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The Effect on Asset Values of the Allocation of Carbon Dioxide Emission Allowances

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March 2002 • Discussion Paper 02–15

Resources for the Future
1616 P Street, NW
Washington, D.C. 20036
Telephone: 202–328–5000
Fax: 202–939–3460
Internet: http://www.rff.org

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Abstract

Paradoxically, owners of existing generation assets may be better off paying for carbon dioxide emission allowances than having them distributed for free. This analysis shows that it takes just 7.5% of the revenue raised under an auction to preserve the asset values of existing generators.

Key Words: carbon dioxide, emission allowance trading, allocation, electricity, restructuring, air pollution, auction, grandfathering, generation performance standard, output-based allocation, cost-effectiveness

JEL Classification Numbers: Q2, Q25, Q4, L94

Contents

The Effect on Asset Values of the Allocation of Carbon Dioxide Emission Allowances

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1. Introduction

On Valentine's Day 2002 President Bush reaffirmed that his proposals for addressing conventional pollutants (sulfur dioxide, nitrogen oxides, and mercury) from the electricity sector would not include caps on carbon dioxide emissions. Nonetheless, emissions of carbon dioxide are thought to be the primary source of human contribution to global climate change. Instead of mandatory reductions, the administration proposed a voluntary approach aimed at achieving a rate of improvement in emissions per unit of economic activity in the next decade that replicates the improvement achieved in the past decade. The proposal was coupled with an 18% increase ($700 million) in federal spending on climate change programs, including research and development.

But the President left the door open for a possible future market-based policy beginning in 2012. Meanwhile, some in Congress, including most notably Senators Jeffords (I-VT), McCain (R-AZ), and Lieberman (D-CT), would impose on electricity generators a carbon dioxide emissions cap, with trading, that would take effect much sooner—in 2007—along with caps on the conventional pollutants in the electricity sector.

One of the biggest issues in designing a market-based carbon policy is how to initially allocate the emissions allowances. The choice has tremendous effects on the efficiency and overall cost of a trading program, a point that has emerged in the recent economics literature.[1] But just as importantly, how allowances are allocated can have dramatic effects on the relative burdens borne by regions, customer classes, and types of generators, as well as leading to

* The authors are grateful to Meghan McGuinness and David Evans for research assistance. Direct correspondence to Burtraw@RFF.org.

[1] Parry (1995) and Bovenberg and Goulder (1996) and other recent articles find that revenues raised under an auction can be used to decrease distortionary taxes thereby reducing the cost of policies, while other allocation schemes exacerbate the distortions caused by other taxes.

potentially significant transfers of wealth, and thus the allocation mechanism affects the perceived fairness of the carbon policy.

Using the Haiku electricity market simulation model, we investigate three alternative approaches to distributing allowances, and the results are surprising.[2] Paradoxically, owners of existing generation assets may be better off paying for emission allowances rather than receiving them for free.

2. Three ways of dividing up the pie

Although there are many ways emission allowances could be and have been allocated in the trading programs to date, the taxonomy is simple. (We adopt the convention of describing carbon dioxide in units of carbon equivalent.) One approach is "grandfathering," patterned after the sulfur dioxide (SO_2) trading program, which would allocate allowances on the basis of a historical measure, such as emissions or generation. A second is a generation performance standard (GPS). One's share of the initial distribution of allowances each year under the GPS is equal to one's share of generation. Typically, allowances are allocated to all fossil fuel generators and to nonhydro renewables; that is the GPS approach considered here. GPS is embodied in recent legislative proposals to address multiple pollutant emissions from the U.S. electricity sector and in policy in Sweden for taxation of nitrogen oxide emissions, with revenues returned to industry on the basis of generation. A third approach is a revenue-raising auction of emission allowances.

Market-based approaches to pollution reduction provide an incentive for firms to reduce pollution by placing an opportunity cost on emissions; that feature is common to the three approaches to allocating emissions. Even if a firm receives allowances for free, in a competitive market the firm has an incentive to reduce emissions because the unused allowances can be sold for profit. What distinguishes the approaches is the incentive they provide to change behavior to earn additional emissions allowances—or not, as the case may be.

Grandfathering is based on history and thereby provides no incentives to change behavior because the allocation is predetermined. Similarly, if the market is deep enough, nothing the firm does can affect the price it has to pay for allowances under an auction. The GPS, on the other

[2] These results are presented in greater detail Burtraw et al. (2001).

hand, provides an important incentive to increase generation at plants with below-average emissions rates because doing so earns allowances that will be surplus to the firm and can be sold at a profit.[3]

The method of allocation has been important to the previous political debate about emission trading programs, but the magnitude of the asset value of allowances created by these programs is small compared with the asset value of carbon permits. The SO_2 program creates and distributes an asset worth about $2 billion every year, and the proposed NO_x trading program in the eastern 19 states scheduled to take effect in 2004 will create an asset of comparable magnitude.

