De-Carbonizing California and the EU

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California and Sweden are both leaders in green regulations and actions. They are both enmeshed in federal systems that constrain their actions. In both there is a substantial political base for environmental regulation, yet the path to regulation in these two political entities is quite different. This chapter describes how these two political entities made environmental policy, with particular reference to their legal systems and the interaction of their systems and those of their federal partners, the United States and the EU.

Background

California (CA) is a not so small, open economy, with no monetary policy and a near balanced budget. It is not known for heavy manufacturing and no longer has significant

steel mills or car plants. It has fading oil reserves and a significant refinery capacity. Although it is among the largest agricultural states by value, it is not a major producer of grain.

It is the longtime home of the environmental movement and currently has a very green, Republican governor and a strongly democratic and green legislature. It is among the states that have decided to set green-house gas reduction goals independent of US policy.

Sweden, in contrast, is a small, open economy that has preserved its monetary autonomy (as opposed to joining the euro) and runs a balanced budget by choice. Sweden has considerable heavy industry, including a large mining sector, truck and automobile manufacture. It has no fossil fuel. It does have a large paper and forestry industry. Sweden has a parliamentary system and a Green Party that can be the margin of victory for the left wing alliance. Attention to climate change action has been unabated in the current center-right coalition. Stats-minister Reinfelt has even been pictured with Governor Schwarzenegger.

Both Sweden and California have a long record of environmental action unforced by external actors—Sweden was green before Brussels required it and California was green before there was a US EPA. While these countries have green policies in common, they differ considerably in the legal regime surrounding the environment and the tools that are used to induce compliance.

Sweden's Environmental Regulation Regime

From 1999, Sweden has a new and comprehensive environmental code. The code provides a framework for the environment that is at once very familiar to a US environmental practitioner, yet also startlingly different. To begin with the code applies in all media, unlike the US and Ca model of separate laws for water, endangered species, air, pesticides, procedure, and so on. As a single code of seven parts, 33 chapters, and 450 articles, it proceeds from principles to procedure and then to penalties.

The heart of the code is (1) the precautionary approach, (2) the requirement that measures must be taken to avert damage to human health or the environment and (3) the polluter pays principle.[1] These are general rules and apply to all activities both private and public.

The polluter pays principle opens the possibility of money damages for almost any activity that adversely affects the environment. In this sense it looks like CERCLA, which provides for natural resource damages in a more limited setting. The litigation generated by CERCLA, like the case for damages from the Exxon Valdez spill, has not been viewed by all as a positive development in environmental policy.

Like the Clean Water (CWA)and Clean Air Act (CAA), the Environmental Code requires "best available technology" to avoid damage. And again like its US cousin, it allows a phase in period for existing sources to comply.

Again like the CEQA and NEPA, the Code requires that large projects obtain environmental permits. In the US, the environmental laws require public entities, broadly

[1] The source is Sweden's Environmental Policy. Ministry of the Environment. www.sweden.gov.se/environment. Document number M 2004.03. Stockholm. 2004.

construed to produce EIRs or EISs, for major actions (including issuing permits to private entities) with an effect on the environment. The Code extends this equally to private and public entities. The major difference in the Code and US law is the approval process for actions with environmental consequences.

Under the Code the moving entity submits its plan to a county agency if the project is small or to the Environmental Court (approximately a Federal District Court) if the project is large. The ruling of the court may be appealed to an appellate environmental court and ultimately to the High Court. The legal action is designed to go to the ultimate question of whether the plan is consonant with the Code. In contrast, much of the legal action in the US is about whether the EIS is procedurally correct. In Sweden, the government can intervene in this process and make a political decision allow a project that would otherwise be denied.

In the above respects, there is correspondence in the ways that environmental law is carried out in these two entities. The most radical difference between California and Sweden is the Swedes use of environmental taxes. Taxes are a direct result of the polluter pays principle. They literally make the polluter pay for all their pollution.

Sweden's performance in GHG reduction between 1991 and 2001 is remarkable 5% reduction in emissions and 40% since the mid 1970's. The majority of this reduction was attributable to the buildup of the nuclear power industry. Climate policy, per se, dates only from the late 1980's. Figure 1 gives a short history.

