Renew on-line 141 Sep-Oct 2019

Technology for a Sustainable Future

A bimonthly roundup of news and views on renewable energy developments and policies

Produced by NATTA, the independent Network for Alternative Technology and Technology Assessment.

Contents

1. UK Developments

Energy White paper stalled, new CfD looks good for offshore wind, but CCS & nuclear try to get on board

2. Global Developments

BNEF, IRENA, and REN 21 all quite positive - but some more than others

3. Forum

Wind kills, nuclear doesn’t, Goodbye to fossil fuel - and to Godfrey Boyle

Renew adopts an independent critical approach. It should not be taken to necessarily reflect the views of the Open University

Renew was for many years produced by Prof. Dave Elliott and Tam Dougan, then based at the Open University, as a NATTA membership subscription journal, with, from issue 100 onwards, this free shorter web version, Renew on Line, also being produced. Now run by NATTA independently of the OU, that still continues, delivered as a free bimonthly Blog. In parallel, a full PDF bimonthly version of Renew is also offered as a password protected online version, available on a contract basis to students and staff on relevant University courses. This full version of Renew draws on the News sections of Renew On Line, so there’s some duplication, but it also has additional Features, Reviews & commentary sections. For a full guide to NATTA’s various offerings, and access to our free annual end of year review, see: http://renewnatta.wordpress.com

Don’t forget our short Renew Extra blog, now posted monthly focusing on general energy issues, not related to renewables. It’s at: http://newrenewextra.blogspot.co.uk/

Contact: d.a.elliott@open.ac.uk

Recent Energy Books by Dave Elliott:


If urls open oddly, refresh or paste in your browser

We are very sad to report to death of Prof. Godfrey Boyle, renewable pioneer and much more - see Forum

Obits: www.theguardian.com/environment/2019/jul/31/godfrey-boyle-obituary which does some justice to his major impact…

So did this: www.open.ac.uk/blogs/design/professor-godfrey-boyle/ But nothing can compensate for the loss of such a good guy.
1. UK Renewables

Wind-battery link ScottishPower’s Whitelee on-shore wind farm, near Glasgow, the UK’s largest, with 215 turbines, has been doing well: https://eandt.theiet.org/content/articles/2019/06/uk-s-largest-wind-farm-hailed-as-national-success-story-after-decade-of-operation It’s now set to have a ‘super battery’ installed with 50 MWh of capacity. It will be able to reach a full charge in under an hour and allow excess power to be stored at times when demand is low or wind turbine output is high - e.g. at night - which can then be released at times of higher demand and low wind. It will also be used to provide ‘bursts’ of power to help stabilise the UK grid on a second-by-second basis.

www.businessgreen.com/bg/news/3077120/50mw-super-battery-approved-for-uk-s-biggest-windfarm

Saving money Vivid Economics says expanding on-shore wind from 13 GW today to 35 GW by 2035 would reduce the cost by 7%. A boom in on-shore wind could cut energy bills by £50 a year compared to a high gas energy mix according to research commissioned by RenewablesUK: www.theguardian.com/environment/2019/jun/12/onshore-wind-farms-in-uk-could-cut-50-a-year-off-energy-bills


Go for hydrogen? IET says it could replace fossil gas grid delivery: ‘Following completion of the iron mains replacement programme already underway for other reasons, the gas system will be able to carry hydrogen safely’. But the Institution of Engineering & Technology identifies ‘a range of engineering questions that require resolution before a commitment to hydrogen at scale can be made with full confidence’. As well as the completion of the replacement of the old iron gas mains by hydrogen-safe polyethylene pipes by 2030, domestic gas boilers would have to be replaced with ‘hydrogen-ready’ units, but IET says that could be done at little extra cost to consumers since boilers are replaced every 10-15 years, so by the time hydrogen was flowing the boilers would be in place. Though for hydrogen production it backs fossil-gas steam reformation (SMR) plus CCS to cut its carbon, rather than zero carbon P2G green gas electrolysis, on cost grounds: https://climatenewsnetwork.net/hydrogen-can-replace-natural-gas-by-2050/ IET: www.theiet.org/media/4095/transiti ioning-to-hydrogen.pdf

..and tidal power? A £8.5bn Morecambe Bay tidal barrage It could supply 8 TWh p.a., 2% of UK power, say backers. There could be eco/wildlife impacts, but it could also provide protection from sea level rise, and a road link from Heysham in north Lancs to Furness in south Cumbria, & then across the Duddon Estuary. www.lancasterguardian.co.uk/business/8.5bn-morecambe-bay-tidal-power-gateway-and-road-link-plans-to-go-on-show-1-9757793

The Mersey Barrage idea is also pushed again - maybe viable @ £3.5 bn, but it could have big eco-impacts: https://theconversation.com/liverpool-huge-tidal-power-plant-on-the-mersey-could-make-city-a-renewable-energy-hotspot-120958

Highviefs Liquid Air storage system moves ahead A Levelized Cost of Storage of £140/MWh for a 10-hour, 200 MW/2 GWh ‘CRYOBattery’ system is claimed. And possible use for days or weeks: www.highviewpower.com/news-announcement/highview-power-unveils-cryogenic-battery-worlds-first-giga-scale-cryogenic-battery/

Renewable electricity grew by 11% 2017-18 supplying 33% of UK power in 2018, and 11% of total final energy- up from 9.9% in 2017. And emissions down 2.4%: www.gov.uk/government/stat istics/oil-and-oil-products-section-3-energy-trends

Biomass - wood v trees Wales 40MW wood waste-fried plant: www.energylive.co.uk/2019/06/24/new-160mw-tow-energy-plant-fired-up-in-wales BECCS ‘vital’ to meet climate targets - REA wants CID support for it: www.energylive.co.uk/2019/06/25/uk-must-use-bioenergy-with-carbon-capture-and-storage-to-go-net-zero Biofuelwatch won’t like that! Grass Ecoticrity see it as vegan power: www.telegaph.co.uk/technology/2019/03/03/uk-has-enough-grass-power-every-household-claims-green-energy/ No use of animal products...


SGN on hydrogen https://solarcentury.co.uk/employe e-newsletters/pdfs/sgn-hydrogen-white-paper.pdf


Chemical magic Some clever ideas for upgrading the value of biogas: https://pubs.acs.org/doi/pdf/10.1021/acs.iecr.8b03495
CBI wants more on-shore wind, PV & nuclear!

In a letter to the then business secretary, Greg Clark, the Confederation of British Industry (CBI) said the UK’s struggling new nuclear programme has ‘an important role’ in a low carbon economy ‘at the right price’. But it also said ‘We must see action to unblock the substantial pipeline of onshore wind projects ready to be developed and built in parts of the country where they receive public support, such as Scotland’. It added that ‘hiding the continued deployment of the cheapest form of renewable electricity is hampering the goal of decarbonising at the lowest cost’. It also called for government to help create a route to market for low-cost solar power, including projects that combined battery storage.


Tory call to wind ban: www.theguardian.com/environment/2019/jun/30/tories-urge-lifting-off-onshore-windfarm-ban

All change? Energy White paper delay


And a new government, with new plans? See Box ...but big disruptive changes expected and needed, says UKERC: www.current-news.co.uk/news/large-scale-renewables-vital-to-net-zero-but-economy-wide-disruption-inevitable

...though this change looks easier

Forget the nuclear RAB, supermarket freezers can coast off-power at peak demand times: www.theguardian.com/business/2019/jun/23/cool-running-supermarket-fridges-could-help-power-uk

And we don’t need base-load plants: http://omburke.co.uk/2019/06/25/do-we-need-some-base-provision-from-nuclear-power-if-we-are-to-keep-the-lights-on-sky-news/

...or to blame the EU for the UK’s 15% PV/energy materials VAT rise - it could have been avoided: www.theguardian.com/commentisfree/2019/jun/26/brexit-green-policies-vat-solar-batteries See also Solar Push below, for REgens new report.

Post BREXIT carbon tax? no deal

New government - new plans?


