, the capacity of agencies should be enhanced to ensure compliance with targets, policies and regulations.
- **Compliance.** Investors often are concerned about utilities' commitment to comply with PPAs. It is therefore important to establish transparent cost recovery rules and prudency tests for utility compliance with policies and contractual arrangements. It also necessary to ensure utilities' compliance with any obligations that they may have to purchase RE or RE certificates.
- **Coordination.** Coordination across the multitude of agencies involved in the clean energy sector (regulatory agencies, implementing agencies, utilities, distribution companies, etc.) is critical to ensure that clean energy policies are implemented consistently and efficiently.
- **Collateral.** Banks are often reluctant to finance clean energy projects because of concerns about the bankability of the PPAs, which are often related to utilities' compliance. Until clean energy becomes as competitive as conventional energy, countries should consider specialized vehicles or institutions that could ensure adequate clean energy financing and help to mitigate risk.
- **Connectivity.** Access to the grid is an important criterion for investment in the renewable energy sector. Investors look for transparent rules, procedures and standards for grid connectivity for the energy they produce.
- **Cartography.** Since the quality and availability of RE (wind, solar, hydro, biomass) varies across locations, the accurate mapping of potential sites will have a bearing on returns to investment.

Country-specific Factors

Many of the country-specific issues that emerged from the consultations can also be categorized under the ten Cs.

India

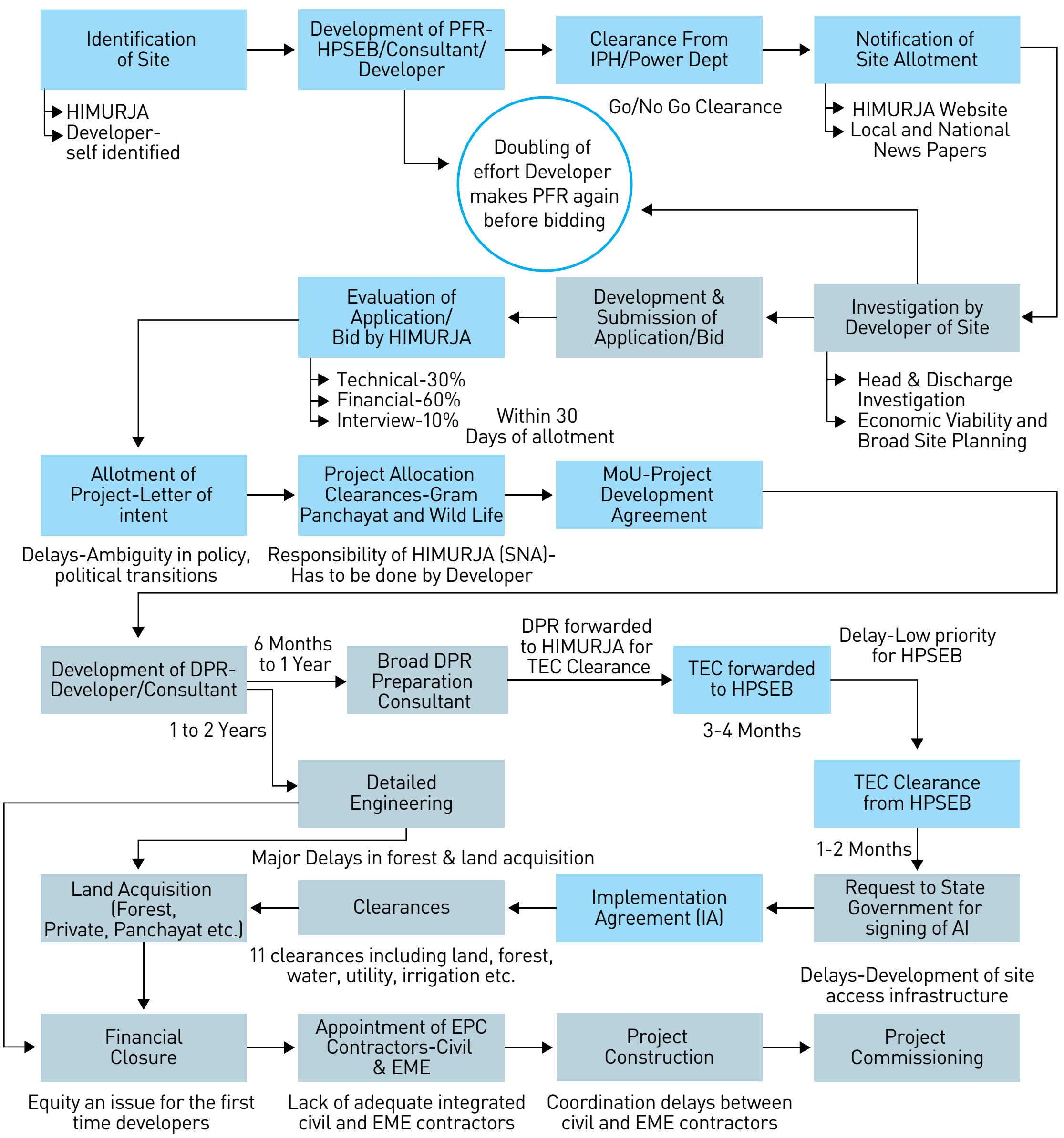
Attractive project financing options and terms and conditions are required. The availability of finance emerged as an important issue in India. Smaller firms pointed to difficulties in obtaining project-specific financing, while larger firms had the option of using balance-sheet financing (owing to their large capital base or assets held in non-RE related sectors). According to some firm representatives, rates of interest and loan tenures (both important determinants of a project's IRR), could be better. Given that most RE costs are up-front costs, the availability of financing mechanisms and options, including direct subsidies and grants that could alleviate such costs, are seen

47. Such a process would require officials to explicitly reject an application and provide written explanations for the reasons they did so; unless rejected, an application would automatically be considered approved. (See Unleashing the Potential of RE in India, South Asia Energy Unit Sustainable Development Department and ESMAPThe World Bank, 2010.)

as desirable. Also mentioned was the need to make the CDM more easily accessible and less administratively cumbersome.

A federal system of governance creates opportunities as well as challenges. Solar PV firms pointed to the diversity of taxes on solar equipment from state to state, some of which were considered burdensome. State-level enforcement of RPOs was also an issue, as were timely payments by state electricity boards. On the other hand, federalism has helped create space for regulatory autonomy, which has enabled some states to move faster than

Figure 5.1 Project allocation and development cycle of a small hydro power project in Himachal Pradesh



Note: SNA/SREDA: state nodal agency or state renewable development agency (HIMURJA in Himachal Pradesh); PFR: prefeasibility report; DPR: detailed project report; HPSEB: Himachal Pradesh State Electricity Board (state utility); IPH: (state) Department of Irrigation and Public Health; MoU: Memorandum of Understanding; TEC: technical and economic clearance; IA: implementation agreement; EME: electromechanical equipment.

Source: *Unleashing the Potential of RE in India,* South Asia Energy Unit Sustainable Development Department and ESMAP, The World Bank, 2010.

others in terms of providing investors with access to land and clearances. The states of Rajasthan and Gujarat were noted for their efforts to facilitate investments in solar energy. The state of Himachal Pradesh was noted for its support of small hydro; Figure 5.1 shows the procedures and agencies involved.[48]

Access to both data and grids is vital. Renewable power firms require access to grids to enable easy evacuation of the power generated from all renewable sources. A clear and predictable policy regarding grid access was seen as essential if firms are to meet their responsibilities to construct and maintain such facilities, as well as negotiate rights of way for transmission lines with third parties, when required. For wind and solar, access to reliable data on wind speeds and solar radiation would enable firms to select locations that provide maximum return on investment. Such data would also enable investors to more accurately estimate revenue streams, which is essential for obtaining project financing from commercial banks.

Technology costs are important, but so is performance. Power generation firms place a great deal of importance on cost-effective technology, whether domestically produced or imported. They also emphasize the need for stable and durable performance—a factor that is vital to calculating revenue streams and to winning the confidence of commercial banks still unsure about renewable technologies (primarily solar), which have not been widely tested under Indian conditions.

The investors also noted, in relation to wind, that the prevailing cap on generation-based incentives penalizes firms that use the most efficient technology, as they reach the cap sooner due to their higher productivity. Some suggested that incentives could be designed to benefit the most efficient and productive firms. There were also concerns about ensuring the quality of equipment. Power generation firms would like the freedom to procure the best and most cost-effective equipment globally. However, some domestic manufacturing firms expressed concern about unfair competition from certain countries, and argued that given a bit of breathing space, Indian manufacturers could emerge as cost-effective producers of most RE technologies. Some manufacturers stressed that power generation firms are already benefiting from the market for domestic wind turbines, and would further benefit from an established domestic manufacturing presence for solar cells.

