Journal of Energy Challenges and Mechanics
http://www.nscj.co.uk/JECM/

ISSN 2056-9386
Volume 4 (2017) issue 1, article 3

Present status of a revenue-neutral "four-E" policy on energy, employment, equality, and the environment

关于能源，就业，平等和环境的收入中立"四-E"政策的现状

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Accepted for publication on 27th August 2017

Abstract: **An energy policy devised in the US in 1973 has become adopted by legislators, scientists and advocacy groups in a number of different forms, most avoiding the safeguards introduced by the original developer. It seemed appropriate for these forms to be studied so that the advantages and disadvantages of the different forms could be understood and for conscious choices to be made in future.**

Keywords: **Energy Policy, Employment Equality, Universal Basic Income**

I. INTRODUCTION

This is a case study of an energy policy that has become popular in the US, being advocated by Dr. James Hansen, often called the world's leading climate scientist, and by the Citizen's Climate Lobby, a large and enthusiastic nationwide group, among many. I devised the policy in 1973, publicized it in November 1973 and presented it to the Joint Economic Committee of Congress in 1974, but lost control of it because of almost immediate plagiarism. I have continued to add improvements, but most of these have not been adopted, so that it now exists in several alternative arrangements. It seemed that a study of the present forms of the policy might be interesting and instructive.

To start with I am giving below the (later) form of the policy as sent several times to senior people in the Obama administration. None was acknowledged.

II. A FOUR-E POLICY: ENERGY, EMPLOYMENT, EQUALITY AND THE ENVIRONMENT (2010)

2.1. SUMMARY

The underlying principle of the proposed policy is to produce gradually increasing incentives for all parties in the US (and in other countries with appropriate inputs) to produce more "green" energy and less harmful pollution and to consume less fossil fuel. These incentives would come from fees put on fossil fuels and on easily measured (or fairly estimated) emissions. The fees would start at a low level and would be incrementally increased until a committee of Congress decides that the fee levels had reached an appropriate level. The fees would be entirely returned to legal adult residents of the US (say aged 17 and over) in monthly rebates transferred to their bank accounts or, for poorer people, distributed in debit cards. Thus, the policy would be progressive, whereas taxation of fossil fuels and of emissions is regressive. The rebates would be included in the evaluation of the cost of living so that there would be virtually no direct inflationary effects.

2.1. INTRODUCTION

The US government has many methods at its disposal to reduce the use of fossil fuels and to reduce pollutant emissions. One is "command and control", such as the CAFÉ (corporate average fuel-economy) standards for highway vehicles, and the banning of the sales of incandescent light bulbs. These approaches show a faith in high-efficiency technology to reduce fossil-fuel usage, even though there is a human tendency to be more wasteful when using cars and lights that use less energy, sometimes referred to as the "Prius effect". An extreme "command and control" measure

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is rationing, not favored in the US. However, a near relative to rationing is the requirement that industries reduce pollutant emissions to, say, 50% of former levels, something that clearly discourages firms from reducing emissions before such mandates come into force. Another is price control, such as the price fixed for interstate sales of natural gas in the 1970s at a level that made it uneconomic to look for, produce and sell gas. This low level encouraged industries, even those having huge amounts of waste heat such as nuclear power plants, to use natural gas to heat buildings rather than use their own waste heat.

Another method used to reduce the consumption of undesirables is taxation, for tobacco and alcohol, for instances. When applied to something like petroleum in widespread use, taxation has three major disadvantages: it is highly inflationary; it takes a large amount of money out of normal circulation and transfers it to the government for possibly frivolous purposes like bridges to nowhere; and taxes are regressive, hurting the poor far more than the rich. A rather strange form of taxation is cap-and-trade, which is a complex system of taxing some pollution, replete, however, with permits to pollute freely. The Economist described a US bill as "Cap and trade, with handouts and loopholes" [i] They have, it seems, granted some rather generous concessions to Midwestern Democrats from states dependent on coal or heavy industry." This bill gave away 85% of carbon permits for nothing, with only 15% being auctioned, according to the quoted article.

