Smart Policy and the Renewable Energy Revolution : the Feed-in Tariff

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This paper focuses on the political economy of the feed-in tariff, a key public policy in the midst of the accelerating energy-environmental revolution. 2011 finds the global economy still stuck in its worst crisis in nearly a century. It is supported by ultralow interest rates throughout most of the developed world, in addition to strong demand from the developing world as well as what is left of developed world fiscal stimulus packages. The International Monetary Fund (IMF) thus projects a 2-speed recovery in 2011, one in which the developed economies grow weakly whereas the developing economies may overheat.[1] Yet commodity prices are already showing strong signs of becoming major hurdles to a sustainable recovery. Of particular concern, the UN warns of record high food prices[2] and the International Energy Association (IEA) is concerned that escalating oil prices could destabilize the global economy.[3]

At the same time, the financial crisis that nearly brought down the global economy in the fall of 2008 is still smouldering. Crises threaten to erupt again among the weaker elements of the EU (including Spain) as well as the even more "too big to fail" banks of the United States. The financial authorities in virtually all these affected

1) On the IMF projections, see the interview with their chief economist Olivier Blanchard in the IMF Survey magazine, December 30, 2010 : http://www.imf.org/external/pubs/ft/survey/so/2010/NEW123010A.htm

2) As the New York Times warned on January 5, 2011, UN data show world food prices reaching "crisis levels that provoked shortages and riots in poor countries three years ago." See "U. N. Data Notes Sharp Rise in World Food Prices" : http://www.nytimes.com/2011/01/06/business/global/06food.html

3) On the IEA warning, see its January 5, 2011 news release wherein IEA chief economist Fatih Birol notes that oil prices nearing USD 100/bbl are in a "danger zone" and OECD oil import costs have risen USD 200 billion to USD 790 billion at the end of 2010 : http://www.iea.org/index_info.asp?id=1737

countries have dealt with the crisis more as one of liquidity than one of solvency. They are thus gambling on a strong recovery to validate their policies of forbearance and rescue weak banks through economic growth and the recovery of asset values. Growth of any kind, but most preferably in the housing sector, is seen as crucial by actors in this sector, so they too are effectively on a collision course with resource constraints.

This paper argues that we do indeed require massive demand to recover from the financial crisis that erupted in 2007. But it asserts that demand needs to be both sustainable and centred in the energy economy. This is because energy is not only the largest sector in the economy, comprising roughly 10% of GDP,[4] but also drives prices in other sectors. Agriculture, transportation, services, and virtually all other areas of economic activity are significantly affected by energy prices. The energy sector is also the source of about two-thirds of the carbon dioxide emissions that are at the core of the rapidly worsening climate crisis.

We also emphasize that sustainable growth can only be driven by smart public policy. In this paper, we first introduce the feed-in tariff and argue that it is the most effective policy for achieving the clean energy and carbon reduction goals that are common across the developed and developing countries. The feed-in tariff, if designed to encourage distributed power, can also bolster civil society in our collective transition to a sustainable economy. We also argue that a confluence of outmoded ideas, vested interests and perversely incentivized institutions are at work in some of the biggest economies in keeping the policy from achieving its promise.

The Energy Revolution and its Policy Drivers

Many observers believe that it is absurd to suggest that the energy sector is in

4) None of the major international organizations such as the IEA, OECD, World Bank, and the like, publish figures on energy costs for the global economy. But energy expenditures as a percent of overall GDP appear to be in the range of 8-10 percent. Ancillary costs in infrastructure and elsewhere would seem to take that figure into the double-digits. For one estimate of energy expenditures, see "A Primer on Energy and the Economy," Institute for Energy Research, February 16, 2010:
http://www.instituteforenergyresearch.org/2010/02/16/a-primer-on-energy-and-the-economy-energys-large-share-of-the-economy-requires-caution-in-determining-policies-that-affect-it/

the midst of disruptive change via renewable energy technologies. On January 4 of 2010, the otherwise very perspicacious Michael Lind wrote that "the moment when much-hyped alternative energy sources like wind and solar become competitive with fossil fuels and nuclear energy seems to perpetually recede into the future. The all renewable energy sector is 30 years away — and always will be."[5)]

Yet even as Lind disparaged the prospects for renewable energy, the major countries of the European Union were connecting their vastly multiplying renewable energy sites. Those countries clustered on the North Sea (Germany, France, Belgium, the Netherlands, Luxemburg, Denmark, Sweden, and Ireland and the UK) are building a EURO 30 billion "supergrid" to interconnect their renewables output and store excess and intermittent generation in, among other places, Norwegian hydroelectric dams.[6)] The European renewable energy generation is in massive amounts. The Germans alone had ramped up their generation of electricity via renewables from about 6.3% in 2000 to roughly 17% in 2010, nearly tripling it in a decade.[7)]

In the meantime, China became even more committed to leading this industrial revolution. It has adopted the target of getting 16 percent of its primary energy from renewables by 2020, with an explicit goal of 500 gigawatts of renewable capacity by the same date. China's incentives have become so robust that it has leapt to the top of the Ernst and Young "Renewable Energy Attractiveness Index," considerably outpacing all competitors, including aggressive US states such as California.[8)] This lead will persist, according to Nicholas Stern, author of October 30, 2006 "Stern Review on the Economics of Climate Change."[9)] Stern regards the climate challenge as

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5) See Lind's remarks at : http://www.salon.com/news/opinion/feature/2010/01/04/new_economy/

6) In hydro-electric dams, water runs from the reservoir through turbine blades to generate power. So "pumped-storage" of power is simply a matter of pumping water back into the reservoir. The technology dates from the 1890s, has an efficiency of about 70 to 85 percent, and already has 90 gigawatts of capacity (3 percent of global generation) . See Electricity Storage Association : http://www.electricitystorage.org/site/technologies/pumped_hydro/

7) See "Germany : renewable electricity output rises by 7.8% in 2010," in Industrial Fuels and Power, December 17, 2010 : http://www.ifandp.com/article/008670.html

