WORLD RESOURCES INSTITUTE

Prayas, Energy Group

Working Paper

Electricity Governance Initiative

10 QUESTIONS TO ASK ABOUT INTEGRATED RESOURCES PLANNING

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THE 10 QUESTIONS SERIES: FRAMEWORKS FOR DESIGNING GOOD ELECTRICITY POLICY

The 10 Questions to Ask Series, or the 10Q Series, is an initiative of the World Resources Institute's (WRI) Electricity Governance Initiative (EGI) and Prayas, Energy Group. It aims to build the capacity of electricity sector stakeholders—government agencies, regulators, utilities, the private sector, civil society, and others —to design and participate in policy making and implementation processes. Each paper in the series asks a set of 10 questions relevant to a particular topic within the broader electricity sector. The series pays particular attention to public interests—interests in which society has a stake and that warrant government recognition, promotion, and protection. These interests may include decisions concerning public expenditures, affordability, service quality, and impact on local and global resources. We consider "good" electricity policy to be policies designed to improve effectiveness of public expenditures, reduce unnecessary costs, raise the quality of service, and minimize social and environmental impacts while seeking to reach specific policy objectives. "Good" also references "good governance" as laid out in EGI's flagship publication, the "Electricity Governance Initiative Assessment Toolkit" (EGI Assessment Toolkit) (see Box 1).

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Disclaimer: *Working Papers contain preliminary research, analysis, findings, and recommendations. They are circulated to stimulate timely discussion and critical feedback and to influence ongoing debate on emerging issues. Most working papers are eventually published in another form and their content may be revised.*

Suggested Citation: Dixit, S., A. Chitnis, B. Jairaj, S. Martin, D. Wood, and A. Kundu. 2014. "10 Questions to Ask About Integrated Resources Planning." Working Paper. Washington, D.C.: World Resources Institute. Available online at http://www.wri.org/publication/10-questions-integrated-resource-planning.

The questions raised in the 10Q Series are relevant in a variety of policy making contexts. Individuals in government, utilities, and planning agencies can use the 10Qs to assess or review electricity policies. Civil society groups can draw on the 10Qs as a guide to engaging with policymakers at public hearings or other consultations. Combinations of these modes of engagement can guide multi-stakeholder forums to design policy roadmaps under a common framework. The questions posed are designed to help readers focus on issues affecting their country or region. The questions can be used to identify crucial gaps and challenges within a country's electricity sector; query decision-makers on plans to fill those gaps; and help ensure that electricity policies represent public interests by keeping social, economic, and environmental considerations in mind. Each question is formulated to emphasize the active role that stakeholders can play in policy design and review processes, and is accompanied by an explanation of its relevance to the public interest. Users should feel free to adapt the questions to the knowledge level of different types of stakeholders. For example, pilot tests found that those wanting to build the capacity of consumers to participate in public hearings needed to adopt less technical language. Additional resources are provided for readers who are interested in pursuing each question in greater detail.

Box 1 | TAP–C Key Principles of Good Governance

THE ELECTRICITY GOVERNANCE INITIATIVE TOOLKIT
Benchmarking Best Practice and Promoting Accountability in the Electricity Sector

Transparency and Access to Information: Transparency is the process of revealing actions and information so that outsiders can scrutinize them. Attributes of transparency include the comprehensiveness, timeliness, availability, comprehensibility of information, and whether efforts are made to make sure information reaches affected and vulnerable groups as appropriate.

Accountability and Redress Mechanisms: Access to justice and redress are necessary to hold governments and actors in the private and public sector accountable. Accountability includes the extent to which there is clarity about the role of various institutions in sector decision making; there is systematic monitoring of sector operations and processes; the basis for basic decisions is clear or justified; and legal systems are in place to uphold public interests.

Participation: Diverse and meaningful public input helps decision-makers consider different issues, perspectives, and options when defining a problem. Elements of access to participation include formal space for participation in relevant forums, the use of appropriate or sufficient mechanisms to invite participation, the inclusiveness and openness of such processes, and the extent to which the gathered input is taken into account.

Capacity: Capacity refers to the government's social, educational, technological, legal, and institutional ability to practice good governance, and the ability of civil society to engage in decision making. This includes the capacity of government and official institutions to act autonomously and independently, the availability of resources (both human and financial) to provide access, and the capacity of civil society (particularly NGOs and the media) to analyze the issues and participate effectively.

Source: Dixit, S., N.K. Dubash, C. Maurer, & S. Nakhooda. 2007. The Electricity Governance Initiative Toolkit: Benchmarking Best Practices and Promoting Accountability in the Electricity Sector. Washington DC & Pune: WRI & Prayas, Energy Group.

The 10Q Series builds on the Electricity Governance Initiative Toolkit (EGI Toolkit), which provides a set of good governance indicators customized for policy and regulatory processes in the electricity sector. The EGI Toolkit highlights the good governance principles of transparency, participation, and accountability, which correspond to the principles of access to information, decision-making, and justice in Principle 10 of the 1992 Rio Declaration on Environment and Development.[1] The EGI Toolkit adds a fourth principle of capacity (see Box 1). Indicators from the EGI Toolkit may be used to supplement the 10Qs to assess procedural aspects of governance.

To date, the 10Q Series includes:

- 10 Questions to Ask about Electricity Tariffs
- 10 Questions to Ask about Integrated Resources Planning
- 10 Questions to Ask about Scaling On-Grid Renewable Energy

