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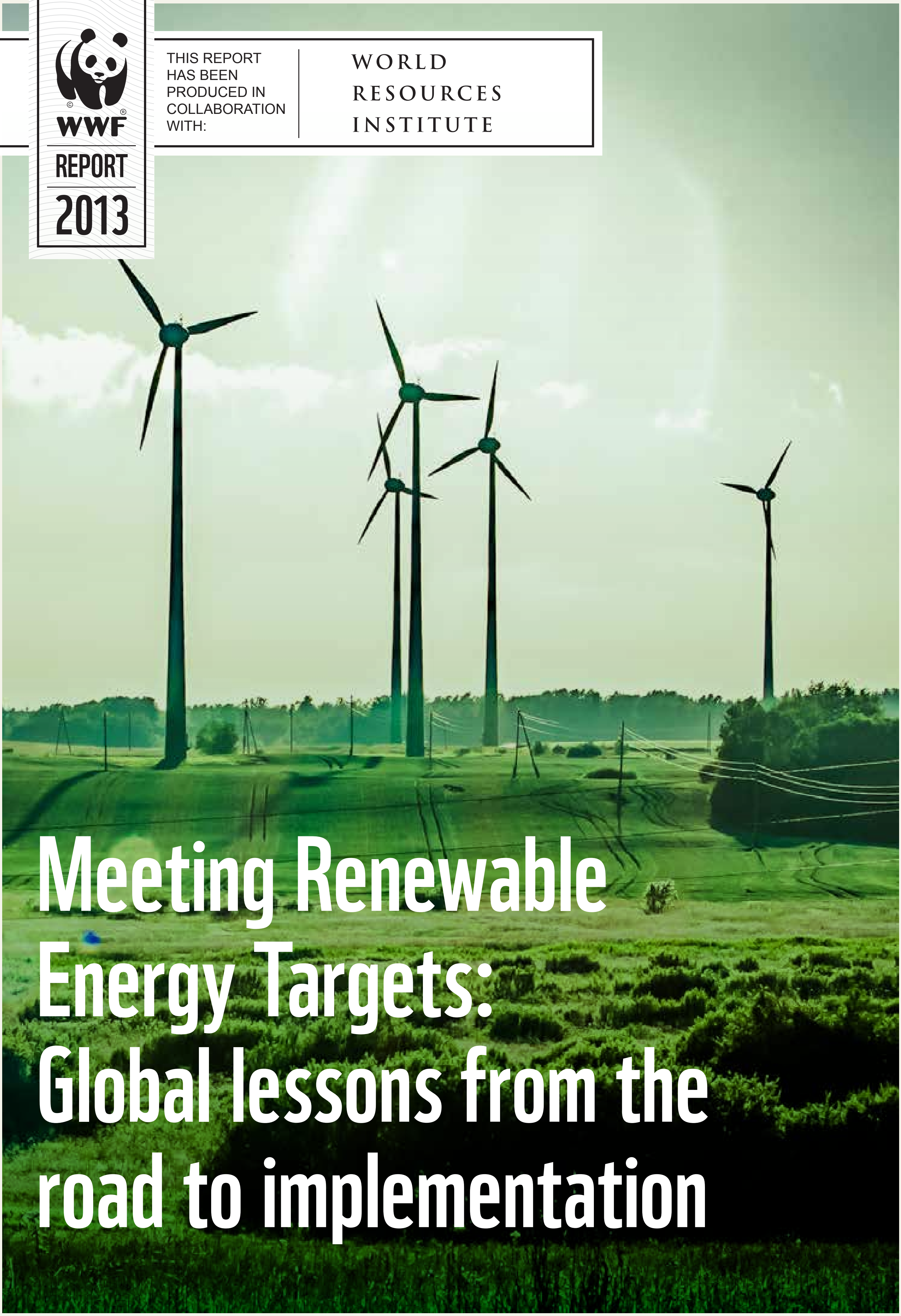


Meeting Renewable Energy Targets: Global lessons from the road to implementation

CONTENTS

EXECUTIVE SUMMARY

Purpose/Scope

By the beginning of 2012, one hundred and eighteen countries worldwide had introduced renewable energy (RE) targets, mostly to be met by 2020. While setting targets represents a clear commitment to RE, simply setting these targets does not actually mean that they will be achieved. The weightier task is to create an enabling environment with the right support factors that will ensure these targets are achieved. These factors include deciding which policy reforms to undertake, what institutional frameworks to develop and identifying which capacity requirements will be needed, all keeping in mind how to best design, implement and adapt them.

The purpose of this report is to provide an understanding of what factors are required in order to reach renewable energy targets at the national level. The report is based on lessons learned from experience in renewable energy policy-making in seven countries. Case studies were conducted for China, India, Germany, Morocco, Philippines, South Africa and Spain. The report allows the reader to better answer the question: Which policy, institutional and capacity (human and technical) qualities and factors have enabled countries to achieve ambitious renewable energy targets?

About this report

Chapter 1 (Introduction and Context) of this report provides background and context on the renewable energy targets set by each country assessed and the rationale for writing this report: to identify factors embedded within the process of RE policy development and implementation that have led to success and failure. The report deliberately focuses on political, institutional, and social factors that are often overlooked in studies of RE deployment. Factors such as financing models and mechanisms are examined from the perspective of social impact, recognizing that the business case has been studied in detail elsewhere.

Chapter 2–4 (Key Factors for Achieving Renewable Energy Targets) then details the seven countries' renewable energy targets and national objectives. A set of common and significant factors to consider when planning a successful renewable energy policy were derived from consistent themes that emerged across the case studies. The key factors are introduced and Chapter 2 continues in three sections (A. Policy Planning and Regulation, B. Institutions, Good Governance and Coordination Requirements, and C. Capacity) to elaborate on each factor and discuss their real-world implications. Specific examples from country cases illustrate these factors and describe concrete processes and outcomes.

Chapter 5 (Conclusions) identifies a list of obstacles that were found to be fairly common or significantly disruptive to reaching renewable energy targets, among the seven case study countries. The report then concludes with comprehensive and direct recommendations for decisions makers involved in the RE sector: 1. Policy designs that have clearly defined policy objectives, targets and promotion mechanisms; 2. Institutional frameworks that foster good governance principles in order to ensure that policy frameworks are well managed and outcomes are achieved; 3. Enabling industry structures and, infrastructural and technical requirements made available; and 4. Enhanced institutional and human capacity that will be able to manage complex technical and regulatory systems, and portfolios of projects in the short, medium and long-term. The conclusions are informed by the successes and failures of the 7 case study countries assessed. An annex containing the detailed case studies is provided. The recommendations are likely to be useful to readers from any country, at any level – whether they be in the targeting, planning or implementation stage.

FOREWORD BY WWF

Dr Stephan Singer, Director Global Energy Policy, WWF International

The world has seen substantive increases in investments in clean renewable energies—mainly solar and wind. Over the last years, we have seen double-digit deployment growth rates. Despite a slight dip in investments in 2012, the last three years provided an average of $US 250 billion annually of renewable energy financing. This is a tremendous growth compared to the average $US 64 billion annually in the years 2004-2006. Manufacturing costs also went down and new renewable technologies have become more sophisticated. In addition, forecasters predict further growth to $US 300 billion annually in years to come. In some regions such as in Europe, newly installed electric capacity of wind and solar dwarf that of fossil and nuclear.

This is a promising trend to lead the way to WWF's vision of 100% sustainable renewable energy by 2050. Our vision is the only way to meet the plethora of challenges facing the planet, from combating climate change and hedging against risks of volatile and costly fossil fuel imports, to addressing air pollution and providing sustainable energy for the poor. At the same time, and while providing less than 10% of all energy supply, renewable energy secures about 5 million jobs worldwide; more than twice as much as the world's twenty largest oil and gas companies.

So, the glass is half-full? Not quite.

Unfortunately, and despite substantive growth of renewable energy deployment in many more countries than the 'usual suspects' of China, US and Germany, the amount of fossil fuel investments is also growing. In 2012, oil and gas upstream investments alone grew to about $US 620 billion according to the International Energy Agency (IEA).

Furthermore, global pre- and post-tax fossil fuel subsidies amount to the staggering sum of $US 1.9 trillion. This equals almost 10% of all governments' state budgets as reported by the International Monetary Fund (IMF) in March 2013. How many hospitals, schools, roads, train-lines or lighting systems could governments not build because of this tremendous subsidy flaw? We do not know.

What we do know is that global CO_2 emissions are on a record rise. The atmosphere now contains 400 ppm CO_2. The last time the CO_2 concentration was this high, global sea levels were a few meters higher. This was about 3-5 million years ago, when there were not 7 billion people on Earth and no large cities at the coast that could be inundated by rising sea levels.

This report shows that a number of countries are already scaling up renewables. We need to accelerate the take-up, avoid the mistakes and learn from the successes identified in this report. Renewable energy targets, as important as they are, function only as cherries on the cake. Local and national participation by stakeholders, sound national technology assessments, schemes to provide affordable and clean energy to the poor, financing for capital and infrastructure, grid integration, monitoring success and bottlenecks as well as a good compliance system are all crucial parts of a sound implementation plan to make renewables the key energy source in the decades ahead.

WWF and WRI are committed to work on this with all our partners in governments, industry and NGOs. We need to substantially grow investments in renewables and energy efficiency. Can the world afford that? The answer is yes, if combined with reducing the amount invested in conventional fossil fuels and nuclear power. A shift from fossil fuel subsidies to leveraging large-scale clean energy for industrial scale up and small-scale distributed energy services for the poor can also provide finance. In principal this is all easy. What is difficult is securing the political will required to make it happen. We will keep on pushing for this.

We have no alternative.

INTRODUCTION AND CONTEXT

By the end of 2012, one hundred and thirty eight countries worldwide had introduced renewable energy (RE) targets.

Meeting these targets could result in an increased share of renewable energy at an annual rate of 1.2-1.5%. In reality, however, increasing the rate of renewable energy deployment at the national level has proven to be a challenge. Simply setting renewable energy targets does not mean that these targets will be achieved.

As countries move towards ambitious renewable energy deployment, a suite of good policies and practices must be implemented in order to ensure that renewable energy technologies can thrive. This becomes even more important for renewable energy development post-2020 to ensure that policy decisions taken today have sustainable and long-term impacts. WWF's vision of a 100 percent renewable energy future by 2050 requires a more ambitious move towards renewables and away from fossil fuels and nuclear than currently exists. In this respect, lessons learned from the implementation of renewable energy policies and programs – or in some cases the inability to implement – are crucial.

This report looks at the development of renewable energy in seven case study countries: China, Germany, India, Morocco, the Philippines, South Africa and Spain. These countries were selected based on their experience with renewable energy target setting and deployment at different stages of the target achievement process.

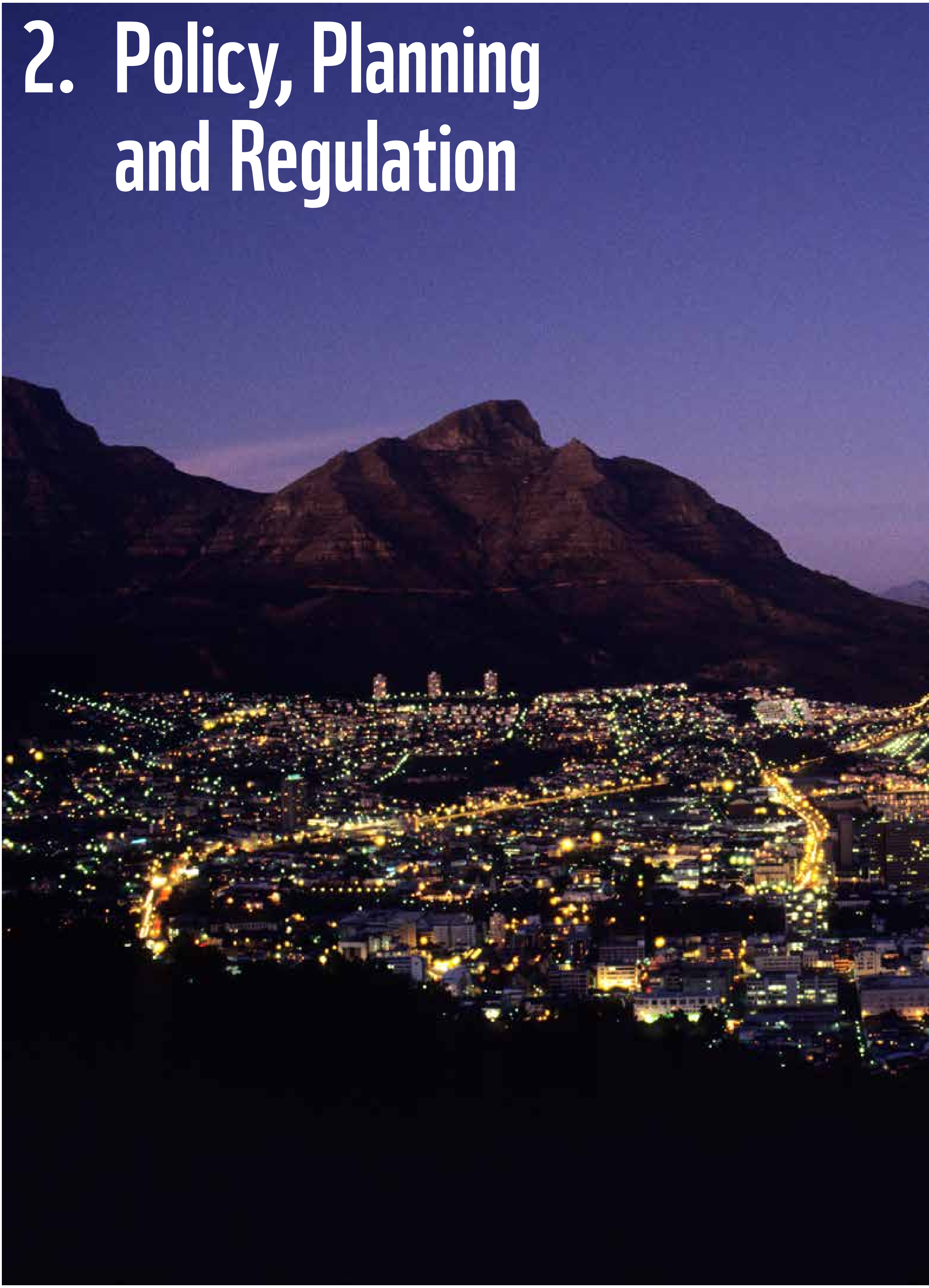
The primary interest of this report is to identify factors embedded within the process of renewable energy policy development and implementation that have led to success and failure. The report deliberately focuses on political, institutional, and social factors that are often overlooked in studies of renewable energy deployment. While factors such as financing models and mechanisms are crucially important, they have been studied elsewhere and are not dealt with in depth in this report, except where they raise issues of social impact.[1] The electricity sector is one that is highly dependent on public policy and the governing institutions which must implement them (Barua et al 2012). It is critical therefore to get these elements right in order to create an enabling environment for renewable energy development and make effective use of financial instruments.

The report seeks to understand 1) how enabling renewable energy policies were designed and the objectives they are intended to achieve; 2) the political and institutional context in which the policies were developed; and 3) the human and technical capacity necessary to advance renewable energy development. Unless otherwise noted, the arguments made in this report are based on consistent themes that emerged across the case studies.

1 A bibliography of existing literature can be found at: Venugopal, S. and A. Srivastava. 2013. Reading Resources on Using Public Climate Finance to Leverage Private Capital. Washington, DC.: WRI. Online at: http://pdf.wri.org/reading_resources_using_public_climate_finance_to_leverage_private_capital_jan2013.pdf

Chapter 2 of the report outlines the targets set by each country and describes the objectives they seek to achieve as well as the overall policy or planning framework in which they exist, and details the policy mechanisms that have been put in place to promote the use of renewable energy and assesses key qualities of these policy mechanisms. Chapter 3 reviews the institutional components necessary for renewable energy development, including governance and coordination requirements. Chapter 4 highlights the technical and human capacity requirements and constraints that exist in many national landscapes. The paper concludes by offering insights and recommendations to further the development of renewable energy in a national context and shares lessons learned from each of the seven countries. Case studies upon which these lessons are based are offered in the annex.

2. Policy, Planning and Regulation

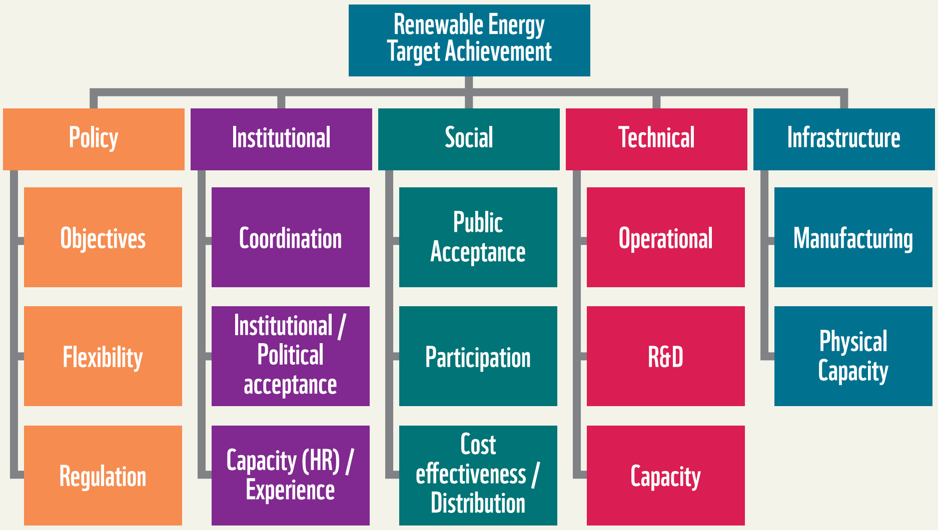


POLICY, PLANNING AND REGULATION

All seven case study countries have put in place renewable energy targets that are supported by policies. Announcing targets and enacting policies, however, is not sufficient to ensure the announced targets are achieved.

Our case study analysis suggests that the effectiveness of any policy intervention depends on the coordination of a number of key factors (Figure 1). These include policy, institutional, social, technical, and infrastructural factors. Coordination of these factors can be considered to be the basis for effective use of financial instruments (Polycarp et al. 2012).

Figure 1 **Key factors in achieving renewable energy targets**



Targets and Objectives

This section highlights the different renewable energy targets that have been put forward by each country studied, and sets them within the context of wider objectives and institutional frameworks.

Setting a target is a highly visible way to demonstrate commitment to renewable energy (Weischer et al. 2011). Each country that is analysed has set short-term, medium-term and/or long-term targets (Table 1). In some countries targets fall within larger national plans and are backed by clear objectives, legislation and policies, while in others the supporting frameworks are still being developed.

