

## **Nuclear Power and Jobs**

### **Introduction**

Building new nuclear reactors is probably the worst energy strategy we could choose in terms of job creation. The UK Government has tended to exaggerate the numbers of jobs created by a new reactor programme, but almost never discusses the job creation potential of alternative energy strategies. Just as nuclear power can damage efforts to reduce carbon emissions by saving much less carbon per pound spent than would be saved by an energy strategy based on energy efficiency and decentralised energy, so too nuclear power can actually kill jobs by creating far fewer jobs than would be created if the money were spent on alternative strategies.

Nuclear power is likely to detract attention from the far greater job creating potential of other industries around nuclear sites, such as the offshore wind industry, and may actually dissuade companies from setting up in those areas, and could damage existing industry, such as tourism and agriculture, which rely on an areas reputation for a clean environment to attract business.

### **Nuclear Jobs – the Government exaggerates**

The UK Government says it expects the nuclear industry to bring forward proposals to develop 16 Gigawatts (GW) of new nuclear capacity by 2025. (1) This could mean the construction of two 1,600 Megawatt (MW) European Pressurised water Reactors (EPRs) at each of five sites – Hinkley Point in Somerset, Sizewell in Suffolk, Wylfa on Anglesey, Oldbury in Gloucestershire and Sellafield in Cumbria.<sup>1</sup>

John Hutton, the then Secretary of State for Business, Enterprise and Regulatory Reform told the Unite union conference on 28 March 2008 that a new nuclear programme could create up to 100,000 new skilled jobs. (2) The Prime Minister, Gordon Brown, later claimed that each new nuclear station would create 10,000 jobs – 9,000 construction jobs and 1,000 permanent jobs. (3)

A Freedom of Information request was required to clarify that Hutton's 100,000 jobs figure was for ten twin reactor stations (4) each with two 1,600MW EPRs - a total programme of 32GW – twice the capacity actually being discussed.

More recently in 2010, David Kidney MP, the Parliamentary Under Secretary of State at DECC said, rather confusingly, 16GW of nuclear power by 2025 “*would require an average of approximately 10,000 workers per year until that point – jobs in the supply chain, construction sector, and to support operation*”. (5) This is in the introduction to a report by the skills agency, Cogent, which suggests there may be 110,000 – 140,000 job years<sup>2</sup> in nuclear construction and manufacture for a 16GW programme over the next 14 years to 2025 which averages out at 10,000 jobs lasting 14 years. This is a lot less than the 9,000 construction jobs at each of 5 new stations which Gordon Brown's statement implied.

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<sup>1</sup> At the last three sites the reactor-type has yet to be decided. The Westinghouse AP1000 may be chosen instead of the EPR. The capacity of this reactor is 1,100MW, but this may mean three reactors are built at some of the sites instead of two.

<sup>2</sup> Job years are the number of jobs multiplied by the number of years the jobs will exist for.

Ministers also appear to have rather over-egged the number of jobs required to operate each reactor. Gordon Brown's 1,000 permanent jobs figure at each twin reactor station compares with EDF's figure of 900 jobs for Hinkley Point C (6) and Cogent's estimate of 800 jobs.

So the Government began by exaggerating the number of reactors likely to be built, and exaggerating the number of construction jobs to build each reactor and finally exaggerating the number of permanent jobs once the reactors were operating.

The Department of Energy and Climate Change is now a bit more realistic. According to its website, the proposed 16GW new nuclear build programme will create an estimated 30,000 jobs by 2025, but it's not clear exactly how this figure is arrived at, and may still be on the high side. (7)

Cogent gives a bit more detail about what this might mean. It says a station with twin reactor units will require about 13,000 job-years in site preparation, construction, electrical and mechanical work over a typical 6-year period to deliver, assuming a staggered but overlapping build of reactor units. Taking these numbers over a 6-year build period for a twin-unit station, the average employment is 2,200 personnel per year. (8)

Then there are jobs in manufacturing which might be created in order to supply civil engineering items, major nuclear items, and the non-nuclear sections of the generating plant (termed the 'balance of plant'). Cogent says this area is subject to a lot of uncertainty, but it estimates that to supply a twin unit station would create 3,200 job-years of employment or an average of 530 jobs per year.