8) The November 2010 index (issue 27) can be downloaded as a PDF file at the following site : http://www.ey.com/GL/en/Industries/Power---Utilities/Renewable-energy-country-attractiveness-indices

9) Nicholas Stern is former chief economist of the World Bank. The Stern Review remains

being much more potentially costly than when he compiled his 2006 study ; but he also regards the opportunities to be profound for first-movers in renewable energy and other means of reducing carbon emissions. And he evaluates China's current policies as giving it a strong advantage in the current industrial revolution.[10)]

Moreover, wind farms in especially productive environments already produce electricity whose costs are at parity with coal-fired power, generally the cheapest form of electricity. Other renewable technologies are also quite near "grid parity" or trending in that direction.[11)] The cost-effectiveness of renewables is one reason that the US Navy is committed to getting 50% of its energy needs from renewables by 2020. The Chairman of the US Joint Chiefs of Staff, Admiral Mike Mullen, reaffirmed this goal in a October 13, 2010 speech.[12)]

There is indeed significant evidence that the global energy economy is at a very critical turning point, as financial flows are following smart policy. The September 2010 Renewable Global Status Report shows that the USD 30 billion invested in renewable energy capacity and manufacturing plants in 2004 had expanded to USD 150 billion by 2009. It also shows that 2009 was the second year running in which "more money was invested in new renewable energy capacity than in new fossil fuel capacity." Reflecting their robust policies, Germany and China were the investment leaders (at about USD 25–30 billion each), with the US a distant third (at just over

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the largest and most authoritative study of the economics of climate change, with a clear warning that potential costs far outweigh the costs of reducing carbon emissions. The Stern Review is available at the website of the UK Treasury :
http://webarchive.nationalarchives.gov.uk/+/
http://www.hm-treasury.gov.uk/sternreview_index.htm

10) See Nicholas Stern "China's growth, China's cities, and the new global low-carbon industrial revolution," November 10, 2010, Policy Paper, Centre for Climate Change Economics and Policy :
http://www.cccep.ac.uk/Publications/Policy/docs/PPStern_China-green-revolution.pdf

11) These facts were highlighted in a Boston Consulting Group November 10, 2010 report "What's Next for Alternative Energy?" See the summary as well as a download link at :
http://www.bcg.com/media/PressReleaseDetails.aspx?id=tcm :12-65301

12) Note that the Pentagon is explicitly committed to leading the energy transition in the United States, in order to reduce its own human, material and other costs as well as lever the country out of the quagmire of relying on fossil fuels. Admiral Mullen's speech was given at the US military's Energy Security Forum :
http://www.jcs.mil/speech.aspx?ID=1472

USD 15 billion) followed by Italy and Spain (roughly USD 4–5 billion each).[13)]

In addition, even conservative estimates of energy demand project it to increase by 44% between 2007 and 2035.[14)] Meeting this demand will require trillions of dollars in new investment. In the developed and especially the developing economies, massive amounts of new energy investment are awaiting price signals for emissions costs as well as the potential for fossil fuel-price increases. Uncertainty about these costs troubles investors greatly, as power generation facilities are enormous capital expenditures that are written down over decades. Just before the COP 16 Cancun meeting in December of 2010, institutional investors from all global regions and managing USD 15 trillion in funds made a very public call for "strong government policies that reward clean technologies and discourage dirty technologies." They added "a basic lesson to be learned from past experience in renewable energy is that, almost without exception, private sector investment has been driven by consistent and sustained government policy." And they explicitly called for the robust emissions reductions targets, policies to accelerate the uptake of renewable energy, and other mechanisms.[15)]

Because of these pressures, the International Energy Agency (IEA), hitherto dubious about renewables, now emphasizes the need to invest USD 5.7 trillion in renewables between 2010 and 2035 to cope with rising energy demand, the peaking of conventional oil supplies, and the threat of runaway climate change.[16)] The IEA's 2010 World Energy Outlook also recognized that the peak in conventional oil production had likely been reached in 2006, meaning costs are virtually certain to increase.[17)] The prices of conventional fuels are therefore on the rise, with only the overall rate of price rise

13) The report, is available for download from the REN21's website : http://www.ren21.net/Portals/97/documents/GSR/REN21_GSR_2010_full_revised%20Sept2010.pdf The financial data can be found on page 27.

14) See the analysis at the US Energy Information Administration's May 25, 2010 released "International Energy Outlook" : http://www.eia.doe.gov/oiaf/ieo/highlights.html

15) The group's November 16, 2010 press release can be found here : http://www.incr.com/Page.aspx?pid=1294

16) See the IEA's 2010 World Energy Report summary factsheet at : http://www.worldenergyoutlook.org/docs/weo2010/factsheets.pdf

17) For an analysis of this aspect of the IEA report, see : http://news.nationalgeographic.com/news/energy/2010/11/101109-peak-oil-iea-world-energy-outlook/

Figure 1: Levelized Cost of Electricity

(US, units: cent/kilowatt hour)

