

# Competitive energy markets and the implementation of the Climate Change Convention: Roles for renewable energy, energy efficiency and emission trading <sup>1</sup>

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## Abstract

The paper discusses renewable energy, energy efficiency and emission trading in the context of competitive energy markets and the implementation of the Climate Change Convention. This Convention is likely to be implemented through measures that encourage the participation of renewable energy and increased energy efficiency, and through some form of emission trading regimes. The interesting dilemma, yet to be resolved, is the interaction between competitive energy markets, and regulatory and market measures to implement the Convention. This paper makes some preliminary comments based on market developments in different countries.

Competitive energy markets are emerging on a global basis. The role of the energy regulator is also developing as the energy sector changes from state monopolies to private companies that provide services under the supervision of regulators. Though energy markets and regulation differs for countries and regions, market and regulatory developments influence renewable energy uses and the implementation of energy efficient measures. Emission trading regimes occur in very limited contexts and regions.

Arguably, it will be more difficult for renewable energy to participate in competitive energy markets due to greater generation costs and incomplete costing of the environmental impacts of other forms of energy. Market forces and lower energy prices may also discourage energy efficiency measures. Therefore, it may be necessary to introduce specific measures to encourage the participation of renewable energy and energy efficiency that are compatible with the operation of competitive markets. These measures will assist countries and sectors with meeting obligations under the Climate Change Convention. Emission trading regimes may be more complex as it will be

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<sup>1</sup> Copyright Magdalena AK Muir 2000. This paper is derived in part on a draft article written for a book on sustainable development in Canada to be published by the Canadian Bar Association in 2000. Further efforts on this topic will occur in England and Scotland during May 2000, and will be presented at the ENERGETICS '2000 conference in July 2000.

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necessary to ensure they do not unduly distort the operation of the market, or result in unpredictable or unwanted developments.

## **Keywords**

Competitive markets, renewable energy, energy efficiency, emission trading.

## **Renewable energy, energy efficient uses, and emission trading**

In order to discuss renewable energy, energy efficient uses, or emission trading regimes, it is useful to define these terms. For the purposes of this paper, renewable energy is defined as energy with low impact on the environment, and include wind, solar and earth energy, run of the river hydro, and sustainable biomass fuel.<sup>3</sup> Energy efficiency refers to measures to conserve energy or that result in the more efficient use of the energy. Some examples are measures to manage the time of day and the level of customer demand for energy, or to develop more energy efficient cars and appliances. It also can include industrial processes that use the heat or steam associated with electricity generation, such as co-generation. Emission trading regimes for greenhouse gases are in the process of being defined and developed. For the purposes of this paper, they will be understood to be market place initiatives that allow the trading of positive or negative credits for the reduction of greenhouse gas emissions. These credits may be traded in conjunction with or independent of the energy commodity, which in most cases will be electricity.

## **Competitive energy markets**

Competitive energy markets exist or are developing throughout the world. In North America, markets have been embraced to introduce competition for goods and services, and to lower the price of that service or good. Competitive markets are being encouraged in Europe to lower energy prices and thus maintain industrial competitiveness, and to develop the European energy market. In South America, energy markets have been introduced to encourage private investment in the energy sector and to assist in meeting increased demand for energy throughout the continent.

The role of energy regulation changes as competitive markets emerge, and private companies provide energy services under regulatory supervision. In the past, energy regulators were involved in regulating and directing the market. Under this regulatory framework, there was some ability to encourage utilities to make non-economic decisions about renewable energy or energy efficiency through legislation, regulatory initiatives, and utility decisions. Energy regulation is changing as the focus is on increasing and maintaining competition. In some instances, energy regulators are being created to encourage the development and the continuance of markets. Regulators in Canada, the

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<sup>3</sup>This understanding of low impact renewable energy is drawn from an article: Low Impact Renewable Energy: Options for a Clean Environment and Healthy Canadian Environment by Solar Energy Society of Canada Inc., Canadian Wind Energy Association, Earth Energy Society of Canada, Canadian Solar Industries Association and Canadian Association for Renewable Energies (September 1999).

United Kingdom, and Colombia are involved in structuring electricity markets. Power pools in these countries establish their terms and conditions of access. Subject to limited exceptions, regulators are committed to ensuring equal access to the pool, irrespective of the source of the energy and with dispatch priority determined on the basis of price. Competition between types of energy is actively encouraged with rules against market manipulation or discrimination.

Regulators in North America initially required markets to be more competitive, but market participants subsequently drove these changes. Competitive natural gas markets were introduced by 1985 in Canada, and by 1992 in the US. This was done due to ideological support for deregulation, but also to lower the price of natural gas. These markets were introduced by removing regulated prices for sales within the Canada and the US and at export points. Natural gas pipelines were required to provide transportation services to other sellers of gas, and to separate gas transportation and sales. North American natural gas deregulation resulted in many new participants in the producing and marketing sector in Canada and the United States. It also created North American markets for long and short-term transportation and gas sales, and resulted in market prices for gas for most of the past decade that were significantly below regulated prices.

