

# Body of Knowledge on Infrastructure Regulation: The Challenge of Renewables

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## Abstract

The Body of Knowledge on Infrastructure Regulation contains summaries of regulatory literature, tutorials, self-paced tests, and more than 500 downloadable references for regulatory reform and performance improvements in infrastructure industries. The online glossary has been translated from English into Chinese, French, Italian, Portuguese, and Spanish. The redesigned site also includes Frequently Asked Questions.

This online resource was originally developed in 2006 and has benefitted from funding from The World Bank and the Public-Private Infrastructure Advisory Facility (PPIAF). PURC has led the effort to update content for the new site: [www.regulationbodyofknowledge.org](http://www.regulationbodyofknowledge.org). This site is a comprehensive online resource for utility and regulation professionals, policy makers, and academics focusing on regulatory reform and the promotion of strong performance in energy, telecommunications, transportation, and water sectors.

The resource has been used in in-house training programs for regulatory commissions and regulated companies. The most recent additions include new Frequently Asked Questions related to the regulation of state-owned utilities and how energy regulators can promote cost-effective renewable energy (RE) and energy efficiency (EE). The new material on RE and EE addresses eight questions, including:

*-What should be the involvement and mandate of the energy regulator in connection with promotion of Renewable Energy and what are the main challenges associated from a regulatory perspective?*

*-What is the best choice of regulatory instruments/tools for Renewable Energy promotion based on efficiency and effectiveness of reaching policy targets (FiT versus Green Certificates versus Central Procurement and others)?*

*-How have countries linked policy-making related to energy efficiency to regulatory functions?*

The “answers” are not meant to be definitive, but to provide a foundation that would enable the user to ask better questions of consultants and to begin his (or her) own analysis of these issues.

## 1. Introduction and Background

The Body of Knowledge on Infrastructure Regulation (BoKIR) was developed to complement regional and international training initiatives and to enable professionals to stay abreast of recent analytical developments and lessons emerging from cross-country studies. It initially had three main features:

- An annotated reference list covering all of the areas of knowledge expected to be known by regulatory practitioners;
- A survey of key articles and studies, summarizing main points; and
- A glossary of terms that would provide the standard definition of the main terms used in the annotated reading list and used in the survey.

With funding from the World Bank, material was prepared by a team of experts and reviewed during a November 2003 expert review workshop in Washington D.C. Based on feedback from the team of experts, a revised version of the BoKIR was produced along with a Glossary of Terms. This document represented an important step in strengthening professional development among regulatory staff and infrastructure managers. It started being utilized in in-house programs and has become an important resource for the *PURC/World Bank International Training Program on Utility Regulation and Strategy* at the University of Florida. From the feedback received since its launch, researchers and practitioners have found it to be very helpful in their work.

In 2006 a hyperlinked, online version of the BoKIR was made available at <http://www.regulationbodyofknowledge.org/> . This web site has become a resource to practitioners, researchers, students, and anyone interested in learning about utility regulation. By providing summaries of key concepts and arguments and links to more than 500 references and case studies, the BoKIR improved awareness of regulatory best practice and helped regulatory professionals to efficiently access both established and cutting edge learning on issues central to establishing a well-functioning regulatory system.

The BoKIR's credibility and continued usefulness is dependent upon keeping it up-to-date and its use by groups around the world. In 2008, the Public-Private Infrastructure Advisory Facility (PPIAF) recognized the need for the BoKIR to change over time as the regulatory environment changed. A Review Committee, comprised of international regulatory experts, met in April 2008 in Washington, D.C. to revise and update the content of the BoKIR. As a result of the meeting, a number of additions and improvements were completed and implemented during 2008 and 2009. These modifications included the following:

**Regulatory Challenges (FAQs):** To make the site more accessible and timely, a Frequently-Asked Questions (FAQ) section was added with sub-questions and answers. This feature allowed additional new material to be accessible without excessively expanding the set of core references.

**Content and References Updates:** The content of each web page and the original Annotated Reading List were updated and revised. The site added more than 90 new references and case studies.

**Transportation Sector:** Approximately 100 transportation references and summaries were also added to the site.

**Glossary Translations:** The World Bank had funded translations of the Glossary into Spanish and French. PURC collaborations with regulatory professionals in three countries led to translations of the English glossary into Chinese, Italian, and Portuguese (without requiring external funds). Translations into Russian and Arabic are in the works.

**Search Engine Optimization and Site Security:** To improve user capabilities, the search engine has been modified. The BoKIR's Google Page Rank increased and traffic on the site has significantly expanded. In addition, particular attention has been given to site security.