A scenario presented by Cogent suggests that, if all goes according to plan, a 16GW programme with six twin unit stations (6 EPR reactors and 6 AP1000 reactors) would start to create jobs in 2012, but would be expected to employ a peak of only 14,000 workers around 2021 and then there will be around 5,000 permanent jobs once construction is completed around 2027 – a bit different from the 100,000 jobs originally promised.

### **Towards an efficient way of creating jobs**

Clearly creating jobs is not the main motivation for building new nuclear reactors. The Government says the UK needs 59GW of new generating capacity by 2025. Of this, 33GW needs to be renewable capacity to meet our obligation to European Union targets. 8GW of new non-renewable capacity is already under construction, so that leaves a further 18GW of new capacity for which the type of generating plant is still to be determined. (9) The Government says that new nuclear power should be able to contribute as much as possible to meeting this need for new non-renewable capacity. (10)

The Government's Appraisal of Sustainability (AoS) for the Draft National Policy Statement on Nuclear Power (11) only looks at a scenario in which new reactors are replaced by gas-fired generating stations. It doesn't evaluate, for example, an alternative strategy based on a high level of Government support for decentralised energy and combined heat and power. The Government's Low Carbon Transition Plan (12) only expects 2% of UK electricity to come from small-scale renewables by 2020. Yet research by the Energy Saving Trust shows that small-scale renewables and microgeneration could provide around 30-40% by 2050. (13) Similarly, the Chief Executive of National Grid, Steve Holliday, says that 15% of the country's electricity production could come from so called "embedded generation" in homes and offices by 2020 as micro generation becomes increasingly viable after the £9 billion rollout of "smart meters" for every home in Britain. (14)

So, if there is a choice about how best to provide the 18GW of new capacity required over and above the renewable capacity already planned, it make sense, at this time of rising unemployment, to look at a strategy which is the most efficient at creating jobs.

## Jobs per TWh

Nuclear power is a capital intensive industry, which means it requires a much higher injection of money to produce its final product in comparison with a labour intensive industry like textiles which makes much higher use of labour to produce its final product. So nuclear power is not a very efficient way of creating jobs. If there were an alternative way of providing or saving the same amount of electricity, but at the same time create more jobs, clearly that would be a strategy worth pursuing.

One way of comparing the number of jobs created by different energy sources is to calculate the number of jobs for each Terawatt hour (TWh—1 billion kilowatt hours) generated annually. This, of course, will depend on the performance of the generating station. So a new 1.6GW reactor employing 500 people which operates an average of 80% of the time will be providing 45 jobs per TWh.<sup>3</sup>

Goldemberg gives the following estimates of jobs created per TWh of power generated. (15) He estimated that nuclear produces around 75 jobs per terawatt hour (TWh) of power, whereas wind power produces 918 – 2,400 per TWh.

Natural Gas	250 jobs/TWh
Coal	370 jobs/TWh
Nuclear	75 jobs/TWh
Wood Energy	733 – 1067 jobs/TWh
Hydro	250 jobs/TWh
Wind	918 – 2,400 jobs/TWh
Photovoltaics	29,580 – 107,000 jobs/TWh

In 2008 Greenpeace International and the European Renewable Energy Council published a global energy scenario, Energy [R]evolution, which set out a vision for low-carbon global energy supply. (16) A later report by the Institute of Sustainable Futures (17) compared this to an energy projection put forward by the International Energy Agency (IEA), which includes nuclear power and continued use of fossil fuels. (18) The comparison showed that an Energy [R]evolution scenario would generate 2.7 million more jobs globally than the IEA scenario.

The Institute of Sustainable Futures looks specifically at the UK. It shows that there are more energy sector jobs in the UK in the [R]evolution scenario than the IEA scenario at every stage. In 2010, the [R]evolution has about 3,000 additional jobs compared to the IEA scenario, with 79,000 more in 2020, and 78,000 more by 2030. Employment in the [R]evolution scenario shows very strong growth, reaching 130,000 by 2020 and 152,000 by 2030. (19)

A joint report by Greenpeace International and the European Photovoltaic Industry Association predicts that just one of the technologies - solar electricity - could be providing jobs for 2.25 million people globally by 2020. (20)

