Victorian Parliamentary Inquiry into Nuclear Prohibition
Answers to Questions on Notice

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Q1. In relation to the five over-budget nuclear projects under construction in northern America and Western Europe, how much, if any, public money has been spent to prop up construction? Are there any taxpayer dollars subsidising these projects to make them viable to provide the energy to the market?

Project	Location	Estimated Subsidy
Olkiluoto 3	Finland	overruns funded by France
Flamanville 3	France	overruns funded by France
Hinkley Point C	United Kingdom	contract for difference by rate payers, overruns underwritten by France and China
Vogtle 3 & 4	USA	rate payers, federal loans and tax-subsidised financing
VC Summer 2 & 3	USA	rate payers and/or state balance sheet (subject to resolution of legal actions)

Olkiluoto 3, Finland

The contract to build Olkiluoto 3 was awarded in 2005 to AREVA NP, a joint venture of AREVA and Siemens. In 2009 Siemens withdrew from the JV, putting the construction in the hands of AREVA, which is mostly owned by the French state.

Construction on Olkiluoto 3 has been delayed many times, driving up costs and ultimately forcing AREVA into liquidation in 2016. The French state injected €2bn to recapitalise AREVA SA and is exposed to the budget overrun. As such, the French government is subsidising the construction of a power station in Finland.

Flamanville 3, France

EDF owns the entire fleet of nuclear reactors in both France and the UK. As well as Olkiluoto in Finland, EDF is financially responsible for the construction of Flamanville 3 and Hinkley Point C.

Flamanville 3 started construction in 2007. A 2020 report by the French “Court of Auditors” indicates that the cost has grown from €3.4bn in 2007 to €12.4bn excluding an additional €6.7bn in other costs for a total of €19.1bn. This projected cost increase of €15.8bn has been entirely borne by EDF.

Hinkley Point C, UK

Hinkley Point C is the first nuclear power station to be built in the UK since 1995. In 2007 EDF submitted the design for the EPR reactor to the UK's Office of Nuclear Regulation and made the decision to proceed in July 2016, receiving project approval by the UK government in September of the same year. The project is a collaboration between EDF and China General Nuclear Power Group (CGN), a Chinese state-owned company which has committed £6bn. The first of two units is currently expected to commence operations in 2027 and is being financed by a contract for difference (CfD) written by the Low Carbon Contracts Company, funded by UK electricity consumers.

Under the 35 year contract, consumers will make up any difference between the wholesale price and the nominal 2012 contract price of £92.50 in 2012. This is well in excess of UK wholesale prices which have typically ranged from £30–£60/MWh over the past decade. Because the strike price is linked to inflation, by the time Hinkley Point C is operational, the strike price will be well over A$200/MWh.

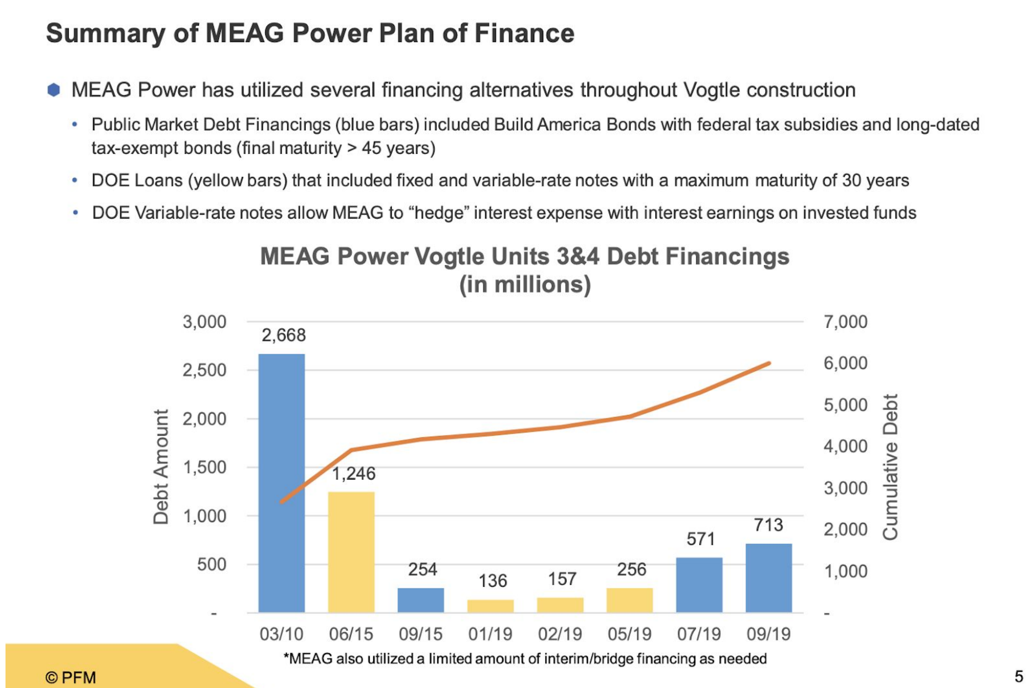
Hinkley Point C has already experienced significant cost overruns, which ultimately will be covered by the French and Chinese governments.