From the first concept meeting of international infrastructure experts in 2002 and throughout the BoKIR project, the Team has recognized the importance of developing a global curriculum that could include diverse regional and sector perspectives. PURC is in the process of expanding linkages with regional and international regulatory associations. Associations like the African Forum for Utility Regulation (AFUR), Organization of Caribbean Utility Regulators (OOCUR), East Asia and Pacific Infrastructure Regulatory Forum (EAPIRF), Energy Regulators Regional Association (ERRA) and international networks like the International Confederation of Utility Regulators (ICER) provide a number of “products” for regulators around the world (Berg and Horrall, 2008). This process will improve regional representation of references, cases, and test questions. It will also enable PURC to develop FAQs that are relevant to specific regions. For example, the African Infrastructure Diagnostic initiative is yielding a number of valuable reports that are in the process of being added to the site. The BoKIR is now widely used by regulatory professionals and academics around the world.

## **2. Renewable Energy and Energy Efficiency: Illustrative Resources**

The most recent addition to the site is a series of FAQs related to a challenging issue facing regulators around the world—renewable energy (RE) and energy efficiency (EE):

- *What should be the involvement and mandate of the energy regulator in connection with promotion of Renewable Energy and what are the main challenges associated from a regulatory perspective?*
- *What should be the involvement and mandate of the energy regulator in connection with promotion of Energy Efficiency and what are the main challenges associated from a regulatory perspective?*
- *What is the best choice of regulatory instruments/tools for Renewable Energy promotion based on efficiency and effectiveness of reaching policy targets (FiT versus Green Certificates versus Central Procurement and others)?*
- *What is the best choice of regulatory instruments/tools for Energy Efficiency promotion based on efficiency and effectiveness of reaching policy targets? (Energy Efficiency Certificates versus Central Procurement and others)*
- *What are the regulatory issues presented by renewable technologies (solar, wind, biomass, geothermal, and hydropower) and what are the basic characteristics of these options?*
- *If a government decides to consider feed-in tariffs (FITs) as a tool to promote distributed generation via renewable energy, what are the regulatory steps that should be taken by those implementing rules?*
- *If the government decides to use purchase power agreements as a tool to obtain renewable energy, what are the regulatory steps that should be taken to implement rules?*
- *How have countries linked policy-making related to energy efficiency to regulatory functions?*

The project was funded by the Norwegian Trust through the World Bank. The “answers” are not meant to be definitive, but to provide a foundation that would enable the user to ask better questions of consultants and to begin his (or her) own analysis of these issues. Some of the key

points are summarized in Berg (2013). The FAQs draw upon handbooks prepared for NARUC (Bjork, et. al., 2011), ICER (2010), and other organizations.

A key point is that ultimately, public policy determines the extent to which renewables are to be incorporated into a developing (or developed) country's generation mix. Energy sector regulators implement that policy—thus affecting the pace and pattern of RE investments and connections to the grid. New regulatory RE objectives specified in legislation are likely to require the agency to balance fundamental goals of affordability, cost recovery (for sustainable utility operations), and fairness (since implicit cross-subsidies may be required to meet new policy mandates).

Energy regulators often have authority to carry out a number of functions that have implications for the financial feasibility of renewable energy projects. Such functions include:

1. issuing licenses,
2. setting performance standards,
3. monitoring the performance of regulated firms,
4. determining the price level and structure of tariffs,
5. establishing uniform systems of accounts,
6. arbitrating stakeholder disputes,
7. performing management audits,
8. developing agency human resources (expertise),
9. reporting sector and commission activities to government authorities, and
10. coordinating decisions with other government agencies.

Thus, regulators make a wide range of decisions that affect the financial outcomes associated with RE investments. In addition, the sector regulator is in a position to give advice to the government regarding the full implications of focusing on climate change or energy security. The energy sector regulator is the natural advocate for efficiency and cost-containment throughout the process of designing and implementing RE policies. Since policies are not self-implementing, energy sector regulators become a key facilitator (or blocker) of renewables in developing nations. Figure 1 (from Berg, 2013) depicts how the regulatory functions and policy instruments affect the development and implementation of RE policies.

While market failures might justify government playing a role in RE and EE, there is also the possibility of government failure, as when energy efficiency initiatives are the result of special interest lobbying that benefits one set of stakeholders but results in cost burdens being met other stakeholders, raising questions of *fairness*. In addition, the benefits might not exceed the costs of particular programs; this possibility raises the question of *efficiency*.

There are two broad sets of instruments for reducing emissions or promoting RE; setting prices or quantities. The basic issue involves how to deal with the uncertainty regarding compliance costs for reducing emissions (or for reducing kWh consumption). When a price is set, as in the form of a tax on emissions, utilities will reduce emissions up to the point where the additional costs of compliance equals the tax. The utility would not spend money on reducing emissions when it is less expensive to pay the tax. However, the outcome is not known in advance, since policy-makers are not sure about the cost of compliance. On the other hand, quantity controls (limiting emissions by mandating targets) are generally handled via tradable permits or quotas that establish the targets without knowing the marginal cost of meeting the target. Utilities are issued a permit allowing them to emit a particular quantity. The target can be met by reducing

their own emissions or from buying “permits” or certificates from utilities that find it relatively inexpensive to meet their targets. Such utilities reduce emissions more than required, and so they have permits they can sell. Thus, the quantity targets are met, but policy-makers do not know the marginal cost of meeting the targets in advance. Tools for achieving RE targets include Feed-in Tariffs, Net-metering, Renewable Portfolio Standards, purchase power agreements, and central procurement via energy auctions—to list a few. More are identified in the References and the FAQs associated with RE/EE.

