







- As for the Newsweek article, the key thing to understand is that this clean energy stuff isn't primarily about "the environment."

It's about freedom, democracy, security, prosperity, jobs, and, in my view, a moral obligation we have to future generations to quit cannibalizing the planet.

There are five key technologies that will be important: wind, solar, electric vehicles, energy storage, and electric end use efficiency (including demand response.) Plus, the smart grid to the extent we need to tie them all together.

Peak oil more than climate change means that expanding these things--scaling them up rapidly--are going to be a bipartisan package that will transcend politics, religion, regions, and culture. And, of course, they all have to do with your business.

In the depth of the stiffest recession to hit this country in 40 years, HCE customers gave you the "green light" to get after it--not because they are concerned about the polar bear, but because they are concerned about their future and that of their kids.

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Bill McKibben said something interesting in Aspen. He said, "When I'm talking with conservatives, and they express doubts about climate change, I generally say something like...

"Well, you might consider environmentalists "radical."

"Actually, I think of myself as very conservative. I'm trying to preserve the climate that gave birth to human civilization."

"Abby Hoffman, the old hippie, never in his wildest dreams did he propose doubling the amount of greenhouse gases in the atmosphere."

"That's one of the most radical things anyone could ever propose to do."

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Every one on your board is a conservative. Tom takes better care of 1000 acres than I do my lawn.

But, at the board level, and among your senior staff, we need to somehow forge a common vision. And a better understanding of why we are throwing millions at PV rebates. And why HCE customers said, hit me for \$5 million.

The Germans will spend \$5 billion subsidizing PV this year, and will install more in the next 6 months than the US has in its history.

- They have a solar resource worse than Seattle!

So, why are they doing that?

Are they insane?

No, they are participating in a global effort to slash the cost of RE, and to accelerate the clean energy transition. They are paying 40c to 50c to get solar kwh. Due to our better resource and the federal investment tax credit, we can buy them for less than 20c, and the price is falling rapidly.

Instead of thinking to ourselves, as I sometimes do, "One MW is just a pittance, noise on the system, why bother?" We ought to ask ourselves how we might someday, a couple of decades from now, have distributed solar providing 10% of HCE's power.

That's 80 MW, a target which seems insane to put on paper.

But is it? Couldn't we have that much by, say, 2035?

How long might it take to get there? How would we get there? How much more would the price need to drop? How can we best use our rebate money, however much it is, to play our part in this exciting transition?

And what about wind? And what about storage? And what about the grid?

And what about rate impacts? And what about long-term power supply. Yes, they are all interconnected, and the decisions we have to make are sober and serious and deserve much thought and reflection. But these are both stroke-serious challenges and wonderful opportunities.

Right now, American families are each spending \$1500 a year to fight Al Qaeda. And maybe \$50 a year to secure their energy future.

Historians may look back and say, we over-invested in security--and under-invested in freedom.

- The average household will pay \$1.33 per month and an average business will pay \$3.80 per month. The tax will generate about \$1 million annually through 2012 when the tax is set to expire. Estimated energy cost savings from implementing the Climate Action Plan are \$63 million over the long term.

- The policy has allowed Germany not only to meet but to exceed its renewable energy goals. Initially, the aim was to get **12 percent** of its electricity from renewable sources by 2010. But it passed that milestone three years early, and has since reached the **15 percent** mark—the most rapid growth seen in any country. By mid-century, Germany aims to increase that share to **50 percent**. Already, the nation, which is about as sunny as Juneau, Alaska, is home to

