Before the Ohio
Senate Public Utilities Committee

Prepared Testimony of

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I. Introduction

Good afternoon. My name is Jonathan Lesser. I am the President of Continental Economics, Inc., an economic consulting firm specializing in economic and regulatory matters affecting the energy industry. Last April, I testified before the Committee on several aspects of SB 58 at the invitation of Chairman Seitz. Today, I am speaking on behalf of the Industrial Energy Users-Ohio ("IEU-Ohio")[1].

I have testified numerous times before state regulatory commissions, including the Public Utilities Commission of Ohio ("PUCO"), the Federal Energy Regulatory Commission ("FERC"), and international regulators. I've also testified on energy policy issues before Congress and before state legislative committees like this one. I've attached a copy of my resume to my written testimony.

In my testimony before you today, IEU-Ohio has asked me to address the wholesale electric market price suppression theory that has been advanced by some stakeholders who assert that: (1) such price suppression is directly and uniquely attributable to Ohio's portfolio mandates; and, (2) the mandates benefit Ohio's retail electric customers by reducing the electric bills. I have not read the substitute version of SB 58 because doing so is not necessary for me to evaluate the price suppression claims. My testimony focuses on examining whether the price suppression claims are valid.

More specifically, my testimony addresses four recent "studies," which some stakeholders rely upon to support their wholesale market price suppression claims. These wholesale market price suppression claims, in turn, are being used to assert that the wholesale price suppression benefits are flowing to retail customers in Ohio because of the current portfolio mandates set out in R.C. 4928.64 and R.C. 4928.66.

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[1] It is my understanding that Sam Randazzo has previously testified before this Committee, and has provided you with information about the membership of IEU-Ohio and its positions regarding proposals to reform Ohio's supply side and demand side portfolio mandates. Accordingly, I will not describe IEU-Ohio as part of my testimony.

You have likely seen the claims that are tied to the studies which some stakeholders are promoting for the purpose of urging you to make no changes to the current mandates. The studies I will discuss are as follows:

1. "Renewable Resources and Wholesale Price Suppression," August 2013, which appears to have been prepared by the Staff of the PUCO ("PUCO Staff");

2. "Ohio's Energy Efficiency Resource Standard: Impacts on the Ohio Wholesale Electricity Market and Benefits to the State," April 2013, which appears[2] to have been prepared by the American Council for an Energy Efficient Economy ("ACEEE") on behalf of the Ohio Manufacturers' Association ("OMA");

3. "Price Mitigation Benefits of Ohio's Energy Efficiency Program Outweigh Costs for All Sizes of Manufacturers," a supplementary analysis to the ACEEE study. This study was also commissioned by OMA and examined the distribution of benefits to business and industrial customers having different electricity usage patterns. This supplemental study was prepared by Go Sustainable Energy, LLC ("GSE Analysis"); and

4. A study prepared for the Center for Resilience at The Ohio State University ("OSU") that evaluated the renewable and energy efficiency standards under SB 221. This study was commissioned by the Advanced Energy Ohio Institute ("AEOI") and compared its results to the PUCO and ACEEE study results. This particular study indicates that it is based on a complex model called "DEEPS," which was developed by OSU and the Millennium Institute (a global think tank focused on creating a "sustainable" future), as part of a project for the Ohio Department of Economic Development. The results of that project were published in a 2011 report (long before the content of SB 58 was known) titled, "Assuring Ohio's Competitiveness in a Carbon-Constrained World." I will have more to say about this model later.

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[2] The ACEEE document indicates that a variety of stakeholders made contributions to the report but it does not identify how the contributions affected the report or the conclusions therein.

As a preliminary point, OMA has not released the actual GSE Analysis, but only the summary of findings. Therefore, I do not know how GSE actually performed its analysis. The PUCO Staff and ACEEE study also do not contain documentation indicating how the various models were run, what inputs were used, or whether the models have been validated (an important part of testing the predictive capability of a model). Ironically, the AEOI document concludes that, based on the DEEPS model analysis, Ohio's current renewable mandates ***raised*** electric prices in 2011 and 2012. That would seem to call into question the ability of renewable generation to suppress wholesale prices at all, much less the alleged benefits of price suppression.

Because there are more fundamental problems with all of these models, it is unnecessary to drill deeper into their inner workings before concluding that the claims that depend on these models are unfit for their intended purpose. Accordingly, I urge you to not rely on the claims that depend on the validity of any of these studies as you consider SB 58 and potential modifications to the state's alternative energy, energy efficiency and peak demand reduction mandates.

I will first summarize my general conclusions about the claimed price suppression "benefits" and then provide some specific comments on each of these four studies.

A. What is Meant by "Price Suppression?"

Let me begin with a brief definition of the type of price suppression that is attributed to the studies. All of them focus on what should be termed "artificial price suppression." It is artificial because it is a byproduct of mandated intervention in a market, in which willing buyers and sellers would otherwise define the portfolio of supply and demand side resources. Thus, artificial price suppression does not reflect how competitive markets work. In effect, the stakeholders who are asserting these price suppression benefit claims are really arguing that the mandates provide a type of price control that trumps the price that would otherwise prevail in a market in which buyers and sellers engage in commerce willingly.

When prices in competitive electric markets decrease as a result of government mandates that force willing buyers and sellers to deviate from their preferences, those prices are not being "suppressed" by the workings of the market. You only need to look at the generally accepted definition of the word "suppress" to see that suppression occurs by a force that is involuntarily or externally imposed. In most market-based economies, it is often unlawful for a market

participant to suppress prices because this type of conduct is anti-competitive and works to unreasonably deprive consumers of the benefits of competition, resulting in higher prices for products and services. For example, under the Sherman Antitrust Act, an unlawful monopoly exists when one firm controls the market for a product or service, and it has obtained that market power, not because its product or service is superior to others, but by ***suppressing*** market competition itself.

I believe you will understand the issues before you more clearly if you maintain this clear distinction. Price "suppression" means manipulating the outcome of a competitive market. And, when the workings of competitive markets are artificially manipulated, the results do not bode well for consumers.

There are two major points I hope you will keep in mind as you consider the claims about the "benefits" of wholesale price suppression. The first is what I term the "free lunch" fallacy. The second is the long-run damages artificial price suppression inflicts on competitive markets, damages that are always greater than temporary "benefits."

II. ARTIFICIAL PRICE SUPPRESSION CAUSED BY MANDATED INVESTMENTS IN ALTERNATIVE ENERGY RESOURCES (INCLUDING RENEWABLES, ENERGY EFFICIENCY AND PEAK DEMAND REDUCTIONS) DOES NOT, AND CANNOT, PROVIDE BENEFITS EXCEEDING THE COSTS OF THOSE MANDATES. THAT IS AN ECONOMIC "FREE LUNCH" FALLACY.

The economic "free lunch" fallacy means getting something of value at no cost. Arguments that artificial wholesale electric price suppression through mandated investments provide greater benefits to retail customers than the costs to those same retail customers are an example of this fallacy.