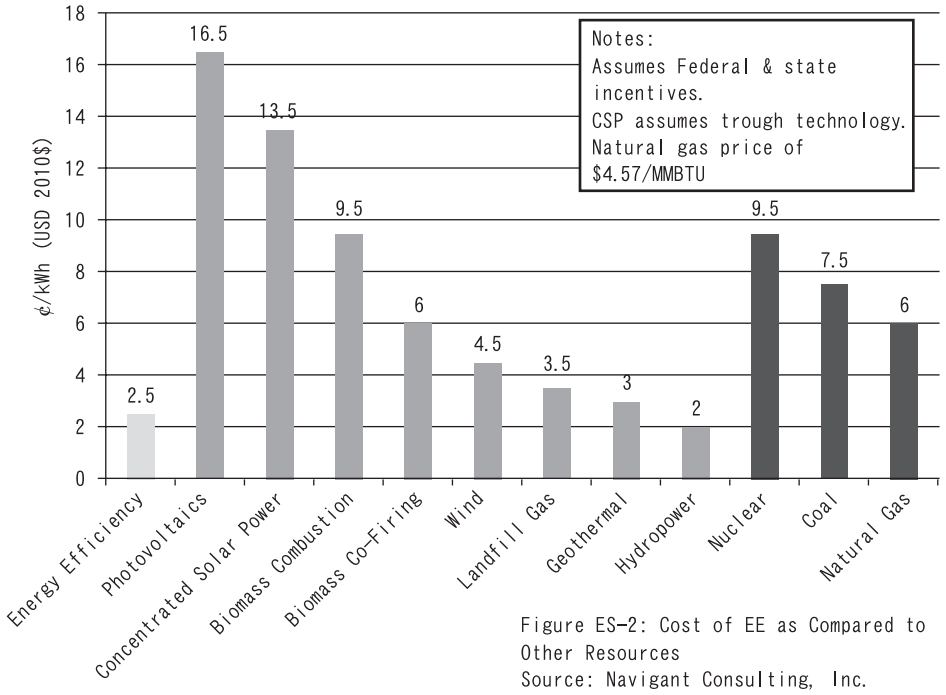

Figure ES-2: Cost of EE as Compared to Other Resources
Source: Navigant Consulting, Inc.

appearing uncertain, whereas the costs of renewables are dropping.[18] As we see in Figure 1, independent analyses indicate that several renewable options are already cheaper, per kilowatt-hour of power generated, than fossil fuels and nuclear.[19]

Smart policy is clearly key to achieving grid parity with renewables and thus

18) The strong entry of China into renewables has accelerated this price decline. The United Nations Environmental Program reports that in 2009 China produced 40% of global solar panels, 25% of global wind turbines, and that prices of solar photovoltaic are estimated to have dropped by 50-60% from the previous year. See "Global Trends in Green Energy, 2009": http://sefi.unep.org/fileadmin/media/sefi/docs/publications/FINAL_UNEP-REN21_Press_Release_post_embargo.pdf

19) This cost calculation examines the levelized cost of various kinds of options for generating electrical power. The levelized cost takes into account the initial capital cost of constructing the facility that is used to produce electricity as well as fuel, maintenance, and other kinds of costs that one can project over the facility's expected life, generally about 40 years. Then this levelized cost is calculated in cents per kilowatt hour, using the 2010 value of the US dollar. See page 7 of the report at: http://www.incr.com/Page.aspx?pid=1294

reaping the benefits of cost reduction from price declines as the facilities diffuse. The cheapening of highly portable renewables also presents an enormous export opportunity for first-mover countries. About 1.5 billion people remain without access to electricity grids and conventional forms of power.[20]

The Feed-in Tariff

The critical aspect of this ongoing industrial revolution, its profound difference from previous industrial revolutions, is the role of public policies in driving it. Every industrial revolution is intimately bound up with the role of the state, as Nicholas Stern argues in his work.[21] This fact has long been evident in so-called late-developing countries. Alexander Gerschenkron pointed out in his arguments on "the advantages of backwardness"[22] that public sectors in late developing countries took a strategic orientation towards the domestic political economy, re-shaping it so as to put it onto a rapid growth track that rivaled the contemporary industrial leaders. The Meiji-era government in Japan, for example, thoroughly revamped the country's political and economic institutions in order to make it a contender in the industrialization of the late 19th and early 20th centuries. The current industrial revolution is likely to be at least as encompassing in many respects, as the environmental and energy shifts will rewrite employment patterns, urbanization, job training, and other vast areas of social and political life.

At this takeoff stage, one of the most notable aspects of state activity is the use of incentivist policies to encourage the uptake of renewable energy technologies. These policies play a key role, as the capital cost of renewable facilities is generally more expensive than more expensive than conventional means such as coal-fired power

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20) On the expansion of this market and the facts on "energy poverty," see Elizabeth Rosenthal "African Huts Far From the Grid Glow With Renewable Power," The New York Times, December 24, 2010 : http://www.nytimes.com/2010/12/25/science/earth/25fossil.html

21) See Nicholas Stern "China's growth, China's cities, and the new global low-carbon industrial revolution," November 10, 2010, Policy Paper, Centre for Climate Change Economics and Policy : http://www.cccep.ac.uk/Publications/Policy/docs/PPStern_China-green-revolution.pdf

22) In Alexander Gerschenkron (1962) Economic Backwardness in Historical Perspective, Cambridge : Harvard University Press.

generation, nuclear power, and hydroelectric power. Moreover, the fact of being new - "unconventional" - can in and of itself be a disadvantage in attracting capital investment. And this is especially true in the midst of a financial crisis when lenders and non-financials are so averse to risk that they hold unprecedented levels of liquidity.[23)]

There are a plethora of policies aimed at encouraging the uptake of renewable energy technologies, including subsidy schemes, renewable energy certificate schemes, and the like. Some of these simply offer a subsidization of the purchase price of the technology. Others see national or regional governments adopt targets for the overall percentage of electrical power that will be generated by renewable energy, leaving it to energy producers to make use of subsidies and other encouragement to reach this target. Renewable energy certificate schemes are extraordinarily complex devices that seek to mimic a marketplace. They do this by mandating renewable production but then leaving renewables producers to accept prices for their product based on the value of certificates traded in quasi-markets.

All of these policies are part of a collective groping in the dark towards fostering emergent technologies. The policies also imply reshaping a large market dominated by powerful vested interests. These vested interests are of course eager to shape policies that reproduce their dominance in energy markets. This ideological and political economy background to much of the policymaking in energy markets affects policy choices. The greater the influence of incumbent energy interests, the more likely there will be reluctant and constrained solutions to the overall problem of changing energy generation in more sustainable directions.

