Chapter 10
Integrated Resource Planning

ABSTRACT

Integrated Resource Planning (IRP) is an economic planning process which, if implemented correctly, selects a plan with the lowest practical cost at which a utility can deliver reliable energy services to its customers. The ultimate objective of this planning process is to formulate a plan having a mix of energy resources, but at the same time minimizing the total financial outlays spent in order to maximize the energy service benefits gained. IRP can be described as an approach through which the future demand for electricity services, during any given planning period, is met with a combination of least-cost of supply and demand side efficiency options, while incorporating issues such as security of supply, environmental protection, national economy, and other country-specific goals.

IRP can provide a vehicle to test and put into force regulatory policies and actions. Environmental externalities, risk reduction, improving continuity of service, market distortions, and lack of inexpensive financing are all included in the IRP process. Policies are usually translated to fiscal or monetary measures through licensing procedures, tariff design, environmental penalties, renewable energy encouragement acts, and additional taxes or levies. This would certainly provide demand side options with some advantage over the conventional ones.

INTRODUCTION

IRP is a process of planning to meet electricity consumers’ requirements in a manner that meets more than one objective simultaneously. These objectives are: 1) maintain high level of reliability and continuity of supply, 2) match national macro-economic objectives, 3) reach all current and future consumers and provide reliable service, 4) make sure that supply of electricity is at the minimum possible cost, 5) minimize environmental impacts of power supply, 6) reduce dependence on imported energy, 7) attempt to achieve positive attitudes related to consumption and energy efficiency, 8) incorporate new and renewable resources in future supply options, and 9) create new jobs and participate in economic development.

As such IRP is applied at a national level to meet the set objectives. Each country sets its own objectives, in spite the fact that these objectives may conflict with one another to a certain degree. This requires that a tradeoff must be adopted be-
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tween conflicting objectives to arrive to a final set of objectives. These final objectives must be decided upon after an intensive analysis and processing phase, leading to better judgment of stakeholders in the process of developing plans.

It should be stressed that IRP introduces both supply and demand sides in the formulation of long term expansion plans. It is built as a comprehensive process based on holistic analysis. It differs from traditional planning, which focuses on supply side options only, by incorporating demand side options as well. Therefore, in addition to looking at options to expand generation, transmission, and distribution facilities, IRP involves programs that affect consumption habits and levels. In other words IRP increases the efficiency with which electricity is used by the different consumers. This results in savings in electricity use which is equivalent to adding new capacity.

It is usually said that a MW saved is a MW added. If this one MW was saved from some existing consumer by altering consumption habits, levels, duration, or type of equipment used it will be supplied to another new consumer or any additional demand of the same existing consumer. Moreover, IRP is carried out to reduce the overall cost of expanding the power system. The expansion cost, as outlined in chapter 9, is very high and as resources become scarcer, and environmental impacts become more pronounced, this cost will further increase. Therefore, IRP is an attempt to reduce this cost and at the same time reduce environmental and land occupation issues.

Bauer and Eto quote: “IRP is the process of integrating supply and demand side resources to provide energy services at a cost that balances the interests of all stakeholders. The goals of IRP have evolved from least cost planning and encouragement of demand side management to broader, more complex issues including core competitive business activity, risk management and sharing, accounting for externalities, and fuel switching” (Bauer & Eto, 1992, p. 8).

IRP is an economic planning process which, if implemented correctly, selects a plan with the lowest practical cost at which a utility can deliver reliable energy services to its customers. The ultimate objective of this planning process is to formulate a plan having a mix of energy resources, but at the same time it minimizes the total financial outlays spent in order to maximize the energy service benefits gained (Harrington, et al., 1994, p. 7).

Reddy and Sumithra quote: “Integrated resource planning is an energy planning approach to identify the mix of clean and centralized/decentralized renewables and efficiency improvements that will meet the demand for increasing energy services for instance at least cost or least environmental impact” (Reddy & Sumithra, 1997, p. 14).

Antonette quotes: “IRP can be described as an approach through which the estimated requirement for electricity services during the planning period is met 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” (Antonette, 2005, p. 1272).

CONCEPT AND RATIONALE

The most important objective of IRP is to ensure the long-term supply of adequate and reliable electricity service to consumers at the lowest reasonable cost and in a manner consistent with national interests including public welfare. The underlying role of IRP is to chart future action related to determining and implementing the long-range supply and demand side resource utilization strategy in order to fulfill future demand.

IRP includes some societal costs such as environmental impact mitigation in the assessment of certain alternatives (Hu, et al., 2010). This distinguishes it from the classical supply planning. IRP is also technologically neutral with respect to
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