# ITER Forum News Log April 2010



## 1. Chance to combat climate change through policy has come and gone

Tom Switzer From: The Australian April 21, 2010 12:00 AM 3 comments

http://www.theaustralian.com.au/news/opinion/chance-to-combat-climate-change-through-policy-has-come-and-gone/story-e6frg6zo-1225856117702

**ON the ABC1's 7.30 Report last week, Barack Obama reiterated his belief that putting a price on carbon was the best way to reduce greenhouse gas emissions. However sweet the rhetoric about combating global warming, the cold reality is this: comprehensive climate legislation, which US senators will unveil next week, is unlikely to pass into law this year. Here are five reasons why.**

PUBLIC OPINION: In the wake of climate-gate, glacier-gate and the recent record-breaking snow storms, polls show rising scepticism of the science of man-made global warming. A Harris poll last year found that only 51 per cent of Americans believe the Earth is getting warmer - down from 71 per cent two years ago. And according to a January Pew Survey, climate change is ranked dead last in a list of policy priorities; only 28 per cent think reducing carbon emissions is a top priority.

THE ECONOMY: The American people, not to mention nervous politicians up for re-election, are always wary of new taxes, especially when unemployment remains at 9.7 per cent. Outgoing Democrat Senator Evan Bayh spoke for many colleagues when he recently said: "We need to deal with the phenomena of global warming, but I think it is very difficult in the economic circumstances we have right now." In this environment, it is politically dangerous for, say, a Democrat politician facing re-election in a Rust Belt state to tell constituents they should pay higher taxes to help China become more energy efficient and more economically competitive.

GEOGRAPHY: In Washington, climate politics is just as much about geography as partisanship: where a majority of voters in the Pacific coast and the Northeast are green, people in other regions are brown. To secure passage of climate legislation, Obama has to win over not only a few Republican but also several "blue dog" Democrat senators from the South as well as "brown dog" Democrats from the Midwest and Great Plains, whose states are heavily dependent on oil, coal and manufacturing. And that is before the substantially amended legislation requires a stamp of approval from the House of Representatives which only narrowly passed an even less pork-ridden Bill last June.

OFF-SHORE DRILLING: To appeal to sceptics on the Right, Obama supports plans to expand

nuclear power generation and off-shore drilling. Although conservatives are largely in favour of ending the drilling ban, many Republicans warn that the President's proposal is too modest. Besides, environmental groups and liberal Democrats, especially from oceanside states, are strongly opposed to off-shore drilling. So Obama's overture could very well be counterproductive: he could fail to win over unconverted Republicans even as he drives away erstwhile supporters.

INTERNATIONAL CLIMATE: It is difficult for US politicians to sell the imperative of pricing carbon at home when the rest of the world is suffering global-warming fatigue. Copenhagen failed to secure any kind of legally binding, verifiable and enforceable global climate deal. And with China and India chugging along the smoky path to prosperity, the chances of a post-Kyoto agreement at Mexico City are small.

Beijing and Delhi insist they will not join the West in what they see as an economic suicide pact. In France, the Sarkozy government recently jettisoned the idea of a carbon tax. In Canada, the emissions trading scheme is stalled in legislative limbo. And in Australia, public confidence in what Tony Abbott calls Labor's "big new tax" has collapsed.

These factors explain why comprehensive US climate legislation is unlikely to pass this year. And with Republicans set to gain seats in both the House and Senate in November's mid-term elections, any serious climate and energy Bill is even less likely to become US law in the next few years.

The political climate is changing so dramatically that even Obama's Interior Secretary Ken Salazar recently said: "I think the term `cap and trade' (or emissions trading) is not in the lexicon any more." Al Gore's moment has come and gone.

*Tom Switzer is a research associate at Sydney University's United States Studies Centre and the Institute of Public Affairs in Melbourne.*

## 2. Sunshine claim clouded by dispute

Cheryl Jones From: The Australian April 28, 2010 12:00AM 8 comments

http://www.theaustralian.com.au/higher-education/sunshine-claim-clouded-by-dispute/story-e6frgcjx-1225859043744

**UNIVERSITY of Newcastle researchers relied on "spurious" results in claiming to debunk evidence that global warming is worsening Australia's droughts, a rival team of scientists contends in the latest battle of the climate wars.**

The rival team, led by CSIRO climatologist Wenju Cai, fired the salvo in Geophysical Research Letters, the peer-reviewed journal of the powerful American Geophysical Union.

Dr Cai's team was commenting on a paper published in the same journal by a group from the University of Newcastle's school of engineering in late December challenging the results of some of the world's top climate scientists.

The Novocastrians' paper has been used as ammunition by greenhouse sceptics in the climate wars. The battle over the paper turns on a point of junior high school science -- the dependence of daylight hours on latitude -- which the Newcastle team failed to factor into its analysis.

The senior author of the paper, Stewart Franks, an associate professor in environmental engineering at Newcastle who has written extensively on climate change, told the HES the criticism by Dr Cai's group was off topic.

Professor Franks was part of a delegation led by Family First senator Steve Fielding, a climate change sceptic, that tackled Climate Change Minister Penny Wong and chief scientist Penny Sackett last June on the evidence that the burning of fossil fuels was causing the planet to warm.

The Franks team paper, titled On the Recent Warming in the Murray-Darling Basin: Land Surface Interactions Misunderstood, challenges studies by climatologists David Karoly of the University of Melbourne and Neville Nicholls of Monash University suggesting that human-caused climate change exacerbated the crippling 2002 El Nino drought.

Professor Karoly is a world-renowned expert on global warming who has served on the Intergovernmental Panel on Climate Change.

In a report for the WWF in 2003, the high-profile scientist and colleagues said the 2002 drought was the worst in 50 years because anomalously higher maximum temperatures had increased the rate of evaporation of the available water.

"This is the first drought in Australia where the impact of human-induced global warming can be clearly observed," the report said.