But he says ‘it is time for a nuclear renaissance... I believe passionately that nuclear must be part of our energy mix’. There’s a consultation on the RAB scheme for consumer financing for it: www.theguardian.com/business/2019/jul/23/energy-nationalisation-cost-and-www.theguardian.com/business/truth-testing-on-energy-2019/jul/23/labour-seeking-to-nationalise-energy-power

Will he back it? Will he revamp the White Paper? That may depend on Andrea Leadsom, once DECC energy Minister/Environment Secretary, now the new BEIS secretary. Claire Perry exits her BEIS energy role to be the president of COP 26 - it comes to the UK next year. She’s replaced by Kwasi Kwarteng as energy minister. The new Environment Secretary is Theresa Villiers. https://theecologist.org/2019/08/05/johnsons-extraordinary-cull

Carbon Targets A Labour government would introduce an earlier net-zero carbon emissions deadline than the current 2050 target under plans being considered by the party leadership, according to shadow chancellor John McDonnell in a Financial Times interview 13/6/19.

Otherwise it will take until 2099: www.businessgreen.com/bg/news/3079117/pmqc-corbym-warns-uk-wont-reach-net-zero-until-2099


Control ‘People forget that in 1948 the electricity industry was not taken into public ownership. It was already largely owned by local authorities. It was nationalised, yes, but this was primarily an act of centralisation, not public ownership. What we need today is more decentralisation, not control by the dead hand of the fading industrial establishment.’ Or the GMB? https://realfeed.intariffs.blogspot.com/2019/06/labour-and-energy-nationalisation-why.html

Labour’s Mersey barrage https://jerseyeveningpost.com/news/uk/1072964/lomond-demands-mersey-. It was nationalised, yes, but this was primarily an act of centralisation, not public ownership. What we need today is more decentralisation, not control by the dead hand of the fading industrial establishment.’ Or the GMB? https://realfeed.intariffs.blogspot.com/2019/06/labour-and-energy-nationalisation-why.html

Labour’s Mersey barrage https://jerseyeveningpost.com/news/uk/1072964/lomond-demands-mersey-

Scotland The Royal Society of Edinburgh’s mixed bag of ideas, including more renewables, but also maybe new nuclear: www.bbc.co.uk/news/uk-scotland-scotland-business-48659683


Action on efficiency The previous government promised to turbo-charge the deployment of energy efficiency measures in buildings. Its Green Finance Strategy proposed new lending practices, homeowner incentives & data collection to incentivise lenders, landlords & building occupants to invest in energy saving. A £5m Green Home Finance Fund was included. Green Deal 2?

www.gov.uk/government/publications/energy-efficiency-strategy


Though sadly, we seem to be going the other way, with cut backs in support for domestic efficiency upgrades: www.theguardian.com/environment/2019/jul/18/uk-energy-saving-efforts-collapse-after-government-slashes-subsidies-creds-to-the-rescue?
Another big cost drop for offshore wind in new CfD?

A new competitive auction round of the Contracts for Difference system is underway with offshore wind likely to win out at lower cost. Under the CfD, generators get paid a fixed price, set as the difference between the contract ‘strike price’ and a market reference price. If the wholesale rate is at a higher level than the contract price, generators pay the difference back to the suppliers, in theory cutting costs for consumers, if its higher they get reimbursed by the supply company and the consumer get charged more. There’s competitive pressure to get cost down & win lucrative contracts. A £65m cap was set for the new round, limiting how many projects got supported, and also a 6 GW capacity cap. Bloomberg

NEF’s global benchmark for offshore wind is $89/MWh, 22% down on its 2018 figure. Denmark

has the lowest offshore wind levelised cost of energy at $49/MWh, but the UK might now better that. In the 2017 CfD round, the lowest strike price for offshore wind was £57.50/MW, half that in the 2015 round.

SSE wanted the 6 GW cap lifted, citing CCC’s ’75 GW by 2050’ offshore wind proposal & the new zero net carbon by 2050 target. https://theenergyst.com/lift-6gw-offshore-wind-cap-urges-sse/


*Fossil plants with CCS may soon get CfDs, but the pipes & storage may get RAB support. Meantime CCUS gets £26m www.energynewsof.com/2019/06/27/uk-government-awards-26m-for-carbon-capture-utilisation-and-storage

Solar Push  We need 20 million PV generators – and better innovation integration:

Regen’s Solar Commission, backed by UKERC’s Whole Systems Network Fund, examined areas where the UK could use its scientific & technical capabilities to play a leading role in innovation in solar power. It found that the UK has strong capabilities in many of the areas transforming the PV market, though its strengths in new solar cell techs, storage, information & communication and finance ‘have sometimes been obscured by a focus on China’s domination of the manufacture of current generation crystalline PV’. The UK should coordinate investment in innovation in PV with that in complementary techs such as storage & digital techs, to maximise the value of public & private innovation spending:

What’s in STOR Combined Heat and Power ought to be an ideal option for helping to balance renewables since CHP plants can vary their heat/power output ratio. They’re finding a role in STOR, the UK Short Term Operating Reserve balancing system:

None of the above (or below) - GWPF

The Global Warming Policy Foundation has waded in with a broad review of the impacts of renewables, under the noone too neutral title ‘Green Killing Machines’. It damns just about all of them: ‘Far from making the world a better place, renewable energy will destroy all we hold dear’. Alleging ‘wilful blindness’, it says that ‘RSPB barely opposes a development. Wind & solar power plants scar our landscapes and yet the CPRE say nothing either.’ Its press release says ‘Net zero carbon emissions will mean a vast expansion of wind & solar farms together with massive expansion of biofuel crops cultivation causing wholesale devastation of the UK’s landscape & wildlife’. It uses the late Prof. David MacKay’s scenarios as a template, but also looks at various green NGO plans. It has little time for any of them: www.thegwpf.org/content/uploads/2019/07/Green-Killing-Machines-1.pdf

It follows a more focused, a bit less intertemperate, study of wind power impacts on birds & bats: www.thegwpf.org/content/uploads/2019/07/wind-impact-1.pdf

But it’s clearly out to flatten renewables See Forum Video with Hinkley template: www.youtube.com/watch?v=viJ-Y4K-5zQ&utm_source=CCNet&Newsletter&utm_campaign=293eaf6d

It also had a go at biomass/Drax - maybe an easier target: www.thegwpf.org/content/uploads/2019/07/Biomass-biomass.pdf
Climate Crisis: The Green Transition

The Governments advisory Climate Change Committee says we now have to get on with it: www.theucc.org.uk/2019/07/10/uk-credibility-on-climate-change-rests-on-government-action-over-next-18-months/ Not easy: we were already missing interim targets for the old 80% GHG reduction target, so getting a 100% cut by 2050 will be tough: www.bbc.co.uk/news/science-environment-48929632

CCC wants action on all fronts. Its CEO, Chris Stark, told Carbon Brief: ‘My biggest disappointment of the past year is that enthusiasm to do something on climate change has only manifested in a new target.. Policy just hasn’t kept pace with new desire for climate action.’ The CCC says ‘Progress in deploying measures to reduce emissions is off-track across transport, buildings, agriculture & land use. In these areas, progress to date is behind virtually every indicator we track, often by a wide margin.’ E.g.: ‘over 10 years after the Climate Change Act was passed, there is still no serious plan for decarbonising UK heating systems or improving the efficiency of the housing stock, while large-scale trials have begun for either heat pumps or hydrogen’. www.carbonbrief.org/ccc-uk-has-just-18-months-to-avoid-embarassment-over-climate-inaction

There were also plenty of other calls for action www.independent.co.uk/environment/greenhouse-gas-emissions-climate-change-2050-target-committee-a8997826.html with some focusing on the cost & who pays: www.energyvoice.com/otherenergy/203245/uk-government-must-be-clear-on-who-pays-for-clean-energy-revolution See Box>

Zero Emissions bill - £1 trillion or half that? A good deal either way The £1 trillion figure calculated by the Treasury has prompted questions - it was 40% higher than the Committee on Climate Change’s estimate for the cost of getting to Net Zero by 2050 But former leader of the Labour Party and co-chair of IPPR’s Environmental Justice Commission, Ed Miliband, thought it was a good deal anyway, only between 1-2% of GDP: www.current-news.co.uk/news/miliband-brands-treasury-net-zero-cost-predictions-slightly-disturbing-in-moment-of-huge-opportunity