The author, in debating with himself and others on which of these alternatives or some other would be most appropriate to handle energy shortages and pollution excesses, became intrigued by a variation of "the tragedy of the commons" known as "the shared-lunch syndrome". It can be illustrated by a group of twenty who eat lunch every day at the same restaurant. One day, someone says "Let's save the server writing out 20 checks. Just have her write one check and we'll divide it by 20." One of them realizes that now he can order lobster thermidor and pay only 1/20 of the difference over the cost of his usual egg-salad sandwich. Within a week, everyone has copied him. They are all saying "Why is lunch so expensive, and why am I getting so fat?"

2.3. The First Version of the Proposed Policy.

The incentives in the shared-lunch situation were so obviously negative and were so similar to the use of energy and to other aspects of life in the US that the author became concerned with the need to reverse these incentives. In 1973 he came up with something that was close to a simple reversal of the shared-lunch arrangements. A gradually increasing fee would be added to the price of petroleum and coal products. All the fees would go into an "impregnable" trust fund. At the end of every month the entire contents of the trust fund would be divided equally by the number of legal adults (say seventeen and older) in the country and an exactly identical amount would be deposited in each person's bank account. Thus, fossil fuels would become more expensive, but the average user would get a rebate that would cover the increased cost even if she or he did not reduce fossil-fuel usage or emissions. Poor people, getting the same rebate but being likely to use much less fossil fuels, would get a rebate that was larger than the added costs. The rich would, if they didn't change their purchasing patterns, be financially somewhat disadvantaged, but would have far greater freedom to change their life-styles than do the poor. They would buy everything that promised to reduce or eliminate their added fees. There would be a strong stimulus to job growth, e.g., in high-tech jobs and in highly insulating replacement windows. This policy was named the "modified free market" and "tax-pus-rebate" (later changed to "fee-plus-rebate" recognizing that taxes always go to the government, whereas a fee can have a more advantageous destination.) With regard to the trust fund, it was recognized that to have so large an amount of money that could not be raided by Congress may seem fanciful. However, if the funds were redirected elsewhere, the policy would become immediately inflationary and regressive in the same way as would carbon taxes.

The next version of this policy followed the description of it in 1974 to Senator Proxmire's Joint Economic Committee, and he pointed out that at a time when inflation was over fifteen percent, my policy would make it worse. The direct inflationary aspects were eliminated by requiring that the "basket" of goods and services used to assess inflation would be modified to include the rebates as reducing the cost of living, counterbalancing the increases from the effects of the fees. Later versions incorporated fees on emissions where these could be measured at low cost or could be fairly estimated. Poor people who are unlikely to have bank accounts could receive their rebates in debit cards, as used for poor relief in many countries. The modified free market produced by this policy could also be universal in that there would need to be no other government taxes or fees on fossil energy, with two exceptions. The Department of Defense could need to fund some fuel and energy systems that would not be produced by the free market. And if there were catastrophic events like earthquakes, tsunamis or asteroid impacts there may be need for crash programs under government financing and control.

2.4. A Modeling Table.

The accompanying table illustrates how the policy could be scheduled. Some notes on the table are the following.

1. No fees are put on fossil fuels or emissions during the six months after enactment, to allow time for preparation. This delay could be varied (by the chosen Congressional committee) to be shorter or longer.

2. After the six-month fallow period, fees on all fossil fuels are started at $1.00 per 500 MJ, which for gasoline is about 25 cents per gallon. The fee is increased by a suggested further $1.00/500MJ each quarter until two years after enactment, after which the increase would occur every six months for two years, and thereafter every year. The starting fee could be increased or decreased and its rate of increase could be speeded up or slowed down by Congress. Different starting fees and rates of change could be applied to different

fuels and emissions. The author prefers the uniform fee applied to the energy value in the fuels coupled with an additional fee on the emissions from the different fuels and power systems, being charged as in note 5 below.

3. The expected decreases in fossil-fuel use and in unemployment are from the conditions at enactment, and are simply the author's judgments.

4. There would be large savings in government expenditures on energy, environment, welfare, etc., many of which would no longer be required. No attempt to estimate these savings has been made here.

5. Either simultaneously or subsequently, fees would be required from emitters of greenhouse or toxic gases such as ozone (O3), methane (CH4), nitrous oxides (NOx) , carbon monoxide (CO) and carbon dioxide (CO2) , where they could be estimated or measured fairly and inexpensively, and the collected fees would be deposited in the same trust fund and distributed. The author has used as a starting point the fees for carbon derived from the carbon taxes in British Columbia, where a partial trial of this policy was instituted in 2008 and has achieved considerable success.

