Testimony Before the United States House
Subcommittee on Energy and Power
Honorable Ed Whitfield, Chair
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Thank you, Chairman Whitfield and members of the subcommittee for inviting me to testify today on various State energy policies. I intend this testimony to inform discussion on "Laboratories of Democracy: The Economic Impacts of State Energy Policies." My comments reflect professional experiences over nearly four decades in California and elsewhere with such programs ostensibly put in place to reduce environmental impacts, enhance energy security or provide other broad social benefit. I attach a short bio for your convenience. I also attach excerpts from a select few papers that may provide the subcommittee with additional detail.

Summary:

- The economic impacts of State energy policy are quite large, with costs generally being larger than benefits, when indirect costs and externalities are included.

- The economic impacts cannot be attributable entirely to "laboratories of democracy" for the simple reason they often are adopted or evolve outside of democratic mechanisms:
    - Due to mission creep and/or lack of legislative oversight
    - Costs and burdens may be imposed on residents in neighboring states, creating unconstitutional extraterritoriality, such as with Renewable Portfolio Standards
    - Costs are often 'hidden' from consumers, such as the cross subsidy inherent in many Net Metering Programs and the 'tax' imposed through cap and trade mechanisms
    - Misinformation taken at face value by citizens that is disseminated by rent seekers and bureaucratic advocates, such as the cost of certain technologies
- Using states to test policy approaches and mechanism results in smaller negative impacts overall and easier-to-correct standards and regulations
- Each state has different needs, opportunity and challenges, and may benefit from lessons learned in earlier attempts in other states (both positive and negative.) It is unlikely that what works efficiently or effectively in one state is ideal for another state. The same is true for transfer between states and individuals. The more centralized a policy is, the more susceptible it is to rent seeking behavior and cronyism.
- Increasing intervention seldom fixes issues created by poorly designed intervention policies.
- Various Federal programs impede efficient achievement of important State Energy Policy goals.
    - The Production Tax Credit has led to building of enormous amounts of variable and volatile electrical generation threatening State reliability of the electrical grid.

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- The Renewable Fuel Standard has impeded important State goals, including maintaining affordable food and fiber prices, with resulting economic disruptions.

- There are a number of economically sound State energy policies, such as North Dakota's development regime and California's Senate Bill (SB) 4 (hydrofracturing regulations) and others. The economically sound policies are invariably the result of democratic and representative Legislative deliberations, not the result of solely Administrative and bureaucratic actions.

Background:

While my comments focus on estimates of monetary costs of specific state policies, it is important to recognize that most such policies also bring with them non-monetary costs, externalities and of course unintended consequences. I focus on a select list of electricity and transportation policies but my conclusions can generally be applied to other policies such as demand side management.

As one example, California and numerous other States have so called Renewable Portfolio Standards (RPS). These Standards, while varying in eligible technologies and amounts, require utilities to supply a portion of all electricity in their territory from certain renewables. The most common technology used to satisfy these requirements is industrial wind. However, wind generated electricity is of much less value to the grid, as it provides energy but no capacity, and thus requires so called backup. Further, because it is highly volatile, it also requires balancing[2] to keep the grid in operational balance between instantaneous demand and supply. These two requirements add significant cost, but those costs are typically 'offloaded' to others and not reflected in the artificial price paid to the wind developers that cause those costs to be incurred. A paper I co-wrote in 2012, included as Attachment 2, provides additional details, illustrating how wind is actually twice as expensive as claimed. While the aggregate cost to ratepayers depends upon a variety of factors (e.g. existing and future fleet of generators, load profile, competitive alternatives, etc.) the cost just in California totals in the billions and reflects perhaps a 20% increase in cost over what they would have been absent the RPS. My organization (under its former name American Tradition Institute) has published a number of papers produced by Beacon Hill Institute and State level think tanks on the cost borne by various states due to their own RPSs. They are provided in attachment 3. Further, these RPS impose costs on neighboring States' residents for transmission and grid services. They create their own devastating non-monetized environmental costs, such as endangered species mortality (see Eagle deaths from wind turbines) and mass kill offs (see avian 'frying' from the attractive nuisance of concentrated solar facilities like Ivanpah). They may also create new and yet unquantified impacts like hazards to air traffic[3].