Soon after, Professor Nicholls, who spent 35 years at the Bureau of Meteorology before joining Monash, and who has played a leading role on the IPCC, zeroed in on temperature, rainfall and evaporation data from weather stations across the Murray-Darling Basin. He focused on the cool months from May until October, the growing season for many crops in the basin, which supplies 40 per cent of the nation's food.

He also suggested that high temperatures had worsened the drought by increasing evaporation and transpiration, or loss of water from plants. The dry was worse than the 1982 and 1994 droughts, which had had similar rainfall readings but lower temperatures.

Without much water to cool the atmosphere, temperatures rise during droughts. But Professor Nicholls found that temperatures in 2002 were higher than would be expected from this effect. This was due partly to the continuation of an underlying warming trend since the middle of the 20th century, said his paper, published in the journal Climatic Change.

The possibility that human-caused global warming was increasing the severity of droughts "needs to be considered", the paper said.

For its paper, Professor Franks's team drew data from 15 stations across the Murray-Darling Basin. The group claimed the data showed an increase in sunshine hours since 1952, and this natural effect, rather than global warming, explained the elevated temperatures. The paper did not spell out why the number of sunshine hours would increase, or overcast weather decrease, throughout the period. In its conclusions, the Newcastle team stressed that its results "in no way negate genuine concerns over anthropogenic climate change".

"However, the science of assessing future hydroclimatic risk is not aided by premature claims of recent severe drought being incorrectly attributed to enhanced evaporation due to increased atmospheric carbon dioxide."

In a media release last November, Professor Franks's group said its study "highlighted the importance of getting the science right". However, in a commentary accepted for publication in Geophysical Research Letters, Dr Cai's team said the sunshine hour trend reported by the Newcastle researchers was "spurious and an artefact of their analysis".

(More follows)

## 3. Germany's green credentials illusory

Charles c. Johnson From: The Australian April 27, 2010 7:41PM 1 comment

http://www.theaustralian.com.au/news/opinion/germanys-green-credentials-illusory/story-e6frg6zo-1225859033642

**IN Germany, Weltschmerz is the sadness one feels when comparing the way the world is to the way it ought to be. German environmentalists must be suffering a profound case of it as not-in-my-backyard protests derail industry and government-planned alternative energy projects. Germany's Renewable Energy Sources Act (Erneuerbare Energien Gesetz, or EEG) was supposed to help the German Ministry for the Environment achieve its goal of renewables producing 30 per cent of the country's electricity by 2020. Instead, the EEG has met with widespread opposition.**

Crucial to the EEG is a "feed-in" scheme, hailed by greens the world over, which encourages ordinary German households to become energy producers. Under the EEG, any German has the right to feed unlimited electricity - from home-based windmills or solar panels, for example - into the country's grid. Government-run utilities then buy this energy from the households at a government-determined price. That price, including a profit for the households, is under a 20-year contract. In theory, every individual could run a power plant, and every backyard could produce clean, renewable energy.

But in reality, every individual also has a neighbour who doesn't want a power plant next door. With the help of social-networking websites, Germans, Europe's most litigious people, have been using the country's arcane ballot initiatives to delay or shut down their neighbours' planned energy investments.

Nor is the EEG Germany's only ill-advised energy regulation. Another recent law requires new German homes to meet 10 per cent of their heating needs with renewable energy. But the carbon-emission reductions that this achieves are effectively non-existent, according to the journal Energy Policy. Further, the law's incentives to use only certain kinds of renewables freezes technology in an industry that needs to be more dynamic.

The worst obstacle to Germany's grand plans is physics. A solar panel converts only 11 per cent of the solar energy that it receives into usable energy, while coal and natural gas facilities convert about 40 per cent of their fuel into electricity. Vast panel arrays are the only way to make solar economical: a single solar module on a very sunny day in the Sahara can create only enough energy to power one 75-watt light bulb - and Germany on the brightest of days receives just half the sunlight that the Sahara does.

Germany's Foreign Minister, Frank-Walter Steinmeier, had hoped that a diversification of the country's energy portfolio would make it less dependent on Russia, from which Germany buys a third of its oil and gas. Unless renewables pick up the slack, Germany will become even more dependent on Russia for its fuel. But that's partly Germany's own fault: by 2020, it will to phase out its 17 nuclear power plants, which supply about a quarter of the nation's electricity and the only form of renewable energy capable of meeting German demand.

Greens had promised that Germany would be a Mecca for energy investment, but instead it has become a Potemkin village - fooling foreign governments into believing that its economy is a model for the future. Barack Obama seems to be among those taken in. "We invented solar technology, but we've fallen behind countries like Germany and Japan in producing it," he told a joint session of congress in February. The President has indulged in his own brand of environmental fooling, trying to persuade Americans to support his wasteful cap-and-trade bill and as much as $5 billion in tax credits for weatherisation schemes like insulating homes for the winter. Obama calls this a "real stimulus". The Germans have another word for it: Volksverdummung, a deliberate deception of the public.

*Charles C. Johnson is a Los Angeles-based writer. This article first appeared on www.cityjournal.com*