TARGETS
ARE A HIGHLY VISIBLE WAYS TO DEMONSTRATE COMMITMENT TO RENEWABLE ENERGY

Table 1 **Renewable energy targets by country**

Country	Target: renewable energy share of electricity production	Other renewable energy targets
China[2]	20% by 2015	Wind: 100 GW on and off-shore by 2015, and 200 GW on and off-shore wind by 2020
		Solar photovoltaic: 34 GW by 2015; 50 GW by 2020 Solar water heater: 400 million m^3 by 2015; 800 million m^3 by 2020
		Hydro: 290 GW by 2015; 420 GW by 2020
		Biomass power: 13 GW by 2015; Bio-gas: 22 billion m^3 by 2015; Solid biofuel: 10 million ton; Biofuels: bio-ethanol at 3.5-4 million ton by 2015; bio-diesel and bio-bunker at 1 million ton by 2015.
Germany[3]	At least 35% by 2020 At least 50% by 2030 At least 65% by 2040 At least 80% by 2050	Heating and Cooling: 14% renewable energy in total heat supply by 2020; net 7% decrease in transport GHG emissions by 2020
India[4]	17% by 2017	54.5 GW by 2017 (30 GW capacity additions between 2012-2017)
		Wind: 15,000 MW capacity additions between 2012-2017.
		Solar: 10,000 MW capacity additions between 2012-2017.
		Small Hydro: 2,100 MW capacity additions between 2012-2017.
Morocco[5]	42% by 2020	Wind: 14% by 2020 or 2,000 MW by 2020
		Solar: 14% by 2020 or 2,000 MW by 2020
		Hydro: 14% by 2020
		Solar hot water: 0.28 GWth (400,000 m^2) by 2012, 1.19 GWth (1.7 million m^2) by 2020

2 Singapore 2012. & CNREC 2012
3 REN21 2012
4 Government of India 2013 & REN21 2012
5 REN2. 2012 & GIZ et al.2012.

Country	Target: renewable energy share of electricity production	Other renewable energy targets
Philippines[6]	40% by 2020	Triple the 2010 renewable power capacity to 15,304 MW by 2030 and to be comprised of[7]:
		Hydro 8,724.1 MW by 2030
		Geothermal 3,461 MW by 2030
		Wind 2,378 MW by 2030
		Biomass 315.7 MW by 2030
		Solar 285 MW by 2030
		Ocean 70.5 MW by 2030
South Africa[8]	4% by 2013 13% by 2020	3,100 MW capacity (including 500 MW wind and 50 MW CSP); and 10,000 GWh produced by 2013
Spain[9]	38.1% by 2020	Hydro 13,861 MW by 2020
		Pumping 8,811 MW by 2020
		Geothermal 50 MW by 2020
		Solar photovoltaic 7,250 MW by 2020
		Solar thermoelectric 4,800 MW by 2020
		Ocean energy 100 MW by 2020
		Onshore wind 35,000 MW by 2020
		Offshore wind 750 MW by 2020
		Solid biomass 1,350 MW by 2020
		Waste 200 MW by 2020
		Biogas 400 MW by 2020

While targets provide a clear metric to evaluate success, clearly defined objectives are also necessary in order for a policy instrument to be evaluated in terms of its success or failure. By evaluating outcomes against objectives, decision makers and implementers of renewable energy policy can be held accountable for staying on track to achieve the objectives. Defined objectives also help stakeholders to evaluate if the proposed policy instruments are appropriate to the stated purpose. Examples of objectives stated by various governments to promote renewable energy include diversifying energy portfolio, promoting energy security and reducing energy import costs, boosting domestic manufacturing industry, job creation, bringing down the

6 REN21 2012
7 Philippine Department of Energy 2011.
The Philippines Department of Energy has also put forward short and long-term renewable energy goals. In the short term, the DoE has put forward the goal of increasing the renewable energy base capacity by 100% by 2013, in part by doubling hydro capacity. The Philippines Energy Plan (2009-2030) by the DoE puts forward the goal of doubling the renewable energy capacity by 2030. http://www.doe.gov.ph/ER/RE%20tables%20pdf/energy%20sector%20objectives.pdf http://www.doe.gov.ph/pep/iec2009.htm
8 REN21 2012
9 REN21 2012

prices of cleaner fuel and reducing the impact of fossil fuels. Table 2 outlines the varying objectives that governments have stated for renewable energy promotion.

Table 2 **National objectives for promoting renewable energy development.**

Country	Objectives
China[10]	Improved energy structure, energy supply diversification, energy security, environmental protection, and sustainable development of the economy and society.
Germany[11]	Green economy, energy security, effective environmental and climate protection, economic prosperity through jobs and innovation.
India[12]	Energy security, low carbon planning, energy availability and access, energy affordability, and energy equity.
Morocco[13]	Energy security, access to modern energy, sustainable development, and regional market integration.
Philippines[143]	Energy security, increased energy self-sufficiency, and sustainable development.
South Africa[15]	Low carbon planning and development of domestic industry
Spain[16]	Energy security and low carbon planning

ANNOUNCING TARGETS & ENACTING POLICIES IS NOT SUFFICIENT TO ENSURE TARGETS ARE MET

It is interesting to note that in most of the countries analysed, the key driver for expanding renewable energy is energy security and import cost concerns and creating a new job-intensive sector. While climate change is often a factor, as expressed through objectives of low-carbon planning, it is mostly seen as a co-benefit but not necessarily the prime driver for renewable energy development in particular in developing countries.

In China and India, targets are set forth under Five-year National Plans and are embedded within larger national objectives of job creation, industry development, and growth. Germany, Morocco and Spain have established their targets under specific renewable energy laws that have been created with the goal of renewable energy development for electricity consumption. The Philippines and South Africa have incorporated their renewable energy plans within larger long-term energy or integrated resources plans (Philippines Energy Plan and the Integrated Resources Plan in South Africa).

Ideally, the targets put forward should be well known and certain. Targets can be stated as a percentage of overall capacity allocations (at least 35% renewable energy in Germany by 2020) or as a single target (54.5 GW by 2017). In either case, these commitments should be clearly outlined and defined in plans and strategies that include precise timeframes, should be based on evidence from scientific assessments of renewable energy resources that clearly state the potential for renewable energy

10 Beijing Review 2005
11 BMU 2010
12 MNrenewable energy n.d.
13 Royaume Du Maroc. 2010a
14 Philippine Department of Energy 2011
15 South Africa Department of Energy 2011
16 IDAE 2005

technologies in the country or specific jurisdictions, and should allow for an array of development paths.

Policy Mechanisms

This section will analyse the support policies that have been used to develop renewable energy in country contexts. The primary focus will be on policy design, flexibility and evolution, and specific design aspects that have been particularly important for deployment of renewable energy.

Selecting policy instruments that are appropriate in achieving policy objectives are essential. For example, if the country's objective is to increase manufacturing, policy makers must design appropriate supply-push policies (policies that support development and production of, for example, renewable energy technologies), while to increase installed capacities, policy makers must design demand-pull policies (policies that increase support for the production of electricity through renewable energy). Table 3 lists different types of push and pull policies that have been used to achieve policy objectives.

Table 3 **Differentiation between demand-pull and supply-push policies for the achievement of renewable energy targets**[17]

Demand-Pull	Supply-Push
Feed-in tariffs set a fixed, guaranteed rate that power producers will be paid through a standard PPA for every kWh fed into the grid and usually guarantees grid access to RE generators.	**Research and Development (R&D) low cost loans** aim to increase the amount of innovation by providing direct funding to specific projects. Effectiveness depends on successful selection of projects where funding does not replace private-sector money.
Renewable Portfolio Standards (or Renewable Purchase Obligation-RPO or quota): measure requiring a percentage of electricity or heat capacity be provided using renewable energy sources. Obligated utilities are required to ensure that the target is by own generation, signing PPAs or, in many cases, purchasing Renewable Energy Certificates (REC)t; if it is not, a fine is usually levied.	**Matched equity funding** provides financing and business advice to early stage companies/developers, or more established entities looking to grow.
Public procurement/bidding is an approach under which public authorities organize tenders for a given quota of renewable energy supply or capacity, and remunerate winning bids at prices that are typically above standard market levels.	**Training** provides supplemental support to build capacity among personnel and research facilities, and information sharing.
Tax incentives/credits, consumer grants or rebates are pay¬ments by a utility, government agency, or government-owned bank to cover a share of the capital cost of an investment in a renewable energy asset such as a solar water heater or a solar photovoltaic system.	

17 The table has been developed through the use of several sources, including: Frontier Economics 2009, Desmukh et al. 2011 Desmukh, R. et al. 2011a, REN 21 2012 and Weischer et al. 2011.

The seven countries studied in this report have all implemented different policies, some choosing certain push or pull policies, and selecting a combination of the two. Analysis shows that, regardless of the policy chosen, there are certain policy qualities that either work to enhance the policy chosen and, therefore, renewable energy development or not.

Policy Qualities

This section reviews a number of policy qualities will be reviewed and analysed based on in country experiences. Table 4 summarizes the advantages and disadvantages of each.

Table 4 **Policy Qualities: Advantages and Disadvantages**

Policy Quality	Advantage	Disadvantage	Example
Policy flexibility	- Quick to adapt to market signals, learning curves, and technology changes.	- Can create policy instability, if reviews, policy changes and long-term rates are not clearly stated and planned. - Difficult to anticipate rapid changes and learning curves.	Germany's degression rate system, which accounts for technological learning curves and helps avoid over compensation.
Policy funding through ratepayers	- Costs are shared among ratepayers, regardless of where electricity is being generated and used. - Not vulnerable to situations of national instability (including political and fiscal).	- Costs are often unevenly shared among or passed on to some ratepayers. - Raises concerns about cost distribution and equity, especially among poorer electricity users.	The Philippines new customer based feed-in tariffs model has raised concerns about payment distribution amongst different sets of consumers, e.g. lifeline consumers, and/or consumers located in geographic areas that do not benefit from renewable energy.
Policy funding through public funds	- More attractive in developing countries to cover costs for poorer consumers	- Vulnerable to situations of national instability (including political and fiscal).	Spain's publically funded feed-in tariffs suffered during the European crisis.
Comprehensive policy frameworks	- Provide necessary provisions, interconnection rules, that further strengthen policy	- Frameworks require proper governance frameworks to ensure envisioned policy outcomes occur	China's feed-in tariff mechanism is supported by an overarching legal renewable energy framework that includes provisions such as mandatory grid access for renewable energy

Policy Response to Market Fluctuations

The fluctuations of the rapidly evolving renewable energy market have necessitated responsive policy frameworks. Germany and Spain offer examples of policy evolution through their experiences with feed-in tariffs. In China, South Africa, and India, on the other hand, there has been debate over whether feed-in tariffs or bidding programs are more successful in bringing down the price of renewable energy. Each experience highlights differing responses towards policy support mechanism.

In some respects, feed-in tariffs provide high levels of investor certainty and for this reason are the most widely used mechanisms to launch and scale up renewable energy. However, challenges arise when determining appropriate rates (neither too low nor too high). Germany's feed-in tariff mechanism is designed to reflect market changes, making cost-efficiency an important aspect and incorporating degression rates within the design. Degression rates[18] are used to account for technological learning curves and avoid overcompensation within the policy design. While over-compensation has been difficult to avoid, flexibility towards price and policy adjustments has proven to be crucial. Flexibility within the policy design has allowed frequent price adjustments, which have primarily reflected photovoltaic market changes (Oetzel 2012). Additionally, degression rates within the tariff mechanism design mean that the policy support mechanism will be phased out eventually, regardless of whether caps are in place.

CLIMATE CHANGE IS NOT NECESSARILY THE PRIME DRIVER FOR RENEWABLE ENERGY DEVELOPMENT – IN PARTICULAR DEVELOPING COUNTRIES

In Spain, policy revisions have occurred annually in order to ensure the most effective, efficient and low cost integration of renewable energy possible. While frequent revisions have allowed for much policy flexibility and been deemed strengths of the Spanish system, they have also been criticized by Spanish producers for creating too much instability. Investors and producers initially viewed annual revisions of support levels as a drawback, as not knowing what the lifetime revenue for a project was is seen as an investment risk. This problem was resolved in 2004, when changes to the Royal Decree included more guaranteed support for a fixed period of time (depending on the technology) and medium-term price signals (Del Rio Gonzalez 2008).

Table 5 outlines the main evolutionary steps that Spain and Germany's national feed-in tariffs programs saw in order to accommodate for changes in the rapidly evolving solar photovoltaic market.

Table 5 **Spanish and German solar photovoltaic feed-in tariff changes**

Spanish feed-in tariff evolution	German feed-in tariff evolution
	1991: Introduction of the feed-in tariff
2004: Inception of the Regimen Especial (feed-in tariff)	2004/05: significant upward revision of feed-in tariff
2007: No premium option for photovoltaics	2000-2009: Degression rates still modest
2008: Decreased feed-in tariff rate and annual cap for photovoltaics under tariff	2009-2011: Degression rates for photovoltaics linked closely to installation; More frequent rate revisions
2012: Temporary suspension for premium on all new installations	2012: Cap for photovoltaics under feed-in tariff at 52GW

The ability of policy frameworks to quickly respond to market changes is crucial but has proven to be challenging. In particular, it has been difficult to keep up with the rapid learning curves and declining prices of the photovoltaic market. In Spain, inability to create the policy changes quickly enough to mimic the market resulted in oversaturation of the market, windfall profits for project developers, and fears that electricity costs would rise.

18 The International Feed-in Cooperation defines tariff degression as: "a tariff level that depends on the year when an renewable energy plant begins operation. Each year, the level for new plants is reduced by a certain percentage. However, the remuneration per kWh for commissioned plants remains constant for the guaranteed duration of support. Therefore, the later a plant is installed, the lower the reimbursement received. Klein, A. et al. 2010

Morocco's renewable energy targets for solar hot water by 2020 is 1.19 GWth (1.7 million m2).

In countries such as Morocco and the Philippines, the Spanish feed-in tariffs example has often been referenced, and these countries have been more cautious when considering feed-in tariffs as a policy option. In an attempt to avoid the Spanish experience, the Philippines employed an installation target approach, capping renewable energy projects covered by feed-in tariffs at 760MW until 2014. In Morocco, a different policy model has been chosen, with renewable energy policy support system based on a competitive bidding process rather than a feed-in tariff. This decision is motivated by the concern that a fixed tariff will elevate prices substantially for consumers[19] or will be risky in terms of creating a speculative bubble, and cause over investments (Faquihi 2012). At the same time, the lack of subsidies, incentives and a guaranteed tariff has been considered by some stakeholders as a major set back for the development of renewable energy in the country.

In China, it was not until 2009 that a feed-in tariff mechanism was adopted as a replacement for the competitive bidding system for wind, which was found to be a barrier to profitable development (Junfeng et al. 2010). It is important to note, however, that feed-in tariff rates were established based on the bidding system, and not based in cost plus methodology. On the other hand, bidding programs allow for easy price determination and eliminate windfall profits (Weischer et al. 2011). The South African government, for example, made a switch from using a feed-in tariff program (REFIT) to a bidding program (REBID), in efforts to drive down costs. In India, under the JNNSM and some state government policy, most states are following a reverse bidding program with a feed-in tariff acting as a ceiling cap for the tariff rate for solar photovoltaic. Bidding programs for wind projects have still not been taken up by states, and they are still promoted under a feed-in tariff program.

Most countries are at an initial phase in policy implementation where circumstances are so dynamic that it is still difficult to project which mechanism is most appropriate to achieve renewable energy objectives. For this reason, policies require constant monitoring and linking to objectives, and need to allow for adaptation and flexibility. Performing regular policy reviews, empowering energy regulators to approve power prices, closely monitoring national and international renewable energy sectors, and benchmarking best practices in terms of technology and deployment strategies can all assist with promoting flexibility.

Socio-economic considerations

Policy support mechanisms, such as feed-in tariffs, have been funded differently among the countries assessed. In Germany's case, feed-in tariff premiums are paid through a national equalization of additional costs for electricity, whereby energy consumers pay a renewable energy surcharge on their electricity bills. While this surcharge is spread evenly geographically, controversies have arisen among consumers. Many power intensive companies are exempt from price increases due to renewable energy, putting a higher burden on household consumers (Spiegel Online. 2013) In Spain, the government covers the utilities' extra costs through public funding (Zhong 2012), meaning that the program is affected by any public cut back measures. Publically funded programs have proven to be more vulnerable to public fiscal measures. The European debt crisis serves as an example where fiscal constraints resulted in the temporary suspension of the Spanish feed-in tariffs program as austerity measures were put in place to right the Spanish economy

19 Personal Interview with International expert August 17, 2012.

(Zhong 2012). In Germany, the feed-in tariffs program was not affected by the debt crisis.[20]

Impact on public budgets can influence the choice of support mechanism. While it may be more attractive for countries with poor customers to cover tariff costs through public investment and subsidization, Spain's experience of incurring large government deficits has deterred countries like the Philippines from using that type of payment model. The Philippines has rather followed customer-based feed-in tariffs model. This model also raises concerns about payment distribution and equity. The newly promulgated feed-in tariffs in the Philippines received substantial opposition, mostly based on the argument that feed-in tariffs will result in additional charges to the already elevated electricity rates (Remo 2012).

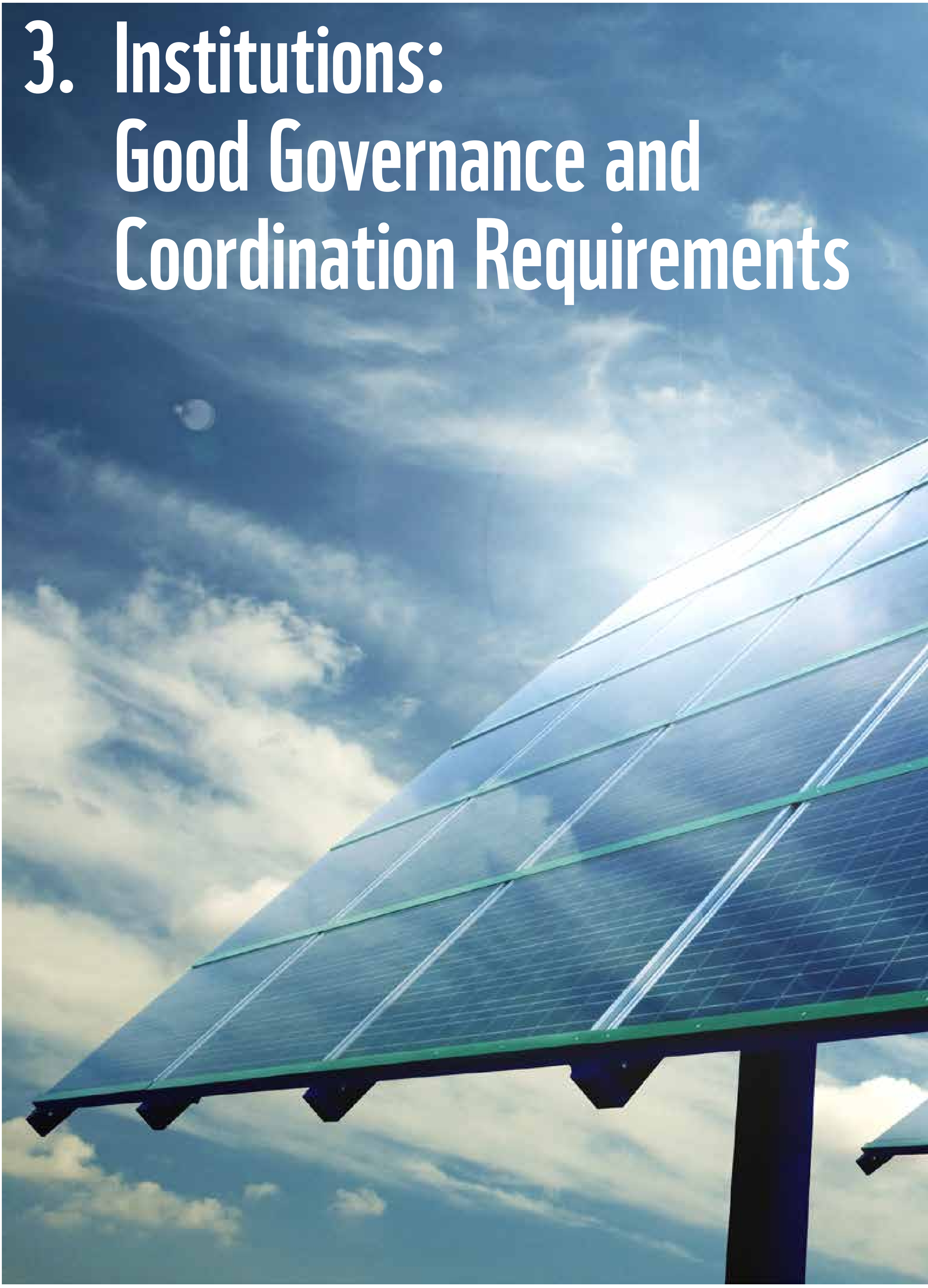
FEED-IN TARIFFS ARE THE MOST WIDELY USED MECHANISMS TO LAUNCH AND SCALE UP RENEWABLE ENERGY

Overarching frameworks

Policies have proven to be more effective when they fall under an overarching framework that enables renewable energy deployment. German, Spanish, and Chinese feed-in tariffs programs all fall under larger renewable energy legal frameworks that include provisions necessary for renewable energy development and deployment, such as mandatory and priority grid access for renewable energy, curtailment measures, and clear indications in terms of who is responsible for grid connectivity. Yet, as will be seen in the following section, if these measures are not paired with adequate governance mechanisms, they prove to be less successful.