Vogtle 3 & 4, GA, USA

Announced in 2006, the two-unit extension of the Vogtle Generating Station in Georgia was expected to cost US$14bn and begin generation in 2016. At the time of writing the project is six years behind schedule and the total cost is now forecast at US$27.5bn.

The US Department of Energy has directly loaned US$12bn to the project's owners, Georgia Power Company (GPC), Oglethorpe Power Corporation (OPC), and three subsidiaries of Municipal Electric Authority of Georgia (MEAG Power).

MEAG, which owns 22.7% of the project is carrying more than US$6bn in debt. While the DoE reports that only US$2.2bn has been loaned directly to MEAG, the municipal power company's public market debt financings enjoy valuable tax subsidies.



VC Summer 2 & 3, SC, USA

In March 2008 the owners of the VC Summer nuclear plant in South Carolina applied for a licence to build two new reactor units. The extension was expected to cost US$9.8bn and commence operations in 2016.

The project was financed in part by South Carolina electricity consumers via a series of rate increases, starting in May 2008 and ending with the ninth in July 2016. Less than a year later, Westinghouse (the prime contractor) filed for Chapter 11 bankruptcy. At this stage ratepayers had paid $2bn in rates through their utility bills.

When analysts determined that the estimated completion cost had ballooned to $23bn, the project was abandoned. A long series of legal battles followed to recover ratepayer contributions to the failed project. Much of the cost is likely to be borne by either the state of South Carolina or South Carolina rate payers.

US Waste Levy

In the US, for most of the past 30 years nuclear generators have paid a $1/MWh levy towards the federal Nuclear Waste Fund, however the fee was reduced to zero in 2013 by court decree. There is concern that the funds, currently totalling more than US$43bn may be of insufficient magnitude to provide for the safe, long-term storage of the high level waste, however the size of the shortfall cannot be known as there is still no definitive plan for long term storage.

In the meantime, while waste is being stored indefinitely on the site of otherwise decommissioned facilities, the facility owners are legally obliged to provide costly around-the-clock armed security. The facility owners are locked in a cycle of suing the Department of Energy periodically to recuperate costs, ie. the federal government is paying the civilian nuclear industry to look after civilian nuclear waste.

The US federal government has quantified their financial liability for the impasse at $35bn, on top of the long term cost of storage liabilities.

US Nuclear Insurance and Disaster Relief

The 1957 Price-Anderson Act provides a maximum cap on liability for nuclear power stations. The legislation was introduced with the recognition that private enterprise could not shoulder the burden of liability in the event of a catastrophic nuclear accident impacting citizens or property off-site.

Plant owners are required to contribute to a pooled fund with a current value of US$13bn. If a claim were to exceed that amount, the industry would be required to contribute up to another US$12.9bn. Beyond this total pool, liability then falls to the Congress.

As such, the taxpayer is ultimately the insurer of last resort for all nuclear power plants in the United States.

Clean-up costs of the Fukushima Daiichi Nuclear Accident

In July 2019 the Japan Center for Economic Research determined that the total cleanup costs from the 2011 accident at the Fukushima Daiichi Nuclear Power Plant could total 35–80 trillion yen. This translates to between A$461bn and $1,055bn.

It's challenging to put this number into perspective. In the 54 years since Japan's first nuclear power station commenced operation, the country's nuclear fleet has generated 7,870 TWh. If this estimated cost of the Fukushima accident clean-up were to be levied over every MWh ever generated in the country, the range would be between $59 and $134/MWh.

It's quite possible that the clean-up cost of the nuclear accident at Fukushima Daiichi will exceed the value of all nuclear power ever generated in Japan. Almost the entire cost will be borne by the taxpayer.

Regulation

A safe nuclear industry requires a well resourced and sophisticated regulator. There should be no doubt that Australia is capable of extending its existing nuclear regulatory capabilities to cover nuclear power, but this will come at a cost.

The United Arab Emirates, which went from no established nuclear power sector in 2008 to first nuclear generation in 2020 might provide a model. In a recent presentation to the Australian Nuclear Association, the former Deputy Director General for Operations of the UAE's Federal Authority for Nuclear Regulation (FANR) advised that the regulator employs 244 staff. One third of FANR's staff are expatriates, hired in for their experience and expertise.

If Australia were to go down the path of nuclear power, lawmakers would need to decide whether the costs of regulation would be borne by the nuclear industry, or by taxpayers.

Q2. Can you make further comment on the statement in your submission that claims by Bright New World of a reduction in capital needed to make nuclear viable are misleading, as they are based on the unlikely scenario of a carbon price of over $150 per tonne.