RE represents a supply-side intervention, and EE represents demand-side management. In general, the regulator will have a less direct role in EE than in RE initiatives, since the latter primarily involve adjustments by customers. However, EE basically promotes energy conservation—which means that programs impact utility costs (directly through program costs and changes in production patterns) and revenues. There are a number of tools available to regulators for promoting demand-side initiatives in support of conservation and EE, including utility-based information/education programs, improvements in load patterns, reductions in line losses, improvements in metering, and extensive utility energy audits—promoting conservation. Regulators would focus on utility-based EE initiatives, to ensure that outlays are prudent and cost-effective. Other agencies might focus on building codes, appliance standards, and subsidies for EE activities. In countries where there are energy shortages (and rationing), EE increases system reliability—improving the quality of service experienced by customers. Thus, the role of regulators primarily involves providing technical input into the development of EE policies initiated by other agencies or via legislated tax programs. However, EE and conservation programs incentivized by the utility must be approved and monitored by the regulator to ensure that the programs are well-designed and that they meet the objectives of the enabling legislation.

## Concluding Observations

The purpose of this article has been to re-introduce the Body of Knowledge on Infrastructure Regulation to the international regulatory community. This web site is one of the many resources available to regulatory decision-makers and to those managing infrastructure firms. Both groups need to understand the roles and responsibilities of their respective institutions. The issues surrounding renewable energy illustrate need for processes that clearly identify objectives, alternative strategies, and regulatory choices that balance those objectives in a politically acceptable manner.

Key challenges identified in the first FAQ on RE include:

1. **Legal Mandate:** Does the regulatory commission have legal authority to undertake the function? Each of the potential RE program listed above requires a clear regulatory framework if rules are to be established in a timely and transparent manner. This challenge may be further complicated by a potential lack of clear legal authority when other agencies have responsibilities related to RE, including siting or resource-use.
2. **Clarity in Authority:** Is there overlapping or unclear allocation of roles and responsibilities of different agencies? The NARUC Handbook (Bjork, et. al., 2011, p. 9) recommends that regulators “Review legal and administrative processes in other sectors that may impact RE advancements, including environmental siting and permitting restrictions, environmental standards, and investment and procurement rules.”
3. **Coherence:** The internal consistency of RE programs is essential if they are to be cost-effective. Unfortunately, stated policy objectives may not be prioritized, so regulators need to

check the links between programs and objectives to ensure that impacts are well-understood and that the beneficiaries are clearly identified. If the affordability objective is applied very broadly, cash flows to the investor in renewables might be reduced. Regulators are in a position to evaluate the internal consistency of RE programs, so that the incentives (established by a number of agencies) reinforce one another. Policy and regulatory consistency is important: the regulatory function should focus on identifying inconsistencies and promoting processes for coordinating the implementation of RE policies.

4. **Resources:** Does the agency have the staff expertise and/or consulting budget that enables the functions to be performed in a professional manner? For example, it is important that the regulator follows closely the trend in capital costs of renewable technologies to avoid windfall profits under approved Feed-in Tariffs, especially when these technologies are benefitting from regulated tariffs.
5. **Transparent Processes:** Do special interests representing particular technologies, regions of the country, or politically powerful stakeholders have inappropriate input into the implementation of rules affecting RE? In particular, can stakeholders bypass regulatory processes, limiting transparency and reducing the cost-effectiveness of RE initiatives? Corruption, as reflected in bribery and fraud, raises the cost of doing business and reduces the credibility of government officials promoting energy efficiency and renewable energy. If citizens do not trust regulatory and corporate leaders, then the legitimacy of the system is called into question. This observation implies that bidding procedures, the development of Feed-in Tariffs, and other activities must be perceived as totally transparent and based on best-practice.
6. **Funding:** Is there stable and sufficient funding for the required investments? The political will can change as new policy priorities emerge, making government funding unpredictable. The availability of donor and private investment funds will depend on perceptions regarding the stability of the policy environment and on forecasted net cash flows from RE projects.

Addressing these challenges will require continued collaboration among regulators and continuing education at regulatory commissions. The new *ICER Chronicle* represents a new resource that can strengthen capabilities to address difficult regulatory issues.

## References

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**Figure 1 Regulatory Functions Influencing Renewable Energy**