20 Although Germany announced a 52GW cap in June 2012, this measure is not directly related to the crisis.

3. Institutions: Good Governance and Coordination Requirements



INSTITUTIONS: GOOD GOVERNANCE AND COORDINATION REQUIREMENTS

This chapter analyses several interrelated aspects of institutional functioning, including good governance and coordination requirements. The relationship between good governance and social acceptance is also considered here.

It is increasingly being recognized that institutional frameworks that foster good governance principles are necessary for achieving renewable energy targets. Good governance can be defined by TAP-C principles (see box overleaf): Transparency, Accountability, Stakeholder Participation and Capacity.

Good governance principles often lead to more effective and informed policy outputs and greater societal acceptance and should characterize all stages of renewable energy planning, from objective setting, to policy development, regulatory decision making, and policy implementation. (Figure 2).

While no program embodies all good governance principles to the full extent, each case study highlights elements of the renewable energy target setting and achievement process where principles of good governance have been implemented and where those principles have led to successful outcomes.

PARTICIPATION SHOULD EXIST AT ALL STAGES OF PROJECT DEVELOPMENT AND IMPLEMENTATION IF WIDESPREAD SOCIAL ACCEPTANCE IS TO BE ACHIEVED

Transparency and Accountability

This section focuses on transparency in decision-making processes, as well as accountability mechanisms.

Transparent decision-making – including transparency of the process for making decisions and transparency with respect to the substantive basis for these decisions – is central to building stakeholder confidence. Key measures could include publicizing the timeline for decision-making, opportunities for stakeholder input, and making key documents available to the public such as annual reports, background analytic papers, and/or tender selection criteria[21]. In South Africa, for example, the Department of Energy (DOE) create a web portal to disclose key documents relating to the national integrated resource planning process in 2010.

21 The Electricity Governance Indicator Toolkit elaborates on a comprehensive set of transparency indicators, and measures for achieving them. Available at http://electricitygovernance.wri.org

Transparency, Accountability, Participation and Capacity (TAP-C)

The Electricity Governance Initiative (EGI), a global network of civil society organizations with the main secretariat housed at the World Resources Institute (WRI), has developed a governance framework organized around the TAP-C principles — transparency, accountability, stakeholder participation, and capacity — that should guide the development of robust policy and planning processes, transparent procedures for the selection of projects and setting of prices, and clear performance metrics for monitoring and evaluation.

Transparency and access to information: The process of revealing actions and information so that outsiders can scrutinize them. Attributes of transparency include comprehensiveness, timeliness, and availability.

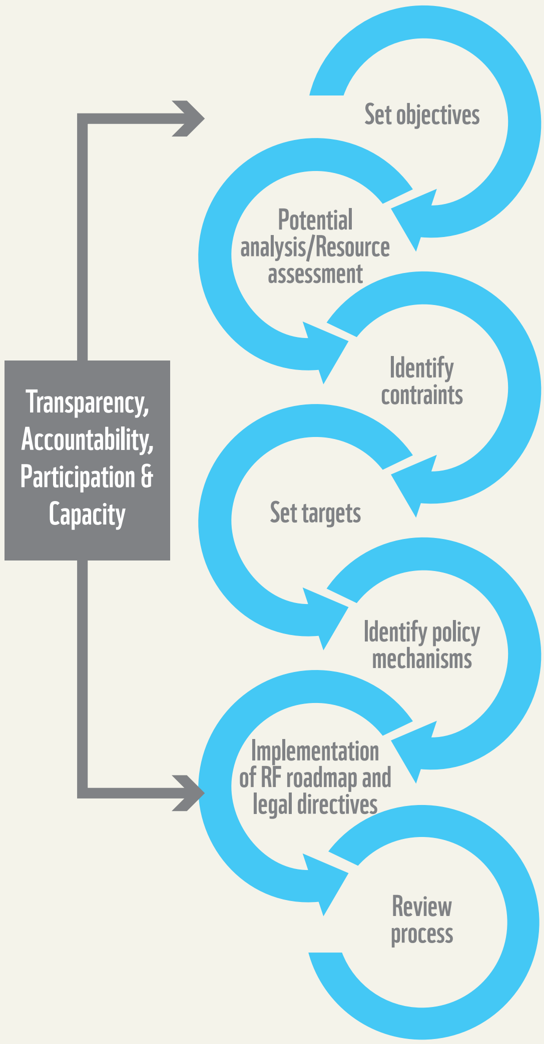
Participation: Input from diverse stakeholders to help decision-makers consider different issues, perspectives, and options when defining a problem. Forms of participation include technical review processes and public hearings.

Accountability and redress mechanisms: The extent to which there is clarity about the role of various institutions in sector decision-making, there is a systematic monitoring of sector operations and processes, the basis for decisions is clear or justified, and legal systems are in place to uphold stakeholders interests.

Capacity: capacity of government and official institutions to act autonomously and independently, the institutional ability to provide access to decision-making processes, as well as the capacity of civil society (particularly NGOs and the media) to analyze issues and participate effectively.*

* Adapted from "The Electricity Governance Toolkit: Benchmarking Best Practice and Promoting Accountability in the Electricity Sector" June 2007. EGI is a joint project of WRI and Prayas Energy Group.

Figure 2 **TAP-C Principles throughout the renewable energy policy development process**



Indian regulatory processes often include technical consultations where stakeholders have access to background papers and may request additional information.

Concerns regarding the extent to which implementing bodies act in an accountable manner have shaped renewable energy discussions in several countries. In India, for example, where issues regarding weak enforcement and non-compliance with renewable purchase obligations (RPO) amongst state and central Electricity Regulatory Commissions have emerged (Team Reconnect 2013), the Ministry of New and Renewable Energy (MNRE) has been proactive in identifying misconduct and fraudulent behaviour to ensure that the National Solar Mission (JNNSM) and Renewable Energy Certificates (RECs) scheme deliver results in a timely manner (Parihar 2012).

In China, however, questions of accountability concerning the enforcement of regulations have hampered grid connection, as grid companies have no pressure to achieve their quotas. Regulatory provisions mandating grid companies to connect renewable energy projects are not being followed and grid enterprises are not sanctioned if they fail to connect renewable energy projects to the grid (Junfeng et al. 2010).

Multi-stakeholder Participation and Acceptance: Allies and Adversaries

This section will look at how a variety of stakeholders, including government, the private sector and non-governmental organizations, have been involved in decision-making processes and to what extent stakeholders across administrative levels have supported renewable energy developments within the countries examined. Experience shows that inclusive decision-making processes lead to more public acceptance. At the same time, multi-level administrative acceptance and coordination is required in order to achieve large-scale renewable energy deployment.

Acceptance is an enabling factor in achieving renewable energy targets. Effective public participation can enhance acceptance through collaborative decision-making processes that address concerns of all stakeholders affected by renewable energy targets, policies and projects. Participation should exist at all stages of project development and implementation if widespread social acceptance is to be achieved. In the design phase, inputs from independent analysts can supplement the technical capacity available to decision-makers. In the implementation phase, participation allows for affected stakeholder concerns about project development to be expressed early on and avoid future conflicts from arising. Participation also helps minimize adverse effects of project development on stakeholders. It can also provide decision-makers with additional information and ideas not otherwise available to them.

Decision makers need to actively create spaces for increased multi-stakeholder participation through the creation of committees, hearings, workshops, consultative groups, and other means.

Three dimensions of social acceptance have been identified; in some cases these dimensions are interdependent (Wüstenhagen et al 2007):

- **Socio-political acceptance**: The acceptance of key stakeholders and policy actors involved in policy processes. Stakeholders include all those affected by renewable energy target setting, policy implementation or project development processes including, utilities, regulators, manufacturers, and civil society organizations (CSOs).

- **Community acceptance**: The specific acceptance of local stakeholders pertaining to, for example, siting decisions.

- **Market acceptance**: Acceptance by consumers (who switch to renewable energy supply), by producers (large energy firms break from their path dependencies and invest in renewable energy), and/or new players in the market, such as new investors, community projects, and independent power producers.

The following section will provide examples of systems that include options to address acceptance in each of these three dimensions.

INDIVIDUALS THAT LIVE IN CLOSE PROXIMITY ARE MORE RESISTANT TO THEM IF THEY PERCEIVE THAT ABSENTEE OWNERS OR CORPORATE INTERESTS ARE BENEFITING FINANCIALLY AT THEIR EXPENSE

Socio-political acceptance

Policy decisions are susceptible to policy, political, and social risk. Risks can include changes in government or political parties that threaten the long-term survival of renewable energy policies (whether legitimate or not)[22]. Open and collaborative decision-making processes can help to achieve widespread socio-political acceptance of decisions and promote stability (Wüstenhagen et al 2007).

In Germany, renewable energy has received widespread support from a variety of stakeholders, including political parties, and the general public. Acceptance has been seen as a critical component for renewable energy deployment in the country and has always been a priority in renewable energy decision making processes.

In South Africa, civil society involvement in the Integrated Resources Plan process led to more ambitious renewable energy targets (WRI 2012). Civil society participation has also been important in India for reducing information asymmetry around the cost of various renewable energy technologies. Prayas, a public interest policy research organization, performed a comparative analysis of solar, wind and biomass energy generation in different states to help shed light on price discrepancies, which can lead to more cost effective policies (Weischer et al. 2011).

The Philippines presents an example where a biased participatory process involving actors mainly in favour of renewable energy led to serious setbacks in terms of renewable energy deployment. Opposition towards the feed-in tariffs, mostly based on the argument that it will result in additional charges to be collected from all electricity consumers, has led to set backs in the policy's adoption (Remo 2012). While the feed-in tariffs has been recently adopted, long-term setbacks in its adoption resulted in massive stalled investments in renewable energy. It will be important to track how the policy develops in the country to determine if the policy is successful and how it will affect long-term renewable energy prices.

22 For more information about risk, please see: Frisari. et al 2013 and Venugopal et al. 2012.

GOOD GOVERNANCE PRINCIPLES OFTEN LEAD TO MORE EFFECTIVE AND INFORMED POLICY OUTPUTS AND GREATER SOCIETAL ACCEPTANCE

Community acceptance

Questions of cost and benefit distribution, as well as inclusive and participatory processes are key to enhancing community acceptance. This has been particularly the case in situations where Not In My Backyard (NIMBY)[23] concerns have been raised. In many cases, these setbacks are due to the fact that the public is suspicious of policy objectives and where individuals are doubtful of governmental motives or when projects labeled as "community" do not deliver benefits to locals at all (Hale 2010). Furthermore, individuals that live in close proximity of renewable projects, such as wind farms or newly constructed transmission lines, are more resistant to them if they perceive that absentee[24] owners or corporate interests are benefiting economically at their expense (Lantz et al. 2009).

Germany's history with community renewable energy ownership models has helped minimize ownership and benefit distribution concerns and has led to large scale and dispersed renewable energy deployment nationwide (Aitken 2010). In 2010 over 50% of renewable-energy capacity was in the hands of individuals or farmers (The Economist 2012).

Participatory practices, including proper consultation and benefit sharing, are crucial in all steps of renewable energy planning, citing, and deployment. This will continue to be crucial in the next steps of grid integration in Germany. As certain levels of renewable energy deployment and penetration are achieved, issues relating to public acceptance are increasing and need to be addressed, especially as scale and impact of deployment continues to grow. For this reason, the government has launched an information campaign called "Grids for environmentally sound energy supply to mitigate opposition" (Reiche 2010). German NGO's have also been deeply involved in creating awareness around renewable energy and mitigating barriers for the development of the grid (Bruckmann 2011).

Market acceptance

It is often difficult for energy companies and utilities to break away from traditional forms of energy production because of path dependent tendencies, which can include the existence of technology specific infrastructure and human skill. However, there are cases where these types of companies have shifted towards renewable energy and have increased acceptance towards renewable energy deployment in the country. In Spain, big energy players have shown strong commitment towards renewable energy development (Rivier Abbad 2010). The role of these main players has been fundamental for renewable energy growth in the country, especially concerning wind. Iberdrola, one of Spain's biggest electric utilities, was the first major utility to focus on wind (Rivier Abbad 2010).

These firms also often have a strong influence on socio-political acceptance as they are influential stakeholders in the development of energy policy and can shape crucial policy discussions related to, for example, access to the grid for renewable energy developers (Wüstenhagen et al. 2007).

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23 The term NIMBY has often been used in media sources to described circumstances where residents oppose new developments in their community
24 Absentee ownership refers to projects where ownership is completely outside of a local community and is often taken on by a private developer. In these cases, little or no financial benefits or compensation are returned into the community, despite the fact that the community living in the vicinity of the project is most affected

A geothermal power station. In the Philippines, experience with geothermal and hydropower projects has helped develop capacity.

Institutional Coordination

This section looks at two different aspects of institutional coordination. The first is coordination among institutions that play a role in the sector. The second is the coordination of institutional development with long-term renewable energy plans. It is important to analyze these issues in order to identify the effectiveness of institutions in helping achieve targets, guaranteeing accountability, setting up systems in place to ensure compliance with targets, and meeting other roles.

Inter-institutional coordination

In many cases, various levels of government and different entities are involved in the renewable energy decision-making process. Often, there is little or no coordination across departments / ministries or between federal / central and state / local governments to grant approvals or exercise authority over regulatory processes (Dixit et al. 2007). In India, for example, there is a lack of clarity on who pays for the last mile infrastructure for grid connectivity (MNRE 2012c). These are guidelines that have been clearly specified in the Spanish and German regulatory framework. For example, in Germany, the Transmission System Operators are legally required to pay for any transmission upgrades or extensions required to connect renewable energy projects.

A lack of coordination between levels of government has resulted in complications and setbacks in renewable energy deployment. In Spain, a lack of coordination between regional and national level governments has led to poor control of the permitting process, which has been related to the solar rush that partially led to the temporary suspension of Spain's Regimen Especial.

In contrast, the German regulatory framework has allowed for rapid uptake of renewable energy through greater coordination and standardization across implementing agencies, and minimization of bureaucracy and administrative barriers. This is particularly the case in the residential solar sector, where permitting, interconnections and inspection costs and procedures are almost negligible. Fewer permitting requirements, greater standardizations, and less onerous interconnection processes have led to lower installation costs, contributing to high rates of solar photovoltaic deployment (Cinnamon 2012).

Overarching institutional coordination

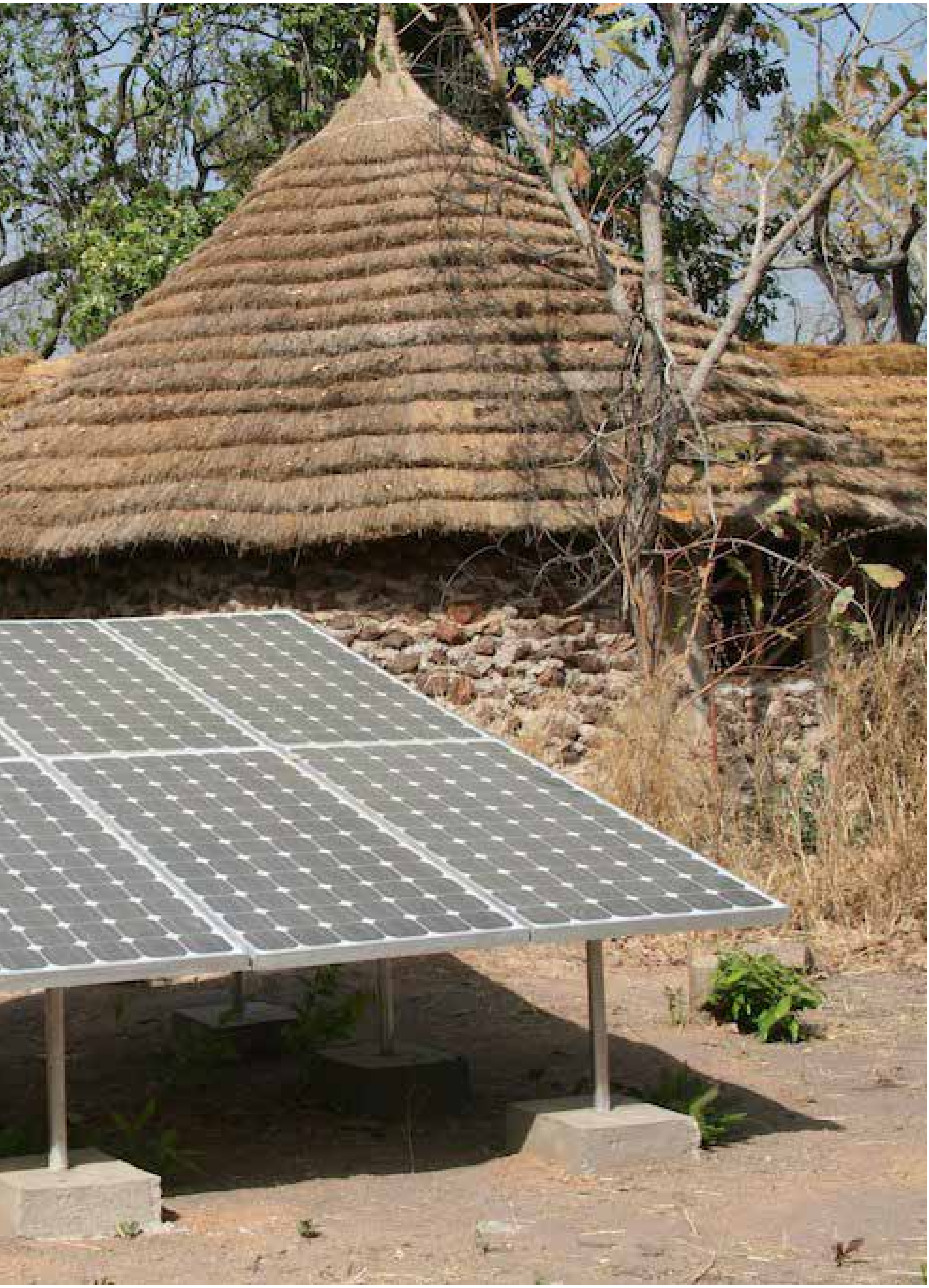
The lack of institutional coordination that exists in many countries raises the question of whether an overarching renewable energy institution is required or if other more efficient models exist. In many cases, separate ministries or specialized departments dedicated to promoting new and renewable technologies are functioning. These include the National Renewable Energy Board (NREB) and the Renewable Energy Management Bureau (REMB) in the Philippines, the Ministry of New and Renewable Energy (MNRE) in India, the Agency for the Development of Renewable Energy and Energy Efficiency (*Agence Nationale pour le Développment des Energies Renouvelables et de l'Efficacité Energétique* - ADEREE) in Morocco, and the Institute for Energy Diversification and Saving (*Instituto para la Diversificacion y Ahorro de la Energia* - IDAE) in Spain.