Carbon Pricing

In its submission to this inquiry, Bright New World wrote:

> The LCOE of nuclear is heavily impacted by the cost of capital. This can comprise of up to 75% of overall LCOE of a SMR or gigawatt scale nuclear plant[49]. De-risking the financing phase of nuclear deployment has the ability to lower the LCOE of nuclear to acceptable levels for investment. The sensitivity to cost of capital can be as much as US$55/MWh[50].
>
> The Nuclear Fuel Cycle Royal Commission assessed reactors that could be commercially deployed and found that `LCOE of nuclear is impacted by the capital and finance costs. With an 8% reduction in capital or finance obtained at 7% nuclear could be viable in South Australia at current costs[51].
>
> ---
>
> 47 (GHD, 2018)
> 48 (Energy Options Network, 2017)
> 49 (Nuclear Fuel Cycle Royal Commission, 2016), p. 62
> 50 (Lazard, 2018)
> 51 (Nuclear Fuel Cycle Royal Commission, 2016), p. 220

BNE is correct that the levelised cost of energy (LCoE) of nuclear energy is highly sensitive to the cost of capital. (The same applies, arguably moreso, to wind and solar energy.)

BNE is also correct that the SA NFC Royal Commission found that the LCoE of nuclear is impacted by capital and finance costs..

BNE then claimed that the RC found that "With an 8% reduction in capital or finance obtained at 7% nuclear could be viable in South Australia at current costs". ***By omitting the context of the claim, BNW is misrepresenting the findings of the Royal Commission.***

The RC constructed an extreme scenario for a sensitivity analysis:

> **SENSITIVITY ANALYSIS**
>
> A sensitivity analysis reflecting a higher cost of meeting abatement goals and a lower consumer uptake of storage was undertaken based upon a higher carbon price (25 per cent higher than the base case) and a lower uptake of residential storage technologies (40 per cent lower than the base case).
>
> This led to a wholesale electricity price (shown in Figure G.6) estimated to be 49 per cent higher in 2050 than under the base strong carbon price scenario.[35]

In the extreme scenario wholesale electricity prices were modelled to increase to \$220/MWh (in 2015\$), around 3–4 times current levels.

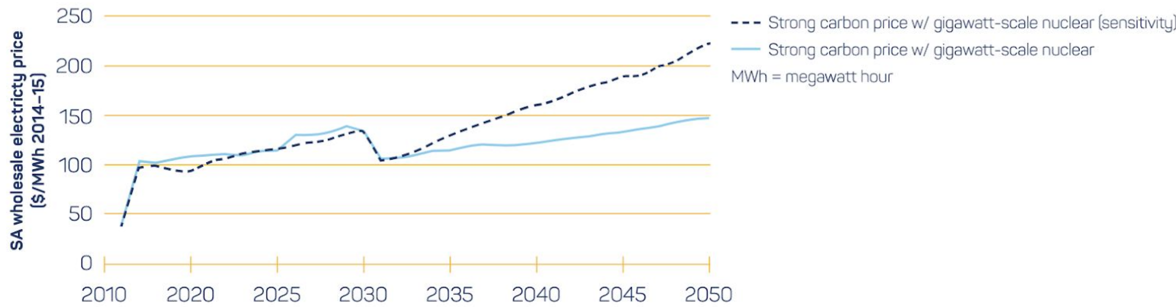


Figure G.6: Annual average real wholesale electricity price in South Australia, 2014/15 prices, Strong Carbon Price sensitivity

Source: WSP/Parsons Brinckerhoff

Even in this extreme and highly improbable scenario, the RC determined that "investment in a large nuclear plant would not be viable at present costs. ***However***, as shown in Figure G.7, ***it might be viable*** if it were able to be delivered for a cost that is 8 per cent less than the current estimates set out in Table G.1.36. The same result would prevail, at current costs, if finance could be obtained at 7 per cent: see Figure G.8." (emphasis added.)

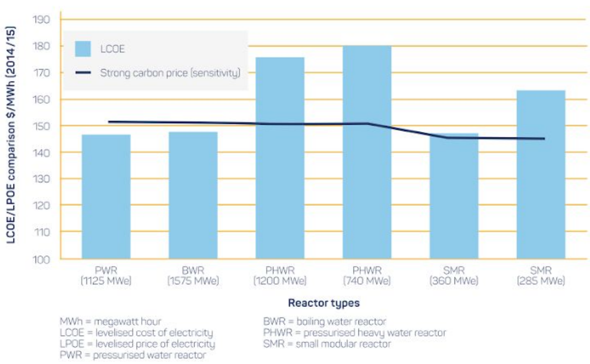


Figure G.7: Low capital cost

Source: WSP/Parsons Brinckerhoff

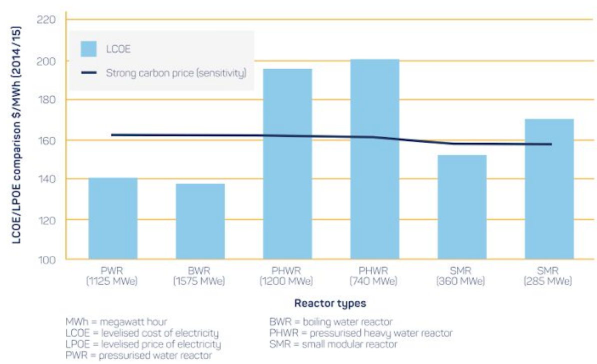


Figure G.8: Low finance cost (7 per cent)

Source: WSP/Parsons Brinckerhoff

It should be noted that the 'Strong Carbon Price' scenario assumed a carbon price of approximately \$175/tCO2 (2015\$) in 2040 and more than \$250/tCO2 (2015\$) in 2050.

