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Harvard Electricity Policy Group



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HARVARD ELECTRICITY POLICY GROUP SEMINAR
**THE ENVIRONMENTAL IMPACTS OF INCREASED COMPETITION IN THE U.S.
ELECTRICITY INDUSTRY**

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MEETING SUMMARY

Environmentalists have made the assertion that, while the economic costs involved in the transition to a competitive power supply market are worthy of attention, the environmental costs may be as important. We have received funding from the EPA to characterize those costs, and to assess options for managing them. This seminar kicked off the research being coordinated by Henry Lee, Director of the Environment and Natural Resources Program at Harvard's Kennedy School of Government.

The object of this seminar was to provide guidance to this research effort by identifying the range of impacts which should be explored, the information needed to describe these impacts, and finally by selecting the policy solutions to be analyzed.

Session I: Principal Impacts

What are the principal impacts of a move to a more competitive electricity industry -- up to and including the possibility of retail wheeling? The following concerns emerge from the writings and speeches of environmental advocates. the demise of demand-side management and integrated resource planning; reduced enthusiasm on the part of legislators for requiring greater emissions reductions from utilities; and the elimination of incentives to invest in renewables and alternative fuel programs.

In addition to these specific impacts, some interests have expressed concern that a competitive power supply market will significantly alter the incentives and motives of key parties -- Le. decision-makers will focus on minimizing short-term costs and ignore the longer-term social costs of their decisions. This session examined the questions behind these potential

*impacts.*¹

Speaker

I'm going to step back and talk about the nature of the problem we're facing in the power sector. For purposes of this discussion, I'm going to talk about a system not unlike the United Kingdom's, where renewables acquisition and generation-mix issues are not explicitly dealt with by any legislative or regulatory mechanism. Although I am aware that **some** of these issues are also relevant to a competitive wholesale market, for purposes of this discussion I will start by examining a retail competition framework.

The key challenge is the transition to a sustainable electricity supply system. By sustainable, I mean a system which does not exceed critical thresholds or deliver critical loadings of pollutants into air, water, or soils, that takes the long-term productivity of our ecosystems and human health into account.

These are the key elements of the problem: the power sector is the largest U.S. industrial air polluter; it is a more concentrated polluter than any other industrial sector. The power sector accounts for 3% of GDP – much less than the size of the health care in our economy. In contrast, the power sector produces from 30-66% of total air pollutants, depending on which pollutants you're counting. This comparison is important, because this debate is over how much it's worth to squeeze a few cents out of electricity prices, by trading, among other things, environmental impacts. Another issue is the growth of these emissions in the future. Under any "business-as-usual" scenario, power sector emissions are expected to grow substantially over the next 15 years -- especially with early nuclear plant

¹ Papers and outlines handed out for this seminar are listed at the end of this summary.

retirements. We also have the possibility of future regulation of air toxics, particulates, and other substances. Our recent research suggests that it is unlikely that we can reach our CO₂ stabilization goals simply by repowering with natural gas.

The point I want to make here is that this is a holistic problem. It's not a problem of just complying with SO₂ standards. It's looking at the interrelated impacts of the power sector on environmental quality and human health. We should be looking at these impacts as a whole, and not as "Pollutants Du Jour", which is how we've traditionally regulated. If we continue to use dirty technologies, and then backfit them when we change the way we regulate, clean technologies may well end up making more economic, as well as environmental, sense.

Integrated resource planning, although practiced imperfectly in many places, is at least an attempt to balance a number of factors. Wholesale competition is one tool in the mix, using the market to get the cheapest commodity price for a particular resource category. An assessment of risks associated with the costs of compliance with environmental regulation is another tool. Retail wheeling in the form I've described would substitute short- and medium-term markets integrated planning. The ideology underlying this is that whatever generation mix, liability risk level, cost, and environmental impact results from a market is better public policy. In practical terms, this means that the producer with the lowest short- to medium-term price wins. The evidence from the U.K. is that this means a 3 to 5-year planning horizon. A market driven by such a time frame is unlikely to internalize the risks associated with future environmental regulation. It also means that the present owners of existing generating resources are going to resist making the capital

investment required to clean up their plants. There is some evidence that the willingness of capital markets in the U.K. to support investments in cleaning up existing facilities is constrained, because there is no guarantee that there will be a market for the power from those facilities. The same thing is true for renewables, which tend to be capital- rather than fuel-intensive. In a market driven exclusively by short-term considerations, capital-intensive investments will be less attractive than those projects which are less capital-intensive. Renewables are also not simply a replacement for generation -- they also frequently have the ability to replace the need for investment in transmission and distribution (fuel cells in a hotel basement, photovoltaics on a rooftop, etc.) The value of a renewables investment therefore represents more than the production of a commodity -- it is also the avoidance of T&D investment, because of reduced load on the off-site power supplier.

What are the environmental consequences of this?