Transparency and good governance are essential but not always present. Some firms alluded to non-transparency in the bidding and allotment process, and in loan disbursements. In certain cases, firms with no prior experience in delivering solar projects have been selected simply because they submitted the lowest bids. Investors also see the need for greater clarity on the proposed value-added tax (VAT), since it has the potential to neutralize the tax benefits given to RE firms. Streamlining the onerous clearance process would also facilitate the reduction of corrupt practices. On the issue of transparency, investors said they welcomed initiatives, such as the JNNSM, which provide open access to detailed data necessary for siting and estimation of revenues. Easy access to land and the need for government to control speculative land grabbing emerged as an issue for some investors. Certain states fared better than others in facilitating access to land for RE projects, with Gujarat being a notable example.

48. Unleashing the Potential of RE in India, South Asia Energy Unit Sustainable Development Department and ESMAP, The World Bank, 2010.

Table 5.1: Other Sector-specific issues highlighted during consultations — India

Sector	Issues/Challenges Identified	Respondent Firm Type
Cross-cutting	❖ Need for easier access to project-specific financing for smaller firms	Indian firm/start-ups and with a pure IPP profile (i.e. little or no vertical and horizontal integration)
Roof-top Solar PV	❖ Need for effective implementation of Net Metering Regulations and provision of Net Metering Equipment	Diverse
Biomass	❖ Need to ensure reliable supply of biomass feedstock through a good network of supply chains and curb price fluctuations. ❖ Alternatively allow power tariff to rise proportionate to a rise in fuel costs. ❖ Effective implementation of zoning restrictions to enable not more than a certain number of firms with a limited radius to ensure economies of scale and reduction in transport costs through a reliance on local feedstock. ❖ Check unscrupulous practices by middle-men that create artificial scarcity.	Indian firms/ Pure IPPs
Wind	❖ Facilitate imports of equipment from all over the world to ensure access to best equipment at competitive prices. Protection of domestic manufacturers will be counter-productive.	Global horizontally and vertically integrated equipment manufacturing firm

Sri Lanka

The focus of the consultations in Sri Lanka was on net metering and the potential for grid-connected solar projects. Grid-connected solar has been in place since 2007, through net metering, which is still at a nascent stage. The approach does not involve actual payments to a supplier into the grid. Instead, excess solar energy produced by a captive user can be fed into the grid, and the value is offset against the consumer's electricity bills.

Financing is essential for deployment of net metering: Net metered projects are not eligible for RERED funding or grants.[49] Investors flagged this as a significant shortcoming, since

49. The RE for Rural Economic Development (RERED) Project. It is a market based Project of the Government of Sri Lanka (GOSL) supported with financial assistance from the World Bank and Global Environment Facility, and implemented by Development Finance Corporation of Ceylon (DFCC) Bank. The RERED Project aims to expand the commercial provision and utilization of renewable energy resources, with a focus on improving the quality of life in rural areas by using electricity as a means to further income generation and social service delivery. Source: http://www.energyservices.lk/

borrowing from commercial banks carries a high interest rate. They emphasized the need for incentives and subsidies for net metered projects.

Clarity, consistency and speedy clearances are required for effective operationalization of net metering. Firms involved in the consultations pointed to a lack of clarity—and lack of commitment on the part of utilities—concerning the procedures for establishing net metering. While one of the two transmission companies in Sri Lanka—the CEB—seems to have indicated that credits will be carried forward for 10 years, the second company—Lanka Electric Company (LECO)—has indicated that the credits will lapse after a shorter period. There also is no mechanism to allow for utilities to pay producers for accumulated credits. Further, the time required to obtain relevant permits and clearances is unnecessarily long.

Financing and policy predictability are both essential for the success of grid-connected solar parks. There was a general perception that the Government's efforts to attract private sector investment through the establishment of solar parks would be ineffective without appropriate financing schemes and other incentives. Many firms also suggested that the Government should not establish preferential tariffs, but that allowing tariffs to be negotiated between producers and the utilities would be more conducive to private investment.

Pakistan

A number of private sector firms praised the efforts of the Government of Pakistan to create an attractive investment climate for RE producers. However, they called for more effective implementation of existing laws and regulations and greater transparency, as well as measures to alleviate Pakistan's negative investment image caused by the prevailing political and security situation.

Many of the issues faced by Pakistani firms echo those in India and Sri Lanka, such as access to easy financing options and effective implementation of laws and regulations. However, one distinct issue that arose repeatedly during the consultations was that Pakistan's security climate is driving away potential investors—despite one of the most attractive terms and conditions offered by any government in South Asia, notably a guaranteed rate of return of nearly 18 percent. Several firms called for some sort of international political and security risk guarantee mechanism to be provided by international institutions.

Existing laws need to be effectively implemented. A major problem facing RE firms in Pakistan is the weak implementation of RE laws and regulations. For instance, while FiT for various RE sources exist on paper, in actual practice, tariffs are set through a process of negotiations between the relevant authorities and power companies.

Administrative costs need to be reduced. RE in Pakistan comes under the purview of a number of agencies (see Table 5.2). In certain sectors such as small hydro, the entrepreneur has to obtain both provincial and federal-level clearances, and the lack of efficient coordination among these agencies leads to delayed implementation and increases administrative burdens and costs for the entrepreneur. There was also a need for speedier, less political process of obtaining clearances. Private sector groups have suggested the creation of a single agency—the Energy Administration Authority (EAA)—and this needs to be pursued.

Table 5.2: Processing Schedule for solicited projects in Pakistan

Activity	Typical Allowance (Days)
a. Prequalification of bidders for specific projects at sites identified by the AEDB/Provincial/AJK Agency, which shall invite sponsors for registration and for collection of prequalification documents through public advertisement	30
b. Submission of prequalification documents by sponsors to the AEDB/Provincial/AJK Agency	30
c. Evaluation of prequalification documents and notification of prequalified bidders by the AEDB/Provincial/AJK Agency	15
d. Requests for proposals (RFPs) from prequalified bidders issued by the AEDB/Provincial/AJK Agency and collection of bidding documents by prequalified bidders	30
e. Submission of bids to the AEDB/Provincial/AJK Agency, together with bid bond and evaluation fee	90
f. Evaluation of bids by the AEDB/Provincial/AJK Agency, including preliminary tariff determination, and notification of successful bidder	30
g. Posting of Performance Guarantee by successful bidders	15
h. Issuarnce of Letter of Support (LoS) by the AEDB/Provincial/AJK Agency after determination of final tariff by NEPRA	7
i. Issuance of Generation License and Tariff Determination by NEPRA	15

Note: Indicated time alowance represents maximum processing period.

Source: *Policy for Development of Renewable Energy for Power Generation Employing Small-Hydro, Wind, and Solar Technologies,* Government of Pakistan, 2006.

Difficulties in obtaining finance. Access to finance was also mentioned as being very important, especially in sectors such as solar PV, where initial investment is high. Many firms find it very difficult to obtain easy access to finance. More concessional loans were suggested, particularly for smaller players.

Cost-effective access to both land and equipment is critically important. Access to land remains a serious constraint to investment. Most land is controlled by the provincial governments, and none has a system in place for allocating land to the private sector at cost-effective rates. Private land is also quite expensive. Investors also noted the need for cost-effective access to equipment and inputs. For wind, as there is no manufacturing in Pakistan, customs duties are zero for wind equipment. But for solar cells and modules, prevailing duties continue to be high—up to 50 percent—which raises investment costs for solar PV producers. For biomass, opportunities to facilitate imports and technology transfer from India needs to be explored, with institutions such as the World Bank playing a facilitating role.

Table 5.3: Other sector-specific issues highlighted during consultations — Pakistan

Sector	Issues/Challenges Identified	Respondent Firm Type
Cross-cutting	❖ Lack of RE data was an issue especially for sectors such as solar and wind. Even though data in certain regions were available, there were barriers to firms who wished to buy the data. ❖ There was a lack of information and awareness in Pakistan regarding various quality standards and certification for RE equipment. This lack of information and awareness is an area where international agencies could step-up training activities.	Diverse
Wind	❖ Cost-escalation has occurred due to a depreciation of the Pakistani rupee vis a vis the dollar. This requires regulatory authorities to be responsive to demands for tariff increases.	Pakistani firm/ Wind IPP
Biomass	❖ Biomass does not figure in Pakistan's 2006 RE Policy. There is a need for up-front tariffs for biomass as in the case of wind instead of project-by-project negotiations as happens at present. ❖ In addition to cost-effective technology access, another critical issue as far as biomass in Pakistan is concerned is pelletization. Unlike India, there is a lack of pelletization and pellet manufacture in Pakistan. Pellets would enable biomass raw material to be processed and stored over a longer period of time. Pakistan could learn from the success of India in this regard as well as in enabling a low project cost for biomass projects. Equipment and technologies need to be made available at the lowest cost possible: Here too steps could be taken to facilitate easier imports from India. Institutions such as the World Bank and others should facilitate greater co-operation between India and Pakistan in this regard. ❖ Prices of feedstock should be set in a manner that assures a fair return to farmers as well as mill-owners and also enables cost-effective access of raw material to power producers. ❖ Raw material availability as well as price stability of raw-material is important for biomass. There is a need for zoning laws and regulations which do not permit more than a certain number of biomass plants within a given radius. This will ensure greater availability of raw-material for the plant that is established.	Pakistani firm/ biomass IPP and horizontally integrated IPP (cross-sectoral)

Bangladesh

Clear and supportive policies are needed. Firms in Bangladesh highlighted the need for a clear set of laws and enabling framework to realize effective deployment of RE. So far such clarity has been missing. There is, for instance, no law on net metering, which would encourage rooftop solar. The Government recently issued an order making it mandatory for new residential and commercial establishments to install solar panels as a condition for securing an electricity connection. While the aim is laudable, the initiative lacks supportive aspects, such as financial help for installation costs, which are likely to be more effective.