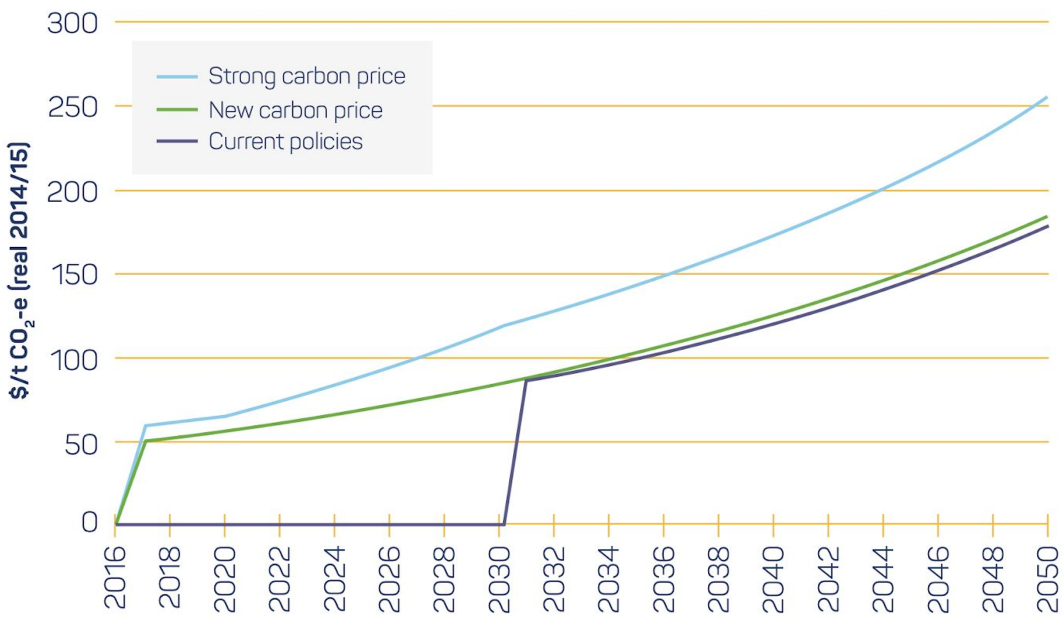


Figure G.2: Assumed carbon prices under the Current Policies, New Carbon Price and Strong Carbon Price scenarios

Source: Ernst & Young

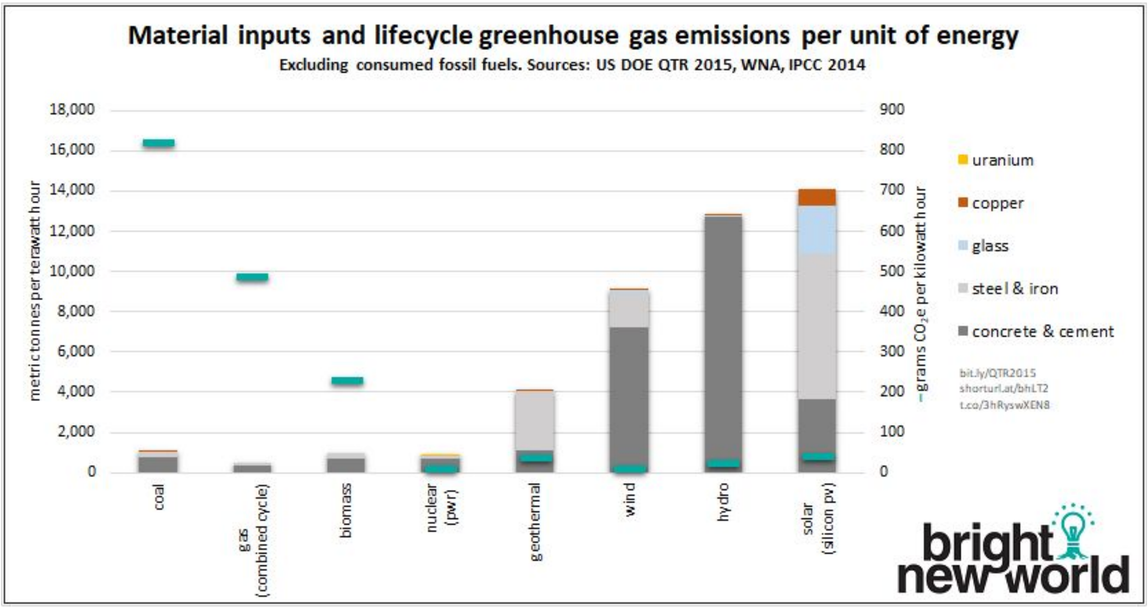
In the years since the RC concluded, a carbon price of $175–$250/t (2015$) in near-term decades has become extremely unlikely. The claim of economic viability only holds in this improbable scenario; context that BNW excluded from its submission.

As I state in my submission, since the SANFCRC, the costs of nuclear power have only increased, while the costs of competing technologies have continued to fall. BNW is aware of these facts, and also that these facts make the economic case less, not more, probable.

