

ITER Forum Website – News Log June 2009

Fusion falters under soaring costs

By Matt McGrath Science reporter, BBC World Service
'World's biggest science experiment'

An international plan to build a nuclear fusion reactor is being threatened by rising costs, delays and technical challenges.

Emails leaked to the BBC indicate that construction costs for the experimental fusion project called Iter have more than doubled.

Some scientists also believe that the technical hurdles to fusion have become more difficult to overcome and that the development of fusion as a commercial power source is still at least 100 years away.

At a meeting in Japan on Wednesday, members of the governing Iter council reviewed the plans and may agree to scale back the project.

'Size of a battleship'

On a windy construction site in the south of France, the lofty scientific goal of developing nuclear fusion as a power source is starting to take on a more substantial form.

Covering an area of more than 400,000 square metres, workers have built a one-kilometre-long earthen platform on which the experimental reactor will sit.

"This is going to be the world's biggest science experiment," says Neil Calder, Iter's head of communications.

"This is a vast global project to show the scientific feasibility of fusion as a limitless source of energy.

"On top of this platform we are going to build 130 buildings. The main building will contain the Iter machine itself.

"It will be huge - the size of the Arc de Triomphe in Paris - and it'll weigh about the same as a battleship - 36,000 tonnes of metal and instrumentation."

Controlling fusion

Iter was formally launched in 2006 as collaboration between the European Union, the United States, Russia, Japan, China, India and South Korea. The plan was to build the world's most advanced fusion experiment within 10 years for a budget of \$6bn (£3.6bn).

But the grand scheme has been dogged by soaring costs caused by more expensive raw materials and increases in staff numbers. Emails seen by the BBC indicate that the total price of constructing the experiment is now expected to be in excess of \$16bn (£10bn).

Professor Sebastien Balibar is research director for the French national research laboratory in Paris. He says that if the rising price of Iter is met by cutting back other research programmes that would be a disaster for science.

"If Iter is built on money having to do with energy or oil, that is perfectly good, I hope it works and in one hundred years I hope we know how to control a fusion reaction. But if it is taken from the public support of research in physics or biology then I would be very upset," says Professor Balibar.

'Different road'

Costs are not the only problem; Iter is also beset by huge technical challenges.

Fusion takes place when a superheated gas called a plasma reaches a stage called ignition, where hydrogen atoms start to fuse with each other and release large amounts of energy. Iter aims to achieve this but only for a few minutes at a time.

MIT professor Bruno Coppi has been working on fusion research in Italy and the United States for many decades. He believes that Iter is the wrong experiment; it is too costly, will take too long and may not deliver fusion. He says we should be looking at other options.

"We are pressed for time, the climate situation is worse. I think we should go with a faster line of experiments. Iter should admit its limitations and it will give a limited contribution to fusion, but to get to ignition you need to follow a different road," he says.

Another huge hurdle is how to contain gases that are 10 times hotter than the Sun. The materials required

simply haven't been invented yet.

Professor Balibar explained: "The most difficult problem is the problem of materials. Some time ago I declared that fusion is like trying to put the Sun in a box - but we don't know how to make the box.

"The walls of the box, which need to be leak tight, are bombarded by these neutrons which can make stainless steel boil. Some people say it is just a question of inventing a stainless steel which is porous to let these particles through; personally I would have started by inventing this material."

Failure a possibility

In Provence, the scientists working on Iter say they have faith that the project will deliver the most effective path to fusion.

Dr Norbert Holtkamp is the man tasked with building the machine.

"Iter is a step that will demonstrate whether fusion is viable. But whether it is easy then depends on the cost of energy at that time on the cost of oil, but certainly Iter has the potential.

Dr Holtkamp recognises that Iter is a scientific experiment - and as such it has the possibility of failure.

"Any project can fail, especially if it's one of a kind or the first of its kind. It would be irresponsible for any scientist or project manager to say that in a science project it cannot fail."