INTRODUCTION TO INTEGRATED RESOURCES PLANNING

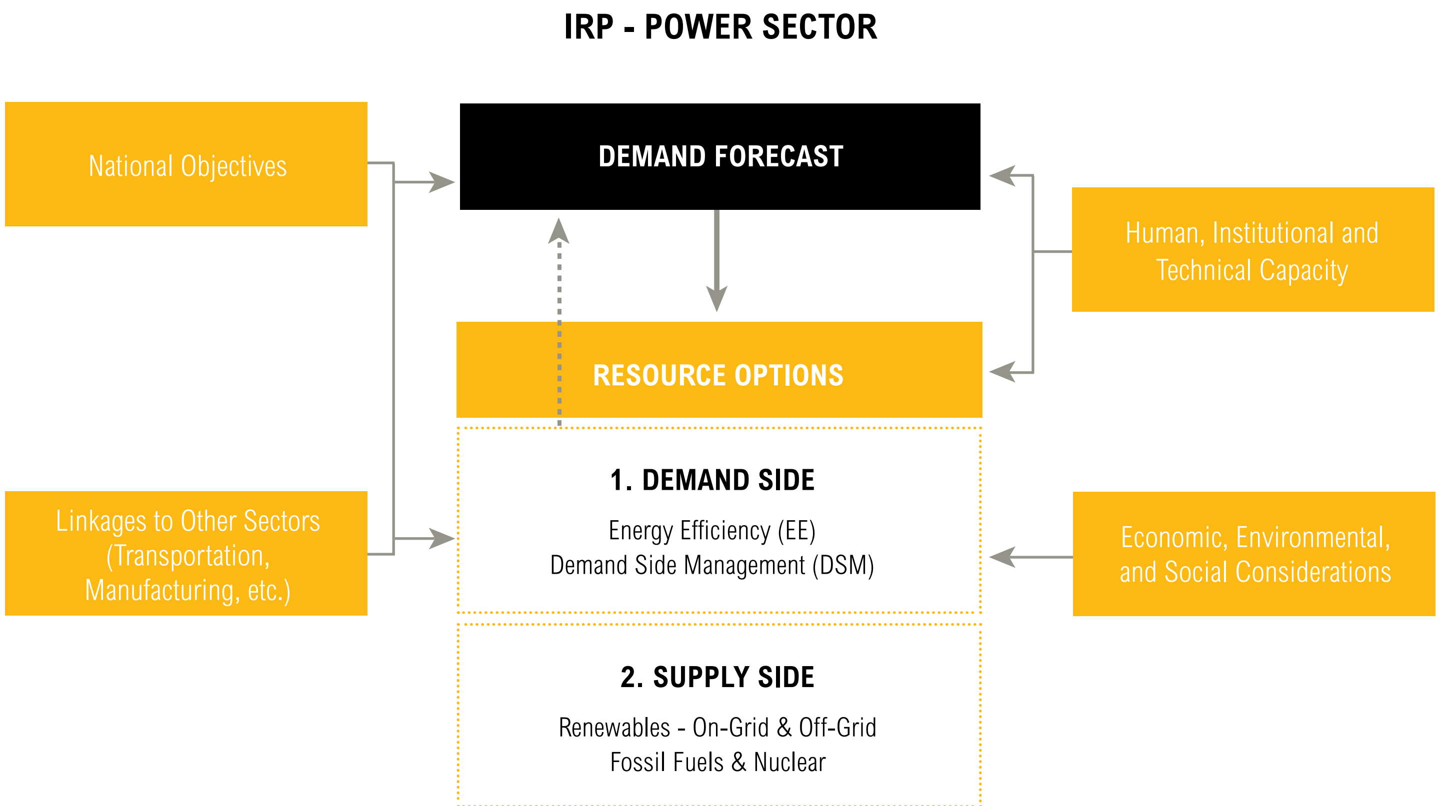
Ensuring an affordable and reliable supply of energy is a concern of national governments around the world. Because electricity sector projects are so capital intensive and can significantly impact the local environment and society, they must be considered as part of a national plan that recognizes the connections between the electricity sector and the broader economic, social, environmental, and political contexts, as well as other sectors like manufacturing and transportation.

Many governments have embedded a dedicated electricity plan into a larger plan, called an Integrated Resources Plan (IRP). When applied to the power sector, an IRP is an approach that meets the estimated long term requirements for electricity services during a specified period with a least-cost combination of supply and end-use efficiency measures, while incorporating concerns such as equity, environmental protection, reliability, and other country-specific goals.[2] The purpose of an IRP is to minimize present and future costs of meeting energy requirements while considering impacts on utilities, government, and society.

Traditional approaches to electricity sector planning, in which utility planners project future demand and expand their supply to meet that anticipated demand, often result in excess capacity and higher-than-necessary energy costs. IRP planners evaluate both demand-side and supply-side options. Using energy efficiency to slow demand growth avoids additional investments in power supply and distribution. This is an underexplored, but emerging dimension of resource planning. Demand-side options include energy efficiency (EE) measures, demand-side management (DSM), and conservation measures to decrease overall and peak electricity demand. Supply-side options include generation from renewable energy (RE) and fossil fuels, distributed generation, and integrated solutions such as combined heat and power. Figure 1 illustrates factors taken into consideration in an IRP.

An IRP also incorporates issues of equity, environment, reliability, flexibility, and other country specific objectives. Countries have undertaken different approaches to power planning or the development of long-term power plans. For example, 28 states across the U.S. are mandated to conduct IRPs,[3] and several developing countries have electricity plans incorporating key elements of a good IRP, including South Africa's Integrated Resource Plan, India's Five Year National Electricity Plan, and Thailand's Power Development Plan. While none of these documents can technically be considered IRPs, each displays some of the key elements of a good IRP (Figure 2). Figure 2 illustrates the 10 elements of an effective IRP.

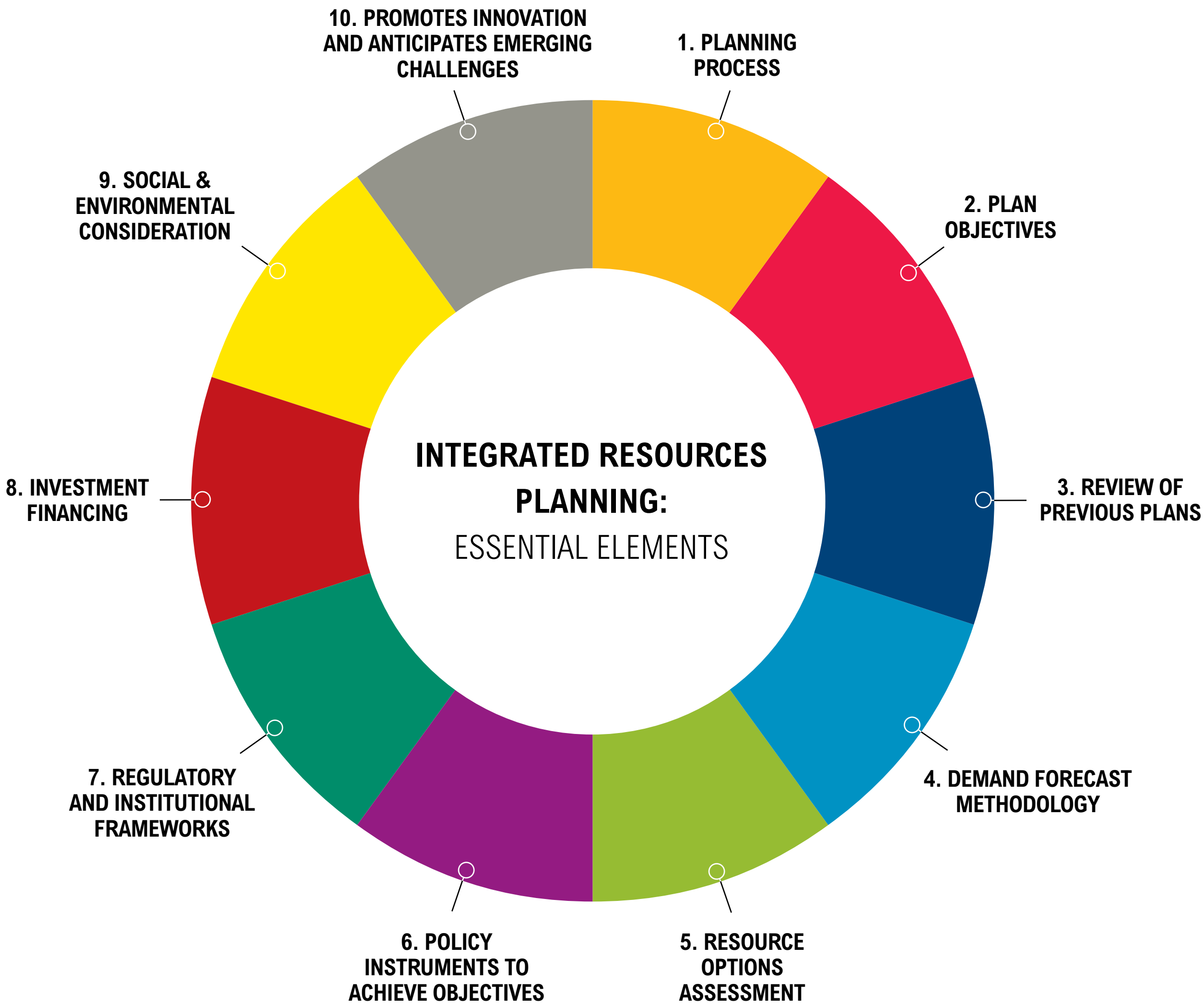
Figure 1 | **Schematic Diagram of an Integrated Resources Plan (IRP)**