RE investors must keep in mind the agrarian nature of the country's economy. Most of the projects in Bangladesh are off-grid in nature, as the existing grid cannot meet the rising energy demand. Given the largely agrarian and rural nature of the economy, RE opportunities are primarily in applications such as water pumping, which presently rely on expensive diesel generators, given the intermittent electricity supply.

Access to finance is still a difficult issue for small-scale projects. Non-profit organizations are an important vehicle for RE technology diffusion in Bangladesh, given their involvement in micro-credit and the small-scale, off-grid nature of RE deployment in most of the country. Commercial interest rates are typically in the range of 11-14 percent for RE projects, although the Government sometimes provides loans at lower rates for the purchase of capital equipment. Institutional actors such as Asian Development Bank and World Bank are active in efforts to expand deployment of RE, although it was noted that large institutional actors are interested mainly in large-scale projects. A programmatic approach with clustering of similar projects was suggested so that smaller private sector players can benefit from these institutional efforts.

There is a need to establish and scale-up local manufacturing and technological collaboration. Some firms pointed to current efforts to manufacture the hardware required for RE deployment, such as batteries and charge controllers. Bangladesh would benefit from technology transfer and private sector collaboration with countries such as India, which are more advanced in this area. Indian companies are already actively involved in areas of RE technology deployment such as solar-powered mobile towers.

Table 5.4: Other sector-specific issues highlighted during consultations — Bangladesh

Sector	Issues/Challenges Identified	Respondent Firm Type
Cross-cutting	❖ There is a need for greater transparency in the procurement process for RE products for government-led/financed projects. At present the purchasing process is arbitrary.	Bangladesh domestic solar energy equipment dealer.
Solar PV	❖ In urban areas rooftop solar has a lot of potential as it avoids the need to secure land required for large-scale utility projects. However, no law exists in Bangladesh on net-metering which would encourage roof-top solar. ❖ Solar PV panels could be imported free of cost but there is currently a steep duty of 60 percent or more on components required to manufacture solar panels. Such restrictions discourage the growth of domestic manufacturing of these panels in Bangladesh and needs to be removed.	Bangladesh horizontally integrated solar energy equipment dealer.

Sector	Issues/Challenges Identified	Respondent Firm Type
Wind	❖ There is a need for a comprehensive wind-mapping and the data should be made accessible to the private sector.	Diverse

Nepal

Given the relatively nascent and off-grid nature of solar, wind, and biomass in Nepal, consultations with the private sector focused on the small hydro sector. One issue that was interesting from a regional energy trade perspective is hydro power exports to India. Private sector firms generally felt that easier access to the Indian market would lead to the rapid scale-up of hydro sector investments in Nepal. Nepal could then import power from India during the dry season, and export surplus power during the wet season—much more than the presently insignificant levels of trade—leading to a 'win-win' situation for both countries. However, they were concerned that large hydro would benefit from this access much more than small hydro, given the high fixed costs (including transmission lines) of installations that could supply the Indian market.

Lack of transmission facilities is a serious constraint to investment in grid-connected small hydro projects.

Delayed clearances are often an issue due to lack of coordination among various government departments. The process is presently streamlined, for smaller projects of less than 50 MW, for which only a simple Environmental Impact Assessment (EIA) is needed, compared to the full range of environmental clearances required for larger projects.

Capacity specifications can be a burden. The Nepal Electricity Authority buys all the power produced by plants of less than 25 MW, provided that they generate at full capacity at least 40 percent of time (i.e., Q40 plants). Firms expressed concern that during the wet season, unless the surplus power generated can be exported, it will be wasted, and producers will incur a loss. Developers are also concerned that, in the absence of a larger market, the Q40 requirement means the plants cannot be designed to optimize costs.

Access to equipment and inputs for small hydro projects was perceived to be largely free of barriers. The zero VAT and one percent customs duty were considered attractive, as were the 7 to 10-year tax holidays. Only construction materials incur a duty, and the Government could help small hydro firms by reducing or eliminating this as well.

6

CONSTRUCTING A CLIMATE INVESTMENT READINESS INDEX (CIRI)

The study undertook a comparative assessment of the investment environment for grid-connected renewable energy and energy efficiency in a select group of South Asian and comparator countries. Details on country selection were explained in section 2 on methodology. The objective was to determine whether these countries have policies, regulations, and incentives designed to attract investments in RE generation and EE, at least on paper, and how they rank when compared with each other. The overall rankings for each sector—solar PV, onshore wind, small hydro and biomass—are based on consolidated CIRI scores for every country.

The indicators selected were based on an extensive survey of literature on some of the main policies, regulations and incentives introduced by countries to attract private sector investment in RE, as well as enable greater diffusion of EE products and techniques. The selected indicators are illustrated in Box 6.1.

For RE, each indicator was assigned a weight of 1, and the weighted score for each indicator was found by multiplying the score for presence or absence.

Thus, in the **presence of an indicator, the weighted CIRI score (WS)** would be:

(policies, regulations and incentives Score =1) X (Assigned Weight=1) == **1**

In the **absence of an indicator, the weighted CIRI score (WS)** would be:

(policies, regulations and incentives Score =0) X (Assigned Weight=1) = = **0**

A slightly different approach to scoring has been followed for policies, regulations and incentives for EE. As one of the indicators—namely, mandatory minimum energy

performance standards (MEPS) and labeling initiatives—is a function of the number of appliances covered by such initiatives, there is no maximum ceiling and no absolute total score. Mandatory standards are obviously much more important than voluntary standards for creating a conducive climate for the diffusion of EE appliances. If similar scores were given for both mandatory as well as voluntary standards, then country A, for instance, could enjoy a high total CIRI score if it had a large number of appliances covered by voluntary standards and none under mandatory standards, whereas it may actually be country B that has a more attractive investment climate due to the presence of mandatory standards.

To reinforce the importance of mandatory standards for lighting, appliances, and building codes, mandatory labeling schemes or minimum energy performance standards are given a scoring weight of 2. Thus for the presence of a single mandatory standard in lighting, a country would receive a score of 1 and a weight of 2, giving it a weighted score of 2. If there are 7 mandatory standards, the country would get a score of 7 and a weighted score of 14. For the presence of voluntary standards in lighting, by contrast, a country would get a weighted score of 1 per standard, so that 1 standard would yield a score of 1, for example, and 7 standards would yield a weighted score of 7.

The resulting total score for each country has been taken as the CIRI consolidated score for EE sectors in the country. The consolidated score reflects the overall regulatory attractiveness of a country. However, it does not indicate the effective implementation of these policies, regulations and incentives, or how the private sector may view them; nor does it capture the geographical and sectoral scale or financial depth of individual EE schemes or projects that may exist in any country.

For comparator countries (both developing and developed) outside of South Asia, CIRI scores were ascertained for solar PV and onshore wind, based on an examination of secondary literature on regulatory policy frameworks in those countries. For small hydro and biomass, select emerging and high GHG-emitting developing countries were selected from Asia, Africa, and Latin America. Among OECD countries, Australia and Japan were included but European countries were excluded for these two sectors as well as for EE. CIRI scores for select European countries were, however, included for solar PV and onshore wind, since Europe has witnessed rapid growth in such installations—particularly in Spain and Germany. Given the large number of sub-federal initiatives, the United States was not included at this time for comparative purposes.

The lists are by no means exhaustive, but they do provide a fair indication of some of the key elements that a country needs to have in place to give a clear signal to private investors.

Renewable Energy

For renewable energy, as noted in section 2, the decision was made to focus on grid-connected electric power generation, as this is the focus of activity in both developed and developing countries, and thus provides easier comparability. Certain indicators, such as RE targets and tax incentives on equipment purchases, are relevant for the expansion of both grid-connected and off-grid RE; but otherwise the two are quite different in terms of the policies, regulations and incentives that matter for attracting investment. The availability of equipment financing schemes and other consumer subsidies, in fact, matter much more in the case of off-grid RE, since they are often targeted at poor communities in remote areas untouched by the electricity grid network.

Box 6.1: Key indicators for construction of CIRI

	Cross-cutting Indicators
1	Existence of RE Policy and Law
	• *Re Policy*
	• *Re Law*
2	Existence of RE Target
3	RE Purchase/Off-take Obligation
4	Availability of Tradable Instruments for RE
	Sector-Specific Indicators for Solar PV, Wind, Biomass and Small Hydro
5	Preferential Tariffs for Solar/Wind/Biomass/Small Hydro
6	Grants/Subsidies/Incentives related to Capital/Investment Tax Credits
7	Incentives Linked to Generation/Production Tax-credits
8	Income Tax Holidays/Exemptions
9	Trade-related Incentives
	• Customs Duty Exemptions
	• Absence of Local Content Requirements
10	Other Tax Exemptions (VAT, Excise etc.)