However, when it comes to allocating carbon emission allowances, we will enter an entirely new world of market-based environmental policy. Full compliance with the Kyoto Protocol—through nationwide carbon trading to achieve more than a 30% reduction in carbon emissions—would create an asset with an annual value of about $450 billion in 2010 (1997 dollars).[4] A modest carbon-trading policy that, say, reduces carbon emissions in the electricity sector by 6% from the projected baseline in 2012 would create an asset worth $14.8 billion to $23.6 billion per year, depending on how the allowances are allocated. That is an asset with a value roughly equal in magnitude to the market value of Duke Energy ($27.4 billion), to be created and allocated every year.

3. Effects on the electricity and fuel sectors

The scenario we consider includes several assumptions that affect some of the absolute numbers we report, but they do not affect the important qualitative features of the approaches to allocating allowances. We assume that there are no changes in the regulation of SO_2 emissions beyond those established under the 1990 Clean Air Act Amendments, and no restrictions on mercury emissions. NO_x emissions are governed by a regional cap-and-trade program for summertime emissions in the 19 eastern states.

A different set of assumptions plays an important role in the absolute numbers we report, as well as in the qualitative findings that emerge. We assume a "limited restructuring" case with

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[3] Fischer (2001).

[4] EIA (1998).

marginal-cost pricing of electricity implemented only in those regions and subregions of the North American Electric Reliability Council (NERC) where a majority of the population lives in states that have made a commitment to implement electricity restructuring by a date certain. All other regions are assumed to have regulated prices for generation set equal to the average cost of service. In all the cases we examine, transmission and distribution services are priced at the average cost of service in all regions, although the rates for these services differ across regions. Industrial customers pay less than commercial and residential customers for transmission and distribution services. We assume that the use of time-varying prices of electricity will become more widespread as a result of restructuring. We represent this change by assuming industrial customers face time-of-use pricing in any region that has implemented competitive pricing. For all other customer classes in all regions, the retail price is assumed not to vary between peak and off-peak times, but it can vary across seasons.

We explore a wide range of carbon emissions targets to establish the generality of our results. We report on a policy to achieve a 6% (35 million metric tons of carbon, mtC) reduction from baseline carbon emissions in the electricity sector; this policy is phased in by 2008. Under the auction, the allowance price necessary to achieve the target is $25 per mtC in 2012. Under grandfathering the allowance price is $38, and under the GPS it is $40.

Carbon reductions in the electricity sector can be achieved in two ways. One is by reducing consumption (or generation). As shown by Table 1, which reports results for 2012, annual national electricity generation falls by 1.8% (77 billion kilowatt-hours, kWh) under the auction approach, 1.0% under grandfathering, and less than 0.4% under the GPS. Changes in output follow directly from changes in electricity price. Consumers face the highest electricity price under the auction, an increase of 6.1% ($3.7 per megawatt-hour, MWh) over the baseline level of $61/MWh. Grandfathering is intermediate, with a 3.3% increase in electricity price, and the GPS yields the smallest increase in electricity price, 0.7%.

Table 1. Changes from limited restructuring baseline for generation, capacity, electricity price, fuel prices, and carbon emission allowance price in 2012 (35 million mtC reduction).

	Baseline	Auction	Grandfathering	GPS
Generation (billion kWh)				
Coal	1,799	-152	-165	-183
Gas	1,405	+63	+104	+156
Wind	30	+6	+10	+6
Other	980	+6	+9	+4
Total	4,214	-77	-42	-17
Capacity (thousand MW)				
Coal	322	-2	-14	-2
Gas	332	-12	+9	+2
Wind	10	+2	+4	+2
Other	246	-2	-1	-3
Total	911	-14	-	-1
Prices (1997 dollars)				
Electricity Price ($/MWh)	61.0	+3.7	+2.1	+0.4
Fuel Cost ($/mmBtu)				
Coal	0.93	-0.03	-0.03	-0.04
Gas	3.66	+0.12	+0.19	+0.22
Carbon Allowance ($/ton)	0	+25	+38	+40