- What we're seeing in the U.K. is the proposal of low-capital generation, like combined-cycle gas turbines.
- We're seeing little, if any, environmental risk mitigation. The risk horizon shrinks considerably without a franchise.
- We can expect attempts by generators to maximize electricity sales -- DSM as we know it will disappear. There has been discussion in the U.K. of a tax on the transmission system to support some DSM, but politically it's a nonstarter. The 5% or 10% load reduction goals currently used in some utility planning are not going to be reached through customer-service DSM alone.
- Investments that make sense from the perspective of an integrated system will

disappear.

- If the nukes shut down, will it be a good thing or a bad thing? What will replace them?

What are the alternative instruments for environmental protection that are available in a deregulated power supply market? If you make environmental protection a part of social programming, rather than internalizing it into economic decisions, you run the risk of getting goals that are arbitrarily set rather than economically-based. In the case of DSM, it turns into a debate over the level of the tax, rather than the appropriate level of DSM.

What is the replacement for resource planning? When you try to site a plant in a community, and the community asks, "Is there any cleaner way of doing it?", how are you going to answer that question with no institution controlling that process? Are you going to find yourself with a process where there is no coherent legal or regulatory basis for planning? This raises issues of political legitimacy.

Response

What is Integrated Resource Planning (IRP), and why do we care about it? Presumably it's not an end in itself, but a means to an end. If we are worried about IRP going away, perhaps it would be useful to enumerate the actual objectives that we are concerned about losing.

- IRP is intended to get lowest-cost supplies. I don't think anyone is suggesting that this is one of the things we're going to lose in a competitive power supply market.
- IRP is a mechanism to internalize environmental externalities. I agree that this is in jeopardy.
- IRP in principle captures the benefits of network effects which would be potentially difficult to capture through a series of bilateral negotiations.
- IRP provides a mechanism for fostering demand-side investments that are economically efficient that customers might not make on their own. Notice that I don't say it provides a mechanism for DSM, because DSM itself is a means to an end, and not an end in itself. We can all agree that DSM may go away in a competitive market, but that's a different thing from whether efficient investment that would not otherwise occur will go away.
- Finally, we value IRP as a process in and of itself. It is desirable to have a forum in which people can get together and talk **about** these things, independent of whether we produce better decisions as a result. This forum would go away in a competitive power supply market.

It is important to note the difference between ideal IRP and actual IRP. The reason why most IRPs don't actually accomplish all of the goals above is because many of them are incredibly hard to accomplish. We've gotten better at it with experience, but no IRP is ever going to do all of this really well. So the question is not, "Are we losing ideal IRP?", but "How well is this typically going to perform compared to something else?"

What are the pros and cons of short-term versus long-term? It is not obvious that short-term marginal cost is the wrong market signal. It is not obvious that competition forces people to only pay attention to short-run costs. In many respects it might be the right signal, and you have to show that the IRP process does a better job than private investors of predicting the future, in order to reach the conclusion that the short-term signals that the competitive market sends are deficient simply because they're short-term. The question of environmental externalities, of course, is a separate issue. But is it bad that a competitive market will lead to a focus on short-run market-clearing cost? Probably not. Currently we have a lot of excess capacity, and the market price is low. So it is currently economically inefficient for customers to run around spending a lot of money to insulate their homes. They can do it a few years from now if the price gets higher -- the social opportunity cost of energy is the short-run marginal price.

DSM is not a natural monopoly, so the notion that we have to provide energy conservation through an integrated, centralized system is not obviously true. I agree that competition will change the incentives and mechanisms available to do conservation, and we should be thinking about what will be available, but we should not be assuming that it must be centralized. [Question: Might not the underinvestment of capital by customers

have monopoly characteristics?] Before you ask if it's a monopoly, you should ask, "How much of this kind of underinvestment is out there?" No one has been able to agree on this. If you think that this represents a failure of information, and that information has properties of a public good, then arguably conservation investment may have certain natural monopoly properties. This is a controversial issue and we are not going to solve it today. My point was simply that we should focus on the goals of DSM rather than the method we use to get there.

Discussion

[This section is a summary of the remarks of various seminar participants following the presentations in Session I]

: There are many parts of the current system that do not have well-defined property rights -- most notably access to and use of the transmission system. We know that if you have a market without well-defined property rights, competition will not necessarily produce an efficient outcome. So we have to make a distinction between situations where it will be hard to define property rights and situations where we *can* define property rights. I can make a case, for example that many of the problems the presenter talked about, like system-wide benefits, would become much less serious if property rights in the transmission system were well-defined.

If you assume that we continue with the system of property rights we have now, and just throw retail wheeling on top of that, I think many of the presenter's criticisms are

correct. But there are alternative systems, and I think we will make use of these alternatives if we go to a competitive retail market. You also get a different answer, dealing with the pricing of transmission as opposed to pricing of the distribution system, even though it all looks like just wires. In one case it's easier to define property rights than in the other, and there's a different answer to how it competes with DSM, and so on. This is an issue that deserves our attention, because you have to define property rights where you can so that markets can operate efficiently.

In the area where it is difficult to define property rights, for instance the issue of environmental externalities, it is not obvious that it will be impossible to design a process that accomplishes the goals of IRP/DSM programs in a way that is compatible with competition. We can certainly focus on ways this can be accomplished.

