SEPTEMBER 2012:

We like Feedback. Remember – Global Warming is Irreversible!

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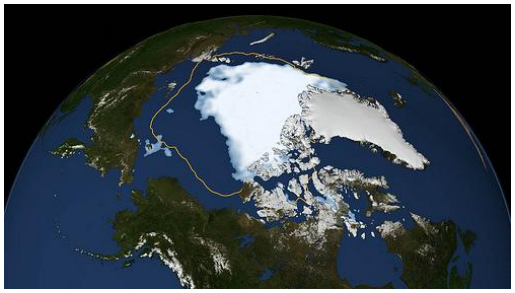
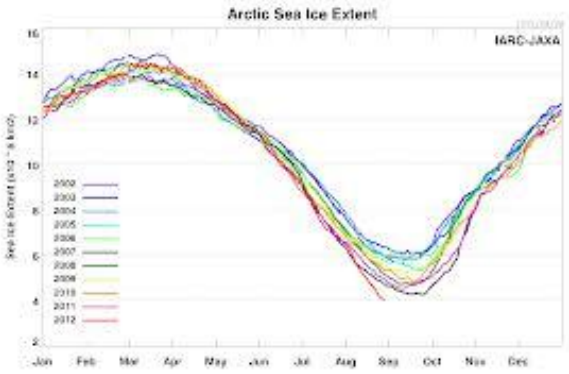
CONTENTS: Why Ice matters; Water Dries Up; Trees Can Not Chill out; Cheap CH4 changes Everything; Fun Stuff & Quiz; Windy Walmart





►Why The Arctic Sea Ice Death Spiral Matters

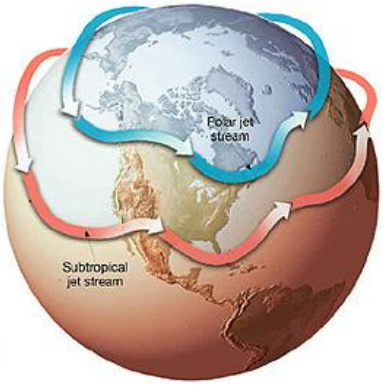
In the past week the Arctic sea ice cover reached an **all-time low**, several weeks before previous records, several weeks before the end of the melting season. The long-term decline of Arctic sea ice has been incredibly fast, and at this point a sudden reversal of events doesn't seem likely. The question no longer seems to be "will we see an ice-free Arctic?" but "how soon will we see it?"

Since the start of the current ice age, about 2.5 million years ago, the **Arctic Ocean** has been completely covered with sea ice. Only during interglacials, like the one we are in now (last 10,000 yrs) , does some of the sea ice melt during summer, when the top of the planet is oriented a bit more towards the Sun and receives large amounts of sunlight for several **summer months**. Even then, when winter starts, the ice-free portion of the Arctic Ocean Normally freezes over again with a new layer of sea ice.

Since the dawn of human civilization, 10,000 years ago, this annual ebb and flow of melting and freezing Arctic sea ice has been more or less consistent. There were

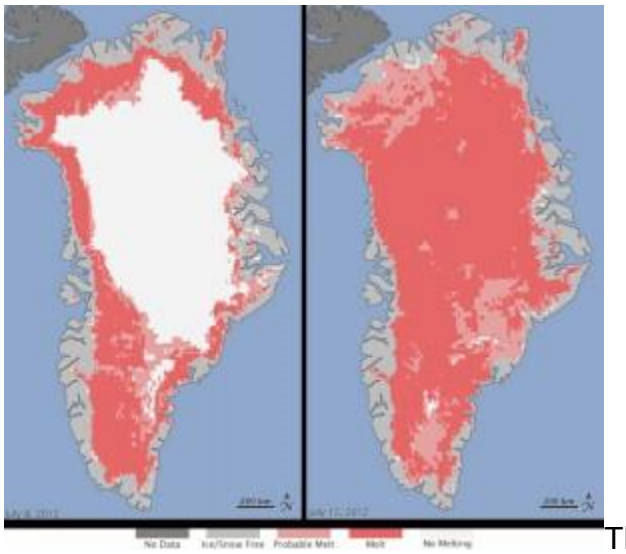
periods when more ice melted during summer, and periods when less melted. However, a **radical shift** has occurred in recent times. Ever since satellites allowed a detailed view of the Arctic and its ice, a pronounced decrease in summer sea ice cover has been observed (with this year setting a new record low).