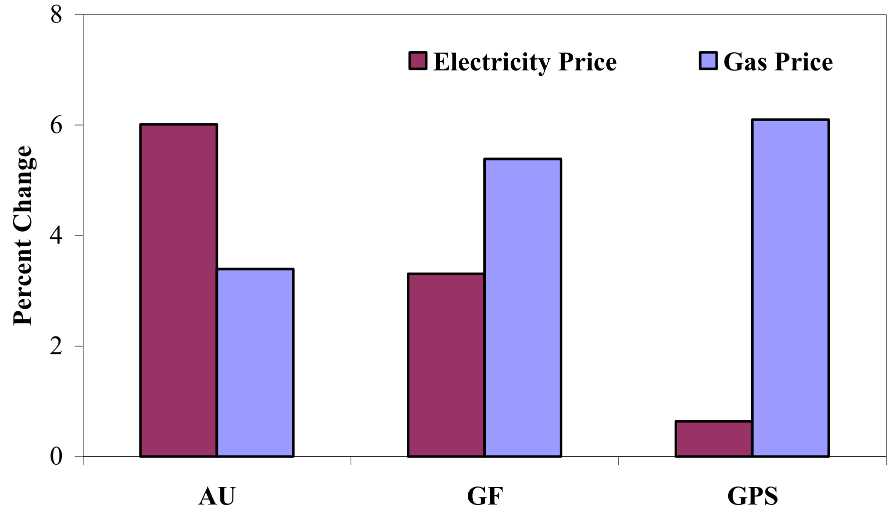
The second and more important way in which carbon reductions are achieved is through switching to fuels with a lower carbon content (e.g., switching from coal to natural gas). The decrease in coal-fired generation is relatively similar under the three policies. The difference among the approaches is much greater in the effect on gas-fired generation. Generation with natural gas increases by nearly 4.5% under the auction and by nearly 7.4% under grandfathering. However, it increases by 11.1% under the GPS, or 2.5 times the increase under the auction. The decrease in coal-fired generation is almost entirely made up by an increase in gas-fired generation under the GPS. We do not find a large effect of a carbon emissions cap on the use of renewable technologies because our assumptions exclude new support programs for renewable technologies.[5]

The ordering of policies according to changes in natural gas prices is the converse of that for electricity price. The smallest increase in natural gas price is 3.2% ($0.12/mmBtu) under the auction. Gas price increases by 5.5% under grandfathering, and by 6% under the GPS. Finally, there is a slight decrease in the national average delivered cost of coal in the electricity sector, a result of the decreased use of coal in electricity generation under all the allocation mechanisms.

These price changes beget noticeable changes in expenditures. From a baseline level of $243.4 billion in annual consumer expenditures on electricity, the auction approach yields an increase of $10.6 billion. Grandfathering yields an increase of $6.0 billion, and the GPS results in an increase of $1.1 billion. The total increase in expenditures on primary fuels outside the electricity sector is $1.4 billion under the auction, $1.2 billion under grandfathering, and $1.6 billion under the GPS.

[5] A recent study from EIA (Beamon, Leckey, and Martin, 2001) finds similar results comparing a grandfather policy and a generation performance standard policy using the National Energy Modeling System (NEMS). The study finds both approaches lead to a substitution of natural gas for coal-fired generation, with a very modest contribution to electricity generation from renewables.

Figure 1. Percent change in electricity and natural gas prices from baseline in 2012 due to a 35 million metric ton reduction in carbon emissions.