But from within this welter of vested interests and often tendentious debate, a clear policy option has emerged and run to the top of the list among effective

23) In the United States, the Federal Reserve's 2010 3rd Quarter "Flow of Funds" report (released December 9, 2010) shows that bank lending continued to contract. Domestic financial sector credit market growth for the 3rd quarter was down 4%, and this was in spite of massive liquidity support from the FRB. Moreover, the non-financial sector held an unprecedented USD 1.93 trillion in cash and other liquid assets. See "Flow of Funds Accounts of the United States," Federal Reserve : http://www.federalreserve.gov/releases/z1/Current/

solutions. This is the feed-in tariff, a policy device that was actually first introduced in the United States but whose current manifestation is largely the result of innovations pioneered by the German political and policymaking community.[24] This policy device is the focus of the first comprehensive account of comparative policies in fostering renewable energy technologies : "Powering the Green Economy : the Feed-In Tariff Handbook."[25] The authors note that the feed-in tariff (or "FIT") sets :

> a fixed price for purchases of renewable power, usually paying producers of premium rate over the retail rate for each unit of electricity, or kilowatt hour, fed into the grid. FITs usually require power companies to purchase all electricity from eligible producers in their service area at this premium rate, over a long period of time. FITs also often compel electrical utilities and transmission operators to connect all possible renewable power providers, and mandate that the utilities themselves pay the interconnection costs... These costs are then distributed among all electricity consumers, minimizing costs while delivering an ever-growing amount of renewable energy. It may not look like it, but it is a truly revolutionary tool — one that changes the role that governments, power operators, grid operators, transmission and distribution operators, and ordinary consumers currently play when it comes to electricity... FITs are a way for consumers wishing to generate their own power to receive guaranteed payments, and benefit from additional revenue and the improved reliability of energy supply. These benefits spill over and help all consumers by lowering electricity prices. Electrical utilities benefit from displaced fuel costs and decreased volatility of fuel and electricity prices. Politicians benefit because FITs often jumpstart a robust manufacturing sector for renewable electricity technologies, bringing with them tax revenue and high-paying jobs that stay within the community. Business and farmers, among other groups, can install generation equipment and gain extra income, and society benefits from reduced greenhouse gas emissions and greater

24) And note that this political community includes the center-right governments, who in fact adopted the early versions of the feed-in tariff in 1991 "in response to demands by members in rural southern Germany with access to small, disused hydropower plants." See Paul Gipe's excellent work on this and related issues :
http://www.wind-works.org/FeedLaws/EvolutionofFeed-inTariffs.html

25) published in October 2009 by Earthscan in the UK
http://www.earthscan-usa.com/Books/BookDetail.aspx?productID=214747)

diversification of the electricity sector. Properly designed FITs can deliver all these things, at low cost.

And one of the truly revolutionary aspects of this policy is that it is a transitional tool. The point of the FIT is to encourage as much uptake of renewable energy as possible, as well as encourage technological advances that reduce the cost of using these technologies. There is a tipping point, which differs with each renewable technology, where the per-kilowatt hours price of electricity drops below the average cost of conventional power generation. The authors argue (pp. xxii) that "once we have reached the tipping point, FITs will have done their job, and will only be needed on a limited basis, if at all."

So this is not a reworking of policy approaches with an eye to establishing a new bureaucracy and policy regime as a permanent feature of the political landscape. In this respect, policymaking that fosters renewable energy differs strikingly from that which we see in, for example, pension policies for the aged, insurance policies and healthcare markets, and other policies that are designed for the long-term. That is to be expected, of course, because the explicit purpose of the FIT is not social policy, per se, but rather a temporary policy intervention in order to deal with the investment disincentives of the technology in its infancy. As noted, per-kilowatt generation costs for renewables have dropped considerably over the past decade and can be expected to decline further — perhaps with increasing speed — over the coming years. Once these generation technologies have reached a level of sophistication sufficient for them to displace conventional means of power generation, the feed in tariff and other policy supports will no longer be necessary.

But if used strategically, the FIT can also be good social and other kinds of policy. This is because a well-designed FIT can encourage the uptake of renewable energy technologies and the democratization of electricity production. The authors of "Powering the Green Economy" point out (pp. xxiv) that they "believe decentralization and democratization of energy production to be a fundamental requirement for the 21st century, a shift in trajectory which will bring wide and deep benefits to those who participate." They regard "the advantages of renewable electricity democratization" to be "economic, financial, environmental, social, political, geopolitical, technical and

medical all at once." This is because the new energy system fostered through FITs and renewable energy technologies is one where fuel is free and abundant just about anywhere, where the supply of the fuel (eg, wind, sunlight, waves) is widespread and often abundant within nations and along their coasts, where resource conflicts are greatly reduced as a risk, where virtually anywhere can become a point of production, the environmental cost of electrical production are drastically reduced through less as air pollution, water pollution, destruction of land, and other negative externalities. They stress that the incentives embedded in the FIT can bolster local production of electricity (as well as manufactures to produce it), and so enhance the community's income and competitiveness.

The Political Economy of the FIT

Given all the incentives to deploy the FIT, it is no surprise that over 70 national and subnational jurisdictions have already done so. But many have not. And even among those that have adopted the FIT, it is often so constrained as to be relatively ineffective. Let us take the position that the FIT is an obvious advantage in the midst of an increasingly competitive industrial revolution. In seeking to understand why the policy is not adopted, adopted with significant hindrances, or adopted in a comprehensive manner, we need a political economy analysis.

Let us briefly outline the main points of the political economy perspective. The adoption of the feed-in tariff and the way it is structured needs to be seen as a dependent variable determined by independent variables. We can also seek to explain the absence of an expected outcome. As noted, given the demonstrated effectiveness and efficiency of well-designed feed-in tariffs, coupled with the goal of transitioning to clean energy and reducing carbon emissions, it is in fact a major puzzle that many countries and subnational jurisdictions have yet to adopt the policy. It is particularly odd that Japan has only adopted the policy reluctantly and in a fashion that excludes so many excellent renewable resources (such as wind and geothermal) and constrains even the uptake of solar power.