"10 Questions to Ask about IRP" attempts to capture critical features and complexities of resource planning. Each of the 10 elements essential to integrated resource planning is presented as a question that can be explored by decision-makers and stakeholders, and is followed by a brief explanation of its significance, and a list of key points. The framework could be used in multiple ways. For example, it could help develop a vision for the electricity sector that addresses trade-offs for achieving national goals. This framework is intended to be used primarily in countries with regulated or partially regulated electricity industry structures.

An IRP is most effective when it is created through a planning process that is informed by public involvement and active dialogue with national policymakers, state agencies, customer and industry advocacy groups, project developers, civil society, and others. These stakeholders can use this 10Qs framework to assess the quality and effectiveness of an existing resource plan, or to help build a new, exemplary IRP.

Figure 2 | **Ten Essential Elements of Integrated Resources Planning**



Q1. WHAT IS THE PROCESS FOR ESTABLISHING THE IRP?

A first step toward understanding a country's short-, medium-, and long-term energy resource planning process is to identify national policies and programs related to energy and resources, as well as the entities responsible for developing and implementing the plan. Responsible entities for energy plans vary. In many countries, regulatory commissions mandate that utilities produce medium- and long-term electricity plans, while in other countries, national and subnational planning bodies are responsible for such plans. National energy authorities, ministries, and government-appointed committees may also be involved in developing energy plans. For example, India's Five Year Plans, which include energy, are developed by a national agency, the Planning Commission of India. In South Africa, the Department of Energy develops the IRP, which is a subset of the Integrated Energy Plan.[4]

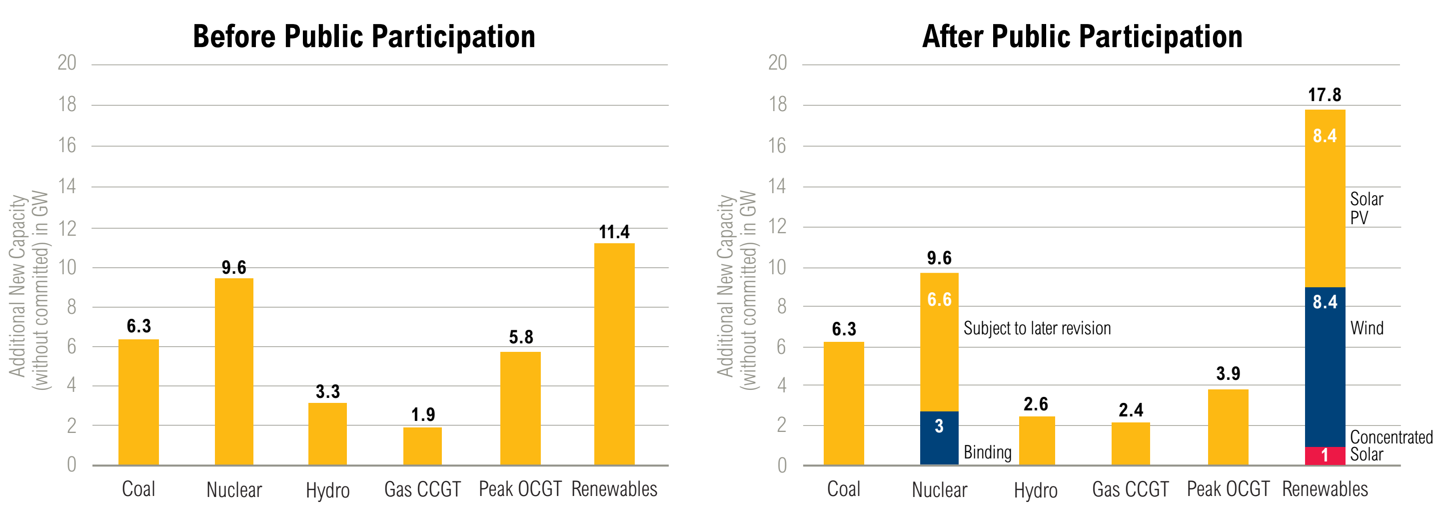
In some countries, multiple bodies and government agencies at national and subnational levels are involved. Adequate governance and coordination mechanisms for harmonizing and managing regulatory roles make the planning process more efficient. Transparency about the responsibilities of participating entities can strengthen the IRP development process, as can the participation of all parties responsible for implementation.

When an IRP is easily accessible to the public and clearly states its underlying assumptions, data, and methodology, opposition during the implementation phase may be reduced. Moreover, transparency and participation mechanisms that provide opportunities for public comment and inputs can increase public awareness of the sector.

An IRP should include mechanisms for periodic stakeholder review of the plan, including its assumptions. In South Africa, in 2010, following two rounds of public stakeholder meetings, significant changes were made to the assumptions in the country's national integrated resource plan (See Figure 3).

