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Part II (10 August) Graphics Additions to 7 August letter

See attached...

Additional submitted attachment is included below.

Docket No. 15-IEPR-11 & 12
Workshop on the State of the Science on Scenarios to Deeply Reduce Greenhouse Gas Emissions from California's Energy System 7/24/15 and 7/27/15

Part II (10 August) Graphics Additions to 7 August letter

Dear Commissioners:

As stated verbally on 24 July and in writing on 7 August, the realities of global warming and ocean acidification are harsh and demand prompt, substantive action, as we all surely agree. Our Governor's energy and emissions plan is laudable, even if California contributes but a few percent of world GHG emissions. California's leadership remains important, but must be founded in science and fact.

The graphics shown and explained here illustrate why our Governor's ambitious environmental goals cannot be met by what are presently termed 'renewable-energy' systems. Our state plan must take account of the fact that there's no such thing as "renewable energy", as physics instructs us, and that some of those sources so designated are directly subject to climate change. As China has found with its western wind 'farms' and we know from our Colorado River dams.

This weakness is aggravated by the need for combustion backup, whether gas in state or coal out of state, for California 'renewables'. For example…

The right-hand portion o the graphic is from the CEC website. It unfortunately misleads us citizens by omitting the necessity for gas-combustion backup at the ready, which will generate more than 2/3 of the yearly energy that the wind 'farm' was claimed able to do (nameplate capacity x CF). As CF (Capacity Factor) drops, the more expensive (in $ & emissions) the source becomes per delivered Watt-hour.

Thus, not only must wind machinery rated far above its actual energy delivery be built, operated and maintained, we must also install gas systems that can reliably make up for frequent wind laxity and which emit at least 2/3 of the GHGs a 100% gas-driven energy system would emit. This hardly puts California energy choices in a leadership position.

We must also honestly assess the real effects of increased gas use to back up variable sources – OSHA and NTSB statistics for injury & death attributed to gas exploration, exploitation and transmission are not zero, as we in California sadly know from San Bruno and Texans know from their daily gas-sourcing activities.

We now also know that from gas exploration through use plus leakage of its constituent methane adds about as much GHG climate forcing as does coal combustion. So uncritically driving California's use of 'renewables' forward simply makes California appear closer to a coal-powered state.

Thus the graphic above shows gas, wind-farm backup adding about 2.6 million tons of CO_2 to yearly state emissions, but the reality, including gas production, is now known to be closer to coal, or more than 3.5 million tons per year for a nameplate-rated 900MW wind 'farm'.

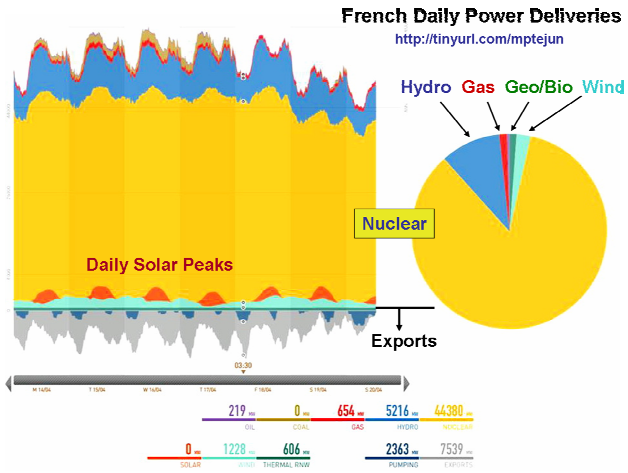
Solar 'farms' of any type suffer the same or worse collateral emissions. But at least local, on-structure solar PV/hot-water isn't environmentally intrusive and offers the prospect of working efficiently with local storage, managed, say, by utilities at substations.

We thus have two, almost 'renewable' energy sources: local solar and nuclear. Solar lasts until the Sun goes red giant, and nuclear lasts as long as there are any watery/rocky bodies in our solar system.