The big question is what are the variables that determine these outcomes, the phenomena we want to explain. The variables can be grouped into three main areas :

ideas, interests and institutions. By ideas, students of political economy do not mean simply any notion. Ideas are coherent and more or less compelling conceptions and arguments about policy and politics. To put this example in the context of contemporary Japan, we might mean the various contending ideas about how to build a sustainable fiscal structure. Ideas about climate change and the energy challenge would include claims that the crisis is all a hoax (as many Americans insist) or that simply reducing energy consumption will fix our collective crisis. Interests, of course, are familiar to everyone who has observed Japanese politics over the past 20 years and watched the economy fail to recover from the collapsed bubble of the late 1980s. Japan has gone from the star of the OECD to a notable under-performer, as vested interests aggressively defend their regulatory, fiscal, and other benefits at the expense of the larger public. These vested interests, especially the electrical utilities, dominate policymaking and prevent reform towards a more robust and sustainable economy. Another unpleasant example of interests at work is evident in Wall Street's ability to defeat serious reform in spite of nearly blowing up the global economy. And institutions are the rules that structure the context in which interests and ideas play out their various roles. In this case, institutions include the regulatory and fiscal instruments that structure energy markets, advantaging dirty and dangerous incumbent industries and giving short shrift to clean alternatives.

We have seen that the feed-in tariff is largely a bridging mechanism that allows us to overcome the current higher market price of renewable energy versus many conventional forms of power generation, especially coal. The feed-in tariff provides additional income to renewable energy producers, usually through a small charge added to the ordinary ratepayer's electricity bill. The feed-in tariff thus fosters the diffusion of renewable energy generation and helps bring down the costs of renewable energy. As with any technology, such as the personal computer and the mobile telephone, renewable energy technologies achieve cheaper per unit costs the more widely they are used. Renewable energy gets cheaper the greater the volume of production of the wind turbines, solar panels, geothermal facilities, and other means for bringing renewable forms of energy to the electricity grid, into the fuel tanks of vehicles, and so on. Moreover, the greater the demand for renewable energy technologies, the greater is the incentive to innovate. That innovation too brings down costs as well as opens up avenues hitherto undreamed of. Consider, as a comparison,

how just a decade ago virtually no one could have imagined the mobile phone becoming a combined handheld computer, camera, stereo, and credit card. And consider too how cheap the devices are, in contrast to what they cost just a decade ago.

The feed-in tariff has repeatedly been assessed as the single most effective policy for promoting the shift to renewable energy. The US National Renewable Energy Laboratory, in a major study released August 9, 2010, reaffirms this assessment and notes as well that about 75% of all photovoltaic and just about 50% of wind power is being fostered by feed-in tariffs.[26] The direct costs to consumers are also minimal : in the German case, which is the global leader and already produces 17% of its electricity via renewables, the feed-in tariff costs ratepayers about an extra 3 euros per month on their utility bills. Through this monthly charge, German utility customers are fostering a new and growing industry that is slated to become larger than their automotive industry. The renewable industry in Germany also enhances domestic security, provides well-paid jobs, and delivers many other concrete benefits. Those clear benefits are why the German centre-right government recently reaffirmed their commitment to the feed-in tariff. Germany's use of the feed-in tariff has not impaired its economic competitiveness.

Indeed, it is difficult to refute the effectiveness of the feed-in tariff on factual grounds. But facts rarely deter vested interests and their cheerleaders in politics, think tanks, the media and academe from making their biased or simply untrue arguments. There is especially nothing new in this. Facts are routinely ignored in debates about climate change, the role of women, the merits of immigration, and other enormously important policy areas. So it should not surprise us that there is a lot of biased argument about renewables and the policies that support them.

But let us look again at the facts of especially great significance in discussing the political economy of the feed in tariff. First, the energy economy is probably a USD 6 trillion economy. Energy is the single biggest and most profitable industry in

26) A summary of the study, titled "A Policymakers Guide to Feed-in Tariff Policy Design," and a link for downloading it can be found at : http://www.wind-works.org/FeedLaws/USA/NRELIssuesMassiveFeed-inTariffDesignGuideforUS.html

the USD 60 trillion global economy. Another important point about the energy economy is that it is a rapidly growing sector. About 86% of global energy demand is supplied at present through fossil fuels, but the share will decline.

Aside from the climate issue, one reason for the decline is that fossil fuels are becoming increasingly expensive. Remaining oil reserves may indeed be as abundant as optimists argue, but one thing is certain : finding and developing these reserves is already expensive and those costs are increasing. Faisel Khan, the director of Citigroup Energy Research, pointed out in a June 16, 2010 interview with Wall Street Transcripts that finding and development costs for oil have increased 350% since 2000, making USD 80/bbl the floor price for new projects in order to cover their capital costs.[27] Another of the myriad reasons to worry is that the second biggest source of new demand for oil is Saudi Arabia's domestic consumption, threatening to erode their capacity to export.[28] The threat is so real that the Saudis have turned to solar energy to run their desalination plants and are on the verge of adopting a feed-in tariff.[29]

Of course, the huge vested interests in the gas and oil industry argue that they have already achieved an energy revolution through hydraulic fracturing technology. They claim that this technology has boosted natural gas reserves to well over 100 years of current consumption and that costs will fall. Yet these claims are very questionable. These new natural gas wells deplete very rapidly and their development produces significant environmental damage, especially to ground water. So the natural gas revolution seems at the very least greatly exaggerated.[30]

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27) See the interview at :
http://finance.yahoo.com/news/18-Per-Barrel-Find-And-twst-481110118.html?x=0

28) Some analysts expect this erosion to take place in the very near-term. See, for example, "Saudi Arabia global exports to wane post-2010," Risk.net April 27, 2010 : :
http://www.risk.net/energy-risk/news/1602907/saudi-arabia-global-oil-exports-wane-post-2010

29) As the Saudi oil minister also argued, to the French oil newsletter Petrostategies, "For a country like Saudi Arabia ... one of the most important sources of energy to look at and to develop is solar energy." Cited in New Solar Today, April 20, 2010 :
http://www.renewableenergyworld.com/rea/partner/first-conferences/news/article/2010/04/saudi-arabia-solar-announcement

30) On this, see the interview with industry analyst Arthur Berman in Lindsay Curren's "The Great White Shale," Transition Voice November 1, 2010 :
http://transitionvoice.com/2010/11/great-white-shale/