BIG FIRMS ARE INFLUENTIAL STAKEHOLDERS IN THE DEVELOPMENT OF ENERGY POLICY

MNRE's proactiveness in India's JNNSM and REC programs concerning misconduct, fraudulent behavior and project execution demonstrate the benefits that a dedicated renewable energy agency can bring. In Spain, however, the lack of coordination between federal and provincial governments indicates that, while an overarching agency such as IDEA exists, its role is not relevant if it is not given a regulatory mandate to oversee sector development.

In Morocco and the Philippines, the need for an overarching entity that oversees policy implementation and procedural deployment is evident. In both countries, complicated administrative procedures and means of operations have proven to be a disincentive for project developers. The Market Service Center (MSC) was set up in the Philippines as a one-stop shop for renewable energy to remove barriers to renewable energy development but has ceased to exist. The DOE REMB has integrated several functions of the MSC, including managing funds dedicated to renewable energy (UNDP 2011). Yet, in both countries, there is a need for a one-stop shop to oversee sector development and streamline processes related to applications, permits and licensing, and determining transmission and distribution requirements.

4. Capacity



CAPACITY

This chapter looks at the supporting industry, enabling infrastructure, and institutional capacity that exist to successfully implement and scale up RE. These include technical capacity and infrastructure requirements; manufacturing and ancillary industries; institutional capacity and the development of human know-how.

As the electricity sector adapts to renewable energy developments, enabling industry structures and technical requirements will need to be made available, and institutions require enhanced capacities in order to manage complex technical and regulatory systems, and portfolios of projects (Nilsson et al. 2012).

Technical Capacity and Enabling Infrastructure

This section focuses on the technical capacity and enabling infrastructure needed to implement and scale up renewable energy.

Supporting industries and infrastructure should exist to a certain extent in order to reach renewable energy targets. Supporting industries include technology manufacturers and ancillary service providers that are necessary to ensure that an increased load, changes in voltage, and potential energy imbalances are properly managed. Appropriate infrastructure must be able to facilitate a rapid and large-scale increase in renewable energy generation.

Manufacturing and Technical Potential

The creation of domestic industries is often desirable to support local growth and job creation, which can also lead to political acceptability of renewable energy programs. However, in some cases, deliberate attempts to building domestic industries can keep costs for renewable energy high in comparison to, for example, sometimes cheaper and quality imported equipment. Therefore, a trade-off often exists between creating new and growing industries and providing affordable energy (Barua et al. 2012).

Among our case study countries, China, India, and Spain have put forward domestic content rules (DCR) and requirements in order to spur this potential[25]. DCRs can help spur the establishment of renewable energy manufacturing capacities and have been used to create manufacturing hubs. Spain's DCRs are considered to be instrumental in the success of some of its main wind manufacturers, such as Gamesa (Lewis et al. 2007). On the other hand, Spain's solar sector, which is not bound by DCRs, has not experienced the same success, with most solar equipment being imported (Bayar 2011).

While technical and industrial capacity potential can grow simultaneously with renewable energy sector growth, it has also been seen that a minimum level of potential needs to exist and the presence of support industry is required in order to establish a stable foundation (Weischer et al. 2011). Industry support does not need to come specifically from the renewable energy sector; the contributions of other external industries that provide supportive infrastructure, products and services to make the renewable energy industry more competitive, such as construction companies and technical service providers, are also important (Polycarp et al. 2012). This was the case in China. The fact that China could draw upon a sizable existing manufacturing sector greatly contributed to the success of its domestic content rules. In many cases, in order to scale up creation of wind power equipment, nothing more than the addition of a new production line for a few heavy industry manufacturers was needed (Yang 2011). Once these basic capacities were established in China, for example, they abandoned their 70% domestic content requirements (Localisation Rate Requirement) in 2009 (Junfeng et al. 2010).

A TRADE-OFF OFTEN EXISTS BETWEEN CREATING NEW AND GROWING INDUSTRIES AND PROVIDING AFFORDABLE ENERGY

Industries can be divided into upstream activities, which usually entail manufacturing equipment, and downstream activities, which are related to technology deployment and electricity generation. Research has demonstrated that different policy strategies targeting either upstream or downstream activities will be required depending on the technology being promoted. For example, in the case of solar photovoltaic, deployment rates are highly linked to low system prices. This is because solar components are easily imported at low cost. By contrast, wind components are heavier and more expensive to transport. Development of a strong domestic manufacturing industry is therefore linked to stable domestic deployment of wind technolologies (Barua et al. 2012).

In order to ensure that system costs are kept low, alternative policies such as those that encourage downstream (assembly and installation) rather than upstream (manufacturing) job creation should be considered (Tawney et al. 2011).

It is also important to note that DCRs are increasingly subject to trade disputes between nations in context of the WTO. Recently, trade dispute conflicts have been at the forefront of DCR discussions between the EU and China, US and India, and Canada, Japan and the EU. Alternative job creation strategies could also avoid lengthy trade 'wars' on clean technologies.

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25 DCRs are currently a hotly debated topic worldwide, having spurred trade disputes between countries since they create localization barriers to trade. Furthermore, their value add in creating growth in domestic markets has been debated. DCRs have been criticized for creating domestic sectors that cannot compete internationally, keeping domestic technology costs high. Tawney, L. 2012. "Taking Renewable Energy to Scale in Asia. Pacific Energy Summit." Pacific Energy Summit, 2012 Summit Papers. Online at: http://www.ddrn.dk/filer/forum/PES_2012_summitpaper_Tawney.pdf

As renewable energy deployment increases, two primary infrastructural challenges arise: grid disconnects between demand centres and location of renewable energy resources, and compatibility of variable renewable energy with grid requirements.

Grid Infrastructure

As renewable energy deployment increases, two primary infrastructural challenges arise: 1) grid disconnects between demand centres and location of renewable energy resources, and 2) compatibility of variable renewable energy with grid requirements. Long-term planning and funding frameworks will be required for transmission and distribution grid upgrades and construction in order to accommodate renewable energy development. Long-term planning considerations are required to ensure that generation, transmission and distributions capacities are sufficient enough to meet projected electricity needs (Dixit et al 2007). Examples of enabling infrastructure would include transmission and distribution linkages that can manage load variability and provide options of storage and net metering (Polycarp et al. 2012).

THE SKILLS GOVERNMENT PERSONNEL REQUIRE FOR THE RENEWABLE ENERGY SECTOR ARE OFTEN VERY DIFFERENT TO THOSE REQUIRED FOR CONVENTIONAL ENERGY SOURCES

In China, an estimated one fourth of all wind-generated electricity is not connected to the grid and is wasted (Ernst & Young 2012), due in large part to the fact that wind resources are strongest in regions located great distances from demand, and proper infrastructure does not exist to carry a large load over these great distances. Plans for funding and subsidization are in place to upgrade the country's grid infrastructure over the next five years (Ernst & Young 2012).

In China, as well as Germany and Spain, the next big bottleneck is integrating an ever-growing share of renewable energy into the grid. Due to the scale of renewable energy generation growth in these countries, they face the problem of integrating a significant load of variable power which can offset base load incumbent fossil and nuclear generation. New, technically complex challenges need to be addressed as renewable energy is integrated into the infrastructure framework. These challenges can be addressed in coordination with grid operators to understand where grid integration difficulties lie.

Germany has undertaken many grid integration studies, and as part of Germany's National Network Development Plan, German Transmission Systems Operators (TSOs) are working in close cooperation to develop a common grid development plan, which must contain all the effective measures for needs-based optimization, reinforcement and expansion of the grid that are necessary for a safe and reliable grid operation over the next ten years (Transnet BW 2012).

Complexities attributed to renewable energy variability are being addressed in Spain through establishment of the Renewable Energy Control Centre (CECRE) in order to facilitate integration of variable renewable energy onto the grid. CECRE is the first control centre of its kind worldwide designed to control renewable energy generation for plants larger than 10MW in order to monitor and control the overall renewable energy supply fed onto the grid (REE 2012).

LONG-TERM CAPACITY DEVELOPMENT THROUGH EDUCATION AND TRAINING PROGRAMMES HAS PROVEN TO BE IMPORTANT IN ACHIEVING AND SUSTAINING NATIONAL RENEWABLE ENERGY CAPACITY DEVELOPMENT

Human Know-how

This section looks at how skilled human resources play a crucial part in rolling out renewable energy solutions.

Know-how will also need to be developed institutionally in order to oversee the implementation of renewable energy policy and regulation. A trained and skilled labour force will be required to deal with the technical changes and challenges in the sector.

Institutional capacity

Institutional capacity at various levels of government will be required to design and implement policies necessary for promoting renewable energy development. The skills government personnel require for the renewable energy sector (including those involved in oversight and regulatory tasks) are often very different than those required for conventional energy sources (Polycarp et al. 2012). Since renewable energy is a technically and economically complex sector and governments have less experience in it, governmental agencies will require adequate capacity to ensure that long-term planning is done appropriately as well as to ensure that projects are being delivered.

A lack of capacity at the institutional level can delay renewable energy deployment. In South Africa, there is a lack of Institutional capacity that has resulted in delays with bringing REBID power purchase agreements to financial closure. For example, to award contracts and complete the bidding procurement processes, the DoE was unable to meet deadlines for the first and second windows, and the third window was delayed over 8 months in order to give officials time to catch up as well as to assist bidders struggling to finalise outstanding bid commitments (SAAEA 2012 & Creamer 2012b).

While in some countries capacity may exist at the central level, gaps may exist at local or regional levels. This lack of capacity has also proven to be detrimental to the development of renewable energy. In Morocco and the Philippines, the gap in national and local level capacity negatively impacted the development of renewable energy.

In Morocco, limitations in human know-how have been identified as a main challenge, mainly in smaller urban and regional areas. Historically, human know-how has been very centralized and concentrated in larger urban centres among the population's elite. However, centralization also means that project development is happening in only a few areas. ADEREE, the national authority on renewable energy, has highlighted major barriers to local capacity in the development of renewable energy, including: 1) the dependence of local authorities on centralized funds that are often not allocated regionally; 2) the lack of know-how and legal expertise necessary to promote renewable energy development; and 3) lack of consideration for the potential of renewable energy amongst regional level authorities.

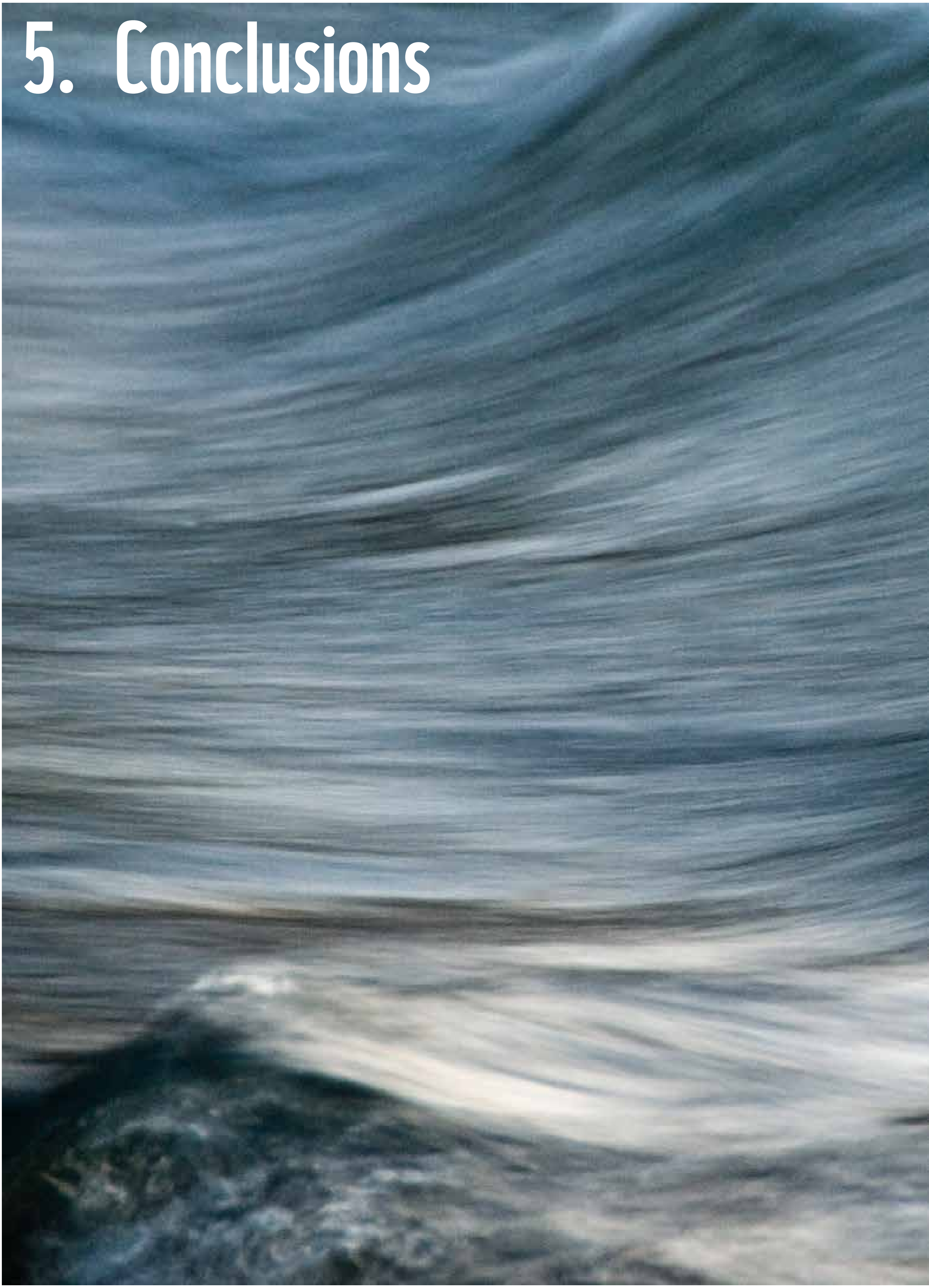
In the Philippines, where experience with geothermal and hydropower projects has helped develop capacity in the sector, capacity still is lacking to a certain extent. At the national level, capacity issues exist regarding implementation and regulation of projects. The DOE has been unable to manage the large number of project applications related to the feed-in tariffs, while the Energy Regulatory Commission lacks the technical expertise resulting in delayed decision making. At the local level, local technicians and end-users are unfamiliar with renewable energy technology and their operations and maintenance requirements (Olz et al. 2010). Recently, there has been an increasing number of successful renewable energy projects in the Philippines, whose success has been attributed to the fact that they have been developed in close collaboration with their beneficiary communities, non-government organizations (NGOs), and private sector at the project design, construction and operation and maintenance phases and capacity at the local level (Zhai 2003).

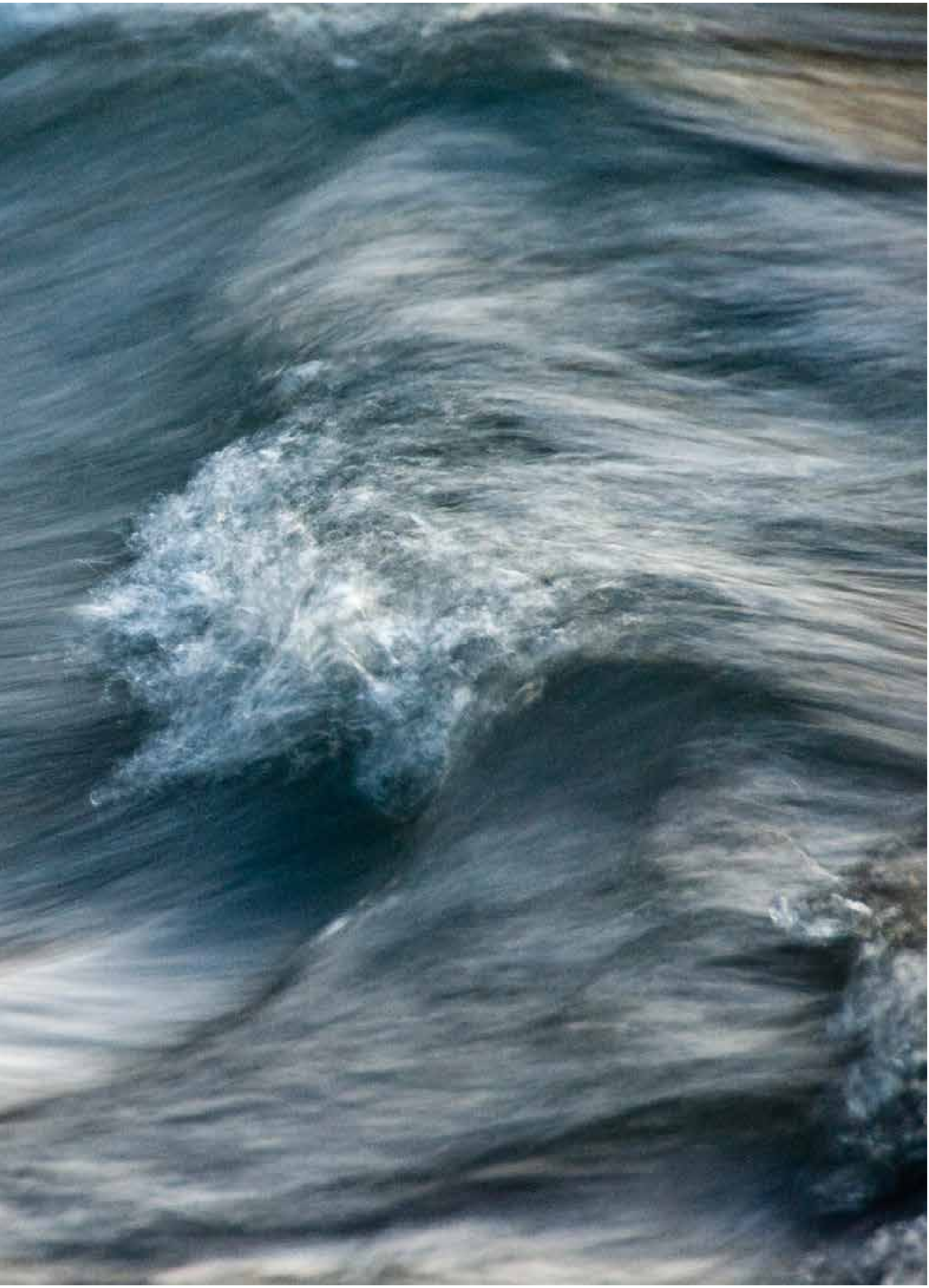
Long-term education and training

Long-term capacity development through education and training programs and the availability of funds to support them has proven to be important in achieving and sustaining the national renewable energy capacity development. A skilled labour force will be needed for long-term planning of installations and energy networks, operations and maintenance, and for managing grid systems.