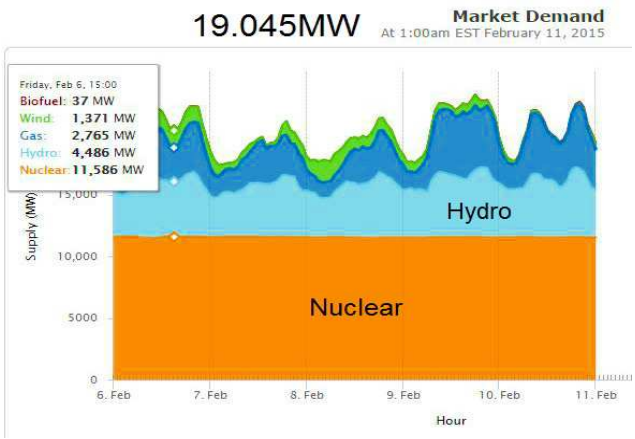
600MW Nuclear Plant CF ~0.9, ~30 Acres. 0 Emissions

The fact is, only nuclear power is both climate-independent and environmentally benign. France, Canada and others have shown us all this for decades…

"France emits around 40 grams of CO_2 per kwh. Germany, the US, Japan, and most other industrialized nations emit between 400 and 500 grams/kwh."
http://ambafrance-us.org/spip.php?article637

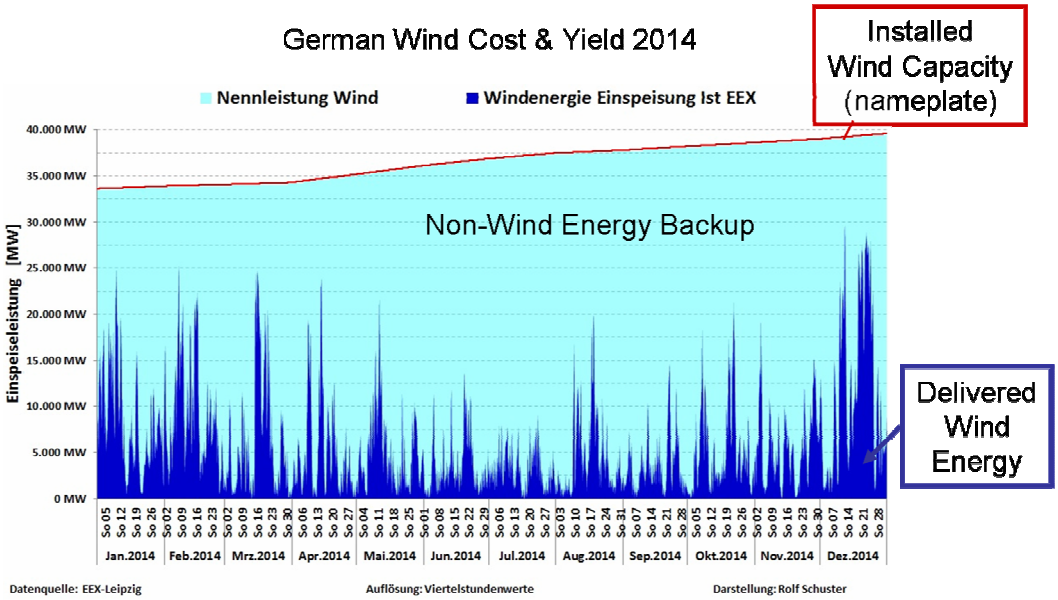


Ontario Daily Power Deliveries



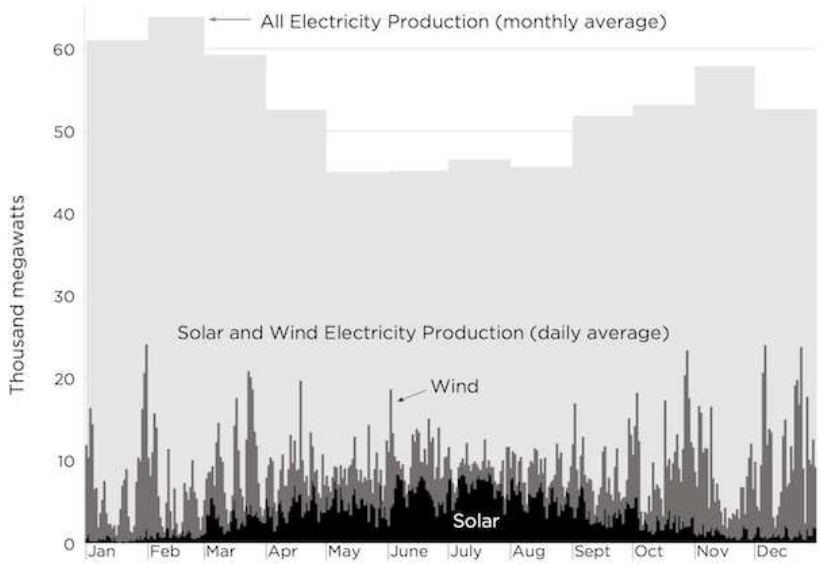
For California, the example of Germany and its politically-motivated roll-out of 'renewables', especially wind, is essential to understand In the following graphic, Germans paid for the upper red line of increasing numbers of windmills over 2014, but received the energy represented by the dark blue spikes. The rest of their power needs had to be satisfied by back-up sources, from burning lignite & coal, through cross-border purchases of power – see also references…