Given how the interstate electric grid works, electric energy policy in one state imposes cost and administrative burdens on residents in neighboring states. Each State's grid supports and is supported by connections to a multistate generation and transmission system that must be kept in perfect harmony between supply and demand. Restrictions and mandates in one state impose costs and burden in other states to maintain that harmony. This creates a facially unconstitutional instance of extraterritoriality, confirmed on April 18, 2014 by the U.S. District Court for the District of Minnesota. The Court struck down the State of Minnesota's restrictions on importing electricity from coal power plants in other states. The court held that these restrictions improperly regulated electric generators and utilities outside the state. The decision sets a precedent that could

[2] "Backup" is required when the wind is not blowing; "balancing" is required when the wind IS blowing.
[3] "Evaluation of Glare at the Ivanpah Solar Electric Generating System," Sandia National Labs. July 17, 2014

threaten state regulations of imported fuel and electricity, such as the numerous renewable power standards and California's low carbon fuel standard.

Masquerading as a policy to encourage residential solar, net metering in several states act though regressive cross subsidies. Forty-three states plus the District of Columbia have net metering policies and regulations. While these policies vary in details, customers with such systems are typically credited at the full retail electric rate for any excess electricity they generate. The retail rate includes the price of the power itself, as well as the cost of paying for the grid which delivers electricity to and from distributed customers and assures that power supplies operate safely and reliably. Electric companies are required to buy this power at the retail rate, even though it would cost less to produce the electricity themselves or to buy the power on the wholesale market. This cross subsidy represents perhaps 35-55 percent of the retail rate for those net-metered customers, and is ultimately paid by non-participating customers[4].

Perhaps most famous, or infamous, is California's "Global Warming Solutions Act" more commonly referred to as AB32. This energy/environmental policy is imposing tremendous cost on California monetarily as I documented in 2010 (see attachment 4) in the billions of dollars and lost gross state product of perhaps 2% (exceeding an anemic recovery of less than one percent) and loss of 75,000 to over one million jobs. It provides a state level experiment that provides significant information for policy makers in other state and in Congress. From a strictly environmental effectiveness standpoint (assuming arguendo that costs are no object), the policy fails miserably. By imposing disparate burdens on productive activity in California, productive activity is pushed to other locales, typically, where carbon intensity is higher, resulting in environmental leakage and little reduction in global carbon emissions or even increases in later years. California should be leading in manufacturing, being highly carbon efficient, yet we're losing manufacturing to other states.

More pernicious is the resulting premature mortality, imposed especially on lower income and less fortunate. Significant perhaps is the application of cap and trade rules (only part of AB32) to transportation fuels, which is scheduled to go into effect January 2015. This new, permanent hidden gas tax created by the California Air Resources Board (CARB) and implemented without legislative approval will cost Californians at least 15 cents to perhaps a dollar more per gallon of gas, with that amount continuing to increase over time. This is in addition to the more than 70 cents that is already paid in state and federal gas taxes. There is pending legislation (California Assembly Bill 69) that would delay that portion of AB32 implementation, but the legislation doesn't affect other sectors of the economy already subject to cap and trade, or more broadly AB32.

Australia, under their own representative democratic system, has recently moved to correct the negative imposition of their own carbon tax, voting July 16 to repeal it.

While soft sold as a public health measure, CARB's implementation of AB32 actually harms public health. Using the EPA's own comparative risk method and data, I have estimated that the pending application of cap and trade rules to transportation fuels will lead to 340 to over 560 premature deaths in California every year. This is because the loss of disposable income results in premature

[4] See Thomas Tanton, *Reforming Net Metering: Providing a Bright and Equitable Future*, An ALEC Policy Paper, March 2014

death, as people have less to spend on healthy lifestyles and nutrition. These numbers increase with larger rates of death as the tax increases in future years. These impacts will more heavily impact California's poor and minority communities because they spend a larger portion of their disposable income on energy.