Table 1. Climate policy decisions in Sweden

1988	The first explicit climate target in Sweden. The target included CO2 only, and implied a stabilisation of emissions at the ”current level”.
1991	An amendment to the 1988 target. All green house gases are now included.
1993	A national climate strategy in line with the targets in the UN Climate Convention was decided. The new target was a stabilization of CO2 emissions orginating from fossil fuels to the 1990 level before year 2000, and a reduction thereaftera.
1997	A decision of new guidelines for energy policy with a specific climate strategy for the energy sector.
1998	A parliamentary decision on transport policy implying a stabilization by 2010 of CO2 emissions from transports to the level of 1990.
1999	A decision to introduce a system with 15 environmental quality targets, in which ”limited climate impact” was one..
2002	A new proposition on the ”Swedish climate strategy”, in which the prevailing objectives were stated.
2002	A further refinement of the system with environmental quality targets, concerning,among other things sector responsibility to achieve the targets.
2002	An energy policy decision, including among other things decisions concerning further international efforts in the climate area.
2006	A decision implying that the intermediate targets 2008-2012 should still be kept, but that the emissions by 2020 should be 25% lower than 1990.

The current commitment is much more stringent than what is required by the EU. The climate target decided upon was a long run objective that the concentration of greenhouse gases not should exceed 550 ppm CO2 equivalents, and that the per capita emissions should not exceed 4.5 ton by the year of 2050. It was also stated, of course, that the fulfilment of the concentration target is largely dependent of international cooperation. It was also decided on some short run targets, implying that the average emissions of greenhouse gases during the period 2008-2012 should be 4% lower than the 1990 level. This should be achieved without the use of “flexible instruments” and/or carbon sinks. (Flexible instruments are being reconsidered.) At the same time Sweden was committed to a binding commitment through the Kyoto protocol and the EU agreement of burden sharing within the EU. According to that commitment Sweden is obliged to limit its

emissions to no more than +4%, as an average, 2008-2012, compared with the 1990 level. In other words, the Swedish parliament decided on national goals that were significantly stricter than the obligations that resulted from the negotiations within the EU.

The current collection of instruments that are being used to reduce GHG emissions are shown in Table 2.

Table 2. Climate policy instruments in Sweden

Non-sector specific national instruments	
Energy consumption tax	Energy tax on energy consumption (not related to CO2)
Energy production tax	Energy tax energy production (not related to CO2)
CO2 tax	Tax levied on CO2 content in fuels
The environmental legislation act	
Local climate investment programme	Subsidies for investments that reduces emissions
Information	Information campaigns about the climate problem jointly done by the energy agency, consumer agency and the Swedish environmental protection agency
Sector specific instruments	
Energy and housing sector	
Green certificates	Consumers of electricity obliged to buy a specific amount of certificates (proportional to electricity consumption) that ensures production of electricity from renewable sources.
Subsidy to windpower	Investment subsidy and a variable "green bonus"
Promotion program for improving energy efficiency	Companys that engage gets a tax relief from the EU minimum energy tax
Energy declaration of buildings	From 2007 it is mandatory to have an energy declaration for buildings
Building norms	Specific norms for energy efficiency in buildings and regulations for loss of heat
Transport sector	
Fuel taxes	
Tax exemption on biofuel	
Yearly vehicle tax	Differentiated with respect to CO2 emissions
Bio fuel car subsidy	SEK 10 000 (€ 1 200) subsidy when purchasing a bio fuel car
EU specific instruments	
EU-ETS	Emission trading system for CO2, launched in 2005. Covers a subset of the EU CO2 emissions.

Except for the tax instruments, nearly the same measures are either in effect for proposed for California. California subsidizes solar cells (an analog of the climate investment program), has a renewable portfolio requirement for electric generators (analog of green certificates), has strict energy codes for buildings, and is working on a trading scheme to cover at least the electric sector.

In the universe of OECD countries, Sweden is not remarkable for its environmental taxes, which are about 3% of GNP. It is the US, whose taxes are about 1% of GNP that is very different from the OECD mean of 2.5%. Table 3. shows the environmental taxes and their yields by year.

Tabel 3. Tax receipts from environmental taxes, in millions of 2003 kroner.

