

**Key Lessons from the
2011 PURC Advanced International Practices Program:
Benchmarking Infrastructure Operations
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Teachers learn from their students, and students learn from each other. In the concluding session of the Advanced International Practices Program, the 21 participants from eight nations in this training course identified the key lessons learned during the 3½ day period. They shared their reactions to formal presentations and informal networking. Rui Marques, Ted Kury, Mark Jamison, and I appreciated the dedication and energy exhibited by participants: attendees brought insight and understanding to the sessions and shared their ideas with all of us.

Note that the lessons listed below refer to regulatory agencies and to those developing and implementing benchmarking systems, so the principles clearly apply to operators. Organizations face the same challenges: creating a sustainable infrastructure system where all stakeholders have confidence in the integrity of the process and have a shared vision of improved infrastructure performance.

As PURC Director, Mark Jamison has observed: “Many of the lessons tend to be strategic rather than technical in nature – suggesting that many of the important ideas involve how regulators, representatives from government ministries, infrastructure managers, and consumer advocates need to ‘get on the balcony’.” Intentionally stepping back from the “give and take” of regulation or utility operations enables leaders to see how various stakeholders limit or promote innovative approaches to improving performance. We hope that the annotated list of lessons stimulates further discussion among those involved in the energy and water sectors. I take full responsibility for errors of interpretation in this summary of key lessons.

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- 1. Data analysis involves both subjective and objective elements:** The subjective part arises from placing weights on the different dimensions of performance (for example, expanding network coverage versus improving service quality). Social values, as translated into laws, determine the weights to be given to different performance goals. The objective component relates to the application of appropriate methodologies for evaluating performance over time and across decision-making units.
- 2. Benchmarking represents a valuable management tool that enables decision-makers to identify and reward top performing units:** “Executives manage what they measure.” The absence of data is evidence of weak managerial processes. Of course, not all that is important is easy to measure, but it is better to have an approximation of an important indicator than a precise calculation of an irrelevant indicator.

3. **Information helps different stakeholder groups understand the performance of different units:** The affected communities deserve to be informed of trends and relative performance, so pressure can be placed on those responsible for improving sector performance.
4. **Multi-period information on operations and financial conditions is essential for decision-making:** Retaining historical data provides analysts with the opportunity to identify trends and conduct more robust statistical analyses.
5. **The fundamental objective of a benchmarking study is to measure productivity and efficiency so that the analyst can make comparisons:** *Productivity* considers the link between inputs and an organization's outputs. *Efficiency* is related to productivity, but it involves establishing a standard and determining how close the firm comes to meeting that standard: how far is the utility from "efficient practice"? How near is the utility to the frontier?
6. **Benchmarking can trigger political changes internal to organizations:** As performance is highlighted on a regular basis, those responsible for implementing successful cost reduction programs are likely to gain influence within the utility. Greater transparency and public awareness of relative performance put pressure on weak utilities to restructure their management teams or to develop better incentives for meeting well-defined targets.
7. **The ability of researchers to conduct and evaluate studies is affected by database limitations and methodological shortcomings:** Clearly, information contains errors (whether due to errors in reading meters or transferring data from sources to accounting reports). Managers need to continually seek ways to improve their information systems. Similarly, the various benchmarking techniques each involve limitations—whether the methodology involves partial indicators, statistical estimates, or data envelopment analysis. Within organizations, "avoid information empires": make data widely available.
8. **Data can be used for forecasting likely future developments: Demand forecasting is essential for business planning (for investments and operations):** Business plans serve as reality checks for decision-makers: are the cash flows reasonable and will the operational targets be met under current financial constraints? Will quality of service be improved under the business plan?
9. **Benchmarking puts pressure on management and regulators:** When citizens see what some utilities (or divisions of a utility) have been able to accomplish, they are in a position to reward strong performance and raise questions regarding weaker performance. Without information, citizens are basically in a vacuum. Similarly, various groups have also performed benchmarking studies of regulatory agencies, focusing on both adherence to accepted (and mandated) processes and actual performance in the sector being regulated.
10. **Benchmarking is one instrument for promoting transparency and access to information:** Annual reports and other communications from utilities provide some data that can be used for making comparisons. However, it is important to have more comprehensive studies that focus on performance over time and across comparable decision-making units.