Education has been a strong focus in Germany, with an increasing uptake of courses at the vocational training and university level (BMU 2011). In India, recognition of a lack of trained manpower (Government of India 2006) has lead the government to set up research to help achieve renewable energy goals, develop educational and training materials, organize workshops and seminars, and coordinate research and technology development. These centres include the Solar Energy Centre (SEC), the Centre for Wind Energy Technology (C-WET), and the National Institute for Renewable Energy (NIRE) (Government of India 2006). Morocco's National Energy Strategy puts an emphasis on the development of higher education that is dedicated to renewable energy through the creation of energy Bachelor and Masters programs and the integration of university programs that include technical and economic components related to energy (Royaume du Maroc 2009).

5. Conclusions





CONCLUSIONS

This chapter sums up the conclusions from the seven case studies, and makes recommendations for ways forward.

This report has analysed case studies of seven countries that have set in place rather ambitious renewable energy targets to be achieved over a defined period of time.

Each of the countries studied presented barriers that are particular to their country contexts, and developed solutions to overcome them.

The following are common barriers and challenges that were identified among the cases studied:

- Balancing policy flexibility and stability
- Implementing policies that promote cost competitiveness and avoid windfall profits
- Identifying appropriate policy funding models
- Ensuring decisions are made transparently and are accountable
- Achieving wide-scale political and social acceptance
- Mapping institutional discrepancies, policy implementation and uncertainty of decision making roles
- Overcoming infrastructural lock-in to conventional energy sources
- Long-term planning and funding
- Sufficient human capacity to lead renewable energy development

If addressed appropriately and consistently, these barriers can become opportunities for creating fundamental and solid conditions for successful renewable energy implementation.

The report suggests that policies cannot function in silos to achieve overall renewable energy policy objectives but must be accompanied by overarching policy and institutional frameworks that include the provisions necessary for large scale transformational change. Although different policy approaches will be required depending on the different country contexts, the case country experiences suggest a set of common recommendations. The analysis concludes that overarching frameworks will have to consider the following:

1. **Policy designs that have clearly defined policy objectives, targets and promotion mechanisms. This should include:**

   - Designing policies that are flexible and able to respond to market changes quickly so that they can adapt to learning curves and technology changes, and avoid windfall profits. Policies and institutions that are not nimble enough to respond to these changes can seriously undermine a program's efficiency and lead to overall program abandonment.

- Renewable energy scale up will require a clear and compelling economic narrative in order to mobilize public support. This will be important in developing countries to demonstrate that lifeline or poorer consumers will not be burdened by renewable energy development, and that economic benefits will accrue to consumers and the broader economy over a reasonable period of time. This will likewise be an important narrative in developed countries to achieving overall multi-stakeholder acceptance.

- Additional provisions for renewable energy deployment, such as mandatory grid access for renewable energy or curtailment measures are critical components for renewable energy development. Without these provisions, renewable energy can only achieve a minimal level of deployment.

2. Institutional frameworks that foster good governance principles in order to ensure that policy frameworks are well managed and outcomes are achieved. This should include:

- Decision-making processes that are transparent and accountable to increase program legitimacy. A lack of transparency and accountability in decision-making and policy implementation processes can undermine renewable energy deployment and damage sector confidence.

- Multi-stakeholder participation, including participation from civil society organizations to increase political and social acceptance. Effective public participation can enhance acceptance through collaborative decision-making processes that address concerns of all stakeholders affected. Acceptance has been seen as one of the underlying drivers necessary for renewable energy policies to move forward and renewable energy development to occur at a large-scale.

- Coordination and cooperation among relevant decision makers, to ensure there is no policy overlap, and to streamline procedures and facilitate renewable energy deployment for project developers. When coordination among entities lacking, project development lags, backlogs are created, and can ultimately lead to the suspension of a program.

- Creation of a specialised renewable energy agency that has a clear mandate and role. This entity should also have the power to oversee and regulate the sector with the aim of minimizing foul play and ensuring legitimacy in the sector.

3. Enabling industry structures and, infrastructural and technical requirements made available. This will require:

- Analysis of job creation potential along the full spectrum of upstream and downstream activity. An industrial manufacturing base can be a foundation for building an renewable energy manufacturing hub. However, possible trade-offs between creating new and growing industries and providing affordable energy need to be considered. Job creation in assembly, installation, and service can be an alternative to creating a manufacturing base through DCRS.

The Kuyasa CDM Pilot Project involves the retrofitting of solar water heater (SWHs), insulated ceilings and energy efficient lighting in over 2 300 low-cost homes in Khayelitsha, Cape Town, South Africa. The project will see an immediate impact on the social, health and economic well-being of the targeted beneficiaries.

- Early attention to short, medium and long-term planning for infrastructure and technical requirements that will allow for integration and deployment of renewable energy technology onto the grid. Countries that have not planned for these requirements are now seeing renewable energy development coming to a halt. Examples of enabling infrastructure include technologies that can manage issues of load variability such as forecasting technologies or storage, as well as increased transmissions and distribution grid planning.

4. **Enhanced institutional and human capacity that will be able to manage complex technical and regulatory systems, and portfolios of projects in the short, medium and long-term. This will require:**

- Institutional capacity at various levels (local, provincial and national) to provide the skills needed to government personnel, including those involved in oversight and regulatory processes. In many countries, there has been a gap between existing capacities at different governmental levels, with more focus on capacity development at the national level. Capacity will be required at all levels to ensure sustained renewable energy development that is visible nationwide.

- Education and training programs needs to be made available to equip the sector with the long-term technical know-how needed. This will involve developing appropriate vocational and university syllabus, research centres and allocating the funds necessary for this type of program development.

6. Annex: Country Case Studies

ANNEX

COUNTRY CASE STUDIES

China

Clear targets and Objectives

China leads the world in total non-hydropower renewable energy capacity, with 70 GW installed nation-wide (excluding hydropower) by the end of 2011. In this same year, in addition to installing more wind turbines and manufacturing more photovoltaic solar panels than any other country in the world, China also increased its generation from wind by 48.2 percent (REN21 2012).

The incredible growth of China's renewable energy sector is due in large part to intentional and calculated action and will on part of the government. By clearly setting a legal framework through the 2006 renewable energy law, articulating time-bound goals and objectives for renewable energy deployment, including diversifying its energy mix and developing its manufacturing base, setting in place an aggressive pricing mechanism, and building off an already strong manufacturing capacity, the government has enabled much of this growth.

In 2005, the government sent a clear signal that renewable energy development was a priority by setting a target of 30GW of renewable energy by 2020 (Yang 2011). More recently in 2011, after far surpassing its 30GW target, the government has reconfirmed its dedication by increasing the number of its technology specific installation targets. For grid-connected wind, its target was increased from 90GW to 100GW by the end of 2015, and to 200 GW by 2020 (REN21 2012). Targets for installed capacity of solar photovoltaic recently increased from 15GW to 21GW by 2015 (Buddensiek 2012).

With such rapid developments in renewable energy installation, the next major bottlenecks that China is facing are grid connection issues, not only in terms of physical constraints, but also political challenges.

Establishing the right policy mechanism

Determining an adequate pricing mechanism that would drive down costs as quickly as possible was one of the main incentives of the National Development and Reform Commission (NDRC) of China. Support mechanisms have evolved from a competitive bidding system to a feed-in tariff (FIT) with variations based on differences in wind energy resources. The introduction of the feed-in tariffs has led to positive developments in wind and power generation capacity in the country.

To spur growth in wind energy development, a competitive bidding process was set in 2003 in a number of select locations. Companies who won the bids were approved for project development and guaranteed a grid connection. These companies were also granted a power purchase agreement (PPA) for the first 30,000 hours of generated capacity, preferential loan and tax conditions, and financial support for road and grid extension (Dubey n.d.).

At the same time, the Renewable Energy Law also promised that feed-in tariff rates would be determined for different technologies. It was not until 2009, when the NDRC identified the competitive bidding system for wind as a barrier to profitable development, that a feed-in tariff was adopted as a replacement. The feed-in tariffs was designed to vary by region and wind resource class and thus was composed of four possible price levels ranging from 8-9.6 US cents/kWh (Yang 2011). In 2009, wind power capacity grew by over 40 percent, 10 percent higher than the average over the previous 10 years (Junfeng et al. 2010).

In August of 2011, the government took measures to encourage domestic photovoltaic generation through the implementation of a solar feed-in tariffs. The feed-in tariffs is designed to decrease overtime and was originally set at about $0.18/kWh (Montgomery 2011). This program was overwhelmingly successful in spurring installation and generation, and photovoltaic capacity grew in 2011 by 500 percent over 2010 levels.

Infrastructure requirements

In light of the incredible growth of variable renewable energy penetration, China is now facing grid integration issues. This has become the biggest problem for the future development of wind power in the country. According to Ernst and Young, a quarter of all wind-generated electricity is not connected to the grid (Ernst & Young 2012).

Technically, there are some issues that have led to this increasingly challenging bottleneck. Firstly, a weak grid network has led to a failed connection between load and renewable energy resources that are usually far from these. A second issue is the compatibility of wind power with the requirements of the grid, where large output fluctuations affect the power system's ability to manage supply and demand balance (Junfeng et al. 2010).

To address this issue, the National Energy Administration and Finance Ministry has announced plans to provide government grid improvement subsidies to state-owned grid companies, and the State Grid has announced that it will invest US$250 billion to upgrade the country's grid infrastructure over the next (Ernst & Young 2012).

Slowly, improvements are being achieved. On May 4, 2012, the Chinese Ministry of Science and Technology (MOST) released the Special Planning of 12th Five-Year Plan (2011-2015) on Smart Grid Major Science and Technology Industrialization Projects. The plan clarifies the overall objectives for smart grid construction during the 12th Five-Year Plan period as well as the industries that China will mainly focus on supporting (Xu et al. 2012).

China connected 50.26 GW of wind-generated capacity to the nation's largest electricity grid as of this year. Furthermore, growth in the on-grid wind power capacity was up 87 percent annually over the last six years. Grid-linked capacity is set to rise to 100 GW by 2015 and 200 GW by 2020 (Baizhen 2012).

Grid connection in the law but no accountability

A lack of accountability has hampered grid connection potentials in the country, as grid companies have no pressure to achieve their quotas. While the Renewable Energy Law requires grid companies to connect renewable energy projects, and while the 11th Five-Year Plan issued in 2008 declared that from 2015 and 2020 there would be requirements for the power companies to achieve a 1 percent and 3 percent portfolio of renewable energy generation in their output, these provisions have not been followed. Grid enterprises receive no punishment if they fail to connect renewable energy projects to the grid.

Additionally, disincentives exist as compensation for accepting wind power is not enough to encourage grid companies, even though a cost sharing mechanism has been put in place. Pricing policies for wind power, for example, do not fairly reflect the difficulties encountered in terms of grid connections. The country's feed-in tariff policy does not consider wind turbine shutdown that may be necessary in situations where grid accommodation is difficult due to large influxes of wind power. This disincentivises developers from exploiting full wind power potentials in order to avoid grid accommodation difficulties (Junfeng et al. 2010).

Manufacturing capacity

While China's domestic content rules helped develop China's wind manufacturing capacities, many have argued that local manufacturing acceleration was fueled by an already existing domestic market, and the dedication to large wind projects. For example, China's existing heavy industry manufacturers were well positioned to start producing new production lines for wind power equipment (Yang 2011). Dedication to planning and construction of large scale wind projects through the organization of bidding invitations starting in 2003 also boosted development of the industry (Junfeng et al. 2010). By 2009, 70% of wind equipment bought by wind developers was produced in China, with major international manufacturers located in China.

Conclusion

China's experience with renewable energy development is like no other. Clear political will has been the main driving force behind the country's success, paired with an aggressive pricing mechanism and a strong manufacturing capacity.

Despite China's successes in the renewable energy sector, there are actions to be taken in order to further renewable energy development and continue on a trajectory of success. Grid connection issues will continue to present future challenges if policies and laws regarding grid connection priorities are not accounted for and the right incentives do not exist. Incentive mechanisms and mechanisms for accountability therefore need to be in place to help China continue on its path as a renewable energy leader.

India

Introduction/Targets

India has proven to be a leading force in renewable energy deployment with over 28GW (MNRE 2012b) of installed renewable energy capacity (excluding hydropower) and representing the world's 6th largest renewable energy market (REN21 2012). In the last 3 years, over 8,000MW of renewable capacity from wind and solar has been connected to the grid (MNRE 2012b).

Currently, renewable energy development in the country has been largely guided by targets set forward in Five Year National Plans, as well as the National Action Plan on Climate Change (NAPCC). India's 11th Five Year Plan, running from 2007-2012 targeted an addition of 12.4GW of grid-connected renewable energy (Bloomberg 2012), which was exceeded, with over 14GW added in that period (ABPS Infra 2009). For the 12th 5 year plan (2012-2017), a target of an additional 30 GW of grid-interactive renewable power has been put forward, comprising 15GW wind, 10GW solar, and 2.1 GW small hydro (Government of India 2013).

The NAPCC was launched in 2008 and contains a target of 15% electricity consumption from renewable energy sources by 2020, NAPCC laid the foundation for the Jawaharlal Nehru National Solar Mission (JNNSM), which sets out a 22GW target for solar capacity by 2022 (20GW on-grid and 2GW off-grid) and outlines a framework for developing holistic policy support including R&D, manufacturing development, and market deployment (EPIA 2012 & MNRE n.d.).

Through rapidly growing investments (in 2011, India saw $10.3 billion in clean energy investment, 52% higher than the previous year) (Bloomberg 2012), increasingly ambitious targets within national plans and the NAPCC, and policy incentives and mechanisms, such as Renewable Portfolio Obligations (RPOs) scheme with tradable renewable energy certificates mechanism[26] and feed-in tariffs for all technologies (while some states have gone in for bidding wrt solar). Despite such rapid growth, however, India has seen and will continue to see challenges in renewable energy development. Renewable energy development has been very much so restricted to a few Indian States, such as Gujarat, Rajasthan, Tamil Nadu, Andhra Pradesh, Punjab, Jharkhand, Karnataka and Maharashtra (MOSPI 2012). Furthermore, the country's sector will require ongoing strengthening of transparency and accountability for achieving RPO and targets, as well as increased attention to grid infrastructure requirements.

Policy

At the national level, renewable energy generation is encouraged through a combination of incentive mechanisms which include tax incentives, generation based incentives, capital subsidies, grants, rebates, public investment, loans, and feed-in tariffs for some technologies such as solar (KPMG 2011). In addition to these incentive mechanisms there is also a Renewable Portfolio Obligations (RPOs) scheme with tradable renewable energy certificates mechanism, which is implemented at the state level, but it is not enforced by all states. In some states RPOs include a minimum amount of solar and/or wind electricity while others are technology neutral.

Recent solar energy development in India has largely been guided by the Jawaharlal Nehru National Solar Mission (JNNSM). Phase one of the JNNSM has proven to be successful in catalyzing additional renewable energy capacity and driving down solar costs. Since launch of the JNNSM, the capacity of solar photovoltaic power projects has grown from 8 MW in January 2010 to over 1,200 MW as of March 2013 (The

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26 The national certificate scheme and feed-in tariffs offered at the state level are mutually exclusive, with power producers either choosing to sell power under feed-in tariffs or availing of the national certificate scheme.

Economic Times 2013). In under 1 year, prices dropped from about 35c/Kwh to less than 17c/kWh due to the reverse bidding process adopted under the JNNSM (MNRE 2012d), moving rapidly in the direction of cost competitiveness with fossil fuel powered electricity (EEW & NRDC 2012).

While the phase I managed to bring down the costs to almost grid parity (with industrial/commercial rates) the low rates drew concerns about financial viability of projects from various stakeholders. The bidding process was criticized for not screening bidders well resulting is a few small and inexperienced bidders to quote aggressive prices, and caused fears that some projects may not come online. While these concerns were present at the beginning, all but 1 project has come online. Such concerns are not reason enough to abandon the competitive bidding process. Furthermore, the Ministry of New and Renewable Energy has set guidelines stating that Firms that do not commissions their projects within the stipulated time (12 months for photovoltaic and 28 months for CST) stand to lose significant amounts of money relative to their initial capital investments (MNRE 2010b). Lastly, since tariffs are generation –based, any underperformance would result in losses to the project developer, therefore providing enough incentive to ensure appropriate performance (Deshmukh et al. 2011b). In order to ensure that future projects are being developed in a timely manner under this system, it will be essential that government facilitate transparency in monitoring and accountability (Deshmukh et al. 2011b).

JNNSM is certainly one of the most successful renewable energy policies in the country. The policy was successful in attracting several bidders to bid aggressively. According to Mohit Anand a Senior Consultant from Bridge to India this was because JNNSM was unique in its approach. JNNSM's goals were ambitious and it took advantage of the fact that renewable energy is emerging as an attractive market for investors.

Domestic Content/Dumping

However, Domestic Content Regulations (DCR) have sparked concerns. While the JNNSM has catalyzed growth in India's solar sector, domestic content regulations (DCR) included under the Mission have also threatened the domestic solar market. Enabling the development of a strong domestic solar manufacturing industry is one of the primary objectives of the JNNSM, and the MNRE has attempted to support the domestic manufacturing industry by imposing a DCR on crystalline silicon photovoltaic cells and modules for projects under the JNNSM. However, this measure has been ineffective (PV Magazine 2012c).

Contrary to crystalline silicon projects, thin film projects may procure their equipment from other regions, which is considered a loophole. This has skewed the market in favour of thin film panels imported primarily from the US (PV Magazine 2012b). For example, First Solar, a US company, will supply 50 MW of its thin film photovoltaic modules to two projects, worth 20 MW and 30 MW, respectively, located in the Indian state of Rajasthan (PV Magazine 2012a). Currently, almost 60 percent of panels installed in India are thin film (PV Magazine 2012b). Thus despite increasing local manufacturing of silicon photovoltaic cells, manufacturers have not benefitted from local content requirement clause of the JNNSM. Because of this, India's solar manufacturers have called for an anti-dumping investigation, claiming that suppliers from other countries such as Taiwan, Malaysia and the U.S. have also received unfair incentives, such as subsidies, and should therefore be penalized, and meaning that they are unable to compete (PV Magazine 2012c).

State level policies

As mentioned previously, renewable energy development varies considerably from state to state. For example, the JNNSM's success has been felt mostly in select states, notably Gujarat and Rajasthan where over 85% of the installed solar capacity exists.