What makes this event significant, is the role Arctic sea ice plays as a reflector of solar energy. Ice is white and therefore reflects over 80% of incoming sunlight back out to space. But where there is no ice, dark ocean water absorbs 96% of the sunlight and thus heats up. The less ice there is, the more the water heats up, melting more ice. This **feedback** has all kinds of consequences for the Arctic region. Disappearing ice can be good for species such as tiny algae from the warmer waters and extended growing season, but no sea ice could spell catastrophe for larger animals including marine life. Rapidly changing conditions also have repercussions for human populations whose income and culture depend on sea ice. Their communities literally melt and wash away as the sea ice no longer acts as a buffer to weaken wave action.



But what happens in the Arctic, doesn't stay in the Arctic. **The rapid disappearance of sea ice cover can have consequences that are felt all over the Northern Hemisphere, due to the effects it has on atmospheric patterns**. The heat and moisture from the warmer ocean are then released to the atmosphere in fall and winter could be leading to disturbances of the **jet stream**, the high-altitude wind that separates warm air to its south from cold air to the north. A destabilized jet stream becomes more 'wavy', allowing frigid air to plunge farther south, a possible factor in the **extreme winters** that were experienced all around the Northern Hemisphere in recent years. Another side-effect is that as the jet stream waves become larger, they slow down or even stall at times, leading to a significant increase in so-called **blocking events**. These cause extreme weather simply because they lead to

unusually prolonged conditions of one type or another. The recent prolonged **heat wave**, drought and wildfires in the USA are one example of what can happen; another is the cool, dull and extremely wet first half of summer 2012 in the UK and other parts of Eurasia.



The accumulation of heat in Arctic waters also influences other frozen parts of the Arctic, such as glaciers and ice caps on Greenland (enough water to raise oceans 25 ft) . As there is less and less sea ice to act as a buffer, more energy can go into melting glaciers from below and warming the air above them. Not only are glaciers flowing **faster** towards sea, but there is also a rapid increase in the **summer surface melt** Greenland experiences, leading to accelerating **mass loss** from the Greenland Ice Sheet. As the Arctic warms, an increased contribution to sea level rise is inevitable.

Another way Arctic warming could have worldwide consequences is through its influence on permafrost. Permanently frozen soils worldwide contain 1400-1700 Gigatons of carbon, about four times more than all the carbon emitted by human activity in modern times. A **2008 study** found that a period of abrupt sea-ice loss could lead to rapid soil thaw, as far as 900 miles inland. Green house gas emissions from warm permafrost would be huge and ***impossible to stop.***

For more information : National Snow & Ice data center. http://nsidc.org/

“It’s hard even for people like me to believe, to see that climate change is actually doing what our worst fears dictated,” said Jennifer A. Francis, a Rutgers University scientist who studies the effect of sea ice on weather patterns. “It’s starting to give me chills, to tell you the truth.”

►A Glimpse of California's water future: Tim Barnett is a research marine

physicist at Scripps Institution of Oceanography.

The idea of global warming is an abstraction to most folks. However, very shortly we who live in Southern California will get a first-hand demonstration of just how it will affect our lives.

The Achilles' heel of Southern California, indeed the whole Southwest, is water. We in San Diego get our water from two main sources. The primary source is the central and northern parts of our state. The other source is the Colorado River. Water from these two sources has enabled the growth of our local civilization and economies. We take these two sources for granted, but just how reliable are they? It turns out, not very reliable at all.

About 0.8-1.7 million acre feet of water, enough to support about 6 to 12 million people, comes into the Los Angeles Basin every year from the north. The water's long journey starts in the snow pack of the Sierra Nevada, travels through the Sacramento Delta and then via aqueduct to Los Angeles where the Metropolitan Water District dispenses it to the region, including San Diego.

In a warmer world there will be less snow and what snow there is will melt earlier. The Sierra, which has been our water banker, will go out of business or at least be seriously impaired. This trend, toward less snow and earlier river flow, has recently been documented by rigorous scientific studies. The water climate of California is already changing and will only change more in the future.

The Colorado, the second source, provides Southern California 4.4 million acre feet of water each year, about 1.0 million acre feet of which goes to non-farming use. But the Colorado water is already oversubscribed. In fact, each year over 1 million **more** acre feet of water are taken from Lake Mead than are supplied by Colorado River inflow to the lake.

This overdraft alone would draw down the reservoirs on the Colorado to dead pool levels within a decade or so. The impacts of global warming are intensifying the problem, for our climate models and observations show that less water will be supplied to the Colorado system, hastening its demise.

Just-released studies show these reductions will lead to lakes Mead and Powell going dry by 2021 with a 50 percent probability, in other words, a 50-50 chance the Colorado System storage will be gone in just 13 years, and a one in ten chance it will be exhausted by 2014.