I am uncomfortable, however, with the assumption that "We know we should do this, and if alternatives we propose don't do it, then it's a bad alternative". If we define the property rights where we can to create an efficient market, if we internalize the externalities, and people look at the price and still say, "No", maybe what they're telling you is that they really aren't willing to do this cleaner stuff and pay that much money. This is a political and social question of the first order. When you confront people transparently with the cost of doing what you think they should do and they say no, does that mean they should be forced to do it anyway? Or does it mean that the cost of what you want to do isn't worth the benefit?

Many of these problems can be fixed, whether we are talking about a retail wheeling or a wholesale wheeling scenario, but it is important to distinguish between property rights,

market failure, and externality problems. The solution requires a different system, but I think we can come up with one that is compatible with a competitive market.

—: Those of us around this table could probably all agree that some kind of carbon tax is the way to go. But this is politically inconceivable right now. The optimal economist tools are off the table. The BTU tax failed in 1993. **In** 1990, when the external costs of oil were obvious, Congress struggled to get a nickel increase in the gasoline tax. It will be very difficult for those utilities that have signed up to voluntarily limit their emissions under the Climate Challenge program to achieve this Administration's policy goals on climate change in an environment of retail wheeling.

I would argue that the economic benefits we're pursuing with competition are fairly marginal when compared to the environmental benefits we may be giving up. The utility industry is not rife with inefficiencies. If we must move towards retail, wheeling, let's go slowly. We just opened the transmission system to wholesale generators -- we're still not sure how that's going to work.

—: In one sense, what's at stake here is, who gets to decide what the goals of sustainable development will be? If you go with the IRP system we have now, that's one set of people who get to decide. If you go with retail wheeling, that implies that another set of people are going to get to choose. I would feel more socially responsible if the people who are most affected got to decide. You can build into the pricing system, be it retail competition or wholesale competition, a way for people to choose if they want wind power, and so forth,

rather than presume that we as regulators or the government know better.

—: I endorse the goals of a transition to a sustainable supply system. I am not convinced that competing energy suppliers would necessarily ignore the environmental risks that are on the horizon related to atmospheric conditions. Intelligent investors would be apt to consider the risks they're facing in the longer run. The same thing goes for investment in greener technologies for the future.

—: Many of the points that the presenter made were really comments on the nature of the process of environmental regulation in this country, rather than complaints about the regulation of utilities. In the transportation sector, the measurement of emissions from mobile sources was low by a factor of 2 or 3. Maybe we should stop worrying so much about how utilities are regulated and worry **about** the effectiveness of all emissions regulation in general. If the market would ordinarily choose one pathway, and politically we feel that that pathway is unacceptable or inappropriate, this is a political discussion we should have. The California proposal states, "We believe that the time is right to re-examine the appropriateness of mandating that the utility act as the principal agent charged with designing, implementing, and bearing the cost of these programs [e.g. DSM and electric vehicles]." This is an important issue, and it belongs in a broader political context.

How do we attach values to long-run impacts? There is a sense in the public, evidenced by support for renewables and conservation programs, that suggests that we might

not want to simply apply the same investment discount rate to all decisions which have long-term resource implications. The IRP process provides a public forum where we can play out these tradeoffs.

_: To say that "Consumer sovereignty is the touchstone" is to say that, "If no consumer or corporation is willing to step forward today with cash on the barrelhead to pay for greener technologies or whatever, then it shouldn't happen". This is an impoverished view. [A participant objected, saying that he had said, if the individual had reviewed it and decided not to do it, and the political system has reviewed it and decided not to do it, then it shouldn't be done] We don't always have government by referendum. We have a representative system of government, and at some point, as a society, we have to step above the microeconomics and realize that trying to solve environmental problems by making sure people realize the real costs is a misfit with the nature of the problem.. I'm not sure every one of the questions, "Should we do DSM?", "Should we do IRP?" should be put to a vote.

Session II: Incorporating Environmental Concerns into Resource Decisions

Some environmentalists believe that more environmentally benign generating options would be ignored in a more competitive power supply market, while the ability of intervenors to push both utilities and regulators to consider environmental factors in developing resource investment plans could be substantially curtailed. In a competitive world, resource decisions may be made by hundreds of entrepreneurs, who are relatively immune to current regulation, and may be influenced entirely by short-run revenue needs.

Are there options in which the environmental benefits inherent in the existing regulatory regime could be retained in a competitive regime? For example, would greater use of market incentives, such as pollution fees, be such an option? Another alternative might be to use the continued regulation of the "wires" as a means to ensure that environmental costs and benefits were incorporated into resource decisions. This session explored the options available for incorporating environmental concerns into resource decisions in a more competitive power market.

Speaker

The premise of the paper I'm going to talk from was that, "If we're going to have retail competition, how do we restructure the industry, and how do we reform regulation in a way that will allow us to realize the benefits we are seeking from competition?" This discussion is not intended to make a case for retail competition, but rather to say, "How do we do retail competition if we want to do it right?"

If you really care about environmental protection, the three things you have to carry forward into any new system are IRP, DSM, and renewables. IRP and competition are completely compatible. Many people confuse IRP as a regulatory process with the economic principles which underlie IRP. You can implement these principles using lots of different processes. Some are very light-handed or invisible. Some are very heavy-handed and bring out a great deal of discussion.