6. The carbon tax in British Columbia increased from $10 to $30 per metric ton over three years.

ESTIMATES OF EFFECTS OF A POLICY TO REDUCE FOSSIL-ENERGY USE, TO STIMULATE RENEWABLE ENERGY USE AND EMPLOYMENT IN THEM, AND TO AID THE POOR

Months after enactment	0	6-9	9-12	12-15	15-18	18-21	21-24	24-30	30-36	36-42	42-48	48-56
Energy fee, in units of $/500 MJ	0	1	2	3	4	5	6	7	8	9	10	11
Approximate fee in cents/gallon	0	25	50	75	100	125	150	175	200	225	250	275
Carbon fee, $/metric ton	0	10	11	12	13	14	15	16	18	20	22	24
Estimated % reduction in use	1	8	12	16	20	24	28	31	34	37	40	42
Energy fees/month, $B	0	13	25	35	45	53	61	68	74	80	84	90
Carbon fees/month, $B	0	1.2	1.3	1.3	1.4	1.4	1.4	1.5	1.6	1.7	1.7	1.8
Monthly rebate, $/person	0	60	112	159	200	237	268	299	327	351	371	396
Expected % decrease in unemployment	1.5	2.5	3.5	4.5	5.5	6	6.5	7	7.5	8	8	8
Gov't.distribution costs, $M/month	10	33	25	3	3	3	2	2	2	2	2	2
Govt. accreditation & anti-fraud costs	4	5	5	5	5	5	5	5	5	5	5	5
Approximate levels of fees at which alternative technologies would become viable without subsidies			Biomass, New hydro Geothermal					Offshore wind				

7. In the third line of the above table the author has shown his suggestion of a gradual increase for this fee. Data from the US Energy Information Administration were used for the most-recent year, 2010, to calculate the effects of this policy.

8. In the data quoted in 7 above, the US consumption of petroleum, natural gas and coal was given as 35 quads, 25 quads and 20 quads respectively. To estimate the carbon fee, the same US administration gave the CO2 produced by the three classes of fossil fuels as 73, 54 and 95 kg per million Btu of energy in the fuel. The results are shown in the seventh line of the table. (The fees for emissions are considered by the author as too small, but the rate used is an economic/political choice.) The carbon content of a kilogram of CO2 is 273 grams, so that the fees and rebates can be calculated. A fee for methane emissions is highly desirable. Recent research has stated that methane contribution to global warming is over eighty times that of CO2 per unit mass, and that there is much more methane emitted than was previously believed.

9. The author recommends that methane and ozone be included in this policy when better data are available.

10. The points at which other energy technologies would become viable without subsidies (in the last line) are taken from the Annual Energy Outlook, 2010 (DOE, 2010). Solar thermal and solar photo-voltaic would become viable at a higher range of fuel fees than those in this table. New technologies for these and other alternatives could bring economic viability sooner (i.e., at a lower fee level).

11. Data from the Energy Information Administration (DOE, 2009) indicate that households with an income of $40,000 would, if the members did not change their patterns of consumption, receive rebates equal to their outlays in fees. Households in the income range $15,000-$20,000 would use only 86% of their rebates to pay their fees, while households with income more than $75,000 would have fees 36% higher than the rebates they would receive.

12. This policy provides a convenient low-cost framework for achieving other social goals. As an example, the gross pollution of the land and more significantly the oceans by plastic bottles, cups and bags was considered using data from the Clean Air Council ("Wastes Facts & Figures" November 2010) for the collection and disposal of these items in the US to suggest a range of fees to be assessed (not shown here).

The proposed rise in fees was stopped at a level at which use of disposable plastic bottles was reduced by 90 percent when similar fees were added in the Republic of Ireland.

The use of water is considered to be greatly underpriced in many areas, and could also be considered for the addition of a fee and redistribution as a rebate.

Besides calculating the fee rebates per person per month based on the above data and estimates, the author has guessed at government monthly distribution, accreditation and anti-fraud costs and at likely reductions in US unemployment.

2.5. A NOTE ON INEQUALITY

Some people have objected to the favorable treatment of the poor in this policy. Since at least 1980 there has been overwhelmingly favorable treatment of the rich in the US. Ben Bernanke has recently (December 2010) drawn attention to the extraordinary level of inequality that has been reached in the US and the need to correct it. Rotman in *Technology Review* and an article in The Economist have added strong views on the subject. Gross inequality in any society promotes instability and a general malaise that can reach the rich.