## Killing Jobs

Pro-nuclear politicians often speak as though the alternative to the jobs created by a new nuclear programme is no jobs, but this is clearly not the case, because any country or region will require an alternative energy strategy if it rejects nuclear power and that alternative strategy will also create jobs. Peter Bradford, former member of the Nuclear Regulatory Commission, argues that nuclear power will, in fact, actually kill jobs, because the capital markets are not swimming in credit. If you use billions for nuclear construction you may well suck up money that might be otherwise be available for, say, wind projects that could create far more jobs per pound spent. (21)

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<sup>3</sup> 1.6GW x 24 hours x 365 days x 80% = 11.2TWh. 500/11.2 = 44.6 jobs per TWh

The Labour energy minister in 2009, Mike O'Brien, accused the Scottish Government with its non-nuclear policy of "turning up its nose" at thousands of highly paid high-skilled jobs. (22) Peter Hughes, chief executive of the manufacturers' group Scottish Engineering told the *Powering Scotland Conference* that:

*"...someone has to stand up and say [the Scottish Government] policy is nonsense. Can you imagine the number of jobs that would be created if we backed nuclear and coal?"* (23)

The Scottish Government, on the other hand, pointed out that Scotland's renewable energy industry could "...create at least 16,000 green jobs over the next decade. It would be foolish, misguided and plain wrong to turn our back on those possibilities or sacrifice them in pursuit of dangerous and unnecessary new nuclear power stations." During First Minister's questions Alex Salmond reminded the Scottish Parliament that: "Anything you invest - and it will be billions in nuclear power - is billions taken away from clean technology and in renewable technology."

### **Offshore Wind Jobs**

In theory the UK Government wants to see 33GW of renewable capacity by 2025 and around 16GW of new nuclear capacity. (24) In fact the Round Three offshore wind concessions announced by the Crown Estate could add 25GW to the 8GW of offshore wind already announced in Rounds one and two. (25) Unfortunately the Government's planned Electricity Market Reforms, designed to give a leg up to the nuclear industry, could damage the prospects for Round 3 offshore wind developments. Under the Government's proposals the current system of support for renewable electricity will be phased out. The "renewables obligation" will be replaced by a mechanism to support all forms of low-carbon generation, including nuclear electricity. Dr. Gordon Edge, Renewable UK Director of Policy, said:

*"...we must also bear in mind that the Renewables Obligation has turned the UK into an offshore wind powerhouse, and brought forward 20,000 megawatts of applications onshore. We shouldn't be looking to solve a problem that doesn't exist, or take a leap in the dark which might undermine investment."* (26)

These proposals may well emasculate the UK offshore renewables programme, says David Toke, Senior Lecturer in Energy Policy at Birmingham University. The Renewables Obligation currently gives good incentives to offshore wind. The Government's 'low carbon mechanism' which will fund nuclear power stations alongside renewables, means the major electricity companies may divert funds from renewables into nuclear power. There is only a certain amount of investment capital available, so renewable energy will be in competition with nuclear power for subsidies from electricity consumers. The Government will have to give all sorts of guarantees to nuclear to make it work, so funds could well be diverted from renewable projects. Toke believes there is a danger many Round 3 offshore wind projects will be scrapped. (27)

### **Energy Efficiency Jobs**

An alternative energy strategy based on decentralised energy would also require an ambitious energy efficiency programme. According to Kevin Anderson, a senior research fellow at the Tyndall Centre for Climate Change Research, wider use of energy efficiency measures, such as domestic insulation and fuel efficient cars could almost halve UK energy consumption. (28) A strategy to cut emissions from the domestic sector by 80% by 2050, in line with carbon reduction targets, would require every house to have excellent insulation as well as some form of Low and Zero Carbon Technology – microgeneration and community heating schemes. This means carrying out installations in all of the UK's 26 million dwellings over the next 40 years or 650,000 dwellings every year between now and 2050. (29)

The Government would probably claim that it is doing all it can to stimulate the creation of energy efficiency jobs and that these will be additional to any jobs created by new nuclear build. Its flagship energy efficiency policy is the so-called Green Deal. The Secretary of State for Energy and Climate Change suggested that if all 26 million households take up the Green Deal over the next 20 years, employment in the sector would rise from its current level of 27,000 to around a quarter of a million jobs (30) with 100,000 jobs created by 2015. (31)