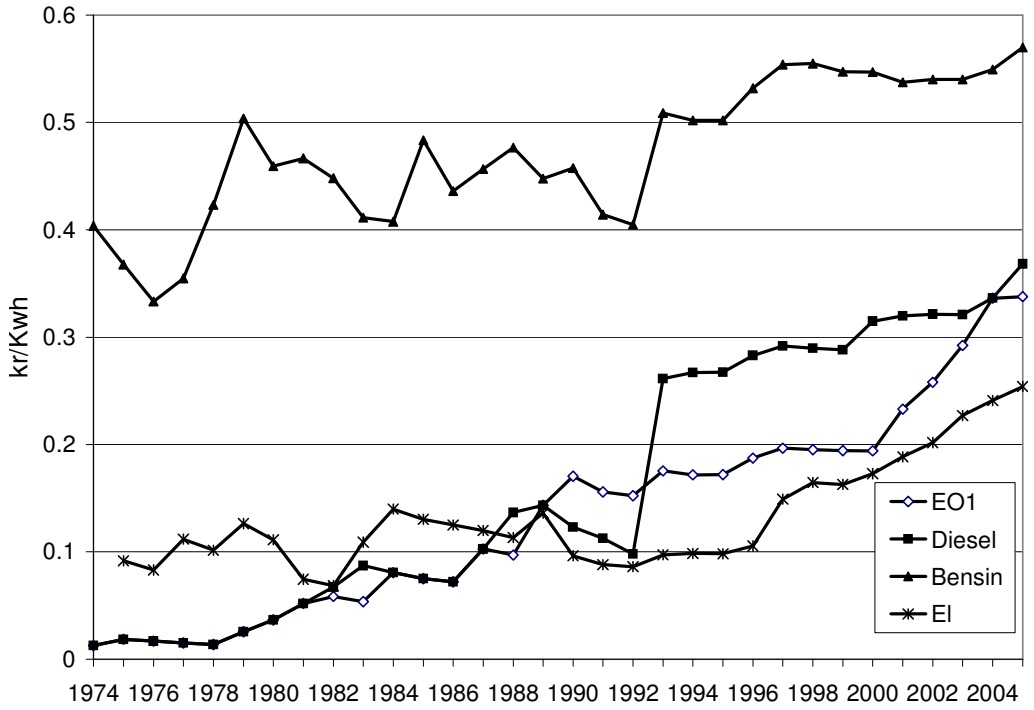
	1993	**1995**	**1997**	**1999**	**2001**	**2003**
			Environmental Taxes			
CO2 tax	12046	12481	13484	13658	17725	23814
Sulfur tax	210	171	155	129	87	122
Pesticide/herbicide tax	15	35	56	43	61	67
Fertilizer tax	211	326	401	368	384	340
Refuse tax					936	906
Mining tax			141	151	128	193
Sum (A)	**12 482**	**13 014**	**14 237**	**14 348**	**19 322**	**25 442**
			Environment Related Taxes			
Fuel tax	23431	25649	28260	28686	24930	20831
Electric energy tax	6519	6727	9495	11515	13080	15651
Waterpower tax	1175	1018				
Nuclear tax	114	145	1587	1662	1939	1829
Ultimate waste disposal tax	1272	1495	867	1017	760	459
Sum (B)	**32 510**	**35 034**	**40 208**	**42 879**	**40 709**	**38 770**
			Weakly Related Environmental Taxes			
Vehicle tax	4675	4418	6728	6881	7303	7687

Sales tax on vehicles	1469	1908	225	281	-23	
Mileage tax	3125					
Sum (C)	**9 269**	**6 326**	**6 954**	**7 162**	**7 280**	**7 687**
Environmental Tax (%)[1]	*23*	*24*	*23*	*22*	*29*	*35*
A+B+C ,	**54 261**	**54 373**	**61 399**	**64 389**	**67 311**	**71 899**
Percent of Total Tax		*6,1*	*6,1*	*5,5*	*5,5*	*5,5*
Percent of GNP	*3,1*	*2,8*	*3,0*	*2,9*	*2,9*	*2,9*

[1] **(A) / (A+B+C)**

Taxes on the environmental goods are not applied uniformly. There is one set of rates for non-manufacturing and another for manufacturing. The next two figures show those rates for Oil, Electricity, Gasoline, and Diesel.