http://tinyurl.com/jwofrtx
http://tinyurl.com/kyq6ddr (note Fig. 25 Interventions)
http://tinyurl.com/qd3pswl
http://tinyurl.com/ko4u2m8 (former Economics Minister)
https://www.youtube.com/watch?v=y7Ca72-WxuI (Vice Chancellor)
http://tinyurl.com/q7y6pfy In 2014, "...Germany's wind turbines as a whole ran at between 0 to 10% of their rated capacity 45.5% of the time (3986.75 hrs)! The turbines, which the German government says will become the "workhorse" of the German power industry, ran at over 50% of their rated capacity only for 461 hours, or just 5.2% of the time." (CF < 15% for all 2014)



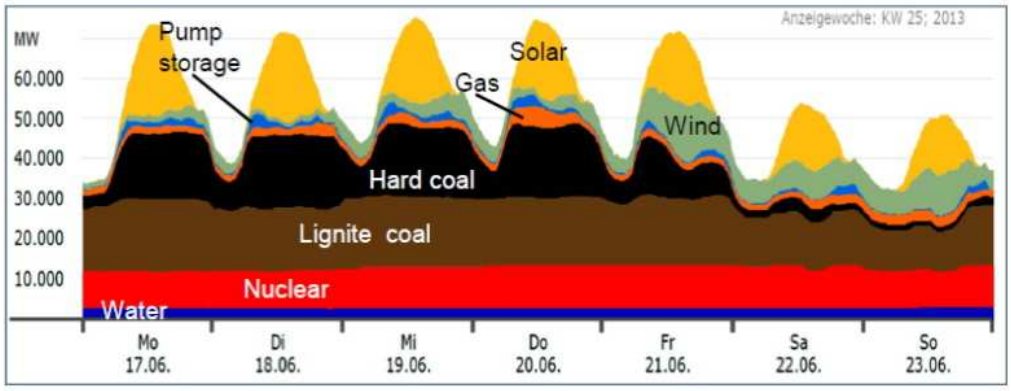
German energy policy is not scientifically informed, and the results are a cautionary tale for us in California. We appear to think burning gas allows us to conscript massive California natural lands for wind/solar 'farms' of low CF, high maintenance & transmission loss, and unnecessary emissions produced by necessary backup systems.

The following graphic illustrates the reality faced in 2014 by Germany, after expending hundreds of billions of Euros on wind & solar sources…



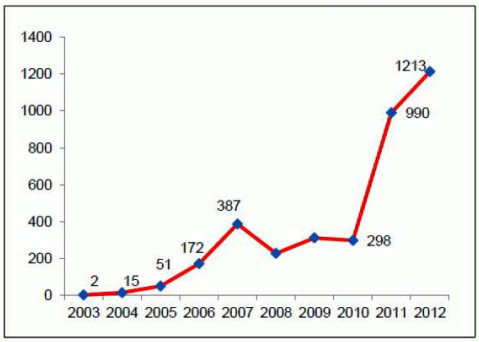
And this graphic illustrates how weather affected all German sources…

Figure 26. SIEMENS: Weather-related fluctuation of renewable energy (solar and wind power) with significant influence on operation regime of conventional power plants



A reflection of both the variability of 'renewables' and the cost of their integration is simply illustrated by the German experience in grid management – interventions…