It can’t just be done by markets Capitalism will not do it left to itself. The government has to intervene to reshape markets and force the pace, with state funding too: www.theguardian.com/environment/2019/jul/07/to-ensure-a-green-future-the-uk-needs-to-ditch-free-market-economics

A Just Transition: better jobs The TUC wants to ensure that new jobs in the low carbon economy are not of lower quality than jobs that are changed or superseded: so workers’ voices should be put at the heart of net zero transition plans. TUC general secretary Frances O’Grady said ‘Trade unions are committed to addressing the climate emergency. A greener economy can be a fairer economy too, with new work and better jobs right across Britain.’ www.tuc.org.uk/research-analysis/reports/just-transition-greener-fairer-economy

Nuclear ‘to balance renewables’ The Prospect Trade Union submission to BEIS Financing energy infrastructure inquiry said: ‘Given that renewables technologies like wind & solar are inherently variable & non-dispatchable, nuclear power still has a key role to play in balancing renewables & ensuring security of supply without jeopardising the push to decarbonise our energy system’. But how? It can’t do the former (it’s inflexible) and may divert funding from cheaper renewables. The Institution of Civil Engineers submission noted the high cost of nuclear & the falling cost of renewables, but said ‘while renewable capacity has increased this comes with the need to balance the power system. Doing so has added 6% to wholesale prices as the day-to-day costs of running the transmission system increase - equivalent to £3.8m per day during the third quarter of 2018. More flexible generation, storage & demand-side response is therefore critical in minimising system costs.’ www.parliament.uk/business/committees/committees-a-z/commons-select/business-energy-industry-strategy/inquiries/parliament-2017/financing-energy-infrastructure-17-19/publications/


Otheractions - and reaction www.bbc.co.uk/programmes/p06y7w61

Community Power
UKERC vision/plan www.ukerc.ac.uk/publications/visions-for-the-future-of-community-energy.html And https://communityenergyengland.org


Who do we trust? ‘On your side’ says GMB union Despite its pro nuclear stance https://mariannewildart.wordpress.com/2019/07/06/gmb-on-your-side-really-because-it-is-not-for-the-safety-of-their-workforce-or-the-public/

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Otheractions - and reaction www.bbc.co.uk/programmes/p06y7w61

Community Power
UKERC vision/plan www.ukerc.ac.uk/publications/visions-for-the-future-of-community-energy.html And https://communityenergyengland.org


Next COP The UK to host COP26, the 26th UN Climate Change Conference, in Nov. 2020, jointly with Italy.
Does the UK need 40 GW of firm capacity?

Whether from nuclear plants or power stations with carbon capture and storage (CCS), the UK will need 30-40 GW of new low-carbon baseload generation by 2050 to meet the net-zero emissions target, Greg Clark said, just before being replaced by Andrea Leadsom as BEIS Secretary of State. www.edie.net/news/10/Clark-UK-may-need-40GW-of-new-baseload-generation-by-2050/38818/

That view underlined the consultation on RAB support for new nuclear, see above. Is it right? First off, ‘baseload’ plants, ‘firm power’ and ‘dispatchable power’ are not the same thing. As BNEF’s Michael Liebreich told Carbon Brief: ‘Any case for ‘firm’ power is essentially valueless without knowing the detail of the assumptions. Firm power which cannot be switched off when you don’t need it will be as much of a problem as variable power which cannot be switched on when you do. What is called for is flexibility, in huge quantities and of all types.’ Nuclear plants of the current type can’t provide that, and gas turbines with CCS may find it hard to load follow economically - with inefficient part-time use of costly CCS kit. What we need to do is to plan the whole new system coherently, not just add on odd bits.

At present, peak winter time power demand is around 60 GW. It’s met from so-called baseload plants, which is all that are needed to meet the summer night-time minimum demand of about 20 GW, topped up, mainly, by flexible gas plants. Renewables like wind & solar are variable, so, as they expand, we will need to use flexible plants more often and add other balancing measures. But that doesn’t have to be fossil gas-fired back-up plants. Biogas & green syngas fired plants would avoid the need for costly CCS, and storable hydrogen syngas could be made from the occasional surplus renewable power outputs, via P2G electrolysis at maybe soon similar overall costs. If we are talking about meeting near 100% of power demand from renewables most of the time, then there would, at low demand times, be a substantial surplus, available, if P2G converted and stored, to meet the occasional demand peaks and lulls in renewable availability, without much need for other storage, although compressed air/liquid air storage are also options for longer term bulk storage. Pumped hydro & batteries can help with shorter term balancing. Some easily-varied biogas-fired Combined Heat & Power plant outputs, linked to heat stores/district heating networks, could also help, with the heat stores topped up using solar heat & also heat made from surplus wind/PV power. And demand side management (DSM) could delay the peaks. Green power might also be imported, if available, to met local lulls. Will all that suffice? The current plan is to switch most heating & transport over to electricity - heat pumps and EVs. That has some issues: the power grid may not be up to it, as power demand would be pushed up at peak times, unless evening EV charging was delayed. But let’s say demand rose to 70 GW (despite the fact that power use has actually been falling). With say 100 GW of renewables on the grid, that demand could be met most times, with DSM helping with peaks. NG’s ESO says ‘there soon will be times in the year when the market could meet the total demand for electricity through renewable generation only and these periods will increase as more and more renewables are connected & more load actively participates in the market’. www.nationalgrideso.com/news/zero-carbon-operation-great-britains-electricity-system-2025

But if not, when there were long lulls in wind/PV, the stored converted surplus should be able to meet the shortfall. That does mean green gas plants must be there for occasional extra back-up use, but not 70 GW. If DSM can delay peaks and we import some power briefly, less should be needed - and that’s forgetting that the wind & PV are unlikely to both get to zero, and inputs from hydro and, possibly, geothermal & tidal. While BEIS insists ‘we need more nuclear and fossil CCS’, there are alternatives: www.carbonbrief.org/analysis-does-the-uk-require-new-nuclear-to-reach-net-zero-emissions

With climate targets being missed & the COP26 roadshow here soon, BEIS has to up its game:

www.theccc.org.uk/2019/07/10/uk-credibility-on-climate-change rests-on-government-action-over-next-18-months/
Public support for renewables up but more so in the south

Changes in renewable support since 2012 - up overall, but not everywhere. Scotland dourer on most options!

A more recent BEIS poll found support for on-shore wind had risen to 79% (from 76% in 2018). Offshore wind was at 83% (up from 79%), solar 89% (up from 83%), wave & tidal 82% (up from 77%) Renewables in all 84%.

Still no to onshore wind In a Lords debate in July on the UK Carbon Budget, asked if the government would now remove its blocks of onshore wind (see above, quite popular), the Parliamentary Under-Secretary of State for Business, Energy and Industrial Strategy, Lord Henley (Con) said ‘the opportunities for the price of offshore wind coming down are surely far greater than for onshore wind, because of the scale of the windmills that one can build at sea, compared to on land. We have no plans to review that policy.’ But nuclear was backed.

National Grid ESO
Its updated Future Energy Scenarios study says the old 80% 2050 carbon cut target could be reached via multiple pathways, but Net Zero C needs more action in all sectors. The power system will need to operate using only zero carbon generation and will need to deliver negative carbon (e.g. BECCUS). The gas system must adjust to hydrogen, with hydrogen-ready appliances. The use of over 35 million electric vehicles in 2050 will help with flexibility & help integrate a higher level of renewable. Electrolysis/P2G gas/power hybrids will also boost flexibility. But in some scenarios, ‘the effects of electrifying first transport & then heat become apparent’ & ‘out weigh the improvements in energy efficiency peak avoidance’. So we may need more BECCS/NETS.