And what of coal, the old standby and equivalent to oil as a supplier of global energy demand? Even coal is expected to get more expensive. This fact is actually quite striking. The United States Geological Service is reassessing earlier optimistic projections of coal supplies. It has found that the Powder River basin reserves, source of 37% of US coal production in 2006, are not the original 200 billion ton estimate but rather 10 billion tons. That's a 95% downward revision. It has long been taken for granted that coal, a resource that supplies about a third of global energy needs, is available in enormous supplies that are very cheap to extract. But the USGS survey suggests that the assessments of available coal are greatly exaggerated. Moreover, the survey notes that the best and most readily extracted coal supplies have already been exploited. From now on we are largely going for supplies that are of poorer quality and more expensive to extract. So even in the coal market, long seen as the cheapest and most abundant energy resource, we confront escalating prices.[31)]

Let us pause and consider these facts for a moment. For the longest time policymakers and the attentive public have taken vested interests in the energy sector at their word. The energy sector was strongly represented by the IEA as well as other agencies, and these agencies routinely trotted out optimistic projections of future supply as well as future price levels. Yet now we are finding that these optimistic scenarios are largely pipe-dreams. Even the IEA is deeply worried about the capacity to satisfy oil demand at acceptable prices.

But blowing smokescreens about the facts is what incumbent interests in any industry do, and especially when their position is challenged. The industry's owners, managers, employees and others all have strong incentives to believe the best about their industry and to obscure any problems. We saw that phenomenon most recently in Wall Street's repeated assurances that derivatives safely spread financial risk and virtually eliminated the need for regulation. Wall Street still believe this and continues to block the adoption of effective regulation of derivatives, in spite of the financial crisis that increased global unemployment by 30 million and destroyed over USD 30 trillion in wealth.

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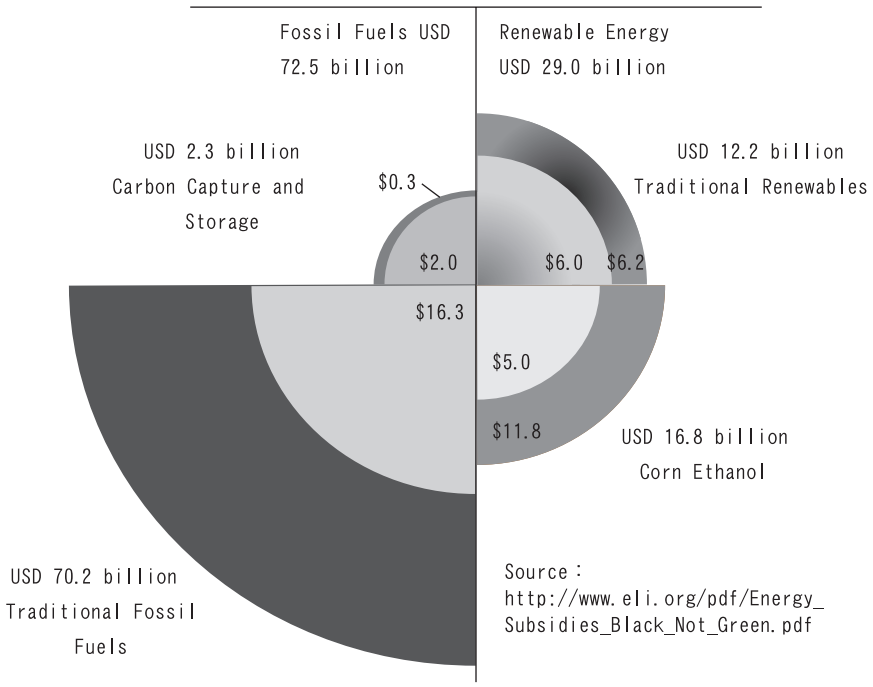
31) On this, see "The End of Cheap Coal," in Nature 468, November 18, 2010. http://www.nature.com/nature/journal/v468/n7322/full/468367a.html

Figure 2: US Federal Subsidies for Energy (2008-2002)



Nuclear power is also hugely expensive and plagued by the problem of a dwindling resource base. In Japan, of course, there is almost a religious obsession with nuclear power as an opportunity for growth and employment. But even the IEA, a strong supporter of nuclear power, does not expect it to increase much as a supplier of global energy needs. And as the American group Ceres notes in their July 2010 study on utilities, those that deploy nuclear power facilities are taking on risks that make them increasingly unattractive to investors and financial institutions. It is important to note that the Ceres group represents USD10 trillion of institutional investor money. Investors are increasingly concerned that the conventional energy sector is a risky bet.[32)]

The problem of increasing costs is not only evident in market prices. In recent years, we are also discovering that conventional energy sources impose huge costs on

32) The study was released July 8, 2010, and is titled "The 21st Century Utility: Positioning for a Low-Carbon Future." An overview and download link can be found at: http://www.ceres.org/Page.aspx?pid=1263

Figure 3 : Share of Total Budgetary Support for Energy in Japan, 1970–2007

- Nuclear 96, 829
- Coal 45, 390
- Oil 122, 481
- Renewable 16, 973

Total All Energy: 348, 667

Unit : YEN 100 million

Source : Kenichi Oshima, Saisei Kanon Enenugii no Seijikeizaigaku (The Political Economy of Renewable Energy), Tokyo: Toyo Keizai, 2010

Figure 4 : Funding by Local Allocation Tax, for Power Sources, Japan, 1975–2007

Power Source	Amount (YEN 100 million)	Share of total
Nuclear	6, 251.17	68.4%
Thermal	2, 498.99	27.3%
Hydro	352.65	3.9%
Geothermal	13.63	0.1%
Others	21.15	0.2%
Total	9, 137.59	

Source : Kenichi Oshima, Saisei Kanon Enenugii no Seijikeizaigaku (The Political Economy of Renewable Energy, Tokyo: Toyo Keizai), 2010

society through often hidden subsidization as well as external costs. As to subsidization, recent assessments have shown that federal subsidies for oil, gas and coal interests in the United States totaled USD 72.5 billion between 2002 and 2008, far more than the 12 billion that traditional renewables received.

