# Ten Most Distortionary Energy Subsidies*

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January 2007

*Spiraling energy demand and rising environmental costs are growing concerns around the world. Governmental responses all too often involve issuing a torrent of energy plans, white-papers, and legislation. In an ideal world, government policies should work in tandem with market forces to achieve an adequate energy supply mix that is cleaner and more diverse than what preceded it. These synergies do not currently exist. In fact, there are thousands of government policies in place around the world that act counter to stated objectives with regard to energy security, diversification, and environmental protection.*

*The ten distortionary energy subsidies discussed below represent policies that, if corrected, would materially realign price signals to more effectively achieve energy market end goals. The list was generated with input from a variety of subsidy analysts around the world on distortionary subsidies an associated data.† The author is grateful for their suggestions, though is solely responsible for the final selection. If you disagree with the list, have additions to it, or more data to support existing entries, please direct them to* ***earth_track@yahoo.com*** *for consideration in a future update.*

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* A shorter version of this article appears in the Handbook of Energy, Cutler Cleveland, editor, Elsevier Science, 2007.

† Thanks to the following people for sharing their views and data on the most distortionary subsidies: Bruce Biewald (Synapse Energy Economics); Nils-Axel Braathen (OECD), Anthony Froggatt (Independent Consultant); Gawain Kripke (Oxfam America); Burkhard Huckestein (European Environment Agency); Mona Hymel (University of Arizona); Masami Kojima (World Bank); Skip Laitner (ACEEE); Trevor Morgan (Menecon Consulting); Norman Myers (Independent Consultant); Shirley Neff (Columbia University); Frans Oosterhuis (Vrjie University); Geoffrey Rothwell (Stanford University); Ron Steenblik (Global Subsidies Initiative); Vangelis Vitalis (New Zealand Ministry of Foreign Affairs and Trade).

## 1) Absence of charges on GHG emissions

Despite the absence of perfect knowledge on the precise pathway and timing of global climate change, the state of knowledge is certainly high enough, and the risks of inaction dire enough, to begin placing constraints on emissions of greenhouse gases worldwide. The continued absence of such constraints generates a large subsidy to certain energy resources, primarily fossil fuels. The economic results are skewed price signals that slow the needed diversification of energy demand. One political result of muddled price signals and policy uncertainty is a slew of equally misguided subsidies to competing energy resources such as nuclear or biomass. These perhaps well-intentioned subsidies enable the substitutes to avoid facing any form of market test to show that they are, in reality, the quickest and cheapest ways to provide energy services with a smaller carbon footprint.[1] Properly integrating GHG constraints into the pricing of goods and services would provide a far more neutral playing field on which the thousands of possible solutions to reduce emissions could compete.

Current estimates for global carbon markets are roughly $28 billion in 2006, more than double the $12 billion in 2005.[2] Under reasonable scenarios for carbon prices and required reductions modeled worldwide carbon markets would be on the order of $100 to $200 billion per year larger than they are now.[3] Not all of this would be borne by energy markets, but a sizeable percentage would be.

## 2) Oil security

Pipelines, water transit chokepoints, and long supply lines all make global oil supplies (and increasingly natural gas as well) vulnerable to disruption. Supply disruptions and price spikes in oil markets have historically generated major economic dislocations, suggesting that public investments to reduce the impact of disruptions are likely rational and economic. Because other energy resources do not have these vulnerabilities, however, it is important that the cost of securing oil supplies be reflected in commodity prices and recovered from oil consumers. Often, it is not.

Oil stockpiling was initiated in the early 1970s as one way to provide some cushioning to the world's large importing markets, and is coordinated by the International Energy Agency. A combination of private, pooled, and public stocks are used. Government-owned public stocks are normally paid by taxpayers, and provide large subsidies (billions per year) in both the United States and Japan.[4] Luckily, most other stockpiling approaches do seem to pass costs on to consumers.[5]

Defense of shipping chokepoints such as the Persian Gulf and key pipelines clearly cost governments tens of billions of dollars per year.[6] Most of these costs are borne by the United States, though the benefits accrue to consumers in other countries as well. Costs are difficult to tease out from general budgets. As a result, reasonable allocations of joint costs to oil product markets are not made. Important price signals to diversify energy resources and energy suppliers are therefore lost.