An examination of the presence or absence of these policies, regulations and incentives in South Asia reveals that India, as expected, scores high for the presence of both cross-cutting and sector-specific policies, regulations and incentives. Only in wind-specific policies, regulations and incentives does Pakistan score above India, due to Pakistan's income tax holidays. India is the only country that has deployed tradeable instruments to facilitate entities' obligation to purchase RE. Pakistan scores higher than Sri Lanka for the presence of policies, regulations and incentives in all sectors. A higher CIRI score, however, does not mean that a country is attracting higher levels of investment or even that it offers a better climate for RE investors. It merely indicates that a country has put in place more policies, regulations and incentives to *attract* investors. Whether this contributes to creating a more attractive investment climate depends on a number of other factors, including effective implementation. As the findings from the private sector consultations reveal, many investors, particularly foreign firms, are still hesitant to invest in Pakistan owing to the prevailing political and security climate, despite the offer of very attractive terms and conditions.

The tables below indicate the existence or absence of policies, regulations and incentives for grid-connected RE investment in India, Pakistan and Sri Lanka. Scores are on a scale of 10 (which indicates the presence of all the key RE policies, regulations and incentives). The presence of an indicator gives a country a score of 1 and its absence a score of zero. Equal weights (carrying a value of 1) have been assumed for each indicator set. One can, in principle, change the weights of various categories to arrive at a revised scoring scheme. However, care must be taken to ensure that the weighting schemes are consistent with private sector perceptions of the policies, regulations and incentives. As noted earlier, Nepal, Bangladesh and Maldives have

not been included in the scoring due to their emphasis on off-grid deployment and relatively underdeveloped state of grid-connected RE, as well as the absence of required policies, regulations and incentives.

Table 6a: Cross-cutting grid-connected RE policy, regulation and incentives: CIRI scores for India, Pakistan and Sri Lanka

	Cross-cutting Grid-Connected CIRI Indicators	India Weighted Score	Pakistan Weighted Score	Sri Lanka Weighted Score
1	Existence of Law and Policy on Renewable Energy	1	1	1
a	*Existence of RE Policy*	*0.5*	*0.5*	*0.5*
b	*Existence of RE Law*	*0.5*	*0.5*	*0.5*
2	Existence of RE Target	1	1	1
3	Obligation for Designated Entities to Purchase/Off-take RE	1	1	1
4	Availability of Tradeable Instruments for RE Generation	1	0	0
Total		4	3	3

Table 6b: Solar PV-grid-connected RE policy, regulation and incentives: CIRI scores for India, Pakistan, and Sri Lanka

	Grid-connected Solar PV CIRI Indicators	India	Pakistan	Sri Lanka
1	Availability of Designated Preferential Tariffs for Solar PV Power	1	0	0
2	Grants, Subsidies and Incentives Related to Capital/Investment Tax Credits	1	1	0
3	Incentives Linked to Generation/ Production Tax-Credits	1	0	0
4	Income-tax Holidays/Exemptions	1	1	1
5	Trade-related Incentives	0.5	1	1
	-Customs-duty exemptions (zero duty on major components and equipment)	*0.5*	*0.5*	*0.5*
	-Absence of 'local-content' requirements for power producers	*0*	*0.5*	*0.5*
6	Other Tax-exemptions (Sales, VAT, Energy Tax, etc.)	1	1	0
Total		5.5	4	2

Table 6c: Onshore Wind-grid-connected RE policy, regulation and incentives: CIRI scores for India, Pakistan, and Sri Lanka

	Onshore Wind Grid-Connected CIRI Indicators	India	Pakistan	Sri Lanka
1	Availability of Designated Preferential Tariffs for Onshore Wind Power	1	1	1
2	Grants, Subsidies and Incentives Related to Capital/Investment Tax Credits	1	0	0
3	Incentives Linked to Generation/ Production Tax Credits	1	1	0
4	Income-tax Holidays/Exemptions	0	1	1
5	Trade-related Incentives	0.5	1	1
	-Customs-duty exemptions (zero duty on major components and equipment)	*0*	*0.5*	*0.5*
	-Absence of 'local-content' requirements for power producers	*0.5*	*0.5*	*0.5*
6	Other Tax-exemptions (Sales, VAT, Energy Tax, etc.)	1	1	1
Total		4.5	5	4

Table 6d: Small hydro grid-connected RE policy, regulation and incentives: CIRI scores for India, Pakistan, and Sri Lanka

	Small-hydro Grid-Connected CIRI Indicators	India weighted score	Pakistan weighted score	Sri Lanka weighted score
1	Availability of Designated Preferential Tariffs for Small-hydro Power	1	1	1
2	Grants, Subsidies and Incentives Related to Capital/Investment Tax Credits	1	0	0
3	Incentives Linked to Generation/ Production Tax Credits	0	1	0
4	Income-tax Holidays/Exemptions	1	1	1
5	Trade-related Incentives	0.5	1	0.5
	-Customs-duty exemptions (zero duty on major components and equipment)	*0*	*0.5*	*0*
	-Absence of 'local-content' requirements for power producers	*0.5*	*0.5*	*0.5*
6	Other Tax-exemptions (Sales, VAT, Energy Tax, etc.)	1	0	0
Total		4.5	4	2.5

Table 6e: Biomass grid-connected RE policy, regulation and incentives: CIRI scores for India, Pakistan, and Sri Lanka

	Biomass Grid-Connected CIRI Indicators	India weighted score	Pakistan weighted score	Sri Lanka weighted score
1	Availability of Designated Preferential Tariffs for Biomass Power	1	0	1
2	Grants, Subsidies and Incentives Related to Capital/Investment Tax Credits	1	0	0
3	Incentives Linked to Generation/ Production Tax Credits	0	0	0
4	Income-tax Holidays/Exemptions	1	1	1
5	Trade-related Incentives	0.5	1	0.5
	-Customs-duty exemptions (zero duty on major components and equipment)	*0*	*0.5*	*0*
	-Absence of 'local-content' requirements for power producers	*0.5*	*0.5*	*0.5*
6	Other Tax-exemptions (Sales, VAT, Energy Tax, etc.)	1	1	0
Total		4.5	3	2.5

Consultations with the private sector in South Asia, as well as existing literature on the subject, reveal that the two elements most critical for attracting private sector investment in RE are the *attractiveness* and *stability* of the power purchase tariff (i.e., a preferential tariff and the length of time for which it will be available, to allow for more stable returns). Perceptions of what constitutes an attractive tariff will vary from country to country, depending on local investment costs and conditions.

In addition to stability of the power purchase tariff, other critical elements include some assurance that the RE generated will be purchased, as well as accelerated depreciation and other investment-related incentives that reduce up-front investment costs. Policy stability is also necessary to make calculations of returns on investment more predictable. An unpredictable policy environment (where policies, regulations and incentives are altered or dropped without warning) will not be attractive to private investors. The CIRI score tables above do not attempt to measure the *degree of policy stability,* which can be gauged only through private sector interactions and detailed surveys in each country context. As a general rule, however, longer time-frames for maintaining policies, regulations and incentives (for preferential tariffs, firms often cite at least 20 years) is a good indicator of policy stability. As many countries in the developing world, including those in South Asia have only recently started introducing policies, regulations and incentives, it may take a while before the degree of stability can be properly ascertained.

The consolidated CIRI scores for India, Pakistan and Sri Lanka for each sector are shown in tables 6f, g, h and i below. These scores were obtained by adding the scores for cross-cutting policies, regulations and incentives (common to all sectors) with the sector-specific CIRI scores. The cross-cutting, sector-specific and consolidated RE CIRI score tables for select countries outside South Asia are provided in Annex B.

Table 6f: Consolidated CIRI scores for grid-connected Solar PV for India, Pakistan and Sri Lanka

Country	Cross-cutting CIRI Scores (A)	Grid-connected Solar PV CIRI Score (B)	Consolidated Solar PV CIRI Score (A+B)
India	4	5.5	9.5
Pakistan	3	4	7
Sri Lanka	3	2	5

Table 6g: Consolidated CIRI scores for grid-connected Onshore Wind for India, Pakistan and Sri Lanka

Country	Cross-cutting CIRI Scores (A)	Grid-connected Onshore Wind CIRI Score (B)	Consolidated Onshore Wind CIRI Score (A+B)
India	4	4.5	8.5
Pakistan	3	5	8
Sri Lanka	3	4	7

Table 6h: Consolidated CIRI scores for grid-connected Small hydro for India, Pakistan and Sri Lanka

Country	Cross-cutting CIRI Scores (A)	Grid-connected Small-hydro CIRI Score (B)	Consolidated Small hydro CIRI Score (A+B)
India	4	4.5	8.5
Pakistan	3	4	7
Sri Lanka	3	2.5	5.5

Table 6i: Consolidated CIRI scores for grid-connected Biomass for India, Pakistan and Sri Lanka

Country	Cross-cutting CIRI Scores (A)	Grid-connected Biomass CIRI Score (B)	Consolidated Biomass CIRI Score (A+B)
India	4	4.5	8.5
Pakistan	3	3	6
Sri Lanka	3	2.5	5.5

Comparative Analysis of Renewable Energy CIRI Scores for South Asia and Other Countries

How does South Asia fare in terms of the presence of RE policies, regulations and incentives compared with countries outside the region? Tables 6a thru 6i and the Annex B table are revealing. In sectors such as onshore wind, countries with a very good record in installed

wind power capacity, such as China and India, come out with high scores. However, a number of European countries with a good wind power presence, such as Spain, UK and the Netherlands, score lower than, for example, the Philippines. This trend of traditionally dominant countries scoring lower than new-comers is also seen in other RE sectors, such as solar PV. One obvious reason for this counter-intuitive finding is that a number of countries have geographical advantages for certain RE resources such as solar and wind, as well as an attractive market in terms of population numbers with a certain purchasing power capacity. Countries that may not have these advantages or are new entrants may need to offer significant incentives to make it worthwhile for the private sector to establish a presence, until the market develops and the costs of RE deployment come down.