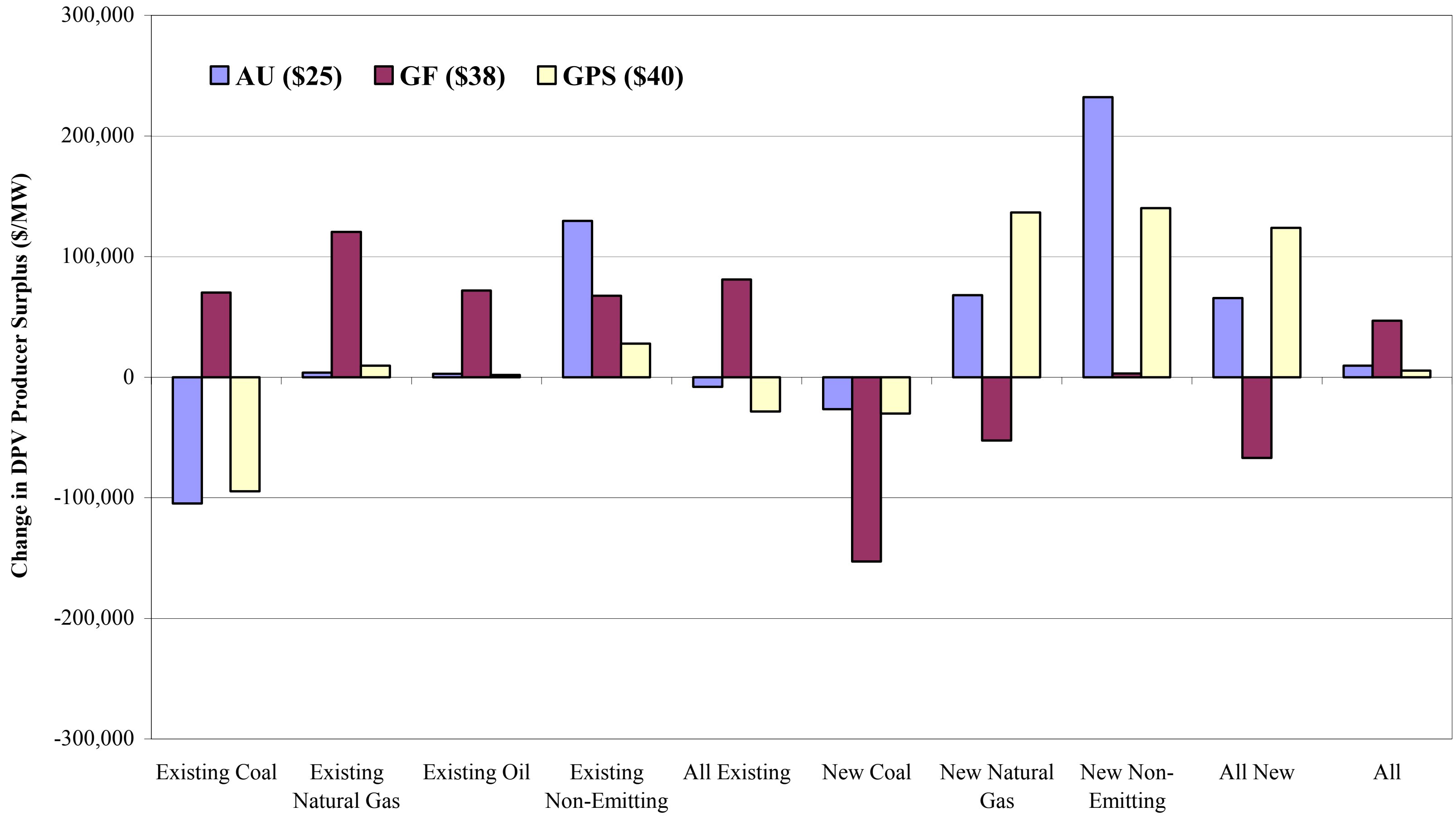


4. Asset Values

We calculate the net present value of the stream of profits over a 20-year horizon from 2001 to 2020 under the baseline, and the change under each allocation method. The change in net present value directly indicates how the value of a firm would be affected under the three approaches.

Figure 2 reports the change in asset value for each major type and vintage of generation capacity. Value is indicated as dollars per MW of capacity. The baseline for existing capacity is generation capacity in 1997. In the middle of the figure is the comparison of change in asset value for all existing capacity under each approach.

Figure 2. National aggregate changes in asset values by technology and vintage (1997 $/MW in 2001; 35 million mtC reduction).



It is not surprising that producers can expect to do the best under grandfathering (as shown by the middle bar for each region). In fact, producer profits and asset values increase substantially compared with the baseline (absent a carbon policy), making producers better off with a carbon policy than without, but leaving consumers substantially worse off. This increase results because there is no cost associated with initially obtaining emission allowances under grandfathering. In competitive regions, producers can pass along the opportunity cost of emission allowances used at the marginal generation facility in the prices charged to electricity consumers even though the allowances were obtained at zero cost. Although grandfathering appeared to be the intermediate approach in its effect on electricity and natural gas prices, it is thus the most extreme approach with respect to transfers of wealth.

The auction and GPS approaches have much more moderate distributional effects, and we focus primarily on a comparison of these two alternatives. One of our major findings is that producers can expect to do at least as well in the aggregate under an auction, compared with a GPS, while owners of existing assets can expect to do substantially better under an auction. The asset value of existing generation assets is the smallest under the GPS. Further, in several regions the value of existing assets actually increases under auction.

Figure 2 also indicates the effect on asset values for new facilities. In the aggregate, the change in asset value is negative under the grandfathering approach because new facilities do not receive allowances. The change is positive, and it is the greatest under the GPS. It is also positive under auction.

5. The Auction Paradox

The effect of allocation on the profits in the electricity industry creates an apparent paradox: producers can be at least as well off and are usually *better off* paying for emission allowances (under the auction) than receiving them for free (under the GPS). How can this be?

The reason is that the GPS yields the lowest electricity price, which erodes the value of existing assets relative to the other allocation mechanisms. The auction yields the highest electricity price, which preserves or enhances the value of many assets. (Box 1 illustrates how generation assets could actually increase under an auction.)

The lower electricity price under the GPS is due to the incentive to increase electricity generation. The incentive—which resembles an output subsidy—results because a firm or facility earns a greater share of the value of the emission allowances when it increases its share of total generation.

Focus: How Utilities Can Profit from a Carbon Auction

Reducing carbon emissions from electricity generators through a cap-and-trade program imposes costs on society. However, it need not impose costs on generators even if they are forced to purchase allowances in an auction.

