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Fiddling With Trade as Home Burns[1]

Although we were again reminded in 2008 of the unreliability of markets, pollution mitigation and environmental improvement become increasingly intertwined with market economics. We seem irrationally to continue and in fact, increase the role of the market in maintaining and improving human health and the environment. In this article, the author reviews four popular schemes for market participation in human health and the environment: emissions trading, the top runner program, corporate average fuel economy (CAFE), and technology forcing. This review demonstrates that when each of these programs has been deemed "effective," it generally means "economically profitable," not effective in improving human health or the environment. The review further shows that as these four methods are compared one to the other, when they do work to improve human health or the environment, their relative ability to do so is directly proportional to the degree of legal control, and indirectly proportional to the role of the market.

A. Introduction

Scientists do not often offer themselves as visionaries. The mandates of careful science do not allow for such fanciful excursions. However for his seventieth birthday, Stephen Hawking, the most iconic authority in natural science in the world today, prognosticated. He said that the future will see humans populate space, out of necessity. "I don't think we will survive another thousand years without escaping beyond our fragile planet."[2] He went on to say "It is possible that the human race could become extinct but it is not inevitable. I think it is almost certain that a disaster, such as nuclear war or global warming will befall the earth within a thousand years."[3]

The most iconic scientist of the last century, Albert Einstein, already had written (together with Bertrand Russell) to the President of the United States in 1955 asking "do we want to end war, or shall we erase our existence from the planet?"[4] With the disintegration of the Soviet Union, the world sighed a bit of relief from the threat of nuclear war, at least insofar it was assumed it would begin between the two nuclear superpowers of the time, the USSR and the USA. But with each new threat today – real or imagined – by North Korea or Iran for example, of using nuclear weapons, our collective nervous tension again rises. There are no new arguments against nuclear war, just new entities capable of participating. But the Cold War never did heat into active combat (conventional or nuclear). We should ask ourselves – why not? Did these same arguments against nuclear war convince anyone during the Cold War not to push the button? Or did the nuclear war just not happen because there was never the triggering event to make anyone push the button?

By comparison, if Hawking is correct and climate change alone could cause us to need to leave planet Earth, why would we not do anything to prevent that? Some will say we are doing all we can. But those are the same who first said there was no climate change and then when the evidence overwhelmed their politics, said that we were not causing the climate change. All current science says the little we are doing is not enough. We like to tell ourselves that we make rational decisions on such matters. But just as Bruno Latour pointed out that we have never really been modern,[5] we may well have never really been rational. We may have embraced the rationalism of the Enlightenment – either in rational science or in rational law – but we failed to incorporate its mandates into our consciousness. The ideology of rationalism may provide suitable instrumentalities at times to fulfill the other-than-rational wishes of some persons with power, and as such, play to an image we would have of ourselves. We would at the same time however be hard pressed to demonstrate that rationality motivates collective action, such as the action required to mitigate the effects of greenhouse gases on our climate.

Rationality in science, does not change human behaviour, it would seem. For example, most persons would identify themselves as humanitarians and at the same time know, as rational facts, that their computer or athletic shoes are produced by humans working in humanly unacceptable conditions. Yet we buy the shoes anyway. And this is our action in an area where the rational facts are uncontroverted. Somehow we have come to believe that science is not objective enough, or, more possibly, we are simply not choosing that to which rationality leads us. So in the area of environmental mitigation and remediation, we got things like the George W. Bush administration's position that it need heed its own science advisors – music to the ears of big businesses who supported Bush and who would stand to lose from greenhouse gas emission regulations.

The function of rationality in law is slightly better. Rather than insisting that it only describes the world, as rationality in science claims, rationality in law is conscious of the fact that

1 The legend is that the Roman Emperor Nero simply watched Rome burn in the great fire in the year 64AD while playing the lyre (referred to as a "fiddle") rather than taking responsibility to control the fire.

2 Stephen Hawking, as quoted by Raphael Satter in "On 70th birthday, Stephen Hawking repeats call to colonize other worlds," Associated Press, January 8, 2012, http://www.theglobeandmail.com/news/technology/science/on-70th-birthday-stephen-hawking-repeats-call-to-colonize-other-worlds/article2295254/ (last accessed February 20, 2012).

3 Responding to Climate Change (staff), Stephen Hawking: climate disaster within 1000 years, January 6, 2012. http://www.rtcc.org/technology/stephen-hawking-warns-of-climate-disaster-ahead-of-70th-birthday/ (last accessed February 20, 2012).

4 On July 9, 1955, Albert Einstein and Bertrand Russell issued the Russell-Einstein Manifesto warning of the peril of nuclear weapons and the dangers of continuing an arms race and called upon Congress, scientists and the general public to join in a resolution. The Russell Einstein Manifesto resolved: "In view of the fact that in any future world war nuclear weapons will certainly be employed, and that such weapons threaten the continued existence of mankind, we urge the Governments of the world to realize, and to acknowledge publicly, that their purpose cannot be furthered by a world war, and we urge them, consequently, to find peaceful means for the settlement of all matters of dispute between them." "Albert Einstein: Man of Imagination," by Nuclear Peace Foundation, http://www.wagingpeace.org/menu/action/urgent-actions/einstein/ (last accessed February 20, 2012).

5 Bruno Latour, *We Have Never Been Modern* (Harvard University Press, 1993.).

it both reflects and produces norms. But law is in fact perhaps most effective when the norm production functions to educate – which brings us to the conclusion that governments ought to put more effort into environmental education than regulation.[6] In the law, a society directly or indirectly must agree upon norms, so they are less likely to be rejected because one has hired his own legal advisor who, like hiring one's own chemist, can say the law is another way.

Biologist-turned-sociologist Professor Nikolas Rose once made a striking observation at the annual meeting of the British Sociological Association that the social sciences historically had proceeded based upon the notion that if we could understand the social world of the human, we could change them for the better, and the natural sciences had proceeded based upon the notion that we cannot change the physical world. But with the cloning of Dolly the sheep, and our apparent inability to stop so much destructive social behaviour, it might well be the case that the physical is changeable and the social is not.[7]

Article 2 of the Kyoto Protocol requires member states to pursue both mitigation of greenhouse gas effects and adaptation to those effects. Originally, we hoped to put great effort into mitigation and left adaptation for those changes due to climate that we just could not manage to prevent. But we have prevented so little that we have regrettably and necessarily shifted most of our efforts to adaptation. When Hawking's future generations need to leave the planet, will we say it is just adaptation? So just what is the point of mitigation and adaptation measures to climate change?