## 4. NK reiterates its claim for nuclear fusion success

By Sunny Lee□Korea Times correspondent BEIJING —

http://www.koreatimes.co.kr/www/news/nation/2010/05/113_65942.html

North Korea Saturday once again claimed nuclear fusion success, in an apparent bid to highlight the unlikely scientific achievement amid widespread global skepticism.□□The Rodong Sinmun, the official mouthpiece newspaper of the ruling Workers' Party, on Saturday claimed: "Despite the fact that our country is under the pressure of extreme [U.N.] sanctions and pressure, we proudly succeeded in nuclear fusion through our 'unique' methods," Yonhap News Agency said.□□The North's newspaper also added that the new achievement is "to develop a new source of energy," in a seeming effort to counter the international suspicion over its nuclear weapons ambition. □□The newspaper said the project was a "very difficult and arduous research" that involved maintaining "a high temperature of tens and thousands of Celsius degrees" and took "astronomical financial investment.□□Yet North Korea didn't mention the principle behind "the unique" way it claimed used to carry out its experiments, nor did it show any picture of the laboratory where the experiment was allegedly carried out.□□North Korea first reported its claim of nuclear fusion on the front of the newspaper on Wednesday. Saturday's report was much longer. □□Analysts remain very skeptical, if not entirely dismissing, about North Korea's renewed claim, whose first implication is that its nuclear technology now has reached a level that can create hydrogen bombs. □□Fusion is the process used in hydrogen bombs to generate a thermonuclear explosion, which is far more powerful than fission in atomic device.□□But experts

don't believe North Korea has hydrogen bombs. "Fission is yes, but not fusion," Joseph Bermudez, an internationally recognized military analyst for Jane's Intelligence Review and author of "The Armed Forces of North Korea," told The Korea Times. If proven true, North Korea will be the first country in the world to carry out nuclear fusion. Some analysts view that the North's claim is to lay a foothold for its self-promoting image as a nuclear state, by hyping the latest breakthrough in the nuclear technology front. The local Dong A Ilbo newspaper warned that South Korea shouldn't be too dismissive about the North's claim. "We shouldn't forget that North Korea's declarations often later became reality," it said in an editorial.

sunny.lee@koreatimes.co.kr

## 5. North Korean claims to have conducted nuclear fusion reaction

http://www.radioaustralia.net.au/connectasia/stories/201005/s2898411.htm

Updated May 13, 2010 12:26:11

North Korea's Government is claiming it has successfully carried out a nuclear fusion reaction. Nuclear fusion is considered the holy grail of energy, producing safe and almost limitless power from hydrogen atoms with zero emissions and almost zero waste. The claim seems unlikely. If true, it means North Korea has achieved with Soviet-era technology what a multi-billion dollar, multi-national experiment currently underway in the south of France has so far failed to do. The International Thermo-nuclear Experimental Reactor, or ITER, expects to start its fusion reaction in 2019.□□*Presenter: Paul Allen*□*Speaker: Neil Calder, Communications Director ITER*

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CALDER: ITER is a huge international collaboration between China, Europe, Japan, Korea, Russia, India and the United States to prove once and for all that it is technologically feasible to create power from fusion. We are building an enormous piece of equipment down here in the south of France, which we'll be doing first experiments in about 2019 to show that fusion is basically unlimited clean energy source for the future. ALLEN: Well North Korea's government has today claimed that they have in fact beaten you to the punch. Do you find that to be a credible claim that North Korea's developed fusion electricity? CALDER: Well let's say that would be a surprise that as you know the scientific world, in which is the world we operate in, is very much controlled by peer-reviewed papers, by research, and it's not a national thing, it's a sort of global procedure that everybody knows what everyone else is doing. And there's no doubt at all that if there was activity in North Korea on fusion and breakthroughs in fusion that the community would know about it before anybody else. I've had no signals as yet to show that there's been any major breakthroughs in North Korea. ALLEN: Well of course fusion nuclear power is often considered the holy grail of energy generation, it's like bringing the power of the sun to earth. Can you talk us through some of the technical difficulties in making that reaction happen?□□CALDER: So as you mentioned fusion is seen as the holy grail of energy. It has remarkable advantages that is uses fuel which is basically hydrogen, which we can have a supply not for just like a hundred years, which was petrol, but for hundreds of thousands of years. That it produces absolutely no CO2 at all, so it has no effect on climate change. The other advantage is there's no risk of proliferation that traditional nuclear plants can be used as we see with the problem with Iran for nuclear weaponry. Fusion doesn't have that risk, and so these plants can be put anywhere around the world. And I think also and a very major advantage is that produces no nuclear waste. So the actual physics of it we know very well, we know how the sun works and as you say it's really a question of getting this to work here on earth. The difficulties for us are the basic process is we get two forms of hydrogen, squeeze them together at extremely high temperatures and then they fuse. When they fuse they release a lot of energy. And if you get a lot of atoms doing this at the same time they create what we call a plasma. This plasma is a badly behaved creature, it doesn't like to be calm and quiet and reflective. It tends to run around all over the place. And so our major challenge is in fact to control this plasma and make it stable because once it runs around and touches something it turns itself off. So controlling the plasma is one of the major challenges that we're going to look at here in ITER.□□ALLEN: Now as you mentioned before there are seven countries working on this, spending hundreds of millions of dollars over a period of decades with cutting edge technology. What sort of technology do North Korean nuclear

scientists work with?□□CALDER: Well I'm afraid you have me there because the first thing I heard about North Korea having a fusion program was when you contacted me about this.

## 6. Laser celebrates 50th birthday

16-05-2010

http://www.rthk.org.hk/rthk/news/englishnews/20100516/news_20100516_56_668559.htm

One of the world's most revolutionary modern inventions, the laser, is 50 years old today.

Lasers -- which generate intense and powerful beams of light -- are found in everything from DVD players, to complicated medical devices, to supermarket scanners, to the fibre optic cables that hold the internet together.

An American scientist, Theodore Maiman, demonstrated the first working laser in 1960 -- a machine with a tiny ruby rod at its centre.

Experts say the laser has a bright future too, with plans to use it to manipulate molecules, or even generate nuclear fusion.

## 7. More Top Stories »Science and Education

World's largest laser takes first steps towards nuclear fusion reaction

By Tannith Cattermole

*23:00 May 9, 2010*

*http://www.gizmag.com/creating-a-star-with-the-worlds-largest-laser/14983/*

The quest to create a controlled fusion reaction is underway at the Lawrence Livermore National Laboratory's National Ignition Facility (NIF), with scientists reporting early progress ahead of ignition experiments which are due to start later this year. The ultimate aim of the world's largest laser - which is the size of three football fields - is to develop carbon-free, limitless fusion energy.