The “Green Deal” is supposed to give every household the right to have home energy efficiency improvements of up to £6,500 in value with the cost of the work paid back through the household's energy bills. The cost of repaying the loan should be less than the savings arising from a more energy-efficient home. (32) It is yet to be seen what kind of consumer take up there will be for this kind of market-based scheme, but it's unlikely to be anywhere near the 100% take-up mentioned by Huhne. Utilities have spent the last decade installing the most cost-effective energy saving items - loft and cavity wall insulation – at a heavily subsidised price, yet there are still many people who haven't taken up the offer. The Green Deal expects people to pay the full unsubsidised rate, plus interest on the loan, so it is difficult to see how take up will be sufficient to create the number of jobs claimed by the Government. (33)

Paul King, chief executive of the UK Green Building Council says:

*“Unfortunately, hoping that the Green Deal will simply 'catch on' is very optimistic. It's critical that the finance is provided at sufficiently low interest rates to make it attractive for consumers. We may have to bite the bullet and say people won't be able to rent or sell their home until it meets a minimum standard.”*

Friends of the Earth climate campaigner Tony Bosworth, says the Government:

*“...must ensure the Energy Bill [which will implement the Green Deal] goes further, with a plan for a nationwide retrofit to slash emissions from British homes by 42 per cent this decade. A strong Energy Bill would bring about warmer homes, cheaper fuel bills and tens of thousands of new jobs.”* (34)

It's not just achieving our carbon targets that will require a more comprehensive energy efficiency programme than the Green Deal. To get the sort of jobs numbers being talked about by the Government would require much more of a street-by-street approach. The Association for the Conservation of Energy, for example, published an energy efficiency scenario for Scotland – the location of about 10% of UK dwellings – which could create 10,000 new jobs over and above business as usual. “*Warm Homes, Green Jobs*” found that achieving a 42% cut in carbon emissions from Scots dwellings by 2020, as required by the Climate Change (Scotland) Act 2009 would need the installation of extra efficiency measures including 341,000 loft insulation packages, 179,000 solid wall insulation packages, 1 million efficient boilers, 1.2 million solar panels, as well as smaller numbers of wood fuel boilers and replacement glazing. (35)

Professor of Energy Policy at Exeter University, Catherine Mitchell, says what's needed is a change to the energy market to deliver a new type of energy system with regulated obligations on the scale of the transition from town gas to natural gas. Tendering for street-by-street or area-by-area contracts to make homes energy efficient would be much more cost effective, and would deliver the kind of job numbers being talked about by the Government with more certainty (36)

At a UK level, a £5 billion per year domestic sector energy efficiency investment could create around 55,000 jobs directly and hundreds of thousands of jobs indirectly, according to a report commissioned by Greenpeace. This is the scale of investment that would be required to tackle the energy inefficiency of the UK housing stock in the space of several decades. (37)

## **Think Global – Act Local**

There is huge potential for job creation in sustainable energy. Energy efficiency installation, advice, local small-scale generation and renewables are all more labour intensive businesses than traditional power generation, and the jobs are rooted in the areas they serve. (38)

Although the Government says it would like to see decentralised and community energy systems such as micro-generation making a contribution to targets, (39) it also expresses the view that demand management opportunities will not be sufficient to affect the need for new large energy infrastructure, particularly given the likely increase in the need for electricity for heating and transport. (40)

If the Government focuses on new reactors to the exclusion of building a community-based energy system the contribution from decentralised energy will end up being minimal. Local authorities will achieve much less without government support. Alternatively, a groundswell of actions by individual communities led by local authorities with the support of central government will be able to achieve the sort of penetration levels for small-scale renewables and microgeneration promoted by the Energy Saving Trust and National Grid.

## **Nuclear Power - Damaging the Local Economy?**

Replacing the UK's nuclear reactors will save only around 4% of the UK's carbon emissions. (41) Nuclear power provides around 20% of UK electricity, but only about 8% of total energy. Allowing for losses at the power station, nuclear power's current contribution to the UK's final energy consumption is only 3.6 % (80 TWh/y out of a final consumption of about 2,250 TWh/y). Therefore, we need to be absolutely sure that promoting new reactors is not going to negatively impact on our ability to deal with the other 96% of emissions. Investing in new reactors could well divert investment from other low carbon technologies and energy efficiency measures. Any such diversion of investment will not only be bad in terms of carbon emissions, it will also damage job creation and the local economy around proposed nuclear sites.