In searching for human motivations behind constitutions, Kenneth Burke concluded that "in effect, therefore, the theory of ‚positive law' has given us courts which are the representatives of business in a mood of mild self-criticism."[8] In considering why we have shifted our focus from environmental concerns to energy concerns, from environmental law to energy law, one might well ask whether that shift of focus is also not a shift from the tools of mitigation to the tools of adaptation. A recent turning point from mitigation to adaptation was the 1990s invention of the term "stakeholders." In the 1990s, the term "stakeholders" was introduced into environmental discourse with the claim that it was meant to bring all parties with a "stake" in environmental regulation to the table to meet with regulators. A stake of course is a wager; a bet. And a stakeholder is a gambler holding such a bet.[9] But the bet here, noble that it may have sounded, was not to bring "all interested persons" to the table. After all, who is not interested in clean air and clean water? True to its denotation, "stakeholder" signals, perhaps unintentionally, that it is those with a financial interest who are of concern and it was their financial interests that were to be brought to the regulators' table. What is more, it signaled they were to negotiate regulations on clean air and water, not on behalf of the public, whose health and well-being the regulations were meant to protect, but on behalf of business' financial stake in the outcome. And so with big business regulating the environment through the shadow it casts over government through politics, we get "environmental" legal measures such as the Japan's Top Runner program, the European Emissions Trading System, and the U.S. Corporate Average Fuel Economy (CAFE) standards. To determine if these programs are really about mitigation, or rather are about allowing pollution to continue while we are forced to adapt to it, one should examine not the financial advantages of these legal tools, but instead turn them on their heads and see if pollution mitigation is accomplished by any of these.

B. Applying the Lessons from Economic Failure to Environmental Concerns

The claim is made that markets, not states, will lead the way to cleaner air. Yet over a period of eight hundred years, time after time, we know that markets fail. Historical economic studies, such as those by Robert J. Schiller[10] and Carmen Reinhart and Kenneth Rogoff[11] make plain that human economic behaviour is not rational. To illustrate the failure of idealized market models to predict real effects, we can indeed look to environmental applications. "We find that initial allocation and ex-post emissions are correlated. The most plausible explanation is that carbon markets deviate from the idealized market conditions assumed in the Coase theorem."[12]

Without the backing of empirical history, the inquiry that Adam Smith makes into the nature and causes of the wealth of nations results in recommending laissez faire economics only due to two rationalist assumptions (neither of which has ever been demonstrated empirically to be in place nor can it be in place): first, the perfect market with no irrational behavior and no control by the state, and second an invisible hand to replace the control of the state in guiding economic policy.[13] Though a brilliant writer and convincing user of anecdotal evidence, Smith's historical account is Whiggish. On the contrary, Carmen Reinhart and Kenneth Rogoff have demonstrated that by examining empirical evidence, we see recorded about eight hundred years of market failures.[14] Moreover, not only do we know that markets fail, we know that Smith's assumptions fail so often that economists have abbreviations for them such as IHF to stand for invisible hand failure.[15] The economic literature reports that

"Invisible Hand failures (IHF) exist whenever voluntary and self-interested behavior of economic agents leads to a Pareto-suboptimal outcome. Market failures form the most important subset of IHFs. Examples of IHFs are the tragedy of the commons, the Prisoner's dilemma, the under-provision of public goods, [and] economies with externalities . . .."[16]

6 W.R. Black, Social Change and Sustainable Transport: A Summary of Workshop and Conference Activities, Research Needs and Future Directions, 2000; Cf. Deutsches Institut für Wirtschaftsforschung Ökosteuer hat zu geringer Umweltbelastung des Verkehrs beigetragen, 2010.

7 Nikolas Rose, British Sociological Association Annual Meeting, Edinburgh, April 1998. Notes on file with author. Rose was then with Goldsmith's College and is now with the London School of Economics.

8 Kenneth Burke, *A Grammar of Motives*, University of California Press, 1969, p. 363.

9 See, the Oxford English Dictionary.

10 Robert Schiller, *Irrational Exuberance*, Princeton University Press 2000; Carmen M. Reinhart and Kenneth Rogoff, *This Time is Different: Eight Centuries of Financial Folly*, Princeton University Press, 2009.

11 Reinhart and Rogoff, supra note 10.

12 Jan Abrell, Anta Ndoye Faye and Georg Zachmann, "Assessing the Impact of the EU ETS Using Firm Level Data," *Bruegel Working Paper*, 2011/08, July 2011, p. 15. Emphasis added.

13 R. V. Fabella, "A Nozick-Buchanan contractarian governance as solution to some Invisible Hand," Quarterly Review of Economics and Finance, 45 (2005) p. 294.

14 Reinhart and Rogoff, *supra* note 10.

15 Fabella, *supra* note 13, pp. 284–295.

16 *Ibid.*, pp. 285-286.

The empirical experience of economic history can tell us several things: first that markets all fail eventually, second that we know approximately why they fail, and third, that there has never been a market correction without control from outside the market. What even empirical economic experience cannot tell us, however, is the timing or duration of market failure. The problem of course with basing something like Adam Smith's economics upon rationalism is demonstrated by historicising the rational claims made by economics.