While it may be possible to provide the *appearance* of "gain-without-pain" in the short-run, it is impossible in the long run. Otherwise, what economists call "arbitrage opportunities" would exist, in which unlimited gains can be achieved at zero cost. For example, the DEEPS model analysis shows that the more stringent the mandate, the greater would be Ohio's economic

growth, income, and job creation.[3] This is an example of a "free lunch" analytical result, because it means Ohio can improve the state economy by the energy equivalent of "printing money." Or, if you prefer, it is the economic equivalent of a perpetual motion machine that creates more energy than it uses. Neither is possible.

If these mandates actually were able to reduce prices in the competitive market, then mandated resources would compete successfully without a need for any mandates. If energy efficiency and renewable resource mandates really do provide greater long-term economic growth, higher incomes, and more jobs, then these resources can successfully compete based on their merit in the market. In our economic system, private capital (as opposed to captive customers) would happily invest in these resources and reap the rewards of providing better service *and* lower prices to retail consumers. That isn't happening in Ohio, which is why reform of the current mandates is being considered.

If investments in energy efficiency and renewable resources can suppress wholesale market prices and benefit consumers, but are not taking place, at least at the level proponents for the status quo believe they should, it is important to consider why the targeted level of investment is not being supplied voluntarily by private capital markets and more traditional financing options.

There are two possible reasons why these investments are not occurring voluntarily: (1) So-called "market barriers" (which economists refer to as "barriers to entry") mean that the wholesale electric market is not really competitive; or (2) the claimed wholesale price suppression benefits don't actually exist.

Mandate advocates emphasize the first reason. They argue that "market barriers" are preventing *voluntary* investments in energy efficiency and renewable resources and, therefore, mandates are required. In essence, these advocates suggest that consumers and businesses do not know what's good for them and, hence, policy makers must make the "right" decisions for them.

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[3] *See* "Assuring Ohio's Competitiveness in a Carbon-Constrained World," Chapter 9, p. 23. "[C]limate change policies … have a positive impact on the state economy and environment, increasing GSP by 0.1% each year on average, disposable income by an annual average of 0.2%, and total number of jobs by an annual average of 0.22%."

In evaluating proponents' claims about wholesale price suppression, we can examine these two possibilities. I will begin with discussing the first possible reason: the existence of "market barriers," including what that term means and whether energy efficiency and renewable generation face market barriers that require mandates. Then, I will discuss the second, and what I believe is the real reason: the mandates do not provide the economic "free lunch" through wholesale price suppression that proponents claim.

A. Energy Efficiency and Renewable Resources Do Not Face Market Barriers

The Nobel prize-winning economist George Stigler defined a "barrier to entry" as "A cost of producing which must be borne by a firm which seeks to enter an industry but is not borne by firms already in the industry."[4] Under this definition, market barriers can be *observed*. For example, a law that requires any new companies drilling for natural gas in Ohio's Utica Shale to carry $100 million in liability insurance, but allows existing companies to drill there with no insurance, creates a market barrier to new entry.

Advocates of mandated energy efficiency and renewable resource investments define market barriers differently. For these advocates, "market barriers" are *deduced* by the choices consumers make. Specifically, advocates deduce the presence of market barriers to energy efficiency and renewable resource investments if they believe consumers are not choosing those investments voluntarily or are not investing sufficiently (based on the advocates' determinations) in, for example, energy efficiency and alternative energy resources.

For example, LED lights use very little electricity and last a long time. However, an LED bulb can cost as much as $50. Under the "deduced" market barrier theory, if an analysis shows that the energy savings benefits of the LED bulb are greater than its $50 cost, but a consumer does not buy the bulb, then mandate advocates assert that there *must* be a market barrier, either because of the bulbs' high cost, consumers lack enough information or are incapable of making the "right" decision (which for the mandate advocates would be purchasing the LED bulb).

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[4] G. Stigler, *The Organization of Industry* (Chicago, IL: University of Chicago Press, 1968).

1. An above-market price is not a "market barrier"

Rolls-Royce sells very expensive automobiles, which few people can afford. Yet, Rolls-Royce does not face market barriers to sell these cars. It simply sells cars to a small market segment of individuals who are willing to pay for the benefits they believe are provided by Rolls-Royce cars.

Similarly, simply because developers of solar and wind resources believe they will be unable to recover the costs of these resources in the competitive wholesale market, or because few consumers will install $50 LED bulbs, does not mean these products face market barriers. The situation is much the same today for nuclear power, with low natural gas prices having made development of new, and even continued operation of some existing, nuclear plants uneconomic. I doubt you will hear anyone arguing that non CO2 emitting nuclear power faces a market barrier as a consequence.

You may also hear advocates of energy efficiency and renewable resource mandates argue that the market price of electricity does not reflect its "true" social cost (i.e., it fails to incorporate environmental costs, especially from carbon emissions), and therefore "clean" energy resources face a market barrier: if the prices of other energy resources reflected their true cost, then the "clean" resources would be chosen voluntarily.

This argument suffers from three problems. First is a tendency to "double-count" environmental costs. For example, under the U.S. Clean Air Act, the emissions of sulfur dioxide and NOx are controlled and the costs of such controls are reflected in market prices as well as in decisions made by generating plant owners to close existing generating plants. In economic parlance, those external, social costs have been "internalized" into the market price as well as market entry and exit decisions.

Second, not only are estimates of the social cost of carbon emissions fraught with uncertainty, but, more importantly, unilateral action by Ohio, or even the US, will have no measurable impact on the global climate. For example, as US consumption of domestically produced coal has declined, we have seen a steady increase in coal exports to other nations. Hence, unilateral actions by Ohio are the economic equivalent of "falling on one's sword."

This leads to the third problem. Mandate supporters are effectively arguing that current wholesale electric prices are "too low," because they fail to recognize social costs while, at the same time, also claiming that mandated investments in energy efficiency and renewable resources will benefit consumers by suppressing those same (too low) wholesale prices even further. These positions are inconsistent, to say the least.

2. Consumers and businesses have enough information to make their own economic decisions

The "lack of information" argument also does not withstand objective scrutiny. Mandate advocates presume that Ohio businesses and consumers are incapable of weighing the costs and benefits of energy efficiency investments, even when provided with the relevant information to do so. In essence, this is an "eat your spinach" argument. If consumers and businesses know how good energy efficiency investments are, but don't make the investments voluntarily, or don't know how good energy efficiency investments are, then they must be forced to make those investments by policy makers who "know better."

This argument suggests that large manufacturing firms, who compete in global markets and make multi-million or even billion dollar investment choices, such as constructing new factories, somehow lack the ability to evaluate the benefits and costs of installing higher efficiency motors and lights, for example. I've worked with large manufacturers in other states, such as IBM. I can assure you they know how to define real energy efficiency and they know which energy efficiency investments work and which do not.

III. WHERE THERE ARE ARTIFICIAL PRICE SUPPRESSION EFFECTS, THEY ARE TEMPORARY: SUBSIDIES AND MANDATES MAY SUPPRESS MARKET PRICES IN THE SHORT-TERM, BUT IN THE LONG RUN, MARKET PRICES WILL BE HIGHER THAN THEY WOULD HAVE BEEN BUT FOR THE SUBSIDIES AND MANDATES. THUS, ARTIFICIAL PRICE SUPPRESSION ULTIMATELY HARMS OHIO CONSUMERS.