2.6. INEVITABLE CONSEQUENCES OF THE PROPOSED POLICY

1. The use of fossil fuels – natural gas, gasoline, diesel and fuel oil, coal, nuclear fuel etc. – and emissions of pollutants would be gradually but strongly reduced. The one-billion dollars we formerly spent every day to buy non-US fuel would also be reduced.

2. Business in general would rejoice at the reduction in uncertainty about energy prices and, in consequence, would make vigorous plans for future developments of all kinds.

3. Inventors, entrepreneurs, individuals and companies would start projects to produce energy from wind, sun, biomass etc. and to reduce emissions in ways governed by the market, and would hire many people to work in them.

4. All these new employees would start paying taxes, reducing the country's deficit.

5. People would start buying more-efficient vehicles, using buses more, walking and bicycling when convenient, buying better home-heating systems, refrigerators et cetera.

6. Poor people would get a little richer because their energy and other expenditures would increase less than those of the rich, but they would get the same rebates. They would receive something like a guaranteed income and have greater self-pride. If the rebates continued to increase, virtually all would come off welfare.

7. The rich would pay out more than they would get in their rebates. However, they would have far more freedom than do the poor to change their life-styles. They would buy everything available to lower their fees: fuel-efficient cars, air-conditioning systems, LED lighting, photo-voltaic generators and so on.

8. Congress would have the right to roll back, stop or accelerate the increases in any of the individual fees put on energy or emissions at any time. They would be hearing cries of joy from many and of anguish from the rich. They might even receive evidence that would convince them that global warming has been exaggerated, and they might therefore decide to roll back fees. All these possibilities would be democratic applications of Congressional power if the pressures came from voters rather than from lobbyists.

9. Congress would be discouraged from advocating one technology over another, because the modified free market would work its magic.

10. The government could cease to put stimulus money from our taxes to increase employment and to decrease the use of fossil fuels etc. The deficit would drop fast.

11. Almost the only expenditure required of the government would be for the system for transferring the monthly rebates – surely a relatively low-cost operation - and a step up of enforcement on people seeking opportunities to cheat. This policy would shrink government, would provide incentives for all of us to solve problems, and would greatly reduce government expenditures. Additional data on the proposed policy can be found on the web-site lessgovletsgo.org

2.7. DIFFERENT FORMS IN WHICH THIS POLICY HAS BEEN PROMULGATED.

In March 1974, I attended a seminar at MIT by Kenneth Boulding, former president of the American Economic Association and of the American Association for the Advancement of Science. He was rather negative about the future, and I asked him if I might send him some concepts that I had come up with that could produce better projections. He agreed, and I sent this policy as it was then in addition to others. After a few weeks, a most extraordinary response came from Boulding, complimenting me and my economics and asking me to get my ideas published in top-level economics journals. I was of course delighted, and wrote several papers, all of which were rejected. Economics editors do not like getting economics advice from engineers. Eventually I lowered my sights to op-ed articles in newspapers and had two or three published. I also wrote to every member of Congress several times and to other individuals, and testified five times to Congressional committees. Accordingly, I thought that I was doing a good job at spreading the word when variations of my policy began appearing in different places. For instance, the Carter Administration came up with the "Well-Head Tax" that was almost identical to my policy in several respects, and was apparently advocated by a Harvard economics professor to whom I had sent the policy. He had replied that he liked it and that it should be tried out. (I was not given any credit for this). A large number of others claimed to have originated it, but I found rather recently that one of these was in charge of a Harvard energy-policy meeting in December 1974, and he came to see me to claim that he had dreamed up the policy before I had done so. I pointed out that his meeting occurred ten days after I had received a lot of coverage in local newspapers and after I had been interviewed on the radio about it, and he dropped his claim. This strange event changed my attitude somewhat, because people copying

from a plagiarist who has not credited his sources have considerably less blame than do those who copy from an originator and claim credit.

I would like, therefore, to come to more-recent proposals for some version of the policy. Perhaps the most noteworthy was the use of the policy by the right-leaning Liberal-Party government of British Columbia in 2008. As stated above, the fee per ton of carbon dioxide increased from $10 to $30 from 2008 to 2012. All the proceeds were fed back to people and businesses, some in the form of income-tax reductions, which is how my policy started until I realized that these do nothing for poor people. The rigid schedule of the fee increase was not my preferred approach, but the policy performed better than any competing variety from any other Canadian province, and grew more popular as time went on, so it was considered a success.