As Joseph Stiglitz notes:

„whenever information was imperfect, which is always, the reason the invisible hand so often seemed invisible was that, in fact, it was not there. The implication was that there were always government interventions that could make everyone in society better off, which was, in a sense, a theoretical repeal of market fundamentalism: the belief that markets worked on their own and acted with efficiency was simply not true."[17]

By comparison, more recent history shows that "The countries that followed neo-liberal policies, which focused on market fundamentalism and the idea that markets worked on their own, by and large failed. These were doctrines that were especially widespread in Latin America."[18] On the other hand, the region of the world that was most successful was East Asia which had rejected the fundamentalist model and instead followed a much more balanced course of government control and private profit."[19] Economists have observed that when it comes to then environment, allowing the market to determine what we do and do not do has not produced a very good record for the environment. "We knew markets didn't work well in the context of pollution or innovation as they produced too much pollution and too little innovation."[20]

In the law itself, even ardent market fundamentalist Judge Richard Posner of the US federal appeals court, famous proponent of economic determinism in the so-called "Chicago School," of law and economics, is having second thoughts and admits the market has again failed. "If you're worried that lions are eating too many zebras, you don't say to the lions, ‚You're eating too many zebras.' You have to build a fence around the lions. They're not going to build it."[21]

The law creates some norms based upon expediency or efficiency, such as when it creates traffic regulations, for example. Other norms are based upon the prevailing morality of the culture, such as the criminal prohibition on murder. Environmental pollution harms other human beings. The scientific standards set in environmental statutes and regulations make explicit reference to human health standards. When we exceed those standards, we harm other humans. We would not dream of introducing market standards to compliance with murder prohibition norms – why would we do so for environmental norms?

The argument has been made of course that markets improve the environment better than old-fashioned command-and-control state creation and enforcement of norms. This argument makes rational sense when one considers the market options offered, as explained by the proponents before they are put into effect. The problem of course is that when put into effect, they do not function as planned. Why not? Because human economic behavior (in fact, perhaps all of human behavior) is not rational. What does the market offer when things do not go as planned? More market under the name of "market correction" or even "market self-correction." If this dynamic – a rational plan, followed by market implementation, corrected by more market mechanics – was successful in improving the environment, we ought to be able to see empirical evidence of that improvement after a period of market implementation and self-correction, should we not? So to check that, one can have a look at the bigger and more popular market promises to clean the environment: emissions trading and the top runner idea. As we will see, the relative success or failure of these four programs is directly proportional to the degree of old-fashioned command-and-control exercised by the state on behalf of health and the environment in each, with emissions trading accomplishing least in health and environment, followed by the top runner program, followed by the corporate average fuel economy standards, and at the other end of the spectrum – technology forcing.

C. Emissions Trading – Business' Favorite Greenwashing Excuse

Emissions trading came into public consciousness when the United States initiated the idea for sulfur emissions. That program could be said to have contributed to some of the success of the United States in reducing the sulfur compound loading into the atmosphere and resultant reduction in effects like acid rain. It was therefore not surprising that when it came to mitigating another atmospheric pollutant – greenhouse gases – the United States wanted again to invite business to trade emissions – this time greenhouse gases. Ironically, although it was the United States that proposed the inclusion of emissions trading as a so-called flexibility mechanism when negotiating the Kyoto Protocol, and emissions trading was in fact included in the final document, the United States has failed to participate by ratifying the Kyoto Protocol.[22]

It is rather telling that economists and business measure the "effectiveness" of emissions trading based upon, for example, whether the European Union's emissions trading scheme had an impact on "profits of participating companies."[23] The fact of the matter is that the EU, as well as many individual states, adopted their respective emissions trading schemes because of those same states having ratified the Kyoto Protocol and implemented its mandates into domestic law. However, the clear and unmistakable purpose of the Kyoto Protocol is to mitigate greenhouse gas loading and its effects on the atmosphere. Only for the express purpose of "supplementing" that mitigation process, flexibility mechanisms were negotiated into place by Brazil (the clean development mechanism), Norway (joint implementation) and the United States (emissions trading).[24] It is equally ironic to find that one can

17 Joseph Stiglitz, *"Moving Beyond Market Fundamentalism,"* Annals of Public and Cooperative Economics, 80:3 (2009) p. 348.
18 *Ibid.*, pp. 348-49.
19 *Ibid.*
20 *Ibid.*, p. 347.
21 Richard A. Posner, *A Failure of Capitalism: The Crisis of '08 and the Descent into Depression*, Harvard University Press, 2009.
22 Donald A. Brown, *American Heat: The Ethical Problems with the United States' Response to Global Warming*, Brown and Littlefield, 2002.
23 Abrell et al., supra note 12.
24 Brown, supra note 22, p. 157.

openly call the system "allocation of marketable pollution permits" when the Americans were so adamant and careful not to characterize the scheme as permits, for real and dangerous legal reasons.[25] Conclusions by economists focus upon monetary gain, and skim over emissions changes. The Abrell study cited above, for example, states in the conclusion that there was a two percent rise in emissions during the first phase, and an apparent two percent drop in the second phase.[26] That subsequent two percent decline is two percent of a larger raw number of emission tons, however, considering the initial rise plus the fact that all states continue to emit more. The net result of emissions trading? Profits for corporations during a period of net emission increases. Although an optimistic view could be taken from European Environmental Agency statistics of the (fifteen member) European Union's goal to reduce by eight percent its greenhouse gas emissions by 2012 below 1990 base limits,[27] if we include the other ten EU member states or the updated goal of twenty percent emission reduction, the impressive 12.7 per cent reduction below 1990 by the EU-15 becomes far less impressive, if in fact it will at all meet the total emission reduction goal necessary as forecasted by the Intergovernmental Panel on Climate Change (IPCC).

Other trading programs, such as that in China, fare worse under analysis. As a result, one must conclude that emissions trading schemes do not reduce greenhouse gas emissions, but that such schemes represent "economic instruments for achieving a given target – the reduction of greenhouse gases – with the lowest possible costs.[28]

D. Top Runner Approach

The top runner program might indirectly be characterized as an environmental protection program because of its goal of using energy efficiently. In various industries in Japan for various, but not all products, efficiency standards were to be set not by government mandate, but by competitive market practices of making the most energy efficient product in that field. The major characteristics of the Japanese top runner approach are that the most efficient products (that is, the "top runners") set the standard, taking into consideration technological potential. In addition, differentiated standards are set based on various parameters. "The standards are based on the currently most energy efficient products on the market, such that the initial phase looks like a best available technology (Stand der Technik) program. "But as standards are dynamically further developed over time, it eventually forces environmental innovations beyond the current state of technology. This becomes evident in the second phase of the program: The second, more ambitious, standard is no longer based on the "Top Runner" found on the market; rather it is already a product of the regulatory process. The Top-Runner Program may therefore be seen as a variant of forced technology development based on dynamic product standards.[29] It remains however important for the current discussion to remember that compliance with the top runner standard is evaluated by corporate average, similar to the corporate average fuel efficiency standards in the United States.