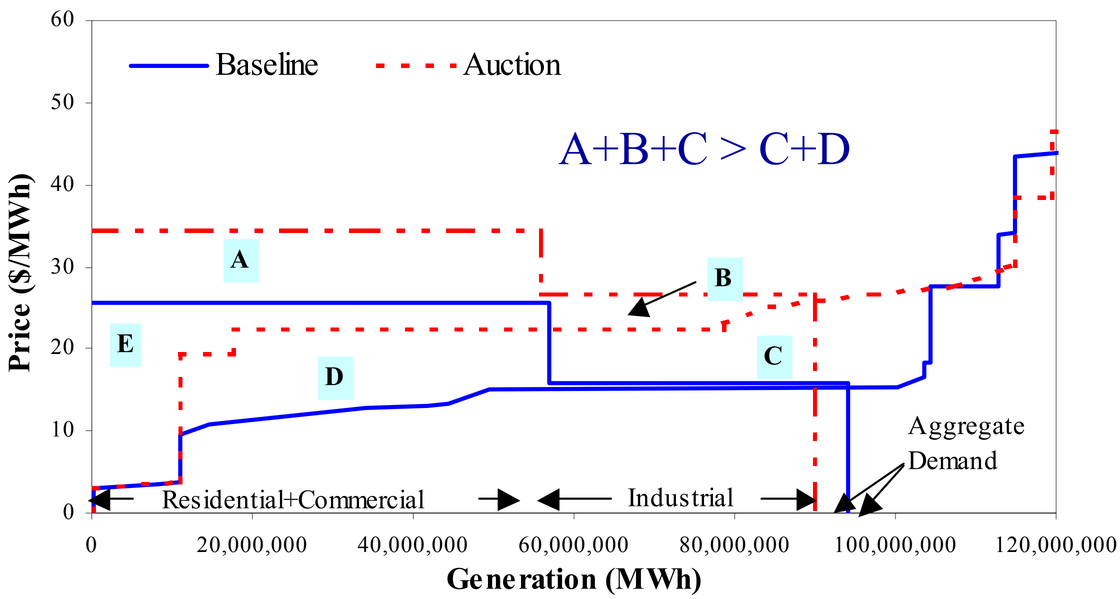
Imagine a utility comprising 25% hydro capacity, 25% nuclear capacity, and 50% natural gas–fired capacity. In a competitive electricity market, the gas generation sets the price for electricity generation because it has the highest variable cost. Requiring firms to buy carbon allowances raises the variable cost of gas generation. The generation price rises even though hydro and nuclear have no carbon emissions, and thus, in this case, revenues increase by more than costs and the utility profits from the policy.

An example from the summer baseload period in Texas (covering 70% of total summer demand) for the year 2012 shows that a carbon auction can be profitable for generators even when nonemitting technologies play a very small role. In Texas only about one-tenth of total generation comes from nuclear, and there is virtually no hydro.

The figure illustrates two policy scenarios. The upward-sloping solid line represents the ordering of variable costs of electricity generators in the state in the absence of a carbon policy. The falling step function illustrated by a solid line represents blocks of revenue per MWh of generation (not including transmission and distribution revenues). Revenue blocks are ordered by customer class, as indicated at the bottom of the figure. In the model, the price of electricity generation for industrial consumers differs from the price for other (i.e., residential and commercial combined) consumers because under deregulation, industrial consumers pay prices that vary by time of use (equal to marginal cost) while everyone else pays the same price throughout the day. In the baseline, areas E+D on the graph represent the approximate difference between revenues and variable costs. Economic profits to the industry will equal the difference between revenues and all costs, including capital costs, which are not represented in the figure.[6]

The rising broken line represents the variable cost ordering with a carbon allowance auction. The ordering of generating plants differs from the baseline because of the cost of emission allowances used by carbon-emitting plants, and because of changes in generation capacity for different technologies. The falling step function illustrated by a broken line represents blocks of electricity revenue under the carbon auction. In this case, areas A+B+E represent the approximate difference between revenues and variable costs with the carbon auction. The possibility for an auction to increase generator profits is illustrated by the possibility that area A+B is greater than area D. In other words, the increase in revenues is greater than the increase in costs. In the Texas example, the increase in revenues minus variable costs in this season and time block is estimated to be $26 million.

Producer costs and revenues for summer baseload time block In ERCOT (Texas) in 2012



6 The numbers we report are pretax producer surplus. The Haiku model accounts for local, state, and federal taxes in an aggregate way based on historical tax payments in each region.

Since change in electricity price plays the critical role in the calculation of producer profits, it is useful to evaluate how the GPS affects prices. This evaluation is done by analyzing costs. Imagine the variable cost of electricity generation is $30 per MWh (3 cents per kWh) and the marginal generating facility has an emission rate that is below average. Assume each MWh of generation from the generating facility earns a share of emission allowances worth $2 per MWh. Then the opportunity cost of generation is actually $28 per MWh. Consequently, the GPS provides incentives that will tend to increase electricity generation and reduce electricity price, compared with a scheme that does not allocate allowances on the basis of electricity generation. Increased generation means that greater reductions in emission rates must be achieved at all generating facilities to achieve the emissions target for the sector.