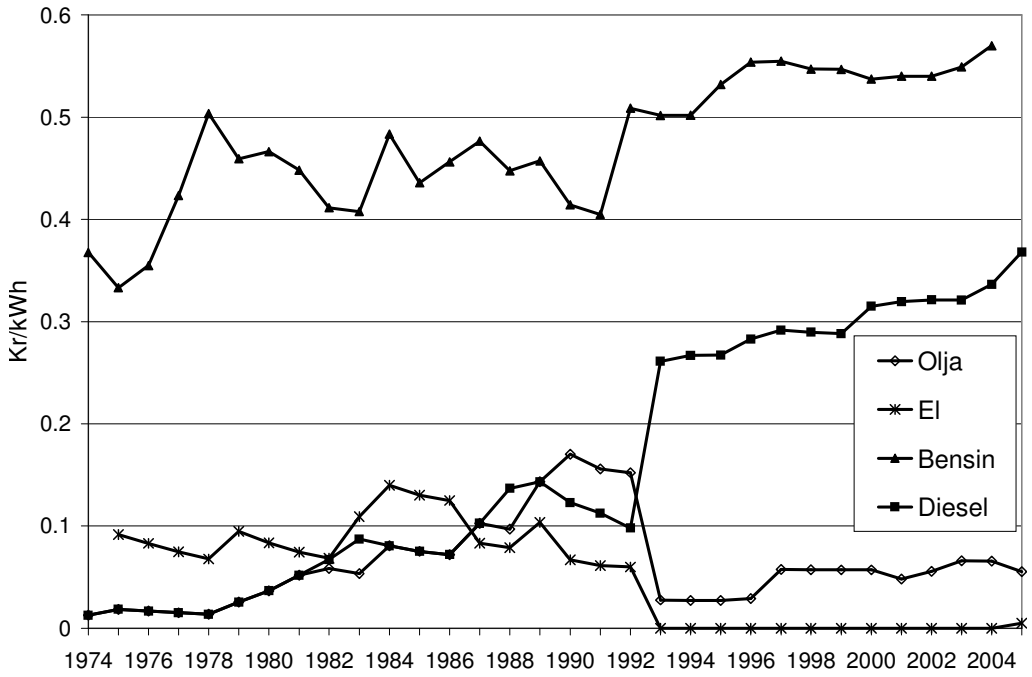
Figure 4.12. Specific tax for fuel and electricity (not including sulfur) in 2004 Kr/ Kwh. Non-manufacturing sectors.



Source: Skatteverket. E01 is oil, Bensin is gasoline, El is electricity.

The sharp increases in the early 1990's corresponds to a policy decision to tax carbon dioxide and otherwise shift taxation towards the environment and away from labor.

Figur 4.13. Specific tax for fuel and electricity (not including sulfur) in 2004 Kr/ Kwh. Manufacturing sectors.



Source: Skatteverket. Olja=oil, El= electricity, Bensin=gasoline.

The tax schedule for manufacturing is notable for the difference in tax rates for oil and electricity. These rates are much lower than for households or non-manufacturing sectors. This reflects a desire not to burden export sectors and a willingness to tax consumers (themselves) for green purposes.

On the whole, the policy has been effective in keeping fossil fuels relatively constant over the 1990-2005 period, while increasing electric use and bio-fuels . The total fuel use increase is at a lower rate than GNP. In the most recent period, GHG emissions have actually decreased.

While the total performance of the energy taxes is quite good, the specific case of automobiles is in some dimensions less impressive.

California's Special Place in US Environmental Regulation

Many of California's environmental laws predate similar laws of the US. California was the first state to regulate automobile exhaust. Since its regulations predated the CAA and since the LA basin traps exhaust to a greater degree than is common in the rest of the US, the CAA allowed California to keep its strict regulations and provided a special mechanism for California to make air regulations more stringent than the US as a whole. Once California makes such regulations other states are free to adopt the CA regulation rather than the regulations made by the USEPA.

The CAA itself is very broadly drawn and mentions climate change as well as human health. CA is trying to use the authority granted by the CAA to originate climate legislation that can be copied by other states.

California has decided to join Kyoto, or even do Kyoto one better. By executive order, Gov. Schwarzenegger (the Guvenator) has decreed that CA's GHG goal is to reduce our emissions to 80% of our 1990 levels by 2050.