Plans can be shaped around short-, medium-, and long-term objectives. IRP development processes that take a long-term perspective may be more effective. Even a plan designed for five years can include a vision of what it expects to achieve in the long term—over 20 years, for example. Likewise, a long-term plan can suggest short- and medium-term objectives as well as provide for revisions to ensure flexibility and response to changes. South Africa's IRP is designed to cover 20 years and is expected to be revised and updated every two years to adapt to changing circumstances.[5]

Figure 3 | **South Africa's Policy Adjusted Integrated Resources Plan for Electricity 2010-2030, before and after public participation**[6]



Q1. Analysis Highlights—IRP Planning Process

LOOK FOR:

- Clear institutional mandate and coordination among the different agencies
- Transparency of the planning process
- Availability of assumptions, data, and methodology for public scrutiny
- Opportunity for public comments and inputs
- Feedback and review mechanisms
- Long-term vision

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Q2. WHAT ARE THE OBJECTIVES OF THE IRP?

Modern resource planning has moved away from solely supply-side planning to a more holistic and integrated planning approach that aims to satisfy several economic, environmental, and social objectives. Implementing an effective IRP requires that objectives be based on analysis and stakeholder prioritization and clearly presented. At times, these objectives can conflict. South Africa tackled potentially conflicting objectives in its IRP for the electricity sector (2010–30) by using multi-objective decision making criteria to choose the plan that best met its three objectives: reducing water usage, cost, and portfolio risk or uncertainty; embracing climate change mitigation; and increasing localized benefits and regional development.[7]

Clear and succinct objectives help clarify the key aims of an IRP and help align the short-, medium-, and long-term goals. A clear statement of the objectives (and the criteria by which their achievement is measured) can be used to hold decision-makers and implementers accountable. The objectives should be specific, measurable, achievable, realistic, and time-bound (SMART) and yet be flexible enough to accommodate changes in the sector. In 2005, the Chinese government set a target of 30 gigawatts (GW) of renewable energy by the end of 2015. In 2011, having far surpassed that target, China intensified its technology-specific installation targets of grid-connected wind to 100GW and solar photovoltaic to 21GW.[8]

Objectives commonly set during the integrated resources planning process include:

- Diversifying supply and ensuring energy security
- Increasing electrification rates
- Providing reliable electric service
- Reducing electricity costs
- Minimizing/mitigating social and environmental impacts of the sector
- Reducing sector inefficiencies (financial/technical losses)
- Providing local employment and increasing social benefits
- Increasing end-use efficiency

Because the power sector significantly impacts other demand sectors (such as transportation, housing, and industry), it is important to acknowledge these links and incorporate them into objectives so that electricity sector plans are aligned with those of other sectors. (Q6).

Finally, the objectives of the energy sector should complement national, regional, and local development objectives. For example, a national climate plan might have future targets that bear on the electricity sector in a state. By considering the development objectives of all levels of government during the development of sector plans (climate mitigation plan, industrial growth plan, and so on) within the IRP, conflicts in implementation will be reduced.

Q2. Analysis Highlights—IRP Objectives

LOOK FOR:

- Clearly stated objectives for the IRP
- Well-defined priority areas reflected in the objectives
- Short-, medium-, and long-term goals well aligned with the stated objectives
- Linkages with other sectors and development objectives

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Q3. HOW DOES THE IRP INCORPORATE LESSONS LEARNED?

To progressively build sector plans within an IRP, it is important to incorporate lessons learned from a country's past plans or other countries' experiences. Lessons can be gleaned by analyzing the implementation of past policies, including the implementing institutions, in terms of whether the plans met their objectives. The costs incurred, methodologies used, measurement of impact, and data sources consulted can also provide insight. By examining the gap between the expected and actual outcomes of previous plans, policymakers can determine what worked and what didn't to achieve objectives and strengthen policies. Additionally, to avoid a mismatch among sector plans, planners should consider recent developments and growth trends in linked sectors.

New plans should reflect current conditions. The concept of integrated resource planning arose in response to inaccurate energy forecasts in the early 1970s, which predicted high energy demand growth and led to supply expansions worldwide. However demand did not grow as expected, which challenged the underlying assumptions of the demand forecast models. Subsequently, bottom-up forecasting methodology was adopted (See Q4).

An exchange program between the U.S. Energy Northwest utility and the Thai Energy Regulatory Commission demonstrates the value of learning from other countries' experiences. The Thai Energy Regulatory Commission learned that the cost of conservation measures for Energy Northwest was several times lower than the cost of installing new power facilities, and that nuclear power was not necessarily the cheapest source of energy (See Table 1). After evaluating its applicability to Thailand, the Energy Regulatory Commission planned to incentivize utilities to work toward a demand-side management model.

Similarly, World Wildlife Fund Brazil commissioned a study assessing sustainable alternatives including policies for reducing power waste during production and consumption and for promoting new renewable energy. The study led to the inclusion of energy efficiency aspects in Brazil's energy plan.[9]

Table 1 | **Assessment of the costs of various resource options considered presented during the U.S. Energy Northwest and Thai Energy Delegates Exchange Program**[10]

RESOURCE	PROJECT SIZE	LEVELIZED COST
Concentrated Solar	30 MW	$174/MWh
Biomass Combustion	25 MW	$114/MWh
Biomass Gasification	21 MW	$106/MWh
Combined Cycle	117 MW	$128/MWh
Hybrid Solar Combined Cycle	147 MW	$129/MWh
Small Hydro	10 MW	$81/MWh
Wind	80-200 MW	$100/MWh
Future Nuclear	250-1500 MW	$100/MWh
Conservation/ Energy Efficiency	Various	$30/MWh

Q3. Analysis Highlights—Lessons Learned

LOOK FOR:

- Clear identification of lessons learned from previous plans (both domestic and international)
- Review of assumptions, policies, and institutional aspects of planning considered in earlier plans
- Analysis of gaps between expected and actual outcomes from earlier plans

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Q4. WHAT IS AN APPROPRIATE DEMAND FORECAST METHODOLOGY?

A scientific and well-calibrated demand forecast, which estimates future energy needs and peak loads, lies at the crux of good electricity planning. An ideal forecast should be based on three main components: clear assumptions underlying the forecast, a valid and scientific methodology, and dependable sources of data. To ensure transparency, forecasts should be clearly written and documented and both the forecasts and their assumptions should be made available for public comment and critique. Separate forecasts to address short-, medium-, and long-term objectives should be carried out.

Traditionally, demand forecasts are based on projected national economic growth rates. This method can often lead to overestimating demand, resulting in investment in unnecessary power plants and waste of resources. Traditional forecasts assume that the relationship between income, price, and demand that existed in the past will hold true in the future. Although this method can shed light on the aggregate nature of energy demand or electricity sales, it does not acknowledge that energy demand varies depending on technological and economic changes, as well as on consumer behavior.