In terms of the presence of cross-cutting framework elements, India is in the same category as Asian countries that have put in place overarching RE policies and laws, including China, Indonesia, Japan, Philippines, Indonesia and Kazakhstan, as well as the major economies of Europe, Australia, Mexico and South Africa. For solar and wind-specific policies, regulations and incentives, India and Pakistan's CIRI scores are comparable to those of China, Vietnam and Philippines in East Asia. India, in fact, scores higher than most countries in Europe, Latin America and Africa for solar-specific policies, regulations and incentives; and India, Pakistan and Sri Lanka all score higher than most European, Latin American and African countries as well as Australia for wind-specific policies, regulations and incentives.

These findings highlight the fact that countries with lower sector-specific CIRI scores may fall into the category of either more mature markets (as in Europe) that need to rely on fewer incentives to attract wind investments; or else immature or very early-stage markets that have not yet developed investment incentives. Rapidly growing and emerging countries generally reflect higher sector-specific CIRI scores. A higher score can also reflect recognition of the potential of renewables by pro-active policy-makers and their desire to attract investment as quickly as possible. The Philippines is a notable example in Asia. Consolidated solar PV and onshore wind index scores put the South Asian countries in the top league among countries from both Asia as and Western Europe. Russia and Ukraine fare rather poorly.

A similar picture is emerging for small hydro and biomass. India once again scores high for the presence of policies, regulations and incentives for both sectors, whereas Pakistan and particularly Sri Lanka reflect lower scores similar to those of a number of Latin American and many Asian countries. Japan surprisingly obtains low CIRI scores in many RE sectors—more similar to Sri Lanka. Once again this reflects the fact that the Japanese market may not require certain types of incentives (perhaps owing to higher prevailing electricity prices). Reliance on cheaper alternative forms of energy such as oil and gas in Russia and nuclear in Japan may also have a role in explaining their lower CIRI scores, despite a higher level of wealth than many Asian and Latin American countries that score better. Two countries in the MENA region—Egypt and Iran—with an under-developed potential for RE development, both have low CIRI scores, indicating the need to develop a more robust policy, regulatory and incentive framework.

Energy Efficiency

Unlike the scale of 10 used for scoring policies, regulations and incentives in RE, there is no perfect total score for EE. This is because in addition to scoring for the *presence* of policy, regulatory and incentive indicators, countries are also scored based on the number of appliances covered by mandatory minimum energy performance standards and labeling (which carries a weight of 2). Such an approach means that country A with 10 mandatory

standards and 20 voluntary ones gets a higher score than a country with 5 mandatory standards and 100 voluntary ones. From the perspective of deployment of EE appliances, there is a higher probability that mandatory standards will be implemented as compared to voluntary standards. Therefore it is appropriate to give a higher CIRI scores based on the number of appliances covered by mandatory standards and labeling schemes, but to keep the score and weight constant at 1, irrespective of how many appliances are covered by voluntary standards or labeling schemes.[50] The weighted EE CIRI scores for India, Pakistan and Sri Lanka are given below in Table 6j.

Table 6j: Energy Efficiency CIRI scores for India, Pakistan and Sri Lanka

Energy Efficiency CIRI Indicators	India Weighted Score	Pakistan Weighted Score	Sri Lanka Weighted Score
Cross Cutting			
Existence of Law and Policy on EE	1	0.5	0.5
Existence of EE Policy	0.5	0.5	0.5
Existence of EE Law	0.5		
Existence of EE Targets	1	0	0
Designated Implementing Institution/Department	1	1	1
Availability of Trading Schemes/Tradeable Instruments for Energy-efficiency	1	0	0
Existence of Procurements for Energy-efficient Products/Construction	0	0	0
Lighting			
Existence of Voluntary Standards/Labeling Schemes for Lighting	1	0	1
Existence of Mandatory Minimum Energy Performance Standards for Lighting (Score equals number of lighting appliances)	2	2	0
Existence of Mandatory Labeling Schemes for Lighting (Score equals number of lighting appliances)	2	0	2
Subsidies/Incentive Programs Available for EE Lighting	1	0	0
Applicances			
Existence of Voluntary Standards/Labeling Schemes for Electric Appliances	1	0	0
Existence of Mandatory Minimum Energy Performance Standards for Electric Appliances (Score equals number of appliances)	6	0	0
Existence of Mandatory Labeling Schemes for Electric Appliances (Score equals number of appliances)	6	0	0
Building			
Existence of Voluntary Green-building Codes	1	0	1
Existence of Mandatory Green-building Codes	2	0	2
Subsidies/Incentives Available for 'Green-Construction'	1	0	0
Total	**27**	**3.5**	**8**

50. Information and numbers for lighting and electrical appliances have been obtained from the Collaborative Labelling and Appliance Standards Program (CLASP) at http://www.clasne.org/index.php. Ballast related standards and labels have been included under the category of 'Lighting'.

The CIRI scores for EE reveal that, within the South Asian region, India is well ahead in terms of relevant policies, regulations and incentives as well as institutional structures for EE. India's high scores are largely due to a larger number of electric appliances being covered by mandatory energy performance standards, as well to the higher weights assigned to building codes. India has also introduced a trading scheme for EE credits—the first of its kind in South Asia. As EE initiatives get underway in other South Asian countries and more mandatory standards are introduced, the climate for diffusion of energy efficient appliances will certainly improve. However, India—due to the sheer size of its market, coupled with strong economic growth and its imperatives for energy conservation, energy security and greenhouse gas reductions—is likely to remain the most attractive market for energy-efficient products in South Asia.

Comparative Analysis of Energy Efficiency CIRI Scores for South Asia and Other Countries

The absolute scores obtained in the case of EE policies, regulations and incentives in some ways provide a more robust and quantitative basis to assess where countries stand in terms of the environment to deploy energy-efficient products. This is because while the presence of voluntary standards and labeling initiatives are acknowledged with a nominal score, countries are really rewarded for the presence of mandatory standards and labeling initiatives (which carries a greater weight of 2). Further, the more appliances that are covered by mandatory standards and labeling initiatives, the higher the CIRI score that countries may chalk up.

As shown by the table in Annex C, the CIRI scores for EE broadly appear to correlate to levels of development, as reflected by the high scores of Japan and Australia and of emerging countries such as Brazil and Mexico in Latin America. China scores particularly high, reflecting the realization among policy-makers of the need to save energy, given the high energy intensity of its economy and increasing reliance on fossil fuel imports. While India has put in place a sound regulatory framework and certain sophisticated measures (such as tradeable EE certificates), overall it scores much lower than China and other countries in Asia (Thailand and the Philippines) and Latin America (Brazil and Mexico) in terms of weighted EE policies, regulations and incentives. India's situation in EE is more comparable to Indonesia in Asia and Argentina in Latin America, and it performs better than Egypt, South Africa, Peru and even Malaysia. The main reason for India's lower EE CIRI score is the comparatively low number of lighting and electrical appliances covered by mandatory labeling schemes or minimum energy performance standards (MEPS).

In the cases of Pakistan and Sri Lanka, a low score for mandatory labeling, coupled with missing broader indicators such as EE targets and a lack of green building codes, explain why they score lower than India.

CONCLUSION AND NEXT STEPS

It is clear that investment in RE and EE will continue to expand, driven by government policies, regulations and incentives as well as underlying macro strengths. Policies, regulations and incentives will continue to exert influence over investment decisions. As costs of RE and EE technologies decline and renewable power becomes comparable in cost and reliability to power generated from fossil fuels, the need for additional incentives will decline. As this trend progresses, it will be useful to analyze the correlation between policies, regulations and incentives and investment flows into the RE and EE sectors. From a survey of the literature and of regulatory frameworks worldwide, there appears to be a broad set of policies, regulations and incentives that countries usually put in place. For RE, these include preferential tariffs, RE purchase obligations or portfolio standards, income and equipment tax breaks and incentives (for producers and/or consumers), as well as incentives linked to capital and/or generation cost. For EE, the main policies, regulations and incentives include minimum energy performance standards, voluntary and mandatory labeling schemes, and incentives or tax breaks for the sale and purchase of energy-efficient products. Countries may differ in the specific design of these policies, regulations and incentives, choosing those that may be most appropriate for prevailing conditions in the country.