CA has already taken the first steps to reduce its auto emissions. AB 1493 (Pavely) mandates the reduction of GHG from automobiles. The California Air Resources Board, acting in accordance with AB 1493, promulgated an effluent standard for CO_2e for automobile exhaust. For vehicles less than 3751lbs, the requirements for 2009 are an average of 323g/mile and for 2016 they are 205g/mile. For heavier vehicles (up to 8500lbs) they start at 439g/mile and are reduced to 332g/mile. There were two bars to the enforcement of the CA regulations. One was that the regulations required the assent of the USEPA and the second were lawsuits against the regulations by the Alliance of Automobile Manufacturers (among others).[2]

The California requirements will not have the force of law until the USEPA grants CA a waiver from federal preemption—the technical term for allowing CA to have its own automobile standards—and therein hangs a long legal tail. The USEPA has been reluctant to exercise authority to regulate green house gasses. The State of Massachusetts, among others, sued the USEPA to force GHG rulemaking.[3] After protracted litigation, the US Supreme Court found that automobiles contribute to global warming, that incremental regulation that does not solve the whole global warming problem is admissible, and that EPA has the authority to regulate. The Court also found that EPA could not ignore its responsibility to regulate. [4]

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[2] Green Mountain Chrysler v. Crombie, US District Court for the District of Vermont. Case No. 2:05-cv-302. Trial was in 2007 and finished after the judgment in Mass. V. EPA.

[3] Massachusetts v. EPA. Pg. 1457 contains findings that automobiles contribute to GHGs and that incremental regulation is acceptable.

[4] Id. At 1462.

While the litigation was in process, the US Congress passed and the President signed the Energy Independence and Security Act of 2007. The act required average fuel economy of 35 mpg by 2050. The increases in fuel economy must start by 2011. This law requires a slower pace of fuel economy increase than the state legislation and CA chose to maintain its request for a waiver. Partially because the US action covers the same ground and in much the same way as the CA action, the USEPA administrator felt that the EPA had some grounds to deny the CA request for waiver. The USEPA administrator has denied the CA request and CA is challenging the denial in court.

At the same time, the Automobile industry has sued CA and other states that copied the CA regulations to prevent the regulations from coming into force. That trial is over and California won in all respects. In addition to trying the issues of whether GHG's do cause global climate change, the issues involved in that case also turn on the reasonableness of the regulations in several dimensions.

The most pertinent of these dimensions are the costs and efficacy of the measurers that could be used to reduce GHG's. The key finding for regulatory purposes is that: "There is a near-term, or off-the-shelf, technology package in each of the vehicle classes evaluated (small and large car, minivan, small and large truck) that
resulted in a reduction of CO2 emissions of at least 15 to 20 percent from
baseline 2009 values." For instance, CAL ARB found that six speed automated manual transmissions would save about 8% of GHG emissions. ARB created packages of techniques that would reduce emissions at least cost. For the 2015 time period, the costs

were about $1,000 per car for a 26% reduction in GHG output. The industry alleges these techniques will save less fuel and cost 3 times as much. The weighing of the costs and benefits is required by CA legislation and indirectly by the CAA. The CA law requires maximum feasible technology and cost effectiveness. While a strict cost-benefit evaluation is not germane to regulation under the CAA, there is a back door to limiting costs. The cost of technologies in the CAA are described as such things as "best available technology." This seems to mean something that exists and can be used at a 'reasonable' cost. Technologies that do not exist or have exorbitant cost do not fit this rubric and cannot be used as a basis for regulation. Once the regulator has chosen a set of technologies that are efficacious and implementable, the regulator sets an effluent standard (so many grams of co2 equivalent per mile). The firms are free to meet that standard by using the technology suggested or in any other way that they wish. In this case the manufacturers could meet the requirement by selling a different mix of cars in CA than in the rest of the US. Domestic manufacturers could leave out their larger and more profitable models. This is what they claim they will do, but it is not profit maximizing for them to do so.

Once GHG's are found to be pollutants there are two subsections of the CAA that pertain to regulating stationary sources. One section requires the US EPA to set a "National Ambient Air Quality Standard." States are then obligated to regulate stationary sources in such a way as to meet that standard. While this makes good sense for Nox and Sox, it is much more difficult with a long lived pollutant like GHG. With Nox if one stops emitting very soon the ambient standard is met. With GHG if one trims the whole worlds

output of GHG, then in 50 or 100 years the standard may be met. Fortunately for those states that wish to cut their emissions, the CAA also allows them to directly regulate stationary sources, even without there being a NAAQS.