California energy policy in transportation also provides the Committee with some "experimental observations." California has had numerous programs to encourage or force alternative transportation fuels into the market. In each case, they have failed due to lack of consumer acceptance of the "alternative" subsidized or mandated by the government. Based on my experiences such programs generally fall short in enabling:

- *Real competition.* In fact, by mandating certain percentages of specified technologies, the programs stifles competition on a level playing field, resulting in impeded innovation.
- *Adequate time for markets to evolve*. Specifying time frames for market evolution will likely ad has led to market disruptions and rent seeking.
- *Flexibility to accommodate or account for future changes in the market.* For example, EIA predicts a 13% reduction in imports of petroleum by 2035, reducing the strategic importance of petroleum.[5] The Keystone pipeline would also significantly reduce the strategic importance of petroleum, depending on its ultimate construction and operation. Various vehicle types, such as electric vehicles, pose their own strategic concerns, such as Rare Earth metals needed for batteries and catalysts. Similarly, hydraulic fracturing has dramatically increased the supply and reduced the price of natural gas, a factor unforeseen when many programs were justified based on limited and diminishing supplies of domestic natural gas.
- *Informed consumers.* Consumers will face additional, unquantified, costs from purchase of qualified vehicles in addition to higher first costs, further compounded by conflicting policies. With respect to electric vehicles, for example, EPA's promulgation of revisions to Maximum Achievable Control Technologies (MACT) and various states' renewable portfolio standards increase the cost of electricity (necessary for recharging EV) by up to 40%, making the consumer's going forward cost to own an EV even more prohibitive and less competitive.

For additional detail, I refer the Members to Testimony I provided July 10, 2012 to this Committee regarding the "Open Fuel Standard" (HR1687) and I will not repeat those here today.

Finally, circumstances change and legislation must allow the flexibility to account for future knowledge and circumstances. I offer the following recommended perspectives to the Committee as they deliberate on the State's as Laboratories of Democracy.

1. Policies must be technology neutral and real performance based. It is best to not even refer to specific fuels or technology, to accommodate technology, resource and market changes that will occur, but that are unforeseen,
2. Enabling true consumer choice should be paramount and recognize that consumers have very diverse—and expanding—needs and opportunities, and that time demands impose costs, as does reliability and energy quality.

[5] http://www.eia.gov/forecasts/aeo/chapter_executive_summary.cfm

3. The experimental nature of such policies should be explicit, with adequate monitoring of performance to metrics, contingency plans for unanticipated outcomes,[6] and recognition that non-willing participants (such as residents in neighboring states)
4. Policies should be tested for cost effectiveness relative to the performance metrics. As one example, natural gas fired combined cycles can reduce carbon emissions from coal plants at one-tenth the cost per ton reduced, or ten times as much for a given expenditure.
5. The value of various performance metrics is not proportional. A ton of NOx reduced in a relatively polluted area is vastly different than a ton reduced in an area already achieving ambient air quality standards.
6. Recognize that critical infrastructures are dependent on and depended upon by all other critical infrastructures…they are interconnected; also recognize that policies are often in conflict and/or counterproductive. Similarly, consideration should be given to ancillary requirements, such as the need for backup and balancing of wind turbines.
7. If a policy is failing to provide real performance, measured using the metrics, don't do more of it, do less.
8. Forecast of the cost and affects of proposed policy should be done probabilistically and not deterministically.
9. If a policy succeeds in achieving its goal, be willing to declare success. Once an infant industry is capable of market competitiveness, favored treatment should end. If after decades, no competiveness has been demonstrated, favored treatment should end.

In other words, focus on free market mechanisms and consumer choice, principles and process rather than the technology or fuel of the moment.

[6] As an example, during the 2000 California electricity market debacle, much of the $30 billion loss to California's economy can be traced to the market clearing using reverse Dutch auction, which works during supply surplus conditions. A contingency of 'paid as bid' would likely have reduced the losses to perhaps $3 billion, during the periods of supply shortage.