For the avoidance of doubt, the SANFCRC did not find that “with an 8% reduction in capital or finance obtained at 7%” that nuclear power could be viable in South Australia at present costs. To claim so, as BNW did, is misleading.

Material Use

Bright New World also makes misleading claims about material use when comparing nuclear and solar PV electricity generation. The following chart appears on page nine of their submission.



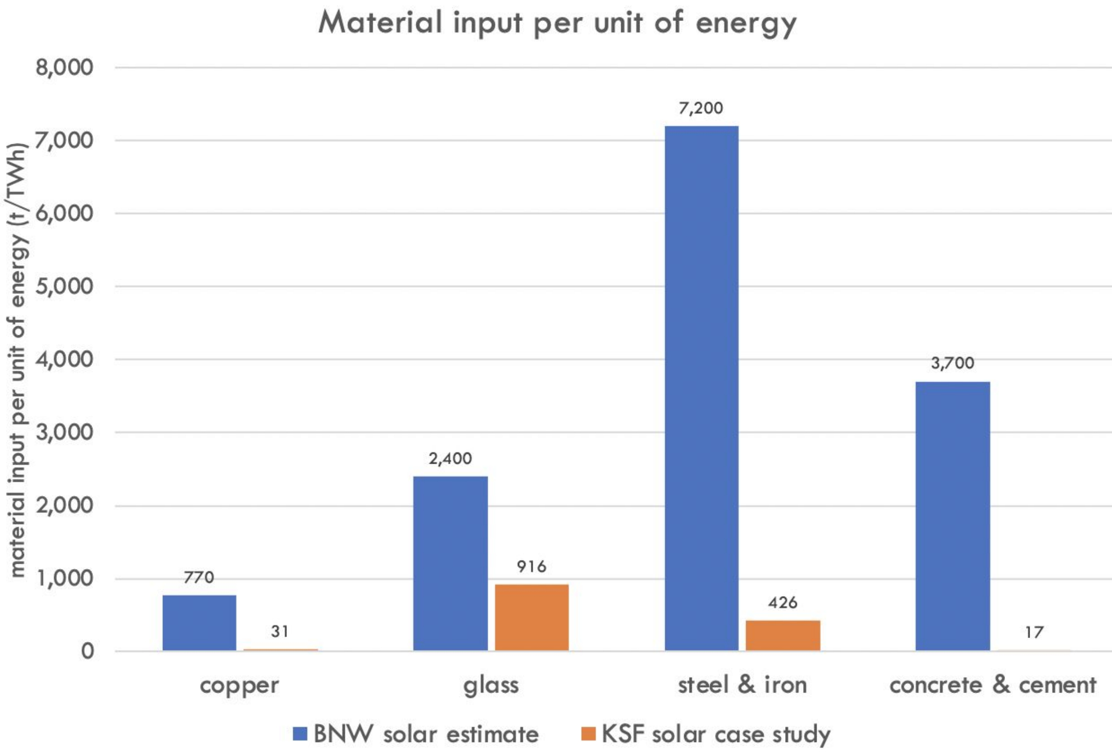
The chart claims that it takes ~7,200 tonnes of steel and iron and around ~3,700 tonnes of concrete and cement to produce one terawatt hour of electricity from solar PV.

While the amount of steel and concrete used in a solar farm varies with construction techniques and local conditions, it is clear that BNW has not independently checked the assumptions underlying this chart.

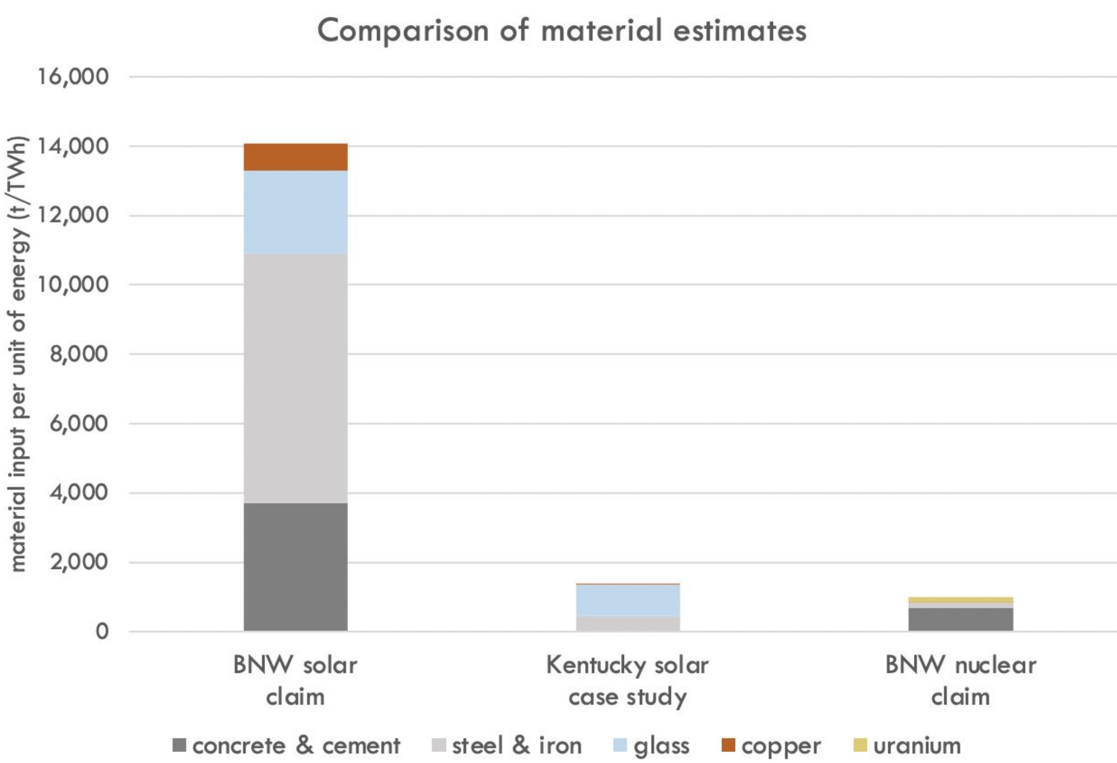
While comparing energy sources by the combined mass of material inputs is somewhat unorthodox, given that this chart has been tendered in evidence to a government inquiry, I felt it would be instructive to prepare a case study using construction data from a modern solar farm. (Note, this is not intended to be an estimate across the whole sector, just a case study to test the veracity of the data.)