- 11. Benchmarking reduces information asymmetry for decision-making:** Within a utility, executives at the highest levels tend to receive summaries of information, yet the detail can reveal patterns that are very important. Without more careful data analysis, the executives are in no position to develop and implement new strategies for improving performance. Similarly, regulators have far less information on actual and potential performance than managers. Getting the information out into the public domain improves decision-making: “People are entitled to their own opinions, but not to their own facts.”
- 12. Benchmarking sets baselines:** Managers need a clear idea regarding the actual status of operations and the financial sustainability of their utilities. Benchmarking documents current conditions and performance, so improvements can be quantified relative to current indicators.
- 13. Benchmarking can be used to establish targets:** The best-performing decision-units provide evidence of best practice: the current frontier. How quickly other decision-units should be able to move to that frontier is a more complicated question requiring input from all stakeholders, including utility management. However, with benchmarking, the burden of proof is placed on decision-makers to explain their organizations’ relative performance and their ability to move to the frontier.
- 14. Benchmarking promotes continuous improvements:** Key Performance Indicators (KPIs), like output per worker, can be used to track improvements in utility performance. Another type of benchmarking, called *process benchmarking*, focuses on individual production processes in the vertical production chain. Managers from different organizations can share “best practices” and improve utility performance. One advantage of this approach is the ability to identify specific stages of the production process that warrant attention (including pumping, intake, transport, clarification and filtration of groundwater, purification and treatment of raw surface water, maintenance, meter reading, collections, planning, etc.).
- 15. Metric benchmarking can include a variety of quantitative tools:** The various methodologies have different degrees of sophistication (each with their associated strengths and limitations). Key Performance Indicators (KPIs) tend to be partial indicators, capturing one feature of performance. Statistical methods include Ordinary Least Squares (OLS), Corrected Ordinary Least Squares (COLS), and Stochastic Frontier Analysis (SFA). These methods are labeled *parametric*, since they provide statistical measures of goodness of fit and parameters (or coefficients) for the cost or production functions. Data Envelopment Analysis (DEA) is a *nonparametric* technique in which linear programming is applied to a selected set of variables to calculate an efficiency score for each utility (or decision-unit). DEA has the advantage of not requiring a specific functional form.
- 16. Reports should avoid the use of excessive jargon:** Technical terminology has its place, but only for technical communities. There are different audiences for benchmarking reports. The analyst should know the audience (a legislative committee or the general public) and determine the appropriate format for the report. Such reports can be misinterpreted or misused, so great care

must be taken to explain how robust the results are and how the ranking will be utilized. Preliminary reports can seek input from stakeholders. Final reports should be widely available for review.

- 17. The focus should be on what is important, not what is easily measured:** Studies can hide as much as they reveal. Analysts should address the real issues and not bury the implications of a study in footnotes. Readers will want to understand why the study was conducted and how it will be used. An authoritative and robust study should point out the strengths and limitations of the methodologies utilized *and* the implications for decision-makers. If the study is preliminary in nature, that should be made clear early in the report. Finally, “The perfect is the enemy of the good.” No study is perfect. The task is to get started.
- 18. Benchmarking can be disruptive:** The press is likely to sensationalize the comparisons and vilify managers and regulators. Comparisons are bound to create problems for those utilities identified as “weak” or for those divisions (within a utility) identified as performing poorly. People will point fingers and managers will scramble. When dramatic change is called for, such disruption is quite appropriate. However, the analyst needs to be completely candid about his or her confidence in the results (or rankings) determined by the analysis. Managerial and political careers can be affected by performance benchmarking studies.
- 19. Benchmarking studies force decision-makers to face reality:** Facts focus attention on particular dimensions of performance. So long as there are no facts, different groups can make claims, but those claims will not be backed up by evidence. Benchmarking changes the “game” since it provides information to stakeholders. That information captures the context within which the industry operates and the actual performance of service providers. Rhetoric about water or energy as a “human right” that should be available to all can help citizens prioritize sectors receiving public funds. However, that rhetoric is empty if it does not specify a plan for achieving specified goals.
- 20. Analysts should draw upon the skills and support of personal networks of experts:** No analyst can afford to work alone. The preparation and dissemination of sound benchmarking studies require a wide range of skills, some technical and some strategic. Continuing education is essential if analysts are to remain abreast of new developments. Colleagues in organizations around the world are able to provide advice and feedback on technical studies. Analysts can work with local university researchers and with professionals who share their interest in strengthening performance in infrastructure sectors.