As evident from South Asia, countries may also be at various levels of evolution with regard to the introduction of policies, regulations and incentives. Consultations with the private sector, however, have made it clear that in addition to macroeconomic indicators and the presence of policies, regulations and incentives, it is the attractiveness and effective implementation of these policies, regulations and incentives that do the most to attract private investment. Hence to effectively assess and compare various countries in terms of their investment climates, it becomes important to survey firms about their perceptions of those investment climates.

In the next Phase of the study, the team will closely interact with the World Bank Group's Investment Climate Assessment (ICA) and DB teams to avoid any duplication of effort, ensure coherence, and take advantage of synergies. The World Bank's ICAs, and DB initiatives already evaluate and compare countries' general business climates (which impacts the clean energy sectors). The CIRI will take both of these valuable initiatives in a new direction by looking at sector-specific determinants. Like the ICA and IAB, the CIRI will examine objective laws and regulations (in this case, those relevant to clean electricity generation). Unlike the IAB (which focuses on foreign direct investment), the CIRI will analyze the perceptions of both foreign and domestic investors. While the cross-cutting variables measured by DB (such as the number of days required to register a business) are important for clean energy investors, the CIRI initiative (unlike DB) at this point will not be limited to firms of any particular size or by geographical location within a country.

The CIRI will seek to be a living and constantly evolving tool. Based on feedback from experts and target audiences, the indices can, over time, ensure that the policy variable elements it measures are the ones that truly matter to clean energy and energy-efficiency investors.

Expected Outcomes and Measurement of the Study's Effectiveness

The success of every study lies in the outcomes and long-term impact that it has and the real effectiveness and value of the study will lie in the useful information and analysis it can provide for policy-makers, private investors and development agencies.

The "Assessing Investment Climates for Climate Business" study will seek to enable the following outcomes:

Transparency: It will provide factual information about what clean-energy and energy-efficiency laws and regulations say and how they are implemented, complemented by a qualitative assessment of the investment climate based on extensive consultations with the private sector as well.

Identification of 'weak' spots in a country's business climate for climate business by clearly identifying areas of policy implementation where a country needs to improve.

Reform: An index-based benchmarking of countries based on the perception of the private sector about their investment climates will be useful in spurring reform in these countries, particularly those that obtain weaker scores. Even countries with strong overall scores will be able to identify specific policy variables that may benefit from further reform.

Better evaluation and understanding of what clean-energy and EE promotion policies may or may not work in different country-contexts both by governments as well as donor agencies.

Better targeting of external assistance: The study results will be useful for tailoring country-specific technical assistance to improve investment climates in the clean-energy and EE sectors both from various departments within the Bank group as well as other aid-agencies. Further it is also expected that the results will influence the nature and direction

of assistance that is channeled under the auspices of the UNFCCC through the Green Climate Fund and Technology Mechanism.

Independent verification: The results could also be a useful way to independently verify a country's NAMAs that are related to clean-energy.

Indicators that reveal the achievement of these outcomes will be a useful way to assess the impact and success of the study. Over a period of time it may be possible to draw a correlation between individual and a collective group of CIRIs—their evolution and implementation and flows of private sector investments in RE and EE sectors in a country. The lessons from such an exercise may indeed prove invaluable. Measuring some of these impacts will also be an important aspect of assessing the overall effectiveness of the study. In the long run, it is expected that the wider diffusion of study findings will in turn result in greater inflows of private-sector investments into clean-energy sectors as a result of reform driven by the findings. It is anticipated that a web portal based on CIRIs could become a 'one stop shop' for a better understanding of drivers of clean energy finance, both from a public and private sector perspective. Greater coherence and synergy between public financing (domestic governments, World Bank and external aid agencies) and private-sector needs is also expected to result in better use of public funds to leverage clean energy and EE investments.

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ANNEX -A: EVOLUTION OF POLICIES, REGULATIONS AND INCENTIVES IN SOUTH ASIA

Table A 1: Important Renewable Energy Policies, regulations and incentives and their year of introduction

Renewable Energy Policy/Law/Incentive Scheme	Sector	Year of Introduction
India		
National Biogas Manure and Management Programme (NBMMP)	Biogas	1981-82
Programme on Small Wind Energy and Hybrid Systems (SWES)	Wind	2002
Electricity Act	Cross-cutting	2003 (replacing earlier laws of 1910 and 1948)
Programmes for Recovery of Energy from Industrial and Urban Wastes	Waste to Energy	2005
Programme on Biomass Energy and Cogeneration (non-bagasse) in Industry	Biomass	2007
Special Incentive Package Scheme to Encourage Investments for Setting up Semiconductor Fabrication and other Micro and Nano Technology Manufacture Industries in India	Solar	2007
National Action Plan on Climate Change (NAPCC)	Cross-cutting	2008
National Hydro-power Policy	Hydro	2008
Generation-based Incentive Scheme for Grid-interactive Solar PV	Solar PV	2008

Renewable Energy Policy/Law/Incentive Scheme	Sector	Year of Introduction
Generation-based Incentive Scheme for Grid-interactive Solar Thermal	Solar Thermal	2008
Generation-based Incentive Scheme for Wind	Wind	2009
National Policy on Biofuels	Biofuels	2009
Biomass Gasifier based Distributed/Off-grid Programme for Rural Areas and Grid Power Programme	Biomass	2009
Incentives to Banks/ Micro Financing Institutions to Support Installation of Solar Home Lighting and Other Small Solar Systems through Loans	Solar	2009
Solar Water Heating Scheme	Solar	2005
Programme on Development of Solar Cities	Solar	2008
Scheme for Grid Interactive Biomass Power and Bagasse Cogeneration Projects	Biomass	2010
Jawaharlal Nehru National Solar Mission (JNNSM)	Solar	2010
Guidelines for Migration of Existing Under Development Grid Connected Solar Projects from Existing Arrangements to the Jawaharlal Nehru National Solar Mission (JNNSM) ("JNNSM Migration Guidelines")	Solar	2010
Guidelines for Off-Grid and Decentralized Solar Applications	Solar	2010
Rooftop PV and Small Solar Power Generation Programme	Solar PV	2010
Indian Electricity Grid Code ('IEGC')	Cross-cutting	2010
Renewable Energy Certificate for Renewable Energy Generation) Regulations	Cross-cutting	2010
Pakistan		
Regulation of Generation, Transmission and Distribution of Electric Power Regulation Act (NEPRA Act).	Cross-cutting	1997
Power Policy	Cross-cutting	2002
Renewable Energy Policy—Short Term	Cross-cutting	2006
National Policy for Power Co-Generation by Sugar Industry	Biomass	2008
Sri Lanka		
Sri Lanka Sustainable Energy Authority Act	Cross-cutting	2007
National Energy Policy and Strategies of Sri Lanka	Cross-cutting	2008
Bangladesh		
Renewable Energy Policy of Bangladesh	Cross-cutting	2008
Bangladesh Climate Change Strategy and Action Plan ("BCCSAP")	Cross-cutting	2009
Nepal		
Biogas Support Programme	Biogas	1992
Rural Energy Policy	Cross-cutting	2006

Renewable Energy Policy/Law/Incentive Scheme	Sector	Year of Introduction
National Electricity Crisis Resolution Action Plan	Cross-cutting	2008
Subsidy Policy for Renewable (Rural) Energy	Cross-cutting	2009
Maldives		
National Strategy for Sustainable Development	Cross-cutting	2009
National Energy Policy and Strategy	Cross-cutting	2010

Table A 2: Important Energy Efficiency policies, regulations and incentives and their year of introduction

Energy Efficiency Policy/Law/Incentive Scheme	Sector	Year of Introduction
India		
Energy Conservation Act (ECA)	Cross-cutting	2001
Standards and Labeling Scheme	Appliances	2006
Energy Conservation Building Code	Buildings	2007
National Action Plan on Climate Change (NAPCC)	Cross-cutting	2008
National Mission on Enhanced Energy Efficiency (NMEE) including Schemes such as Perform, Achieve and Trade (PAT), Market Transformation for Energy Efficiency (MTEE), Energy Efficiency Financing Platform (EEFP), Framework for Energy Efficient Economic Development (FEEED)	Cross-cutting	2009
BEE Star Rating for Programme for Buildings	Buildings	2009
GRIHA System of Green Rating of Buildings	Buildings	2007
Bachat Lamp Yojana (BLY)	Lighting	2009
Green Building Parameters dated 16th March mandating that all CPWD shall be green	Buildings	2009
MNRE Incentive Scheme for Energy-efficient Solar/Green Buildings	Solar PV/ Buildings	2009
Pakistan		
National Energy Conservation Policy	Cross-cutting	2005
Sri Lanka		
Sri Lanka Sustainable Energy Authority Act	Cross-cutting	2007
Mandatory Energy-labeling for CFLs	Lighting	2009
Code of Practice for Energy-efficient Buildings	Buildings	2008
Bangladesh		
Bangladesh Climate Change Strategy and Action Plan ("BCCSAP")	Cross-cutting	2009
Efficient Lighting Initiative for Bangladesh	Lighting	2010