Attachment 1

Thomas Tanton

Mr. Tanton is President of T^2 & Associates, a firm providing consulting services to the energy and technology industries. T^2 & Associates are active primarily in the area of renewable energy and interconnected infrastructures, analyzing and providing advice on their impacts on energy prices, environmental quality and regional economic development. Mr. Tanton is also Director of Science and Technology Assessment with Energy and Environment Legal Institute. Mr. Tanton has 40 years direct and responsible experience in energy technology and legislative interface, having been central to many of the critical legislative changes that enable technology choice and economic development at the state and federal level. Mr. Tanton is a strong proponent of free market environmentalism and consumer choice, and frequently publishes and speaks against alarmist and reactionary policies and government failures.

As the General Manager at EPRI, from 2000 to 2003, Mr. Tanton was responsible for the overall management and direction of collaborative research and development programs in electric generation technologies, integrating technology, market infrastructure, and public policy. From 2003 through 2007, Mr. Tanton was Senior Fellow and Vice President of the Houston based Institute for Energy Research. Mr. Tanton was also a Senior Fellow in Energy Studies with the Pacific Research Institute until 2010.Until 2000, Mr. Tanton was the Principal Policy Advisor with the California Energy Commission (CEC) in Sacramento, California. He began his career there in 1976. He developed and implemented policies and legislation on energy issues of importance to California, and U.S. and International markets, including electric restructuring, gasoline and natural gas supply and pricing, energy facility siting and permitting, environmental issues, power plant siting, technology development, and transportation. Mr. Tanton completed the first assessment of environmental externalities used in regulatory settings. Mr. Tanton held primary responsibility for comparative economic analysis, environmental assessment of new technologies, and the evaluation of alternatives under state and federal environmental law. Mr. Tanton had oversight responsibilities for electricity and transportation technology development. Mr. Tanton served as Guest Lecturer for the Master in Environmental Science program at California State University Sacramento (CSUS), lecturing on power plant and electric grid technologies and their comparative environmental impacts.

Attachment 2

Hidden Cost of Wind Electricity

(Executive Summary Only, full report at http://eelegal.org/wp-content/uploads/2013/09/Hidden-Cost.pdf)

Executive Summary

The cost of the second most rapidly-growing choice -- wind electricity – has been vastly understated. If six missing factors were taken into account, wind electricity would be nearly twice as expensive as the Energy Information Administration reported in its most recent Annual Energy Outlook [1]

1. An implicit subsidy
2. An optimistic assumption about the operating life of wind facilities
3. The capital and operations & maintenance costs of primary plants
4. Fuel consumption
5. Transmission
6. Transmission losses

The missing costs are not difficult to understand. They just have not been counted because wind electricity is so different from traditional sources.

The bottom line is that the cost of wind electricity is nowhere near parity today with the cost of coal, natural gas or nuclear electricity; and would not break even with gas-fired electricity unless the delivered price of natural gas were 5 times higher than today's price.

While wind energy advocates have often claimed that wind will soon be competitive:

> "The best wind farms in the world already produce power as economically as coal, gas or nuclear; the average wind farm will be fully competitive by 2016."
> *Bloomberg New Energy Finance, November 10, 2011 [2]*

The only way to reach such a conclusion is by ignoring some costs and socializing others.

Reports such as Bloomberg's press release and the Energy Information Administration (EIA)'s 2012 Annual Energy Outlook have not only failed to count all the costs of wind generation, but have failed to explain how wind works. It cannot operate by itself, but can operate only as an appendage to some primary source such as natural gas, coal or hydro. And since its only benefit is to supply energy but no capacity, part of its cost includes maintaining the availability of whatever source it's combined with. Which means that, unlike all conventional sources, there is not just one cost for wind electricity, there is a different cost for each type of primary source that it's combined with.

Table 1 summarizes how the six factors we examine in this report would increase the estimated cost of wind electricity from the 8 cents per kilowatt-hour that EIA reported to at