The Kentucky Solar Farm is preparing to commence construction in northern New South Wales and I am grateful to developer Kinelli Pty Ltd for sharing a high level materials list. The project uses fixed tilt east-west panels with the PEG® mounting system. The only concrete in the project is for three posts in each of the four corners of the fence surrounding the site and two gateposts.

Instead of 7,200 t/TWh of steel and iron, the project uses an estimated 426 t/TWh. Instead of 3,700 t/TWh of concrete and cement, the project uses an estimated 16.6 t/TWh. The chart below compares BNW's estimates with those from the Kentucky Solar Farm case study. The use of modern integrated central inverter/transformer stations results in short bus bars and sharply reduces the amount of copper used in the plant. The PEG design and the use of modern higher efficiency PV modules plant results in a compact plant, reducing the amount of DC cabling. The improved efficiency of the PV modules reduces the required surface area which combined with optimised manufacturing strongly reduces the amount of glass compared with solar installations at the turn of the century.



If we reformat the data so that it is directly comparable to the BNW submission, we see that the “total material use” for the solar case study is very similar to their value for nuclear.



What might explain this discrepancy? BNW references the Quadrennial Technology Review (2015), published by the US Department of Energy, which in turn cites the The Greenhouse gases, Regulated Emissions, and Energy use in Technologies Model (2014) developed by the Argonne National Laboratory. The latter report derived its estimates from a paper Life-Cycle Analysis Results of Geothermal Systems in Comparison to Other Power Systems (2010) which made an unsophisticated analysis (ie. simple average) from four papers written between 1995 and 2006.

In summary the findings (converted to metric tonnes/TWh) are as follows:

	Aluminum t/TWh	Cement t/TWh	Concrete t/TWh	Glass t/TWh	Cu t/TWh	Si t/TWh	Plastic t/TWh	Iron t/TWh	Steel t/TWh
Pacca, 2002	1,067	13,343	0	6,400	2,891	0	0	0	27,600
Mason, 2006	367	0	1,269	0	145	0	112	0	1,080
Phylipsen, 1995	334	0	0	1,332	5	73	416	0	0
de Wild, 2005	673	0	0	2,023	25	132	231	0	0

One of the papers, Pacca and Horvath (2002)[1], is an outlier, massively skewing the results. As can be seen from the extract below, the layout of the solar farm used to estimate the material use is acknowledged by the authors to be "an unrealistic configuration in practice".

> The 100-W panels of dimensions 1.316 × 0.66 m (*31*) are used in a nonconcentrating array (an unrealistic configuration in practice, but suitable for this analysis; such large arrays would almost always take advantage of concentrating lenses), with array units of 3 × 10 panels, each having its own concrete foundation, for a surface area of 3.9 × 6.6 m, sited at 30° latitude, at a 30-deg tilt (approximately 1.2 m of additional width is needed to account for shading by the array due to the sun's angle). There is 0.9 m between each of these array units for personnel access. Each adjacent unit covers a land area of 37.44 m^2 and has a capacity rating of 3 kW. Some 1 372 500 of these 3 kW units are required (*32*). The upgraded Glen Canyon plant yields 5.55 TWh of energy each year from a capacity of 1296 MW. Since the photovoltaic plant will have a smaller capacity factor (due to solar resource availability), the necessary installed capacity to achieve the same delivered energy is 4118 MW, more than three times the hydroelectric plant's capacity. By comparison, the world production of PV modules was 125 MW in 1997 (*33*), thus meeting the capacity with PV is unreachable without major investments in production capacity or new technological breakthroughs.

The paper was written at a time when total global solar production was around 1/1000th of what it is today, when nobody had ever built a large solar farm. In the two decades since, the industry has become immensely more efficient thanks to half a dozen learning cycles.