### 3) Cap on liability for accidents at nuclear power facilities

Civilian nuclear power producers benefit greatly from shifting a substantial portion of their liability for radioactive releases from accidents or attacks away from owners and investors and onto the taxpayer and the surrounding population. These costs, both through higher insurance premiums and higher cost of capital, would properly be reflected in the price of nuclear electricity. This subsidy has never been quantified comprehensively, but affects not only reactors but nuclear fuel cycle facilities and nuclear materials transport as well. On a global level, subsidies are likely to be well in excess of $10 billion per year.

Legislation stipulating mandated insurance coverage varies around the world, and efforts under the 1997 Convention on Supplementary Compensation for Nuclear Damage (CSC) attempt to set a liability floor internationally. However, mandated coverage levels worldwide all appear too low to address any reasonably-sized accident. Even in the US, where coverage requirements under the Price-Anderson Act greatly exceed the CSC, total third party liability coverage is less than damages periodically caused by natural events such as large hurricanes. The situation is far worse in other countries. China, for example, has liability limits of only US$36 million.[7]

Industry claims that caps do not constitute a subsidy because historical payouts have not exceeded them. These claims are without merit, as indicated by the direct actions of the nuclear industry. In the US, the industry regularly lobbies to prevent cap increases or expiration, a situation that would not occur if the caps really had only minimal economic value to producers. Review of US operator insurance on their own operations (plant, equipment, and business continuity) is instructive. A single firm's coverage of its own operations exceeds the entire pool of coverage within the US for offsite liability in the case of an accident.[8]

### 4) Tax credits and exemptions for ethanol and biodiesel

Sparking the imagination for oil independence, farm prosperity, and "green fuels," ethanol and biodiesel energy have been showered with subsidies around the world. They commonly include production tax credits and special treatment under motor fuel excise tax schedules. More than 200 policies are now in place in the United States alone, at a cost of more than $500 per metric ton of CO2-equivalent displaced.[9] Subsidies to water and farmers combine with those directly to the fuels to further accelerate the expansion of production. The downside of biofuels in the form of habitat loss, land conversion and erosion, water depletion and pollution, and food-fuel competition have received insufficient attention. Biofuels production is now a major risk to the world's remaining rainforests, threatening both habitat and biodiversity.[10]

The volumetric ethanol excise tax credit (VEETC) in the United States exemplifies much of what is wrong with this market. It is a production-linked subsidy without any cap or linkage to the price of the fuels ethanol is supposed to compete with. It duplicates incentives already provided by federal mandates purchases of "renewable" fuels, needlessly increasing the cost of achieving a particular level of market penetration. Though ethanol is promoted as a clean fuel, the blenders subsidy is the same even if the ethanol plant relies on coal rather than a cleaner energy source to convert the corn into fuel. Worth $4.5 to $6.4 billion per year in the US[11] and growing rapidly, the VEETC also appears to be exempt from taxation, increasing its

distortionary effect. There is also growing concern that a companion credit for biodiesel is being gamed by market participants who collect the credit in the US before shipping fuels abroad to collect downstream biofuels subsidies elsewhere.[12]