- Policy ramblings from the cheap seats:
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- As you know, I'm not a big fan of the national RES, because of the southern and conventional sources political strength, and what it would take to get their buy-in, especially in the changing national initial sentiment . The Nuke option, while it needs to be examined is clearly the utility financial winner, since they get ROI on \$7000/kW, and the government/taxpayer covers their financial risk. (Not to mention where the water's going to come from for a new nuclear fleet in the West).
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- An interesting battle underway in the Eastern interconnect indicates that Midwest wind, with transmission, can substantially lower least cost marginal prices in the east, so the imbedded high cost eastern producers are dug in against mid-west wind (making the regional economic development argument)...I'd like to see what a deliberative poll of rate payers in the East would say.
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- So, the states are the best places for innovative policies. BUT, unlike Europe where both the region and countries believe in the seriousness of climate change and energy security, the US and its states are (currently) driven by economic development (and the votes it brings).
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- If NOAA, NCAR, CU, NREL, the tourism industry, the RE industry and the advocates would join forces with the rural ag, landowner, and economic development interests to effectively communicate the climate devastation to the forests of Colorado and addressing climate change through innovative EE&RE incentives brings billions to CO for both rural and mountain communities, there is chance that the message can neutralize those who want to continue the status quo (e.g., Tri-state, coal industry). But it has to be a broad coalition, not just the university, NGO, and Boulder-Denver left-wingers. And it can't be solar specific, it has to be equal opportunity RETs.
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- Feed-in tariffs work, but utilities see them as seriously flawed, compared to competitive RFPs (can pay too much \$\$). I forget exactly what Ontario's FIT's are, but they were crazy high for PV (>\$400/MWh). Remember that the incentives have work for the utilities, not just the rate payer. The real reason utilities resisted wind for a long time, was buying it from a third party didn't get benefit for the stockholder, their # 1 priority....until Warren Buffett figured why not make money while meeting the customers' and state political interests.
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- BTW, check out the latest wind update on the WPA website, showing the amount of different generation in the various regional queues; wind (@300GW) is greater than all other generation options combined...we're not solving climate change on the back of PV in the next 20 years...we can't afford it, even you Obamaeconomaniacs don't have enough \$\$\$.
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- I still believe in my 6-pack solution: build wind (and the necessary transmission) like crazy; increase building and appliance standards; increase CAFÉ (including trucks); fully engage PHEV's; research CCS and cellulosic EtOH...you added PV. So let's make it an 8 pack, and make all educational facilities as green as possible (including the curricula).
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# Key Definitions

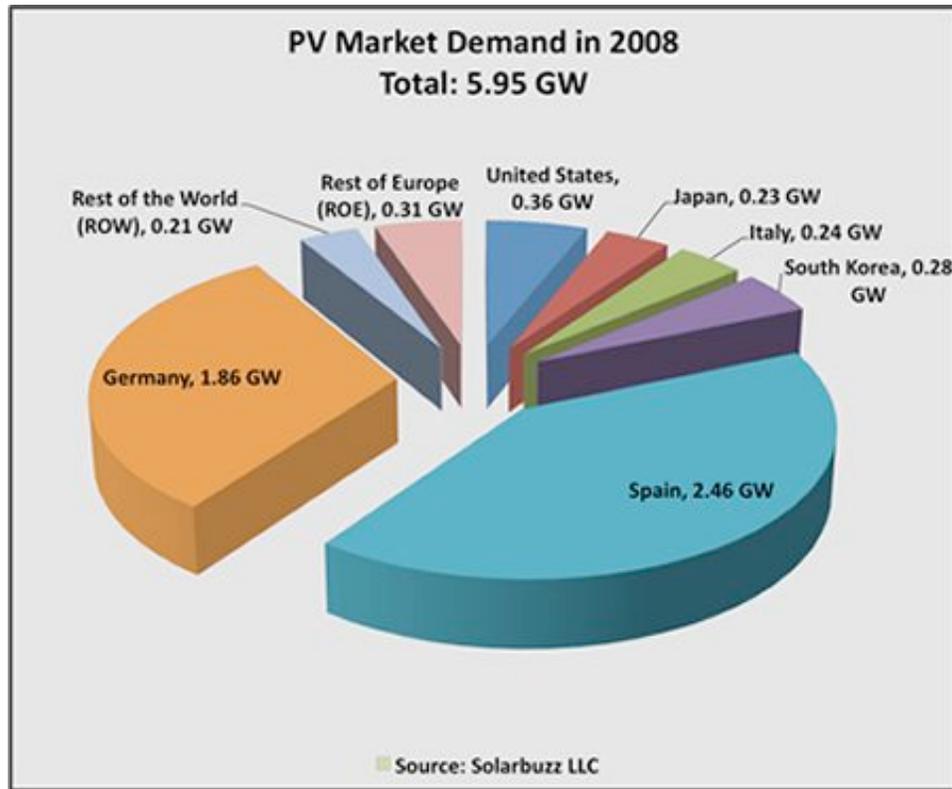
- DG = Distributed Generation
  - Retail DG (RDG)
    - Behind-the-meter
    - Net metered
  - Wholesale DG (WDG) has some basic attributes
    - Wholesale (all energy sold to the utility)
    - 20MW-and-under
    - Distribution-interconnected (close-to-load, but not behind-the-meter)
- PPA = Power Purchase Agreement
  - Energy purchasing agreement between electricity generator and customer
- FIT = Feed-In Tariff
  - Pre-defined, pre-approved PPAs between renewable energy generators and utilities
  - Most effective policy in the world for getting cost-effective renewables online
  - Simple, fair, and effective
- RPS = Renewables Portfolio Standard
  - A renewables target: a percentage of total delivered energy by a specified date