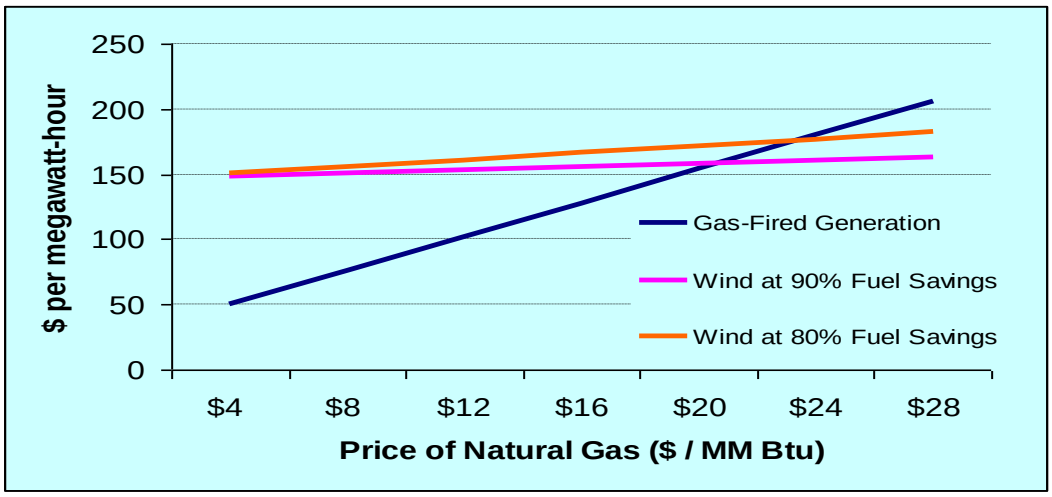
least 15 cents/kWh if wind were combined with natural gas and 19 cents/kWh if wind were combined with coal.

Table 1. Levelized Cost of Wind Electricity, (starting from the assumptions in the Energy Information Administration's 2012 Annual Energy Outlook)	Onshore Wind Added to Natural Gas (c / kWh)	Onshore Wind Added to Coal (c / kWh)
As reported by EIA, but using more recent (lower) wind turbine prices	**8.2**	**8.2**
①② Backing out an implicit subsidy, and assuming a 20-year lifetime	10.1	10.1
③ Plus the cost of keeping primary fossil plants available	11.8	15.6
④ Plus the extra fuel that fossil plants are forced to consume	12.4	16.5
⑤⑥ Plus estimated costs for transmission and transmission losses, as wind penetration increases from today's levels	**15.1**	**19.2**
Using higher published estimates for the cost of wind operations and maintenance	**16.1**	**20.2**

The Breakeven Price of Natural Gas

Figure 1 shows that wind electricity would not reach breakeven with gas-fired electricity unless the delivered price of natural gas were about $20 per million Btu if wind were 90% effective at saving natural gas, or about $23 per million Btu if wind were 80% effective at saving natural gas[7]. At either point, both wind and gas generation would be far more expensive than nuclear generation, and perhaps more expensive than coal with carbon capture and storage.

Figure 1. The Costs of Wind versus Gas-Fired Electricity, Relative to the Price of Natural Gas



[7] The average delivered price of natural gas was about $5 per million Btu from 2009-2011 and $4 per million Btu in 2012 [6].

What Policymakers Need To Know About Wind Electricity

- That since wind generation reduces the average level of generation of the primary fossil plants, but does not reduce the need for keeping those plants in operation, part of wind's cost must be to pay for the costs of capital, operations and maintenance of those plants.

Levelized costs do not correlate with estimates of the wholesale price of electricity. They are designed to enable reasonable comparisons between the costs of various options over the life of facilities. Levelized costs reflect the present net value of the total cost of constructing, maintaining and operating an electricity generation plant over its lifetime, expressed in terms of dollars per unit of output. Levelized cost comparisons are an artifact of the regulated monopoly paradigm, where all costs of power and energy, transmission and operations were incurred by the utility and no costs were hidden by off-loading to others or to society as a whole.

- Since wind generation also imposes inefficiencies on those primary fossil plants, and requires additional reserves in order to maintain system reliability, **wind cannot save 100% of the fuel that would otherwise have been consumed.** This shortfall has not been counted in most cost of electricity tables, although it has been reported as a "cost of intermittency" in studies on the cost of wind integration.

- Because its best locations are remote from major cities, **wind requires new long-distance transmission lines** which are much longer than before, and would not be necessary today, except to support wind. For every other type of generation except hydro, it has always been less expensive to move the fuel than to move the electricity. Consequently, nearly all traditional generation facilities have been built closer to major cities.

- Even cost studies which claim to have excluded subsidies typically still contain a special accelerated-depreciation subsidy for wind, solar and biomass.