I'm going to spend most of my time talking about structural options. How do you

create a structural framework that is consistent with long-term investments in renewables and DSM? How do you communicate information on the environmental impacts of various options in a clear and understandable way? This is the only way to make sure that the people who want to be green actually end up *paying* for something that's green. We know from research into green pricing that people have very little idea how their electricity is produced, and some of them are aghast to find out that their utility uses coal. If you tell customers how their electricity is produced, how it *could* be produced, and give them the price of Option A versus Option B, they respond much differently than they do given the information they have now.

Other options are possible, but are more complex to implement and more politically difficult. We have some examples, for instance, of mandated diversity, like set-asides for renewables that are used in some states. California has a kind of diversity mandate which calls for zero emission vehicles. This set of options works by picking a mandate, say, some amount of renewables, and then providing economic penalties or rewards to reach that level, say a tax credit, or collect a tax on the transmission system, etc.

Emissions taxes may currently be politically dead, but there are some constructive steps that can be made in the same direction. For example, many utilities have made commitments to reduce emissions voluntarily under the Administration's "Climate Challenge" program. Given the current climate in the industry, these commitments aren't worth the paper they're written on. But we could take those Climate Challenge commitments and, utility by utility, sit down with the IRS administrator and hammer out a tax agreement that will substitute carbon taxes for federal income taxes -- just for those

utilities -- it wouldn't affect anyone else. This would shed the political baggage, and we'll start to get some experience, and get a precedent in motion for having emissions taxes on the table. After a couple of years of this, the politics might begin to change.

Obviously, trading systems, offsets, and the like, à la SO₂, are another option.

IRP is an analytical method that tells you the cost of things into the future, and how those things fit into your system overall. For instance, everyone thinks renewables cost more, and so we have to have some kind of pricing mechanism to get them into the system. But a lot of renewables *are* cost-effective. Say a utility has two plants to choose between - a gas plant and a wind facility. On an expected cost basis, they're both about a nickel a kilowatthour -- in other words, they're worth about the same in your system. You've made the decision based on what you think future gas prices are going to be. They might be lower, they might be higher, but on an expected basis, we think it's going to cost us a nickel. The amount of uncertainty about the future cost of the wind plant is much smaller than it is about the gas plant. Renewables, whether you're buying them from NUGs or building them yourselves, look a lot like fixed-price contracts. The problem we're living with today in many parts of the country is that fuel prices are very low. So if you committed to fixed-price contracts, whether it's renewables like they did in Maine, or Seabrook, or a coal plant, you ended up looking stupid. Risk analysis of this type is not really part of the IRP process. Neither is the question of who bears these risks.

So what are the pieces you have to put together in a competitive system? The first

thing is to divest generation -- this is the part of the business where competition has potential net gains to offer society. If independent operators would indeed be more efficient operators of existing power plants, they ought to be willing to offer more than book value for these plants. What do you do with that excess of book value? You can use it to write down stranded investment, to lower rates -- whatever you want to do. If you don't divest, you can find other ways to separate generation -- for instance through what California calls "performance-based contracts", although coming up with the price of those contracts is difficult.

The next step is what to do about the distribution company. Their costs aren't tied anymore to electricity sales, so we'd probably want to regulate them on a revenue-per-customer basis, making revenue growth a function of customer growth. This could be handled on a long-term contract basis rather than a cost of service basis. So the decoupling part of the distribution charge is part of the aggregate revenue requirement, but there is, if you can get it, a volumetric price which the customer sees. If they change their load, they could save money on that part of the charge, but you could also handle it some other way. *The* major thing is to focus on overall revenue level, and not have a distribution system where prices are dictated by volume of electricity sold, because that's not how costs are incurred, anyway. Southern California Edison has proposed something similar to this. If you want to impose some variety of competitive discipline on the monopoly wires business, you could conduct service franchise auctions periodically, again based on the revenues from these contracts.

IRP tells us how to do cost-effective things. If DSM or some other resource can beat the utility's avoided costs, you go after it. We don't want non-cost-effective DSM, and we don't want non-cost-effective generation. When we talk about a retail wheeling framework, we want customers to act the same way -- we don't want them to engage in non-cost effective DSM or self-generation, just because their rates are too high. The principle is the same -- only do things that beat the utility's avoided costs. The utility could structure it by giving them a "shopper's tariff" -- let them go out and try to find a better price. You can start slowly -- limit it to 100 MW at first. If you regulate the system this way, renewables and DSM remain part of the system -- you make conservation in the interest of the distribution company. This is not a perfect system, but I what have tried to do is illustrate that IRP and competition can be reconciled.

Those states which have externality adders could adapt the retail-rate-minus-avoided-cost scheme to accommodate the adder approach, by including the environmental cost of the service that the utility would have provided, as compared to the environmental cost of the customer's other power supplier. If they can go out in the marketplace and find something cleaner, their bill goes down. Only nine states use externality adders, and the other 41 would probably want to use some other mechanism, like the income tax swap suggested earlier.