ANNEX -B : CIRI RE SCORES FOR SELECT COUNTRIES

Country	*Cross-cutting* CIRI Scores	*Grid-connected Solar-PV* CIRI Score	*Grid-connected Onshore Wind* CIRI Score	*Grid-Connected Small hydro* CIRI Score	*Grid-connected Biomass CIRI Score*
Asia					
India	4	5.5	4.5	4.5	4.5
Pakistan	3	4	5	4	3
Sri Lanka	3	2	4	2.5	2.5
China	3	5.5	6	2.5	3.5
Indonesia	3	3	4	4	4
Thailand	2	3	4	3	4
Philippines	4	6	6	6	6
Vietnam	2	4	4	5	4
Japan	4	2.5	1.5	1.5	1.5
Middle East					
Iran	2	1.5	1.5	0.5	1.5
Kazakhstan	4	1.5	1.5	0.5	0.5
Europe					
Czech Republic	4	4.5	4.5	NA	NA
France	4	3.5	3.5	NA	NA
Germany	3	3.5	3.5	NA	NA
Italy	4	4.5	1.5	NA	NA
Netherlands	3	4.5	3.5	NA	NA
Spain	4	3.5	3.5	NA	NA
Switzerland	3	3.5	2.5	NA	NA
UK	4	3.5	2.5	NA	NA
Poland	4	3.5	2.5	NA	NA
Ukraine	3	1.5	2	NA	NA
Russia	2.5	1.5	0.5	NA	NA
Turkey	3	2.5	2.5	NA	NA
Latin America					
Mexico	3	2	2	1.5	1.5
Argentina	2	4.5	4	4.5	4.5
Brazil	2	0.5	2	2	2

Country	*Cross-cutting* CIRI Scores	*Grid-connected Solar-PV* CIRI Score	*Grid-connected Onshore Wind* CIRI Score	*Grid-Connected Small hydro* CIRI Score	*Grid-connected Biomass CIRI Score*
Peru	**2**	3.5	1.5	4	4
Africa					
Egypt	**1.5**	2.5	2.5	0.5	0.5
South Africa	**3**	2.5	3.5	3.5	3.5
Australia and Oceania					
Australia	**4**	1.5	2.5	2.5	2.5

ANNEX -C : CIRI EE SCORES FOR SELECT COUNTRIES

Country	Cross-cutting CIRI Scores	Lighting	Appliances	Buildings
Asia				
India	4	6	13	4
Pakistan	1.5	2	0	0
Sri Lanka	1.5	3	0	3
China	4	32	75	4
Indonesia	3	4	10	1
Malaysia	0.5	2	9	2
Thailand	4	13	39	4
Philippines	3.5	18	25	2
Japan	4	6	66	4
Latin America				
Argentina	4	10	20	1
Brazil	4	12	37	1
Mexico	4	10	59	4
Peru	3	1	8	0
Middle East				
Iran	1	2	20	1
Egypt	0	3	16	1
Africa				
South Africa	4	4	30	3
Australia				
Australia	5	12	59	4

ANNEX- D : CLIMATE INVESTMENT READINESS INDEX (CIRI) COMPARED WITH OTHER CLEAN ENERGY AND CLIMATE CHANGE INDICES

Existing Indexes	Organization/ Institution	Objective/Key Features	Similarities /Differences with CIRI
1. RE **Country Attractiveness Indices**	Ernst and Young **Website:** http://www.ey.com	❖ The EY indices provide scores for national renewable energy markets, renewable energy infrastructures and their suitability for individual technologies. ❖ The main indices are called "**Long-term**" indices (which includes all renewables such as Onshore and Offshore Wind, Solar PV, Solar CSP, and Biomass/Others). There is also a 'near-term' index specifically for Wind that takes a 2-year view with slightly different parameters and weighting. ❖ The Long Term Solar Index is derived from scoring the Solar PV index (73 percent) and the Solar CSP index (27 percent). ❖ The Long Term Wind Index is derived from scoring the Onshore Wind index (70 percent) and the Offshore Wind index 30 percent). ❖ There is also an " All Renewables Index" which provides an overall score for all RE technologies by combining technology indices as follows: Wind Index - 68% (Offshore and Onshore Wind), Solar Index - 15% (comprising Solar PV and CSP) and Biomass and other Resources (17 percent).	**Similarities:** 1. Both the CIRI as well as the EY Country Attractiveness Indices measure attractiveness of countries for investors in renewable energy. 2. The sectors considered by EY and CIRI are broadly the same. 3. The audiences targeted by EY and CIRI are also broadly similar although the EY appears more heavily geared towards private investors. **Differences:** 1. The main difference lies in the methodology for index construction and the variables considered. The EY index selects variables based on market conditions such as the state of electricity infrastructure as well as positive or negative policy developments as they may occur. CIRI focuses only on objective policy indicators related to renewable energy and the private-sector perceptions on how they are implemented.

Existing Indexes	Organization/ Institution	Objective/Key Features	Similarities /Differences with CIRI
		• Each sector (Technology) index is derived from scoring general country-specific parameters: the renewables infrastructure index (35 %) and technology-specific parameters (65%). • Country scores are out of 100 and are updated on a • regular basis. • Utilizes the strength of E&Y RE professionals around the globe.	2. Weights for variables are assigned by EY experts whereas the weighting process in the CIRI will be based on the majority of responses with regard to weights obtained from the private sector. Thus, the greater the number of firms that are surveyed, the more robust and credible will be the CIRI results. At the same time relying on the private sector which constitutes the key respondents as well as one of the main audiences for the CIRI ensures that arbitrariness in the construction of weights or in ranking is avoided.
2. International Solar Index	Solrico **Website:** http://www.solrico.com/	• Reflects the business climate in the global solar heating and cooling industry. • Designed to be a long-term indicator of national and international market development in the solar thermal sector. • The ISOL Index is based on six questions relating to the current business climate and the expectations for the next six months. The questions probe the level of satisfaction with the sales volume and the return on investment, as well as the level of current and planned investments.	**Similarities:** 1. Also based on a perception-based survey of business. 2. There will be sectoral overlap with CIRI if CIRI expands to cover investments in solar thermal and solar heating and cooling technologies. 3. Sorlico survey questions — similar to those of the CIRI survey — try to assess the levels of satisfaction amongst private-sector firms. 4. Like the CIRI, the index is calculated through a system of points-based weighting.

Existing Indexes	Organization/ Institution	Objective/Key Features	Similarities /Differences with CIRI
		❖ ISOL Index is calculated by weighting the responses according to a points system, which serves to calculate an individual ISOL Index between 0 and 100 points for each company. The business climate for a particular country or region can be assessed by averaging the indices of the individual company.	**Differences:** 1. The Solrico surveys are focused entirely on the solar thermal sector or to be more precise on solar heating and cooling technologies and component manufacturers. Unlike CIRI it does not cover investments in clean electricity generation. 2. The surveys try and assess the level of satisfaction not only with the current business climate but also private-sector expectations for the next six months. The CIRI focuses on the present business climate and surveys will likely be repeated at 2 year intervals.
3. Climate Competitiveness Index **Other Similar Indices:**	Account Ability and UNEP	❖ CCI measures climate-friendly activities and performance of countries in a broad manner, across a broad spectrum of variables, to assess how well-placed a country is to pursue a low-carbon economic trajectory. ❖ The performance measured is that of multiple actors—government, business, civil society etc.	**Similarities:** ❖ Some elements that may be used to construct the CIRI include initiatives by the government such as deployment of green standards and regulations or draft guidelines for building energy efficiency, price of gasoline etc. These are also used by the CCI to score countries.

Existing Indexes	Organization/ Institution	Objective/Key Features	Similarities /Differences with CIRI
Climate Action Network (CAN)'s **Climate Change Performance Index** accessible at: http://www.climnet.org/	**Website:** http://www.climatecompetitiveness.org/	CCI is based on two indices — **Climate Accountability Index and the Climate Performance Index:** ❖ **Climate Accountability** is how government, business and civil society formulate a climate strategy that covers all the key opportunities and challenges, that involves all relevant stakeholders in providing solutions, and that is clearly articulated, communicated and adjusted if necessary. **The Climate Accountability Index** examines the degree to which a country has the leadership, institutions, systems and practices in place to deliver climate competitiveness. In addition to government actors it considers the role of business associations, investment promotion agencies, citizens and consumer groups. ❖ **Climate Performance** is the track record of action and capabilities demonstrated by government, business and civil society in setting incentives, building effective systems and reducing carbon intensity while expanding low carbon products and services. **The Climate Performance Index** assesses the economic drivers of the low-carbon economy, covering energy and water price signals, clean energy networks, consumer demand and carbon management by businesses, and emissions intensity track records. It draws on 13 hard and soft datasets from the International Energy Agency (IEA), World Economic Forum (WEF), Gallup, Swiss Re, GTZ, OECD, UNSTAT and Account Ability.	❖ CIRI also measures government performance like the CCI in that it assesses the degree of enforcement of laws, policies and regulations, but this, however, is from a private-sector investor's perspective. **Differences** ❖ A key difference between the CIRI and CCI is the scope and focus of the initiative. The objectives of the CIRI are more focused and specific—namely to measure the 'enabling environment' for private sector investment in climate-friendly technologies and track performance of countries over time with the help of clearly quantifiable indicators. ❖ The targeted actors for CIRI are narrowly defined and specific. The variables measured are rather detailed and specific to assessing investment climate. CIRI also relies, unlike CCI, on direct stakeholder surveys involving the private sector.