State-wide targets are not fixed through the 5 Year Plans, however, state wide policies have played an important role in wind, bio and solar development in the country. Tradable RECs, for example, seek to address the mismatch between availability of renewable energy sources and the requirement of the obligated entities to meet their RPO. They are expected to encourage the renewable energy capacity addition in the States where there is potential for renewable energy generation as the REC framework seeks to create a national level market for such generators to recover their cost. Since November 2011, 33,15340 RECS have been issued. Representing 3552.45 MW of accredited renewable energy capacity (RECRI n.d.). The bulk of these RECs, however, have been distributed in Tamil Nadu, Maharashtra, Uttar Pradesh and Gujarat, states that already have higher than average renewable energy portfolios.

State level feed-in tariffs, for example are a key mechanism for driving development. While the Central Electricity Regulatory Commission sets recommended feed-in tariffs levels and durations, the levels, duration, and structure of these tariffs vary by state and hence play a role in determining where projects are installed. For example, for the FY 2010-2011, tariffs set for solar photovoltaic projects were on average 32 percent lower than CERC set rates (Deshmulch et al. 2011b).

In Gujarat, for example a preferential tariff was offered at of Rs. 12.54 per kWh for photovoltaic and Rs. 9.29 per kWh for CSP which includes the incentive of accelerated depreciation. Despite a lower tariff as compared to CERC proposed rates the state government of Gujarat signed PPAs for about 1000 MW of solar projects under its own Solar Power Policy 2009. There are several reasons for such a success:[27]

- The state of Gujarat played a facilitative role in the procurement of solar power projects;
- The State has a good investment climate;
- The policy framework is very clear; and
- Gujarat is the only state in the country where utilities are making profits.

Increased transparency

Transparency and accountability has been and will continue to be essential for the renewable energy development in India. As mentioned previously, concerns regarding bidding schemes were dismissed, in part because projects were delivered in a timely manner. In the future, transparency and accountability will be essential to ensure this continues to happen.

The MNRE has been proactive in identifying misconduct and fraudulent behaviour regarding the JNNSM and RECs and producing results in a timely manner. A case

27 Personal Interview with International expert, August 31, 2012.

regarding false commissioning of certificates in Rajasthan has led to investigations by the MNRE. Furthermore, an MNRE internal committee, Vidyut Vyapar Nigan Limited (NVVN), has imposed penalties for the 3 companies who received false certificates and 11 others that missed their deadlines (Parihar 2012).

Lack technical capacity

An increased volume in renewable energy projects has also placed increasing pressure on electricity infrastructure. Underdeveloped infrastructure that varies from state to state, for example slows the deployment of projects. Upgrading/Strengthening the transmission network, delays in payments by DISCOMS, weak State Nodal Agencies, and lack of clarity on who pays for the last mile infrastructure for grid connectivity, all pose challenges (MNRE 2012c). Providing power evacuation and transmission facilities to power projects including wind is primarily the responsibility of respective state governments (MNRE 2012a). The government has commissioned a study on “Green Energy Corridors” to identify evacuation and transmission infrastructural requirement for renewable energy, including wind energy in future (MNRE 2012a). Recently India has signed a cooperation deal with Germany under which a 1 billion euro concessional loan would be given to India to build part of the green corridor.

The Government has also identified that there is a lack of trained manpower (Government of India 2006).

The Ministry has set up research centres to help achieve renewable energy goals, develop educational and training materials, organize workshops and seminars, and coordinating research and technology development. These centres include the Solar Energy Centre (SEC), the Centre for Wind Energy Technology (C-WET), and the National Institute for Renewable Energy (NIRE) (Governmnet of India 2006).

Conclusion

India has seen rapid growth in renewable energy development over the last few years, and as has been mentioned, the JNNSM has proven to be a successful policy in certain states. Several factors have contributed to the success of JNNSM. Firstly, JNNSM being a national policy, which gives a better visibility to investors than other state level policies. Further, MNRE (Ministry of New and Renewable Energy) should be lauded for its efforts to manage the entire process commendably. JNNSM has to date ensured transparency in its bidding process. Moreover, it has also driven down costs for solar significantly. Enhanced transparency and better governance of the bidding process has helped garner investor confidence. In addition to this, by penalizing projects that failed to come online as per the deadlines, JNNSM also gave strong signals in terms of enforceability.

Yet, JNNSM’s success, as well as other policy mechanisms such as RECs, has not been implemented uniformly throughout the country and renewable energy development has been concentrated in certain states. Facilitation of procurement processes should be considered as a priority. Furthermore, transparency in these processes needs to be further encouraged and strengthened, accompanied by regulatory accountability and monitoring in order to ensure the legitimacy of the current procurement process, that renewable energy projects keep moving forward, and to maintain investor confidence.

Germany

Ambitious targets

Germany is a global leader in renewable energy given rapid developments within the sector, particularly in the last decade. In 2000, Germany's *Erneuerbare-Energien-Gesetz* (Renewable Energy Sources Act- EEG) came into effect. The EEG is the central instrument for the promotion of renewable energy in the electricity sector and creates statutory obligations between the installation operator and the grid operator, which is a binding law (Vollprecht 2012). The share of renewables in Germany's energy supply has increased from 6.4% in 2000 to over 25% in 2012 (BDEW 2012). Installed capacity has grown over 6 times, from 10,875MW in 2000 to 65,698MW in 2011 (BMU 2012b). Growth in the renewable energy sector has also meant a boom in domestic employment, with more than 380,000 jobs directly related to manufacturing, operations & maintenance, and research and administration in the sector (BMU 2012a).

The EEG has received support from its inception from the majority of political parties, mostly due to the fact that renewable energy development has always been part of industrial development policy, a notion that has been accepted by all parties. Strong political support towards further development of the German renewable energy sector came in 2011 with the announcement of the *Energiewende* (Energy Transformation),the German long-term energy plan to shift from nuclear and fossil fuels to renewables. Through the *Energiewende*, the German Government has announced plans to achieve at least 35% renewable energy by 2020 and at least 80% by 2050 for electricity consumption, and to phase out nuclear energy by 2022 (BMU 2010).

A number of factors have come together to create a favourable and successful environment for renewable energy development and deployment in the country. These factors include, primarily:

- A solid policy frameworks that provide favourable policy features for renewable energy developers, including flexible policy design and long-term policy commitments

- Strong political will from multiple political parties

- Multi-stakeholder acceptance among all facets of society, in part due to a participatory decision making process

- Minimal to no red-tape concerning grid connection and project development processes; and

- Attention to technical and human capacity development needs

The upcoming challenges for renewable energy deployment in Germany is integrating an ever growing share of variable renewable energy into the grid while providing for residual load capacity at all times. The challenges involved are not only technical, but also administrative and cultural.

Solid feed-in tariffs from the beginning

Feed-in tariffs evolution reflect market changes

Policy flexibility and market responsiveness has proven to be an essential feature of Germany's renewable energy policy design. Germany's Feed-in Tariff program has evolved since its inception in 1991 with the introduction of the *StromEinspG* (Feed-In Act) and later within the EEG, which has created a stable and legal framework since 2000.

The feed-in tariff is designed to reflect market changes, making cost-efficiency an important aspect and incorporating degression[28] rates to account for technological learning curves and avoid overcompensation within the policy design. Flexibility within the policy design has allowed frequent policy adjustments, which have primarily incorporated photovoltaic market changes (Oetzel 2010). For example, between 2000-2004, the feed-in tariff degression rates, while modest, existed and periodic adjustments were made to the feed-in tariff rates for solar photovoltaic. The rapidly decreasing costs of photovoltaic have proven to be a challenge in terms of policy adjustments and have resulted in high levels of photovoltaic deployment in the country at inappropriate prices. Between 2009 and 2010, total installed capacity almost doubled from 9,914MW to 17,320MW (BMU 2011). During this period, German policy makers were forced to reflect market changes more actively, and linked the feed-in tariff degression rates for photovoltaic to the volume of photovoltaic installations that were connected. Feed-in tariff review processes also happened more frequently (BMU 2012b).

Latest amendments to the EEG occurred in 2012, capping support for photovoltaic at 52GW (as of 2011, almost half of that cap has been achieved with over 25GW of Solar photovoltaic capacity instalments)(BMU 2012b) and lowering support levels by 20-30%. Furthermore, there are plans to eliminate the feed-in tariffs for photovoltaic projects larger than 10MW altogether (Lee 2012). Built in degression rates within the feed-in tariff design mean that the policy support mechanism will be phased out eventually, even if caps are not in place.

Solid regulatory framework support renewable energy deployment

The detailed feed-in tariff design has often been highlighted as the main driver behind renewable energy growth in the country. Yet the EEG also includes important features that have been equally important in spurring this growth and providing a stable, predictable and favourable framework. Some of these key features include: priority access for renewable energy to the grid; priority transmission and distribution of renewable energy; the obligation of grid operators to purchase electricity from renewable energy sources; differentiated and fixed tariffs with annual degression rates; national equalization of additional costs for electricity, whereby all costs are shared among all German ratepayers; and compensation for renewable energy plant operators if energy is curtailed (Oetzel 2010).

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28 The International Feed-in Cooperation defines tariff degression as: “a tariff level that depends on the year when an renewable energy plant begins operation. Each year, the level for new plants is reduced by a certain percentage. However, the remuneration per kWh for commissioned plants remains constant for the guaranteed duration of support. Therefore, the later a plant is installed, the lower the reimbursement received. Klen, A. et al. (2010). Evaluation of different feed-in tariff design options- Best practices paper for the International Feed-In Cooperation. Pg. 39.

This framework has provided investment security for project developers, investors and lending institutions (Bruckmann 2011) such as KfW, Germany's public bank which has co-financed roughly 80% of all domestic installed wind capacity (KFW 2012).

The German regulatory framework has also allowed for rapid uptake of renewable energy through minimization of bureaucracy and red-tape, particularly in the residential solar sector where permitting, interconnections and inspection costs and procedures are almost negligible. Fewer permitting requirements, greater standardizations, and less onerous interconnection processes have led to lower installation costs, a large portion of overall project development costs and contributing to high rates of solar photovoltaic deployment (Cinnamon 2012).

While the EEG regulatory framework has provided favourable conditions for renewable energy deployment, the high deployment rates of variable renewable energy sources have highlighted the challenges regarding limits to the technical integration of large scales of variable renewable energy (Bruckmann 2011). Integration of high levels of variable renewable energy has not only become a technical challenge, but an administrative and cultural challenge as well, as the construction of large transmission lines has received much opposition.

Allies: multi-stakeholder acceptance

Multi-level acceptance towards renewable energy has played a primary role in renewable energy deployment. Acceptance has been received at the governmental level and was strengthened recently after the Fukushima nuclear catastrophe in Japan in March 2011. This event led the German Government to re-introduce the Nuclear Energy Act (2002), mandating all nuclear power plants to be shut down and taken out of operation by 2022. The introduction of this Act has meant that originally planned for nuclear power will be replaced by renewable energy, with government commitments to at least 80% renewable energy by 2050 to cover the country's electricity consumption (Transnet BW 2012).

renewable energy has received widespread support from a variety of stakeholders, including political parties, the general public and, increasingly, from utilities and major power producers. Acceptance has been seen as a critical component for renewable energy deployment in the country and has always been a priority in renewable energy decision making processes.

Since its adoption in parliament in 2000, the EEG has received broad based support from the main political parties and has always been part of a non-partisan discussion between parties (Social Democratic Party- SPD, Christian Democratic Union- CDU, Christian Social Union- CSU and the Greens) (Bensmann 2010). The SPD saw buy in from the CDU as a critical move, and got the party on board by raising the issue of the adoption of renewable energy as one of utter urgency (Bensmann 2010). Support for the EEG has evolved over the years, with the CDU and CSU increasingly demonstrating support, in large part due to support from farmers who have largely benefited from the Act.[29] One key reason for such strong political support is because Germany's renewable energy development was always part of an industrial development policy and only marginally an environmental policy. The

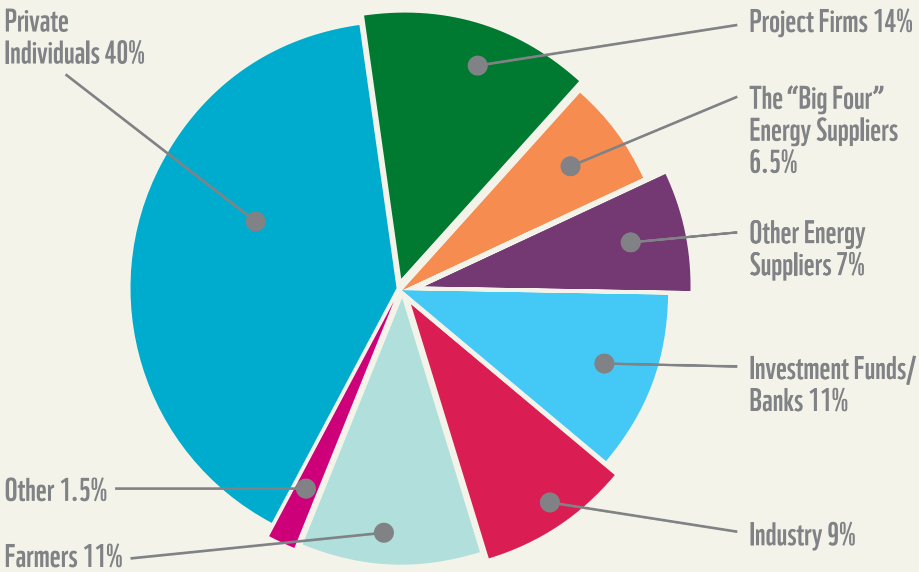
29 Personal Interview with International expert, July 21, 2012

need for the former is accepted by all parties from the left to the centre-right in parliaments, as well as powerful trade unions. The latter is always subject to debates.

Traditionally, Germany's 4 major power utility companies (the big four: Vattenfall, EnBW, RWE, and E.oN), have been major opponents of renewable energy development and deployment. Legally, the EEG requires the transmission system operator (TSO) to purchase renewable energy, at prices that are much higher than electricity produced by more traditional sources, such as coal and natural gas (Spiegel Online 2013). Increasingly, however, local utility companies are turning towards renewables in their regions. The energy market in Germany is becoming more decentralized, with more and more municipal utility companies arising. According to the German Association of Local Utilities (VKU), the proportion of Germany's total electricity generated by local utilities is only around 10% – a figure the VKU wants to double to 20% by 2020 (Yapp 2012). Additionally, many of them want to become more dependent on renewable energy, with plans to increase their shares of electricity production from renewable energy from a tenth to at least a fifth by 2020 The Economist 2012). To date, municipal utilities represented by VKU have over 3GW of capacity under construction or in the process of approval (Yapp 2012).

The move towards more decentralized forms of energy production has also contributed immensely to the growth in renewable energy, drawing support from communities and individuals who are benefiting from innovative ownership models, such as cooperatives and citizen wind parks. This support has been optimized by the fact that many renewable energy projects are in the hands of communities themselves, with over 50% of renewable-energy capacity owned by individuals or farmers. In the case of wind developments, for example, the big four owns just 6.5% (The Economist 2012).Figure 3 illustrates the share of renewable energy projects by investor type, citizens being the largest investors in renewable energy projects.

Figure 3 **The share of renewable energy projects by investor type**



Aside from community involvement, the government has always had a strong focus on transparency and participation within the decision making process. This has been increasingly the case in light of grid expansion requirements for renewable energy integration. One of the main barriers to grid expansion has been public opposition (Bruckmann 2011). For this reason, a National Network Development Plan is being implemented in order to get people involved in the planning process and to raise awareness on grid expansion, an issue that is seen as very important for the Government (Transnet BW 2012). The Government will also launch an information campaign called "Grids for environmentally sound energy supply to mitigate opposition" (Reiche 2010).

German NGO's have also been very involved in creating awareness around renewable energy and mitigating barriers for the development of the grid (bruckmann 2011). From the very beginning, all major renewable energy associations (BSW, BEE, BWE) have worked together, along with powerful think tanks and NGOs, creating a coalition against coal. This combination has contributed largely to the success of renewable energy in the country (BMU 2011).

High human and technical capacity: Present strengths and future challenges

Germany's renewable energy potential has also been strengthened by the importance given to capacity building in the sector, both at a research level and a technical level. Education has been a strong focus, with an increasing uptake of courses at the vocational training and university level (BMU 2011). Furthermore, assistance for R&D has been recognized as necessary for market leadership, and job-creation (BMU 2011). Investments in renewable energy for the electricity sector in particular totalled 25 Billion Euros (BMU 2012b), and the German government spent $233 million on renewable energy R&D, $46 million of which specifically on wind power (IEA 2011).

While a focus has been on capacity building and R&D in the sector, which has helped Germany reach the levels of renewable energy deployment it sees today, new emerging technical issues are being foreseen. Due to the expected growth in renewable energy, and in particular offshore wind parks, barriers on the national grid at the transmission level are being discussed and highlighted as one of the next major challenges for Germany (Bruckmann 2011). According to the country's grid operators, the transmission system will require €20 billion in investment over the next 10 years to upgrade the network and increase reliance on renewables (Yapp 2012).

Steps are being taken to facilitate this process. In July 2011, the German government undertook legal reforms to improve the situation for the integration of renewable energy (Bruckmann 2011). Furthermore, Interdisciplinary studies, which are undertaken in conjunction with energy scientific institutions, are being completed as an important step for grid development. These include, for example, dena I, dena II und EWIS. The grid extension will be undertaken, by all four German TSOs working in close cooperation. An essential component of this is the National Network Development Plan (Transnet BW 2012). Each year the German TSOs create a common grid development plan, which must contain all the effective measures for needs-based optimization, reinforcement and expansion of the grid that are necessary for a safe and reliable grid operation over the next ten years (Transnet BW 2012).

Conclusion

Germany has seen large growth renewable energy deployment since the creation and inception of the EEG. Development of the domestic market has been achieved, overcoming opposition and serious dedication to R&D. Significant growth in renewable energy has also led to challenges regarding feed-in tariff adjustments, namely for solar photovoltaic technologies, as well as new technical challenges concerning grid integration that were not necessarily foreseen.

Germany will need to focus its efforts on developing a clear roadmap describing what its future energy system will look like, while also further strengthening initiatives for public engagement. Additionally, policy development and evolution of, for example the solar photovoltaic feed-in tariff need to be made clear to ensure investor and developer confidence.

Morocco

Background: Context and targets

Morocco has seen a number of changes in its political climate over the last few years, which has enabled and shaped a more open, decentralized and participatory atmosphere. This atmosphere has been reflected within the energy sector as well with a series of regulatory, legal and institutional changes that has led to the incremental promotion and support for renewable energy. Morocco's ambition towards renewable energy scale up is strengthened by the need to diversify its energy sources and lower its currently high import rates, but is also seen as an opportunity tap the renewable energy market and to export energy to the region and to Europe given its geographic location and grid connection with Spain.

Morocco is a country that relies on foreign energy sources, importing over 95 percent of its energy needs, and all based on fossil fuel sources. In addition, Morocco's economy has seen significant growth in the last few years, putting increased pressure on the energy demand, which has grown at roughly 7 percent per year over the last few years. Given these pressures to achieve energy dependence, diversify their energy sources and meet increasing energy demands, Morocco has set out to become a green energy leader in the North African region, being the first country in that region to put forward clear and defined renewable energy objectives and targets.