Because the most energy efficient product on the market during the standard setting process sets the top runner standards, the approach is essentially based on market data.[30] Ironically, it was precisely the reliance upon the market that created the exigency in the first place, as one of the industry's own representatives admits. "Mandatory energy efficiency standards for appliances and automobiles had been in effect since 1980 in Japan. However, they had failed to induce a sufficient energy efficiency improvement as they were rarely revised and were largely based on negotiations with industry without any explicit standard-setting method."[31]

Thus, rather than allow industry to set the standards based solely on making profit from being the top seller, "what is needed is a clear focus on prioritizing the ecological effectiveness of environmental innovations, devising ‚smart regulation' through instrument mixes and addressing the inherent limitations of innovation-oriented policies,"[32] As economist Joseph Stiglitz reminds us, the market makes too little innovation and too much pollution. Moreover, "due to problems of market failure, supporting government measures acquire a key role in this context."[33] "The development and diffusion of environmental innovation therefore requires a proactive role by government. However, environmental innovations should never be considered an end in themselves but rather a means to achieve existing environmental quality objectives."[34]

In their comprehensive assessment of the top runner approach, and to answer the question whether it might work for Europe, Jänicke and Lindemann conclude that the changes that one typically sees when innovation is driven by the market are incremental and when a large scale problem needs immediate attention, such as climate change, that incremental innovation is insufficient to address the problem. Only the combination of two criteria – "radicalness of innovation and market penetration – provides with a suitable yardstick to assess the ecological effectiveness of environmental innovations," according to Jänicke and Lindemann.[35] Moreover, as between the two, market penetration is qualitatively more important than radical innovation.[36] They go on to say that "In the end, it is the replacement of coal-fired power plants by renewable energies rather than continuous incremental efficiency gains that will ensure the decoupling of environmental pressures from economic growth and the absolute reduction of environmental impacts."[37] When the top runner program is most effective is when it features mandatory regulation,

25 See, Kirk W. Junker, *"Ethical Emissions Trading and the Law,"* 13 *University of Baltimore Journal of Environmental Law* 149 (2006).
26 Abrell et al., supra note 12, p. 15.
27 Lawan Usman Ali, "Examining the Environmental Impact of European Union Emissions Trading Scheme (EU-ETS) – An Input Output Approach", *Centre for Energy, Petroleum and Mineral Law and Policy*, University of Dundee, 2011, p. 3.
28 R. Baldwin, "Regulation Lite: The Rise of Emissions Trading" in London School of Economics Law, *Society and Economy Working Papers 3/2008*, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1091784 (last accessed July 27, 2011). See also, F. Yamin and J. Depledge, *The International Climate Change Regime: A Guide to Rules, Institutions and Procedures*, Cambridge University Press, 2004.
29 Martin Jänicke and Stefan Lindemann, "Governing Environmental Innovations," *Environmental Politics*, vol. 19, No. 1 February 2010, pp. 127-141, p. 133, citing Swedish Environmental Protection Agency 2004, Kuik 2006a and Oosterhuis 2006b.
30 Osamu Kimura, SERC Discussion Paper 09035, "Japanese Top Runner Approach for Energy Efficiency Standards," http://www.climatepolicy.jp/thesis/pdf/09035dp.pdf (last accessed February 22, 2012), p. 2.
31 *Ibid.*, p. 1.
32 Jänicke and Lindemann, *supra* note 29, p. 127.
33 *Ibid.*, p. 128.
34 *Ibid.*, p. 128-9.
35 *Ibid.*, p. 128.
36 *Ibid.*, p. 128.
37 *Ibid.*, p. 130.

making it a variation on technology forcing, which will be discussed in greater detail below. "We should not overlook the scope for innovation potential of regulatory instruments to be substantially increased by ‚technology-forcing.' . . . Technology forcing has been particularly present in the regulation of both stationary sources and in the American automobile sector. It has also been significant in the areas of worker protection and consumer product safety."[38] Two decades after the US Clean Air Act set targets for HC, CO and NOx based upon human health, but which targets were beyond the existing state of technology, Japan itself developed converter technology that could meet the American standards.[39] So not only had technology forcing worked in the car industry in the U.S., it was sufficient as a U.S. legal tool to guide and force Japanese technology development to meet human health and environment standards.

It is of course crucial to note here that the Top Runner Program relies upon being carried as a "product of the regulatory process," not a laissez-faire market. Nevertheless, "the results of the program have been evaluated as ‚very positive' by the Swedish Environmental Protection Agency 2004."[40] In what is perhaps the most comprehensive government analysis of the top runner program to date, the Swedish Environmental Protection Agency published an eighty-one page assessment that went on to note that "The mandatory nature of the Program forced producers to meet the standards and to consider some issues – in the case of the Top Runner program, energy efficiency–in their product development strategy that they might not otherwise consider."[41] However, according to the Swedish EPA, "Setting standards at a ‚realistic' level, as in the Top Runner Program, facilitates steady improvement, but may not contribute to radical change. The change achieved may not correspond to what is necessary for the creation of a sustainable society."[42] Moreover, in attempting to assess the achievement of the top runner program after its first five years of operation, the Swedish EPA commented that "It should be noted that the data presented only covers the manufacturers and importers of the respective industry associations. . . ."[43]

It is of interest to note that even in the ambitious Swedish study, "except for computers and cars, information regarding the number of products placed on the market could not be obtained. (because, according to the Japanese Energy Conservation Center, sales data are available for the respective models (of other products)), but are prohibitively expensive."[44] Regarding meeting the standards, they also note that "the fact that manufacturers in some groups manage to meet the standards even prior to the target year suggest that the standards maybe have been set too low."[45] Therefore, economic rationality is ironically too expensive to be tested by empirical data. Two years later, Joakim Nordqvist executed a project within the framework of the Energy Intelligence for Europe program, called "Evaluation of Japans's Top Runner Programme." Germany itself considered a similar program to that of the Japanese when in 2005, Greenpeace introduced a variation on Top Runner legislation.[46]