Figure 25. Grid interventions to stabilize the grid by grid operator



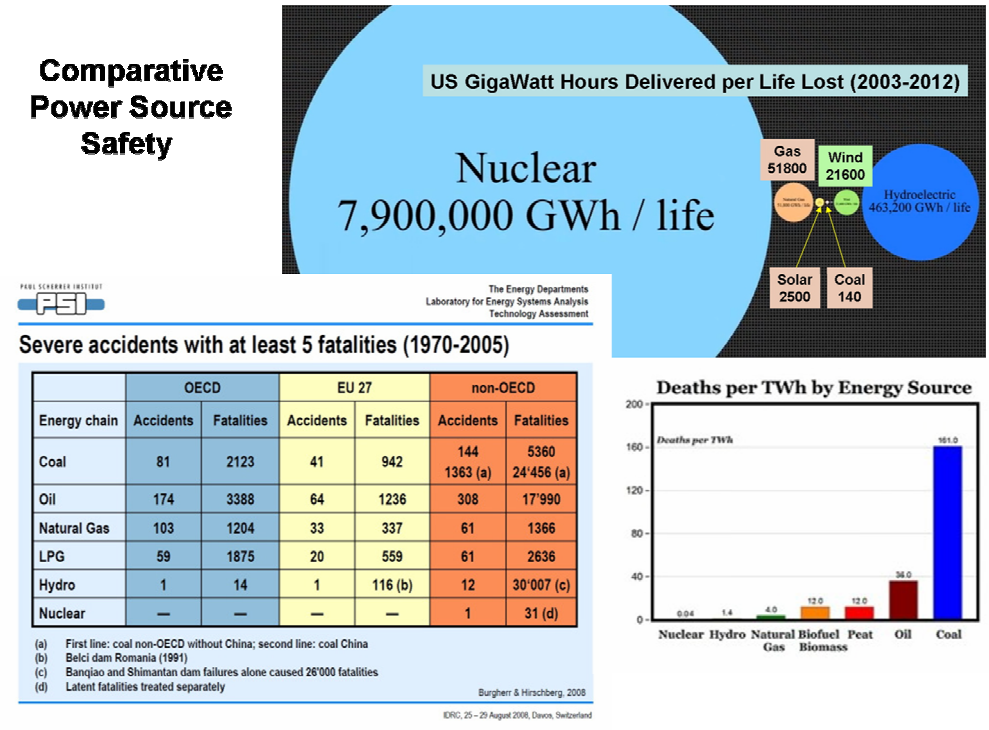
The graph goes 'til 2012, but the cost of grid stabilization has continued to skyrocket since then. Our own California "duck curve" is symptomatic of how our own misinformation about 'renewables' and curious avoidance of nuclear power's reliability has put us into an unnecessarily expensive and environmentally threatening position regarding energy production. We've been lured into sacrificing lands, species and emissions to serve a misinformed political position.

California must understand the importance of scientific & engineering reality when setting energy policy. It's past time to recognize that nuclear power is even more naturally included in the RPS than low CF sources – other states see this. The NREL presenter to CEC on 7/24 inadvertently confirmed this, because he later explained they had planned a nuclear version of their study, but it didn't get funded. Thus, our CEC has received incomplete information to guide our clean-energy policy. This will not aid our Governor in achieving his stated goals.

We will also be unable to provide secure water sources for our citizens in drought periods, unless we have adequate clean power for desalination. We know that the new desalinator for San Diego County will have to be replicated about 14 times to serve the county's residents, or 140 times (>5GW) to serve California coastal residents. For this, 'renewables' plus gas backup is irrelevant.

We, in fact, need all of San Onofre operating again, plus 2 or more nuclear plants just as big as it or Diablo Canyon.

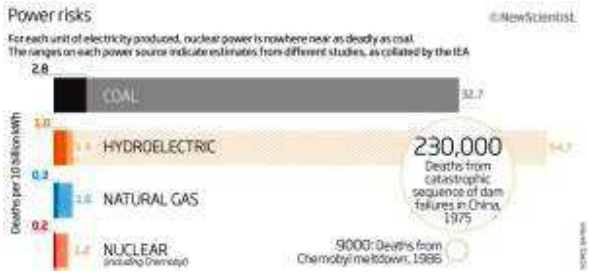
In evaluating and advocating nuclear power, we should also understand its safety, relative to other sources. As it turns out, because of excellent regulation, especially in western countries, nuclear power is unmatched for safety, for all its 57 years of deployment…



	OECD		EU 27		non-OECD	
Energy chain	Accidents	Fatalities	Accidents	Fatalities	Accidents	Fatalities
Coal	81	2123	41	942	144 1363 (a)	5360 24'456 (a)
Oil	174	3388	64	1236	308	17'990
Natural Gas	103	1204	33	337	61	1366
LPG	59	1875	20	559	61	2636
Hydro	1	14	1	116 (b)	12	30'007 (c)
Nuclear	—	—	—	—	1	31 (d)

(a) First line: coal non-OECD without China; second line: coal China
(b) Belci dam Romania (1991)
(c) Banqiao and Shimantan dam failures alone caused 26'000 fatalities
(d) Latent fatalities treated separately

The Swiss, PSI research has even included Chernobyl and other nuclear accidents, yet nuclear power remains safest, even in comparison to wind & solar. There are many such analyses…