Long-term plan

The rising costs of construction and technical challenges are to be reviewed at a meeting of the Iter council in Japan on Wednesday and Thursday. It is possible that by the end of this year, a new scaled-down version of Iter will be agreed.

Dr Holtkamp says the view that the project is to be scaled down is wrong.

"Fusion is not going to be the alternative in the next 20, 30 or 40 years, that is correct. But there needs to be a long term plan; 40 years is little more than a generation. We need to think about the next generation and the many after that."

Professor Balibar says that the end result of the ballooning costs and increasing technical challenges will be a further slowing of the path to fusion.

"The consequence of all these difficulties is that it's not going to be tomorrow that one succeeds with fusion. But the energy problem and the climate problem are urgent," he says.

"The global warming is now - one needs to find a solution immediately, one cannot wait 100 years. The solution to the climate and energy problem is not Iter, (it) is not fusion."

While fusion offers a long-term hope of securing energy supplies, the changing climate and the pressing need for greener energy may ensure that renewables get greater political support in the short to medium term.

Ultimately fusion may be a technological dream that is just too hard to turn into reality. And Iter, in a beautiful setting in the south of France, may become the graveyard of a good but impossible idea.

<http://news.bbc.co.uk/2/hi/science/nature/8103557.stm>

5 million to boost Australian fusion research plan

-Boyd Blackwell, Director, H-1NF NPFRRF, Australian National University

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The Australian fusion science community was well pleased with the government announcement mid-May of much-needed upgrade funding of approximately 5 million Australian dollars for the H-1 National Plasma Fusion Research Facility at the Australian National University. The funding will enable replacement of aging heating systems, allow improvements in plasma performance, and ensure continuity of plasma research activities on the H-1 helical axis stellarator ($R=1\text{m}$, $a=0.25\text{m}$, $l=1$, $m=3$) until 2015.

A significant driver for this positive outcome has been the promotional and awareness-raising activities of the Australian ITER Forum. The Forum is a collection of over 100 Australian scientists and engineers who have been lobbying government for an expansion of Australian fusion science, with a view towards an engagement with ITER. Dr Matthew Hole, who is chair of the Forum, stated that "this is a significant endorsement of Australian fusion science, but much still remains to be done to attain our long term goal."

The plasma physics community aims to build on this success by seeking additional funding from other schemes to develop and demonstrate ITER-relevant diagnostic systems. It is hoped that this new funding boost signals government willingness to embrace a larger-scale engagement with international fusion science, and in particular, the ITER project.

The H-1 is a three-field period helical axis stellarator located in the Research School of Physical Sciences and at the "Australian National University"

<http://www.iter.org/newsline/Pages/84/547.aspx>

Ice shelves stable over six years

Christian Kerr | June 17, 2009

Article from: [The Australian](#)

ANTARCTIC ice shelves are showing no sign of climate change, six years of unique research have shown.

Scientists from Western Australia's Curtin University of Technology are using acoustic sensors developed to support the Comprehensive Nuclear Test Ban Treaty to listen for the sound of icebergs breaking away from the giant ice sheets of the south pole.

"More than six years of observation has not revealed any significant climatic trends," CUT associate professor Alexander Gavrilov said yesterday.

Professor Gavrilov and PhD student Binghui Li are investigating whether it is possible to detect and monitor significant changes in the disintegration rate of the Antarctic ice shelf by monitoring the noise of ice breaking.

The pair are using two acoustic stations, one 150km off Cape Leeuwin, the southwest tip of WA, and another off the gigantic US military base on Diego Garcia in the Chagos Archipelago, in the Indian Ocean.

"They are part of a network of underwater acoustic receivers, or hydrophones," Dr Gavrilov told The Australian yesterday.

The stations have been used to locate nuclear explosions detonated by India.

More than 100 signals from Antarctica are detected weekly by the Cape Leeuwin station. They are then transmitted to Geoscience Australia in Canberra.

"Six years of results is not long in the scheme of things, so we will keep watching," Dr Gavrilov said.

The pair will present their research at a conference in Europe later this month.