By comparison, another program is that created by the EU Directive on Energy-using Products. It is said to be potentially even more innovative, a Jänicke and Lindemann conclude is necessary for environmental improvement, in that "it follows a more holistic approach. Instead of focusing on energy conservation alone, it strives to reduce the total environmental disposal (or recycling)"[47] At the end of the day, one must "remember that technology simply cannot solve all environmental problems. This is particularly true of policy domains such as biodiversity and soil conservation where few, if any, technological solutions are available."[48] Jänicke and Lindemann further conclude that "Strategies are most likely to succeed if market-based ‚trend-steering' through economic instruments (e.g. emission trading) is complemented with regulatory ‚fine-tuning' by means of regulatory standards."[49] Regrettably, in addition to emissions trading and the front runner program, the comprehensive European Environmental Technologies Action Plan tends "to focus on the associated economic opportunities rather than environmental improvements."[50]

E. Corporate Average Fuel Economy Legal Narrative: Effectiveness and Litigation

Moving one step closer to a strict regulatory approach on the spectrum, the United States' National Highway Traffic Safety Administration (NHSTA) reserved the right to promulgate regulations controlling greenhouse gas emissions through Corporate Average Fuel Economy (CAFE) standards.[51] These standards set a minimum requirement for the average number of miles a vehicle travels per gallon of gasoline or diesel fuel.[52] Within a specified model year, an auto manufacturer must meet an average level of fuel economy for all vehicles in its fleet.[53] Failure to do so can result in civil penalties assessed by the government against the manufacturer.[54]

The minimum performance requirements must reflect the "maximum feasible fuel economy" that can be achieved by manufacturers in specific model years.[55] Four considerations have been set forth by law – the US Energy Policy and Conservation Act of 1975 (EPCA)[56] – which the NHSTA must consider: technological feasibility, economic practicability,

38 Ashford, N. A. Ayers, C., and Stone, R.F., Using regulation to change the market for innovation. *Harvard Environmental Law Review*, 2 (9) (1985), 419–466, as cited by Jänicke and Lindemann, supra note 29, p. 133.
39 Jänicke and Lindemann, supra note 29, p. 133.
40 *Ibid.*, p. 134.
41 The Swedish Environmental Protection Agency, *"The Top Runner Program in Japan: its effectiveness and implications for the EU,"* 2005, p. 10.
42 The Swedish Environmental Protection Agency, p. 10. It should be noted that in conducing the interviews for the report, the EPA noted that "A number of interviewees commented on the effect of the fact that the Program is based on legislation." p. 9.
43 The Swedish Environmental Protection Agency, p. 39.
44 The Swedish Environmental Protection Agency, p. 41, fn. 34.
45 The Swedish Environmental Protection Agency, p. 44.
46 Greenpeace, Greenpeace-Entwurf vom 30.5.2005 für ein Gesetz zur Steigerung der Energieeffizienz beim Einsatz energiebetriebener Geräte und Maschinen (Energieeffizienzgesetz, "Top Runner"). Greenpeace, Hamburg (2005) and Greenpeace, Effizienz: Die Energiequelle der Zukunft, Greenpeace, Hamburg 2005.
47 Jänicke and Lindemann, supra note 29, p. 138, note 6.
48 *Ibid.*, p. 135.
49 *Ibid.*, p. 137.
50 *Ibid.*, p. 138.
51 National Highway Transportation Safety Agency, "CAFE – Fuel Economy," http://www.nhtsa.gov/fuel-economy (last accessed Feb. 16, 2012).
52 See Ctr. for Auto Safety v. Nat'l Highway Traffic Safety Adm., 793 F.2d 1322, 1324 (D.C. Cir. 1986).
53 *Ibid.*
54 *Ibid.*, at pp. 1324-25.
55 *Ibid.*, at p. 1325.
56 Matthew Frong, Fueling Change: Judicial Review Standards – Center for Biological Diversity v. National Highway Traffic Safety Administration, 508 F.3d 508 (9th Cir. 2007), 77 U. Cin. L. Rev. 759, 762 (Congress, in response to the 1973 Middle East oil embargo, passed the Energy Policy and Conservation Act which provided for the creation of the NHTSA).

the effect of other Federal motor vehicle standards on fuel economy, and the need of the U.S. to conserve energy.[57] Because Congress entrusted NHTSA, and not the market, with broad authority to make policy determinations, when litigation arises, the courts have historically granted considerable deference to the agency's determinations.[58] However, a recent decision by the Ninth Circuit Court of federal appeals reversed the course of the judiciary by ruling that the NHSTA must apply stricter standards.[59]

Judicial review of final administrative rules promulgated by the NHSTA are conducted pursuant to the EPCA[60] and the Administrative Procedure Act (APA), which requires that an agency action be set aside if it is "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law."[61] Per the "arbitrary and capricious" standard of review, "the agency must examine the relevant data and articulate a satisfactory explanation for its action including a ‚rational connection between the facts found and the choice made.'"[62] Under this standard, the agency must demonstrate only a reasonable choice in light of the highly deferential nature of the standard of review.[63] Early case law exhibited the extreme deference shown by the courts, as will be noted below, and it was not based upon market choice.

In Citizens for Clean Air v. Environmental Protection Agency, the Washington Department of Ecology issued a permit pursuant to the Clean Air Act (CAA) for the construction of a solid waste incinerator without the implementation of a waste recycling program, and environmental organizations filed for administrative review.[64] The EPA argued that "it was, 'unable to reliably quantify the emission reductions attributable to materials separation'"[65] and also stated that "data are currently inadequate to determine precisely the effect on air emissions . . .."[66] The Ninth Circuit, applying a deferential standard of review, determined that the EPA's denial of the petition based upon uncertain or unavailable information was not arbitrary, capricious, or an abuse of discretion,[67] and without considerable evidence, the EPA was not required to give credence to any figures presented or assertions made.[68]