Because there are no economic "free-lunches," any artificial wholesale price suppression effects are temporary. Moreover, in the long run, prices will be *higher* than they would have been *but for* the subsidies and mandates. Thus, artificial price suppression ultimately harms Ohio consumers.

When suppliers voluntarily enter a market, prices will tend to fall and consumers will benefit from those lower prices. And, although incumbent suppliers may "lose" when the market price falls, the benefits to consumers are always greater than the loss to those existing suppliers.

With a mandate that subsidizes market entry, the cost of the subsidy is always greater than the benefit from the initially lower or suppressed market price.[5] Moreover, the mandates and subsidies ultimately cause market prices to be *higher* than they would otherwise be *but for* the mandates and subsidies. This long-run negative impact occurs for two reasons: (1) when mandates and subsidies artificially suppress short-run market prices, they will force some unsubsidized competitors out of the market, thus reducing supply; and (2) mandates and subsidies create more investment uncertainty, which raises the cost of entry and leads to less market entry by unsubsidized investors, further reducing market supply and, again, leading to higher long-run market prices.[6]

Importantly, none of the four studies examine these long-run impacts. Instead, they simply focus on the short-run impacts of artificial price suppression and ignore the long-run damage to competitive markets and electric consumers in Ohio. Ironically, the ACEEE study *acknowledges* the transitory nature of artificial "price suppression," stating:

> Suppliers participating in these wholesale markets will likely respond to reductions in market prices by taking actions that will, over time, offset the reduction and eventually cause the market price to move toward the level it would have been in the reference case.[7]

A. History and Experience Show that Subsidies Inflict Economic Harm

If we have learned anything from our history, we have learned that states and nations cannot mandate and subsidize their way to greater economic growth.

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[5] For a formal explanation why this must be the case, *see* Jonathan Lesser, "Wind Generation Patterns and the Economics of Wind Subsidies," *The Electricity Journal* 26, Jan/Feb. 2013, pp. 8-16. *See also* Jonathan Lesser, "The High Cost of Low-Value Wind Power," *Regulation*, Spring 2013, pp. 22-27.

[6] This result is shown in a just published paper by R.J. Briggs and Andrew Kleit, "Resource adequacy reliability and the impacts of capacity subsidies in competitive electricity markets," *Energy Policy* 40, November 2013, pp. 297-305.

[7] ACEEE Report, p. 26 (emphasis added)

In Europe, for example, consumers in countries like Britain, Germany, and Spain, which have heavily subsidized renewable energy investments, pay very high prices for electricity. Those high electricity prices are crippling economic growth and harming the most vulnerable consumers. Now, these countries are attempting to unwind their renewable energy policies. For example, an article titled "Germany's Energy Poverty: How Electricity Became a Luxury Good,"[8] which was published on September 4, 2013 by *Der Spiegel*, Germany's main newspaper, states:

> *German consumers already pay the highest electricity prices in Europe. But because the government is failing to get the costs of its new energy policy under control, rising prices are already on the horizon. Electricity is becoming a luxury good in Germany …*
>
> *For society as a whole, the costs have reached levels comparable only to the euro-zone bailouts. This year, German consumers will be forced to pay €20 billion ($26 billion) for electricity from solar, wind and biogas plants -- electricity with a market price of just over €3 billion. Even the figure of €20 billion is disputable if you include all the unintended costs and collateral damage associated with the project. Solar panels and wind turbines at times generate huge amounts of electricity, and sometimes none at all. Depending on the weather and the time of day, the country can face absurd states of energy surplus or deficit.*
>
> …
>
> *Consumer advocates and aid organizations say the breaking point has already been reached. Today, more than 300,000 households a year are seeing their power shut off because of unpaid bills. Caritas and other charity groups call it "energy poverty."*
>
> *Lawmakers, on the other hand, have largely ignored the phenomenon. In the concluding legislative period, the government and opposition argued passionately over a €5 increase in payments to the long-term unemployed. But no one paid much attention to the fact that those welfare recipients would subsequently see the extra €5 wiped out by higher electricity bills.*

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[8] A complete copy of this article is included with my testimony.

> *It is only gradually becoming apparent how the renewable energy subsidies redistribute money from the poor to the more affluent, like when someone living in [a] small rental apartment subsidizes a homeowner's roof-mounted solar panels through his electricity bill. The SPD, which sees itself as the party of the working class, long ignored this regressive aspect of the system. The Greens, the party of higher earners, continue to do so.*

Ohio hasn't reached this level yet, but states with the most aggressive renewable generation mandates, such as California, are close. Moreover, the German experience points to the inherent economic fallacies being promoted by stakeholders advancing the price suppression claims.

IV. SELECTED COMMENTS ON THE FOUR STUDIES

Although the PUCO Staff study admits Staff did not perform any analysis of the mandate costs and therefore cannot be used to support the price suppression benefit claims,[9] the other three studies all are being used to support the claim that that price suppression "benefits" exceed the mandates' costs. The other three studies claim that the electric price suppression related benefits flowing to Ohio retail electric consumers exceed the costs that these consumers pay as a result of the mandates.

Let me conclude with some brief comments about each of the four studies.

A. PUCO Staff

- Staff's analysis simply moves out the supply curve, assuming renewable resources are bid into the market at a zero price. Greater supply bid into the market at a zero price means lower market prices; hence the zero bid price assumption is the foundation for the conclusion in the Staff document.

- Staff wrongly assumes that 100% of wholesale purchases come from the PJM spot market. In reality, only about 25% of PJM sales settle at the spot market price. The remainder are bilateral contracts or dispatch of owned generating assets.[10] As a result,

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[9] PUCO Staff Report, p. 3.

[10] *See* Monitoring Analytics, *2012 State of the Market Report for PJM*, p. 92.

Staff overestimates the "load savings" values shown on page 6 of its report. The ACEEE study makes this same mistake.

- The Staff document does not consider or address the cost of the mandates themselves, nor of the long-term reaction by other suppliers. It's essentially a snapshot in time.

- The Staff analysis assumes there is a one-to-one relationship between wholesale prices and retail prices. Thus, if wholesale energy prices decrease by one cent, Staff's analysis assumes retail prices decrease by the same amount. That is not the case one observes in retail ratemaking cases I have participated in, including cases before the PUCO, which has granted utilities non-bypassable above-market generation related charges to offset the price reductions that retail consumers would have otherwise realized if retail generation supply prices tracked wholesale generation supply prices. The reason for the differences between wholesale and retail impacts stems from the fact that they are different segments of the larger electric market with different regulators and very different controlling laws. For example, Ohio's Electric Security Plan and Market Price Offer mechanisms for establishing default generation supply prices have no counterparts in the wholesale market.

- The zero price bid strategy assumed in the Staff document ignores the fact that winning bidders are not paid zero (they are paid a uniform clearing price set by other bidders offering to sell at much higher prices) and ignores the fact that renewable sellers often sell their output under bilateral contracts.