Recent major changes relating to renewable energy started in 2009 with the introduction of a new legal and regulatory framework (*Loi 13-09 relative aux Energies Renouvelables*), through the institutional transformation in switching from the *Centre pour le Développement des Energies Renouvelables* (CDER) to the *Agence pour le Développement des Energies Renouvelables et de l'Efficacité Energétique* (ADEREE), a national agency with legal authority, and through the establishment of the Moroccan Agency for Solar Energy (MASEN) and *Institut de Recherche en Energie Solaire et Energies Nouvelles* (IRESEN). With these changes also came the establishment of ambitious targets in relation to renewable energy and energy efficiency measures to achieve energy objectives in the country.

By 2020, Morocco aims to reduce its energy consumption by 12 percent and obtain 42 percent of its electricity needs by renewable energy sources, more specifically 14 percent solar, 14 percent wind and 14 percent hydro (GIZ et al. 2012). In addition to committing to these targets, Morocco's commitment to renewable energy is demonstrated through its National Energy Strategy, where a long-term energy plan has been put forward (Royaume du Maroc 2009).

Morocco's case presents an example where ambition clearly exists to increase renewable energy for local consumption, but also to export to Europe, given its geographic location and grid connection with Spain. Currently, several large scale solar and wind projects are being planned, enough to satisfy the 2,000MW solar and 2,000MW wind targets that have been put in place. Concerns have been expressed that Morocco's legal and political frameworks, and lack of human know-how present the main barriers to actually achieving these targets. Morocco, therefore, presents a case where ambition alone is not enough to achieve targets.

Policies/legal framework

In 2010, the law 13-09 relative to renewable energy was promulgated, putting forward a legal framework to promote energy production from renewable energy sources. Within the law, special provisions enabling the generation, sale and export of electricity (Royaume du Maroc 2010b) by companies other than the *Office National de l'Electricité* (ONE), the national electricity company, as well as over the transport network of electricity, were made (Roller 2007).

Monopoly over energy generation ended in 1994, allowing ONE to sign PPAs with private companies (*Ministère d'Economie et Finance* 2005).

While the legal framework sets forward a basis for renewable energy production, it also lacks legal requirements that pose great challenges to the increase in renewable energy development and market growth within Morocco. More specifically, two areas of the law deserve mention from this perspective:

- The law provides the right for operators to generate electricity from renewable energy and connect to the national medium, high and extra high voltage grid (Royaume du Maroc 2010b). However, renewable energy projects cannot connect to the low voltage grid, which poses a significant barrier to connecting photovoltaic and wind energy projects (Faquihi 2012), and;

- The law provides no clarity in terms of technical details or guidance as to how targets are intended to be achieved, leading to unstable and uncertain market environments for project developers.[30]

The way in which projects are being developed are through PPAs and, for solar and wind projects that fall under the national program, competitive bidding processes. The lack of subsidies, incentives and a guaranteed tariff have also been seen as a major setback for the development of renewable energy (Faquihi 2012). There are no policy or finance mechanisms likely to be set up in the near or long-term future for the promotion of renewable energy, and most financial mechanisms being considered are still in an analysis phase (GIZ et al. 2012). Although there is recognition that fixing a tariff through programs such as feed-in tariffs has been successful, there is

30 Personal Interview with International expert August 17, 2012

also the concern that a fixed tariff will elevate prices substantially for consumers[31] or will be risky in terms of creating a speculative bubble, and cause over investments (Faquihi 2012).

These legal and policy challenges have led to an environment where project developers are unsure or disincentivised to participate in Morocco's renewable energy market. Current renewable energy ambitions are, to a certain degree, dependent on international support. For example, the Moroccan *Fond de Developpement de l'Energie* (FDE- the Energy Development Fund) has received $150 million from the World Bank's Clean Technology Fund to support its transition towards a low-carbon energy strategy (CIF 2009), and particularly ONE's Wind Energy Program (WEP) (CIF 2011).

Institutions

While there is not yet a mandated regulator for the electricity sector in Morocco, there is recognition that a transparent system of governance needs to be established where clearly defined roles and responsibilities for involved stakeholders are known (Royaume du Maroc 2009).

With recognition from the Moroccan government for the need of institutional reform and networks (Royaume du Maroc 2009), Morocco has, since 2009, been developing a new institutional framework for national renewable energy. Following recommendations for institutional reform of CDER to move away from its purely administrative role towards one that provides services for political institutions, CDER was reorganized and renamed to ADEREE in 2010 and transformed into a legalized national entity tasked with designing, administering, and implementing the national renewable energy plan (Royaume du Maroc 2010a). Other newly created institutions have been MASEN, The Society for Energy Investments (SIE), and IRESEN.

In an effort to coordinate institutional roles, the Energy Minister, Fouad Douiri, created an initiative called "Team Energy Maroc" just two months after being appointed in January 2012. The Team, composed of ADEREE, ONE, SIE, MASEN and IRESEN, was created to ensure homogeneity and coordination in the sector (Thiam 2012).

What has been apparent has been the political will and support for an renewable energy plan from the inception of Morocco's New Energy Strategy, adopted in 2009. The Strategy aims at reinforcing energy security and access to energy at affordable costs. These objectives will be reached through the diversification of energy sources, the development of national energy potential, particularly renewable energy and EE, and a more close integration with the regional energy system. The Strategy has received full support from the King of Morocco since its inception, which has also proven to be a main driver for renewable energy development in the country.

Administrative processes and means for operation have also proven to be cumbersome for private project developers, representing a disincentive for those interested in Morocco's renewable energy tenders. With no clear regulatory body in place or operating practices clarified, developers who would like to operate in Morocco, essentially need to operate as an independent utility, finding its own group

31 Personal Interview with International expert August 17, 2012

of consumers, negotiating their own electricity prices and determining processes with ONE in terms of transmission and distribution necessary . As has been explained in an ADEREE/GIZ report (2012), private investors operate as facilitators, regulators and managers of public services all at once.

Capacity

One of Morocco's ambitions is to develop the human know-how and industrial capacity of Morocco through renewable energy development. The National Energy Strategy puts an emphasis on the development of higher education that is dedicated to renewable energy through the creation of an energy BA, the integration of university programs that include technical and economic components related to energy, and the appropriation of new technologies through R&D, technology transfer, and attraction of Moroccan products internationally, among others (Royaume du Maroc 2009).

Limitations in human know-how has been identified as one of the main challenges for the Moroccan renewable energy landscape, mainly in smaller urban and regional areas. Traditionally, human know-how has been very centralized and concentrated in larger urban centres among the population's elite. However, having human know-how concentrated in a few, centralized areas also means that project development is happening in few centralized areas.

The new Moroccan Energy Strategy highlights the importance of decentralization of Morocco's electricity system, which would require development of local technical and human capacity (GIZ et al. 2012). ADEREE has recognized that renewable energy development needs to start occurring at the local level and has started a processes of decentralization, communal mobilization and regional renewable energy potential analysis throughout the country. One example of this is through ADEREE's Jiha Tinou Program, started in March 2012. The Program aims to encourage local initiatives and expand capacity of local level actors in order to achieve nationwide objectives. Local support will be provided through: support for policy makers, transfer of institutional and personnel know-how, and access to information through education and citizen orientation. The program also provides technical assistance for planning, implementation and evaluation of projects (ADEREE 2012).

ADEREE is also cognizant of the human capacity that will need to be developed if such an ambitious plan is to come to fruition and has taken on training exercises for experts and managers, to develop the legal framework and regional strategy, and to establish a network for training and applied research in the country's renewable energy sector (Altmann 2012). A recent report ADEREE/GIZ (2012) outlines local capacities in the promotion and development of renewable energy, highlighting the important role that local level participation can play in the industrialization and growth of the Moroccan renewable energy market through, for example, production of equipment and installation services. However, the report also highlights major barriers to local capacity in the development of renewable energy, including: 1) the dependence of local authorities on centralized funds that are often not allocated regionally; 2) the lack of know-how and legal expertise necessary to promote renewable energy development; and 3) lack of consideration for the potential of renewable energy amongst regional level authorities.

Renewable energy potential analyses are being completed at the local level and it has been seen that given the amount of solar radiation, and considering what consumers currently pay on average for electricity solar will become cost competitive within a few years. To be more specific, based on potential analysis, the prices in electricity production based on solar photovoltaic are forecasted to drop dramatically in the MENA region due to favourable solar conditions, to US 6 cents/kWh by 2020. These prices would require, however, high scales of electricity based on renewable energy planning at the national and regional levels (Mouline 2011).

Efforts for decentralization also fall short in terms of project planning, development and siting, where few, large scale solar and wind projects have already been planned in select areas of the country. In total, five large scale solar projects are being planned by MASEN and ten large scale wind projects are being developed and/or planned through public private partnerships with ONE, all ranging from 50-300MW in size (MASEN n.d. & ONE 2010). These projects are set to make up the total renewable energy installed capacity required to meet Morocco's renewable energy targets.

Conclusion

The political will in Morocco towards supporting renewable energy and developing the national market sector has been recognized internationally, and has put the country at the forefront of regional of large scale renewable energy development. Initiatives such as Team Energy Morocco demonstrate this dedication to improve the landscape for renewable energy development in the country and to create a unified vision. Yet, from a policy and capacity perspective, Morocco still faces many hurdles that need to be overcome if the vision to become a regional leader in renewable energy is to become a reality.

A focus on developing a clear renewable energy roadmap including strong guidelines that address grid connection requirements, such as opening up low voltage lines to photovoltaic and wind, needs to be undertaken by the Government. This coupled with capacity building initiatives at the local level as well as improved incentives will help renewable energy development in the country.

Philippines

Framework and Targets in the Philippine context

The Philippine's energy portfolio is quite unique in the region in that domestically, it has few of its own fossil fuel resources, it's energy mix already includes a high capacity of renewable energy and, in terms of pricing, the Philippines has the 2nd highest electricity rates in Asia and the 4th highest in the world (Malinao 2011).

The high cost of electricity is partly attributed to high costs related to importing fossil fuels. As far as renewable energy sources, the Department of Energy reported that 40.6 percent of the primary energy mix was contributed by renewable energy sources in 2011, primarily composed of geothermal at 21.7 percent, followed by biomass at 12.4 percent and hydro at 6 percent (Philippine Department of Energy 2012).

Given these unique features, the Philippines Department of Energy has put forward long-term energy plan targets through its National Renewable Energy Program, aiming to triple its renewable energy capacity base to 15,304MW by 2030. More specifically, these targets are differentiated by technology, and include Hydro (8,724 MW), geothermal (3,461 MW) and wind (2,378 MW). This would signify an increase in renewable energy capacity of 9, 865.3 MW, increasing the total shares of hydro by 5,394.1 MW, geothermal by 1,495 MW, and wind by 2,345 MW, based on 2010 figures (Philippine Department of Energy 2011).

While these goals have been put in place and have received significant support from government officials, external opposition has set back the Philippine's renewable energy development process, particularly pertaining to the implementation of a feed-in tariff program as well as other policy mechanisms. Opposition to feed-in tariff rates came from various stakeholder groups including project developers who wanted higher prices and consumer organizations that represent the interest of lifeline consumers. Opposition coupled with the Philippines Energy Regulatory Commission's (ERC) weak capacity, delayed the renewable energy development process and has caused investor uncertainty, risking the country of losing over $2.5 billion in potential renewable energy investments. Substantial project implementation bottlenecks related to lack of institutional coordination and technical grid capacity constraints are also putting serious constrains on renewable energy development in the Philippines.

Policy mechanisms with too much uncertainty

In 2008, the Philippines signed the Renewable Energy Act which became effective 6 months later and provides the legal basis for renewable energy development and promotion in the country (Velasco 2010). The Act is very comprehensive, and puts forward a number of fiscal and non-fiscal incentive mechanism to encourage renewable energy development. The two major non-fiscal mechanisms for encouraging generation of renewable energy resources are the Feed-in Tariff and Net Metering.

To supplement these mechanisms, the law also provides for the following non- fiscal mechanisms: Renewable Portfolio Standards (RPS)(ERC 2010d), Green Energy Option (ERC 2010d), and a Renewable Energy Market (ERC 2010d). Other fiscal incentives include an income tax holiday, a lower corporate tax rate of 10 percent for new and existing renewable energy developers, tax and duty free importation, zero percent VAT rate, and payment of transmission charges, among others (Sargento 2011).

Unfortunately, of the non-fiscal mechanism, only the feed-in tariffs has been finalized and approved, which has not come as an easy process (Sargento 2011). The Philippines Energy Regulatory Commission (ERC) finally approved feed-in tariff rates in July 2012, 4 years after first being proposed in the Renewable Energy Act of 2008, which directed the government to set rates for wind, solar, run-of-river hydro, biomass and ocean thermal energy (Gipe 2012).

The delay has caused frustration among industry stakeholders, who saw the anticipated development of renewable energy projects stalled due to lack of clarity in policies or slow action on these crucial rules (Velasco 2010). The delay on policy action has put thousands of megawatts of potential renewable energy projects at a standstill and put the country at risk to losing over $2.5 billion in potential renewable energy investments (Philippine Daily Inquirer 2012). In 2011, at least 384 renewable energy service contracts were awaiting approval from the Department of Energy, equalling to 6,046MW of generation capacity. While the feed-in tariffs has been approved, unfortunately, many of these projects are still in limbo pending the approval of other renewable energy mechanisms and backed up because of administrative bottlenecks. According to and IEA report (2010), complexities and delays in grid connection authorization procedures pose administrative barriers for renewable energy deployment (Olz et al. 2010). Moreover, statements from some top government officials that not all of the fiscal incentives under Renewable Energy Act will be granted have also sent confusing and discouraging signals to investors and developers.

Yet, the newly approved feed-in tariffs does present interesting features in terms of market response mechanisms and flexibility.

The costs of feed-in tariffs are being controlled through various methods, such as: installation targets, review processes, degression rates, inflation and foreign exchange adjustments, and reference cost studies. Based on these methods, the ERC will review and re-adjust the feed-in tariffs when (a) the installation target per technology is achieved within the target period (3 years), (b) when the installation target per technology is not achieved within the target period, (c) when there are significant changes to the costs or when more accurate data become available to calculate the feed-in tariffs, and (d) other analogous circumstances that justify review and readjustment of the feed-in tariffs (ERC 2010d).

These procedures have been put in place to prevent situations of over-installation and windfall profits, a lesson learnt from the Spanish experience (Sargento 2011).

Adversaries and allies

Delays in policy decisions have mostly been affected by disagreements within governments and the opposition of various influential groups, such as Electric cooperatives, Freedom from Debt Coalition, Foundation for Economic Freedom, Consumers' Associations and the Department of Trade and Industry (DTI).[32] Opposition is mostly based on the argument that a feed-in tariff, to be called the FIT-allowance, will result in additional charges, which will be collected from all electricity consumers (Remo 2012).

Politically, the feed-in tariffs has been considered a central feature of the Renewable Energy Act. NREB and ERC have petitioned for it stating that feed-in tariffs are "indispensable" to achieving the goals of the Renewable Energy Act, since they grant priority connection to the grid, priority to the purchase, transmission, and payment for renewable generation, and provides a fixed tariff that pays for the renewable generation for a fixed period (Gipe 2012). Despite support from the main consultative body on renewable energy, NREB,[33] and recognition from Energy Secretary, Rene D. Almendras that renewable energy and feed-in tariffs are beneficial, avoiding increasing electricity rates have remained the main priority (Velasco 2010).

32 Personal Interview with International expert, August 31, 2012.
33 The NREB is primarily a consultative and recommendatory body created by virtue of the Renewable Energy Act 2008 to facilitate the implementation of the mechanisms under the Act. To ensure participation and consultation of all key stakeholders, the board is composed of one Chairman and 14 board members coming from both the private and public sectors. There are one representative each from the following sectors: renewable energy Developers, Government Financial Institutions, Private Distribution Utilities, Electric Cooperatives, Electricity Suppliers and Non-Governmental Organizations.

Institutional coordination and technical capacity – main non-financial barriers

While the feed-in tariffs has been officially passed, and while grid infrastructure and management practices were taken into account in setting renewable energy installation targets, especially for variable power sources such as wind and solar, substantial project development and interconnection delays are still expected. Given the amount of projects that were at a standstill and awaiting approval and other policies and technical protocols that need to be established, project implementation processes may still be burdened by at least three years of delay (Velasco 2012).

In the Philippines, renewable energy development is burdened by a lack of coordination among involved authorities in permitting procedures (Olz et al. 2010). According to an NREB official, there is a need to establish a One-Stop Shop to handle and streamline all renewable energy applications. The long and convoluted process to incorporate the company, apply for service contracts, secure the permits and licenses, and deal with so many government offices discourages many possible investors and delays the projects. The Market Service Center (MSC) was set up in the Philippines as a one-stop shop for renewable energy to Remove Barriers to Renewable Energy Development in the Philippines and the DOEs REMB has integrated several of the functions of the MSC (UNDP 2011).

Given the Philippines experience with geothermal and hydropower projects, the human and technical capacity in these areas do exist, but still is lacking to a certain extent. At the national level, capacity issues exist regarding implementation and regulation of projects. The DOE has been unable to manage the large number of project applications related to the feed-in tariffs, while the Energy Regulatory Commission lacks the technical expertise resulting in delayed decision making. At the local level, local technicians and end-users are unfamiliar with renewable energy technology and their operations and maintenance requirements (Olz et al. 2010). Recently, there have been an increasing number of successful renewable energy projects in the Philippines, whose success has been attributed to the fact that they have been developed in close collaboration of their beneficiary communities, non-government organizations (NGOs), and private sector at the project design, construction and operation and maintenance phases (Zhai 2003).

Technical infrastructural barriers are also still a major constraint in the country. These constraints are related to the natural geographical landscape posing a serious infrastructural challenge to building adequate grid connections (Olz et al. 2010). Site specificity of renewable energy availability is, therefore, an important consideration for renewable energy planning.[34]

Conclusion

The Philippines' experience with renewable energy development offers a good example of the importance of political will and overall mobilization of stakeholders. While one of the main strengths of the renewable energy framework is that the policy mechanisms are legislated under the Renewable Energy Act, 2008, many of the details and rules pertaining to these mechanisms have been delayed and un-clarified since the law's inception. These delays have been caused by resistance from many

34 Personal Interview with International expert, August 31, 2012.

stakeholders- governmental, private, and utilities, among others- which has been the primary challenge in renewable energy development for the country.

Primarily, the challenges that lie ahead in the Philippines for renewable energy deployment and achievement if its national targets will be to properly mobilize all stakeholders involved in the sector through engagement and public participation. Furthermore, coordinating decision making and project planning processes, and ensuring the technical and human capacity exists by involving beneficiaries in the development stages, operation and maintenance of projects will help strengthen the sector.