Table 2 provides a stylized summary of how prices are affected by the allocation scheme. Total cost is the sum of capital, fixed operation and maintenance (O&M), variable O&M, and fuel costs under all three approaches. In addition, total cost is affected by what a firm pays to obtain emission allowances. By ignoring allowances acquired through trading among firms and focusing only on the original allocation, and by ignoring changes in the amount of generation, total cost is affected only under the auction, as indicated in Table 2.

Table 2. Stylized characterization of how the price for generation is determined.

Total Cost ($):

capital + FOM + fuel + VOM + emission allowances [**Au**]

Variable Cost Ordering ($/MWh):

fuel + VOM + emissions allowances - subsidy [**GPS**]

Price ($/MWh):

Regulated Price **=** Average Cost = (Total Cost ÷ Production)

=> Price [**Au**] **>** Price [**GF, GPS**]

Competitive Price = Variable Cost

=> Price [**Au, GF**] > Price [**GPS**]

The generation price in Table 2 is independent of the cost of transmission and distribution services. Also, it ignores important details about calculating reserve capacity costs, the role of time-of-use pricing, stranded cost recovery, and other factors. Under our limited restructuring scenario, about half the nation has regulated electricity prices set to equal average cost of service. In regulated regions the price of generation services is determined by average cost per unit of generation. Because total cost is greatest under the auction, electricity price would also be greatest under the auction. Other things equal, the prices under grandfathering and the GPS would be the same.

In competitive regions, electricity price is determined by the variable cost of the marginal generation facility. In this case, the price under the auction and grandfathering would be the same. However, the price of the GPS would be less because of the rebate or output subsidy associated with the allocation of allowances.

6. Compensating the losers

Although some generators profit under an allowance auction, others, such as the existing coal-fired generators taken as a group, lose money as a result of the carbon policy. A hybrid approach to allowance allocation that combines an auction of the majority of the allowances with a targeted grant of a few allowances would offset the losses. The grant allowances would be issued at no cost to those generators adversely affected by the policy.

For the case considered here—a 35 million metric ton reduction in carbon emissions—we find that the amount of allowances necessary to compensate generators is very modest.[7] We associate generation assets with firms as they were constituted in 1999 and estimate the change in net present value of assets, or in other words, the change in the value of each firm. Some firms, such as those heavily invested in nuclear generation, may realize an increase in value on net. We remove firms that realize an increase in asset value and then examine only the losers. For the group of losers, we find that it would be sufficient for the government to allocate at zero cost only 7.5% of the emissions allowances to completely offset the losses within the electricity sector—about the difference in a baker's dozen.[8]

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[7] Other recent more aggregate studies of a carbon policy for the entire U.S. economy find similar results on a sectoral basis (Smith and Ross, 2002; Bovenberg and Goulder, 2001).

[8] Fuel suppliers, particularly coal companies, as well as railroads would suffer losses as a result of the policy as well. Some portion of allowances would have to be withheld to compensate these parties if that was the goal of policy. There would also be some substantial winners, specifically, natural gas suppliers.

7. How does competition change the results?

The different way that prices are set in competitive regions, as demonstrated in Table 2, raises a question about the importance of our assumptions for the mix of regulated and competitive electricity markets in achieving the results. Heretofore, we have assumed limited restructuring. What happens if we assume a transition to competition (marginal cost pricing) nationwide?

Under our nationwide restructuring scenario, we assume that all regions of the country move to competition by 2008. There are several parameters in the model that take on different values in the nationwide restructuring scenario, including expected changes in productivity, transmission capability, and renewables policy.[9]

Under nationwide restructuring, the carbon policy results in a comparable increase in electricity prices for the auction and grandfathering approaches, but electricity prices decrease under the GPS—that is, the output subsidy outweighs the greater compliance costs under the GPS and electricity price falls by almost 3%.

We find that under nationwide restructuring, an auction does a noticeably better job of preserving asset values than the GPS for existing nonemitting technologies. The positive effect of an auction on asset values is due strictly to the increase in price, which benefits nonemitting assets in particular because they have no compliance costs. The GPS erodes the value of nonemitting assets because it leads to a decline in electricity price.

The big difference between the limited restructuring and nationwide restructuring scenarios is the effect of the grandfathering approach on price. Under regulated prices, grandfathered allowances are valued at zero for cost-recovery purposes and have no direct effect on price, whereas under competition their market value is reflected in price. So under competition, for all technology categories except new coal, asset values increase under grandfathering. The price effect is especially evident for new facilities, which receive no allocation of emission allowances and benefit solely through the price effect, which outweighs their increase in costs. Nonemitting technologies also receive no allowance allocation but benefit significantly from the price effect.

[9] Note that carbon emissions are 665 million mtC under nationwide restructuring compared with 626 million mtC under limited restructuring.