In contrast, methods that use a bottom-up or end-use projection approach calculate the total national demand by disaggregating the demand by different sectors and activities based on the energy services availed. Energy demand is calculated in terms of energy used (in the form of electricity or other fuels) to produce a service. Examples of energy services include the comfort derived from a heated home, hot water, and the illumination from a light fixture. End-use energy consumption estimates are extracted from consumer-use data using engineering and econometric techniques. The evaluation generally includes the residential, commercial, industrial, and agricultural sectors, and factors in technology changes, as well as increases or decreases in the energy required for the service based on policy incentives. Because the disaggregated structure of a bottom-up approach makes it easy to analyze impacts of energy efficiency (EE) and demand-side management (DSM), it is the preferred methodology for assessing demand-side options and planning a good IRP (see Q5).

A holistic demand forecast using reliable data and expertise should be completed for a country's IRP. It should consider a range of variability in economic development, population growth, electricity access, seasonal demand changes, peak and base loads, future technological improvements, impacts of DSM and EE programs, and development in other interrelated economic sectors. Expertise can be sought from local or regional academic and research institutions regarding the most appropriate method.

Plans should also be accompanied by sensitivity analyses, (see Q6) in particular to account for the variability in predicted future scenarios. For example, if an energy demand growth forecast assumes a gross domestic product (GDP) growth rate of 7 percent over 10 years, how would a 10 percent GDP growth rate change the demand and supply options? To capture this type of uncertainty, South Africa's IRP uses three GDP growth rate scenarios: high, moderate, and low.

Previously popular deterministic demand forecasts did not consider the possibility of error or flexibility in the forecast. Now the need for frequent revision of demand forecasts is increasingly recognized. (See Q6). In Australia, annual forecast reviews showed lower growth in demand in 2012 as compared to the projections in 2011. This led to significant avoidance of new generation and network investment requirements.[11]

Q4. Analysis Highlights—Demand Forecast Methodology

LOOK FOR:

- Clearly defined and publicly available data, assumptions, and methodologies
- End-use projection approach
- Consideration of variability that impacts demand
- Periodic revision of demand forecasts

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Q5. HOW ARE POTENTIAL ENERGY RESOURCE OPTIONS SELECTED FOR THE IRP?

Assessing all potential options—both demand-side and supply-side options—for meeting future energy demand can help planners develop the optimal energy resource plan (see Q4). Such an assessment can help policymakers efficiently allocate resources as well as set realistic targets as the plan progresses.

The following assessments—conducted on all available types of energy resources—can help gauge the feasibility and cost of demand- and supply-side energy resource options:

- **Technical potential**, an estimate of commercially available technology, regardless of economic cost or achievability of developing the resource
- **Economic potential**, the fraction of technical potential that can be achieved in a cost-effective manner
- **Achievable potential**, the fraction of the economic potential that can be achieved, keeping market and consumer behavior and other constraints in mind

On the demand side, the technical potential of different DSM and EE options is assessed through multiple scenario analysis compared with a baseline scenario. To justify the demand-side options chosen, the IRP should clearly state:

- Sectors considered (industries, infrastructure, consumer appliances)
- Methodology used for estimating the savings
- Savings measures introduced (reducing standby power, replacing incandescent bulbs with CFLs, reducing transmission and distribution losses, and so on)
- Data sources used
- Sensitivity of results to the assumptions

The California Utilities Commission, for instance, uses five cost-benefit tests to select its DSM and EE programs: participant test, ratepayer impact measure test, total resource cost test, societal test, and utility cost test.[12]

On the supply side, a thorough feasibility assessment of on-grid and off-grid renewable energy and clean fossil-fuel-based thermal generation is instructive. An assessment should consider any transmission and distribution bottlenecks that may inhibit the successful integration of new power generation to the grid (Q10).

It is also pertinent to examine the assumptions made about the technologies, the methodology used to arrive at the supporting data, and the sources of data used. Specifically useful for off-grid renewable energy is identifying the supply potential of possible off-grid, mini-grid, and home-systems as well as tariff structures and interconnection and distribution systems.

Although completely negating the use of fossil fuels or thermal generation in capacity expansion is not yet possible, substituting cleaner technologies through fuel-switching programs (such as natural gas vs. coal) or technological advancements (such as supercritical, ultra supercritical, and integrated gasification technology based thermal power plants) are important considerations in an IRP. For example, India has adopted cleaner thermal power generation in its national plans. The Central Electricity Authority of India has set an ambitious goal to build 50 percent of its new coal-fired plants using supercritical technology during its 12th Five Year Plan (2012–16).

Furthermore, the sizable potential in supply-side efficiency (i.e., energy savings from more efficient power plants and reduction in transmission and distribution losses) should not be overlooked. Initiatives by the Ministry of Energy in Kyrgyzstan led to a 5.7 percent decrease in distribution losses.[13]

Once the demand-side and supply-side resource options are laid out clearly, expansion planning analysis should identify the least-cost optimal investment mix. To achieve the optimal mix of resources in an IRP, the demand- and supply-side resources should have a common basis for comparison. The traditional least-cost-based supply calculation is expanded in integrated resource planning to include environmental and societal impacts and objectives (Q9). This expansion creates a more favorable economic environment for the deployment of cleaner and less centralized supply technologies including DSM, EE, and RE. The California Energy Commission's IRP follows a specific loading order as a foundation for its recommended energy policies and decisions. The order recommends first decreasing electricity demand by employing energy efficiency and conservation to meet customer demand. New generation needs are then met first with renewable and distributed generation options, and second with clean fossil fuel generation.

Q5. Analysis Highlights—Potential Resource Options Assessment

LOOK FOR:

- Consideration for all demand and supply options meeting demand
- Technical, economic, and achievable potentials assessment of all options
- Environmental and social impacts and objectives integrated into least-cost calculations

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Q6. WHAT POLICY INSTRUMENTS ARE NECESSARY TO ACHIEVE THE OBJECTIVES OF THE IRP?

Well-designed policy instruments can help realize the underlying policy objectives of an IRP (see Q2). For example, if a country's objective is to meet a substantial portion of future electricity demand through aggressive increases in end-use energy efficiency, policymakers should consider "demand-pull" policy instruments that create programs to increase consumer awareness and incentivize electric utilities to promote DSM and EE practices. If the objective is to significantly increase job creation in the clean energy sector, policymakers should consider "supply-push" policy instruments, such as investing in research and development (R&D for clean energy technology) and vocational training. Existing policies also can be amended to incorporate the new plan.