So Southern California's two main water sources will almost certainly be heavily impacted by global warming. Bottom line is that water will become more expensive and scarce in our near-term future if we do nothing but stay the course.

What can we do about these coming water crises?

First, the bad news. These impacts will be on us before we get any relief from reduction in atmospheric greenhouse gases. The planet would continue to warm for some decades even if we held fixed carbon emissions at today's values immediately. So our actions must first be toward adaptation.

One option is start a serious water conservation effort and that includes the judicious use of recycled water. More dams in California, if we can squeeze them in, will catch the snowmelt we have to pass through our reservoirs systems due to their lack of capacity, thereby partially replacing Mother Nature's role as water banker. (Ditto with subsurface sequestration of water.)

We can shift water between agriculture, which uses 70 to 80 percent of it, and thirsty urban populations. San Diego and other cities have already started this process. This will mean fallowing less productive land, but growing subsidized crops with subsidized water has never made much sense anyway.

Desalination is also an obvious solution, as long as it does not require fossil fuel to run the desalination plants.

Another option is to seriously curtail the run away building boom that has succeeded in building communities in our deserts without thought to the stability of their water supply.

►Climatic Changes Lead to Declining Winter Chill for Fruit and Nut Trees in California during 1950–2099; Eike Luedeling, et al: PLoS ONE 4(7): e6166.

Background: Winter chill is one of the defining characteristics of a location's suitability for the production of many tree crops. We mapped and investigated observed historic and projected future changes in winter chill in California, quantified with two different chilling models.

Conclusions/Significance: Both chilling models consistently projected climatic conditions by the middle to end of the 21st century that will **no longer support some of the main tree crops currently grown in California. Some species or cultivars decreasing 50–75% by mid-21st century, and 90–100% by late century. Note: this is an $8.7 Billion industry at risk.** *Note also as Pennsylvania warms our hardwoods and nut trees will experience warmer winters and will be stressed or die.*

►China Myths Vs Reality

1. *Yes China burns about 50% of coal burned in world. Their population is one billion more than the USA. But their strategy is low carbon energy technology as job and wealth creation and reducing their environmental pollution. Thus:*

2. *China will spend **$372 Billion** over next 3 yrs to reduce energy use ($155 B) and pollution.*

3. *They have 26 nuclear plants with14 under construction and 12 more planned. America has 100. Note China is building 2 of the newest "pebble" design technology. First in the world.*

4. *World's largest mfg of solar PV cells & Wind Turbines.*

5. *Buying 80% of lithium battery company A123 for $450 million. A123 could not get loans in USA. They obviously see energy storage as key to the future of energy.*

6. *World leader in Carbon capture & sequestration.* For details see. http://www.carboncapturereport.org/

But reducing China's own emissions might be a beneficial side note to a larger aim: marketing CCUS technology to other countries.

Chinese utility company Huaneng and U.S. company Duke Energy Corp. signed a cooperation agreement this year calling for a study to determine the feasibility of applying Huaneng's carbon capture process at Duke Energy's coal-fired power plant in Indiana.

While Huaneng is leading the way in capturing carbon for coal-fired power plants, an industry that is traditionally tied with CCUS, the Chinese coal giant Shenhua is trying to adopt CCUS technology in a new sector: factories that produce chemicals out of coal.

Compared with coal-fired power plants, coal-to-chemicals factories capture CO2 from industrial waste more easily. That is because more than 80 percent of their industrial waste is carbon dioxide; by contrast, the figure is less than 20 percent in the power plants. All new coal-to-chemicals factories in China will need to submit plans on how to reduce their future emissions when applying for construction permits.

► Cheap Natural Gas has changed the Energy Game: First let's look at how this will impact your home energy bill: This is followed by an article from authors from National Renewable Energy Lab.

A recent Doe/ EIA report of the cost of electricity if you build new utility based on various technologies compares fossil fuel types vs nuclear vs wind or solar vs natural gas. http://www.eia.gov/forecasts/aeo/electricity_generation.cfm 2012 update.

This estimates that the cost of electricity from wind is $ 9.6 cents / kwh with a range from 7.7 to 11.2- for on shore wind. Vs Natural gas = $ 6.5 cents per kwh; So – wind costs 3. cents per kilowatt hr more than nat gas.

Note that new coal plants are more expensive than wind. But they will keep the old ones running for as long they can avoid the public understanding.

So what does this mean for electric bills? If a home uses 10,000 Kw hr per yr (ck your bill for your home) then the added cost if wind alone vs nat gas = $ 300. /yr . Compare that to the annual bill. - PECO (@ 16 cents / kwh- ck your bill for all those xtra charges) = $1600/ yr. Thus wind costs 19. % more than natural gas.