In Public Citizen v. National Highway Traffic Safety Administration, the courts again demonstrated immense deference to the NHTSA.[69] In 1986, the NHTSA implemented a roll back of the CAFE standard for passenger automobiles from 27.5 miles per gallon (mpg) to 26.0 mpg.[70] Nonprofit consumer and environmental organizations, numerous municipalities, and the State of California, appealed the order and challenged the roll back. The NHTSA claimed that the standard as set forth by the EPCA (27.5 mpg) was not "economically practicable."[71] The petitioners asserted that the standards were arbitrary and capricious, as well as contrary to the EPCA and the "technology-forcing" design of the statute because the roll back improperly elevated consideration of market forces.[72] In light of a proviso in the EPCA that provided the standard could be amended by rule, the Circuit Court found that the standard reasonably accommodated conflicting policies committed to the agency's discretion, and affirmed the order of the NHTSA.[73]

In a second case from the Court of Appeals for the District Court of Columbia, Competitive Enterprise Institute v. National Highway Traffic Safety Administration, petitioner interest groups sought a further reduction of CAFE standards by the NHTSA, but the NHTSA declined.[74] The petitioners argued that the decision of the NHTSA was arbitrary and capricious in that it failed to set the minimum standard lower, which compromised vehicle safety as a result of manufacturers having to downsize the size of their fleets.[75] The Circuit Court, in making its determination, noted that it "must avoid substituting [the court's] judgment for that of the agency," and continued that "[i]t [was] particularly important to adhere to [a deferential] standard when an agency has been called upon the weigh the costs and benefits of alternative policies."[76] The Circuit Court dismissed the petitioner's claim, holding that the action of the NHTSA was not arbitrary or capricious because its interpretation of the statute was reasonable and that the time for an assessment of standards had not come.[77]

Despite the judicial deference shown by the courts to the NHTSA since the implementation of the CAFE standards, the case known as Center for Biological Diversity v. National Highway Traffic Safety Administration marked a clear contrast to prior court actions and a divergence from the status quo.[78] The Circuit Court, sitting en banc, determined that the CAFE standards set by the NHTSA were "arbitrary and capricious" and in conflict with the EPCA.[79] The Court, in coming to its holding, reviewed a 2002 report entitled "Effectiveness and Impact of Corporate Average Fuel Economy (CAFE) Standards," produced by the National Academy of Sciences (NAC) in response to a Congressional request.[80]

The report concluded that particular aspects of the CAFE program had not functioned as originally intended.[81] For example, the report found that CAFE standards aided in a 50% increase in fuel economy for new light trucks from 1970 until 1982, but that standards set for passenger cars were drastically less stringent.[82] Because of decreased competition and the potential for greater profit margins in the light truck segment of industry, incentive existed for manufacturers to

57 Ctr. for Auto Safety, supra note 52, at p. 1325.
58 See Citizens for Clean Air v. EPA, 959 F.2d 839 (9th Cir. 1992); Pub. Citizen v. Nat'l Highway Traffic Safety Admin., 848 F.2d 256 (D.C. Cir. 1988); Ctr. for Auto Safety, 793 F.2d 1322.
59 Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin., 508 F.3d at p. 514, vacated, 538 F.3d 1172 (9th Cir. 2008).
60 Competitive Enter. Inst. v. Nat'l Highway Traffic Safety Admin., 901 F.2d 107 (D.C. Cir. 1990).
61 Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin., supra note 59, at p. 514, vacated, 538 F.3d 1172 (9th Cir. 2008).
62 *Ibid.*
63 *Ibid.*, at p. 555 (Siler, J., dissenting).
64 Citzens for Clean Air, 959 F.2d 839, at p. 841 (9th Cir. 1992).
65 *Ibid.*, at p. 844.
66 *Ibid.*, at p. 847.
67 *Ibid.*, at pp. 847-48.
68 *Ibid.*, at p. 848.
69 Pub. Citizen, 848 F.2d 256 (D.C. Cir. 1988).
70 *Ibid.*, at p. 259.
71 *Ibid.*
72 *Ibid.*
73 *Ibid.*, at p. 265.
74 Competitive Enter. Inst., 901 F.2d 107 (D.C. Cir. 1990).
75 *Ibid.*, at p. 116.
76 *Ibid.*, at p. 120.
77 *Ibid.*, at p 122.
78 Ctr. for Biological Diversity, supra note 59.
79 *Ibid.*, at p. 558.
80 U.S. Dep't of Transp./Nat'l Highway Traffic Safety Admin., NHTSA Docket No. 2005-22224-14, Effectiveness and Impact of Corporate Average Fuel Economy (CAFE) Standards (2005).
81 Ctr. for Biological Diversity, supra note 59, at p. 516.
82 *Ibid.*

invest in vehicles fitting the less stringent standard.[83] American consumerism responded positively to the shift to the benefit of the manufacturers and the detriment of environmental protection – light trucks accounted for 20 % of new vehicle sales in the 1970s, whereas light truck sales account for approximately 50 % of new vehicle sales today.[84]

In addition, the report also found that "technologies exist to ‚significantly reduce fuel consumption' . . . and that raising CAFE standards would reduce fuel consumption."[85] The authors of the report, the NAS, determined that improvement of fuel economy is essential to curtail the accumulation of greenhouse gases – particularly CO^2 – in the atmosphere.[86] The NAS noted that the United States emits one-fourth of the world's greenhouse gas emissions and that emissions from light trucks are believed to contribute 8 % of U.S. emissions, and 5 % of global greenhouse gas emissions.[87] Thus, the failure of the NHTSA to address the incongruity between passenger cars and light trucks has led to an increase in greenhouse gas emissions, contrary to the aims of the CAFE standards.

The Circuit Court, in addition to considering the report, also heard arguments set forth by the petitioners. The petitioners argued that the "use of marginal cost-benefit analysis unlawfully overemphasizes cost at the expense of technological feasibility and energy conservation . . .."[88] The petitioners continued, criticizing the standards for "reward[ing] fuel economy laggards while penalizing industry leaders," as the NHTSA considered the strain of the standards on ailing manufacturers.[89] In addition, the petitioners argued that absent a determination monetizing the value of environmental benefits, the maximum feasible standard could not be determined.[90]

The Ninth Circuit, at the conclusion of arguments, remanded the case for the preparation of a full Environmental Impact Statement (EIS), holding the NHTSA's "finding of no significant impact" was arbitrary and capricious.[91] An EIS must be prepared "if substantial questions are raised as to weather a project...may cause significant degradation of some human environmental fact."[92] The Ninth Court stated that although the NHTSA has discretion in setting CAFE standards, the balancing of competing considerations cannot undermine the primary purpose of the EPCA – energy conservation.[93] In conclusion, the judiciary, embodied in the Ninth Circuit ordered the regulation maker, the NHTSA, to produce more stringent CAFE standards.[94] That act leads us to the final approach on the spectrum – technology forcing.