I am not saying that, "If you have DSM and IRP in there, you will get the answer right." What I am saying is, "If you do sensible, economic things, if you invest in things that beat the utility's avoided costs, you will end up with a lot of DSM and renewables." As I mentioned with my wind/gas example, you do have to make sure that the system is

structured in a way that takes long-term risks into account. You have to have a system that is stable enough that people will be willing to make these long-term investments.

We should certainly structure retail competition with one goal in mind, which is to make sure that customers acquire cost-effective resources. I haven't said anything about stranded costs because it is a separate issue -- regulators can require writeoffs or they can provide full cost recovery urge you not to think about this problem in terms of, "What do we do about stranded plants?", but rather, "How do we set up a system so we get cost-effective resources out of retail competition?"

Response

The particular mechanism of retail wheeling described is that the customer is responsible for some set of charges regardless from whom they buy their electricity, or how much electricity they buy, and from then on they go shop for power. We could argue about the definition of what these charges are and how much they are and what they are paying for, but I agree that that's the way the system would work.

The presenter laid out several premises. The first is that you need some place for IRP, DSM and renewables in your system, as a way to judge whether the system meets your environmental goals. I'm not sure I agree with this as a conclusion -- I might accept it as a hypothesis, but it's not clear what the yardstick is, and I don't think everyone here might agree that the presence or absence of IRP, or DSM, or renewables in the solution set is the way to judge whether you've designed a system which does what you want it to do in terms of environmental protection. I would look at it more broadly: If we want more environmental improvement, or less environmental impact than we currently have, there are many places to look for it. We could look for it through DSM. Or through resource selection. But there are several other places we could look for it where we currently don't: one is our existing generating system, and the other is other sources of pollution reduction that don't have anything to do with the electric system. Any system that has as its premise that the supply curve of cost-effective environmental improvement only consists of DSM and new unit decisions is leaving out big pieces of the supply curve for environmental improvement, and it's unlikely to get us the most efficient way of providing that environmental improvement.

On the other hand, we heard a representative of a federal agency this morning, saying, "We wish we could regulate air more rationally at the federal level, but we can't, so if you can get some hook through state regulation, you should use it." This is very sobering. How do you accommodate environmental protection and competition in the electricity industry? Perhaps we should think less along the lines of fixing up our current methods, as the presenter suggested, and more about ways of improving the way we do environmental regulation per se -- applied to all sectors of our economy, and solving our problems in the electric sector along the way.

We've already started thinking along these lines -- as a practitioner who works for clients in this sector, I see a stark contrast between the way these clients approach SO₂ problems and the way they approach NO_x problems, simply because of the difference in the way the emission of these substances is regulated. We have SO₂ clients who are out there trying new technologies, pushing their equipment, looking for every source of cost-effective control they can. The NO_x clients are out there fighting with the regulators: "That technology isn't proven, I can't make this deadline with that technology, you can't make me do it" -- the incentives are backwards with NO_x. This is an illustration from which we can generalize and explore the question of what ways we can do environmental protection better.

To the extent that we fail at finding and implementing these better ways, we can continue to turn to the utility regulatory process as a way of administering suboptimal taxes. That's how we do it now, and we can continue to do it by introducing environmental improvement budgets that are funded through charges on the wires, or by introducing

customer choice at the margin through green pricing. These are all a distinct second best to solving the real problem, which is how we regulate environmental quality in general.

If we were to regulate more rationally, many of these perceived conflicts in the electricity sector would go away. Whether you own existing generation or are thinking of investing in new generation, the environmental cost of your actions would be fully internalized. You will personally bear the costs of your actions, be you a customer buying power voluntarily, or a supplier investing money. That is the essence of an environmental protection system based on retail wheeling. The current system is like that Danny DeVito movie, "Other People's Money" -- we haven't been forced to internalize the environmental consequences. If we *had, we* wouldn't be afraid of retail competition, and of people making choices with their own money.

When people are making choices with their own money, it's not necessary that we all agree that what they're doing is a least-cost strategy. What is necessary is that all the costs be reasonably internalized, and that they live with the financial consequences of their decision.

Discussion

(Moderator): There are a number of value judgments being made here today. Some people say that the future value of environmental benefits may be low, and others are saying that they may be much higher than we realize today.

There is another issue discussed by the previous speaker: "Why don't we regulate

the environment correctly?" This reminds me of the discussion we had during the energy crisis in the seventies about how to help low income people deal with higher energy bills. The economists said, "Why don't you just give people money, instead of messing with low-income weatherization and energy assistance programs?" The bottom line was that we couldn't politically do that at the time.

Let's assume for the moment that future environmental benefits are not insignificant. Whether they're 'big' or 'medium-sized', I'm not going to debate. I'd like to hear from the representatives of the environmental organizations, whether you feel that the presentations we've just heard makes you feel better about retail competition, and if not, why not?