Before looking at other versions of the policy it can be stated that everyone wanted to have a gradual introduction of fees. None did anything about inflation. None had any possibility of a governing board that could increase or decrease the fees.

Rep Stark, California, introduced HR 594 in 2009 with a tax starting at $10 per ton, increasing at $10 per annum, without rebates.

Rep. Larson, CT, introduced HR 1337 in 2009 "America's Energy Security Trust Fund act" with fees starting at $15 per ton CO2 increasing at $10 per year.

Senators Cantwell (D- WA) and Collins (R-ME) introduced the Carbon Limits and Energy for America's Renewal (CLEAR) Act in December 2009. CLEAR proposed to rebate 75% of revenue directly to households. With Sen. Susan Collins' (R-ME) co-sponsorship, CLEAR began as a bipartisan proposal. I had recently written to both senators and thought that I was due some credit, but soon found that an indirect plagiarist from MIT had proposed the concept to them.

Senator Bernie Sanders joined with Senator Barbara Boxer to promote the Climate Protection Act of 2013 with fees rising from $20 to $33 per ton.

In 2015 Senator Bernie Sanders introduced the Climate Protection and Justice Act. The fee would start at $15 per ton CO2 and rise by $3.22 per ton per year until it reached $73/ton. The collected fees would be returned to households.

Senator Sheldon Whitehouse's 2014 American Opportunity Carbon Fee Act would have fees on CO2 and CH4 at $42/ton increasing by 2% per year.

Senator Bernie Sanders joined with Senator Barbara Boxer to promote the Climate Protection Act of 2013 with fees rising from $20 to $33 per ton.

2.8. COMMENT

The Economist has long been a strong advocate for direct taxation of pollutants, and I once tried to engage the present editor, then the economics editor, on the inflationary and regressive effects of such policies, without success. That all modern versions of the policy should show such lack of concern of inflation seems reactionary. To deny the peoples' representatives any control over the magnitude of the fees charged also seems to show a lack of trust. The need to promote a redress of equality and fairness is very disappointing. All these aspects of the policy seem to demand inclusion.

The note on the effects on inequality was written before the current increasing enthusiasm for a universal basic income as something that would combat poverty. The policy rebates produce something very close to this concept, which should be an added point in its favor.

REFERENCES

[i] Anon: "Cap and trade, with handouts and loopholes" *The Economist*, May 23 2009

[ii] Wilson, David Gordon: News release from MIT to Associated Press, United Press International, individual newspapers on a new energy policy, November 30, 1973 This was published in papers of December 2 and 4, 1973, and resulted in a WGBH radio interview of December 4, 1973

[iii] Wilson, David G.: Hearings before the Subcommittee on Priorities and Economy in Government of the Joint Economic Committee, Congress of the United States Ninety-Third Congress, May 20, 1974, pp39 et seq.

[iv] Anon: "We have a winner", *The Economist*, July 23rd, 2011, p. 35

[v] Litman, Todd: "Carbon taxes: tax what you burn, not what you earn" Victoria Transport Policy Institute, Victoria, BC, July 31, 2008

[vi] Wikipedia: "The U.S. Energy Information Administration (EIA) is a principal agency of the U.S. Federal Statistical System responsible for collecting, analyzing, and disseminating energy information to promote sound policy-making, efficient markets, and public understanding of energy and its interaction with the economy and the environment. EIA programs cover data on coal, petroleum, natural gas, electric, renewable and nuclear energy. EIA is part of the U.S. Department of Energy.

[vii] Hamburg, Steve, chief scientist: "Methane: The other important greenhouse gas; methane is 84x more potent than CO_2 in the short term" Environmental Defense Fund, NY, NY, November 2014

[viii] Moyers, Bill: "The rule of the rich", *Mother Jones*, February 2011).

[ix] Rotman, David "The disparity between the rich and everyone else is larger than ever in the United States and increasing in much of Europe. Why?" *MIT Technology Review*, vol. 117 no 8, Cambridge MA, 2014

[x] Anon: "Free Exchange: It is the 0.01% who are really getting ahead in America", *The Economist*, November 8, 2014, p. 76