Inside the NIF, a beam of concentrated light charges up by bouncing back and forth over the distance of a mile and is then split into 192 beams which are concentrated on a tiny spot of deuterium and tritium (reactive isotopes of hydrogen that can be extracted from seawater) called a hohlraum.

When the laser is fired the fusion reaction will be more than 100 million degrees Celsius (hotter than the sun), and exert more than 100 billion atmospheres of pressure. The resulting fusion reaction will also release many times more energy than the laser energy required to initiate the reaction.

One of the key challenges for researchers in initial experiments is to overcome the tendency of the laser beams to scatter and dissipate their energy when they hit the hot plasma in the fusion targets. The researchers have now demonstrated control over these so-called laser-plasma interactions (LPI) to achieve highly symmetrical compression, an important step towards fusion ignition and energy gain.

"Laser-plasma interactions are an instability, and in many cases they can surprise you," said ICF Program Director Brian MacGowan. "However, we showed in the experiments that we could use laser-plasma interactions to transfer energy and actually control symmetry in the hohlraum. Overall, we didn't find any pathological problem with laser-plasma interactions that would prevent us generating a hohlraum suitable for ignition."

When NIF scientists extrapolate the results of the initial experiments to higher-energy shots on full-sized hohlraums, "we feel we will be able to create the necessary hohlraum conditions to drive an implosion to ignition," said Jeff Atherton, director of NIF experiments.

During these early experiments, the NIF lasers fired more than one megajoule of ultraviolet energy into a hohlraum – more than 30 times the energy previously delivered to a target by any laser system.

"This accomplishment is a major milestone that demonstrates both the power and the reliability of NIF's integrated laser system, the precision targets and the integration of the scientific

diagnostics needed to begin ignition experiments," said NIF Director Ed Moses. "NIF has shown that it can consistently deliver the energy required to conduct ignition experiments later this year."

Later this year the researchers will move to ignition-like fuel capsules that require the fuel to be in a frozen hydrogen layer (at 425 degrees Fahrenheit below zero) inside the fuel capsule.

In addition to the quest for nuclear fusion, the NIF is used to ensure the reliability and safety of the U.S. nuclear weapons stockpile without live testing and will also be used to conduct astrophysics and basic science research.

The initial experiments are described in an article on *Science Express*.

Via NIF.

## 8. PPPL makes strides in the uncharted science of fusion energy

May 14th, 2010 by Patricia Wieser

http://www.physorg.com/wire-news/35294290/pppl-makes-strides-in-the-uncharted-science-of-fusion-energy.html

In this simulation of plasma turbulence inside NSTX, the colorful strings represent higher and lower electron density in turbulent plasma as it circles around the donut-shaped fusion reactor; red and orange are higher density. (Image: Kwan-Liu Ma, Chris Ho and Chad Jones, University of California-Davis)

(PhysOrg.com) -- Research being conducted along the frontier of fusion science makes the DOE Princeton Plasma Physics Laboratory (PPPL) a destination for young scholars and community members interested in the field of fusion energy.

More than 2,100 visitors from across the region attended a May open house, adding to the thousands of students and visitors who have made their way to the lab for science competitions, tours and events throughout the year.

PPPL is home to one of the nation's largest experimental fusion machines, the National Spherical Torus Experiment (NSTX). The U.S. Department of Energy funds PPPL and Princeton University manages the laboratory, sited on 88 acres of the University's Forrestal Campus in Plainsboro.

At the lab, there are educational opportunities for students and teachers from elementary school through postgraduate studies.

"We collaborate with researchers across the globe to develop fusion as a safe, clean and abundant energy source for the future," PPPL Director Stewart Prager said. "Coupled with fusion research is the study of plasmas."

**What makes fusion 'hot'**

Plasma is a hot gas of charged particles and is the fuel for fusion energy production. This hot gas accounts for most of the visible universe, making up every star in the cosmos. Fusion -- the same process that powers the Earth's sun and other stars -- occurs when two light atomic nuclei join within a plasma at very high temperatures. When they fuse, matter is converted into energy, which can then be converted to heat for the generation of electricity.

"In our experiments, we use powerful magnets to confine and shape plasma in a vacuum chamber and study its behavior," Prager explained. "For use as a practical source of fusion energy, 100-million-degree plasmas must be contained within magnetic bottles for long periods of time."

In addition to studying plasmas for fusion energy, PPPL scientists conduct research in plasma science and technology, and educate the next generation of plasma and fusion scientists.

"We study plasma-based propulsion systems for space vehicles, how plasma processes affect the accretion of matter onto black holes, and how plasmas give rise to flares on the surface of stars," Prager said. "We also develop spinoff technologies, from a small nuclear material detection system to a plasma treatment method that could lead to artificial muscles."

With nearly 500 employees and students, PPPL has extensive capabilities for the experimental

and theoretical study of fusion and nonfusion plasmas and for the design, fabrication and operation of experimental plasma facilities of all types. The University provides the institutional framework for a broad laboratory-based program of education in plasma physics and related science and technology.

**Innovation in research**

Small, innovative experiments mark several PPPL corridors, which brim with the research activities of graduate students, postdoctoral students and senior scientists.

One experiment is the Lithium Tokamak Experiment (LTX). In LTX, scientists are studying the use of liquid-lithium metal as an inner wall for fusion devices and how such a wall affects plasmas. "Lithium walls may dramatically improve plasma performance, yielding hotter and cleaner plasmas," said LTX scientist Dick Majeski.

The use of liquid lithium is also being explored on NSTX, a collaborative fusion facility supported by the U.S. Fusion Energy Sciences Program. The experiment tests the physics principles of spherically shaped plasmas, which could lead to the development of smaller, more economical fusion reactors.

