GENERIC MODELS FOR ELECTRICITY INDUSTRY STRUCTURE

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INTRODUCTION

The range of possible structures for an electricity industry comprises a continuum from vertically integrated monopoly utilities on the one hand to unbundled electricity businesses with full competition on the other. It is not meaningful to assess all possible combinations of electricity industry structures. However, a multi-national research project, Task VI of the International Energy Agency’s Demand-Side Management Programme, developed four generic models for the structure of electricity industries\(^1\).\(^2\).

The four models are:

- Model 1 - Vertically integrated monopoly
- Model 2 - Unbundled monopoly
- Model 3 - Unbundled, limited competition
- Model 4 - Unbundled, full competition

Descriptions and diagrams of these models are presented on pages 2-5.

The generic models are based on only two structural dimensions of an electricity industry: the degree of unbundling and the extent of competition. Consequently, they represent four points on a continuum (see the matrix diagram on page 6). The models do not attempt to describe other aspects of an electricity industry, such as the type of ownership of electricity businesses, form of industry regulation, and customer access to electricity markets. These can take different forms within each type of industry structure. Such aspects would have to be included in any full description of an actual electricity industry.

Using a limited set of generic models enables the development of consistent comparisons between the changing structures of electricity industries in different countries. However, it is important to note that these models are generic. It is likely that few countries will ever experience any of the structures exactly as described by the models, but rather will develop individual variations of these structures. Moreover, evolution to new structures may be neither sequential nor flow in only one direction; for example, a country that moves into Model 3 may later revert back to Model 2.

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Model 1 - Vertically Integrated Monopoly

The electricity utility controls and undertakes all business functions: generation, transmission, distribution, wholesale and retail energy supply and services. There is no competition at any level. Utilities have the obligation to serve customers within their own region. Government regulates the utility to prevent monopoly abuse. All customers in the region must buy energy from that utility.
Model 2 - Unbundled Monopoly

Generation is separated from all other functions: several generation companies serve distribution companies and, possibly, major industries. Generators and distributors maintain monopoly status: the generation company has the exclusive right to supply customers within its franchise area, and the distribution companies have a monopoly to serve customers in their respective areas. Transmission is provided by generators, distributors, or a separate entity or entities. Government regulates the monopolies to prevent monopoly abuse. Competition may occur at the generation level, but there is no competition at the retail level. All customers in a region must buy energy from the retail utility which holds the franchise to their geographical area.

Model 2: Unbundled Monopoly

Generators

Transmission network

Large end-user

Distributors

Retailer

Distribution network

End-users
Model 3 - Unbundled, Limited Competition

Generation is separated from natural monopoly functions: many generation companies serve distribution companies and, possibly, major industries through a competitive wholesale market. Generators have open access to the transmission and distribution grid. Transmission is provided by generators, distribution companies, or a separate entity or entities. Government regulates the transmission and distribution system to prevent monopoly abuse. There is competition at the wholesale level: primarily among generation companies and there may be some competition through the use of self-generation by large customers. But with this one exception, there is no competition at the retail level.
Model 4 - Unbundled, Full Competition

Generation, transmission and distribution functions are separated. There is competition among generators (generators have open access to the transmission and distribution grids). There is complete competition at the wholesale and retail level. At the retail level, two new organisations supply electricity to end-use customers. Independent retailers (who have no interest in the distribution ‘wires’ business) purchase electricity in bulk from the wholesale market and on sell to end-users. Brokers provide a similar service without ever owning the electricity. There is some oversight (regulation) of the wholesale and retail markets to ensure a more efficiently operating market and to prevent abuse of market power. In addition, government regulates (or maintains ownership of) the monopoly transmission and distribution systems.\(^3\)

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\(^3\) Some analysts have suggested that market failures, mergers and acquisitions could cause Model 4 to collapse into an unregulated monopoly or oligopoly structure. Though this is one possible outcome, it is likely that such a structure would have such negative implications for the public interest as a whole it would not be stable.
Generic Models for Electricity Industry Structure

Model Matrix
The generic models are based on only two structural dimensions of an electricity industry: the degree of unbundling and the extent of competition. Consequently, they represent four points on a continuum as shown in the matrix diagram below. The models do not attempt to describe other aspects of an electricity industry, such as the type of ownership of electricity businesses, form of industry regulation, and customer access to electricity markets. These can take different forms within each type of industry structure. Such aspects would have to be included in any full description of an actual electricity industry.