F. Technology Forcing

Technology forcing may be described as an incentive-based regulatory effort directed at developing technology to meet specific human health and environment standards.[95] It is largely known for its efforts in the U.S. especially in the electric power industry. In broad terms, the standards require that industry develop new technologies or disseminate new technologies.[96] The aims of environmental law statutes developed out of the necessity to improve the quality of the natural environment both for its own sake and to support human life and health.[97] In response to failed congressional efforts directed at curbing pollution emissions through economic incentives, the U.S. Congress reasserted its efforts by providing incentives for polluters to install effective pollution control equipment.[98] The original economic incentives were provided in a two phase process. The first phase required public funding of research and development projects, but it became apparent to federal regulators that no natural incentive existed for an owner of a source of pollution to install abatement equipment developed from public funding.[99] In light of this failure, the government initiated the second phase of research and development, but in response to inadequate funding, Congress considered the need to turn the burden of pollution control technology over to private industry.[100] The government then entered into a third phase of economic incentives, strictly enforcing emissions in order to force industry to research and develop abatement technology.[101]

The U.S. Congress, through the Clean Air Act (CAA) of 1970, passed the first statute intending to regulate emissions through technology forcing.[102] The Act established "a joint state and federal program for regulating the nation's air quality."[103] After the Act was signed into law, litigation soon followed.[104] But the term "technology forcing" first appeared in U.S. cases in 1975.[105] In Union Electric, a case that is still the valid precedent in the field, an electric utility company operating three coal-fired generating plants was subject to sulfur dioxide restrictions under Missouri law. In the event a polluter could not meet the standards as set, the State retained authority to grant a variance. Missouri granted the electric utility company a variance that later expired. The State notified the electric utility company that it was in violation of the CAA and the company thereafter sought review.[106] The federal Court of Appeals for the Eighth Circuit dismissed the case and the U.S. Supreme Court affirmed the appellate court, finding that "[t]echnology forcing is a concept some-

83 *Ibid.*
84 *Ibid.*, at p. 517.
85 *Ibid.*
86 *Ibid.*
87 *Ibid.*, at p. 552.
88 *Ibid.*, at p. 520.
89 *Ibid.*, at p. 521.
90 *Ibid.*, at p. 520.
91 *Ibid.*, at p. 517.
92 *Ibid.*, citing Idaho Sporting Cong. v. Thomas, 137 F.3d 1146, 1149 (9th Cir. 1998).
93 *Ibid.*, at p. 520.
94 It must be noted, however, that the opinion published at 508 F.3d 508 (9th Cir. 2007), was vacated and withdrawn at 538 F.3d 1172. The Ninth Circuit, in vacating the judgment, noted that the preparation of an EIS is not mandated in all cases where an agency prepared a deficient Environmental Assessment (EA) or failed to comply with the National Environmental Policy Act (NEPA). Thus, the Ninth Circuit held that "NHTSA must prepare either a revised Environmental Assessment or, as necessary, an Environmental Impact Statement," which is a fundamentally lesser standard. In addition, the Ninth Circuit deleted the "arbitrary and capricious" paragraph from the opinion.
95 Jay P. Kesan & Rajiv C. Shah, "Shaping Code", 18 *Harv. J.L. & Tech.* 319, (2005).
96 P. Lorang & L. Linden, *Automobile Safety Regulation: Technological Change and the Regulatory Process* 149-54 (1977).
97 John E. Bonine, "The Evoultion of Technology-Forcing in the Clean Air Act", 6 Env't. Rep. (BNA) No. 21, at p. 2 (1975).
98 *Ibid.*
99 *Ibid.*
100 *Ibid.*
101 *Ibid.*
102 Union Elec. Co. v. EPA, 427 U.S. 246, 265-66 (1976) reh'g denied, 429 U. S. 873 (1976).
103 Envtl. Def. v. EPA, 467 F.3d 1329, 1331 (D.C.Cir. 2006) (internal quotation marks omitted).
104 See Train v. Natural Resources Defense Council, Inc., 421 U.S. 60, 91 (1975); see also
105 Kirk W. Junker, *Can Courts "Force" Technological Discovery to Occur?* (1997) citing Train, 421 U.S. 60.
106 Union Elec. Co, *supra* note 102, at p. 252.

what new to our national experience and it necessarily entails certain risks. But Congress considered those risks in passing the 1970 Amendments [to the CAA] and decided that the dangers posed by uncontrolled air pollution made them worth taking."[107] The Court in so holding recognized the inherent danger that Congress sought to prevent and reinforced the mechanism by which emissions in excess of regulations could be remedied. The Court opined that a claim of "economic or technological infeasibility be deemed wholly foreign" and could not be considered.[108] The message became clear – develop technology that could limit the pollutants being emitted within the statutorily-mandated time or face a shut down. In addition, the Court also held that states may impose stricter controls than those set forth by the Environmental Protection Agency (EPA).[109]

Given the relatively strong sovereign power of states in the U. S., one should also consider what has happened with electric power companies there. The Pennsylvania Supreme Court found in Commonwealth of Pennsylvania, Department of Environmental Resources v. Pennsylvania Power Company (a case that is also still valid precedent in the field) that industry must improve technologies to meet guidelines or face sanctions as a result of noncompliance.[110] In Pennsylvania Power, the Department of Environmental Resources brought a civil penalty petition against Pennsylvania Power (hereinafter "Penn Power") for failure to file an emission standard compliance plan. Penn Power argued that government imposed sulfur dioxide regulations were too stringent and that it was technologically impossible to meet the statutory limits. Penn Power then argued that the monetary sanctions imposed for failure to comply would result in an unconstitutional taking of property. The appellate court upheld penalties for particulate matter emission violations but found penalties for sulfur dioxide emission violations to be unconstitutional. The Pennsylvania Supreme Court, on review, reversed on the finding of unconstitutionality of the penalties. The Court held that "the assessment of civil penalties is not only an amicable accommodation, striking a proper balance between the extremes of permitting unbridled pollution and a complete shutdown of the polluter industry, but it provides the spark to ignite the engine for technological change in the industry."[111] The effect of the Court's decision provided that the imposition of civil penalties are not a punishment for an intentional disregard of a regulation or court order but rather an incentive to spur the research and development of technologies aimed at reducing and eliminating pollutants. The Court concluded that "[technology forcing] recognizes the ingenuity and innovativeness of American industry . . . [and] continued profitable conduct of the activity will depend upon the industry's ability to develop the necessary controls."[112]