_: Our fundamental concern is how to meet our environmental goals. Everyone here has said that there are better ways to do it than the ways we are currently using. What we are left with is the question, "If we lose the opportunity to reach these goals through DSM or IRP, what type of mechanisms will be developed which could replace these?" Is it with more command-and-control regulation? Taxes aren't an option. What kind of mechanisms will we have available to protect the environment? We have the ones that we have today because they were the only practical way of achieving our objective.

_: I don't think the approach that was outlined earlier for reconciling IRP with retail competition will satisfy the industrial customers who are the ones pushing this agenda, and therefore it's not going to be politically workable. Similarly, I doubt that using a franchise distribution company or some kind of income tax swap as a way of internalizing externalities

is going to be politically doable. The political process can take you in strange directions. If we start making changes, we run the risk that the existing DSM or externality system or whatever, however imperfect, won't be adequately replaced with something else that accomplishes the same environmental goals. If we really could "internalize externalities in a rational way", all of us would be much more comfortable about all these environmental issues -- but is it possible? Is it worth contorting ourselves to look for some of these new solutions?

Neither is it simply a matter of figuring out how to do environmental regulation better -- there is still the system integration problem. How do you develop a system of regulation that deals with the issue of energy sustainability holistically rather than point-by-point? We're not going to get there by separately legislating 128 separate caps or 128 taxes for various substances. We're not going to assign economic values to the value of damming a river versus thermal discharges versus solid waste disposal.

_: The proposal that distribution be unbundled as some sort of per-customer charge eliminates the disincentive for utilities to fund energy efficiency if the reported costs are higher than the cost of efficiency. But it also means that customers would be indifferent to making the same investment, because it won't change what they have to pay. Are you sure that you don't want them to see any price signals at all?

_: Customers are very sensitive to any price changes -- especially fixed charges. In Maine, the commission proposal to raise the customer charge from \$2.50 to \$4.50 produced two things: a referendum to have elected electricity commissioners and legislation prohibiting

customer charges. The Southern California Edison per-customer ratemaking is one level up from that - it dictates the utility's overall revenue requirement.

_: So if the customers change their load, they save money on the volumetric component, but it's in the form of a readjustment for all customers -- the ones who do and the ones who don't.

_: That depends on what you do overall with prices. Part of your pricing reform could be pricing flexibility -- allowing those prices to move over time. But again, the focus should be on contracts at an overall revenue level, at a revenue level that is decoupled from volumes of sales, since that's not how costs are incurred.

: What does "market stability" mean, how do you make the volatile wholesale commodity market stable, and do you really want to? This winter, when the unusual cold caused energy problems south of here, the spot price of city gate gas went up to \$8.50/Mcf. The spot price for electricity went up to 20 cents/Kwh. The remarkable thing is that, through the whole thing, no retail customer every saw these prices, so you never got the help from the customer side of the meter to balance the market.

_: I happen to believe, as an energy official, not as an environmental official, that the benefits of DSM and use of renewable resources are substantial. But I've also spent enough time in state government to know that we're rarely able to make decisions on the basis of what makes the most economic sense. I'm skeptical about the ability of the political process to legislate a solution, because I don't see an enormous groundswell of public support for

DSM and renewables. As a citizen, with all my monthly bills, I'm not sure if I want to pay a little extra so I don't have to buy what my utility sells.

The idea of improving environmental regulation is a very interesting one. There are opportunities in environmental regulation to provide economic incentives to utilities and to customers to invest in things like renewables, alternative fuels, etc. -- the environmental value of which is not currently reflected in the environmental regulatory process. EPA, in their rulemaking, ought to learn from SO₂ regulation, and try to find more opportunities to provide utilities with economic incentives. The EPA has been very rigid about the way they've approached NO_x credits -- if they're serious about reducing these emissions, they should be prepared to offer a little more flexibility to encourage people to come up with better solutions, rather than constantly looking over their shoulder, on the assumption that you can't trust private industry or the regulators at the state level to do the right thing.

What I keep hearing here is that utility DSM has been a good vehicle for achieving environmental goals, and that the environmental community is reluctant to give that up without the assurance that there are credible alternatives. In certain parts of the country, DSM looked very good in the past because it made very good economic as well as environmental sense. In New England a few years back, utilities looking at potential shortages did a cost-effectiveness analysis, and DSM looked like a clear winner. Today, this debate is being affected by the fact that DSM may not currently be as good a vehicle for achieving our environmental goals, because the underlying economics are currently wrong. I'm an advocate of DSM -- in the long run, it is the right solution. But some of the worry

about the future of DSM right now comes from the fact that the economic reasons for doing it have changed.

Central planning has failed. It was central planning that said oil would be \$100/barrel and that nuclear power would be too cheap to meter. I assert that energy prices are extremely important to our economy, and that central planning has introduced costs that have distorted these prices. If we have laws that require that certain emissions be cut back, that will be done. If we have laws that internalize certain externalities, that will be done. But requiring through a regulatory process what has not been legislatively mandated has resulted in mistakes, and customers paying more in some places than in others -- that's why the industrial customers are pushing for competition.

—: The legislative process is not readily adaptable to the large array of protection that the environmental community seeks. Environmental officials regulate dozens of substances, and rarely get an opportunity to think about these regulations in the context of any other issue. One of the things that IRP offers is an open and flexible forum, where technical information can play a role. We need to think about creating more of this kind of flexible regulatory framework, because it allows us to develop options like economic regulation of environmental issues. It allows us to merge institutional and economic questions the way we did with SO..