### 5) Cross-subsidies in electricity markets

Though by no means simple to address, electricity markets around the world continue to price retail power in ways that average costs across time, service nodes, and customer classes. Because total revenues often cover costs, these problems constitute cross-subsidies rather than direct subsidies. However, they mask important variation in the cost to produce and deliver electricity to particular customers at particular times. Often, it is variation in portions of a market that create niche opportunities for new technologies to gain a foothold and grow. Work by Lawrence Berkeley National Laboratory suggests that these pricing problems may impede demand response by electricity consumers.[13] Correcting these problems could spur decentralized power generation, improved capital efficiency, and increased end-use conservation. However, additional work would also be needed to help customers identify and implement load response capabilities. A US Department of Energy study of transmission also notes the potential benefits of more accurate price signals to grid utilization, expansion, and growth of renewable energy.[14]

### 6) Domestic subsidies to energy consumption

Political efforts to keep domestic fuel prices low are common in energy-rich nations (to coopt opposition) and in developing consuming nations (ostensibly to reduce the hardships to poor citizens). The subsidies dampen fuel substitution and conservation, and are mostly captured by wealthier residents.[15] As world energy prices rise, the fiscal cost of these policies can grow dramatically. In Yemen and Azerbaijan, for example, fuel subsidies in 2005 were 9.2 and 12.7 percent of GDP respectively.[16] Consumption subsidies in non-OECD countries were running at an annual rate of roughly $250 billion based on 2005 data according to the International Energy Agency.[17] Roughly 40% was associated with oil products. The largest subsidies existed in Russia ($40 billion); Iran ($37 billion); and China, Saudi Arabia, India, Indonesia, Ukraine, and Egypt (all in excess of $10 billion).[18]

In addition to the fiscal cost, a growing gap between domestic and border prices drives dramatic surges in corruption and smuggling. This results in domestic scarcity, domestic security problems, and increased resistance to price reform.

Countries sometimes provide special energy subsidies for consumption in particular industrial sectors. These targeted subsidies can be extremely damaging to environmental quality or the natural resource base of the nation. Subsidies to diesel or electricity used to fuel irrigation systems are one example, where heavy subsidization of pumping costs has been an important factor in excessive water depletion in both India and Yemen.[19]

**7) Government absorption of disposal risks for high level nuclear waste**

Though light on carbon emissions, the nuclear fuel cycle leaves behind radioactive residuals that are extremely difficult to deal with. In many countries, responsibility for handling those wastes is taken over by the government in return for a small fee. Were private operators responsible for managing their wastes until they were no longer hazardous -- the norm for all other energy resources -- the elevated risk to investors would result in higher interest and insurance costs, as wastes remain hazardous for many thousands of years. At present there are no operating permanent repositories for high level nuclear waste.[20] In the United States, current surcharges on nuclear power too low to cover expected disposal costs.[21] In addition, the US government foolishly absorbed all risk for an on-time opening of a repository for commercial nuclear waste -- despite longstanding technical and political challenges associated with making this happen. Taxpayers are now paying the industry millions per year for the delays, a figure that could rise sharply in years to come.[22] Between inadequate fees, payments for delays, and most importantly, the shifting of disposal risks away from investors, subsidies to nuclear waste management likely run into the billions of dollar per year.

**8) Tax exemptions for petroleum used in international air and water transport**

Worldwide taxation of oil is pervasive, though levies vary widely by geography. While often viewed primarily as revenue-raising tools, fuel taxes also offset public spending on oil and oil-related services (e.g., road infrastructure or environmental remediation) and help establish tax neutrality with other goods and services in the marketplace.

Special exemptions to baseline tax rates distort intersectoral competition as well as reduce the incentive for improved efficiency. Data on these exemptions are not collected or quantified systematically worldwide. However, they are extremely large. Forthcoming analysis by the European Environment Agency identifies tax exemptions on international waterborne shipping and aviation in the EU to be worth a more than $40 billion (33 billion Euro) per year.[23] Obviously, worldwide values would be much higher.