In a more recent case, the Supreme Court of the United States again reiterated the importance of technology forcing. In Whitman v. American Trucking Associations, Inc., the Supreme Court found that a section of the CAA requiring the EPA to set air quality standards at a level to protect public health with a sufficient safety margin fit within the permitted scope of discretion.[113] The Supreme Court also held that the CAA "unambiguously bars cost considerations from the national ambient air quality standards-setting process."[114] Supreme Court Justice Breyer noted that throughout the history of the CAA, Congress has pushed technological and economic limits in order to protect human health.[115] Indeed, as noted by Senator Edmund Muskie, the primary sponsor to the 1970 amendments to the Act, and cited by U.S. Supreme Court Justice Breyer, the Act was not "to be limited by what is or appears to be technologically or economically feasible," but "to establish what the public interest requires to protect the health of persons," even if that means that "industries will be asked to do what seems to be impossible at the present time."[116] Justice Breyer continued, noting that the current 1990 amendments adopted the tradition of the original technology-forcing standards by requiring emission reductions despite excessive costs to the implementing industry.[117]

Furthermore, the judiciary has reinforced technology-forcing standards as set forth in other environmental statutes such as the Clean Water Act (CWA) and the Resource Conservation and Recovery Act (RCRA).[118] The United States Court of Appeals for the District of Columbia noted in the case of Natural Resources Defense Council, Inc. v. U.S. EPA that in relation the CWA, "that EPA enjoyed authority to adopt such a regulation; that the regulation directly promotes the goals of the Act; that it is fully consistent with the technology-forcing framework of the Act; and that the rule is reasonable."[119] The Court continued, stating that "[t]he essential purpose of this series of progressively more demanding technology-based standards was not only to stimulate but to press development of new, more efficient and effective technologies. This policy is expressed as a statutory mandate, not simply as a goal."[120] The same Court also found in Edison Electric Institute v. U. S. EPA that the EPA's interpretation of a section of the RCRA is "consistent with RCRA's status as a highly prescriptive, technology-forcing statute."[121]

Therefore it can be seen that the U.S. Congress, through various acts, has made it clear that technology forcing is a viable option to stimulate change effectively for the protection of human health and the environment. Technology-forcing statutes, unlike pure economic incentives, act more as a sanction rather than a benefit, but despite this and contrary to the claims of market fundamentalists, the results have been positive. In support thereof, the courts have reinforced and reiterated the intent of the Congress by finding technology-forcing policies constitutional and enforceable.

107 *Ibid.*, at p. 269.
108 *Ibid.*, at p. 247.
109 *Ibid.*, at pp. 264-65.
110 Penn Power, 490 Pa. 399, 416 A.2d 995 (1980).
111 *Ibid.*, at p. 1003.
112 *Ibid.*, at p. 999.
113 Whitman v. American Trucking Associations Incorporated, 531 U.S. 457 (2001).
114 *Ibid.*, at p. 471.
115 *Ibid.*, at pp. 490-91 (Breyer, J., concurring).
116 *Ibid.*, citing 116 Cong. Rec. 32901-32902 (1970), 1 Legislative History of the Clean Air Amendments of 1970 (Committee Report compiled for the Senate Committee on Public Works by the Library of Congress), Ser. No. 93-18, p. 227 (1974) (hereinafter Leg. Hist.).
117 *Ibid.*, at pp. 490-91.
118 See NRDC v. EPA, 822 F.2d 104 (D.C. Cir. 1987); see also Edison Elec. Inst. v. EPA, 996 F.2d 326 (D.C. Cir. 1993).
119 NRDC, *supra* note 118, at p. 122.
120 *Ibid.*, at p. 124.
121 Edison Elect. Inst., *supra* note 118, at p. 335.

G. Conclusions

So what have we learned about law in this review of alternative approaches to the environment? First, we see that all the methods, regardless of how much they appeal to the rhetoric of "free markets," have state regulatory schemes that permit or structure the market, who gets the market benefits and how much those benefits are. Moreover, we have seen that in these four examples, from emissions trading to the top runner program to the corporate average fuel economy standards to technology-forcing, the effectiveness in environmental cleanup (not industrial profit) is directly proportional to the amount of state involvement, with emissions trading producing the least environmental improvement and technology forcing producing the most. Related to this second point is the fact that the so-called "free market" has for eight hundred years, continuously failed, and each time it has, the state was needed to put things back together. So in summary, one must be very careful in measuring the notion of success of any environmental program. If the stated goal of the program is a clean environment, history has shown that market-determined programs are ineffective. There always have been areas of human concern that just do not improve through privatization for profit, such as transport, schools, and police and fire protection. According to Nobel-prize winning economist Joseph Stiglitz, the environment is another of these areas. A review of the air pollution programs in this article supports that conclusion.

Further, this evidence demonstrates that we use neither science nor law rationally. This second conclusion raises enormous questions as to how we do in fact make cognizant use of scientific fact and legal tools. While it is beyond the scope of this article to delve further into that, it must here be said that we should begin to invest then how it is that we support emissions trading, the top runner program, the and the corporate average fuel economy standards, if not to improve our health or environment. When it comes to market fundamentalism, Carmen M. Reinhart and Kenneth Rogoff conclude their empirical review of eight centuries of financial folly by admonishing that the four most dangerous words in economics are "this time is different." One is here reminded of a famous statement by John Dewey: "As long as politics is the shadow cast on society by big business, the attenuation of the shadow will not change the substance."[122] Measuring the success of environmental programs by business profit standards amounts to attenuating the shadow . . . or fiddling while home burns.

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122 Robert Westbrook, *John Dewey and American Democracy*, (Ithaca: Cornell University Press, 1991), p. 440.