For benchmarking tutorials and reference material, see

International Benchmarking Network for Water and Sanitation Utilities, <http://www.ib-net.org/>. This site will be adding utilities from the energy industry soon.

Check out other web links at www.purc.ufl.edu and at www.regulationbodyofknowledge.org.

Coelli, Tim, Antonio Estache, Sergio Perelman, and Lourdes Trujillo (2003). [*A Primer on Efficiency Measurement for Utilities and Transport Regulators*](#), World Bank Institute. (6.3 MB PDF file)

This book is intended to help regulators learn about the tools needed to measure efficiency. It provides an overview of the various dimensions of efficiency that regulators should be concerned with. It also summarizes the main quantification techniques available to facilitate decisions in the most common regulatory processes. The book focuses on methodology selection, data collection, and related issues. It provides readers with all the conceptual tools they need to make real-life decisions. It is also supported by a website from which readers can download software they can use to implement the techniques described.

For DEA tutorials and background information, see

<http://www.deazone.com/> Data Envelopment Analysis - Warwick University

Includes a tutorial on the use of DEA, bibliography, software, and other material.

<http://www.etm.pdx.edu/DEA/Dataset/Default.htm> DEA Dataset Repository (Portland State University and the University of Auckland). Includes tutorials.

For statistics tutorials and background information, see

http://en.wikipedia.org/wiki/Outline_of_statistics Wikipedia has a vast amount of information.

<http://stattrek.com/> contains a number of tutorials.

<http://www.statistics-help-online.com/node53.html> contains a number of tutorials.

Links to a few resources (from Sandy's Selections at the PURC website):

[The World Bank Infrastructure and Law website](#). This website is designed for government officials, lawyers, and project managers who are involved in the planning, design, and legal structuring of infrastructure projects, especially projects with private sector participation.

Bogetic, Zelijko, and J. Fedderke. 2006. "[International Benchmarking of Infrastructure Performance in the Southern African Customs Union Countries](#)." World Bank Policy Research Working Paper 3987. This paper provides a first, systematic benchmarking of infrastructure performance in the SACU countries in four major sectors.

Gratwick, Katharine Nawaal, and Anton Eberhard. 2008. "[An Analysis of Independent Power Projects in Africa: Understanding Development and Investment Outcomes](#)." *Development Policy Review*, 26(3):309-338. This document provides a valuable overview of IPPs. Eberhard has spoken on several occasions at the PURC/World Bank International Training Program on Utility Regulation and Strategy.

Berg, Sanford V., and Maria Luisa Corton. 2008. "Water Utility Benchmarking for Managerial and Policy Decisions: Lessons from Developing Countries." In *Performance Assessment of Urban Infrastructure Services*, ed. Enrique A. Cabrera Jr., and Miguel A. Pardo, 307-320. London: IWA Publishing. [PDF version](#)

Another helpful resource on the power sector is the report, [Reforming Power Markets in Developing Countries: What Have We Learned?](#) by John E. Besant-Jones. The paper is a sourcebook of some 240 references that study international experiences in power market reforms. The author was a featured presenter at the 24th PURC/World Bank International Training Program on Utility Regulation and Strategy.

The volume, [Handbook for Evaluating Infrastructure Regulatory Systems](#) (Brown, Stern, and Tenenbaum, World Bank, 2006), provides an overview of why, what, and how to evaluate regulatory systems. A CLASSIC!

Additional Resources

Silver Mugisha (2011). *Utility Benchmarking and Regulation in Developing Countries: Practical Application of Performance Monitoring and Incentives*, International Water Association, xi-195.

[PDF Table of Contents](#)

Sanford Berg (2010). *Water Utility Benchmarking: Measurement, Methodologies and Performance Incentives*," International Water Association, xii-170.

[PDF Table of Contents](#)

Coelli, Timothy, D.S P. Rao, C.J. O'Donnell, and G.E. Battese (2005). [An Introduction to Efficiency and Productivity Analysis](#), Second Edition, Springer, xvii-349. [This book is technical, but very comprehensive.]