Still not improving: www.rechargenews.com/wind/1828429/onshore-wind-critic-leadsom-is-new-uk-energy-secretary

ESO also says demand-side response (DSR) is more reliable than nuclear power in its latest Capacity Market auction guidelines. It has given DSR a de-rating factor of 86%, while nuclear is de-rated to 81%. DSR is also deemed to be marginally more reliable than biomass, coal and most interconnectors.
UK renewable capacity outlook - 80 GW by 2030

GlobalData, a leading data & analytics company, says that installed renewable capacity in the UK increased from 1.4 GW in 2000 to 42.1 GW in 2018, at a CAGR (compound annual growth rate) of 21.1%. Looking ahead, its analyst Arkapal Sil said ‘during 2019-2030, onshore wind capacity is expected to reach 21 GW by 2030 growing at 4% CAGR. On the other hand, offshore capacity accounting for 8% of installed capacity in 2018 is slated to grow at a whopping 11% CAGR to reach 29.7 GW in 2030 from 9.3 GW in 2019. Solar PV capacity contributing 12.5% of installed capacity in 2018 is expected to grow at moderate 2% CAGR to reach 17.2 GW in 2030 from 13.3 GW in 2019. During 2019-2030 hydropower is expected to increase at 4.2% CAGR to reach 7.3 GW in 2030 from 4.6 GW in 2019. Nuclear power, on the other hand, is slated to decrease at 1.5% CAGR to reach 7.6 GW in 2030 from 8.9 GW in 2019. The decrease in nuclear capacity is a part of the scheduled closure of all but one nuclear plant by the next decade.’ Sil added ‘the government plans to fill up the capacity vacuum owing to the closure of coal & nuclear capacity by increased gas capacity for catering to base-load power demand. Gas-based capacity is expected to reach 47.7 GW in 2030 from around 38 GW in 2019 increasing at 2% CAGR.’

www.power-technology.com/comment/uk-renewable-outlook/

CCC cost estimates

The government’s advisory Committee on Climate Change produced estimates for energy costs in 2008 but has admitted recently that renewables had got a lot cheaper than they expected, while nuclear had not done well. The Energy & Climate Change Intelligence Unit produced this updated comparison, see left: https://eciui.net/blog/2019/decarbonisation-is-getting-cheaper-why/

Gas plan

Can fossil gas really be replaced with green gas? www.isonomia.co.uk/turning-off-the-gas-decarbonising-uk-heat-in-the-uk/

Grass plan


Transport policy moves - slowly


Carbon offsets for flying


The UK oil industry looks to aviation & HGV oil markets, but also to green P2G/P2L for some uses. And CCS. It sees the down-stream oil industry as part of the low-carbon future: www.ukpia.com/our-contribution/future-vision/

Updated figures

Unlike nuclear, renewables all much cheaper now..

Mixed EI views on smart power

The Energy Institute’s Energy Barometer membership survey found that, in terms of opportunities opened up by smart energy techs, many members felt that energy companies, rather than domestic customers, will benefit financially most from the data revolution in energy. And while over 60% of EI members felt tariffs that reward flexible demand will be attractive to householders, a similar proportion felt that very few consumers will allow energy companies, rather than domestic suppliers to control their appliances, even if financial benefits are passed on. And while over half of members believed public pressure was a now a leading driver, only one quarter believed regulatory pressure.

DRAX can do no right!


£40bn might be enough pay for the system itself & more.


www.energylive.com/2019/07/17/smartenergystudy-future-energy-system/
No Plutonium burn up

The UK Nuclear Decommissioning Authority is no longer considering IFR/PRISM fast reactors for plutonium disposition. A March 2019 report says ‘the cost, scope & extent of work required to progress Fast Reactor options, such as the GEH PRISM, as well as the timeframe for these options to become available, means it is not credible for the NDA to develop these options, or have them available for implementation within the next 20 years. Therefore no further work with GEH has been funded by NDA.’ The MOX & CANDU options have also been dumped. The 140 tonnes of mostly UK plutonium will just be consolidated in a store at Sellafield, pending a long-term plan.


For more see: http://corecumbria.co.uk/briefings/a-decision-on-the-fate-of-uds-plutonium-stockpile-remains-years-away/

The Plutonium was extracted from spent reactor fuel. At one stage, that’s how bomb material was also obtained, though now reprocessing has been halted. But a different military link may persist:


Some Small Modular Reactors are also direct descendants of submarine nuclear propulsion units:


But now there’s an SMR go-ahead, with £18m initial government support for Rolls Royce:

www.parliament.uk/business/publications/printed/492031a + http://world-nuclear-news.org/Articles/UK-interests-funding-to-Rolls-Royce-6-All-for-the-early-2030s, with a £500m RR investment plan:


New nuclear: Sizewell C ‘would add £6 p.a. to bills’, says EDF, on the basis of the ‘RAB’ model, where consumers pay extra upfront for power, before the EPR plant is built, to reduce its financing costs. But taxpayers could also get hit if, in the event, construction was delayed & costs rose. And the £6 financing cost is on top of whatever the new price for electricity will be - with this extra tranche of inflexible nuclear pushing cheaper renewables out of the market:


Nuclear hydrogen?

To rescue the old Heysham AGRs?

‘H2 explores how Heysham Power Station could produce Hydrogen & drive the Hydrogen Society. This feasibility study provides Lancaster University the opportunity to work with EDF on their aspiration to become a UK wide Hydrogen supplier & distributor (utilising their eight operational nuclear reactors), which is part of EDF’s corporate 2030 strategy’.

www.lancaster.ac.uk/cemore/project/h2h/

Heysham 1 is expected to close in 2024, Heysham 2 in 2030. Is this an attempt to extend that? Or get a new one? An SMR?


But it is now to restart. Scotland also has the Torness AGR.

Scotland should re-think nuclear! says the Royal Society of Edinburgh.

Though it also backs hydrogen, wind etc., it looks to small modular reactors: ‘Melting Salt - and sodium metal-based SMRs such as PRISM & MOLTEX, which can deliver 300 MW, may also be able to utilise & ‘reprocess’ existing UK plutonium stocks as a fuel and vastly reduce its radioactivity, thereby improving the acceptability of nuclear energy in the long term. Reusing stockpiled plutonium for civil programmes could also have the potential additional benefit of mitigating nuclear proliferation.’

But, as above, the NDA says that’s off the agenda. And the Scottish SNP-led government is anti-nuclear.


Silly idea: https://theferret.scot/nuclear-power-reactors-scotland

UK Nuclear policy hole summarized


No SMRs? ‘Contemporary giga-watt scale reactors remain the only designs ready to be deployed in the UK in meaningful numbers between 2025 & 2035’, says the Energy Technologies Institute. Seems SMRs are a way off. https://d2umxnkyjne36n.cloudfront.net/insightReports/Update-to-the-role-for-Nuclear-in-UKs-Transition-to-a-low-carbon-economy_2019.pdf