Electricity is currently being deregulated in both Canada and the United States. Most provinces in Canada have state electric utilities with monopolies on electricity generation, transmission, and distribution. In Alberta and most of the United States, private companies traditionally held these monopolies. As a result of these monopolies, there was little competition between electricity and other types of energy. Electricity deregulation is occurring through the introduction of competition in generation, particularly for new generation, by requiring third party access to transmission wires, and by providing customer choice, particularly for large industrial consumers.

Alberta is one of the leaders of deregulation in Canada. The Electricity Utilities Act was enacted and proclaimed in 1995, and established a framework for changes to the Alberta electrical industry which began in 1996. The Electric Utilities Act did not affect the physical delivery of electricity or the ownership of assets. It established the Power Pool of Alberta as a clearing house through which all electricity must be bought and sold. Generators and importers sell electricity to the Pool, which then resells that electricity to distributors and exporters. The Pool dispatches electricity in a price merit order, with the price being determined by the highest priced unit dispatched for that period. The Pool does not prevent bilateral pricing arrangements, but the concerns about market power and the pool price initially limited the use of these arrangements. Subsequent amendments to the Electric Utilities Act establish a power purchase auction process to auction rights to existing generation. Independent producers and importers now compete with existing utility generators in markets for electricity and for new generation capacity. New generation is developed commercially in response to market conditions and demand.<sup>4</sup> In Alberta, the Power Pool is not allowed to dispatch environmental friendly energy in priority to other electricity. The dual fuel capacity of new generation units, with fuel used depending on price and availability also blurs the origin of electricity delivered to the Pool. There are a number of voluntary energy efficiency programs in Canada, which are

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<sup>4</sup>MAK Muir, *1998 Amendments to the Alberta Electric Utilities Act; The Shape of the Future Market*, Utilities Law Review (October 1998).

spearheaded by the Natural Resources Canada and apply in Alberta. However, there do not seem to be any specific energy efficiency programs in Alberta designed in relation to the power pool and the competitive electricity market.

Competitive energy markets are required in Europe as a result of directives of the European Community. The Internal Market for Electricity Directive 96/92 was adopted by the Council of Ministers in December 1996, and entered into force on February 1997. Under this directive, countries have up to two years to bring into force laws, regulations, and administrative matters. Belgium and Ireland have an additional year, and Greece has two additional years. The Directive established common rules for generation, transmission, and distribution of electricity, but gave countries' discretion in how they implement these rules. For environmental reasons, a country may provide priority dispatch for electricity from renewables, wastes and from combined heat and power processes. This permits the utilization of environmentally friendly electricity even where cost exceeds electricity generated by other means. <sup>5</sup>The European Community is also involved in promoting renewables sources of energy. The current aim is to double the renewable energy share of total energy consumption to 15% by 2010. <sup>6</sup>

The United Kingdom proceeded independently with natural gas and electricity deregulation in the late 1980's and early 1990's. The United Kingdom has three distinct systems for Scotland, Northern Ireland, and England and Wales. Each region has three major generators. Distribution companies own and manage the distribution system. Generators and suppliers have a right of access to transmission and distribution. There is a power pool and customer choice. <sup>7</sup>The United Kingdom has embarked on measures to increase the participation of renewable energy and energy efficiency which are discussed below. The United Kingdom is also considering emission trading systems for greenhouse gases, and is likely to be one of the first countries to implement these systems.

South America has a different impetus for competitive markets and deregulation. Energy has traditionally been viewed as a political issue, and the energy sector was nationalized in many countries in the 1930's and onwards. Competitive energy markets in these countries have developed in the 1980's and 1990's to increase energy production to meet growing demand, given that many of these countries have insufficient investment capital to develop their own energy resources. Different portions of the energy sector have been deregulated and privatized in the countries, including energy exploration and production, the construction and operation of pipeline and electric transmission infrastructure, and the creation of natural gas and electricity distribution networks. Simultaneously, energy regulators were established to regulate the privatized energy sector. Colombia is an excellent example of these trends. It is evolving from a centralized planned economy where the government is an investor or participant in energy projects, to a market-based economy where the government allows that market to function. There is insufficient natural gas production and pipeline capacity in Colombia, though there are

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<sup>5</sup>European Commission, *GuidetotheElectricityDirective* .

<sup>6</sup> *EuropeanParliamentaryFactSheets:4.12.0EnergyPolicy* (May 21, 1999).