<http://www.theaustralian.news.com.au/story/0,25197,25648336-11949,00.html>

Reason clouded by carbon obsession

Peter Schwerdtfeger | June 23, 2009

Article from: [The Australian](#)

ALTHOUGH there are many doubters of man-made climate change, I am not yet one of them. But I remain unconvinced that carbon dioxide is the sole bete noire. Two decades ago, I pored over the spectral properties of the infra-red radiation of this gas, which is essential to plant life, and found that it was almost completely overshadowed by the radiative properties of water vapour, which is vital to all forms of life on earth.

Repeatedly in science we are reminded that happenings in nature can rarely be ascribed to a single phenomenon. For example, sea levels on our coasts are dependent on winds and astronomical forces as well as atmospheric pressure and, on a different time scale, the temperature profile of the ocean. Now, with complete abandon, a vociferous body of claimants is insisting that CO₂ alone is the root of climatic evil.

I fear that many supporters of this view have become carried away by the euphoria of mass or dominant group psyche. Scientists are no more immune from being swayed by the pressure of collective enthusiasm than any other member of the human race. I do not believe for one moment that undisciplined burning of fossil fuels is harmless, but the most awful consequence of the burning of carboniferous fuels is not the release of CO₂ but the large-scale injection of minute particulate pollutants into the atmosphere.

Detailed studies led by internationally acclaimed cloud physicist Daniel Rosenfeld of the Hebrew University of Jerusalem have revealed that the minute water vapour droplets that form around some carbon particles are so small as to be almost incapable of being subsequently coalesced into larger precipitable drops. In short, the particulates prevent rainfall.

Rosenfeld's research group has shown that humans are changing the climate in a much more direct way than through the release of CO₂. Rather, pollution is seriously inhibiting rain over mountains in semi-arid regions, a phenomenon with dire consequences for water resources in the Middle East and many other parts of the world, including China and Australia.

Rosenfeld is no snake-oil salesman. As an American Meteorological Society medallist, he has an internationally endorsed research record in cloud physics that no living Australian can claim to emulate. It is more than 20 years since Australia was a knowledgeable force in cloud physics and cloud seeding. CSIRO's relevant division has long been disbanded and its cloud-seeding techniques based on the use of expensive silver iodide have been superseded by the Israelis using an inexpensive and far more natural product: sea salt.

Chinese and Israeli researchers have shown that the average precipitation on Mt Hua near Xi'an in central China has decreased by 20 per cent amid increasing levels of man-made air pollution during the past 50 years. The precipitation loss was doubled on days that had the poorest visibility because of pollution particles in the air. This explains the widely observed trends of decrease in mountain precipitation relative to the rainfall in nearby densely populated lowlands, which until now had not been directly ascribed to air pollution.

Some of the most chilling evidence was presented by Rosenfeld's Australian-based research associate Aron Gingis in a 2002 submission to the House of Representatives standing committee on agriculture, fisheries and forestry concerning future water supplies for Australia's rural industries and communities.

The US National Oceanic and Atmospheric Administration's satellite map of southeast Australia, enhanced by Rosenfeld, shows the frightening persistence and longevity of pollutant trails across vast areas, including the all-important Snowy Mountains catchments. It may well be concluded that the increasing emissions from the phalanx of brown coal-burning power stations at Hazelwood and other locations in Gippsland, Victoria, have substantially wrecked the natural precipitation processes over the once hydrologically rich Australian Alps.

If Rosenfeld's scientific interpretations are correct, then southern Australia would greatly benefit from the application of his discoveries. At the very least, Rosenfeld's conclusions should be accorded appropriate evaluation and testing by an unprejudiced panel of peers.

Yet his work so far has been ignored in Australia because it does not fit in with the dominant paradigm that holds CO₂ responsible for reduced rainfall in semi-arid regions.

Scientists, like all other people, need to remain open to competing views and avoid the danger of being locked into tunnel vision through group obsession, which is what global warming seems to have become.

Peter Schwerdtfeger is emeritus professor of meteorology at Flinders University in Adelaide.