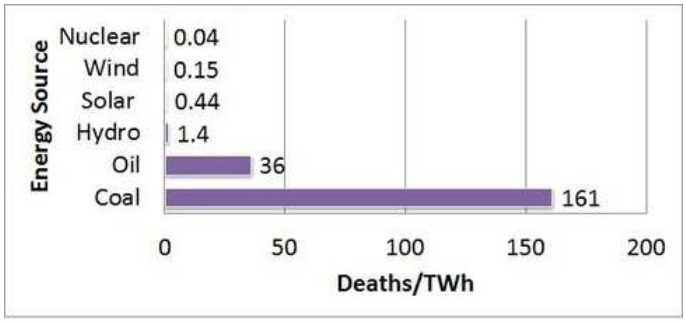
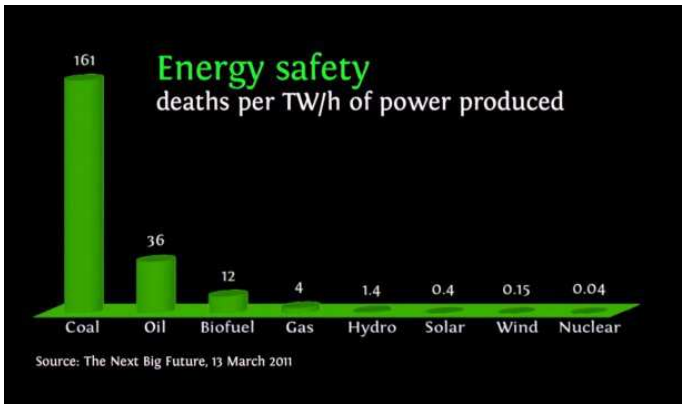


Figure 4: Life Cycle Deaths of Various Energy Sources (Wang 2012)



California has had an odd law that stands in the way of progress – Proposition 8. Of course, that was made irrelevant by the courts. Another bad law, that we in California can actually change, is the act that prevents new nuclear-power construction until the issue of used (spent) fuel storage is solved by the federal government.

That law has the flavor of shooting oneself in the foot. And, because we know ~95% of what's in used nuclear fuel is natural Uranium, of the same isotopic constituency as found in the ground, we know that there's truly very little in it that's true waste.

California, with its engineering & technology strengths, could easily remove that law and work with the federal government to deal with used nuclear fuel wisely – separating the re-usable 95% in new, advanced-technology locations, and engineering new ways to store/re-use/dispose-of the remainder. That remainder, for all 57 years of US nuclear power operation, can be piled between the goal and 5-yard line on a football field. Same can't be said of coal waste/ash, or fracking and other wastes from gas extraction and processing.

As you can see from all the above, there is reason for scientists, engineers, and even the Dalia Lama, to advocate large, new nuclear-power roll-outs…

http://tinyurl.com/kn22qcn
www.dailymail.co.uk/news/article-2486894/Scientists-urge-climate-groups-nuclear-power-warn-wind-solar-fulfil-worlds-energy-needs.html

http://decarbonisesa.com/2014/06/30/another-climate-scientist-joins-calls-for-nuclear/
http://www.sunshinecoastdaily.com.au/news/scientists-tell-greenies-embrace-nuclear-save-plan/2502717/
http://www.coastreporter.net/climate-scientist-says-rational-threat-assessment-needed-for-nuclear-power-1.1776075
https://www.youtube.com/watch?v=lXTPKGuQhzQ&feature=youtu.be
http://www.science20.com/news_articles/james_hansen_to_mitigate_climate_change_nuclear_energy_should_be_included-154923
http://thoriumforum.com/open-letter-those-influencing-environmental-policy-opposed-nuclear-power
http://tinyurl.com/m5qp8vf
http://dotearth.blogs.nytimes.com/2014/01/24/more-views-on-nuclear-power-waste-safety-and-cost/?_php=true&_type=blogs&_php=true&_type=blogs&_r=1
www.slideshare.net/Revkin/dot-nuclear-1-2214-lettersigned-by-4-nuclear-scientists-and-engineers
https://www.facebook.com/download/823098194404759/An-Open-Letter-to-Environmentalists.pdf
http://scitation.aip.org/content/aip/magazine/physicstoday/news/10.1063/PT.4.2433
http://world-nuclear.org/info/Current-and-Future-Generation/The-Nuclear-Debate/

Dalai Lama...
http://tinyurl.com/82o6etd

California could benefit, by taking a leadership position in nuclear-power development, including new Generation-IV DoE designs. Our state can reap economic and environmental benefits that 'renewables' cannot provide. And, we'd meet our Governor's climate/energy goals.

Sincerely,

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Menlo Park, Calif.