8. GPS allocation to nonemitting sources

The GPS that we consider above—allocating emissions allowances to fossil fuel generators and nonhydro renewables—is one of several ways this mechanism could be implemented. As an alternative, we performed a sensitivity analysis that allocates allowances to all generators, including nuclear and hydro, which were excluded in our previous discussion of the GPS. We label this case "GPS All." When emission allowances are allocated to all generators in the GPS All analysis, we find a dramatic increase in asset values for nuclear and hydro, as would be expected because they receive a share of the valuable pool of allowances.[10]

The increase in asset values for nonemitting sources comes at the expense of values for fossil generation, because fossil receives a smaller portion of the allowance allocation. Nonetheless, there is an increase in aggregate asset values of all existing facilities, compared with the GPS approach that excludes nuclear and hydro. The total asset value of all new facilities is less in the GPS All case because a larger portion of the allowances is allocated to existing sources. Also, GPS All leads to a higher electricity price because the magnitude of the output subsidy per kilowatt hour of production is reduced, since the asset value of allowances is spread more widely.

9. Regions

Figure 3 illustrates the change in asset value for all existing generation capacity organized by the NERC subregions in the model. The variation among regions is due to the mix of generation technologies, to the role of interregional trading in the wholesale power market, and especially to the regulatory status and way in which prices are determined in each region. It is also noteworthy that the five regions with the largest increase under grandfathering are those regions that are assumed to have competitive prices in the limited restructuring scenario.

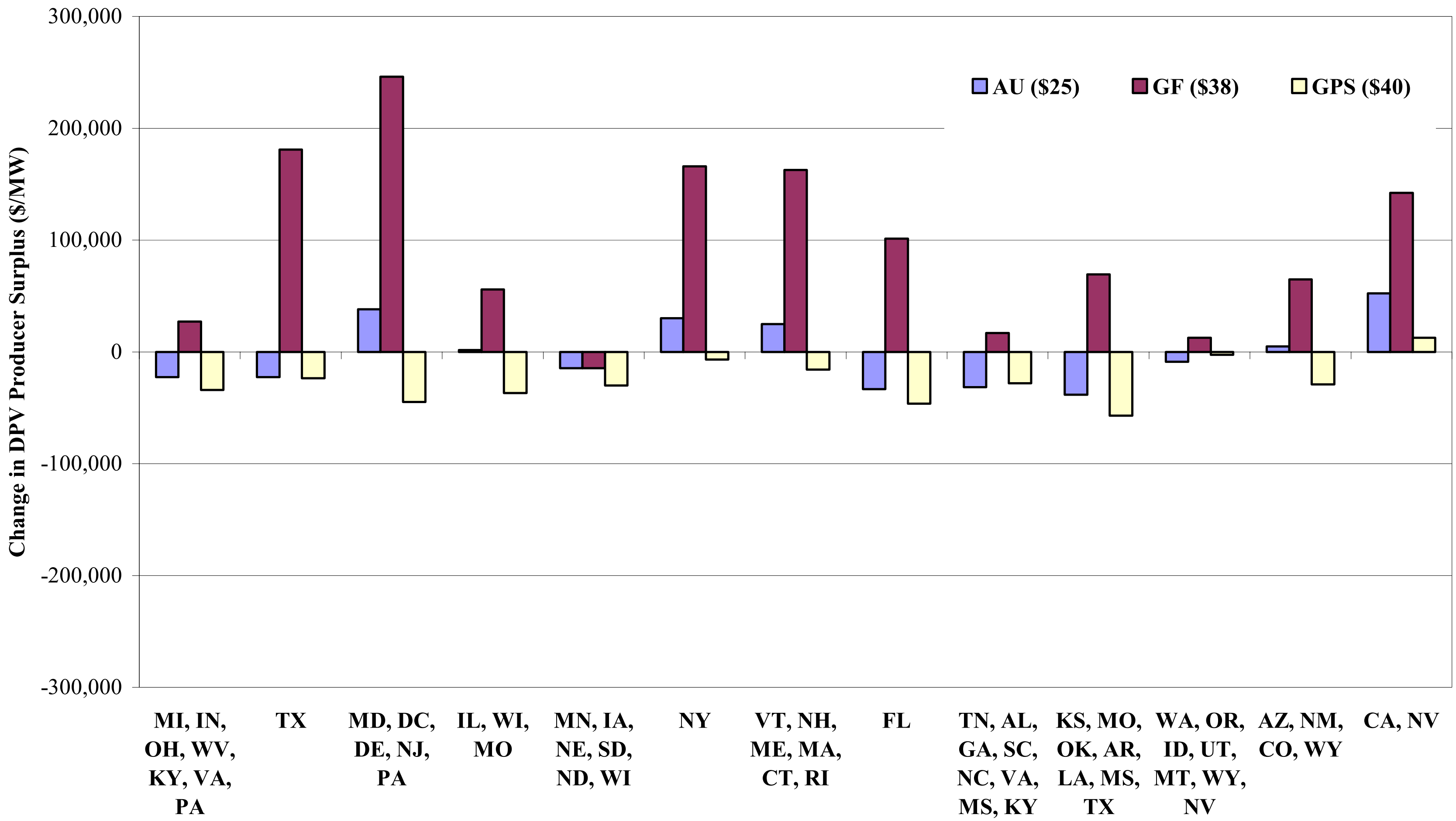
Under the auction, existing generators in almost all regions do better than or at least as well as they do under the GPS. In the two regions where the GPS results in smaller declines in the value of existing assets than the auction, the differences are very small. Asset values increase under the auction for existing generators in the northeastern states, the mid-Atlantic states, the southwestern states, and in California. Three of these regions—California, the mid-Atlantic, and