B. ACEEE Study

- The ACEEE study is actually dependent on work done by Synapse, a consulting firm known for its advocacy in favor of energy conservation and renewable generation. The ACEEE study builds to its conclusions using unidentified contributions from a large group of stakeholders and layers of assumption built upon assumption. It ignores effects on unsubsidized energy and capacity providers exiting the market, despite acknowledging those providers will leave the market and thereby bring an end to the temporary price

suppression. It ignores the effects of the mandate-induced uncertainty on future investments.

- Given all of the monetary benefits of energy efficiency, plus other benefits identified in the report (e.g., reduced maintenance expenditures), the study begs the question of why mandates and subsidies are required to induce the purchase and installation of energy efficiency measures.

- Although the study's "benefit" estimates include price suppression attributed to bidding "energy efficiency" into PJM's wholesale capacity market, the study ignores the fact that PJM increases the overall capacity requirement by the same amount. If a utility's coincident peak is reduced by 10 megawatts ("MW") because of energy efficiency investments, and the utility bids that 10 MW into the wholesale capacity market, PJM adds back the 10 MW to the utility's coincident peak. Thus, depending on where the wholesale capacity market clears, it's possible for the utility's and consumer's capacity prices to increase when energy efficiency is bid into the PJM market rather than being used in other ways. A better solution is simply to reduce the utility's capacity requirement by the 10 MW. In other words, reducing demand guarantees a decrease in the capacity obligation as computed by PJM. Increasing supply and demand by the same amount may not. Also, energy efficiency has a limited life in the PJM capacity market (four years) and the definition of "energy efficiency" for purposes of the PJM capacity market is much more limited than the energy efficiency that counts towards compliance with Ohio's energy efficiency mandates.

- The study ignores all of the participant costs in calculating the savings from energy efficiency mandates. In other words, the study fails to include the costs incurred by businesses and consumers on top of the direct mandate costs, focusing solely on the costs incurred by utilities.

- The study's cost-benefit analysis uses an unrealistically low discount rate of 5% to compare the benefits of energy efficiency to the market. Using a higher, more realistic discount rate, such as a discount rate equal to the weighted average cost of capital for Ohio's electric utilities, would reduce the estimated present value benefits.

- The estimated wholesale market savings from energy efficiency measures are based on unrealistic short-run price responsiveness ("price elasticity") values. The empirical analysis of prices and load shown in Appendix A-2 (p. 27) does not estimate consumer price elasticity of demand whatsoever. Instead, it is a poorly-fit estimate of an average relationship between changes in market demand and changes in market price. The study uses this relationship to estimate the "benefits" from an artificial reduction in market demand, without considering the "rebound" effects, such as occur when the cost of a service decreases. For example, as consumers drive more fuel efficient cars, they tend to increase the miles they drive, because the cost per mile decreases. Similarly, if the cost of providing an amenity with electricity decreases, consumers will tend to increase their consumption. For example, many consumers who purchase new, more efficient refrigerators, tend to keep their older ones, thus reducing the actual measured "savings."

- Despite acknowledging that existing generators will exit the market due to the artificial price suppression, the analysis for the years 2012 – 2020 fails to account for the effects from those unsubsidized suppliers exiting the markets. Moreover, the analysis fails to consider the effects of reduced supplies from potential unsubsidized market entrants who will be less likely to develop new resources if there are subsidies.

- The ACEEE study ignores the effects of removing market barriers rather than erecting them through subsidies and mandates. In other studies, ACEEE has shown how removing information barriers can facilitate market entry based on merit, rather than mandates.[11] Better information leads to better consumer and investor decisions, and enhances competitive markets, rather than undermining competitive markets as mandates and subsidies do.

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[11] *Overcoming Market Barriers and Using Market Forces to Advance Energy Efficiency*, Shruti Vaidyanathan, Steven Nadel, Jennifer Amann, Casey J. Bell, Anna Chittum, Kate Farley, Sara Hayes, Michelle Vigen, and Rachel Young, March 2013, ACEEE Report Number E136.

C. OMA Study

- Because the OMA study is based on the results of the ACEEE study, the OMA results are invalid for the same reasons summarized above for the ACEEE study.

- The OMA study does not disclose the source of assumptions or how the estimates for different customer types were determined. For example, the source of the "load factor" assumptions for different businesses is not disclosed.

- The analysis ignores the impacts on residential and small commercial customers.

- The OMA study suggests that the benefits of price suppression are not uniformly distributed and that larger consumers are benefiting least from such benefits (assuming they exist).

- The OMA study does not provide a known baseline for defining energy efficiency or measuring energy efficiency benefits. In fact, this defect is common to all of the studies that claim energy efficiency-related price suppression benefits. This is a significant and fundamental problem. Is the "energy efficiency" in the studies only the energy efficiency above some hypothetical "best practice" level of energy efficiency or is it based on the actual measured before and after kilowatt-hour ("kWh") consumption relative to a baseline? It is my understanding that there has been much disagreement in Ohio about how to define energy efficiency for purposes of measuring compliance with the Ohio mandates. Yet, none of the studies that attribute benefits to energy efficiency identify the definition of energy efficiency that is embedded in their analysis, how the asserted benefits might change as a function of definitional variations or how they have assembled the baseline from which the amount of energy efficiency (however defined) is being measured.

D. AEOI Study

- The results are based on the DEEPS model, which suffers from significant empirical flaws.

- The DEEPS model is a type of "computable general equilibrium" ("CGE") model that attempts to simultaneously model an entire economy (in this case, the Ohio economy). To do that, the model relies on many simplifying assumptions. For example, DEEPS does not address business relocation based on energy price differences and takes all outside state activity as given. In other words, the modeler specifies activity outside of Ohio, rather than that activity being determined within the model. As a result, there are no feedback effects recognized within the model, such as increased imports arising because of higher in-state costs, or the effects of lower energy demand on market prices, etc.

- The DEEPS model uses simplistic industry model assumptions (i.e., Cobb-Douglas production functions).

- The DEEPS model is a "black-box" which produces results that depend on, and are highly sensitive to, the model structure assumptions, such as assumed energy prices and income elasticities. Supposedly, the model evaluates competitiveness of energy-intensive industries, but does not identify whether this is competitiveness with respect to other states or countries. All international prices are assumed to be exogenous to the model. It's not clear if prices in other states are exogenous – but they must be, given the model's structure.

- The DEEPS model assumes consumers spend all disposable income and do not save.

- The "free lunch" results of the DEEPS model result from a failure to incorporate the long-run dynamic effects of subsidies on the wholesale electric market, which will cause unsubsidized suppliers to exit the market and retard new entry because of higher levels of uncertainty.

V. CONCLUSIONS

Ultimately, my testimony today is about common sense. These four studies purport to "prove" that Ohio can gain something for nothing; that by manipulating energy markets through portfolio mandates, Ohio can, in essence, print money. The more stringent the mandates; the more money

the state can print. It reminds me of those Nigerian junk emails I receive, promising me millions of dollars from lost bank accounts. All I have to do is send a few hundred dollars to cover up-front expenses and somebody will transfer massive amounts of wealth my way.