As a side note, reduced tax rates on energy relative to other consumption goods are common in other sectors as well. Frans Oosterhuis of Vrjie University in Amersterdam estimates that reduced VAT rates on household energy in the EU amount to a subsidy of roughly $9 billion per year, most of which is associated with natural gas and electricity consumption.[24]

**9) Tax credits for US alternative coal production**

Small modifications to standard coal makes the "new" material eligible for substantial tax credits that run close to $3 billion per year.[25] The subsidy is one example of scores around the world ("clean coal" subsidies are another) that shift new product development costs and risks from the industry to the taxpayer. The subsidies reduce the pressure on the industry itself to innovate, and mask the competitive advantage of alternative energy resources with a more favorable environmental profile.

## 10) Coal subsidies in Germany

Over a period of nearly 50 years, Germany has propped up its domestic coal industry using a variety of state aids to the continued viability of coal production in Germany. Karl Storchmann documented nearly $200 billion in subsidies provided during this time frame through a total of nearly 60 support measures.[26] The largest single subsidy program was the *Kohlepfennig*, at more than $60 billion. The "coal penny" program, as it is called in English, levied a special tax on the price of electricity that was used to subsidize generator's consumption of domestic coal. Although subsidies are well down from their highs in the mid-1990s, they remain more than $3 billion per year today.[27] Subsidies have exceeded 85% of the value of sales between 1989 and 2002; it is likely this pattern has continued in recent years as well.

While supports to coal mines in other countries are not as large as in Germany, government subsidies to new coal technologies, and pilot plants to try them out, run into the billions of dollars per year as well. These subsidies reduce the pressure on the industry itself to innovate, and mask the competitive advantage of alternative energy resources with a more favorable environmental profile. Development of next-generation technologies is a basic survival skill of any robust industry; coal should not be an exception.

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[1] It is unlikely that either nuclear power or corn-based ethanol would do well in such a competitive environment. See Doug Koplow. *Biofuels - At What Cost? Government Support for Ethanol and Biodiesel in the United States*, (Geneva: Global Subsidies Initiative), October 2006; and Amory Lovins, "Mighty Mice," *Nuclear Engineering International*, December 2005.

[2] Kjetil Roine *et al.*, Point Carbon, "The Global Carbon Market in 2006 - An Overview of Prices and Volumes," in the International Emissions Trading Association, *Greenhouse Gas Market 2006*, pp. 30-35, 2006.

[3] Donald A. Hanson and John A. "Skip" Laitner. "Technology Policy and World Greenhouse Gas Emissions in the AMIGA Modeling System," *The Energy Journal*, Multi-Greenhouse Gas Mitigation and Climate Policy Special Issue, 2006, pp. 355-372; and Skip Laitner e-mail communication with Doug Koplow, January 2, 2007.

[4] See, for example, Doug Koplow and Aaron Martin, *Fueling Global Warming: Federal Subsidies to Oil in the United States*, Washington, DC: Greenpeace, 1998.

[5] Kristine Kuolt, "Overview of IEA Emergency Response Measures," International Oil Stockpiling Symposium, Houston, TX, December 1, 2004; Kuolt, International Energy Agency, e-mail communication with Doug Koplow, January 5, 2007; Enno Harks, German Institute for International and Security Affairs, telephone conversation with Doug Koplow, January 5, 2007.

[6] "Chapter 4: Defending Oil Shipments" in Koplow and Martin, 1998.

[7] Ian Hore-Lacy. "Civil liability for nuclear damage," *Encyclopedia of the Earth*, August 28, 2006.

[8] Doug Koplow. "Nuclear Power in the US: Still Not Viable Without Subsidy," presentation at the *Nuclear Power and Global Warming Symposium* of the Nuclear Power Research Institute, November 7-8, 2005.

[9] See Koplow, 2006.

[10] See, for example, Patrick Barta and Jane Spencer, "Crude Awakening: As Alternative Energy Heats Up, Environmental Concerns Grow," *Wall Street Journal*, December 5, 2006, p. A1.

[11] Koplow, October 2006.

12 "Traders May Be Gaming Biodiesel Incentive Through Re-Exporting" Energy Washington Week, November 8, 2006, Vol. 3, No. 45.