Hints work continues

Nuclear written out...
2. Global Developments
BNEF looks to 62% renewables by 2050 - 50% wind and solar
in its New Energy Outlook 2019
Bloomberg New Energy Finance says wind & solar PV will supply almost 50% of global electricity by 2050 (wind 26%, solar 22%), and renewables overall 62%. That’s despite electricity demand increasing 62%, resulting in global generating capacity almost tripling by 2050. Nuclear is at 7%, fossil 31%: https://about.bnef.com/new-energy-outlook
BNEF CEO Jon Moore said: ‘In two-thirds of the world, solar and wind are the cheapest energy technologies bar none’. But fossil emissions will still rise, given rising energy demand.
IRENA renewables supply 86%, cutting emissions 75% by 2050
IRENA is more hopeful that BNEF. It says renewables and energy efficiency, boosted by electrification, could provide 90% of the necessary reductions in energy-related carbon emissions to limit the global rise in temperature to well below 2°C by 2050. Renewables can supply 86% of global power, and with electrification, they would provide 75% of the needed reductions. And they can be balanced thanks to smart digital technologies, which promise greater system flexibility, permitting maximum use of low-cost renewable power, including for transport, with new applications such as charging of electric vehicles & renewable-based production of hydrogen. The report looks at some national case studies of balancing.
Hydrogen gets a fair review from WEC...
The World Energy Council has surveyed views on Hydrogen, including P2G, and came up with quite favorable conclusions - it’s more of a hope than a hype. although there is still a way to go. However, it notes that ‘hydrogen producers using electrolysis all mentioned technology maturity and falling costs as recent key developments. Combined with imports, the economic fundamentals of P2X may be about to change.’ Though it says vehicle hydrogen use is likely to dominate.
WEC also look at the fossil steam reformation route to hydrogen production (SMR), but though it costs less than P2G/P2X, it needs CCS to make it (near) carbon neutral, pushing up the cost. There are other less developed routes. A German company is looking at high temperature pyrolysis of fossil gas: www.euractiv.com/article/climate-strategy-2050/news/german-industry-talks-up-carbon-free-hydrogen-from-fossil-gas
..and H2 gets talked up at G20 summit
with a new IEA report. Forbes’ ran this overview:
‘For green hydrogen tech to break through, government & industry must work together to ensure existing regulations foster investment rather than deter it. Trade in hydrogen will benefit from common international standards. International co-operation is vital to accelerate the growth of versatile, clean hydrogen around the world. If governments work to scale up hydrogen in a co-ordinated way, it can help to spur investments in factories & infrastructure that will bring down costs & enable the sharing of knowledge & best practices.’
www.forbes.com/sites/arielcohen/2019/06/26/hydrogen-takes-center-stage-at-g-20-summit-energy-meeting
But Forbes is less keen on methane capture from the air - it does seem unlikely given the low levels:
REN21 As ever, there’s a mine of data on renewable progress round the world in REN 21’s annual Global Status review. It says renewables supplied 18% of global energy in 2017 & over 26% of total power in 2018. But it’s all going too slowly - e.g. on heat & transport: http://ren21.net/gsr-2019/
Renewable growth

‘From 2007 to 2017, the Renewables category grew at an average annual rate of 16.4%. But within that category, power from geothermal and biomass grew at an annual average of 7.1%. Wind and solar power, by contrast, grew at an annual average of 20.8% and 50.2%, respectively, over the past decade.’ So says a Forbes article:


However, energy use has also grown- it’s now, it says, 4 times more. REN21s new status report puts the data, in terms of growth over the period, as a percentage of total energy consumption:

On this basis, renewables (at 2.3% average p.a.) have still grown faster than averaged energy consumption (1.5% p.a.) over the period, and new renewables (excluding traditional biomass which is falling) did even better (4.5% p.a.). Even so, it’s not fast enough to squeeze out fossil fuel, so, with demand rising, emissions are rising too. Renewables need to grow even faster & demand growth needs to be slowed- to squeeze fossil fuel (& nuclear) out. But can it happen? Renewable investment levels are falling- though they may pick up:


New energy, new markets - as renewables expand globally

As renewables spread, the existing energy market trading system may no longer be helpful. Globally and regionally it was dominated in the past by coal, then oil and more recently gas, physical commodities, shifted by rail, tanker, truck or (for the fluids) by pipe, with major geopolitical implications. But electricity has also been traded nationally and increasingly regionally e.g. around the EU, and, with renewables, that could grow. Renewable resources are very different from fossil resources. The latter are concentrated in a few geographical areas, the former are more dispersed & so often is power generation, with smaller local units & varying outputs. Globally the fossil energy companies will of course seek to maintain their market shares as long as possible, while making some concession to cutting emissions where possible, at the margins e.g. reducing gas-flaring, improving oil processing efficiency. But some oil companies are also ramping up their limited involvement in renewables, by acquisitions (e.g. in 2017, BP took a 43% stake in solar developer Lightsource) and by some direct venture capital investment (e.g. BP has invested in concentrating solar power developer BrightSource). Shell also had interests over the years in solar, but now seems more interested in wind energy, including offshore wind. CCS is only so far of marginal interest to the oil companies, hydrogen too, though that may change. For a good very detailed review of oil company polices, see: https://iopscience.iop.org/article/10.1088/2516-1083/ab2503

While the oil majors may thus play some role, as the green power market expands, national power companies will however play a dominant role, and since many of them have historically focused on fossil fuel, especially coal, global political and environmental pressures for an energy transition is causing problems for them and their host countries. Some (like Poland & Hungary) have dug in against rapid top-down imposed change (see below), but Poland, perhaps looking to how power companies might best capitalise on the inevitable expansion of renewables, recently suggested that the EU should move away from centralised regional trading to local more decentral trading between many nodes across the EU. It claims this would be more stable, but its not clear how it would avoid the need for long distance power transfers to help with balancing local supply and demand:

Global Climate Crisis

We’ve not done well (see right), but stabilised for energy, with commitments made to get all emissions to zero or negative by 2050 or before—see chart below. The UK was the first major economy to legislate for a net zero target (now agreed). According to BEIS, ‘the EU Member States that have targets for net zero greenhouse gas emissions in legislation are Sweden (by 2045) and the United Kingdom (by 2050). France is currently in the process of legislating for a 2050 net zero greenhouse target. In addition, a range of Member States have adopted or are currently publicly considering adopting plans for net zero carbon or greenhouse gas emissions by 2050, and in some cases have stated their intention to legislate for a target. These include Denmark, Germany, and Portugal and Finland. Other Member States with plans to significantly reduce emissions by 2050 include the Netherlands, which has a law to reduce greenhouse gas emissions by 95%, and Spain, which has a draft law proposing an at least 90% reduction (in both cases the reduction is compared to 1990). The EU is also considering adopting a bloc-wide net zero 2050 target, with a large majority of Member States, including the UK, supporting a net zero EU target by 2050 at the June European Council this year’.


Global action, fears, also some maybe dodgy solutions

Not Kidding on climate https://twitter.com/search?q=%23FridaysForFuture&src=typeahead_click
Citizen power https://theconversation.com/to-tackle-the-climate-crisis-we-need-more-democracy-not-less-119265
Climate crisis not climate change https://grist.org/article/is-it-time-to-retire-climate-change-for-climate-crisis/
As bad as it gets and then some www.jonathanporritt.com/blog/climate-emergency-continuum-bad-cataclysmic
It really does look quite grim unless we act faster: www.sciencenews.org/article/co2-emissions-global-warming
Oil dig www.theguardian.com/environment/2019/jul/05/biggest-compliment-yet-greta-thunberg-welcomes-oil-chiefs-greatest-threat-label
And a sad sign of our times www.motherjones.com/environment/2019/07/weight-of-the-world-climate-change-scientist-grief/
Another side New evidence suggests that galactic cosmic rays affect Earth’s climate by boosting cloud cover: www.kobe-u.ac.jp/research_at_kobe_en/NEWS/news/2019_07_03_01.html Much to the GWPF’s delight…
But then see this https://news.harvard.edu/gazette/story/2019/06/harvard-chemist-permafrost-n2o-levels-12-times-higher-than-expected

Depends on how its done: https://energythas.wordpress.com/2019/06/10/are-trees-getting-too-much-climate-credit-or-not-enough/
Sea boost www.independent.co.uk/environment/climate-change-ocean-iron-aerosols-fertilise-science-david-king-a8988241.html Dodgy?

Better news Green power Islands for green fuel production; www.pnas.org/content/early/2019/05/28/1902335116 + www.iflscience.com/environment/massive-artificial-islands-could-extract-co2-from-seawater-to-produce-renewable-energy-study-says/
The Court of Auditors want more grass roots power

The European audit agency said at least half the EU member states will be unable to reach their 2020 renewable energy targets, including the Netherlands, France, Ireland, Poland - and the U.K! It recommends citizen participation and more renewable energy auctions to increase investment and raise volume in the EU clean energy sector. Cross border renewables trade and grid improvements are also highlighted as necessary for a successful energy transition.