Now think of what $300 means. 4 family dinners out? 4 concert tickets and parking; 5% of a private school tuition? New camera?

So not minor but well within most budgets. You can get a blower door test for $150; use “smoke” to find the leaks ; then seal up the leaks with silicon; add more insulation and recoup all this $ every year.

So why pay more for renewable energy? It Depends - What do you value?

How do you view the real risks to your children from global warming? (Crop failures from high temps and droughts; Storm surges? Acidic oceans? Extreme weather impacts? Costs to protect sea side communities? Remove salt from water intakes? Or risk irreversible tipping points in a much hotter world?) We spend billions on candy and snack foods & sports without thinking twice. Some spend $10,000 for a home theater.

The United States has won the lottery on natural gas. KEVIN DORAN AND ADAM REED – NREL

According to the most recent estimates by the Energy Information Administration, the U.S. has some 2.2 trillion cubic feet of technically recoverable natural gas — enough to satisfy all of our natural gas demands for the next century at current consumption levels. The extraction of shale gas, enabled by technological advances such as hydrofracturing and horizontal drilling, has led the way in creating this largely unforeseen cornucopia.

Domestic natural gas is now a cheaper fuel for electricity generation than coal — long our go-to fuel for power around the clock — and emits roughly half the greenhouse gas emissions. It appears that our energy problems are over — or are they?

A full-throttle shift to a gas-dominated electricity system, which now appears to be the ordained path forward in many parts of the country, will flash through our newfound abundance more quickly than we realize, and **will not ultimately stave off catastrophic climate change, which by any reasonable measure of sanity is still the defining challenge of the 21st century.** Amid the din of enthusiasm surrounding the rush to natural gas, we run the risk of losing the real prize: a U.S. energy future consistent with our economic, environmental, and lifestyle aspirations. *Wise use of natural gas, in conjunction with policies to support continued growth in renewable energy, can serve as a catalyst to quicken the transition to a sustainable energy system*.

The recent and staggering abundance of natural gas is, ostensibly, a very good thing. Provided that current low natural gas prices persist and that resource estimates hold true, natural gas combined cycle power plants will gradually replace our nation’s aging coal-fired generation fleet.

This shift is already happening. Cancellations of coal deliveries and advance coal contracts have become common as utilities switch to natural gas. The U.S. Environmental Protection Agency (EPA) recently promulgated carbon dioxide emissions thresholds for new power plants that exactly match specs for natural gas combined cycle plants.

But the rose of abundant natural gas is not without thorns. One such thorn is the risk of price increases. James Rogers, the CEO of Duke Energy, recently quipped that to Benjamin Franklin's observation that only death and taxes are certain in life, "I would add the price volatility of natural gas."

Equally obvious is that our current rate of consumption will not remain flat for the next 100 years. If anything, natural gas will likely play a far greater role in our energy mix than it currently does, whether by displacing coal-fired generation, utilization in natural gas vehicles, increased use in manufacturing, or by outcompeting renewables as the cheapest source of power.

Another set of thorns comes in the form of adverse environmental and social impacts from natural gas production. Despite recent advancements in impact mitigation such as faster drilling, smaller and fewer well-pad footprints, and EPA methane capture requirements that go into effect in 2015, there remain serious concerns regarding the potential for shale gas production to contaminate sources of ground and drinking water, induce seismic events, and harm local air quality.

Conflicts have already arisen between industry and the communities that bear the burdens of gas development, and they will likely increase in number as development continues: The Energy Information Administration estimates that bringing most of the U.S. shale gas and shale oil resources into production will require more than 630,000 new wells, in addition to the approximately 487,627 natural gas wells producing in 2010.

Communities that have never seen a drilling rig will be inundated with heavy truck traffic, blanketed with acrid exhaust from trucks and generators, and exposed to a surfeit of noise, lights, and dust from drilling and related activities. When communities face up to these realities, as is already occurring, it may become significantly more difficult and expensive for developers to obtain the so-called "social license to operate" in populated areas.

The natural gas boom also presents the prospect of imminent harm to the deployment of renewable energy, and dire environmental consequences that will follow from a failure to cease adding greenhouse gases to the atmosphere. The growing swell toward a utility sector dominated by natural gas has already resulted in collateral damage throughout the renewables industry.

Wind, for example, had previously been capable of competing with natural gas generation on a cost basis, thanks to advances in technology and a federal production tax credit that seems poised to expire at the end of this year.

Installation of new renewable energy facilities has now all but dried up, unable to compete on a grid now flooded with a low-cost, high-energy fuel that can provide power on demand.