A large, concrete-walled room houses NSTX, which is laden with power supplies and diagnostics -- tools to measure such things as plasma temperature and electron density. Stripped of the exterior cords, tubes and boxes, the machine resembles a multistory holiday ornament with red and blue bands. The bands are magnetic coils.

**Global reach**

PPPL scientists also are involved in the large international fusion energy research collaboration called ITER, currently under construction in the south of France. ITER aims to demonstrate the scientific and technological feasibility of fusion as an energy source. ITER has seven project partners, including China, the European Union, India, Japan, Russia, South Korea and the United States. PPPL is part of the U.S. ITER effort, which is based in Oak Ridge, Tenn.

A major part of PPPL's mission is to collaborate on the development of fusion as an energy source for the world. Scientists throughout the lab have remarked that they chose the field of fusion energy because of its potential benefits to society. Nuclear fusion, the process that powers the sun, offers an environmentally benign, intrinsically safe energy source with an abundant supply of low-cost fuel, the researchers said.

"I became interested in plasma physics and fusion because of the wonderful combination of pure physics and potentially huge application," Prager said.

Added PPPL scientist Hutch Neilson, "I decided to become a fusion scientist while in high school after reading literature from the Atomic Energy Commission. I concluded that fission seemed to be a solved problem but the future belonged to fusion, and I was attracted to its enormous challenges."

Provided by Princeton University.

## 9. Sandia National Laboratories Discovers New Pathway to Commercial Nuclear Fusion Power

*Discovering this unexpected combination of current amplification by flux compression and pulse sharpening by a naturally occurring plasma opening switch was a lucky accident*

- Edited by Linton Levy –

- http://nuclearstreet.com/blogs/nuclear_power_news/archive/2010/05/11/sandia-national-laboratories-discovers-new-pathway-to-commercial-nuclear-fusion-power-05112.aspx

Prospects for low-cost, clean energy through nuclear fusion just got brighter, thanks to a lucky discovery at Sandia National Laboratories in Albuquerque. A research team led by noted physicist Dr. Franklin Felber has taken a big step towards meeting two of the greatest technological challenges of pulsed power for fusion – current amplification and pulse compression. The team's discovery was published in Physical Review Letters.

"Discovering this unexpected combination of current amplification by flux compression and pulse

sharpening by a naturally occurring plasma opening switch was a lucky accident”

"These are surprising and unexpected results and if confirmed by future experiments could shorten the time scale and lower costs to reach pulsed power-driven nuclear fusion," said Dr. Michael Cuneo, Manager of the Radiation and Fusion Experiments Group at Sandia.

For almost 40 years, research teams around the world have been pursuing energy production by tiny nuclear explosions lasting only billionths of a second within a reactor. This approach, called inertial confinement fusion (ICF), requires that tremendous power be concentrated almost instantaneously onto hydrogen pellets.

The research team had been attempting to boost the power that could be delivered to such fusion targets by fastening small cartridges to Sandia’s enormous Saturn pulsed power generator. The cartridges worked better than hoped, doubling the generator’s current. But the researchers nearly overlooked the results, because the dramatic boost in electrical power occurred unexpectedly, only long after the Saturn generator pulse had ended.

The team theorizes that material heated off the cartridge walls blocked the current pulse, allowing electrical energy to build up inside the cartridge before releasing the energy suddenly into the target volume. Such a means of producing high-power pulses from low-power generators could result in substantial savings in future fusion power plants.

“The work reported here seems to be a significant technological advance in flux compression and opening switches that could potentially accelerate development and reduce capital costs of future fusion power plants,” says Dr. Farhat Beg, Professor of Engineering Physics at the University of California, San Diego, who has been collaborating with Sandia on pulsed power experiments.

In the mid-1980’s, Dr. Felber led a research effort sponsored by the U. S. Department of Energy and including scientists at Sandia and in the former Soviet Union. The team showed that hot ionized gas, called plasma, could ‘pinch’ a magnetic field to what was then the highest value ever produced inside a laboratory, about a hundred million times greater than the Earth’s magnetic field. Since then, research teams around the world have been trying to use this method of plasma ‘magnetic flux compression’ to amplify the high electrical currents needed for fusion.

“The results of these new experiments on the Saturn generator show great promise for the potential of magnetic flux compression to achieve the high electrical powers and short pulses needed for fusion drivers,” says Dr. Alexander Velikovich, Research Physicist at the U.S. Naval Research Laboratory in Washington, D.C., and one of the former Soviet scientists who was a pioneer with Dr. Felber in magnetic flux compression nearly 30 years ago.

For the last 30 years, research teams around the world have also been trying to develop high-power plasma opening switches that could store up electrical energy in a magnetic field and then release the energy suddenly onto a target. The cartridges developed by the research team to amplify currents surprisingly also acted as very effective plasma opening switches, storing up electrical energy for a time much longer than the Saturn generator pulse, and then releasing the energy into the target volume in a time shorter than the Saturn generator pulse.

“Discovering this unexpected combination of current amplification by flux compression and pulse sharpening by a naturally occurring plasma opening switch was a lucky accident,” said Dr. Felber. “I hope these advances are put to use quickly to help solve some of the challenges we face meeting this nation’s power needs in a sustainable manner.”

Starmark, Inc. provides government and corporate clients with advanced research and development services in defense sciences, pulsed power, and homeland security. Since 1987, the company has researched and produced groundbreaking advances for organizations including the U.S. Air Force, the U.S. Marine Corps, the Defense Threat Reduction Agency, the Missile Defense Agency, the National Institutes of Health, and other defense contractors. Starmark employs the work of national laboratories, universities, and other contractors as needed to support its mission of providing the highest quality and most innovative research and development.

During his 35 year career, Dr. Felber has led physics research and development programs for the Army, Navy, Air Force, and Marine Corps, the Defense Advanced Research Projects Agency, the

Defense Threat Reduction Agency, the Department of Energy and Department of Transportation, the National Institute of Justice, National Institutes of Health, and national laboratories. Dr. Felber is currently serving as vice president of Starmark, which he co-founded in 1987.