[1] Pacca, S., and A. Horvath, 2002, "Greenhouse Gas Emissions from Building and Operating Electric Power Plants in the Upper Colorado River Basin," *Environ. Sci. & Technol.*, 36, 3194–3200

What is the source of the BNW nuclear material use figures? We can trace them through the same chain of papers back to a 1974 paper written by Bryan and Dudley[2] at Oak Ridge National Laboratories at the dawn of the commercial nuclear power sector.

The paper studies calculates the materials use of a 1971 reference project. The analysis:

- excludes the electrical switchyard
- uses run-of-river cooling — hence no allowance for cooling towers — and notes that "environmental considerations now make this unacceptable in most locations"
- excludes fuel elements including cladding, absorber materials and control rods
- excludes all upstream (uranium enrichment and fabrication) and downstream (waste management, including casks)
- includes 4,800,000 board feet of lumber and 138 tonnes of asbestos.

Clearly, being a 1971 design, the analysis excludes any of the design changes made in response to the Three Mile Island, Fukushima and the 9/11 attacks, all resulting in material use increases. Given these significant developments, it is highly problematic to base an analysis on a 49 year–old reference design.

In fact, if a full materials analysis were to be undertaken for a modern nuclear power project, including those related to upstream and downstream operations, it's quite possible that the nuclear project would require more material input per unit of electricity generation than a modern solar farm.

Similarly, but beyond the scope of this document, BNW has made questionable claims about nuclear safety, waste management and project capital costs that do not fare well under critical examination.

Cooling towers, omitted from the materials analysis.

[2] Bryan, R.H., and I.T. Dudley, 1974, "Estimated Quantities of Materials in a 1000-Mwe PWR Power Plant," ORNL-TM-4515

A fuel enrichment facility, an example of the upstream material usage, omitted from the materials analysis.

Copper and iron components of the 26 tonne waste storage canisters from Finland's Onkalo nuclear waste storage facility — an example of downstream material usage, omitted from the materials analysis. (Photo: Sandra Upson. Source: IEEE.org)

Kentucky Solar Farm Material Input Case Study Data & Calculations

Kentucky Solar Farm, NW New South Wales

Farm specification

capacity	4.99	MW(AC)
annual generation	13.5	GWh
life	30	years
modules in farm	21,504	panels
concrete at farm	2.8	m3
inverter/transformer	30	t
DC cabling	13	t
steel for frames and fence	150	t

Notes

1 https://www.jasolar.com.cn/uploadfile/2019/0813/20190813095505280.pdf
2 https://www.irena.org/DocumentDownloads/Publications/IRENA_IEAPVPS_End-of-Life_Solar_PV_Panels_2016.pdf
3 estimate based on other LCA analyses
4 estimate based on product specification sheet
5 https://greet.es.anl.gov

Panel specification (1)

peak power	410	W/panel
weight	22.7	kg

Factors

density of concrete	2.4	t/m3
conversion tonnes/tons	0.907185	t/ton

Material proportions

	Aluminium	Cement	Concrete	Glass	Cu	Si	Plastic	Iron	Steel	Total
PV panels (2)	8%			76%	1%	5%	10%			100%
switchgear (3)					25%				75%	100%
DC cabling (4)	64%						36%			100%

Array calculations

weight of panels	488	tonnes
lifetime generation	0.405	TWh
capacity factor	30.9%	capacity factor (AC)
DC:AC ratio	1.77	(ratio)

Plant composition

	Aluminium	Cement	Concrete	Glass	Cu	Si	Plastic	Iron	Steel	Total
PV Panels	39.1	0.0	0.0	371.0	4.9	24.4	48.8	0.0	0.0	
PV framing and fence			6.7						150.0	
inverters and transformers	0.0	0.0	0.0	0.0	7.5	0.0	0.0	0.0	22.5	
DC cabling	8.3	0.0	0.0	0.0	0.0	0.0	4.7	0.0	0.0	
Total (tonnes)	47.4	0.0	6.7	371.0	12.4	24.4	53.5	0.0	172.5	
Total (tonnes/TWh)	117.0	0.0	16.6	916.0	30.6	60.3	132.1	0.0	425.9	**1,698**
ANL paper tons/TWh (5)	675	3,677	350	2,688	845	57	209	0	7,903	16,404
ANL paper tonnes/TWh	612	3,336	317	2,438	767	51	190	0	7,170	**14,881**
ANL overstatement factor	**4.2**	**∞**	**18.1**	**1.7**	**24.1**	**-0.1**	**0.4**	**-**	**15.8**	**7.8**

Updated Build Information

20th Century Nuclear Power Station Construction Starts — North America and Western Europe