And as we see in Figure 3, a 2010 assessment of costs in Japan showed that of total energy subsidies of YEN 35 trillion spent between 1970 and 2007, the nuclear industry got 27%, coal 12.8%, oil 35%, and renewables a paltry 4.8%.

Moreover, Figure 4 shows that the biased subsidization in Japan is seen even with the local allocation tax, an intergovernmental subsidy program that is generally seen as a means to equalize local governments capacities to deliver social services. But

even with this programme, just under YEN 1 trillion was spent from 1975 to 2007 subsidizing electrical power projects, with nuclear getting 68.4%, oil and gas and coal, 27.3%, versus a minimal 0.1% for geothermal and 0.2 for other renewables.

Moreover, there are many kinds of subsidization that are hard to cost. One example, of course, is the military cost of bringing oil supplies from overseas. The Chinese, for example, are in the midst of developing a blue-water navy in large part because they have to import increasing volumes of oil and find themselves having to protect the tankers that carry the oil. And the Americans will spend perhaps USD 3 trillion in Iraq fighting a war that does not appear to have ended and are amplifying their efforts in Afghanistan. Access to oil supplies surely has a large role in answering the question, and is indeed another reason the Pentagon is committed to developing renewables.[33)]

As to externalities, recent years have seen a flood of highly detailed and credible studies of the external costs of conventional energy. By external costs, we mean the costs not included in the market price. The external costs include costs to human health of the production as well as consumption of these energy sources. Mining coal for example exacts enormous costs on the environment as well as workers' health. The same is true of oil exploration and development, as we saw from this summer's huge spill in the Gulf of Mexico. Moreover the consumption of these fuels results in pollution that takes further tolls on the environment and human health. None of these facts are new, but strangely calculating their monetary costs is a very recent area of endeavor. The 2009 US National Academies of Science analysis of the externalities of fossil fuel use in the United States (for the year 2005) indicates that the cost was at least USD 120 billion.[34)] As for China, a recent study by Chinese economists/experts suggest that the annual cost of producing and burning coal extracts a toll on human health and the environment that totals USD 248 billion, or about 7% of China's total GDP.[35)]

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33) On this, see "Frontline Commanders Requesting Renewable Power Options," in Defence Industry Daily, September 20, 2010 : http://www.defenseindustrydaily.com/commanders-in-iraq-urgently-request-renewable-power-options-02548/

34) See "The Hidden Costs of Energy : Unpriced Consequences of Energy Production and Use" : http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=12794

35) The October 27, 2008 report is by Mao Yushi, Sheng Hong and Yang Fuqiang, and is available at :

At the same time, we see the cost of renewables declining sharply. There is still a strong argument in many other countries that shifting towards renewable energy will inevitably depress living standards and economic growth. That argument is simply incorrect when it comes to the externalities and subsidization that we outlined above. And it also is incorrect when it comes to market prices. In sharp contrast to the climbing cost of conventional energy sources, renewable energy technologies are constantly getting cheaper and for the most part rely on fuels, such as sunlight and wind and heat under the ground, that are free. As noted earlier, we can look at the cheapening of these technologies in comparative terms already.

Assume we are in the mainstream economists' frictionless world of rational actors operating in perfect markets, with all available information. Surely we are using all available policies, especially the FIT, to shift towards energy technologies that are cheaper, better for public health, available anywhere, provide more employment and better employment than conventional energy, offer enormous spinoffs through the technological development itself as well as the ongoing smartening of the electrical grid, and other benefits. But the pace is incredibly slow compared to pace needed to avoid cascading crises. We need to ask why we are not making the transition as fast as possible now, when the global economy is in the midst of the fallout from a once in a century financial shock and needs sustainable growth.

And we especially need to ask why so few of the advanced industrial countries are using the FIT to make this shift at a time when the US and German militaries, the UK Department of Climate Change, McKinsey Global Institute, the IEA, and other agencies warned us that we face escalating risks of a profound oil shock in the coming few years.

The reasons they are not doing this en masse are plenty. One of them is clearly the activity of vested interests in obfuscating reality. The oil lobby, the natural gas lobby, the coal lobby, the nuclear lobby and their allied think tanks and so on constantly dismiss the capacity of renewable energy to provide reliable and cheap

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http://www.greenpeace.org/raw/content/eastasia/press/reports/the-true-cost-of-coal.pdf

power, even though it already provides reliable and relatively cheap power in Germany, Iceland and a host of other locales. And even though Germany is growing at the most robust pace of the developed countries, and has a commitment to cut CO_2 by 40% by 2020 and provide 20% of its power overall energy via renewables by 2020, and is well on the way to making these targets, these facts are routinely ignored and renewables declared to be a handicap to any economy that might emphasize them. Much of this rhetoric comes from vested interests who would lose by a shift to renewables.[36] Even with growing shareholder pressure, it is difficult for firms with immense sunk costs to scrap capital. So one can readily understand why vested interests not only pollute the atmosphere but also the public debate with toxic arguments that are meant to maintain their dominance of the energy economy. After all, the energy economy is the biggest and most profitable economy in the world. And it is a growing economy.

In contrast to these incumbent interests, which are huge and well funded and well connected, the interests arguing on behalf of sustainable energy are considerably weaker.

So this imbalance between dominant and emergent interests and the way that dominance is represented in the public debate, in policymaking councils, and political parties, and in other key points of the political economy are one reason that we see this dithering on policy. Though 75 countries have adopted the feed-in tariff, many constituencies have adopted very weak and constrained versions. In Japan, for example, the feed-in tariff essentially covers only solar and in a very weak way. It is a testament to the power of vested interests that the Japanese feed-in tariff does not foster wind and geothermal as well as other sustainable energy resources. In the geothermal area alone, Japan has dropped from its former position of fifth in the

36) But not all of it. One of the fascinating aspects of the current conjuncture is how much ill-informed material comes from sources who recognize the status quo to be unsustainable. One of the most persuasive and intelligent analysts in the peak oil community is Robert Hirsch, who co-authored a landmark 2005 study - “The Peaking of World Oil Production : Impact, Mitigation, and Risk Management” - for the US Department of Energy. In his 2010 book on The Impending World Energy Mess, he and his co-authors declare climate change to be a hoax and renewable energy to be absurdly expensive and useless as baseload power. The arguments are so woefully uninformed as to be literally embarrassing to read.