Thank you for this opportunity to appear before you today. I would be happy to answer your questions.

ATTACHMENT 1

Curriculum Vitae of Jonathan A. Lesser, PhD

CONTINENTAL ECONOMICS

Jonathan A. Lesser, Ph.D.
President

SUMMARY OF EXPERIENCE

Dr. Jonathan Lesser is the President of Continental Economics, Inc., and has almost 30 years of experience working for regulated utilities, governments, and as an economic consultant. He has extensive experience in valuation and damages analysis, from estimating the damages associated with breaking commercial leases to valuing nuclear power plants. Dr. Lesser has performed due diligence studies for investment banks, testified on generating plant stranded costs, assessed damages in commercial litigation cases, and performed statistical analysis for class certification. He has also served as an arbiter in commercial damages proceedings.

He has analyzed economic and regulatory issues affecting the energy industry, including cost-benefit analysis of transmission, generation, and distribution investment, gas and electric utility structure and operations, generating asset valuation under uncertainty, mergers and acquisitions, cost allocation and rate design, resource investment decision strategies, utility financing and the cost of capital, depreciation, risk management, incentive regulation, economic impact studies of energy infrastructure development, and general regulatory policy.

Dr. Lesser has prepared expert testimony and reports in cases before utility commissions in numerous U.S. states; before the Federal Energy Regulatory Commission (FERC); before international regulators in Latin America and the Caribbean; in commercial litigation cases; and before legislative committees in Connecticut, Maryland, New Jersey, Ohio, Texas, Vermont, and Washington State. He has also served as an independent arbiter in disputes involving regulatory treatment of utilities and valuation of energy generation assets.

Dr. Lesser is the author of numerous academic and trade press articles. He is also the coauthor of *Environmental Economics and Policy*, published in 1997 by Addison Wesley Longman, *Fundamentals of Energy Regulation*, published in 2007 by Public Utilities Reports, Inc., and *Principles of Utility Corporate Finance*, published in 2011 by Public Utilities Reports, Inc. Dr. Lesser is also a contributing columnist and Editorial Board member for *Natural Gas & Electricity*.

AREAS OF EXPERTISE

- State, federal, and international electric rate regulation—cost of capital, depreciation, cost of service, cost allocation, pricing and rate design, incentive regulation, regulatory policy, wholesale and retail market design, and industry restructuring
- Natural gas markets
- Pipeline rate regulation
- Commercial damages estimation and litigation
- Cost-benefit analysis
- Economic impact analysis and input-output studies
- Environmental policy and analysis
- Market power analysis
- Load forecasting and energy market modeling
- Market valuation and due diligence
- Antitrust

EDUCATION

- PhD, Economics, University of Washington, 1989.
- MA, Economics, University of Washington, 1982.
- BS, Mathematics and Economics (with honors), University of New Mexico, 1980.

EMPLOYMENT HISTORY

- 2009–Present: Continental Economics, Inc., President.
- 2008–2009: Faculty member, PURC/World Bank International Training Program on Utility Regulation and Strategy, University of Florida, Public Utility Research Center, Gainesville, FL. Courses taught:
    - Sector Issues: Basic Techniques–Energy
    - Sector Issues in Rate Design: Energy
    - Sector Issues in Rate Design: Energy–Case Studies
    - Transmission Pricing
- 2004–2009: Bates White, LLC, Partner, Energy Practice.
- 2003–2004: Vermont Dept. of Public Service, Director of Planning.

- 1998–2003: Navigant Consulting, Senior Managing Economist.
- 1996–1998: Adjunct Lecturer, School of Business, University of Vermont (Courses taught: Business and the Environment; Regulation of Business)
- 1993–1998: Green Mountain Power Corporation, Manager, Economic Analysis.
- 1990–1993: Adjunct Lecturer, Dept. of Business and Economics, Saint Martin's College. (Courses taught: Money and Banking)
- 1986–1993: Washington State Energy Office, Energy Policy Specialist.
- 1984–1986: Pacific Northwest Utilities Conference Committee, Energy Economist.
- 1983–1984: Idaho Power Corporation, Load Forecasting Analyst.
- 1980 – 1983: University of Washington, Graduate Teaching Assistant. (Courses taught: Principles of Economics, Microeconomics, Macroeconomics, Industrial Organization)

PROFESSIONAL ACTIVITIES

- Reviewer, *Energy*
- Reviewer, *The Energy Journal*
- Reviewer, *Energy Policy*
- Reviewer, *Journal of Regulatory Economics*
- Editorial Board Member, *Natural Gas & Electricity*

PROFESSIONAL ASSOCIATIONS

- Energy Bar Association
- International Association for Energy Economics
- Society for Benefit-Cost Analysis

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- "The Need for a Texas Capacity Market," Presentation to the Gulf Coast Power Association, April 9, 2013.
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- "Public Policy and Energy Markets: Good Intentions Gone Astray," presentation to the Independent Power Producers of New York, Fall Conference, September 13, 2012.
- "EPA Regulation of Generator Emissions – Key Market Issues," Energy Bar Association, Annual Meeting, April 28, 2012.
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- "Financing the Smart Grid," Energy Bar Association Seminar, Washington, DC, December 4, 2009.
- "Renewable Power: At the Crossroads of Economics and Policy," Presentation to the Utilities State Government Organization, Newport, Rhode Island, July 13, 2009.
- "The Stimulus Act and Laws they Didn't Teach You in Law School," presentation to the 27th National Regulatory Conference, Williamsburg, VA, May 19, 2009.
- "Rate Recovery for Capital Intensive Generation: Rate Base and Construction Work in Progress," Law Seminars International, Las Vegas, NV, February 5, 2009.
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- "Alternative Regulatory Structures and Tariff Mechanisms: Practical approaches to providing low-cost, environmentally responsible energy and how to avoid some dangerous pitfalls." Western Energy Institute, October 1, 2007.
- "Economics and Energy Regulation." Law Seminars International, Washington, DC, March 15-16, 2007.
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- "Energy in the Southwest: New Directions in Energy Markets and Regulations." Law Seminars International, Santa Fe, NM, July 14, 2006.

- "Energy and the Environment." Vermont Journal of Environmental Law, South Royalton, VT, March 10, 2006.
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ATTACHMENT 2

Der Spiegel Article

“Germany's Energy Poverty: How Electricity Became a Luxury Good”

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Germany's Energy Poverty

How Electricity Became a Luxury Good

By SPIEGEL Staff

Germany's agressive and reckless expansion of wind and solar power has come with a hefty pricetag for consumers, and the costs often fall disproportionately on the poor. Government advisors are calling for a completely new start.

If you want to do something big, you have to start small. That's something German Environment Minister Peter Altmaier knows all too well. The politician, a member of the center-right Christian Democratic Union (CDU), has put together a manual of practical tips on how everyone can make small, everyday contributions to the shift away from nuclear power and toward green energy. The so-called Energiewende, or energy revolution, is Chancellor Angela Merkel's project of the century.