Plant	Make	Capacity	Announced	Initial works	Initial projected completion	Initial cost (bn)	Current projected completion	Latest projected cost (bn)	Gross multiplier (see note)	USD (bn)	USD/W	Years end-to-end	Years late	AUD (bn)	AUD/W
Flamanville 3, France	EPR	1650	2004	2006	2012	€2.8	2023	€19.1	6.8x	$22.5	$13.7	19	11	$30.9	$18.7
Olkiluoto 3, Finland	EPR	1600	2002	2004	2010	€3.2	2022	€11.0	3.4x	$13.0	$8.1	20	12	$17.8	$11.1
Hinkley Point C, UK	EPR	3260	2007	2014	2017	£16.0	2027	£22.9	1.4x	$29.3	$9.0	20	10	$40.2	$12.3
Vogtle 3 & 4, GA, USA	AP1000	2234	2006	2009	2016	$14.0	2022	$27.9	2.0x	$27.9	$12.5	16	6	$38.2	$17.1
VC Summer 2 & 3, SC, USA	AP1000	2234	2008	2009	2016	$9.8	*cancelled*	*$25.0*	2.6x	*$25.0*	*$11.2*	∞	∞	*$34.2*	*$15.3*
														max	$18.7
														min	$11.1

Exchange rates	
EUR to USD	1.18
STG to USD	1.28
AUD to USD	0.73

Flamanville 3	**Figure**	**Cost type**	**Reference**	**Note**
announced:	Oct-04		https://web.archive.org/web/20141014020153/http://www.world-nuclear-news.org/newsarticle.aspx?id=14496	
initial works:	summer 2006		ibid.	
initial completion:	2012		ibid.	
initial cost:	€2.8bn	2001€ OCC	ibid.	€3.48bn in 2015€, OCC
latest completion:	2023		https://www.lemonde.fr/economie/article/2020/07/09/nucleaire-la-cour-des-comptes-ereinte-l-epr_6045707_3234.html	
latest cost:	€19.1bn	2020€ final cost estimate	ibid.	
Olkiluoto 3				
announced:	2002		https://tem.fi/documents/1410877/2937056/Nuclear+Energy+in+Finland	https://twitter.com/VTulkki/status/1304708131965067264?s=20
initial works:	Feb-04		ibid.	
initial completion:	2010		https://web.archive.org/web/20070927094543/http://www.ol3.areva-np.com/project/chrono.htm	
initial cost:	€3.2bn	2012€ cost to vendor	https://www.neimagazine.com/features/featurea-long-and-winding-road-5671917/	
latest completion:	Feb-22		https://yle.fi/uutiset/3-11516011	
latest cost:	€11bn	2020€ final cost estimate	https://www.worldnuclearreport.org/IMG/pdf/wnisr2019-v2-hr.pdf	
Hinkley Point C				
announced:	2007?		https://www.reuters.com/article/us-edf-britain-nuclear-hinkley-timeline/timeline-bri	Announcement by EDF Energy's CEO.
	2007		https://www.nao.org.uk/wp-content/uploads/2017/06/Hinkley-Point-C.pdf	
initial works:	May-14		ibid.	
	2011		https://www.nao.org.uk/wp-content/uploads/2017/06/Hinkley-Point-C.pdf	
initial completion:	2017?		ibid.	
initial cost:	£16.0	2013£ OCC	https://www.edfenergy.com/file/1405/download?token=gcM0D47gaHPuYvBZ7XqN0y_fjxKHLOvYuZJg1hoqRJc	
latest completion:	2027		https://www.ft.com/content/3c3658e0-27f5-49a5-b948-3986da3e5bcd	
latest cost:	£22.9	2020£ final cost estimate	https://www.vice.com/en_asia/article/akwayk/ons-nuclear-power-stations-climate-warning-uk	
Vogtle				
announced:	2006		https://www.nrc.gov/docs/ML0902/ML090280033.pdf	
initial works:	2009		https://www.cmbg.org/papers/2018Presentations/Vogtle%2034%20Update%20-%20External.pptx	
initial completion:	2016		https://web.archive.org/web/20111227121317/http://southerncompany.com/nuclearenergy/SNCmedia/Vogtle_Media_Guide.pdf	
initial cost:	$14bn	2013$ reports	https://www.ajc.com/business/vogtle-nuclear-project-take-longer-cost-more/gNRfHV6BSluTa4eDAUFIeL/	
latest completion:	2022		https://www.ajc.com/news/local/georgia-vogtle-nuclear-report-more-delays-extra-costs-flaws/mBxlgXiDcf0SIaTFr0cZXL/	
latest cost:	$27.9bn	2020$ status report	https://twitter.com/mtaylor_nz/status/1306609851582349313?s=20	
VC Summer				
announced:	Mar-08		https://www.nrc.gov/reactors/new-reactors/col/summer.html	
initial works:	2009		https://ors.sc.gov/sites/default/files/Documents/Regulatory/electricNaturalGas/newNuclear/VCSummerUnits/quarterlyReports/ORS4thQtr31710.pdf	
initial completion:	2016		https://www.neimagazine.com/news/newssummer-time-for-ap1000-721	
initial cost:	$9.8bn	2008$ OCC plus forecasted inflation, owner's costs and contingencies	ibid.	
latest completion:	cancelled 2017		https://www.nytimes.com/2017/07/31/climate/nuclear-power-project-canceled-in-south-carolina.html	
latest cost:	$25bn	2017$ final cost estimate	ibid.	

nb: Gross multiplier is a simple comparison between initial and latest costs. Initial cost may or may not include inflation, interest and owner's costs. Check sources.