Perhaps one more word about the legal issues is in order for an EU audience. There is an inherent conflict between the limited power of the US, which in this case is to regulate interstate commerce, and the States whose power it is to protect public health. Congresses power under the commerce clause usually wins out. In the CAA Congress was explicit in granting all states the same rights they had prior to the CAA to regulate stationary sources and to grant CA the same rights it had prior to the CAA to regulate mobile sources.

The legal analysis is complicated. First there is the issue of whether a waiver based upon the CAA has the same force as a law of the US. The Vermont court found that it did. Second there is the issue of whether the CAA or the Energy Policy Conservation Act of 1975 had precedence in the establishment of standards. The Vermont court found that CAA takes precedence. The argument was that since the CAA required the USEPA to consider everything that DOT needs to consider in setting the CAFÉ standards and in addition to consider public health, the CAA imposed duties on EPA that went beyond those imposed on DOT. The Vermont court position has long lasting consequences because it assures that as climate change becomes better understood, the CAA obligation to prevent it will lead to yet stricter automotive standards.

The fundamental economic and political interests in this struggle are plain enough. California has no automobile industry and has already tightly regulated stationary sources to limit conventional pollutants. For instance CA has almost no coal fired boilers in the state and makes all its electricity out of renewables, nuclear, or natural gas. Therefore CA has little at risk from regulating automobiles and conventional mobile sources. The US auto industry, on the other hand, pleads that most of its earnings come from less fuel efficient cars and trucks. Hence a fuel efficiency regulation would favor the Japanese (really Southern US) manufacturers (who make small cars and fuel efficient hybrids) over the US (really Detroit and Northern) manufacturers. Hence their spirited opposition.

The California initiative is proceeding on three other fronts. CA is considering a low carbon fuel standard for cars, CA is actively working to assure that its imported electricity is low carbon electricity, and CA is considering an overall carbon cap, enforced by a cap and trade system.

All of these decisions are much more difficult than the decision to require more expensive automobiles, both as a technical matter and as a political matter.

Automobiles

Let us review what is known about GHG automobile regulation. GHG emissions are vehicle miles travelled times gallons per mile times carbon/gallon. Thus there are three

choices to be made: how far, how efficient, how carbon intensive. Government can and does target all three decisions.

Absent regulation, automobile companies will build and consumers will buy cars with poor fuel efficiency. In Sweden in 2004, Sweden's car fleet averaged 314g/mile of carbon dioxide. That is close to the 2009 standard for Ca. and also close to the emissions intensity of the current Ca car small and large car fleet.

The composition of the Swedish car fleet shows that it is difficult to cause fuel efficiency in automobiles by means of taxes. On February 13, 2008 the lowest price for gas in Umea, Sweden was $6.47/gallon while the lowest Bay Area price was $2.92. Given the Swedish tax on gasoline and on carbon dioxide, the magnitude of this difference in price is easily explained. What is puzzling is that these very high gasoline prices did not have much effect on the choice of cars in Sweden

Automobile companies say that their customers are not very concerned with mileage. In the hearings for the GHG auto efficiency standards, the automobile company representative went as far as to say that his customers care more about cup holders. The work of Berry, Levinsholm and Pakes[5] find that only at the lower end of the price range is mpg much of a determinant of choice of car. No estimate that I know of predicts a strong response of vehicle choice to gasoline price.

[5] "Automobile Prices in Market Equilibrium," *Econometrica, Vol 63. No. 4 July 1995: 841-890.*

The second place to look for GHG savings is in vehicle miles travelled. Again the empirical evidence is that higher gasoline prices do not have a great effect on miles travelled.