"Join in and start today," Altmaier writes in the introduction. He then turns to such everyday activities as baking and cooking. "Avoid preheating and utilize residual heat," Altmaier advises. TV viewers can also save a lot of electricity, albeit at the expense of picture quality. "For instance, you can reduce brightness and contrast," his booklet suggests.

Altmaier and others are on a mission to help people save money on their electricity bills, because they're about to receive some bad news. The government predicts that the renewable energy surcharge added to every consumer's electricity bill will increase from 5.3 cents today to between 6.2 and 6.5 cents per kilowatt hour -- a 20-percent price hike.

German consumers already pay the highest electricity prices in Europe. But because the government is failing to get the costs of its new energy policy under control, rising prices are already on the horizon. Electricity is becoming a luxury good in Germany, and one of the country's most important future-oriented projects is acutely at risk.

After the Fukushima nuclear accident in Japan two and a half years ago, Merkel quickly decided to begin phasing out nuclear power and lead the country into the age of wind and solar. But now many Germans are realizing the coalition government of Merkel's CDU and the pro-business Free Democrats (FDP) is unable to cope with this shift. Of course, this doesn't mean that the public has any more confidence in a potential alliance of the center-left Social Democrats (SPD) and the Greens. The political world is wedged between the green-energy lobby, masquerading as saviors of the world, and the established electric utilities, with their dire warnings of chaotic supply problems and job losses.

Even well-informed citizens can no longer keep track of all the additional costs being imposed on them. According to government sources, the surcharge to finance the power grids will increase by 0.2 to 0.4 cents per kilowatt hour next year. On top of that, consumers pay a host of taxes, surcharges and fees that would make any consumer's head spin.

Former Environment Minister Jürgen Tritten of the Green Party once claimed that switching Germany to renewable energy wasn't going to cost citizens more than one scoop of ice cream. Today his successor Altmaier admits consumers are paying enough to "eat everything on the ice cream menu."

Paying Big for Nothing

For society as a whole, the costs have reached levels comparable only to the euro-zone bailouts. This year, German consumers will be forced to pay €20 billion ($26 billion) for electricity from solar, wind and biogas plants -- electricity with a market price of just over €3 billion. Even the figure of €20 billion is disputable if you include all the unintended costs and collateral damage associated with the project. Solar panels and wind turbines at times generate huge amounts of electricity, and sometimes none at all. Depending on the weather and the time of day, the country can face absurd states of energy surplus or deficit.

If there is too much power coming from the grid, wind turbines have to be shut down. Nevertheless,

consumers are still paying for the "phantom electricity" the turbines are theoretically generating. Occasionally, Germany has to pay fees to dump already subsidized green energy, creating what experts refer to as "negative electricity prices."

On the other hand, when the wind suddenly stops blowing, and in particular during the cold season, supply becomes scarce. That's when heavy oil and coal power plants have to be fired up to close the gap, which is why Germany's energy producers in 2012 actually released more climate-damaging carbon dioxide into the atmosphere than in 2011.

If there is still an electricity shortfall, energy-hungry plants like the ArcelorMittal steel mill in Hamburg are sometimes asked to shut down production to protect the grid. Of course, ordinary electricity customers are then expected to pay for the compensation these businesses are entitled to for lost profits.

The government has high hopes for the expansion of offshore wind farms. But the construction sites are in a state of chaos: Wind turbines off the North Sea island of Borkum are currently rotating without being connected to the grid. The connection cable will probably not be finished until next year. In the meantime, the turbines are being run with diesel fuel to prevent them from rusting.

In the current election campaign, the parties are blaming each other for the disaster. Meanwhile, the federal government would prefer to avoid discussing its energy policies entirely. "It exposes us to criticism," says a government spokesman. "There are undeniably major problems," admits a cabinet member.

But this week, the issue is forcing its way onto the agenda. On Thursday, a government-sanctioned commission plans to submit a special report called "Competition in Times of the Energy Transition." The report is sharply critical, arguing that Germany's current system actually rewards the most inefficient plants, doesn't contribute to protecting the climate, jeopardizes the energy supply and puts the poor at a disadvantage.

The experts propose changing the system to resemble a model long successful in Sweden. If implemented, it would eliminate the more than 4,000 different subsidies currently in place. Instead of bureaucrats setting green energy prices, they would be allowed to develop indepedently on a separate market. The report's authors believe the Swedish model would lead to faster and cheaper implementation of renewable energy, and that the system would also become what it is not today: socially just.

Trouble Paying the Bills

When Stefan Becker of the Berlin office of the Catholic charity Caritas makes a house call, he likes to bring along a few energy-saving bulbs. Many residents still use old light bulbs, which consume a lot of electricity but are cheaper than newer bulbs. "People here have to decide between spending money on an expensive energy-saving bulb or a hot meal," says Becker. In other words, saving energy is well and good -- but only if people can afford it.

A family Becker recently visited is a case in point. They live in a dark, ground-floor apartment in Berlin's Neukölln neighborhood. On a sunny summer day, the two children inside had to keep the lights on -- which drives up the electricity bill, even if the family is using energy-saving bulbs.

Becker wants to prevent his clients from having their electricity shut off for not paying their bill. After sending out a few warning notices, the power company typically sends someone to the apartment to shut off the power -- leaving the customers with no functioning refrigerator, stove or bathroom fan. Unless they happen to have a camping stove, they can't even boil water for a cup of tea. It's like living in the Stone Age.

Once the power has been shut off, it's difficult to have it switched on again. Customers have to negotiate a payment plan, and are also charged a reconnection fee of up to €100. "When people get their late payment notices in the spring, our phones start ringing," says Becker.

In the near future, an average three-person household will spend about €90 a month for electricity. That's about twice as much as in 2000.

Two-thirds of the price increase is due to new government fees, surcharges and taxes. But despite those price hikes, government pensions and social welfare payments have not been adjusted. As a result, every new fee becomes a threat to low-income consumers.

The Regressive Energy Tax

Consumer advocates and aid organizations say the breaking point has already been reached. Today, more than 300,000 households a year are seeing their power shut off because of unpaid bills. Caritas and other charity groups call it "energy poverty."

Lawmakers, on the other hand, have largely ignored the phenomenon. In the concluding legislative period, the government and opposition argued passionately over a €5 increase in payments to the long-term unemployed. But no one paid much attention to the fact that those welfare recipients would subsequently see the extra €5 wiped out by higher electricity bills.

It is only gradually becoming apparent how the renewable energy subsidies redistribute money from the poor to the more affluent, like when someone living in small rental apartment subsidizes a homeowner's roof-mounted solar panels through his electricity bill. The SPD, which sees itself as the party of the working class, long ignored this regressive aspect of the system. The Greens, the party of higher earners, continue to do so.

Germany's renewable energy policy is particularly unfair with respect to the economy. About 2,300 businesses have managed to largely exempt themselves from the green energy surcharge by claiming, often with little justification, that they face tough international competition. Companies with less lobbying power, however, are required to pay the surcharge.