<http://www.theaustralian.news.com.au/story/0,,25673679-17803,00.html>

Climate ball up in the air

Michael Asten June 24, 2009

Article from: [The Australian](#)

IT is surprising to see the slow response of Climate Change Minister Penny Wong in fielding a team to counter the arguments assembled by Family First senator Steve Fielding's team of experts and presented on this page last week. At this stage we don't know whether the questions are too hard or she has opted for the regal approach of lofty silence. As a mere scientist, I'll join my colleague Neville Nicholls, whose letter was published in The Australian on Saturday, and step in where others have declined to tread.

Let us address the three key questions in turn. Have global temperatures cooled since 1998? On a three-year moving average of low to mid troposphere satellite temperature data, the answer is no, although if averages from April 2002 to the present are used, the answer is yes, with the continuing trend being downwards. Score a behind (or, for those north of the border, a try without conversion) to team Fielding.

A more important question is whether temperature changes during periods as short as a decade are quantitatively relevant in climate change. A recent paper from the US National Climatic Data Centre in Geophysical Research Letters suggests not, as the present trend of global warming has sufficient fluctuations that on one estimate there is a 10 per cent probability of a decadal cooling event in the first half of the 21st century superimposed on the global warming trend. Any number of arguments can be made regarding the underlying assumptions and statistical methods used in such a study, but the principle of finding negative trends in a fluctuating upward trend is hard to ignore. Perhaps team Wong missed an opportunity to score a goal with this one.

Are the rate and magnitude of warming between 1979 and 1998 unusual compared with other warming events in global history? A 2006 study by the Swiss Federal Research Institute in the Journal of Climatology found that, based on a study of tree-ring records, four of the 10 hottest decades of the past 1250 years in the European Alps occurred in the 10th and 13th centuries (part of the Medieval Warm

Period). Even more intriguing is a similarity between such temperature movements in the past 50 years and one that occurred 900 years earlier. In the 20th century, two similar hot decades (the 1940s and 90s) are separated by a cooling-warming cycle, with temperatures in 1970 sinking 1.8C lower than in the hot decades. A near identical cycle occurs between the hot decades of the 1160s and the 1200s. We cannot reason from this particular example to the generality of global average temperatures; however, there are abundant peer-reviewed studies showing that the medieval warming was not only a European phenomenon, and the example given is illustrative of the concept that no, the rate and magnitude of warming from 1979 to 1998 is not an unusual phenomenon.

While temperatures fluctuated before, during and after the Medieval Warm Period, the carbon dioxide content of the atmosphere (as measured in DomeC Antarctic ice cores) remained constant in the range of 277-280 parts per million by volume (compared with 380ppmv today). Score a goal to team Fielding.

Do all computer models project a steady increase in global temperature in the period from 1990 to 2008? I am not a student of the many global-coupled climate models but the question is answered at least in part by the first of the three questions; a decadal fluctuation is unlikely to be statistically significant. As Nicholls pointed out in his letter, most computer models predict a warming of 0.3C during the two decades, similar to that measured by satellites. Even though this ball was kicked by a bystander, we can be charitable and award team Wong a goal in absentia.

A crucial issue remains for our two teams to debate when they meet after the next siren. Even though a computer model incorporating CO2 variations and feedback mechanisms gives results consistent with temperature change of the past 50 years, that does not prove the link between CO2 and temperature change, especially if the link fails to be consistent with similar temperature changes in historic times. Are there alternative physical or chemical phenomena not yet incorporated into our climate models? Peter Schwerdtfeger offered one important phenomenon, the role of micro-particulate matter (air pollution), in these pages yesterday.

The highly complex interaction of solar activity, solar magnetic field, solar wind, cosmic rays and cloud formation is another. For examples, see studies by scientists from the Royal Netherlands Institute for Sea Research and the Swiss Institute of Applied Physics and Climate Change Research, published this year in the Journal of Atmospheric and Solar-Terrestrial Physics. The former study, which uses sunspot records instead of tree rings as basic data, observes: "Interestingly, the amplitude of the present period of global warming does not significantly differ from the other episodes of relative warming that occurred in earlier centuries." It appears that a Dutch referee is affirming team Fielding's goal.