Existing Indexes	Organization/ Institution	Objective/Key Features	Similarities /Differences with CIRI
			❖ Another major difference between the two indices is the two types of measures used to build the index. Many CCI index elements are broad, one-off measures and, while important in the road to a low-carbon economy, may be not be directly relevant as a determinant of private-sector investment per se. Examples include initiatives by NGOs and citizen-engagement, concern among citizens about climate change (based on Gallup Polls etc.).
4. CO_2 Score Card	The CO_2 Score Card group **Website:** http://co2scorecard.org/home/aboutus	❖ The CO_2 score card is a performance-monitoring dashboard to display CO_2 emissions and energy use data compiled from six publicly available sources—WB, UNFCC, EIA, IEA, BP and CDIAC. This dashboard displays data as policy metrics and stats, trend charts and a 3-letter performance grade for each country.	**Differences** ❖ The CO_2 scorecard measures performance in a broad range of climate-change and energy-use- related variables. It does not measure performance in terms of policies or regulations to attract renewable energy investment. The data on installed capacity of renewables as measured by the score-card will be very useful for CIRI when correlating the existence of certain policies and their sound implementation with an increase in the capacity of renewables.
5. MSCI Global Climate Index	MSCI Research	❖ MSCI Global Climate Index is an equal weighted index, which is designed for investors seeking a global basket of companies that are leaders in mitigating immediate and long-term causes of climate change. The constituent companies in the MSCI Global Climate Index have pure play involvement in themes such as renewable energies, future fuels, clean technology and efficiency.	**Differences** ❖ The MSCI Global Climate Index evaluates companies based on their profile and performance as opposed to country policies that the CIRI evaluates.

Existing Indexes	Organization/ Institution	Objective/Key Features	Similarities /Differences with CIRI
	Website: http://www.mscibarra.com/products/indices/thematic_and_strategy/esg_indices/environmental.html	❖ The objective of the Index is to identify 100 companies that are global leaders in addressing the conditions that contribute to climate change. Companies involved in three categories of activities (RE, Clean Technology and Efficiency, and Future Fuels) are further analyzed for their leadership position in the industry. To qualify for inclusion in the MSCI Global Climate Index, indicators such as strategic commitment, investment in research and development, market share, intellectual property and reputation of companies are evaluated. This evaluation is done, both on an absolute basis and in a relative context, compared to sector and/or thematic peers, to determine the final constituents of the MSCI Global Climate Index.	
6. MSCI Global Environmental Index Other indices focusing on alternate energy with a similar portfolio and objective as the MSCI Global Climate and Environmental Indices include: (i) RENIXX World (ii) ALTEXGlobal (iii) Ardour Global Alternative Energy Index SM	MSCI Research **Website:** http://www.mscibarra.com/products/indices/thematic_and_strategy/esg_indices/environmental.html	❖ MSCI's Environmental Indices include companies whose products and services focus on specific environmental themes such as alternative energy or clean technology. The MSCI Global Environment Indices include developed and emerging market large, mid and small cap companies that derive 50% or more of their revenues from products and services in one of five environmental themes: (i) Alternative energy (ii) Clean technology (iii) Sustainable water (iv) Green buildings (v) Pollution prevention	**Differences** ❖ The MSCI Global Environmental Index evaluates companies based on the share of their revenue stream from environmental products and services as opposed to country policies that the CIRI evaluates.

Existing Indexes	Organization/ Institution	Objective/Key Features	Similarities /Differences with CIRI
(iv) Credit Suisse Global Alternative Energy Index (v) DAX global Alternative Energy Index (vi) DB NASDAQ OMX Clean Tech Index (vii) S&P Global Clean Energy Index (viii) Wilder hill New Energy Global Innovation Index (ix) World Alternative Energy Index (x) FTSE ET50 Index (xi) FTSE Environmental Opportunities All-Share Index		❖ The MSCI Global Environment Index is an aggregation of the constituents in each of these five MSCI Environmental Indices: (i) MSCI Global Alternative Energy Index (ii) MSCI Global Clean Technology Index (iii) MSCI Global Sustainable Water Index (iv) MSCI Global Green Building Index (v) MSCI Global Pollution Prevention Index	
7. U.S. Clean Energy Leadership Index	Clean Edge **Website:** http://www.cleanedge.com/leadership/index.php	❖ According to the Clean edge website the CELI provides the industry's most comprehensive and objective analysis and ranking of how all 50 states compare across the spectrum of clean-energy technology, policy, and capital, based on the most important developments in these areas. ❖ The CELI aggregates 4000+ data points from 80+ indicators in an easy-to-comprehend format. The index combines both publicly available information with private data and Clean Edge derived indicators.	**Similarities** ❖ Both the CELI as well as CIRI aim to reach out to the same audiences namely corporations, economic development agencies, investors, policy makers, technology innovators, foundations and other key stakeholders actively involved in the clean-tech marketplace.

Existing Indexes	Organization/ Institution	Objective/Key Features	Similarities /Differences with CIRI
		• Indicators include such metrics as total electricity produced by clean-energy sources, hybrid vehicles on the road, and clean-energy venture and patent activity. • The structure of the U.S. Clean Energy Leadership consists of four distinct layers. The **top layer, the Leadership Index** itself, is a set of 50 state scores which evaluates each state based on involvement and leadership in clean energy. Results of the top layer are derived from performance in **three equally weighted categories – technology, policy, and capital**. Each of these categories is composed of two or three subcategories, which themselves include a set of individual indicators. • States are thus also ranked according to various sub-indicators (technology, policy and capital) that contribute to the overall score. Policies include regulations and mandates. • In order to guarantee that smaller states are not put at a disadvantage, all quantitative indicators are adjusted for state size, using metrics such as state population, state GDP, and electricity generation capacity. According to Clean Edge, by reporting in terms of per capita or percent of state GDP, smaller and less populous states are not penalized for having relatively smaller economies.	• Clean Energy Policy is a major focus of both indices. **Differences** • CELI is more a performance index for states on technology, policy and capital, and relies on data points. It does not assess attractiveness based on private sector perception of policy implementation as CIRI does. • CELI measures performance in a number of indicators such as deployment of technology, unlike CIRI. • CELI is presently focused only on the US whereas CIRI is global in scope.

Existing Indexes	Organization/ Institution	Objective/Key Features	Similarities /Differences with CIRI
8. Climatescope	**IADB/Bloomberg**	❖ The Multilateral Investment Fund (MIF) of the Inter-American Development Bank (IDB) has been working with clean energy market research firm Bloomberg New Energy Finance on Climatescope, a project that seeks to comprehensively measure the relative attractiveness for low-carbon energy investment in Latin American and Caribbean nations. The report and accompanying online tool were launched at the Rio+20 Conference in June 2012.	❖ A comparison of CIRI and Climatescope highlights significant complementarities between the two projects. Climatescope provides a useful high-level view of individual renewable energy markets overall by providing market and financing data reflective of policy effectiveness. Each country's policy regime is taken into account for Climatescope via three indicators drawing on outside expert input out of a total of 30 indicators. The index is at an advanced stage of implementation and clearly builds on Bloomberg's comparative advantage in market data with expert input from the MIF and IDB. ❖ The CIRI on the other hand focuses exclusively on the policy environment, documenting its detailed characteristics through more than 30 indicators that cover both energy efficiency and renewable energy. The index is based on objective measures of the policy environment, with a view to pinpointing those specific areas where policy reforms would be needed. The index builds on the World Bank's comparative advantage in the policy environment.

Existing Indexes	Organization/ Institution	Objective/Key Features	Similarities /Differences with CIRI
9. Energy Sustainability Index	**World Energy Council**	❖ WEC's Energy Sustainability Index ranks the energy sustainability performance of the 90 plus WEC member countries according to WEC's definition of energy sustainability, which is based on three core dimensions – energy security, social equity and environmental impact mitigation. The goal of the annual Index is to understand and provide high-level insights into a country's likely ability to provide a stable, affordable and environmentally sensitive energy system. The 2011 Index is a continuation of the 2010 Index, which has been developing and improving since 2009.	❖ Clean Energy Policy is a major focus of both indices. ❖ While the Energy Sustainability Index enables an empirical exploration of the trilemma between affordable energy, secure energy supplies, and supporting environmental objectives, CIRI's focus is on the enabling environment to attract private investments.

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