South Africa

The South African renewable energy landscape has seen a number of developments over the last decade with aspirations to:

- Develop a cleaner more sustainable energy future
- Establish a solid renewable energy manufacturing sector in the country for urgently needed job creation

In 2011, the South African Government put forward an Integrated Resource Plan (IRP) to help minimize greenhouse gas emissions related to fossil fuels and help boost job creation. The Department of Energy released the IRP2010-2030, a 20-year capacity addition plan for the electricity sector, which set a target of 11.4GW of renewables. After a round of public participation was conducted near the end of 2010, several changes were proposed and a second Policy Adjusted IRP was recommended and adopted by Cabinet in March 2011. This newly approved and updated IRP2010, which forms a subset of the overall South African Energy Plan, calls for a total installed capacity of 17.8GW (South Africa Department of Energy 2011) of renewable energy and 42% of all new generation capacity developed up to 2030 (SARI 2011). More specifically, the IRP2010 calls for 8,400MW of wind and solar photovoltaic each, and 1,000MW of concentrated solar thermal (South Africa Department of Energy 2011). Excluding existing hydro this brings the renewable energy share of power supply to 9%. This is limited compared to the coal generation capacity, which will continue to make up about 60 per cent of the generation fleet (South Africa Department of Energy 2011).

The country has implemented a number of initiatives and instruments to help facilitate the achievement of these targets while simultaneously helping develop its green economy. These initiatives include the the South African Renewables Initiative (SARI) and the South African Renewable Energy Council (SAREC), the creation of the Green Economy Accord[35], the incorporation of green growth goals in the Industrial Action Plan (IPAP2), the introduction and revision of the Integrated Resources Plan in 2009 and 2010, and finally the Renewable Energy Independent

35 Through the launch of the Country's Green Economy Accord in November 2011, the Government of South Africa has committed to procuring 3,725 MW of renewable energy for the national grid by 2016 and to create at least 50,000 green jobs by 2020. South African Government (2011, November 29). South Africa's Green Economy Accord. South African Government Information, Online http://www.info.gov.za/speech/DynamicAction?pageid=461&sid=23648&tid=50584

Power Producer Procurement Programme (or REIPPP). After a first and second round of bidding, 47 renewable energy projects were selected (28 in the first round and 19 in the second), securing 2,460 MW of the total 3,625 required (South Africa Department of Energy 2012). The program's first round of bidding successfully reached financial closure, after several months delay, in November 2012 (Creamer 2012a).

While there was an overwhelming response to the recent call for proposals put forward through the REBID programme, a call that seeks to procure 3,725MW of renewable energy (Creamer 2011), South Africa's experience with renewable energy policy and project development has taken some time to take off, most notably due to a slow rule setting procedure causing an uncertain regulatory environment, a lack coordination between key decision-makers, and delays and lack of capacity from the Department of Energy (DoE) to complete and award contracts.

Uncertain regulatory environment

Until mid-August 2011, the main policy mechanism in place to promote renewable energy was a Renewable Energy Feed-in Tariff (REFIT), announced in March 2009 by South Africa's National Energy Regulator (NERSA). Although Tariff rates were set in 2009, developers could not enter into contracts with Eskom (the single power buyer in the Country) because standardized power purchase agreements had not yet been issued (Pegels 2011).

More delays came in March 2011, when NERSA announced that the REFIT rates needed to be lowered. NERSA invited stakeholders from a series of sectors related to renewable energy (project developers, associations, environmental organizations and end users) to comment on the tariff level (NERSA 2011). After a consultation period, tariffs were announced to be lowered considerably—tariffs for photovoltaics, for example, were lowered by over 40%.

Table 6 Tariff changes between the 2009 REFIT rates and the 2011 REFIT rates.[36]

Technology	REFIT 2009 ZAR c/kWh (EUR c/kWh)	REFIT 2011 ZAR c/kWh
Wind	125 (12.8)	93.8
Landfill gas	90 (9.2)	53.9
Small Hydro	94 (9.6)	67.1
CSP, trough with storage (6 hr/day)	210 (21.5)	183.6
CSP, trough w/o storage	314 (32.2)	193.8
CSP tower with storage (6 h/day)	231 (23.7)	139.9
Large-scale grid connected photovoltaic (≥1 MW)	394 (40.4)	231.1
Biomass solid	118 (12.1)	106
Biogas	96 (9.8)	83.7

NERSA received over 200 written submissions concerning the revised REFIT rates and agreed to take all comments into consideration (Van der Merwe 2011). This, along with questions raised by the National Treasury regarding the legality of the

36 National Energy Regulator of South Africa (NERSA). 2011. NERSA Consultation Paper- Review of Renewable Energy Feed-in Tariffs. Online at: http://www.nersa.org.za/Admin/Document/Editor/file/Electricity/Consultation/Documents/Review%20of%20Renewable%20Energy%20Feed-In%20Tariffs%20Consultation%20Paper.pdf

REFIT, led NERSA to delay official feed-in tariff announcements (Pegels 2011). Delays put increasing stress on project developers, which had already started project development processes, such as wind measurements, under the generous 2009 REFIT rate assumptions, and increasing uncertainty and lack of investor confidence amongst investors looking to develop in the country (Webb 2011).

After a nearly 2 year stalemate process of attempting to put in place the REFIT, the program was replaced by the competitive bidding process (REBID) in August of 2011, now known as the Renewable Energy Independent Power Producer Procurement Programme (REIPPP). This occurred when the new generation regulations came out in May 2011. The regulations had no mention of the REFIT, and the new REIPPP process was introduced. NERSA had no option but to comply with this new policy change (Pretorius 2011).

The REIPPP has been designed to deliver the target of 3,625 MW of renewable energy to start and stimulate the renewable energy industry in South Africa, where bidders are required to bid on tariff and the identified socio-economic development objectives of the Department of Energy. To date, the Department has received an overwhelming amount of bids, representing more than double the capacity allocation of the first 2 bidding windows. 132 bids in the first phase and second phases of the bidding processes were received, and 47 have been chosen, representing 2,460 MW of renewable energy capacity (South Africa Department of Energy 2012). The bids are determined overwhelmingly on price, each below the ceiling price set by REFIT. While it is know that the bidding prices have been lower in the first and second rounds of the REIPP than they would have been in the case of REFIT, the end results including what projects will actually be built and the final costs are still unknown (McDaid 2012).

Lack of coordination in the decision making process

The shift to the new program has created some certainty in terms of the procurement process and request for proposals from independent power producers. However, the shift has also raised questions about lack of coordination between the main governmental bodies involved: the DOE and NERSA (Pretorius 2011).

Significant weaknesses in governmental coordination have adversely affected the REFIT implantations process, leading to its derailment and replacement with REBID, and the simultaneous development of the REBID and the REFIT review in 2011 shows a clear lack of coordination between relevant institutions: NERSA, DoE and the Treasury. Currently, while the REBID process assigns greater authority to Treasury and the DoE, it has no clear decision maker (McDaid 2012).

Lack of institutional coordination has also meant that momentum on SARI has been lost. This international partnership involving national government, and development and international finance institutes was created in hopes of overcoming some of the main barriers delaying the uptake of renewable energy. But SARI – initially spearheaded by the Department of Trade and Enterprises and Treasury – has not been linked to the REBID process, though it is now housed in the DOE. For the moment, the DOE focus on attracting private sector investment has taken priority and the fate of SARI remains unknown.

The transition process from REFIT to REBID has also raised many questions concerning transparency and legitimacy. According to Johan van den Berg, CEO of the South African Wind Energy Association, "During REFIT there was excellent alignment and trust between stakeholders and NERSA as the custodian of the process (Van der Berg 2011)." The REBID process however, has failed to maintain public and stakeholder consultation. The terms under which the REFIT had been set were open to the public domain, and the process was completely determined through a series of public consultations that included various stakeholders. The REBID process was not, where top down decisions were taken by the DOE and Treasury and handed to industry (Pretorius 2011).

Some attempts to coordinate private sector, public sector, and civil society interests has occurred in the midst of all the uncertainty and lack of investor confidence. The South African Renewable Energy Council is an umbrella body formed in late 2011 by four leading South African renewable energy associations. Their goal is to grow to include civil society voices in an attempt to create one unified and coordinated voice in light of the rapidly changing policy landscape and in order to meet the Country's Green Economy Accord Targets (Staff Reporter 2011). It is yet to be seen if broad civil society interest could be represented by such a coalition.

Capacity

South Africa faces both human capacity and technical capacity limitations. Constant delays at every step of the REIPP program demonstrate that institutional know-how is lacking. The DoE has been unable to stay on schedule for all 3 bidding rounds under the program, the most recent announcement stating that the 3rd bidding round has been postponed by an additional 3 months (South Africa Department of Energy 2013). The third round of bidding had been delayed by over 8 months in order to give officials time to catch up as well as to assist bidders struggling to finalise outstanding bid commitments (SAAEA 2012 & Creamer 2012b). Nervous investors have raised the possibility of withdrawing their bids in the face of prolonged delay. REBID is operational but there is no power generated and fed into the grid from new IPPs yet. Furthermore, NERSA has been struggling to collect data relating to licensing its distributors (McDaid 2012).

With increasing interest in renewable energy deployment in the country, existing grid infrastructure problems have come to the forefront. In 2010, the DOE and National Treasury, in consultation with Eskom, mapped investor plans against existing Eskom infrastructure and grid planning, and indicated that there was sufficient connection capacity for REFIT IPPs until 2016 (SARI 2011). However, in 2011, Eskom did admit that it does not have the capacity to build the infrastructure needed to connect all IPPs to the grid (McDaid 2012). IPPs have, therefore, undertaken connection requirements themselves and at their own costs. Despite these commitments, existing maintenance backlogs in the country's electricity grid are putting severe constraints on the development and deployment of renewable energy (Buthelezi 2012). In efforts to alleviate the challenge, Eskom has initiated a smart grid pilot project network to enable demand side management through load limiting technology (Burger 2012).

Conclusion

South Africa's main challenges will be to strengthen institutional coordination and capacity. While renewable energy development is occurring, and response from investors and projects developers to the new REBID process has been positive, this development has been slow. A lack of institutional coordination and capacity at all levels has caused delays in policy development and bidding programs. Delays in bidding processes have sparked fears that that developers will abandon renewable energy efforts in the country altogether.

Spain

Overview

Spain's renewable energy market can be defined as one of the most developed worldwide, with over 35 percent of its total installed generation capacity coming from renewable energy sources in 2010 (Sonvilla et al. 2012). In 2011, 93 percent of newly installed energy capacity was based on renewable energy sources. These installations covered 33 percent of the total energy demand that year (IDEA 2012).

The Spanish Government had committed to renewable energy seven years before the inception of the 1998 legal framework (*Real Decreto del Regimen Especial* 2818/1998, the foundation of today's legal framework and the incentive mechanisms for renewable energy. Yet, it was not until 2005 that the Government put forward ambitious targets through the National Renewable Action Plan covering a period and setting targets for 2005-2011. These targets were reviewed in the 2011 Renewable Energy Plan (*Plan de Energias Renovables*). Despite revisions made, the targets have remained ambitious, aiming at an overall share in final energy consumption from renewable energies at 20.8 percent, 0.8 percent higher than the EU's Renewable Energy Directive for Spain.

Spain's success in renewable energy development is often associated with its legal framework (*Real Decreto*, RD) and the continuity of support schemes such as Spain's feed-in tariff/premium program (*Regimen Especial*). On the other hand, Spain's program has also been heavily criticized for having a flawed tariff structure that has led to tremendous growth in the sector, particularly solar, but also tremendous instability. To give an idea of growth seen within the Spanish photovoltaic market, by 2008, Spain had already surpassed its 2010 target of 400MW installed renewable energy capacity (IDEA 2005) by over 2100MW, with the total installed capacity reaching 2,511MW. Furthermore, within a five year period, total installed photovoltaic capacity grew over 100 fold from 25MW in 2005 to 2,511 MW in 2010 (Fontaine et al. 2009). In January 2012, the Government of Spain put a temporary moratorium on premiums under the Regimen Especial, a decision made for reasons such as the economic crisis, and continuously elevating deficits within the electricity sector related to elevated remuneration systems for renewable energy projects (IDEA 2012).

Spain's constantly changing renewable energy landscape merits analysis. On the one hand it is seen as one of the most successful renewable energy programs implemented to date, while on the other hand is often cited as renewable energy failure. Many lessons can be learned from Spain's experience, positive and negative, concerning its regulatory framework, policy mechanisms, institutional coordination and technical infrastructure developments.

Policy highlights

One of the main reasons cited for Spain's success in renewable energy development is the continuity of the support scheme initially put in place in 1998 as the *Regimen Especial* under the RD 2818/1998, which put in place the administrative procedures and conditions necessary for renewable energy plants to access the Regimen Especial (Del Rio Gonzalez 2008). Since then, the RD and the Regimen Especial have undergone changes, very much so in terms of quickly responding to market changes and newly arising challenges.

Policy revisions to the RD have occurred annually in order to ensure the most effective, efficient and low cost integration of renewable energy as possible. While frequent revisions have allowed for much policy flexibility and been deemed strengths of the Spanish system, they have also been criticized by Spanish producers for creating too much instability. Investors and producers initially viewed annual revisions of support levels as a drawback, as not knowing what the lifetime revenue for a project was is seen as an investment risk. This problem was resolved in 2004, when changes to the RD included more guaranteed support for a fixed period of time (different depending on the technology) and medium-term price signals (Del Rio Gonzalez 2008).

The ability of policy frameworks that quickly respond to market changes is crucial but has been challenging at the same time. Mostly, it has been difficult to keep up with the rapid learning curves, declining prices and oversaturation of the photovoltaic market. The result has been a situation where the Spanish government has not been able to anticipate and create the policy changes needed quickly enough to mimic the market, something that was completely possible with the wind sector, given the more constant and predictable development curves.[37]

Consequently what has been seen is a continuity of a strong support scheme through the *Regimen Especial* but instability in terms of the political framework and decisions made. Since the inception of the *Regimen Especial* within the RD in 2004, the RD has seen a number of major policy changes, each triggered by market changes, all mostly involving the high penetration of the photovoltaic market. The following are examples of the major changes seen in the RD since 2004 put in place to avoid windfall profits associated with solar photovoltaic and their premium rates (Del Rio Gonzalez 2008 & Sonvilla et al. 2012):[38]

- In 2007, the premiums under the RD were revised and no longer included a premium option for solar photovoltaic plants;
- In 2008, a regulation was introduced decreasing the feed-in tariff rate for photovoltaic and an annual cap for photovoltaic;
- At the end of 2010, a new RD was adopted which included lower tariffs and reduced payment periods for photovoltaic, and;
- Finally, in January 2012, a temporary suspension was placed for premium on all new installations under the *Regimen Especial*.

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37 Personal Interview with International expert August 3, 2012.
38 Personal Interview with International expert August 3, 2012.

Institutional highlights

Support for renewable energy development in Spain has been seen from different levels of institutions. Until recently, the *Regimen Especial* has received support and commitment from the Spanish government in maintaining a support mechanism for renewable energy generation. Lobby groups and industry associations such as the influential Association of Small Renewable Energy Producers (APPA) who negotiates directly with negotiators, lobbied heavily for attractive premium rates (Del Rio Gonzalez 2008).

Strong commitment levels have also been seen on behalf of the national regulator (CNE), the System Operator (REE) and the big players in terms of electricity generation (Rivier Abbad 2010). These influential players include Iberdrola, Endesa, Gas Natural Fenosa, EDP- Hidro Cantabrico and E.on Generacion. While initially these main utilities showed reluctance to renewable energy deployment, they have gradually become the main players backing renewable energy development. The role of these main players has been fundamental for renewable energy growth in the country, especially concerning wind. Iberdrola, one of Spain's biggest electric utilities, was the first major utility to focus on wind (Rivier Abbad 2010). Furthermore, by 2010, Iberdrola represented over a quarter Spain's total installed wind energy capacity.[39]

Institutionally, however, a lack of governmental and administrative control and coordination has been related to the solar rush that has partially led to the temporary suspension of Spain's *Regimen Especial*. As mentioned previously, by 2008, Spain had overachieved its 2010 target by over 2000MW. Too many projects were being approved by the local autonomous governments, whose administrative approval system has been burdened by lack of coordination. A lack of coordination between the national authority and the 17 distinct autonomous communities has led to serious problems in terms of renewable energy project development and investment security in the country. In Spain, renewable energy projects need to go through two separate approval processes:

- An administrative authorization, which is given at the regional level, and;
- Access to the premium licenses, which if given by the Ministry of Industry, Energy and Tourism at the national level.

Currently, there are about 9,000MW worth of renewable energy projects that have received administrative authorization but no national premium licenses (Patiño 2012). These projects were constrained by administrative red tape and are now not able to move forward because of the temporary moratorium on the *Regimen Especial*.

Capacity highlights

Like Germany, Spain's 2007 RD includes provisions entitling renewable energy generating facilities priority access to the grid system, which has allowed for high

39 By 2010, Spain's total installed wind capacity was 19,821MW, and Iberdrola's share of that was 5,588MW. Iberdrola (2010). Record US wind output boosts second quarter generation. Online: http://www.iberdrolarenewables.us/rel_10.07.09.html. & Sonvilla, P.M. et al. (2012). Integration of electricity from renewables to the electricity grid and to the electricity market- RES Integration- National report: Spain. Berlin: Eclareon.

levels of renewable energy penetration into the national grid. In 2006, the Renewable Energy Control Centre (CECRE), the first control centre worldwide to control renewable energy generation for plants larger than 10MW, was established by Red Electrica de España (the TSO) in order to monitor and control renewable energy supply (REE 2012). In 2011, a new RD law was passed (RD 1699) mandating that all renewable energy installations with a capacity greater than 1MW or that are part of a larger installation comprising of 1MW or larger, must send real time generation information to CECRE in order to guarantee adequate management of the electricity system and avoid issues related to intermittency (MITC 2011).

While the problem of intermittency has been addressed through innovations such as the CECRE, the rapidly increasing number of wind and solar connections have saturated the grid and led to grid connections issues. This challenge now calls for grid improvements in order to further increase the rate of renewable energy deployment. These issues include: excessive grid connection lead times and high connection costs. These issues become even more complex and exacerbated due to insufficient staffing amongst the Transmission System Operators to process connection requests, diverging regional administrative processes and the lack of legislative coordination of Distribution System Operatorsn (Sonvilla et al. 2012).

The 2011 RD 1699 also introduced measures to simplify procedures for small-scale renewable energy installations that wish to connect to preexisting connections points (MITC 2011). As Sonvilla et al. (2012) point out the 2011 RD doesn't modify administrative frameworks that slow down grid connection processes and that cooperation, coordination and communication between all involved stakeholders in necessary to overcome these gridlocks. Furthermore, the Spanish legal framework mandates grid development planning at the transmission level but not at the distribution level.

Conclusions

Spain's renewable energy numbers tell a success story: by 2012, so far, renewable energy has covered 25 percent of the country's electricity demand, saving the country €270 million euros in fossil fuel imports (Morales 2012). Unfortunately, poorly designed premium rates, lack of control and institutional coordination have led to inefficiencies in the system that have not been overcome and damaged its credibility. This has led to the temporary suspension of a program that has achieved some of the highest levels of renewable energy penetration worldwide, a very mature renewable energy industry and significant job creation. In order to overcome this, policy coordination between Federal and Provincial level authorities needs to exist so to minimize administrative bottlenecks and advance projects. Furthermore, while the detailed tariff system, Regimen Especial, has proven to be flexible, challenges in reflecting market changes associated with solar photovoltaic have posed bottlenecks in further renewable energy development. Policy changes need to be foreseen and announced with anticipation in order to provide stability in the sector.

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