

Source: "Is Nuclear Power Part of Australia's Global Warming Solutions?", a speech by Prof Ian Lowe, Australian Conservation Foundation President to the Australian Press Club, Canberra 19/10/05 (As published by the ACF)

"The real cost of nuclear electricity is certainly more than for wind power, energy from bio-wastes and some forms of solar energy."

As the old saying goes "there is no electricity as expensive as no electricity". The developed economies require the majority of their electricity to come from reliable base-load electricity supplies and about the only proven options are coal-fired, nuclear and CCGT generators. Of these the cheapest is often nuclear (see Standard Anti-Nuke Assertion No. 6). Wind power, and solar energy only work when the wind blows or the sun shines, and since there exists no means of efficiently storing electrical energy, these methods cannot provide base-load power. Bio-wastes, on the other hand can be utilised around the clock but there just isn't enough of this fuel to make much of a difference.

"Even if there were political agreement today to build nuclear power stations, it would be at least 15 years before the first one could deliver electricity."

It should take less depending on the conditions at the time. See Standard Anti-Nuke Assertion No. 7.

"...building nuclear power stations would actually increase greenhouse pollution in the short term, and in the long term they put much more carbon dioxide into the air than renewable energy technologies like solar and wind power."

The energy payback time of a nuclear plant is about 4-5 months so they also break even on CO2 emissions with coal-fired generation at that time. Lifetime CO2 emission studies show that nuclear is about the same as wind but much better than PV solar. See Standard Anti-Nuke Assertion No. 5.

"The best estimate is that the known high grade ores could supply the present demand for 40 or 50 years."

Uranium is ubiquitous in the earth's surface. As a matter of fact in the highest ore grade category (i.e., up to \$US40/kgU) the reserves will last about 28 years at current consumption rates. Including the reserves up to \$US130/kgU increases the total to 50 years. Beyond this are as yet undiscovered reserves (most of Australia has been off limits for prospecting for decades), the uranium in the ocean and the use of fast breeder reactors. The latter could extend the 50 year lifetime of the current reserves to 3000 years. See Standard Anti-Nuke Assertion No. 3.

"...nuclear power is too dangerous."

It is much less dangerous than most other major forms of electricity generation (e.g. coal mining deaths, dam failures, gas explosions). Chernobyl was a once-off. Modern commercial nuclear power plants have

killed none and newer designs will be even safer. See Standard Anti-Nuke Assertions No. 9&10.

"Increased use of nuclear power would not lessen greenhouse gases appreciably because electricity generation produces less than half the total"

This assertion is contrary to the general approach by conservationists who say every bit helps. Moreover by this argument wind, wave, hot rocks and most of solar could do even less. But continuing in this vein, getting rid of all net CO2 emissions from this country really wouldn't make much difference either. See Anti-Nuke Assertion No. 15.

It [nuclear power] is too expensive, too risky, too slow and makes too little difference.

This is just four of the quotes discussed above combined into a slogan (it seems the limited uranium assertion got lost somewhere).

Source: Ian Lowe quote in ACF FOE(Aus) pamphlet "EmPowering Change", 2007

"Be in no doubt: renewable energy works. Renewables now amount for a quarter of the installed capacity in California, half of Norway's and three quarters of Iceland's. It is time that we joined the clean energy revolution sweeping the progressive parts of the world."

This statement is similar to other versions over the years - such as:

- "Be in no doubt: renewable energy works. Renewables now account for a quarter of the installed capacity of California, a third of Sweden's energy, half of Norway's and three-quarters of Iceland's. It is time we joined the clean energy revolution sweeping the progressive parts of the world."

Ian Lowe, National Press Club 19/10/05

- "I'm going to argue today that we in Queensland should be setting strong targets for renewables, like 20 per cent of our electricity by 2020, and half of it by 2050," Prof Lowe said.

"..... if you look around the world Sweden now gets a third of its energy from renewables, Norway half, Iceland two-thirds it's simply a matter of political will."

Ian Lowe, ABC Online 25/7/06

- "I believe we should also have serious targets for the share of our electricity that comes from renewables. Sweden now gets a third of its power from these clean energy forms, Norway half, Iceland three-quarters, New Zealand over 80%."

Ian Lowe, Rick Farley Lecture Series 11/2/07

In general these statements are somewhat confusing because they do not make clear whether, as in the pamphlet quote, they are talking about electrical capacity (i.e. power, MWe) or electrical energy (i.e. kWh) or other forms of energy (e.g. gas heating).

Another item of interest is the dropping of Sweden from the list. This is probably because public sentiment in Sweden has begun to swing against the previously mandated and impractical nuclear phase out. This change in policy has been adopted recently by the Christian Democrats and the Center Parties and indicates the beginning of a national political shift back to nuclear.