In the light of this I offer a hint to team Wong (if it plans to front up at the stadium): prepare to be questioned on cosmic rays; I suspect on that count team Fielding is not yet done.

Michael Asten is a professorial fellow at Monash University's school of geosciences.

<http://www.theaustralian.news.com.au/story/0,,25680666-17803,00.html>

Wong's silent treatment

Bob Carter, David Evans, Stewart Franks and Bill Kininmonth | June 19, 2009

Article from: [The Australian](#)

STEVE Fielding recently attended a climate change conference in Washington, DC. Listening to the papers presented, the Family First senator became puzzled that the scientific analyses they provided directly contradicted the reasons the Australian government had been giving as the justification for its emissions trading legislation.

Fielding heard leading atmospheric physicist Dick Lindzen, of the Massachusetts Institute of Technology, describe evidence that the warming effect of carbon dioxide was much overestimated by computer climate models and remark: "What we see, then, is that the very foundation of the issue of global warming is wrong.

"In a normal field, these results would pretty much wrap things up, but global warming-climate change has developed so much momentum that it has a life of its own quite removed from science."

Another scientist, astrophysicist Willie Soon, from the Harvard-Smithsonian Centre for Astrophysics, commented: "A magical CO2 knob for controlling weather and climate simply does not exist." Think about that for a moment with respect to our government's climate policy.

On his return to Canberra Fielding asked Climate Change Minister Penny Wong to answer three simple questions about the relationship between human carbon dioxide emissions and alleged dangerous global warming.

Fielding was seeking evidence, as opposed to unvalidated computer model projections, that human

carbon dioxide emissions are driving dangerous global warming, to help him, and the public, assess whether cutting emissions would be a cost-effective environmental measure.

After all, the cost to Australian taxpayers of the planned emissions trading bill is about \$4000 a family a year for a carbon dioxide tax of \$30 a tonne. The estimated benefit of such a large tax increase is that it may perhaps prevent an unmeasurable one-ten-thousandth of a degree of global warming from occurring. Next year? No, by 2100.

The questions posed were:

* Is it the case that CO₂ increased by 5percent since 1998 while global temperature cooled during the same period? If so, why did the temperature not increase, and how can human emissions be to blame for dangerous levels of warming?

* Is it the case that the rate and magnitude of warming between 1979 and 1998 (the late 20th-century phase of global warming) were not unusual as compared with warmings that have occurred earlier in the Earth's history? If the warming was not unusual, why is it perceived to have been caused by human CO₂ emissions and, in any event, why is warming a problem if the Earth has experienced similar warmings in the past?

* Is it the case that all computer models projected a steady increase in temperature for the period 1990 to 2008, whereas in fact there were only eight years of warming followed by 10years of stasis and cooling? If so, why is it assumed that long-term climate projections by the same models are suitable as a basis for public policy-making?

As independent scientists attending the meeting, we found the minister's advisers unable, indeed in some part unwilling, to answer the questions.

We were told that the first question needed rephrasing because it did not take account of the global thermal balance and the fact much of the heat that drives the climate system is lodged in the ocean.

Que? What is it about "carbon dioxide has increased and temperature has decreased" that the minister's science advisers don't understand?

The second question was dismissed with the comment that climatic events that occurred in the distant geological past were not relevant to policy concerned with contemporary climate change. Try telling that to geologist Ian Plimer.

And regarding the accuracy of the Intergovernmental Panel on Climate Change's computer models, we were assured that better models were in the pipeline. So the minister's advisers apparently concede that the models that have guided preparation of the emissions trading scheme legislation are inadequate.

These are not adequate responses.

It was reported in the Business Age last July that the ministry of climate change's green paper on climate change, which was issued as a prelude to carbon dioxide taxation legislation, contained scientific errors and over-simplifications. Almost 12 months on, our experience confirms that the scientific advice Wong is receiving is inadequate to justify the exorbitantly costly upheaval of our society's energy usage that will be driven by the government's ETS legislation.