In this respect, at least, all of Germany's political parties are pushing for change. They want to close loopholes and more widely distribute the costs of clean energy subsidies. But even this improvement would translate into a relatively minor financial benefit to citizens. According to the SPD plan, an average household would see only about 70 cents a month in savings -- slightly less than under the plan Environment Minister Altmaier proposed a few months ago.

In the end, what actually drives up costs would remain unaffected: the haphazard expansion of wind and solar energy.

The Offshore Trap

Far out in the North Sea, about 70 kilometers (43 miles) from the island of Norderney, there is a large, bright yellow steel box. It's as wide as the Brandenburg Gate and taller than the Federal Chancellery building. It's essentially a giant electrical socket, which collects the electricity from the nearby offshore wind farms and transmits it to the mainland via a thick cable. The system, along with the cable, cost grid operator Tennet about €1 billion and is designed to last 20 years, although there is no data to show that this will actually be the case.

According to an official at Tennet, the company has no experience with such systems. It knows only one thing: There are always obstacles in the way.

In the case of Germany's offshore projects, those obstacles currently include weather and porpoises. In heavy seas, work on the wind farm is suspended. The same applies when porpoises and their young are spotted, because of the potential damage to their sensitive hearing by construction noise. As a result, there are still many spots where metal stumps protrude from the water instead of wind turbines.

Still, the government is pressing ahead with wind expansion, and the plans are breathtaking. By 2020, offshore wind turbines are expected to generate up to 10 gigawatts of electricity, theoretically as much as eight nuclear power plants. To attract investors, the government has created the best possible subsidy conditions, so that operators will be paid 19 cents per kilowatt-hour of offshore electricity, or about 50 percent more than from land-based wind farms. The government has also assumed the liability risk for the wind farm operators. If anything goes wrong, taxpayers will bear the cost.

Hidden Costs

As fascinating as the plan is for engineers, economically it's a potential disaster. Experts believe that because of the more challenging conditions, the power offshore wind turbines generate will be consistently two to three times as expensive as on land. Although the wind blows more consistently at sea, this comes far from offsetting the higher costs.

The less visible costs are also high. There is little demand for electricity in the thinly populated coastal region. New high-voltage power lines will be needed to transport the energy to industrial centers in western and southern Germany. The government already estimates the costs of expanding the grid at €20 billion, which

doesn't include the additional ocean cables for offshore wind power.

If the government sticks to its plans, the price of electricity will literally explode in the coming years. According to a current study for the federal government, electricity will cost up to 40 cents a kilowatt-hour by 2020, a 40-percent increase over today's prices.

Worse yet, it remains completely unclear whether the offshore facilities are even needed. The Federal Environment Agency believes it's enough to install modern turbines in the best terrestrial wind sites. It would also be cheaper.

But even if that were the case, the environment minister still believes consumers can expect to see rising prices. Experts say the miniscule impact wind energy has had on current prices is due to an uncooperative Mother Nature: 2013 has been an unusually windless year so far.

The Storage Conundrum

The Cossebaude reservoir is Dresden's largest and most popular open-air pool. On summer days, up to 8,000 sunbathers lounge on its sandy beach or cool off in the 10,000-square-meter (2.5-acre) lake.

Cossebaude is also part of the enormous Niederwartha pumped storage hydroelectric plant. At night or on weekends, when there is plenty of available power, lake water is pumped electrically through big pipes into a second reservoir 140 meters above the main reservoir. At noon, when electricity is scarce, the water is released from the higher-elevation reservoir, spinning giant turbines as it descends. The system generates electricity when the cost is high and consumes it when the cost is low. Plant operator Vattenfall makes its profit on the difference. When the plant was connected to the grid in November 1929, it was considered the technology of the future.

Now the power plant, along with the recreational lake attached to it, could soon be gone. The company plans to shut down the energy storage facility within the next two years. This is bad news for Dresden's swimmers, but it's especially detrimental to Germany's energy transition, which depends on backup power plants like the Niederwartha facility.

When the sun isn't shining and the wind isn't blowing, gas-fired power plants and pumped storage stations are supposed to fill the gap. A key formula behind the Energiewende is that the more green energy is produced, the more reserves are needed to avert bottlenecks.

This is true in theory, but not in practice. On the contrary, an ironic result of the green energy expansion is that many of the reliable pumped storage stations could be forced out of the market. There are roughly 20 of these power plants in Germany, with Vattenfall being the most important operator. The plants were very profitable for utilities for decades, but now the business has become highly unreliable. Dresden is a case in point.

When it's sunny and people are most likely to head to the lake, solar power is abundant and electricity prices drop. This means the pumped storage station earns less money, so the power plant is shut off. In 2009, for example, the turbines in Niederwartha were in operation for 2,784 hours. Last year, Vattenfall ran the facility for only 277 hours. "Price peaks that last only a few hours aren't enough to utilize the plant to full capacity," says Gunnar Groebler, head of Vattenfall's German hydro division.

No Incentives for Storage

Not surprisingly, the company invests very little in its pumped storage plants today. In Niederwartha, the buildings are filled with the musty smell of earlier floods, the paint is peeling from the walls and the reservoir leaks.

It would cost Vattenfall €150 million to modernize the plant. But company executives are hesitant, fearing they won't recoup that money with future profits. Vattenfall has also hit the brakes elsewhere, like in Hamburg suburb of Geesthacht. Plans to increase the capacity of the existing reservoir there have been put on hold. Instead, the plant is used only as a backup.

Meanwhile, competitors RWE and EnBW have also shelved plans to build a large pumped storage power station in the southern Black Forest. Trianel, an association of about 100 municipal utilities, withdrew from a similar project at Rursee Lake in the western Eifel Mountains in late June.

All this gives credence to the claim that Germany's energy reform is its own worst enemy. Despite the erratic expansion of wind and solar projects, the backup power capacity those projects require is lacking. One study found that Germany's expansion of renewable energy will require additional storage capacity for 20 to 30 billion kilowatt-hours by 2050. So far the storage capacity has grown by little more than 70 million kilowatt-hours. And hardly anyone is interested in maintaining the existing storage facilities.

At least that isn't the case in Dresden, where a grassroots movement is working to keep the old pumped storage facility open -- partly because of the popular swimming lake.

Incentives for Pollution

More and more wind turbines are turning in Germany, and solar panels are basking in the sun, yet the amount of pollutants and greenhouse gases emitted by smokestacks increased last year. This dramatic turn of events is especially evident in small town of Grosskotzenburg, just east of Frankfurt.

Germany's largest energy provider, Düsseldorf-based E.on AG, has been operating a large coal-fired power plant in Grosskotzenburg for many years. The oldest of the five units at the Staudinger plant was built in 1965 and operates at a ridiculous 32-percent efficiency level. Even at E.on, the Staudinger plant is now seen as "completely unacceptable, both economically and environmentally."

State-of-the-art gas-fired power plants, like the one in the Bavarian town of Irsching, operate at almost double the efficiency levels of coal plants, or about 60 percent. They are also more flexible and emit far less carbon dioxide. This may explain why E.on officials were not particularly upset when the operating license for the oldest of Staudinger's five units expired on Jan. 1 of this year.