Building new reactors has a high opportunity cost - the cost of forgoing the alternative outcomes that could have been purchased with the same investment. The local economy around proposed nuclear reactors would be able to achieve far more if money spent on new nuclear reactors were instead spent on energy efficiency and renewables. Building nuclear reactors would kill any hope areas like Somerset, Suffolk, Anglesey and West Cumbria might have of diversifying the local economy, after years of dependency on the nuclear industry, especially if the area also volunteers to host a nuclear waste repository. Many new businesses would be reluctant to move into an area which is so heavily focused on promoting the nuclear industry. It would be likely to detract from the promotion of any industries, such as those connected to food and agriculture or tourism, which require an area with a reputation for having a clean environment.

A large influx of workers during the construction phase of a new reactor or geological disposal site project would put a strain on local services and facilities. Short duration, capital intensive construction projects have been shown to seriously distort the local labour market. Often the bulk of those employed are from outside of the area. After the project is completed many migrant workers remain in the area compounding local employment problems. Even when an effort is made to hire local people the construction project can have a detrimental effect by competing with local firms for a limited number of skilled workers. In some cases where a local firm is already in difficulty the higher wages offered on a large construction project can be the last straw. Evidence suggests that major construction projects in rural areas prevent the growth of employment in more stable industries, and increase unemployment over the longer term. (42)

## **New Nuclear Sites**

EDF Energy is expected to submit a planning application to build two EPR reactors at Hinkley Point C in the winter of 2010/11, (43) followed by an application to build a further two at Sizewell C in Suffolk on 1<sup>st</sup> June 2011 (44). Horizon Nuclear Power, which is a joint venture between the two German utilities, EoN and RWE, (45) is expected to submit an application to build two or three reactors at Wylfa on the Island of Anglesey in the first quarter of 2012 (46) and an application for two or three reactors at Oldbury in Gloucestershire in the second quarter of 2014. (47) Both of the Horizon proposals could comprise of either two 1,650MW Areva EPR reactors or up to three 1,100MW Westinghouse AP1000 reactors, so at this stage the reactor type is uncertain. (48)

Finally, NuGeneration Ltd, a consortium made up of Iberdrola, GDF Suez and Scottish and Southern Energy, has announced that it will make a final decision about whether to go ahead with the construction of up to 3.6GW of new nuclear capacity at Sellafield by 2015. (49)

Each of the four regions with proposed nuclear sites has the potential to create jobs in other areas especially energy. But there is the danger that promoting new reactors will kill off these alternative possibilities. If that were to happen we could be exchanging sustainable energy projects capable of creating a large number of jobs for new reactors which are very poor job creators.

### **Hinkley & Oldbury**

Merlin Hyman, the chief executive of Regen SW – the renewable energy agency for south west England - has urged councils and businesses to seize the opportunity to put significant support for renewable energy at the heart of new Local Enterprise Partnerships, and warned that government policy might otherwise allow Scotland to steal a march on the English regions in green job creation. Regen SW's annual Renewable Futures conference in Bath heard that Scotland was "rubbing its hands" at the demise of England's regional development agencies (RDAs). More government money is being invested in developing ports and infrastructure for renewable energy in Scotland (£70 million) than in the whole of England and Wales (£60 million) – even though South West England alone has an economy the size of Scotland's. (50)

### **Sizewell & Suffolk**

The Great Gabbard offshore windfarm is already being developed off the coast of Suffolk, (51) and the companies chosen to develop the East Anglia Array which is to be built 15 miles off the Norfolk and Suffolk coast were announced by the Crown Estate in January 2010. (52) This investment, worth £24 billion, will create over 1,000 jobs with another 4,000 jobs involved in the supply chain. (53)

1<sup>st</sup> East – the waterfront regeneration company for Great Yarmouth (in Norfolk) and Lowestoft in Suffolk is promoting East Anglia's ports as the hub for the offshore wind industry in Europe. Lowestoft was the construction site for the Round 1 Scroby Sands wind farm and is the operations and maintenance base for the Round 2 Greater Gabbard scheme, currently the world's largest offshore development. (54)

If Government's electricity market reforms turn out to damage the prospects for Round 3 offshore wind, Suffolk could have exchanged an industry which creates up to 2,400 jobs per TWh for one that creates only 75. The 5,000 jobs expected to be created by the East Anglia Array could be replaced by only 800 jobs at Sizewell C.