All Australians owe Fielding a vote of thanks for having had the political courage to ask in parliament where the climate empress's clothes have gone. Together with the senator, and the public, we await with interest any further answers to his questions that Wong's advisers may yet provide.

Geologist Bob Carter, carbon modeller David Evans, hydrologist-climatologist Stewart Franks and meteorologist-climatologist Bill Kininmonth attended the meeting between Steve Fielding, Penny Wong, Chief Scientist Penny Sackett and ANU Climate Change Institute executive director Will Steffen. Sackett has so far declined to answer Fielding's questions on this page.

Climate change is happening 'here, now': US report

June 17, 2009

Article from: Agence France-Presse

THE harmful effects of global warming are being felt "here and now and in your backyard", a groundbreaking US government report on climate change warned today.

"Climate change is happening now, it is not something that will happen decades or centuries in the future," Jerry Melillo of the Marine Biological Laboratory in Massachusetts, one of the lead authors of the report, told AFP.

Climate change, which the report blames largely on human-induced emissions of heat-trapping gases, "is under way in the United States and projected to grow," said the report by the US Global Change Research

Program, a grouping of a dozen government agencies and the White House.

The report is the first on climate change since President Barack Obama took office and outlines in plain, non-scientific terms how global warming has resulted in an increase of extreme weather such as the powerful heatwave that swept Europe in 2003, claiming tens of thousands of lives.

Hurricanes have become fiercer as they gather greater strength over oceans warmed by climate change.

Global warming impacts everything from water supplies to energy, farming to health. And those impacts are expected to increase, according to the report titled Global Change Impacts in the United States.

Areas of the country that already had high levels of rain or snowfall have seen increases in precipitation because of climate change, says the report, which focuses on the US but also tackles global climate change issues.

"We focused on regions of the US because another big message we wanted to get across is that not only is climate change happening now, but it's happening in your backyard," said Melillo.

"You care a great deal more about a tornado in your own backyard than one half a world away," said David Doniger, senior policy director at the National Resources Defense Council (NRDC).

Arid areas, such as the largely desert US Southwest, are experiencing more droughts.

On the US Gulf Coast, sea level rise is particularly pressing; in the Northwest, how long snowpack sits on the mountains might be an issue, and farmers in the Midwest are concerned because winters have become milder, allowing more pests to survive the season.

But climate change also operates in a global nexus and the US cannot be viewed in isolation, the 196-page report says.

Climate change-related food production problems in one part of the world can affect food prices and production decisions in the US, he added.

"There is a whole host of connections when you discuss climate change; the US cannot be viewed as an island," Melillo said.

The chief aim of the report is to help US policymakers and the general public make decisions on how to act to halt climate change, Melillo said.

The report's release comes just six months before countries from around the world meet in the Danish capital Copenhagen for a UN conference that aims to produce an ambitious, new climate pact aimed at rolling back global warming.

Experts have been thrashing out a draft of a negotiating text for the new pact meant to take effect from the end of 2012, spelling out curbs on emissions by 2020 that will be deepened by 2050.

Reports issued by the previous administration of president George W. Bush - who famously rejected the Kyoto Protocol, the previous UN framework on climate change - were highly technical and did not cover as many issues as the sweeping first report issued by the Obama White House, said Melillo.

The report stresses the need for immediate action against global warming, saying: "Future climate change and its impacts depend on choices made today."

"We have the power to determine how bad this could be and to avoid the worst impacts of global warming," said Doniger.

"It's like Charles Dickens' 'A Christmas Carol,' where the ghosts come and show Scrooge the way the future could unfold into either a happy future or a disastrous future.

"This shows us that the future is in our hands, just as it was in Scrooge's hands," said Doniger.

<http://www.theaustralian.news.com.au/story/0,25197,25649436-11949,00.html>

<http://www.theaustralian.news.com.au/story/0,,25656849-17803,00.html>