"To be on the safe side, we informed the relevant authorities several times that we are shutting down the unit," says E.on CEO Johannes Teyssen. When regulators did not object, the company began in May to dismantle key components of the power plant and transfer employees to other sites. E.on had planned to complete the work by the end of the year and remove what was left of the ancient plant.

But the situation suddenly changed on June 30, when E.on received a letter from the grid operator associated with the plant, Tennet, and the regulatory agency. The unit, the letter read, was needed to maintain grid stability, and E.on was to reestablish the coal plant's operational readiness without delay.

This is one of the most curious developments in the story of German energy reform. The country's most heavily polluting plants are now also its most profitable: old and irrelevant brown coal power stations. Many of the plants are now running at full capacity.

This leaves a dirty stain on Germany's environmental statistics. While the amount of electricity from renewable energy rose by 10.2 percent in 2012, the first year of the new energy policy, the amount of electricity generated in hard coal and brown coal plants also increased by 5 percent each. As a result, German CO2 emissions actually increased by 2 percent in 2012. Environment Minister Altmaier was clearly upset, saying: "This development cannot become a tendency."

But experts expect Altmaier will be humiliated once again at the end of the year, if he's still in office. A study released last week by the Federal Network Agency shows that energy generated with brown coal will remain virtually stabile, at 148 terawatt-hours, until 2022. It reached the depressing conclusion that brown coal's competitive position will be "hardly diminished by an increasing share of renewable energy in the mix."

Beyond Sweden

Sometimes the best ideas are borne of necessity. At least that's how Gustav Ebenå sees it when he looks back on the turn of the millennium, when Sweden entered the age of green energy. His country was suffering from the effects of a painful economic crisis at the time. "One thing was clear," the expert with Sweden's energy agency recalls. "Renewable forms of energy had to be developed as cost-effectively as possible."

Sweden developed a system based on government-mandated quotas for green energy and a market for certificates. "In a sense, our model at the time was the opposite of the German subsidy scheme," says Ebenå, who lived in Germany for many years and is well informed about Germany's energy reforms.

The Swedish model has prevailed among the competing concepts. Under the model, a kilowatt-hour of clean power costs only 10 percent more than conventional electricity. "This means that our consumers pay only a fraction of what Germans are spending to enter the renewable energy era," Ebenå says.

Still, Sweden is moving forward briskly with its expansion of green energy. The country already derives about 45 percent of its electricity from hydroelectric power plants. As a result of the subsidy system, biomass and wind turbines have contributed about 10 percent to the energy mix in recent years. Norway implemented the Swedish system last year. But can the model be applied to Germany?

The members of the commission appointed by the German government believe it can, and are due to submit a detailed plan to Economy Minister Philipp Rösler on Thursday. The plan was developed by economist Justus Haucap and legal expert Jürgen Kühling, and is supported by the economic think tank RWI and the German Academy of Science and Engineering (Acatech).

The experts propose that the government impose a green energy quota on energy providers, and gradually increase this quota in accordance with their targets for renewable energy production. The cutoff date would be Jan. 1, 2015. In the ensuing 12 months, 27.5 percent of electricity would have to come from renewable energy, followed by 29 percent in 2016 and, finally, 35 percent in 2020.

But it would be left up to the individual energy companies and municipal utilities to choose their respective sources of clean energy. The commission believes energy providers should decide how to spend their money on wind, solar or biomass. The municipal utilities would seek the lowest possible price for their clean electricity. This would encourage competition between offshore and terrestrial wind power, as well as between solar and biomass, and prices would fall, benefiting customers.

Keeping the System Honest

In Sweden, the system ensures that the electric utilities' investments automatically flow into the technology they see as the most cost-effective. This doesn't always have to be the cheapest technology at a given time. But like any normal company, the Swedish utilities have an interest in maximizing their return on investment. This is different in Germany, where the most inefficient technology at a given time is the most heavily subsidized, based on the bizarre logic that it has to be brought into the market over a particularly lengthy period of time.

To prevent energy providers from cheating the quota model, Sweden requires them to submit a certain number of green energy certificates. Each certificate represents one megawatt-hour of clean electricity. Those that cannot prove they have met their quotas are slapped with a hefty fine.

The rest is left up to supply and demand, based on the usual rules of the market economy. When the amount of green energy being generated is low, there are fewer certificates on the market and their price increases. This, in turn, gives investors an incentive to build additional wind turbines or solar arrays. They can also invest their money in storage systems, which make energy production more efficient. Or they can invest in technologies that play no role in Germany today but are being studied elsewhere in the world.

For Swedish Energy Minister Anna-Karin Hatt, the greatest benefit of the quota model is that it contains few bureaucratic restrictions. The government defines the objective, but not the method. In contrast to the German system, the government is not forced to constantly adjust subsidy rates for wind, solar and biomass. "As a result, the energy market doesn't depend on new political decisions every year," says Hatt. "Investors in renewable energy greatly value this predictability."

In heavily forested Sweden, energy providers initially focused on biomass in the form of wood and paper industry waste. They used this material to fuel conventional power plants, which generate electricity and supply long-distance heating to households. But this potential is now largely exhausted, which is why the industry has shifted to building or modernizing wind farms -- mostly those on land, says Ebenå, "because offshore turbines are still very costly."

Election Liabilities Silence Debate

In Germany, a quota model would also likely lead to more wind turbines being built on land. The government's expansion targets for offshore wind power would no longer be feasible -- and with good reason. Due to the challenging environment, the technology is prone to failure, and the cost of construction far away from the coast is very high. To make matters worse, the electricity also has to be transported hundreds of kilometers across the country.

It is clear that the next German government will have to plan a shift in energy policy. But the price of electricity is a toxic issue in the campaign, given the bad prognoses and broken promises. In a government statement in June 2011, Chancellor Merkel had promised to keep prices stable. "The renewable energy

surcharge should not exceed current levels," Merkel said in the Bundestag. Economy Minister Rösler claimed there might even be room for energy tax cuts. When prices increased, Rösler and then Environment Minister Norbert Röttgen shifted blame instead of coming up with a solution.

None of the parties has a coherent concept of how to approach the problem after the parliamentary election on Sept. 22. The few current proposals are disturbingly simplistic. Altmaier and the CDU are considering paying for next year's green energy subsidies with borrowed funds, so as to delay the next electricity price increase by a few months.

Gerda Hasselfeldt, a member of the CDU's Bavarian sister party, the Christian Social Union (CSU), favors saddling the next generation with at least some of the costs. Under her proposal, the government-owned KfW development bank would assume some of the costs of solar panels and wind turbines. The amount could then be repaid over the course of the next 40 years.

The proposals being floated by the SPD, the Greens and the FDP amount to reducing the electricity tax or the value-added tax. But that wouldn't solve the structural problems, which would require the sort of radical reform the government commission. The problem is that the next government would have to be willing to tangle with the electricity industry's powerful interest groups.

Until the issue comes up in the next legislative period, Environment Minister Altmaier prefers to send consumers on their way with some money-saving tips: "When I cook, I try to keep the lid on the pot."

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Translated from the German by Christopher Sultan

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