And we may need that - Since the European Commission’s proposal for a 2050 net zero target, which needed a unanimous vote, was vetoed by Poland, backed by Hungary, Estonia & the Czech Republic. They blocked the commitment to decarbonization by 2050, preferring a vaguer time commitment. www.euractiv.com/section/energy-environment/news/the-brief-poland-s-failure-to-think-big

The final agreement removes that date, and just says that the EU will ‘ensure a transition to a climate neutral EU in line with the Paris Agreement’. But some say the fudge will undermine it: www.euactiv.com/2019/06/10/eu-decarbonisation-plan-for-2050-collapses-after-polish-veto


Germany Renewables near 50% power

www.independent.co.uk/news/world/europe/germany-renewable-energy-50/MWh, from a consortium le

And tech marches on! See Box for a planned new storage pilot project, with multi GWh-scale storage. But the policy side is tricky. Perversely, unless the EU Emission Trading System is revamped, cutting its coal use could undermine emission reduction support. Market-based emission trading systems don’t always reward reduced emissions - carbon prices can go down

A red scare! www.thegwpf.com/germany-climate-hysteresis-green-party-may-help-communists-to-power-ccdu-leader-warns

Meantime, some, like Tennen T, hope that smart grid digitalisation plans can cut green power costs:

And work starts on a 10 MW hydrogen electrolyser: www.itim-power.com/news-item/shell-rheindorf-refinery-update


Finland Carbon neutral by 2035: ..and negative carbon emissions shortly after, by ‘accelerating the emission reduction measures and strengthening the carbon sinks’. But it would not rely on offsetting carbon emissions by buying credits from other countries. The government says ‘Electrification of society & the integration of various energy systems (for electricity, heat & transport) requires a significant increase in renewable energy production,’ while on nuclear, its view on operating license renewals for existing reactors ‘is positive, provided the Radiation & Nuclear Safety Authority recommends this’. www.world-nuclear-news.org/Articles/Finland-aims-for-carbon-neutrality-by-2035 and www.energyivenews.com/2019/06/04/finland-commits-to-carbon-neutrality-by-2035

France The winning bid for a 600 MW offshore wind farm off Dunkirk was at €50/MWh, from a consortium led by EDF Renewables, Innogy & Enbridge. After that, the government aims to tender for 1 GW of offshore wind p.a., up to 2028. Its previous plan aimed for 2.4 GW by 2023 and 5 GW by 2028. If the updated targets are reached, 6.5 GW could be installed by 2028 and 11.5 GW tendered - around 6% of its total electricity use:


And a 200 MW floating offshore wind project is planned by Equinor off the Canary Islands: www.reneweconomy.com.au/norways-equinor-to-build-worlds-biggest-floating-wind-farm-near-canyon-islands-88138/

Ireland Climate action plan to push renewables up to 70%, & go for heat pumps/EVs: www.theguardian.com/world/2019/jun/17/ireland-to-unveil-bold-plan-to-tackle-climate-emergency


Big hot-rock heat store Siemens Gamesa Renewable Energy has a large electric-thermal energy storage system (ETES) in Hamburg-Altenwerder, with ~1,000 tonnes of volcanic rock as a heat storage medium, fed with hot air produced by a resistance heater & blower that heats the rock to 750°C. When demand peaks, ETES uses a steam turbine to re-electrify the stored energy. It can store up to 130 MWh of thermal energy for a week.


Public dislike of Scooters www.technotian.com/article/2019/jul/15/innovative-electric-scooter-backlash

Danish delight of EVs www.carbonbrief.org/europe-2050-net-zero-eu-emissions-cuts-cut-to-1027745

France - EVs: www.carbonbrief.org/europe-2050-net-zero-eu-emissions-cuts-cut-to-1027745

On-shore wind could supply 10 x EU power needs

Using larger more efficient turbines & higher wind speeds:

http://www.carbonbrief.org/europe-could-get-10-times-its-electricity-needs-from-onshore-wind-study-says


EU news
PV still booming in China

The International Energy Agency says the world’s total installed PV solar capacity will reach 1,721 GW by 2030, and then rise to 4,670 GW by 2050. Much of this is likely to come from China. According to statistics from China Customs, exports of PV modules reached 15 GW in the first quarter of 2019, up 70% on last year. It’s also still expanding its own use of PV. In the first quarter of this year, China added 5.2 GW, the National Energy Administration says. That’s a drop from the 9.65 GW in the same period of 2018, due to the new policy on the construction of PV facilities for 2019 having been issued later in the year than similar policies issued in earlier years. Nevertheless, compared with wind, with 4.78 GW of new installed capacity and biomass, with only 970 MW of new capacity in the first quarter, PV remains the most favored renewable in China.


Meanwhile China is trying to complete its vast new Ultra High Voltage Direct Current supergrid: https://spectrum.ieee.org/energy/the-smarter-grid/chinas-ambitious-plan-to-build-the-worlds-biggest-supergrid

Japan fudges it? A Cabinet plan looks set for ‘a carbon-neutral society as the final goal’, and seeks to realise it ‘at the earliest possible time in the latter half of this century’. The strategy builds on a 2016 pledge to cut emissions by 80% by 2050 from 2010 levels, and to innovate in areas such as hydrogen & carbon capture. It commits to commercialising carbon capture & utilization (CCU) by 2023, and carbon capture & storage (CCS) used in coal-fired power generation by 2030. It also aims to slash production costs of hydrogen to less than one-tenth by 2050. Climate Change News says ‘the plan has been criticised for not tackling the country’s coal dependency’. That powered 33% of the country’s electricity in 2015, ‘while Japanese banks & development agencies are financing coal-fired power plants from Vietnam to Indonesia. In Japan, 30 new coal-fired power plants are either at the stage of planning or construction’. www.climatechangenews.com/2019/06/12/japan-says-will-carbon-neutral-fails-set-timeline/ Yuri Okubo, a senior researcher at the Renewable Energy Institute, warned that Japan risked becoming a ‘CCU, CCS, and hydrogen society. If Japan still aims to [receive] a quarter of its power source from coal by 2030 and does not revise its low renewable energy target, Japan will not see as taking a serious stance on tackling climate change.’

USA PV/wind oversizing works Curtailment cheaper than storage

Also see https://energypost.eu/overbuild-solar-its-getting-so-cheap-curtailment-wont-matter/


We couldn’t resist this: https://grist.org/article/u-s-military-emits-more-co2-than-most-countries/


Africa Power Store - global review from China Globally there is 181 GW of energy storage, 94% of it pumped hydro. China has 314GW in all, leading the world in most categories: http://en.cnjesa.org/white-paper-signup


Kenya’s big wind farm http://news.trust.org/item/20190719195055-fczw3


Huge Horse array in the Kubuqi Desert, Inner Mongolia AR. www.daily-mail.co.uk/news/article/7275483/China-spends-1-7-billion-building-massive-solar-farm-shape-horse.html

Supergrid


Download https://theconversation.com/314GW-in-chinas-energy-storage-capacity-69935920


http://news.trust.org/item/20190719195055-fczw3
The Global Energy Outlook (GEO) report from non-profit research institution Resources for the Future, compares forecasts from companies, government bodies, and expert organizations such as the US Energy Information Agency, BP, Exxon, Shell, the IEA, & others, through to 2040. None of the ‘high/100% renewables’ NGO/Academic studies are included.

Under Reference scenarios, renewables increase from 14% of the mix in 2015 to between 16% & 17%. But under Ambitious Climate scenarios, they become the largest source of global primary energy, overtaking oil to reach up to 31% in 2040. The projections for nuclear’s share of the energy mix also vary. It’s highest under Ambitious Climate scenarios, providing 8% to 9% of global primary energy, up from 5% in 2015. For other scenarios, it accounts for 4%-7% of the mix. Fossil fuels, which made up 82% of global primary energy in 2015, dominate across Reference and Evolving Policies scenarios, ranging from 74% to 79% in 2040. Under Ambitious Climate scenarios, fossil fuels decline to 60% to 62%. But Coal loses market share across all projections. Under Ambitious Climate scenarios, coal declines from 28% in 2015 to between 12% and 17% by 2040. Under Evolving Policies, it falls to 20% to 22%.