—: The SO. system is not as flexible in implementation as it was in creation. It takes a

couple of years to get a compliance plan developed and approved, by which time conditions in the market have changed. Utilities are not going to go back and redo everything, so the system has a great deal of inflexibility built into it.

_: The changes taking place in the industry are going to determine, as they always have done, where the for a for deciding these issues will be. Do you think that the competitive market is developing as a result of conscious policy decisions that were made somewhere, or are we making policy decisions in response to real technological and economic changes? I argue that the latter is true, and that regulatory systems are just playing catch-up. Retail wheeling is just a small part of this. We're talking about a lot more than a few industrial customers walking out. We're talking about more than a few regulatory tweaks.

Electricity is seventy percent of the operating costs of my company. For us, environmental entitlements added to what we pay are disproportionately costly compared to their benefits. Customer choice will help shift these costs to levels which are more appropriate.

: On the question of civil rights in the 1950's and '60's, the nation was incapable of making a decision through the political process. It turned to a politically insulated institution -- the courts -- and said, "You make the call -- we can't do it." That's where we are today with environmental protection. The environmental community has turned to a relatively politically insulated institution -- utility regulators -- and said, The country isn't finding it

possible to obtain adequate levels of environmental protection through the political process -
- so you, the regulators, should step in and set these goals." But the problem is that these
regulatory institutions have a limited ability to act. We need to get away from the notion
that retail competition is some sort of policy debate, and concentrate on finding some more
comprehensive institutional frameworks that can implement appropriate environmental
objectives, instead of trying to retrofit them into a framework that isn't capable of dealing
with them.

I don't think that retail wheeling is going to make a bad situation any better. We
should study what is happening with these issues in the U.K. -- how does the efficiency of
their plants compare with the efficiency of ours?

Session III: Designing a Research Agenda

What are the most important questions that research into these issues can answer?

Commenter (environmental advocacy organization):

We keep going back to the choice between greater competition or the advances we've made to date in protecting the environment. What do people really want, and how do you get it? It seems to me clear that people do want competition, they want lower prices, and they want a cleaner environment. It becomes difficult to resolve these issues if we limit our efforts to get a cleaner environment solely to the utility industry. DSM and IRP are very good, but if we ignore other options, for instance intersectoral trading between, say, utilities and transportation, or the use of offsets, or the use of some of the other tools that are available to us to achieve a cleaner environment, we miss the boat. DSM is not an end unto itself. It can be a very valuable tool and certainly will not be jettisoned by utilities that remember what it is there for. But this is an opportunity to develop tools that address broader policy issues. What can utilities do to focus on trading of greenhouse gases across industrial sectors, across national boundaries?

Commenter (electric utility environmental affairs):

1.) There is a common assumption that utilities will abandon DSM under a competitive market. I believe, to the contrary, that DSM will be a key component of business success for utilities in a competitive market. We're in the business of trying to satisfy our customers' needs for electricity services. If utilities were to get out of the business of providing energy

efficiency services, there would be a void created that would be filled by other parties - perhaps competition in this area will reveal further cost-effective efficiency enhancements and technologies that a regulated DSM process did not. Certain customers expect and demand energy efficiency services. Certain customers expect and demand green business practices. These will be provided by the market.

There is also a possibility for expanded DSM through the entry of utilities into services provided through fiber optics. Electric utilities might in the future provide advanced metering, demand and load management, telecommunications services, and a whole variety of other services.

2.) Will a competitive electricity market lead to lower prices for electricity overall? To what extent will lower electricity prices result in customers substituting electricity for other energy sources, and what will the net environmental impact be?

3.) How existing generating assets are valued has environmental implications that far outweigh the question of investment in new resources and demand-side management. Investment in maintenance, repowering, retirement are all critical to the environmental impact of the industry. The Clean Air Act, for example, should reduce SO₂ by 40 or 50%. Even the most optimistic scenarios for DSM don't come close to this. What effect will competition have on the decisions we make in utilizing these assets? The answer to this question is arguably more important than, "What will happen to DSM?"

Commenter (representative of renewables firms):

- 1.) The broad problem we face here is balancing imperfect regulation with imperfect markets. We tend to assume a perfect market and then look at where it might fail. It is very important to define what your baseline is. I urge you, for purposes of this study, to limit yourself to the power sector -- to looking at the environmental impacts of the power sector and things that might affect those impacts. Once you've done that, you can step back and see where there are tradeoffs with other sectors like transportation, but balancing the choices within the sector should come first.
- 2.) We're dealing with resources that have lifetimes of 30 years or more. It's important to look at the critical environmental impacts at least 10 or 20 years down the road.
- 3.) What is the interface between existing environmental institutions and the possible future structure of the industry? How are environmental institutions currently affecting the entry of different types of resources into the market, and how might they affect entry under another type of industry structure?
- 4.) Transition and timing is the key issue. There are many strategies that might be used, but they also have to be there when we need them.
- 5.) From the point of view of new resources, we are going to have to look for financing instruments that make possible the development of power generation that has a relatively higher fixed-cost component. You can do all the analysis you want showing that, on a long-term basis, this one costs less than that one -- but the bottom line is, if it's got a relatively higher fixed cost component, you're going to have a harder time financing it.
- 6.) Communicating the information that people are going to need to make choices is going

to be very important. Saying customers are going to make their own choices is fine, but it's going to be very difficult to get them the information they need to do it, particularly when the cost difference is slight.

