

# Perfect competition on energy markets counteracts environmental protection

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## 1. SYNOPSIS

Perfect competition on international energy markets may actually obstruct both wealth creation and environmental protection. Taxes on energy exports are sometimes justified.

## 2. INTRODUCTION

The concept of competitive markets enjoys public esteem. To suggest that energy markets should be denied the benefit of competitive markets is therefore a far from obvious conclusion. However, there is a twofold reason why international energy markets may have detrimental effects.

First -- energy is a critical determinant of wealth and accounts for a good portion of the total benefits of industrialization. This combined effect is critical, though not sufficient, in raising the standard of living. For two countries whose labor forces are identical in size and skill, access to energy makes a big difference. The more energy a country acquires, the more goods it can produce. Some of the goods can be exported generating proceeds which can then be used to buy more energy etc. It is like a game of Monopoly in which the rich country passes "GO" more frequently.

Second -- there are important externalities associated with the production and use of energy. Some harmful, others beneficial. If externalities are not fully reflected in energy prices, a competitive market produces an odd result.

A low level of income can be compensated for in part by harsher exploitation of the environment. If no additional resources are spent on limiting environmental damage, energy prices can be kept low since they do not fully cover all costs attributable to energy production. Even though environmental damage can hardly be ignored, the will to pay for environmental protection is low when the standard of living is poor.

If lower energy prices in one country are established through a conscious trade-off between industrial growth and environmental protection, a vicious circle may develop. Rich countries will buy the cheap energy and further increase their own wealth through its use. The result for the energy-exporting poor country is that industrial production will not be promoted to the degree intended, the standard of living will not rise and environmental protection will remain a low priority. When energy is exported, environmental damage is "imported". Although the same is true for a great many commodities, energy is the extreme case. No other good is as important to an industrial society as energy, it is in every sense the fuel in the economic engine. High-voltage electricity cannot be produced by manual labor and less energy-intensive activities have not been proven to generate as much income per capita.

The conditions of poor countries must not be mistaken for those of what have traditionally been referred to as developing countries. When the wealth of an industrialized country, decreases, it does not become a developing country. Even though unemployment rises, export income diminishes and many companies have to be liquidated, the work force is still skilled, the level of technology is still high and the infrastructure remains intact. The Baltic countries are poor compared to Sweden, which is poor compared to Germany, but none of those countries can be classified as developing.

### 3. THE PROBLEM IN BRIEF

Total costs of marginal energy utilization, TMC, includes both the firm's production cost, C, and environmental damage, E.

$$TMC = C + E$$

The total marginal utility of an extra kWh, TMU, includes both what can be bought for the domestic price paid, P, and the value of the beneficial externalities of marginal energy used in production, U.

$$TMU = P + U$$

In equilibrium TMC equals TMU. If there are no externalities, then  $P = C$ . Since there are, an efficient energy price,  $P^*$ , has to be constructed which takes them into account.

$$P^* = C + E - U$$

If no energy is exported, it is certain that U is realized within the country. To facilitate economic growth, energy prices can be kept low by allowing external diseconomies. The energy price in a poor country which has energy resources will then be lower than in a rich country, where the cost to the environment is included in the energy price.

Even if extra expenditures on environmental protection are not consciously avoided, the energy price in a poor country would still be lower than that in a rich country. Consider two countries which differ in wealth but are otherwise identical. The governments of both countries skillfully interpret the wishes of their respective citizens and tax or otherwise legislate regarding pollution control. Let  $T_e$  be a tax or an extra cost for purification; r stands for rich and p for poor. The energy prices will then be

$$P_r = C + T_{er} \quad \text{where } T_{er} = E_r$$

$$P_p = C + T_{ep} \quad \text{where } T_{ep} = E_p$$

Since willingness to pay for environmental protection depends on income  $T_{er} > T_{ep}$ .

Differences in prices make trade profitable. Since energy producers can be expected to sell to the highest bidder, holders of energy resources in poor countries may opt to export some of their output if given the chance. This makes it harder for domestic energy consumers to compete since exporting raises the price. Even if the price received is higher than the domestic energy price, it may still not be high enough to compensate for the lost beneficial externalities.

When the domestic industry is less prosperous than what would have been possible with more advantageous energy conditions, the ability to pay for environmental protection and restoration will be modest as well. In that sense perfect competition on energy markets counteracts environmental protection.

One example is the exporting of electricity from Poland to Austria which in 1989 amounted to 1,5 TWh. As can be seen in Table 1, the price paid to Poland was considerably lower than to Germany and Switzerland.

In Poland, electricity is almost exclusively produced from domestic fossil fuels and few attempts are made to protect the environment. Buyers are attracted to the low price of electricity. Without export controls, the country could have been severely drained of electricity and left with only the environmental damages. Health problems have now started to appear among the Poles and early indications point to serious public health problem. Even though decreasing the production of electricity would alleviate the problem, exports to Austria remain large.

Another example is the northern part of Sweden which contains most of the hydro power resources that

produce fully half of the country's electricity. Much of the region's industry is based on access to cheap energy, but prices are likely to increase when Sweden begins exporting energy to the continent.

#### 4. SOLUTIONS

Any country with less than full employment and therefore desiring growth through industrial development has an interest in keeping its energy for domestic use. Export is prevented as long as there is no physical distribution system across national borders. Once pipe-lines and wires are put in place, export becomes easy.

When energy resources are publicly owned, the government has direct control over all export decisions and the value of imported tools, machines and know-how can be properly weighed against the beneficial effects of using the energy domestically. However, when there is private ownership, indirect measures of government control can be justified in the interest of the common good.

All externalities must be accounted for. The loss of beneficial externalities caused by energy exports can be compensated for by yet another energy tax,  $T_u$ . The efficient price is then

$$P^{**} = P + T_e + T_u$$

$P^{**}$  differs from  $P^*$ . When export income increases, the variety of goods that energy can be traded for increases as well.

Energy taxes and legislation against export can not always be enacted. Some international agreements, such as the EEA agreement, prohibit any restrictions on energy exports including preferential taxation. When countries are unable to set energy prices on their own, broad international agreements is an alternative way to deal with the problem. One possibility is to give poor countries lower energy prices than rich countries. Another option is a quota system. Neither method would be easy to implement. The tasks of gathering correct information and resisting intense lobbying would be tremendously difficult.

**Table 1. Electricity imports of Austria 1989**

Country	GWh	ECU/MWh
BRD	1240	49
Switzerland	9	36
Poland	1467	22
Total import	2716	35

Source: Energieversorgung Österreichs, Endgültige Energiebilanz 1989, Statistische Nachrichten 47 Jahrgang 1992 (Neue Folge) Heft 5.

(The assumed exchange rate is 1 ECU = 14,56 Austrian Schillings)

#### 5. FINAL REMARKS

Some poor countries have the advantage of holding energy resources. Differing energy prices may then make investments in pipe-lines and wires seem more profitable than would have been the case if all externalities had been accounted for. Underemployment and the value of energy to the domestic industry are reasons for export prevention, preferably by means of energy export taxes.

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