Plans should be accompanied by a sensitivity analysis with clearly presented and accessible data to guarantee accuracy and validity of underlying assumptions. Sensitivity analysis can ensure that policymakers are prepared for scenarios that might alter the course of the IRP, and equip planners to make policies flexible enough to address potential changes. Sufficient flexibility is necessary so that the IRP can be cost-effectively modified even if the demand is higher or lower than anticipated. A flexible IRP may involve extra cost associated with accommodating several scenarios, but given future uncertainty, it is less risky to invest in a flexible plan than to contend with a large unforeseen change.

Thailand's Electricity Generating Authority (EGAT) and Ministry of Energy agreed to make explicit in their Power Development Plan 2010 (PDP) assumptions underlying the dependable capacity of renewable energy technologies, and to monitor this dependability over time.[14] Although the values chosen were lower than those proposed by, for example, the independent Healthy Public Policy Foundation (HPPF), acceptance of the concept of transparent monitoring was a breakthrough and demonstrates flexibility in the planning process (see Table 2).

A good IRP is not developed in isolation, and an electricity plan should be integrated with other sectors, such as oil and gas, agriculture, water, manufacturing, infrastructure, finance, and social welfare. Policy instruments should be designed such that multiple policy objectives that cut across multiple sectors can be achieved and, therefore, designed in coordination with affected and relevant sectors, and in a way that integrates and considers pre-existing policy instruments. Linking with policy instruments from other sectors from the beginning makes it easier to align electricity sector plans with overall national and regional growth plans. To reap the benefits of a well-coordinated plan, the Planning Commission of India—while building the National Five-Year Plan for the power sector—consults with representatives from governmental entities related to the energy sector, such as the Ministry of New and Renewable Sources of Energy, the Department of Atomic Energy, the Ministry of Coal, the Ministry of Petroleum and Natural Gas, the Ministry of Environment and Forest, the Department of Science and Technology, and the Central Electricity Authority (see Q1 and Q4 in "10 Questions to Ask about Scaling On-Grid Renewable Energy"). The involvement of representatives from other Ministries is aimed at aligning electricity sector plans with relevant sector plans and vice versa.

Table 2 | **Dependable capacity of renewable energy for Thailand as projected by HPPF and used in the PDP2010**[15]

	DEPENDABLE CAPACITY (AS % OF INSTALLED CAPACITY) PROPOSED BY HPPF	DEPENDABLE CAPACITY (AS % OF INSTALLED CAPACITY) USED IN PDP2010
Biomass	75	33
Biogas	50	21
Solar	40	21
Municipal Solid Waste	40	40
Small and Mini Hydro	30	20
Wind	20	5

Q6. Analysis Highlights—Policy Instrument to Achieve IRP Objectives

LOOK FOR:

- Clearly articulated policy instruments to achieve stated objectives
- Sensitivity analysis
- Clear indication of the assumptions and underlying data used in policy analyses
- Flexibility of policies and ability to be modified
- Policies interlinked with affected and relevant sectors

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Philippines Renewable Energy Plans and Programs (2011-2030)	All

Q7. WHAT REGULATORY AND INSTITUTIONAL FRAMEWORKS CAN BE PROPOSED IN THE IRP TO ACHIEVE OBJECTIVES AND TARGETS?

The IRP should include provisions to support its stated objectives. If the plan aims at increasing household electrification then it should clearly articulate what regulatory measures would be undertaken to achieve this goal, what will be the tariff structure to encourage electrification by poor families, and how increased demand will be met, for example.

A clearly designated network of institutions responsible for different parts of implementation will also help advance the IRP's objectives. These institutions should have clearly defined responsibilities and operate in coordination. Additionally, institutions require human capacity to carry out their responsibilities (See Q8). For example, if the national plan aims to achieve DSM and EE goals, it should undertake a detailed assessment of the appropriate institutional set-up to carry out the evaluation of demand-side options and ensure its implementation, estimate the financial and human resources requirements, design specific programs, and put forward program timelines. South Africa's IRP details the National Energy Efficiency Strategy to be implemented by the South African Department of Energy's Energy Efficiency Directorate. While the plan includes certain details about the strategy, including the formation of a technical team with reporting mechanisms on the progress of EE programs, and comprehensive plans to fund EE interventions, it does not include information details about the strategy's implementation.[16]

Providing an institutional framework to address the grievances of electricity sector stakeholders can increase transparency and accountability. India, among other countries, has provided such a framework. Through its Electricity Act of 2003, the Indian government established the Appellate Tribunal for Electricity, which allows aggrieved customers to file a legal appeal against state and national electricity regulators.

A monitoring mechanism is equally vital to ensure transparency and accountability in the implementation of an IRP. Like any other sector, an IRP may face barriers in the form of powerful market players, lack of political will, and corruption. A well-built IRP—that has effective transparency, monitoring, and feedback mechanisms—can effectively overcome such challenges.

Q7. Analysis Highlights—Regulatory and Institutional Frameworks

LOOK FOR:

- Regulatory provisions to support objectives
- Clearly designated network of institutions responsible for implementation
- Monitoring mechanism to ensure transparency and accountability of IRP implementation

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Q8. HOW ARE NECESSARY INVESTMENTS FOR THE IRP FINANCED?

In addition to policy instruments and institutions, a good IRP should also discuss the financing necessary to achieve objectives. Electricity sector projects are capital intensive, and often have a slow rate of return. They are funded through public funding, loans from commercial or multilateral banks, public-private partnerships, or private sector investments. Transparent and accountable management of these funds will ensure that projects are delivered effectively.

Financing plays a crucial role in ensuring that policies are implemented and targets are met in a timely manner. Evaluating the scale of investment necessary for the IRP and identifying mechanisms to obtain financing is crucial. For example, the Philippines Department of Energy realized that high upfront and technology costs, non-competitiveness, and inaccessible financial markets were barriers to the development of renewables. To promote private sector investment in renewable energy, policymakers put forth legislation such as the Renewable Energy Act of 2008 and the Biofuels Act of 2008, which provided fiscal and non-fiscal incentives to investors, equipment manufacturers, and suppliers.[17]

Transparency and accountability can be enhanced through a clear budget plan made accessible to the public. If a project is financed by multiple sources, policy mechanisms promoting coordination can help ensure an uncorrupted flow of funds.

Electricity consumers should be informed of the financing structure of an electricity plan and how electricity tariffs (rates) will be affected (see "10 Questions to Ask about Electricity Tariffs"). If policy measures are financed through tariff hikes for consumers, a tariff impact report that shows how various categories of consumers are being impacted should be made publicly available.