Sandia National Laboratories is a multiprogram laboratory operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin, for the U.S. Department of Energy's National Nuclear Security Administration. With main facilities in Albuquerque, N.M., and Livermore, Calif., Sandia has major R&D responsibilities in national security, energy and environmental technologies, and economic competitiveness.

Published May 11 2010, 08:50 AM by steveheiser

## 10. Italy and Russia fund fusion reactor to rival ITER - April 28, 2010

*Posted for Emiliano Feresin*

*http://blogs.nature.com/news/thegreatbeyond/2010/04/italy_and_russia_fund_fusion_r.html*

Italy and Russia plan to build up a new nuclear fusion experiment called IGNITOR, according to an intra-governmental memorandum signed on Monday in Milan, Italy. Italian plasma physicist Bruno Coppi of the Massachusetts Institute of Technology in Cambridge, together with the Italian National Agency for New Technologies, Energy and the Environment (ENEA) will collaborate with Evgeny Velikhov, president of the Curchatov Atomic Energy Institute of Moscow to finalize plans for the machine, which will be built at the Triniti site at Troitsk near Moscow.

Nuclear fusion involves squeezing together two nuclei of low mass, usually deuterium and tritium, to release energy. Current fusion experiments, like the giant international project ITER, involve the use of a tokamak, a torus-shaped reactor that magnetically confines fusion reactants in a super-heated plasma.

IGNITOR's design differs from ITER's in having a smaller tokamak weighing around 700 tonnes with a radius of 1.3 meters versus ITER's 19,000 tonnes weight and 6.2 meter radius. Unlike ITER, IGNITOR aims to demonstrate the feasibility of plasma ignition, a self-sustaining plasma state where there is enough fusion power to maintain the reaction without external heating. ITER, on the other hand, will aim to demonstrate that it can generate more power than needs to be put in to spark fusion.

Coppi conceived the idea of the IGNITOR reactor back in the 1970s, while working on high density plasma experiments created with high-magnetic fields in machines such as MIT's ALCATOR . Since then he and a small group of collaborators in the United States and Italy have developed the project on paper and built the first prototype parts, supported by the Italian government. Coppi's long battle to bring the project into being collided with plans to fund ITER. But he believes that his experiment is the only one capable of reaching ignition by the magnetic field confinement approach.

The IGNITOR programme has till now cost Italy around €20 million. According to a 2003 ENEA estimate, additional € 226 million will be needed to build IGNITOR.

## 11. Published online 6 May 2010 | Nature | doi:10.1038/news.2010.227

New director floated for international fusion reactor

Second management change in recent months for ITER.

Geoff Brumfiel

http://www.nature.com/news/2010/100506/full/news.2010.227.html

Osamu Motojima is tipped to be the next head of the ITER fusion project.

*National Institute for Fusion Science*

The multibillion-dollar fusion experiment ITER may be getting a new director-general. Osamu Motojima, a distinguished Japanese physicist, is being floated as the project's new chief, *Nature* has learned. ITER, based in the south of France, has suffered from repeated delays and cost overruns.

Motojima would replace Kaname Ikeda, a former Japanese diplomat and nuclear engineer who

has led the programme since its inception in 2007. Ikeda was originally appointed for a five-year term, and his departure would be the second high-level management change for the fusion reactor in recent months. In February, Europe's project head, Didier Gambier, was replaced by British physicist Frank Briscoe (see 'Delays prompt reshuffle at ITER fusion project').

Neil Calder, ITER's spokesperson, confirmed that the organization would be considering management changes at the next council meeting in June. "ITER is evolving very quickly and is now moving into a construction phase," he says. "There is a logical need to adapt the management structure to this need." However, Calder would not confirm whether Motojima is a candidate for the directorship.

ITER is a massive device that researchers hope will prove the viability of nuclear fusion as a power source. The experiment will heat and squeeze hydrogen isotopes inside a doughnut-shaped reactor vessel until they fuse together to form helium. The energy released by the machine should be roughly ten times the power it consumes.

ITER's seven member states — Europe (encompassing the European Union and Switzerland), Japan, the United States, South Korea, China, Russia and India — originally hoped to build the project for €5 billion (US$6.3 billion) and to have it completed in 2016 (see 'Fusion deal signed'). But, after an extensive design review, that cost is expected to double, and ITER's first experiments are now expected no earlier than late 2019.

The European Union, which has struggled to come up with additional funds for the project, announced on 5 May that it faces a €1.4-billion funding gap for its portion of the construction between 2012 and 2013. Among the options being considered to cover the shortfall are greater contributions from European Union member states or a redistribution of existing funds within the EU budget.

Last summer, ITER's council appointed Won Namkung, an accelerator physicist at the Pohang Accelerator Laboratory in South Korea, to lead a management review. The group's report, which has not been made public, was discussed at ITER's council meeting last November and is believed to have called for changes to management, according to sources.

**Job done**

The project's possible new leader, Motojima, is a 61-year-old physicist with a long career in fusion research. From 1999 to 2002, he oversaw construction of the Large Helical Device (LHD) at the National Institute for Fusion Science in Toki City, Japan. The LHD is a type of fusion machine known as a stellarator, which uses a complex, twisted loop of magnets to hold a hot gas. Although stellarators can theoretically confine their fuel better than the simple doughnut-shaped ITER device, they are much more complex to engineer. A stellarator project in Germany has been beset by budget overruns and delays, and an experiment in the United States was cancelled in 2008 owing to its rising costs.

Although the Japanese budgeting process makes it difficult to tell whether the LHD ran into similar problems, "they got the job done on schedule", says Hutch Nielson, a physicist at Princeton Plasma Physics Laboratory in New Jersey who directed the US stellarator project. "I think Motojima's record there was a complete success."