WDG market size  
100 times larger than  
RDG market size

# FITs have Multiple Critical Features

- FIT Features
  - Standard must-take contract for renewable energy
  - Cost-based, technology-differentiated rates that are fixed for 20 years
    - Rates are set to attract deployments
    - Rates are fixed for the entire contract period
    - Degression reduces rates paid for new contracts based on cost reductions driven by economies-of-scale and learning
  - Renewable energy is purchased at wholesale with environmental attributes
    - All environmental attributes, including RECs, are bundled with the energy sale
  - Guaranteed interconnection for any project designed within the guidelines of the FIT program
- FIT Benefits
  - Simple, fair, and effective
  - Heaps of TLC: transparency, longevity, and certainty
  - Most effective policy in the world for getting cost-effective renewables online in a timely fashion
  - Avoids any type of solicitation process, including auctions, and the overwhelming parasitic costs and parasitic time associated with solicitations

# RDG/Net Metering Fails to Deliver



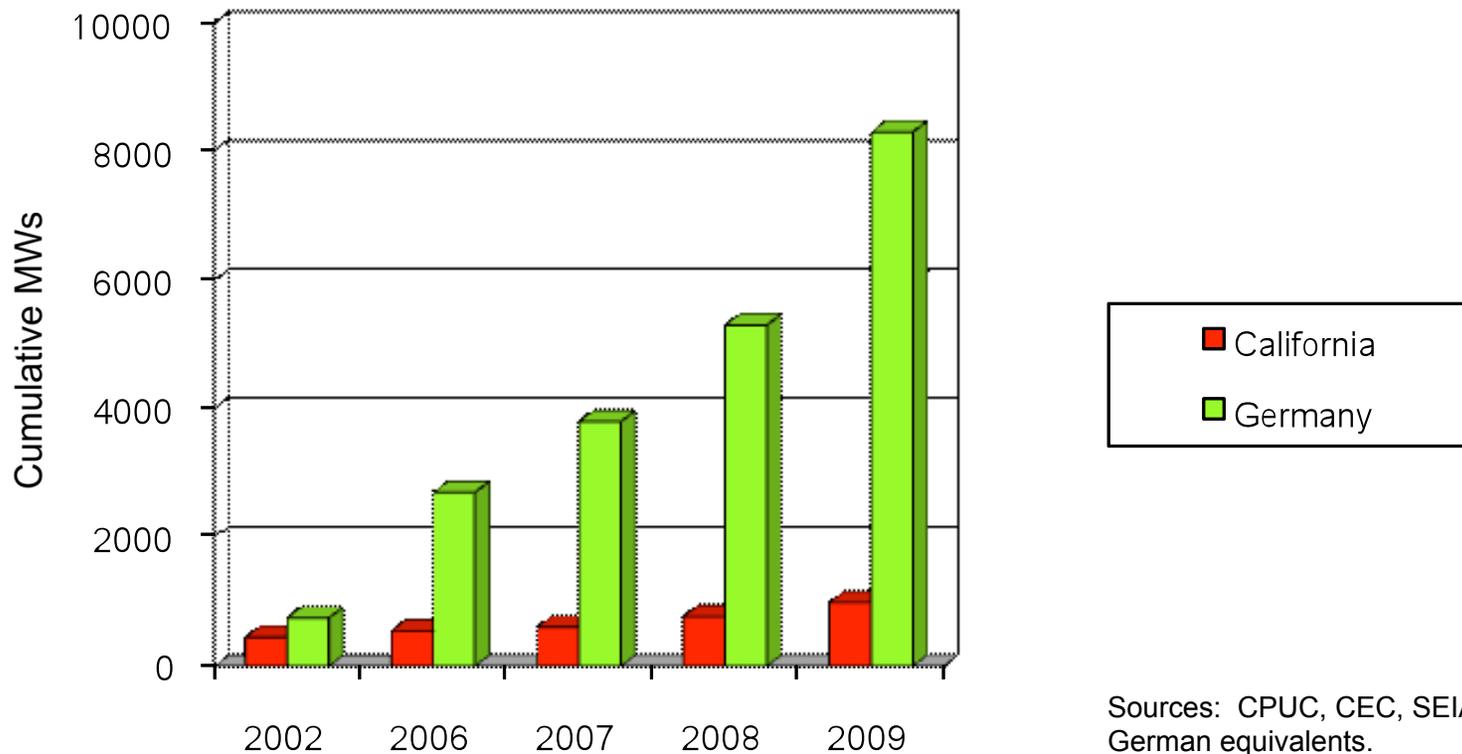
RDG does not drive volume, nor does it satisfy RPS requirements