[10] This is the case studied in Beamon, Leckey and Martin (2001).

the Northeast—are less dependent on coal than much of the rest of the country. California is the only state where existing generators see an increase in asset values as a result of the GPS, and that increase is small.

This regional analysis suggests that existing generators in virtually all regions are likely to prefer an auction over a GPS approach to allocating carbon emission allowances. Nonetheless, the benefits to existing firms from grandfathering are substantial, and existing generators would strongly prefer that approach, if they could get it.

Figure 3. Change in the value of assets existing in 1997, by region (1997 $/MW in 2001; 35 million mtC reduction).



10. Conclusion

From the perspective of most electricity generators, the auction would be preferred over the GPS as a method for allocating allowances; however, both are inferior to grandfathering from the perspective of the existing industry (though this benefit comes at the expense of consumers). From the politically visible perspective of how each approach affects the prices of electricity and natural gas, we see different rankings depending on the fuel. The auction approach leads to the highest electricity price and lowest natural gas price among the policies considered. The GPS leads to the lowest electricity price and highest gas price. Grandfathering is an intermediate case for both measures.

This paper is concerned with the question of the perceived fairness of an approach to allocating emission allowances. The auction performs well in this regard because it has a modest effect on owners of existing generation assets. However, it has a substantial impact on consumers through its effect on electricity prices. An important feature of an auction is its ability to raise revenues, and the measure of fairness will depend on how those revenues are used. If a large portion of revenues is recycled to households, then in fact there may be only a modest impact on net household well-being as well.

An equally important feature is the efficiency of each approach, from a social cost perspective. A large body of recent work in economics, including the project from which this paper is drawn and others cited previously, finds the auction dramatically more efficient than the other approaches to allocating allowances. The auction approach is about twice as cost-effective as grandfathering or GPS, when viewed over a wide range of emission reduction targets.[11] Hence, the effect on the economy and the indirect effect on industry and consumers would be substantially greater under the approaches that would allocate allowances without charge, compared with an auction approach.

The differences among the approaches to allocating allowances stem from two sources. One is the significant value of the pool of allowances, which may be transferred to other parties

[11] Burtraw et al. (2001). The relative efficiency results just within the electricity sector. We measure the change in social cost as the change in consumer well-being and producer profits in the electricity sector plus the value of the government revenues from the allowance auction, which we assume are redistributed to consumers on a per capita basis. The advantage of an auction would be magnified if it was viewed within the context of the entire economy, including the ability to use revenues to reduce distortionary taxes.

under various approaches. The other source is the effect on electricity price. The incentive to increase electricity generation provided by the GPS resembles an output subsidy, and it leads to an increase in generation that mitigates an increase in electricity price.

Many economists have joined the electricity industry in criticizing the notion of targeting just the electricity sector for carbon reductions. The electricity sector is not a special case. It is responsible for about 40% of the emissions in the United States, but it is likely to be responsible for more than two-thirds of the emissions reductions under an economywide policy implemented in a cost-effective way.[12] Nonetheless, we agree strongly that an economywide approach would be substantially more efficient and fair than an approach that targets just the electricity sector.

An important virtue of the auction approach is that it has institutional features that make it more readily expandable to an economywide approach to regulating carbon emissions. It is much more problematic, from an institutional perspective, to implement an economywide GPS policy. For the auction, the effects we model correspond directly to an economywide policy that achieves the specified amount of emissions reduction in the electricity sector.

Also, the auction provides policymakers with flexibility, through the collection of revenues that can be used to compensate those most harmed by the policy. We have noted that in the case of an auction that reduced carbon emissions from electricity generators by 6%, giving away just 7.5% of the allowances would be sufficient to compensate the generation industry for losses due to the policy. The other approaches to allocating allowances do not provide resources to compensate the most severely affected parties. Under an auction, the remaining 92.5% of revenues could be used to compensate those in directly affected upstream industries, to support conservation and other benefit programs or investments in new technologies, or to enhance the fairness and efficiency of the auction even further by reducing preexisting taxes.

In the end, the chosen approach to allocating emissions allowances must be both efficient and fair. An auction is a surprisingly strong performer on both counts.

[12] Energy Information Administration (1998).

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