<sup>7</sup>Meetings with parties in December 1999, and E Holt , *EnergyEfficiencyina RestructuredUKElectricIndustry* (August 1995).

sufficient reserves of gas. The government has a number of priorities, three of which are relevant here. One priority is increasing the overall energy supply by encouraging hydroelectric generation, and thermal generation using natural gas. Another priority is exploring renewable energy in conjunction with rural electrification. Renewable energy is only 1% of the energy supply for Columbia, and insignificant for rural areas. Another priority is encouraging efficient uses of energy by industrial and residential consumers. The Comisión de Regulación de Energía y Gas regulates tariffs and availability of access to natural gas pipelines and electric transmission lines. Both coal and electricity are sold at market prices, while natural gas is subject to a maximum regulated price. Consumers of gas and electricity may be required to pay “contribution” charges to subsidize low-income users, while consumers of coal are not. Given its current structure and legislative authority, the priority of the Comisión de Regulación de Energía y Gas is the promotion of a free and open market in electricity. They do not favour electricity generated by gas or renewable forms of energy. Instead, they are interested in encouraging the use of non-conventional and renewable energy in rural areas unconnected to the electric grid. They are also interested in the energy efficiency of electric transmission lines and gas pipelines.

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### **Some comments on implementation of the Climate Change Convention**

Renewable energy and energy efficiency, emission trading regimes and other measures to implement the Climate Change Convention must function within the context of competitive energy markets. These measures will be affected by energy commodity pricing, and the extent to which external environmental costs are or may be considered by these markets. Given the absence of emission trading regimes for greenhouse gases, comments here are focused on renewable energy and energy efficiency.

Renewable energy usually costs more to produce than other forms of energy. Additionally, the historic practices of regulators to encourage renewable energy and energy efficiency may not be compatible with the operation of these markets as it is difficult to make decisions supporting renewable energy and energy efficiency if these decisions would reduce competition or impose an undue burden on private parties. Consumer preference and reduction of greenhouse gases are important factors in North American and European markets. Consumer preference also has a role in the choice of energy efficient vehicles, homes and appliances. However, in the absence of government initiatives, energy efficiency may be discouraged because low energy prices do not send a signal to conserve.

There are a variety of approaches to renewable energy and energy efficiency in North America depending on the local market and the political culture. In Alberta, this participation of renewable energy is being determined largely by consumer preference. Local distribution companies in Calgary and Edmonton have recently begun offering “green” electricity to satisfy this preference.

Under the Kyoto Protocol to the Climate Change Convention, Europe agreed to reduce emissions of greenhouse gases by 2010 to 8% below 1990 levels. After internal

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<sup>8</sup>This discussion on renewable energy and energy efficiency in Colombia is derived from meetings and consulting work in Colombia on the participation of renewable energy and energy efficiency measures.

re-allocation, the United Kingdom received a 12.5% target reduction. The United Kingdom also set a domestic target of a 20% cut of carbon dioxide levels below 1990 levels by 2010. Some initiatives are that electricity suppliers increase electricity from renewable resources to 10% by 2010, subject to acceptable costs; that electricity from combined heat and power, such as co-generation, double by that time; and for energy efficiency in the domestic sector, including a requirement that the fuel efficiency of new cars increase by 25% by 2008-9 in accordance with European Community agreements with car manufacturers.<sup>9</sup>

The United Kingdom also illustrates the dilemma of solely relying on markets for energy efficiency. Government had sponsored limited energy efficiency programs prior to restructuring, and believed that market forces would meet future demands for energy efficiency. However, the market did not meet these needs and three years later government took a more direct approach. Utilities were then required to promote energy efficiency to meet the region's environmental obligations under the 1992 Rio Convention Accord.<sup>10</sup> United Kingdom initiatives for energy efficiency have since expanded to include the Energy Efficiency Fund for 2001-2 (approximately \$100 to 300 million US), enhanced capital allowances for energy efficient investments, as well as building on existing programs such as the Energy Efficiency Best Practices Programmes.<sup>11</sup>

In economies such as South America where energy demand exceeds availability and there is an investment shortage, renewable energy may be important where access to the national electrical grid is prohibitively expensive. Renewable energy may also be important to reduce pollution in highly contaminated urban centres. Energy efficiency measures may be pursued to minimize incremental energy requirements. Colombia's electricity spot market influences all aspects of the national energy market, and affects the participation and economic viability of natural gas, co-generation, and renewable energy. Under the current electricity market, it is difficult for privately financed coal and gas-fired thermal generation to compete with existing hydroelectric plants. Subject to some exceptions, it is also difficult for non-conventional and renewable forms of energy to compete with electricity sold on the spot market. In the absence of subsidies, or technological or financial transfers occurring as a result of climate change initiatives, renewable energy is only economically viable where connection to the national electric grid is not available or prohibitively expensive. As expected, energy efficiency measures are being considered to moderate energy demand and incremental requirements.

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<sup>9</sup>Department of the Environment, Transportation and the Regions, *Climate Change: Draft UK Programme Summary* (March 9, 2000).

<sup>10</sup>E Holt, *Energy Efficiency in a Restructured UK Electric Industry* (August 1995).

<sup>11</sup>Department of Environment, Transportation and the Regions, *Energy Measures under the Climate Change Levy Package* (December 10, 1999).