7.) Transaction costs are also something to keep in mind. In aggregate, a program may make good economic sense, but if, in implementation, it means an investment gets broken up over a large number of customers, the benefits to individual customers might not be sufficient to make it worth their while.

Commenter (federal agency):

We would like to know how the EPA and other federal regulators should respond to the changes occurring in the industry. Traditionally, utilities were large and there weren't very many of them. They were regulated already, so it was relatively easy to find them and layer on more regulation. Markets are unpredictable, and it might make our job of figuring out how to do these things a little harder. The question I want answered is, to what extent will a competitive electric sector be compatible with current environmental regimes? If not, what kind of policies should we rely on instead? How will we need to change things? For example, we have some climate change programs that have DSM components -- is DSM going to be a part of a competitive industry?

Summary discussion:

(Moderator): One of the difficult issues that arises in a study of impacts into the future is the fact that environmental policies are in constant flux. If we had had this meeting in 1975, I feel sure that CO₂ would not have been on the list of concerns. How should this study deal with this problem? We can take a look at how the existing system meets existing goals, but as someone mentioned previously, these investments last a long time.

: It would be useful to look at actual efficiencies in the U.K., before and after the switch to a competitive generation market. How much more efficient are their plants now? We should also compare their plants now to our plants now, to see if there is anything we could learn from the U.K. in terms of operating efficiency. Finally, it would be interesting to look at environmental performance in the U.K. before and after privatization.

There isn't just one way to do this. We should think about coming up with different competitive frameworks, and then compare the environmental consequences of each.

—: It would be interesting to see some work on the risks associated with future changes in environmental regulation, and how an IRP system versus a competitive system might take those risks into account. I'm not sure that a lot of people's intuitions about the effect of regulatory uncertainty on decision-making in a competitive world will turn out to be accurate. Some of you might have heard my talk this winter on financial option value of deferrable investments, where I suggested that the consequence is actually the opposite from what might be expected -- that future uncertainty will affect both your costs and the market

price of your product, and will cause you to place a higher value on deferring investment until that uncertainty is resolved. It would be constructive to add some research to that debate, as opposed to simply putting my hypothesis up against someone else's.

There are some other interesting things to look at. Certainly, as suggested previously, a look at the costs of producing electricity from existing facilities would be relevant -- as would the savings associated with investments not made as a consequence of the change from one regulatory structure to another. The latter category might well swamp the former. Also important is an assessment of the consumer surplus benefits that come from being able to buy the product you want, as opposed to buying the product that's offered.

IRP is a classic example of state governance as a laboratory of democracy -- an opportunity to test new ideas. It is important as we move to a competitive system not to look to federal regulation as the only answer. Yes, we can have nation-wide caps and trading systems -- but you want to build in the opportunity to test new ideas at the state level, so you don't lose the richness we have today that allows Wisconsin, for example, to go out in front on SO₂ regulation. It would be useful to spend some time thinking about how you create a system where that opportunity continues to exist.

What are the implications of competition for the development paths of new and potentially promising technologies? We've heard some concern from members of the environmental community that renewable and efficient technologies might not be players in a competitive market -- on the other hand, there's an argument on the other side that we

haven't been creating very good incentives for creation of new technologies in the current regulatory and business structure.

Developments in the U.S., especially in fuel use and technology changes, will have profound environmental impacts in other countries. For example, the U.S. was the originator of "Atoms for Peace", and many nations followed.

What kind of environmental programs are compatible with a more competitive electricity market? It's pretty clear that things like SO₂ trading programs are more compatible, and that any problems we've had with the SO₂ program have been a function of the kinds of economic regulatory process we're moving away from. In this case, environmental regulation was a little ahead of economic regulation of the industry. It remains clear that we need to continue to move in this direction.

Handouts for 4/28/94 Harvard Electricity Policy Group Seminar:
Environmental Impacts of Increased Competitions the U.S. Electricity Industry

- Cavanagh, Ralph *The Future of America's Electric Utilities. Reconciling Deregulation and Least-Cost Planning* The Electricity Journal May 1991.
- Cohen, Armond and Steven Kihm *The Political Economy of Retail Wheeling, or How to Not Re-Fight the Last War* The Electricity Journal April 1994.
- Hirst, Eric *Electric-Utility DSM Programs in a Competitive Market* April 1994.
- ICF Consulting Group *Increased Competition In the U.S. Electric Generation Sector Scoping Analysis of Potential Environmental Impacts EPA 353-104* Draft Memorandum, March 4, 1994.
- The Regulatory Assistance Project *IRP and Competition Issues* letter, February 1994.