Nielson adds that Motojima is well-known and respected within the community as a frank but friendly scientist with a clear understanding of project management. "He's a very charming individual; very straightforward, excellent people skills," he says.

Motojima's nomination is expected to be approved soon and will be formally discussed at the June council meeting. Once in place, some observers believe he might make further changes at the top. "I wouldn't be surprised if there's a huge shake-up in ITER management under him," says one fusion scientist familiar with the project, who asked not to be named citing the ongoing discussions of Motojima's candidacy.

## 12. Nuclear power a good solution for our nation

The Bakersfield Californian | Tuesday, May 04 2010 09:47 AM

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http://www.bakersfield.com/opinion/community/x173372743/Nuclear-power-a-good-solution-for-our-nation

People were shocked during the summer of 2008 over the nation's high oil and gasoline prices. But with attentive and bold leadership (are you listening, Congress?) we would have been prepared for it.

Electricity requirements will increase in the future. To meet that need, we must start building new nuclear power stations.

We presently have 104 nuclear power stations that provide 20 percent of our requirements. France has 56 power plants that provide 76 percent of its requirements. Japan has 55 power plants that provide 30 percent of its energy requirements.

Electricity produced by nuclear power stations is cheaper than an equivalent amount produced by oil. Since we last built a nuclear power plant, new technology has increased the efficiency of our present plants. They are now producing more electricity than when new.

More than 400 nuclear power plants worldwide have been operated safely since they were built. Even the Three-Mile Island accident was contained, with no radiation leaked into the atmosphere.

Our nuclear-powered aircraft carriers and submarines are marvels of technology, safety and efficiency. The nuclear fuel they use saves a lot of oil, and it's clean. They can stay at sea for long periods without refueling and are not hampered by oil shortages.

Wind and solar can provide only a small percentage of what we need. Nuclear power is here now and could meet all our power requirements. This source also can produce hydrogen fuel cheaply.

Our scientists are working hard to produce sustained nuclear fusion. Nuclear fusion is a safer, more efficient way to generate nuclear energy. Fusion plants would produce much less radioactive waste, especially if powered by helium-3.

Helium-3 is extremely rare on earth, but abundant on the moon. Experts estimate there are millions of tons in lunar soil. A single space shuttle load of helium-3 would provide enough fuel to power the entire United States for a year.

Nuclear fusion is years away, but our engineers and scientists could accelerate the program, especially if government agencies were capable of rapid review and approval of projects.

An example of slow approval is the $2 billion Hydrogen Energy California project in Tupman, which has been in the permitting process for literally years. The joint owners, Rio Tinto, one of the world's leading mining and exploration companies, and BP, a giant in petroleum exploration, production, refining and marketing, had hoped for approval within 18 months. On top of the slow approval, we had activist judges who legislate from the bench, delaying or causing the cancellation of many projects, all at the whim of some special interest group.

For now, we can use clean coal technology to generate electrical power. We are the Saudi Arabia of coal, and clean coal is ready to go now. We can also recover oil from shale, and from coal-to-oil conversion. We should continue the development of biofuels, using materials other than corn and soybeans. This would keep our food supply available and affordable.

We must fix our surface transportation system. We need to build high-speed trains and improve bus and light-rail systems.

All of the above can be done without any harm to the environment.

Jim Reed of Ridgecrest is retired from a career at the Naval Weapons Center at China Lake.

## 13. Germany's green credentials illusory

Charles c. Johnson From: The Australian April 27, 2010 7:41PM 1 comment

http://www.theaustralian.com.au/news/opinion/germanys-green-credentials-illusory/story-e6frg6zo-1225859033642

**IN Germany, Weltschmerz is the sadness one feels when comparing the way the world is to the way it ought to be. German environmentalists must be suffering a profound case of it as not-in-my-backyard protests derail industry and government-planned alternative**

**energy projects. Germany's Renewable Energy Sources Act (Erneuerbare Energien Gesetz, or EEG) was supposed to help the German Ministry for the Environment achieve its goal of renewables producing 30 per cent of the country's electricity by 2020. Instead, the EEG has met with widespread opposition.**

Crucial to the EEG is a "feed-in" scheme, hailed by greens the world over, which encourages ordinary German households to become energy producers. Under the EEG, any German has the right to feed unlimited electricity - from home-based windmills or solar panels, for example - into the country's grid. Government-run utilities then buy this energy from the households at a government-determined price. That price, including a profit for the households, is under a 20-year contract. In theory, every individual could run a power plant, and every backyard could produce clean, renewable energy.

But in reality, every individual also has a neighbour who doesn't want a power plant next door. With the help of social-networking websites, Germans, Europe's most litigious people, have been using the country's arcane ballot initiatives to delay or shut down their neighbours' planned energy investments.

Nor is the EEG Germany's only ill-advised energy regulation. Another recent law requires new German homes to meet 10 per cent of their heating needs with renewable energy. But the carbon-emission reductions that this achieves are effectively non-existent, according to the journal Energy Policy. Further, the law's incentives to use only certain kinds of renewables freezes technology in an industry that needs to be more dynamic.

The worst obstacle to Germany's grand plans is physics. A solar panel converts only 11 per cent of the solar energy that it receives into usable energy, while coal and natural gas facilities convert about 40 per cent of their fuel into electricity. Vast panel arrays are the only way to make solar economical: a single solar module on a very sunny day in the Sahara can create only enough energy to power one 75-watt light bulb - and Germany on the brightest of days receives just half the sunlight that the Sahara does.

Germany's Foreign Minister, Frank-Walter Steinmeier, had hoped that a diversification of the country's energy portfolio would make it less dependent on Russia, from which Germany buys a third of its oil and gas. Unless renewables pick up the slack, Germany will become even more dependent on Russia for its fuel. But that's partly Germany's own fault: by 2020, it will to phase out its 17 nuclear power plants, which supply about a quarter of the nation's electricity and the only form of renewable energy capable of meeting German demand.

