HB 6023, An Act Concerning Distributed Generation
Energy & Technology Committee
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Co-Chair Doyle, Co-Chair Reed, Committee Members and staff, my name is Joel Gordes. I am an independent energy consultant working out of West Hartford, CT. I offer this testimony on my own behalf representing no client.

I support this bill to ascertain the value of distributed generation (DG) for a number of reasons including to enlarge DG's role in meeting state energy and environmental goals. I will mostly leave those arguments to others and concentrate more on the some historical aspects of why we need this analysis and how greater deployment of distributed generation can enhance energy security, safety and resilience.

The term distributed utility (which has morphed into distributed generation) is credited to Dr. Carl Weinberg, Manager of R&D, and Joe Ianucci at Pacific Gas & Electric. They were the co-originators of the concept in the early 1990's. The original definition has had many amendments to meet specific points of view, and Connecticut, at a 65 MW upper limit, may be the highest in the nation. The definition below is a composite of six credible others:[1]

Distributed generation uses modular electric generation and/or storage located near the point of use either on the demand or supply side. DG includes fuel-diverse fossil and renewable energy generation and can be grid-connected at the distribution level or operate independently. Distributed generation typically ranges from under a kilowatt up to 50 MW. In conjunction with traditional grid power, DG is capable of high reliability (99.9999%) and high power quality required by a digital society.

Notice that it can be "grid-connected …or operate independently" and even back-up generators may qualify under this definition; nor is it confined to renewables. Wind energy, remote from loads, is excluded.

DG, and particularly some renewables, have benefitted from Connecticut's net metering policy receiving compensation for their production of power as well as providing other tangible benefits to the grid that aid all ratepayers as well as less tangible benefits such as moving toward a more secure, safe and resilient grid.

For instance, the compensation provided to the owners of solar systems ought not just cover the energy they produce, but should include a premium for that energy they produce in summer that coincides with peak power needs. All ratepayers benefit from this reduction in peak demand. Among some of the more generally accepted values of solar DG that warrant this compensation and aid all ratepayers are[2]:

- Avoided Energy Costs
- Reduced T&D Losses
- Deferred T&D Upgrades
- Avoided Generation Capacity
- Avoided Transmission Capacity
- Avoided SOx, NOx & CO2 Costs

Yet utilities continue to promote the myth that using renewable DG (and energy efficiency) are significantly "subsidized" by other ratepayers. This unproven rhetoric has no substantiation without this study. Certainly it is difficult to understand how companies who have been monopolies for over a century

[1] Electric Power Research Institute (2), US Dept. of Energy (2), American Gas Association (1), California Energy Commission (1)
[2] Page 3 of this testimony provides a far more comprehensive list of values that should be investigated in a study/docket to determine the value of DG. These apply to utility driven project as well as to utility-scale private projects.

with all but guaranteed rates of return can ignore that their own basic business model provides a "subsidy" as well. There were once good reasons for it foremost of which was allowing them to overcome market barriers. Just compensation to DG allows just the same; an ability to overcome market barriers.

This mischaracterization of "compensation" versus being called a "subsidy" is precisely the reason we need a vigorous, professional study on the value of DG to determine the reality of the situation. Some of these I have already named above but quantifying others like security and resilience, while more difficult to quantify, can undergo what are termed "willingness to pay" analyses to determine dollar figures.

Those security and resilience threats to the grid are not just storms such as we have experienced but also include physical terrorism, cyber terrorism and just the sheer complexity of the ever-growing tightly-coupled, complex and heavily-centralized system our utilities have built. We need to provide added degrees of resilience and security by moving toward a decentralized system where generation is located closer to loads-- just as Mr. Edison first envisioned it—and include critical infrastructure that can operate independently of the grid. Smart utilities and the U.S. military are buying into these concepts and not throwing obstacles in the way of expanded DG as a first step. It is my hope that our own utilities, instead of promoting unproven rhetoric, will follow suit and even profit from it. Almost four years ago, in a published OP-ED this author wrote:

> ...but the key to successful implementation will be to compensate utilities with equal or better rates of return so they cooperate in installation of these systems. We have taken similar steps for their involvement in energy efficiency programs since 1988. Only by making the utilities monetarily whole can a secure, reliable distributed generation plan become a reality.[3]

Thank you for your time and attention.

[3] Gordes, Joel N. *Smaller Electric Grids Safe, Reliable*. The Hartford Courant. September 4, 2011. P. C1.

Examples of Additional Potential Values Streams of DG to Utilities and Ratepayers

Table 1: Selected Sources of Value in Utility Budgets from Utility-Driven Distributed Photovoltaics

Source of Value	Example or Value if Publicly Available
Peak Load Value	
Distribution investment deferral[7]	< $0 to > $6000 per marginal kW for 5 year deferral
Transmission congestion relief[8]	$30 - $50/kW-yr
Transmission investment deferral[9]	$45/kW-yr
Generation capacity	$475/kW[10]; $1550 - $2000/kW if IGCC + Carbon sequestration[11]
Generation O&M[12]	~$10/kW-yr
Generation reserve capacity and O&M[13]	$.014/kWh for peak period
Natural gas[14]	$8.50/MMBTU; highly volatile future prices
Purchased power	PV supply curve offsets highest cost power in generation supply curve
Minimum load power plant dispatch[15]	$28/kW-yr
Environmental[16]	$0.014/kWh NO_X; also Mercury, SO_2, CO_2, PM10
Line losses	Up to 25% in some constrained systems
Reactive power[17]	$15/kW-yr
Voltage support	Varies; may be part of distribution investment deferral
Network O&M[18]	~ $16 to >$88/kW-yr
Intermediate Load Value	
Natural gas	$8.50/MMBTU; Peak + intermediate gas cost NPV $1800 - $3500/kW (increasing, with more volatility due to oil and gas depletion)
Environmental	$0.014/kWh NOx; others
Line losses	6% - 8%

Table 2: Policy and Business Model Economic Value from Utility-Driven Distributed Photovoltaics

Source of Value	Example or Value if Publicly Available
Policy-Driven Value	
Net metering payments	Normal utility rate; moving to Time-of-Use rate
Customer rebate payments	Varies by jurisdiction
Solar renewable energy credits	In NE US (PJM) region $200 - $600/MWh; others much less
Business Model Value	
Customer revenue retention	Normal revenue reduces non-participant cost issues
Peak-period DPV revenue	Sell DPV capacity into peak power market
Tax investor participation[19]	30% PV capital cost through '07; 10% after that
PV system portability[20]	~$2000/kW if redeployed 4x to dist. deferral projects
(Payment to PV host site)	Perhaps 10% of rate, plus insurance coverage

Source: ElectricSUN synthesis from published studies of distributed energy resource benefits and costs

Table 3: Risk Management Issues Affected by Utility-Driven Distributed Photovoltaics

Source of Value	Example or Value if Publicly Available
Grid reliability & outage prevention[21]	$Billions & lives lost -- societal
Natural gas availability	Threat of Fuel Use Act; oil and gas depletion; physical disruption from storm damage
Financial	Lower interest rates for PV due to lower risk
Regulatory	Avoid regulatory pre-emption
Carbon	New requirements likely
Insurance	Global warming liability coverage
Share price & fiduciary duty	Investor expectations for risk management leadership
Generation portfolio cost and risk	DPV net fixed cost reduces gen. portfolio cost & risk

Robertson, Chris and Cliburn, Jill. *Utility-Driven Solar Energy As A Least-Cost Strategy To Meet RPS Policy Goals And Open New Markets.* American Solar Energy Society Solar 2006 Conference.