Figure 5 : Capital Investment in Renewable Energy (2000-2008)

MEF Country	Cap Inv (2000-2008) USD m	GDP 2008 (2008 $ bn)
Japan	888	4, 329
China	41, 196	7, 973
France	6, 645	2, 128
Germany	36, 611	2, 918
India	7, 446	3, 297
Russia	113	2, 266
South Korea	1, 916	1, 335
United Kingdom	17, 119	2, 226
United States	52, 120	14, 260

Source : Kevin Parker "Climate Change: Creating a Framework for Investment": http://www.acore.org/files/images/Parker_Kevin.pdf

world to now eight in the world. With its resource base, financial power, geopolitical risks, and urgent need for growth sectors, Japan should be a leader in geothermal production, seeking to catch up to Iceland which gets fully 80% of its power from geothermal. But Japan is not doing this in large part because incumbent interests, especially the electrical utilities, do not want that to happen. Figure 5 shows us that they have been quite successful in restricting the level of investment in renewables.[37]

But the power of incumbent interests is not the only variable driving inadequate policy, or even immobilism, in this area. Another problem is found in such institutions as highly biased subsidization. Other rules, regulations and fiscal instruments serve to maintain the current energy economy and impede the emergence of alternatives. These kinds of policies are seen around the world, where recent calculations by the Global Subsidies Initiative indicate that subsidization of the fossil fuels totals about USD 500 billion per year[38].

37) The figure is drawn from page 3 of a November 19, 2009, presentation by Kevin Parker, Global Head of Deutsche Bank Asset Management. The presentation is downloadable as a PDF file at : http://www.acore.org/files/images/Parker_Kevin.pdf

38) See their "Hope on the horizon : Will the G-20 really start the final countdown on unsustainable energy subsidies?" in Subsidy Watch, Isssue 41 November 2010 : http://www.globalsubsidies.org/files/assets/subsidy_watch/sw_41_nov_2010.pdf

But perhaps one of the most significant hindrances lies in the area of ideas. In much of the developed world, our policy debates still largely centre on constructing the welfare state envisioned throughout the postwar order. In Japan, for example, the shift away from the LDP to the Democratic Party was largely focused on realizing key aspects of the welfare state through income-support payments and decentralized governance. The progressive policymaking elite in Japan is absorbed in realizing the long dream of attaining a fiscally sustainable welfare state. This dream would see equitable living standards and educational opportunities extended to people who at present do not enjoy those benefits-some would say rights-of living in a developed economy. Their goals are correct and laudable, but they are too limited to deal with current realities.

The sad fact is, Japan's policymaking elite does not fully recognize the need to transition to a new energy economy as a core part of their agenda. They see the energy shift as a subsidiary issue, a tangential issue. They see it involving costs that will be have to be funded from increasingly scarce fiscal resources. And so they are hesitant to embrace these new policy ideas fully. They clearly do not understand that the transition in the energy economy is a core part of building a sustainable welfare society, that it is a core part of realizing the dreams that they have had for all these decades. They do not understand this because all the facts on externalities, the increasing costs of conventional energies resources, the calculations of levelized costs of power, the rapid decline of renewable technologies' costs, and so on are all so very recent. So is most of the proof of the unparalleled performance of the feed-in tariff. Moreover, we are still suffering the enormous aftershocks of what is likely to have been history's largest and most damaging financial crisis. Policymakers appear to a large extent shell-shocked.

The same is true, tragically, with the Obama administration in the United States. The Obama administration is desperate to create jobs, especially green jobs. The Obama administration has long been committed to realizing an energy transition. But it is fundamentally a regime that is centered on realizing the goals of the civil rights movement, goals which centered on education, welfare and other public policies. Their rhetoric shows that they know to some extent that an energy transition can be a major part of realizing these larger objectives. But they never mention the feed-in

tariff, the most effective policy for achieving this transition. There are, of course, a host of institutional reasons for this. The United States federal government is a highly unique and decentralized kind of government that is very open to the politicking of vested interests. There are many reasons that getting a feed-in tariff installed in such a regime would be horrendously difficult. But perhaps the key problem in the United States is that it is not even an objective at the national level. Even Al Gore does not write about feed-in tariffs. Meanwhile, looking at Ontario and what it has done with the feed-in tariff, as governor of Michigan, Jennifer Granholm, noted that the lack of a feed-in tariff is leaving America weak and allowing its competitors to "eat our lunch."[39]

Clearly, interests, institutions and ideas all play crucial roles in the political economy of the feed-in tariff. It seems difficult to be parsimonious in this area because of the scale of the multifaceted crisis, the size of the energy economy, and the implications that policy change has for vested interests. The diffusion of the feed-in tariff throughout much of the EU certainly owes much to policy learning.[40] But from now on, the threat of competition from China and other rapidly rising powers may become a major force in the policy debate.

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39) See Paul Gipe "Michigan Governor Calls for Feed-in Tariffs, Cites Ontario's Success" August 9, 2010 : http://www.wind-works.org/FeedLaws/USA/MichiganGovernorCallsforFeed-inTariffsCitesOntariosSuccess.html

40) On this, see for example Per-Olof Busch and Helge Jorgens "The international sources of policy convergence : explaining the spread of environmental policy innovations," Journal of European Public Policy 12 : 5 October 2005 : See Nicholas Stern "China's growth, China's cities, and the new global low-carbon industrial revolution," November 10, 2010, Policy Paper, Centre for Climate Change Economics and Policy : http://www.cccep.ac.uk/Publications/Policy/docs/PPStern_China-green-revolution.pdf