- **Over $200 billion is at stake**. The state-level mandates and federal subsidies which are driving the current wind boom had already cost $120 billion through mid-2012, even before counting the cost of new transmission. Fulfilling the mandates in their entirety would cost about $200 billion more (plus transmission).

- **Wind's cost per kilowatt-hour will grow larger over time**, because while early wind installations could piggyback on spare capacity in the system, further deployment will increasingly require new infrastructure.

- **Some of the most crucial information about the cost of wind electricity has not been reported**. Given that the nearly all of wind's value is the amount of fossil fuel it can save, and that without this number, the avoided cost that wind facilities must be paid under the terms of the Public Utility Regulatory Policy Act (PURPA) cannot be calculated accurately, it's astonishing that no regulatory authority has reported how much fuel wind has saved, based on real-world experience.

To enable independent evaluation of wind's full cost, regulators need to begin reporting for each region or grid-balancing area:

1. how much fossil fuel wind has saved, and how that changes with different levels of wind
2. the cost of transmission that has been added to support it, and associated transmission losses
3. aggregate wind generation on a fine-grained time scale, and
4. wind's measured capacity factor.

None of this information should be proprietary or difficult to calculate to a reasonable degree of accuracy. But it needs to be reported so that the public will know the real costs of expanding wind generation.

Attachment 3
State Level Renewable Portfolio Standards Economic Cost Studies with Links

May 2011: Study of the Effects of Delaware's Renewable Portfolio Standard on the State Economy
April 2011: Study of the Effects of Minnesota's Renewable Portfolio Standard on the State Economy
April 2011: Study of the Effects of Ohio's Alternative Energy Portfolio Standard on the State Economy
February 2011: Study of the Effects of New Mexico's Renewable Portfolio Standard on the State Economy
February 2011: Study of the Effects of Colorado's Renewable Portfolio Standard on the State Economy
January 2011: Study of the Effects of Montana's Renewable Portfolio Standard on the State Economy

Attachment 4
An Estimate of the Economic Impact of A Cap-and-Trade Auction Tax On California
(Executive Summary Only; full report available upon request)

An Estimate of the Economic Impact of

A Cap and Trade Auction Tax

On California

Thomas Tanton
Principal
T^2 & Associates
March, 2010
For
AB 32 Implementation Group

Summary

We have estimated the following impacts:

⟶ An annual effective cost increase to the typical family of four to be $818 the first year growing to $2800 in 2020, if market clearing prices for permits are $60 dollars per ton. Those figures are $270 and $930 if permit prices are at $20 and as much as $2720 to over $9330 per family if prices clear at $200 per ton. Costs increase for most goods and services. These cost increases are average for the population, although some residents may be compensated through a partial return of auction revenues.

⟶ Annual job losses to the California Economy of 76,000 to 107,000 the first year growing to perhaps 485,000 jobs in 2020, assuming a market clearing price of $60 per ton. These are net jobs losses, accounting for lost jobs and for jobs created by redirecting revenues collected from the auctions.

⟶ Lost economic activity of nearly 2% of gross state product, or about $250 to 350 billion over ten years. Much of this derives from reductions in productivity across the economy, and negative trade implications due to reduced competitiveness.

Table 1
Summary Findings of Net Impact

Year and Permit Clearing Price	Impact on Family	Jobs Lost
2012 @$60	$818	76,000-107,000
@$20	$270	25,500-35,700
@$200	$2720	255,000
2020 @$60	$2800	485,000
@$20	$930	162,000
@$200	$9330	1,617,000

There is uncertainty about how auction revenues would be re-distributed in the economy. To the extent the revenue is captured in a special fund under the control of CARB, the legislature would have limited state budget authority and flexibility. This is a significant concern given the potentially large amount of revenue (collecting in 8 years, fully 120% of the single year 2009/2010 state budget[8]) to be raised by an auction tax.

[8] Assuming collection of revenues at auction price of $60/ton would total $143 billion, compared to California state 2009/10 budget total of $119.2 billion, as documented at http://www.osp.dgs.ca.gov/On-Line+Publications/FinalBudgetSummary.htm