Liquid fuels - primarily oil - continue to be the single largest fuel source in the energy mix across most outlooks, though its share shifts from 32% in 2015 to between 28% and 32% in Evolving Policies scenarios. Under Ambitious Climate policies, liquids still account for 26% to 27% by 2040, but of a smaller aggregate energy base in the case of IEA SDS and Equinor Renewal. Natural gas becomes the second largest source in most outlooks, rising from 21% in 2015 to between 21% and 27% by 2040. CCS only lifts off in the Shell scenario, to lesser extent the IEA-SDS scenario.

Renewables, excluding hydro, supply around half of electricity in the Shell Sky & IEA-SDS scenarios and about 40% in a BNEF scenario, all by 2040. They are at their lowest in EIAs.

As can be seen from the chart left, the ones chosen nearly all depict energy use roaring ahead, much as in the comparative study by the World Energy Council—see the last Renew.

In terms of energy type, renewables, led by wind and solar, grow under all projections, though the rate of growth varies widely. See left. Renewables are the fastest growing source in about half of the scenarios.

LPG going green: https://www.businessgreen.com/bg/news/3078315/lpg-industry-sets-100-per-cent-biofuel-target

LNG horrors www.theguardian.com/environment/2019/jul/03/booming-lng-industry-could-be-as-bad-for-climate-as-coal-experts-warn


The Global Biogas Association says that only 2% of available feedstocks undergo anaerobic digestion and are turned into biogas - and, if developed, biogas could cut global greenhouse gas emissions by up to 13%.

**Big problems - flying**

Aviation is a growing carbon emitter. Commercial aviation burns a relatively small 2%-3% of global fossil fuel and currently aircraft cause about 3.5% of global warming from all human activities. But demand and emissions are rising. In Europe aviation emissions have doubled since 1990, and globally they could, without action, double or treble by 2050. A report from the European Federation for Transport & Environment said that ‘the expected technology and operations improvements will not mitigate the expected fuel demand and emissions growth from aviation. Generating incremental efficiency improvements from current aircraft designs is becoming ever more costly, and difficult. Further operational improvements remain possible but do not achieve decarbonisation & require the right policies to be in place. To significantly reduce the expected fossil fuel demand and ultimately eliminate it from the sector would require further measures.’ It might just about be done, with all technical fixes applied & green fuel (Power to Liquids, biofuels) used, but that would use most the available green energy.


**New electrolysis technology**

Currently, national and European funding bodies devote significant efforts to developing SOE (and SOFC). Hagen says ‘One of the European funded projects is ÉCo (Efficient Co-Electrolyser for Efficient Renewable Energy Storage, grant number: 699892). This recently completed project, combined all parts of the value chain, from CO2 suppliers (cement industry, biogas provider) via research units specialised in the core technology, the SOE & industrial SOEC technology providers, to the potential customer (gas utility). The overall objective was to utilise steam and CO2 with electricity from renewable sources in an SOE, thereby producing synthesis gas, which in turn is converted to synthetic natural gas and added to the existing natural gas infrastructure for large scale and efficient storage and distribution of “green electricity”. The SOE technology was proven to operate on a dynamic electricity input corresponding to a real wind turbine profile. When the SOE operates at elevated pressure, even internal methane formation occurs, which reduces the need of the downstream catalytic unit. The electricity input is the major factor for the SOE system. The cheaper the available electricity, the higher the economic potential. The more “green electricity” is available in the specific grid mix, the higher is the potential for reduction of CO2 emissions.’

**Down sides** SOE’s are high temp & less flexible than PEMs & syngas still makes CO2 when burnt.

www.openaccessgovernment.org/electricity-from-renewable-sources-2/68831/
Nuclear - dying in the USA?

Entergy’s elderly Pilgrim nuclear plant in Massachusetts has been shut after 47 years in operation, one of many such US closures. The 680 MW boiling water reactor was licensed to run until 2032, but has been abandoned early for economic reasons, after an earlier fault-related temporary shutdown:

http://world-nuclear-news.org/Articles/Pilgrim-shuts-down-for-the-final-time

Nuclear afterlives

Old US plants need care:
https://energyathas.wordpress.com/2019/06/24/nuclear-moral-hazard/ and

Who will safeguard them? 

Japan - new shut downs?

Some restarted plants may be shut due to delayed upgrades:

French EPR - still in mess

Flamanville welds still to be fixed:
http://world-nuclear-news.org/Articles/Weld-repairs-to-delay-Flamanville-EPR-start-up-adding-to-EDF’s-woes

www.world-nuclear-news.org/french-nuclear-power-producer-edf-plans-a-turnaround-11565026991
So will this overheating issue be solved?
www.telegraph.co.uk/news/2019/06/30/heatwave-may-force-nuclear-power-shutdown-france-cooling-water-An-annual-event?

itUSKCN1T72AI And climate impacts are likely to rise...

Never Finnish?

New EPR delay:
http://world-nuclear-news.org/Articles/Okkilautso-faces-further-delay-to-July-2020

EU blocs nuclear from financing

Not a green option:
www.euractiv.com/section/energy/news/es/old-nuclear-680MW-reactor-shuttup-as-Entergy-sells-off-Plotniki-

Nuclear afterlives

www.reuters.com/article/usfrancenuclearnews-france-

But would need a 20-50% carbon subsidy:
www.iaea.org/nuclear-power/nuclear-news/2019/jan/04/nuclear-power-doesnt-stack-up-without-a-carbon-price-industry-group-says


Opposed in Brazil
https://climatemoneywatcher.net/brasilianos-reject-nuclear-power-plan-as-it-veers-to-the-political-right...

Integral Fast Reactors - going nowhere

Much pushed, the IFR is still dead in the water.
active waste pyroprocessing too. Nuclear Monitor 876

..but £49m for new US R&D work this is not for new reactors:
www.world-nuclear-news.org/Articles/US-DOE-announces-funding-for-nuclear-energy-R-D

..and BNF’s Liebrich says there’s no choice

We need nuclear since renewables can’t deliver: https://about.bnf.org/blog/liebrich-need-talk-nuclear-power/ But can’t they if money isn’t diverted to nuclear?

UAE hit
dh/advdavoly/wordpress.com/2018/12/concrete-cracks-threaten-smooth-start-to.html The spread of nuclear in the region is worrying anyway, with its US backing:

www.world-energy-news.com/us/leaders-must-cease-where-they-are-going/

Bottom line

WNA on the HBO Chernobyl TV series:

But see:
www.ianjafair.org/news/final-episode-of-the-hbo-series-on-chernobyl/ and
www.world-nuclear-news.org/Articles/Viewpoint-Chernobyl-and-a-very-modern-safety-culture

The current reality at Chernobyl - PV taking over a little bit: www.atlascobuscura.com/articles/chernobyl-nuclear-solar-farm-plant-and-tourism!

IEA’s Nuclear Panic

The International Energy Agency says that ‘a sharp decline in nuclear power capacity in advanced economies would have major implications’. Without additional lifetime extensions and new builds, ‘achieving key sustainable energy goals, including international climate targets, would become more difficult & expensive. If other low-carbon sources, namely wind & solar PV, are to fill the shortfall in nuclear, their deployment would have to accelerate to an unprecedented level.’ It notes that, in the past 20 years, wind & PV have increased by about 580GW in advanced economies, but ‘over the next 20 years, nearly 5 times that amount would need to be added’. It says ‘such a drastic increase in renewable power generation would create serious challenges in integrating the new sources into the broader energy system. Clean energy transitions in advanced economies would also require $1.6 trillion in additional investment over the same period, which would end up hurting consumers through higher electricity bills.’ A bit odd. It seems to be based on the belief that nuclear will get cheaper. At present a renewable programme looks more economic- and renewable costs continue to fall, while nuclear costs remain high. Integrating more large nuclear plants into the expanding renewables mix would also be hard and undermine the economics of the system.

IEA director Dr Birol says: ‘Policy makers hold the key to nuclear power’s future. Electricity market design must value the environmental and energy security attributes of nuclear power & other clean energy sources. Governments should recognise the cost-competitiveness of safely extending the lifetimes of existing nuclear plants.’ Sounds as if is suggesting that new nuclear should get even more subsidies. The new report also argues that, while ‘extending the operational life of existing nuclear plants requires substantial capital investment… its cost is competitive with other electricity generation technologies, including new solar and wind projects, and can lead to a more secure, less disruptive energy transition’.