State	MW Installed in 2008
California*	178.6
New Jersey	22.5
Colorado	21.6
Nevada	13.9
Hawaii	11.3
New York	7.0
Oregon	6.6
Arizona	6.4
Connecticut	5.3
North Carolina	4.0
Others	15.3
<b>TOTAL</b>	<b>292</b>

source: Larry Sherwood (IREC)

# OG FITs Drive Solar (~90%)

## Solar Markets: Germany vs California (RPS + CSI + other)



**Germany added 17 times more solar than California last year!  
Even though California's solar resource is about 70% better!!!**

# German PV FIT = US\$.12/kWh

- Most expensive German FIT rate is set for PV
- Germany's weighted average WDG PV rate is about US\$0.30/kWh
- In CA, equivalent rate would be less than \$0.10/kWh
  - Tax credits in US reduce the German rate by 40%
    - Investment Tax Credit (ITC) and Accelerated Depreciation
  - Solar resource is 70% better in CA, which reduces German rate by more than an additional third
- Conservatively: 30 cents goes to 18 and then to 12

German PV rate of 30 cents is equivalent to less than 12 cents in CA

# Ratepayers SAVE Money

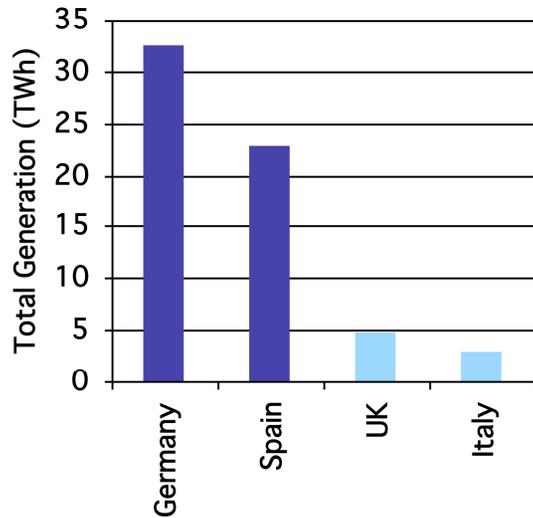
**The REESA FIT in California delivers 5% in ratepayer savings while fulfilling the entire 33% RPS on schedule!!!**