Many developing countries offer significant subsidies for conventional fuel sources such as oil and gas. An IRP that promotes clean energy can include provisions that phase out subsidies for fossil fuels and redirect financing toward clean technology such as renewables and energy efficiency. The Integrated Energy Policy Report by the Planning Commission of India (2006) suggested that "the environmental subsidy for renewables could be financed by a cess[18] on nonrenewables and fuels causing environmental damage."[19]

Q8. Analysis Highlights—Investment Financing

LOOK FOR:

- Evaluation of scale of investment
- Mechanisms to obtain financing
- Clear budget plan available to the public
- Clearly communicated and publicly available tariff impact report
- Potential to phase out fossil fuel subsidies

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Q9. HOW ARE SOCIAL AND ENVIRONMENTAL IMPACTS ADDRESSED IN THE IRP?

Once supply- and demand-side energy resource options have been assessed as economically and technically viable, the selected options should be assessed to determine possible environmental and social impacts. Where negative impacts may arise, plans for impact mitigation should be in place and stakeholders should discuss whether particular demand or supply options are acceptable to society. Social and environmental considerations usually make EE, DSM, and RE options relatively attractive compared with conventional supply options (See Q10 in "10 Questons to Ask about Scaling On-Grid Renewable Energy").

IRPs can mandate that resource project proposals identify, address, and mitigate environmental and social risks. Impacts can be determined through assessments such as environmental and/or social impact assessments. Assessments should weigh impacts caused by land-use change, impacts on flora and fauna, community dislocation, and health impacts on water resources and air quality from emissions such as SO_2, NOX, and CO_2. A clear framework for impact mitigation can determine, for example, how equipment or technology will be disposed of at the end of its lifetime. Regulatory bodies such as pollution control boards can be put in charge of setting appropriate and consistent environmental standards to ensure that the negative impacts of resource projects are within tolerance limits.

Assessments should be made publicly available for scrutiny before decisions are final. Considering stakeholder priorities and concerns can help foster widespread acceptance. Both conventional and renewable energy projects often have negative social and environmental impacts. Hence, it is important to address and clearly communicate these impacts to those the plan will affect.

Thailand presents an example of taking environmental and social impacts seriously. The country's biomass sector has a large potential for energy generation. However, poorly planned projects have resulted in adverse environmental and health effects, including contamination of water supply, air pollution, and respiratory illness from airborne particulate matter and carbon monoxide. Until recently, only projects 10MW and larger were subjected to impact assessments; the government now enforces a new code of practice for biomass power plants smaller than 10MW, which now undergo analyses to determine the environmental and social impacts throughout their lifecycles.[20]

Measures to mitigate impacts on marginalized communities can help assure those communities that the plan will not be harmful to their interests. Such measures can include livelihood protection and mitigating tariff impacts (see "10 Questions to Ask about Electricity Tariffs"). It is important to consider the gender impacts of electricity planning. Because men and women play different roles within households and communities, access to electricity can have disparate gender impacts. In some situations, women pay the bills or are the main consumers of electricity within the household. When there is no electricity, or when electricity becomes inaccessible because of higher tariffs, women are often responsible for substituting electricity with other forms of energy, which can increase the unpaid labor burden of women and girls. In Lao PDR, where nearly half of rural households are female headed, up-front electricity connection costs have led to low levels of electrification. The Rural Electrification project, managed by the World Bank and which provides subsidies designed with gender sensitive criteria, has led to increases in connection rates among female-headed households from 67 percent to 95 percent.[21]

Q9. Analysis Highlights—Social and Environmental Considerations

LOOK FOR:

- Comprehensive and publicly available social and environmental impact assessments
- Mitigation strategies, including protecting livelihoods and mitigating tariff impacts
- Consideration of gender impacts and other social issues

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Q10. HOW DOES THE IRP PROMOTE INNOVATION AND ANTICIPATE EMERGING CHALLENGES IN THE SECTOR?

Because ongoing improvements in technologies and strategies can enable a sector to thrive over the long term, it is important to develop an IRP that promotes innovation and anticipates challenges. New and innovative strategies for improving energy efficiency, new technologies for renewables, expanded potential assessment programs, R&D programs for more efficient and environmentally benign generation, and transmission and distribution technologies should be encouraged, as should strategies for improving human and technical capacity.

Renewables face a particular challenge in the transmission and distribution systems including grid connectivity, scheduling and transmission infrastructure, and reserves planning. Because of their intermittent nature, some renewables require ancillary supports such as voltage control, ramping requirements, load following reserves, and real-time system operations. These requirements need to be identified and addressed in electricity plans within IRPs. The German Energy Agency, DENA, identified and anticipated changes required in its transmission grid system in order to integrate high levels of renewables (see Table 3). To facilitate integration, the government is promoting coordination among different transmission service operators and encouraging interdisciplinary research in this area. It is also reforming existing policies (see Q8 and Q9 in "10 Questions to Ask about Scaling On-Grid Renewable Energy").[22]

Developing skilled human capacity to deploy, operate, progress, and maintain new projects is integral to realizing successful implementation of the plan. Technology advances rapidly in many sectors and to make the best of the available resources and technology, human know-how should be strengthened through academic research, and by governmental institutions. Furthermore, by facilitating a strong push toward research and development in these fields, a country can benefit from a long-term technological advantage.

Government and regulatory institutions that are involved in developing plans for each resource sector also benefit from increased human capacity. Measures to regularly educate and share global technological and policy advancements with decision-makers through workshops, exchange programs, and conferences can be integrated into IRPs. These trainings prepare decision-makers to face technological and implementation challenges, and help them create more fitting policies.

Table 3 | **The potential of Flexible Line Management and High Temperature Conductors was tested by the German Energy Agency (DENA) to increase and optimize the transmission capacity of existing overhead lines to accommodate RE in extra-high voltage grid.**[23]

VARIANT	NEED FOR CONSTRUCTION OF ADDITIONAL ROUTES IN TRANSMISSION GRID	ROUTE LENGTH TO BE MODIFIED WITH AND WITHOUT ANCILLARY SUPPORTS	COSTS
Basic	3,600 km	0 km	EUR 0.946 billion pa
Flexible Line Management (FLM)[1]	3,500 km	3,100 km	EUR 0.985 billion pa
High Temperature Conductors (TAL)[2]	1,700 km	5,700 km	EUR 1.617 billion pa

[1] Flexible Line Management can increase current carrying capacity of overhead lines near costs by up to 50%

[2] High Temperature Conductors are designed for operating temperatures of 150°C or higher, which means that load capacities can be 50% higher than the standard conductor currency used with a limited operating temperature of 80°C

Q10. Analysis Highlights—Measures for Emerging Challenges

LOOK FOR:

- Promotes innovation and strategies for technology improvements
- Measures to address technological advancements (including energy efficiency, transmission, renewable energy, pollution reduction)
- Human capacity building (technical, policy, and regulatory)
- Institutional capacity building for decision-makers and implementers

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SUMMARY TABLE

	QUESTIONS	ANALYSIS HIGHLIGHTS: WHAT TO LOOK FOR
Q1	What is the process for establishing the IRP?	■ Clear institutional mandate and coordination among the different agencies ■ Transparency of the planning process ■ Availability of assumptions, data, and methodology for public scrutiny ■ Opportunity for public comments and inputs ■ Feedback and review mechanisms ■ Long-term vision
Q2	What are the objectives of the IRP?	■ Clearly stated objectives for the IRP ■ Well-defined priority areas reflected in the objectives ■ Short-, medium-, and long-term goals well aligned with the stated objectives ■ Linkages with other sectors and development objectives
Q3	How does the IRP incorporate lessons learned?	■ Clear identification of lessons learned from previous plans (both domestic and international) ■ Review of assumptions, policies, and institutional aspects of planning considered in earlier plans ■ Analysis of gaps between expected and actual outcomes from earlier plans
Q4	What is an appropriate demand forecast methodology?	■ Clearly defined and publicly available data, assumptions, and methodologies ■ End-use projection approach ■ Consideration of variability that impacts demand ■ Periodic revision of demand forecasts
Q5	How are potential energy resource options selected for the IRP?	■ Consideration for all demand and supply options meeting demand ■ Technical, economic, and achievable potentials assessment of all options ■ Environmental and social impacts and objectives integrated into least-cost calculations

	QUESTIONS	ANALYSIS HIGHLIGHTS: WHAT TO LOOK FOR
Q6	What policy instruments are necessary to achieve the objectives of the IRP?	■ Clearly articulated policy instruments to achieve stated objectives ■ Sensitivity analysis ■ Clear indication of the assumptions and underlying data used in policy analyses ■ Flexibility of policies/ability to be cost-effectively modified ■ Policies interlinked with affected and relevant sectors
Q7	What regulatory and institutional frameworks can be proposed in the IRP to achieve objectives and targets ?	■ Regulatory provisions to support objectives ■ Clearly designated network of institutions responsible for implementation ■ Monitoring mechanism to ensure transparency and accountability of IRP implementation
Q8	How are necessary investments for the IRP financed?	■ Evaluation of scale of investment ■ Mechanisms to obtain financing ■ Clear budget plan available to the public ■ Clearly communicated and publicly available tariff impact report ■ Potential plan to phase out fossil fuel subsidies
Q9	How are social and environmental impacts addressed in the IRP?	■ Comprehensive and publicly available social and environmental impact assessments ■ Mitigation strategies, including protecting livelihoods and mitigating tariff impacts ■ Consideration of gender impacts and other social issues
Q10	How does the IRP promote innovation and anticipate emerging challenges in the sector?	■ Promotes innovation and strategies for technology improvements ■ Measures to address technological advancements (including energy efficiency, transmission, renewable energy, and pollution reduction) ■ Human capacity building (technical, policy, and regulatory) ■ Institutional capacity building for decision-makers and implementers

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ABOUT EGI

The Electricity Governance Initiative (EGI) is a unique network of civil society organizations dedicated to promoting transparent, inclusive, and accountable decision making in the electricity sector. We facilitate collaboration of civil society, policymakers, regulators, and other electricity sector actors using a common framework to define "good governance."

Since 2003, we have worked with civil society organizations around the world to complete assessments of electricity governance in their respective countries, and to advocate for improvements in governance. More than 30 organizations around the world are now partners in the Initiative. The World Resources Institute serves as the global secretariat for EGI, with the Prayas, Energy Group (India) serving as our special knowledge partner.

ABOUT WRI

WRI is a global research organization that works closely with leaders to turn big ideas into action to sustain a healthy environment—the foundation of economic opportunity and human well-being.

ABOUT PRAYAS, ENERGY GROUP

Prayas is a nongovernmental, nonprofit organization based in Pune, India. Members of Prayas are professionals working to protect and promote the public interest in general, and interests of the disadvantaged sections of the society, in particular, Prayas, Energy Group (PEG) has been active since 1990 in the electricity sector. We believe that effective control and influence on governance by people and civil society organizations is the key to efficient governance that would protect and promote the public interest. Public interest issues include consumer issues as well broad social issues. In consumer issues, PEG gives more attention to the issues affecting the poor and the disadvantaged. Social issues include environmental sustainability and equity. http://www.prayaspune.org/peg/

ACKNOWLEDGMENTS

We would like to thank the many people who peer reviewed or otherwise contributed thoughtful discussions and ideas that helped shape this report. These include:

Our colleagues at WRI and PEG: Hyacinth Billings, Darryl Ditz, Taryn Fransen, Gayatri Gadag, Ashwin Gambhir, Nick Price, Emily Schabacker, and Peter Veit.

Global experts: Yvette Abrahams, Gender CC, South Africa; Gilberto Jannuzzi, International Energy Initiative, Brazil; Dave Lamont, Regulatory Assistance Project, USA; Cathie Murray, Regulatory Assistance Project, India; and Asif Masood, Consumer Rights Commission of Pakistan, Pakistan;.

We would also like to thank our EGI partners that provided many ideas, thought-provoking inputs, and feedback on iterative drafts during our annual EGI retreats.

In particular, we would like to thank our partners in India who tested the value of this framework to assess state level IRP processes.

In Karnataka, a team of experts led by **Dr. Anjula Gurtoo**, Indian Institute of Science (IISC) and **Ms. Kathyayini Chamaraj**, CIVIC Bangalore and includes **Mr. A. Sivasankaran**, **Mr. M.L. Ashok**, **Mr. Y.G. Muralidharan**, and **Mr. A. Rajarao**. IISC is a premier university for scientific and higher education located in Bangalore, and CIVIC works on urban issues, specially realizing social equity in growth in Bangalore.

In Tamil Nadu, a team of experts led by **Dr. R. Hema**, Madras School of Economics (MSE) and **Mr. Vishnu Rao**, **Ms. M. Naga Nikhitha**, **Mrs. Tara Murali**, Citizen, consumer and civic Action Group (CAG). MSE is a Centre of Excellence in post-graduate education in economics, and CAG is a nonprofit, nonpolitical, and professional citizens group that seeks to make policy changes through strategic interventions to benefit the citizen-consumer.

Kalpana Duleepsingh, Independent consultant. Kalpana's guidance, knowledge and expertise of India's electricity sector was invaluable throughout the entire assessment process.