The U.S. now faces a choice: We can rush into a monolithic energy future dominated by natural gas, or we can leverage the gift of cheap and abundant natural gas to create an

energy system that is profitable, affordable, and more sustainable over the long run. To this end, we offer the following recommendations.

First, we should gradually utilize natural gas as the generation backbone for much of the electricity grid, ***replacing coal-fired generation***.
Second, Renewable energy's zero-fuel-cost realities operate as a hedge against fluctuating fuel prices. **A power system that balances gas and renewables will be able to take advantage of cheap gas while simultaneously insuring itself against fuel price spikes. It is thus imperative that we expand renewable energy standards at the state level**.

Third, we should take advantage of cheap gas to lower the integration costs of renewable energy. We've all heard that the wind doesn't blow and the sun doesn't shine all the time. The rest of the power grid must be flexible enough to accommodate these energy sources when available.

There is a more fundamental point to be made. It is high time that we dispense with the notion that gas and renewables should compete in the first place. The real value of renewable energy lies not in low costs (though lower costs are certainly a laudable development), but in its environmental benefits — the cleaner air, water, and land that we all enjoy, ***and the hope of a future without catastrophic climate change***.

If we force renewables to go toe-to-toe with fossil fuels on costs, they will lose, again and again, until it is too late to matter. Renewables are worth their extra costs because they are clean. No other fundamental justification is required.

►**Public Wave Energy Test Facility Begins Operation in Oregon** : The United States saw the launch of one of the first public wave energy testing systems off the Oregon coast near Newport, an operation which will allow private industry or academic researchers to test new wind energy technology.

The testing facility, The Ocean Sentinel, cost $1.5 million and was developed by the Northwest National Marine Renewable Energy Center (NNMREC) at Oregon State University.
And there's no cooling off period either, with the first device to be tested few days, a "WetNZ" device developed by private industry.

►**Gov. Jerry Brown often rails against the "declinists**". His new Web page:
"Climate change: Just the facts."

“Many of the deniers share some traits,” the website states. “Many have little or no expertise in climate science. While some have some science background, their training often is unrelated to climate science and they have not published 'peer-reviewed' scientific work in climate or atmospheric science.” “After decades of pumping greenhouse gases into the atmosphere, humanity is getting dangerously close to the point of no return,” Brown said in a statement. “Those who still deny global warming’s existence should wake up and honestly face the facts.

?? QUIZ ?? : Last month largest desalination plant using brackish (less salty than ocean water) water is Kay B. Hutchinson plant In El Paso, Texas. The salt residue gets pumped 4000 ft underground. No winners – sorry.

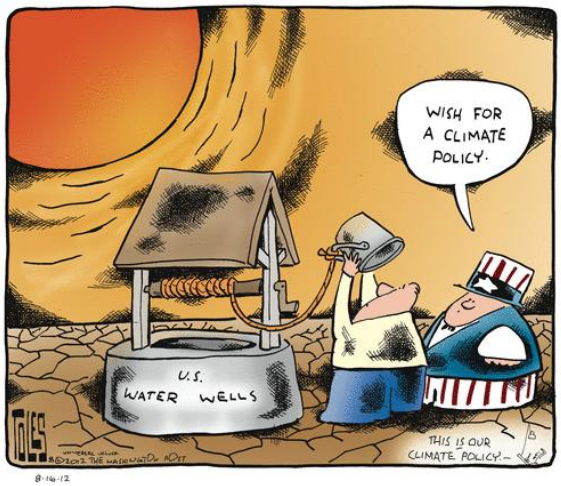
Sept Question: What is this and about how long is it?

Walmart 1st Industrial On-Site Wind Turbine Project

With a height of 265 feet tall, along with a diameter of 250 feet, the new GE 1.0 megawatt (MW) wind turbine will create close to 2,200,000 kilowatt hours (kWh) yearly. Foundation Windpower, as part of a Power Purchase Agreement (PPA) with Walmart, will manage, install and own the turbine. Meanwhile, Walmart will buy the power under the agreement.

Greg Pool, senior manager of renewable energy and emissions at Walmart, and project manager of the California Red Bluff Installation. “We are using every tool in the tool box

as we work toward our goal to be supplied by 100 percent renewable energy, and wind energy is an attractive technology for Walmart." Some other projects include the recent **100th solar installation in California** and 26 fuel cell sites in California providing local energy to Sam's club and Walmart stores.



We love to give our 25 minute PowerPoint presentation on the "Science of & Solutions to Global Warming" to any audience. (Ask your Lions, Rotary, etc.; or church, work, Home Owners Association, or retirement group, etc.)