Greens had promised that Germany would be a Mecca for energy investment, but instead it has become a Potemkin village - fooling foreign governments into believing that its economy is a model for the future. Barack Obama seems to be among those taken in. "We invented solar technology, but we've fallen behind countries like Germany and Japan in producing it," he told a joint session of congress in February. The President has indulged in his own brand of environmental fooling, trying to persuade Americans to support his wasteful cap-and-trade bill and as much as $5 billion in tax credits for weatherisation schemes like insulating homes for the winter. Obama calls this a "real stimulus". The Germans have another word for it: Volksverdummung, a deliberate deception of the public.

*Charles C. Johnson is a Los Angeles-based writer. This article first appeared on www.cityjournal.com*

## 14. Sunshine claim clouded by dispute

Cheryl Jones From: The Australian April 28, 2010 12:00AM

http://www.theaustralian.com.au/higher-education/sunshine-claim-clouded-by-dispute/story-e6frgcjx-1225859043744

**UNIVERSITY of Newcastle researchers relied on "spurious" results in claiming to debunk evidence that global warming is worsening Australia's droughts, a rival team of scientists contends in the latest battle of the climate wars.**

The rival team, led by CSIRO climatologist Wenju Cai, fired the salvo in Geophysical Research

Letters, the peer-reviewed journal of the powerful American Geophysical Union.

Dr Cai's team was commenting on a paper published in the same journal by a group from the University of Newcastle's school of engineering in late December challenging the results of some of the world's top climate scientists.

The Novocastrians' paper has been used as ammunition by greenhouse sceptics in the climate wars. The battle over the paper turns on a point of junior high school science -- the dependence of daylight hours on latitude -- which the Newcastle team failed to factor into its analysis.

The senior author of the paper, Stewart Franks, an associate professor in environmental engineering at Newcastle who has written extensively on climate change, told the HES the criticism by Dr Cai's group was off topic.

Professor Franks was part of a delegation led by Family First senator Steve Fielding, a climate change sceptic, that tackled Climate Change Minister Penny Wong and chief scientist Penny Sackett last June on the evidence that the burning of fossil fuels was causing the planet to warm.

The Franks team paper, titled On the Recent Warming in the Murray-Darling Basin: Land Surface Interactions Misunderstood, challenges studies by climatologists David Karoly of the University of Melbourne and Neville Nicholls of Monash University suggesting that human-caused climate change exacerbated the crippling 2002 El Nino drought.

Professor Karoly is a world-renowned expert on global warming who has served on the Intergovernmental Panel on Climate Change.

In a report for the WWF in 2003, the high-profile scientist and colleagues said the 2002 drought was the worst in 50 years because anomalously higher maximum temperatures had increased the rate of evaporation of the available water.

"This is the first drought in Australia where the impact of human-induced global warming can be clearly observed," the report said.

Soon after, Professor Nicholls, who spent 35 years at the Bureau of Meteorology before joining Monash, and who has played a leading role on the IPCC, zeroed in on temperature, rainfall and evaporation data from weather stations across the Murray-Darling Basin. He focused on the cool months from May until October, the growing season for many crops in the basin, which supplies 40 per cent of the nation's food.

He also suggested that high temperatures had worsened the drought by increasing evaporation and transpiration, or loss of water from plants. The dry was worse than the 1982 and 1994 droughts, which had had similar rainfall readings but lower temperatures.

Without much water to cool the atmosphere, temperatures rise during droughts. But Professor Nicholls found that temperatures in 2002 were higher than would be expected from this effect. This was due partly to the continuation of an underlying warming trend since the middle of the 20th century, said his paper, published in the journal Climatic Change.

The possibility that human-caused global warming was increasing the severity of droughts "needs to be considered", the paper said.

For its paper, Professor Franks's team drew data from 15 stations across the Murray-Darling Basin. The group claimed the data showed an increase in sunshine hours since 1952, and this natural effect, rather than global warming, explained the elevated temperatures. The paper did not spell out why the number of sunshine hours would increase, or overcast weather decrease, throughout the period. In its conclusions, the Newcastle team stressed that its results "in no way negate genuine concerns over anthropogenic climate change".

"However, the science of assessing future hydroclimatic risk is not aided by premature claims of recent severe drought being incorrectly attributed to enhanced evaporation due to increased atmospheric carbon dioxide."

In a media release last November, Professor Franks's group said its study "highlighted the importance of getting the science right". However, in a commentary accepted for publication in Geophysical Research Letters, Dr Cai's team said the sunshine hour trend reported by the Newcastle researchers was "spurious and an artefact of their analysis".

The 15 stations had records of varying length. Most stations did not show a trend in sunshine hours. Too few stations had been factored in, and the ones chosen were spread unevenly and across a region so vast that the influence of latitude on daylight hours came into play.

In winter, the days are shorter the farther south you go. The Franks team's dataset started with stations in the southern basin, including ones near Canberra and Melbourne, and ended with stations as far north as Moree, near the NSW-Queensland border. By adding data from more northern stations later in the period, the analysis gave the impression of a trend towards longer sunshine hours.

Dr Cai's team, which includes Bureau of Meteorology scientists, analysed the same dataset but used corrections for latitude. The "trend" vanished. The patchy distribution of data in space and time had skewed the Newcastle team's results, producing a "large spurious trend".

"Since the trend . . . is not real, it follows that any conclusion drawn from that trend is invalid," Dr Cai's team said.

In a reply accepted for publication in Geophysical Research Letters, Professor Franks's team said its research focus was on demonstrating that maximum temperatures were "better explained" by sunshine hours than by seasonally averaged rainfall. It acknowledged "the issues raised" by Dr Cai's group but said its "key conclusions remain robust and pertinent".

However, Dr Cai told the HES the correlation between sunshine hours and temperatures was "no news, even to high school students".