### **Wylfa**

Anglesey Council has promoted the area as an "energy island", aiming to build up expertise in renewable energy as well as promoting the idea of a replacement for Wylfa nuclear power station. (55) The Anglesey Aluminium site, near Holyhead is for sale. A private consortium is keen to develop the site as a manufacturing base for wind turbines. But a deep water access to Holyhead port is seen as

vital to these plans. The port needs improvements which could cost up to £60m. (56) But on a visit to the Island in January 2011, UK Energy Minister Charles Hendry said the port's redevelopment would have to be paid for by the Welsh Assembly – the £60m fund to develop ports will only be spent in England. (57)

## **Cumbria**

In a similar way to Anglesey, West Cumbria is promoting itself as Britain's Energy Coast. (58) The vision is that by building on existing nuclear expertise within West Cumbria, the boroughs of Copeland, Allerdale and Furness can be transformed into a thriving centre of excellence for energy technologies ranging from off-shore wind, tidal and wave to biomass, anaerobic digestion and energy from waste. The Britain's Energy Coast website, however, gives very little coverage of non-nuclear energy plans. This is despite the fact that the Irish Sea Zone for Round Three could accommodate up to 4.2GW of offshore wind, and several sites which were awarded Round 1 and 2 leases off the coast of Barrow have yet to be developed. (59)

As well as the possibility of a site adjacent to Sellafield being used for the construction of up to 3.6GW of new nuclear capacity, West Cumbria – the boroughs of Copeland and Allerdale – are being investigated as a possible site for a deep geological nuclear waste 'disposal' facility. (60) Concerns have been expressed that this could seriously damage Cumbria's tourism industry. Councillor Joe Sandwith of Allerdale Borough Council says:

*“Cumbria is a tourism magnet and it contributes far more than the nuclear industry to the local economy. Yet we are talking about blighting the land that they come to see.”* (61)

Although the two Greenfield nuclear sites in Cumbria – Kirksanton and Braystones - have been dropped from the list of potential sites, concerns were expressed that building nuclear facilities on land away from Sellafield could plunge Cumbria into a “permanent nuclear winter”, by leading environmental consultant, Doug Cross. The same assessment would almost certainly apply to any proposed geological disposal facility. Cross told a meeting of tourism and business leaders that if the Braystones and Kirksanton plans went ahead it would constitute a “nightmare” for Cumbria's environment and its economy. He said he already knew of holiday park owners who were losing business over customer fears that their holiday homes would be in the shadow of nuclear reactors. (62) The impact of the NuGeneration proposals will not be negligible, and will virtually double the size of the Sellafield site. (63)

## **Conclusions**

Comparing a decentralised and renewable energy scenario with a more conventional scenario suggests that overall the UK could gain 78,000 extra jobs by going down the decentralised energy path.

A 16GW – 5 station programme is expected to create a peak of around 14,000 construction and manufacturing jobs in 2012, but then numbers employed will fall reaching around 5,000 permanent jobs in 2027. This is a long way from the 100,000 jobs originally promised by the Government.

Nuclear power is very poor at creating jobs – only around 75 jobs per TWh. All of the areas where reactors might be built as part of the 16GW programme could promote themselves as suitable for the offshore wind industry to expand creating up to 2,400 jobs per TWh.

There is a limited supply of capital available for investment in energy industries, and there are concerns that the Government's electricity market reforms, designed to encourage new nuclear build, will have the effect of encouraging utilities to shift investment away from offshore wind to nuclear.

The Government has also exaggerated the number of jobs likely to be created by its energy efficiency programme. These jobs will not materialise without a much stronger focus on alternative energy strategies and a much more comprehensive energy efficiency programme.

As well as being inefficient at creating jobs, nuclear power could also kill jobs in some areas by damaging industries like tourism, agriculture and food which rely on an areas reputation for having a clean environment. A large construction project can put a strain on local services and facilities and seriously distort the local labour market and prevent the growth of employment in more stable industries, thus increasing unemployment over the longer term.

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