[13] See, for example, G. Barbose *et al.*, *Real Time Pricing as a Default or Optional Service for C&I Customers: A Comparative Analysis of Eight Case Studies*, Lawrence Berkeley National Laboratory, August 2005; and G. Barbose *et al.*, "Killing Two Birds with One Stone: Can Real-Time Pricing Support Retail Competition *and* Demand Response," paper presented in the proceedings of the *2006 ACEEE Summer Study on Energy Efficiency in Buildings*, August 2006.

[14] U.S. Department of Energy, *National Tranmission Grid Study*, May 2002, pp. 39-40.

[15] A recent IMF analysis of domestic fuel subsidies in five developing countries found that only 15-25% of the fuel subsidies were received by the poorest 40 percent of the population. See David Coady *et al.*, "The Magnitude and Distribution of Fuel Subsidies: Evidence from Bolivia, Ghana, Jordan, Mali, and Sri Lanka," *IMF Working Paper*, WP/06/247, November 2006, p. 13.
[16] David Coady *et al.*, p. 3.
[17] International Energy Agency, *World Energy Outlook 2006*, p. 278.
[18] International Energy Agency, *World Energy Outlook 2006*, p. 278. See also Robert Bacon and Masami Kojima. *Coping with Higher Oil Prices*, (Washington, DC: Energy Sector Management Assistance Program of the World Bank). Country studies in the Annexes. Note that most of these values calculate subsidies by comparing border prices to domestic prices (the price gap approach). This calculation misses all domestic subsidies that leak to factors of production rather than show up in prices, and therefore often underestimate gross energy subsidies by a large margin.
[19] Subsidies to diesel fuel used to pump groundwater in Yemen, for example, has been as high as 90%. See "Yemen: Rationalizing Groundwater Resource Utilization in the Sana'a Basin," *Sustainable Groundwater Practice: Lessons from Practice*, Case Profile Collection #3, World Bank, August 2003, p. 2. India heavily subsidizes agricultural electricity, which is heavily used to pump irrigation water. Many aquifers are being depleted at rates well in excess of recharge. The World Bank estimates that while the agricultural sector constitutes roughly one-third of the electricity sales from state electricity boards, it comprises only 3 percent of the revenues. See World Bank, "Profligate pumping is major threat to India's water security," accessed January 3, 2007.
[20] World Nuclear Association. "Information and Issue Briefs: Waste Management in the Nuclear Fuel Cycle." February 2006.
[21] Geoffrey Rothwell, a nuclear expect at Stanford University, estimated the shortfall in current collections within the US at 2 mil/kWh of nuclear electricity, or more than $1 billion per year. (Rothwell, personal communication with Doug Koplow, October 31 and November 1, 2005).
[22] Exelon alone estimates it will receive payments in excess of $600 million should the Yucca repository open later than 2015 (as is now widely expected). See Mark Holt, *Civilian Nuclear Waste Disposal* (Washington, DC: Congressional Research Service), September 19, 2006.
[23] Burkhard Huckestein, European Environment Agency, e-mail communication with Doug Koplow, November 27, 2006. Estimates compare existing tax rates to those required under the EU fuel tax directive.
[24] Frans Oosterhuis, Vrjie University. "Annual Subsidy Amounts Implicit in VAT reductions for energy in EU countries," excel table provide by the author to Doug Koplow, November 2006.
[25] A general overview on the nuanced rules allowing so much coal to get these special subsidies can be found in Donald Bartlett and James Steele, "A Magic Way To Make Billions," *Time*, February 26, 2006.
[26] Karl Storchmann. "The rise and fall of German hard coal subsidies," *Energy Policy*, V. 33 (2005), pp. 1469-1492.
[27] Klaus Deuse, "Germany Debates the Future of Coal Mining," *Deutsche Welle*, December 16, 2006.