Anyway, assuming that the pamphlet quote is strictly talking about installed electrical capacity it is worthwhile examining the following table of domestic capacity and generation as obtained from 2003 data of the USDOE EIA and the 2004 data of the OECD/IEA:

	CALIFORNIA		NORWAY		ICELAND	
	%MWe	%GWh	%MWe	%GWh	%MWe	%GWh
Coal	0.7	1.2		<0.1		
NatGas	1.3	1.2		0.3		
Oil/Dual	61.7	47.2		<0.1		
Nuclear	8.0	18.4		0		
Renewables	27.9	31.1	99.3	99.4	100	100
Biomass	1.8	3.2		0.3		
Geothermal	3.5	6.7			23.3	16.0
Hydro	18.4	18.8	98.9	98.8	76.7	83.8
Solar	0.7	0.3			0	0
Wind	3.5	2.0	0.4	0.3	0	0
Other	0.4	0.9				

Lowe seems to be correct on the renewables share of California's generating capacity but more than half of this is provided by hydro which most radical environmentalists don't like. In addition other data from the California Energy Commission shows that about 22% of the electricity consumed in California is imported from out of state. It should also be noted that the 3.5% of generating capacity provided by wind (i.e.1,900 MWe) provides only 2.0% of the electricity generated, Whereas nuclear with 8.0% of capacity provides 18.4 % of electricity. This is equivalent to saying that of these two mature generating methods, wind runs 23% of the time at full capacity and nuclear 94%.

Essentially all of Norway's electricity comes from hydro. However, this has been fully developed and Norway has a policy to install enough wind farms to generate 3,000 GWh/y by 2010. This program is lagging, however, and by 2005 the total installed capacity was only 270 MWe whereas to reach the 2010 target about 1,700 MWe will be needed (at a 20% capacity factor). The IEA report of 2005 noted, "In Norway, the interest in wind power as a commercial source of electricity is high. By the end of 2005 there were project plans for over 8,000 MWe in Norway. However, financing and public acceptance remain substantial hurdles to overcome for the installation of wind turbines." As an illustration of the public acceptance problems, the BBC on 23/6/06 reported that the 68 turbine wind farm on the Smola Islands had essentially wiped out the white-tailed eagle colony through bird strikes. Aesthetics are also a concern, and both tend to make it difficult for the true environmentalists to promote wind generation in such locations.

As for Iceland, essentially all of the generating capacity and generation comes from renewables (Lowe doesn't seem to count geothermal as renewable), but again most of this is attributed to

that nasty stuff hydro power. Another interesting thing about Iceland is that on an per capita basis Iceland is the world's largest producer and exporter of refined aluminium. In 2003 this was at the rate of 260,000 tonnes per year (consuming about half of the electricity generated) and this is growing rapidly much to the displeasure of at least some of Europe's environmentalists. (In comparison about 15% of Australia's electricity is used to produce aluminium mostly for export.)

This analysis shows that Lowe's information was essentially correct for California, but completely wrong for Norway and Iceland. Norway and Iceland get their electricity almost totally from renewable energy, moreover, most of this electricity comes from hydro - a method of generation not always available nor even approved by the radical environmentalists. In conclusion, this examination does little to support Lowe's contention that there is a "clean energy revolution sweeping the progressive parts of the world".

Source: Ian Lowe quote in Sydney Morning Herald 7/9/07 article "Heeding the Warning Signs"

"Despite the recent pro-nuclear hype, most of the world has rejected nuclear energy in favour of alternatives that are cheaper, cleaner and more flexible. Most European countries have the same amount of nuclear power now as they had in the Kyoto base year, 1990 (the year against which future emissions are measured). Some have less. Finland is the only European country I am aware of that has commissioned a nuclear reactor this century."

US Energy Information Administration data indicates that annual increases in world nuclear electricity generating capacity reduced from about 6% to about 1% per year in the years following the Chernobyl accident (1986).[1]

In 2005 net world electricity production from various sources was: thermal (coal, gas, oil) 66%, nuclear 15%, hydro 17% and other (geothermal, wind, solar, etc.) 2%.

There are now 439 power reactors in the world totalling 370GWe of capacity. Current plans for new nuclear power plants over the next 7 years are given in the table and total 51.7 GWe for an average annual increase of about 2%.[2]

Year	New Reactors	New GWe	Countries (and numbers of reactors)
2007	4	2.1	India(2),Romania(1), USA(1)
2008	4	3.1	India(3), Iran(1)
2009	4	3.9	Canada(1), Russia(1), Japan(1), China(1)
2010	8	5.5	Canada(1), SKorea(1), India(1), China(3), Russia(1), Argentina(1)
2011	8	7.5	Finland(1), Russia(2), SKorea(2), China(2), Pakistan(1)
2012	8	8.0	China(2), SKorea(1), France(1), Russia(2), Japan(1), Slovakia(1)
2013	10	11.0	China(4), Russia(2), Japan(2), SKorea(1) Slovakia(1)
2014	9	10.6	China(4), SKorea(1), Russia(2), Japan(2)

These figures show that most of the new reactors will be installed outside of Europe. In other words Europe is starting to lag the rest of the world in nuclear capacity growth. In addition, the data indicate that non-hydro renewables will not make a significant contribution to world electricity generation any time soon.

By the way, in the nuclear power industry "commissioned" is when the plant starts commercial operation not when it is contracted. Thus the Finnish reactor will not actually be commissioned until 2011.

References:

1. "International Energy Annual 2005" EIA/USDOE.
2. "Plans for nuclear reactors worldwide", UIC 8/07