Estimating the demand for vmt is a difficult activity. The demand estimates are said to be short run if they account for fleet make up and long run if they do not. Gasoline demand studies surveyed by Espy[6] give a long run price demand elasticity of -.7 and a short run elasticity of about -.2. There is a huge dispersion in estimates. The cost of vmt is not at all treated uniformly in these studies. Let's start with a short run perspective. Here the choice is how much to drive, given the car is already purchased. The costs to consider are the cost of time, the cost of gas (the item of interest), the cost of parking, the marginal cost of mileage on the car, the marginal cost of insurance. To get an order of magnitude idea of these costs, the IRS allows approximately 50c per mile as the cost of a car. The fleet average mph is about 20mpg, so at $2 gallon, gas is 10c of this. The 2006 median weekly earnings divided by 40 is $17 per hour. At 40 miles per hour the cost of time is about 42c per mile. So the price of a marginal vmt is at least 52c and at most 92c, exclusive of parking. (At least for those of us in a big city, the parking for a trip to the center can double the cost of the trip and hence of the vmt). The role of mpg and $/gallon are reciprocal in this exercise, so they should have the same effect with opposite signs in the demand for gas. Now gas is 1/5 to 1/10 of the cost of a vmt, so by the usual derived demand arguments even if demand for vmt were elastic, demand for gas would be very inelastic.

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[6] Espey, M. (1996). "Explaining the Variation in Elasticity Estimates of Gasoline Demand in the United States: A Meta-Analysis." *The Energy Journal* 17(3): 49-60.

The long run situation, and by extension the influence on gasoline price on the choice of motor car, has an additional complication. The choice of car should be influenced by the present value of the expected stream of gasoline expenditures. The real price of this stream has not changed nearly as much as the short run price of gas. The current run up in gas prices is perhaps the first increase that is expected to remain permanent. So the historical data simply doesn't include much variance in present value gas prices.

Going back now to getting the carbon out of transportation, particularly cars, the evidence on the demand for autos leads to the conclusion that a very large tax would be necessary to reduce vmt and induce the purchase of more efficient cars. Indeed the Swedish experience bears out that very high gasoline taxes do not have much effect on the fleet composition.

It is much less clear, however that the Swedish situation in respect to vmt is at all similar to the situation in CA. Here the tendency of the Swedish population to live in areas thoroughly served by mass transit, itself a government policy, may well dominate the equation for how many miles to travel. Perhaps the "less than one beer" permissible blood alcohol level also reduces trips. In 1997 Swedish vmt was 3,989 miles per capita while it was 5,701 for the US.[7]

Let's return to the choice of cars. We have argued above that even doubling fuel prices will not drive fuel efficiency down to the desired target levels in CA or in Sweden.

[7] http://www.fhwa.dot.gov/ohim/onh00/bar4.htm

While in Sweden, the shift of the tax burden from labor to environment was possible, the same exercise seems beyond political reach in the CA. In addition to missing the advantages of a parliamentary system—the government by definition has the votes to carry through policy—CA government has further impediments to tax shifting. The bill that set the CA efficiency standards in motion (AB 1493) also prohibited the use of increased taxes as an instrument. General taxes require a 2/3 vote of the legislature, very unlikely in the anti tax climate of CA.

In the EU, there is discussion of a fuel efficiency standard similar to the CA standard. However it has not been promulgated as was expected on January 23, and the reports in the press blame opposition from Germany, which is a maker of larger cars.[8] In this sense the EU mirrors the US: Areas making large cars oppose efficiency standards and have enough power to delay them for some time. In the US, it appears that it was the threat of CA and allied states setting non-national and very strict standards that allowed Congress to act and the President to sign, somewhat more relaxed standards.

Should the CA waiver of pre-emption ultimately prevail it will create a market for more efficient cars. Vermont, NY, Mass., RI, and Canada and other jurisdictions have already indicated that they will impose similar or the same requirements. With a supply of such cars secured and a demonstration that economic life will not end with more efficient automobiles, there will be increased pressure on the EU to come along. So though CA

[8] Business Week. "Bavaria Battles EU Auto Emissions Plan." January 14. http://www.businessweek.com/globalbiz/content/jan2008/gb20080114_492087.htm?chan=globalbiz_europe+index+page_autos

may not lead by much in this particular case, its leadership may well tip the balance in the EU as it seems to have done in the rest of the US.

So there is a very mixed bag here. The tax measures relied upon in Sweden and impossible in CA are a small hope for reducing vmt. The grams/mile measures relied upon in CA and so far impossible in the EU and Sweden do solve the problem of the carbon intensity of miles.

Auto Fuel

Both GHG intensity and fuel source availability have lead CA to consider policies to make motor fuel less petroleum based. AB 1007 required such a study of the CA Energy Commission (CEC), which is now in complete. The results, in a nutshell, are that absent a breakthrough in cellulosic fuels (either ethanol or a liquid ,) the use of lower carbon fuels will be expensive.