		FIT Rate (\$/kWh)		Annual cap limit (%)		Avoided Cost (\$/kWh)		Annual FIT rate depression (%)	Annual escalator for avoided cost (%)		
		\$ 0.16		2		\$ 0.125		5	3		
Year	Total CA Electric Energy (GWh)	FIT Rate (\$/kWh)	Cumulative Limit	Quantity (GWh)	FIT Fulfillment of RPS	FIT Cost (\$mil)	Avoided Cost (\$/kWh)	Avoided Cost (\$mil)	Rates without FIT	Rates with FIT	Rate Differential baseline premium w/ FIT
2011	267,665	0.160	2.00%	5,353	2%	857	0.125	669	0.138	0.139	0.51%
2012	268,349	0.152	4.00%	10,734	4%	1,674	0.129	1,382	0.139	0.140	0.78%
2013	268,960	0.144	6.00%	16,138	6%	2,455	0.133	2,140	0.141	0.142	0.83%
2014	269,500	0.137	8.00%	21,560	8%	3,199	0.137	2,945	0.142	0.143	0.66%
2015	269,969	0.130	10.00%	26,997	10%	3,907	0.141	3,798	0.143	0.143	0.28%
2016	270,365	0.124	12.00%	32,444	12%	4,581	0.145	4,701	0.144	0.144	-0.31%
2017	270,690	0.118	14.00%	37,897	14%	5,223	0.149	5,656	0.145	0.144	-1.10%
2018	270,943	0.112	16.00%	43,351	16%	5,832	0.154	6,665	0.147	0.144	-2.09%
2019	271,124	0.106	18.00%	48,802	18%	6,411	0.158	7,728	0.148	0.143	-3.29%
2020	271,234	0.101	20.00%	54,247	20%	6,960	0.163	8,847	0.149	0.142	-4.66%

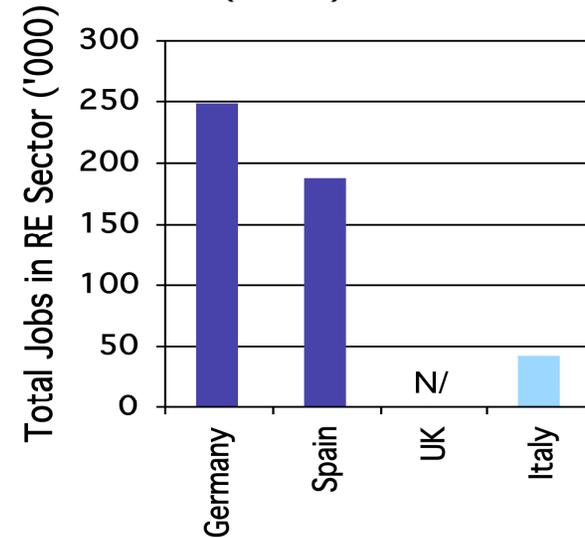
Source: CPUC, FIT Coalition

# WDG FITs Deliver Trifecta

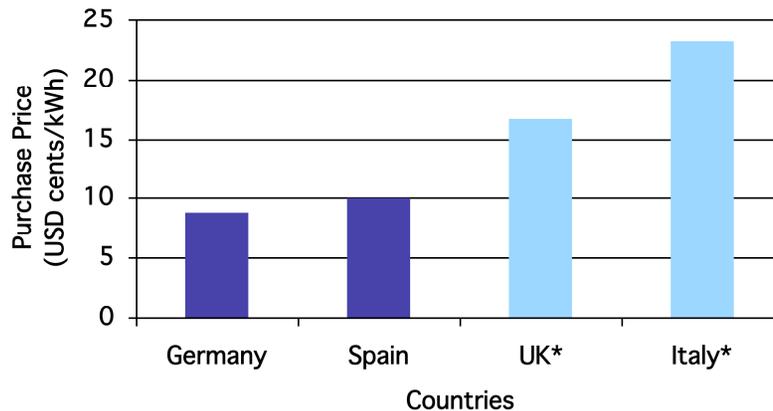
Total Generation from Wind Power (2006)



Total Jobs in RE Sector (2007)



1/h Payment for On: (2008)



\* Electricity price + Tradable Green Certificate (i.e. REC)

Sources: NREL 2009; BMU 2008; EUROSTAT 2008; ISI, 2008; Fouquet, D. et al., 2008.