For the CEC we evaluated three scenarios. These are examples in the report of the California Energy Commission (2007, p. 34). The first example is the ethanol and hydrogen fuel cell vehicle example. The second is the advanced biofuels and partial hybrid electric vehicle example. The third is the biofuels and hydrogen fuel cell vehicle example. They differ in the availability of advanced biofuels and the reliance on partial hybrid electric or fuel cell vehicles. The aggressive scenarios, in terms of how much carbon was displaced, had public sector spending of 8 billion dollars. At these projected costs, it is unclear if any such policy will actually be adopted by California.

Ethanol (or biodiesel) is already required by the US (Energy Policy Act of 2005) and more so by EISA of 2007. These acts provide an assurance of demand in addition to the pre-existing 50c per gallon blenders' credit. Together they have driven the remarkable growth of ethanol in the US. Of course, high prices, more exactly margins between the corn price and the gasoline price also drive this process. Within CA the use of ethanol depends upon the economics, including the economics of the tradeable obligations to use ethanol under the US program, and upon the requirements for use in low pollution gasoline. The US program requires 7.5 billion gallons of renewables in 2012 (the CA share would be about 750 million gallons.)

Ethanol in the US is produced from corn, a minor crop in CA. Using ethanol would require either devoting land now used for other crops, usually of high value, to a feedstock crop or importing the ethanol. A cursory examination of CA agriculture would suggest that major amounts of ethanol will not be produced in CA, at least so long as people are willing to buy lettuce, grapes, avocados, almonds, and so on, at anything like current prices. Land values in CA are more than double those in the corn belt in 2006, lending credence to the proposition that economically little corn based ethanol will be produced from corn grown in CA. Thus CA ethanol is most likely to be imported. Without either a CA renewable portfolio standard for car fuel or an air pollution based requirement for ethanol in gas, the least cost solution to the use of fuel will likely keep most ethanol in the Midwest, especially if the requirement to make E85 cars continues.

The EU and Sweden have an ambivalent relation to the current bio-fuels regime. The Swedes make ample use of their forest biomass for heat, but not as a motor fuel. This opportunity is also possible and is being pursued on smaller scale in rural CA. Like CA, Sweden is not any better suited to corn or sugar cane than CA and so native production is unlikely. The distances between ethanol production and where it might be consumed would militate, in Sweden, as in CA against any great consumption. Finally, there is no farm lobby that will be benefitted by such a requirement.

While the EU has set a biofuels transport target for each country, there is a significant backlash. For instance on Jan. 21 2008, the UK House of Commons Environmental Audit Committee stated its opposition to the further use of biofuels and drew responses from the EU energy and agriculture commissioners.[9] The January 23 draft EU directive on environment calls for 10% of transport fuels to be biofuels. This is about the maximum level of ethanol that can be burned without modification to the car fleet. The directive also requires a 35% GHG savings and no use of wetlands, old forests, etc to produce the fuels. It is an open question as to whether this directive is possible.

With the biofuels initiative CA and the EU are in same position in one way and not another. The current GHG gain of biofuels is contested in both places. The potential costs will loom large in the CA debate but seem less important in the EU. As the debate continues, particularly if the green position becomes strongly anti current biofuels, I

[9] Euractiv. "Commission defends biofuels in face of mounting criticism" Jan. 21 2008. http://www.euractiv.com/en/energy/commission-defends-biofuels-face-mounting-criticism/article-169728

would expect Sweden and CA to come out on the same side, the green side, while the EU as a whole and the US come out on the farm lobby side.

Conclusion.

Both Sweden and CA are driven by internal green politics and enmeshed in federal systems that have strong countervailing tendencies. The interaction of the car, agriculture and energy lobbies with states' rights produce some very different results. The EU does not restrict how green Sweden can be. Thus they can adopt high energy taxes, sulfur taxes, and so on and drive imported coal and oil largely out of their production system. They plan to be fossil fuel free by 2020. They are more conflicted on cars, where they make two brands of large cars (Saab and Volvo) both largely for export. CA produces neither cars nor grain and is free to pursue its green tendencies in both regimes. It is, however, not free to set standards as it pleases within the US and so must compromise with the countervailing lobbies for energy and agriculture.