It all sounds rather desperate & unlikely, e.g. for France:

The IEA’s view that, if nuclear was not expanded or retained, emissions would rise, was certainly challenged as assuming that fossil fuel would be used instead of renewables. Stanford Prof. Mark Jacobson said ‘The IEA is irresponsible for promoting the subsidy of expensive, failing nuclear plants instead of using those subsidies to fund clean renewable energy, particularly wind and solar. These will eliminate more carbon and air pollution than the nuclear they will replace, and at a lower cost.’

Mycle Schneider, lead author of the annual World Nuclear Industry Report, said ‘the IEA’s assertion that it is only a matter of political will to reverse the trend and obtain ‘an 80% increase in global nuclear power production by 2040’ is lacking basic evidence for industrial feasibility, and is in fundamental contradiction with the historic performance of the industry over the past three decades’.

3. Forum  Odds and ends to chew on - comments welcome  Electrifying! www.futurelearn.com/courses/transforming-energy-systems


However, it’s easy to knock down ‘straw men’ - e.g. few look to batteries as major long-term energy stores.

A bit more helpful  A UKERC board game on heat decarbonisation: www.ukerc.ac.uk/news/heat-game.html

And also helpful, Transforming Energy Systems, a free short e-course from iGov at Exeter University:

And a nice bit of Energiewende promo from the USA, though actually there’s a bit to go still:

www.latimes.com/world/europe/la-fg-germany-coal-power-20190126-story.html There and everywhere.. And there are


US: Trump in his own words
In his post- G 20 Summit press conference on 29 June in Osaka, the following exchange took place:

Q. You praised this G20 Summit as extremely successful, yet it was a ‘G19 against one’ summit, if we look at climate change. Why is it that you still think ignoring the dangers of climate change is in the interest of the American (inaudible)?

THE PRESIDENT: I don’t ignore it. So we have the best numbers that we’ve ever had recently. And I’m not looking to put our companies out of business. I’m not looking to create a standard that is so high that we’re going to lose 20, 25 percent of our production. I’m not willing to do that. We have the cleanest water we’ve ever had. We have the cleanest air. You saw the reports come out recently. We have the cleanest air we’ve ever had.

And I’m not willing to sacrifice the tremendous power of what we’ve built up over a long period of time, and what I’ve enhanced and revived.

And they understand where I stand. And, you know, I’m not necessarily sure I agree. I can tell you, I’m not sure that I agree with certain countries, what they’re doing. Because I think they’re losing a lot of the power of what they can do with factories and with- and I’m not talking about political power, although that comes with it. I’m talking about the powering of a plant. It doesn’t always work with a windmill. When the wind goes off, the plant isn’t working. It doesn’t always work with solar, because solar is just not strong enough.

And a lot of them want to go to wind, which has caused a lot of problems. And, you know, the problem with wind is, in the United States, we’re subsidizing these wind towers all over the place because wind doesn’t work- for the most part, doesn’t work without subsidy. And I don’t want to be subsidizing things that don’t have to be subsidized. The United States is paying tremendous amounts of money for subsidies on wind. I don’t like it. I don’t like it. I don’t want to do that.


UK: What to do with DRAX?
The giant ~4GW DRAX plant in Yorkshire is being converted from coal to biomass firing, using imported wood pellets of uncertain provenance. That’s been opposed by Biofuelwatch, worried about the loss of carbon sinks. But not all the wood pellets necessarily come from whole trees- it’s allegedly mostly forestry wastes. That’s still not ideal, even if the sustainable sourcing regulations are tightened up- and applied.

A 3.6GW gas plant is also now proposed on the site. That too has been opposed. However, we may need some gas-fired plants for a while, to balance variable renewables, though not giant inflexible ones like this. Smaller biogas-fired ones would be better, while we develop Power to Gas (P2G) electrolytic conversion of surplus renewable power to storable hydrogen for balancing. DRAX could have a pilot project on that?

From UK’s star P2G pioneer, ITM Power in Sheffield. If all else fails, a fall back is to insist that the new fossil gas plant should be converted to CHP (Combined Heat and Power) to (also) supply heat locally, IF there is a suitable urban and/or industrial heat load nearby (e.g. in Selby). That would get much more total energy output value from the gas burnt, pushing the energy conversion efficiency up from 50% to maybe 80% or more, lowering the CO2/MWh ratio significantly.

There is or was some government cash for biomass-CHP, but the government is mainly into, easier, very big power-only conversion projects like DRAX. DRAX does have a small Biomass Carbon Capture and Storage pilot project. Some see BECCS as a key ‘carbon negative’ option. But it would need vast new biomass plantations and huge CO2 stores to make an impact on global CO2 levels. Why not just plant trees?

Dam removal - or do we need hydro?


Wind turbines are noisy! Oh yeah? Hard to detect above road noise, as this video illustrates: www.youtube.com/watch?v=Fh7migblhX8&feature=youtu.be

And they kill birds There’s an ‘appalling environmental cost of wind energy’


Yes, sadly they can kill birds, but so do cats, though there are ways to reduce wind turbine impacts, including bird scaring systems, better siting & also using larger turbines - which rotate more slowly. GWPF also waded in with this: www.thegwpf.org/content/uploads/2019/07/Green-Killing-Machines-1.pdf

See news. In the first report, they say: ‘We are not opponents of wind energy. Where wind energy makes sense it should be used. Whatever it is unreasonable and destructive, it should be avoided.’ But the second one dams just about all renewables to hell. And see this, from Putin! www.bbc.co.uk/news/science-environment-48936941 Coincidence!
Nuclear ‘safer than wind’

Wind power goes from strength to strength, as in the wind farms in Mecklenburgh, Germany left, but nuclear lobbyist Michael Shellenberger excels himself: ‘Chernobyl proves why nuclear is the safest way to make electricity. In the worst nuclear power accidents, relatively small amounts of particulate matter escape, harming only a handful of people’:  

He says ‘radiation from Chernobyl will kill, at most, 200 people’:  

He recycles Adam Higginbotham’s claim (in his Midnight in Chernobyl book) that ‘nuclear power plants... have been statistically safer than every competing energy industry, including wind turbines’. In fact, total global wind turbine related deaths have been put (by an anti-wind farm group) at 185 so far, mostly due to installation, maintenance and transport accidents, with total wind capacity now at 564 GW compared to under 400 GW for nuclear. In terms of deaths per GW year of output within the EU, wind comes at the bottom of the league table, at 0.005 fatalities/GWy, compared to natural gas at 0.07, oil 0.10, coal at 0.14 fatalities/GWy. For comparison, the global figure for nuclear has been put at 0.03/GWy, but the total number of deaths from Chernobyl is disputed, with estimates ranging up to the thousands or tens of thousands. See CSE’s wind study:  

Though hydro has a similar record. Tragically, dam failures drown people. But, like the much lower risk of wind & solar accidents (e.g. falling off ladders), these are all one-off physical events. To be avoided of course, but with no ‘latency’ period for subsequent heath impacts. Whereas with radiation, the health impacts can take decades to show, and, it seems, can be worse for women than men:  

If we want to avoid the even larger risk of deaths from fossil fuel use (air pollution & climate change), then, quite apart from all its other problems, nuclear doesn’t look a wise option. Wind & solar look much better. But don’t expect Shellenberger to agree: for him, renewables are a busted flush, doomed to failure:  

A parallel universe! One also it seems inhabited by EDF who evidently want to press with an EPR2:  

Nuclear releases - accidents compared

Chernobyl led to the release of about ten times more radioactive material into the atmosphere than Fukushima and most at the latter was blown out to sea. But the make-up was different - see chart. So were the impacts. Iodine tablet dissemination was done much more effectively in Japan, with there being fewer thyroid cancers. Chernobyl was thus worse all told, with an endless debate on blame/impacts ensuing- is it 100, 1000 or 10,000 dead, or even more, and was it all hushed up?  

And more recently:  

And now for something new - Energy Sufficiency says Sue Roaf

After nearly thirty years of energy efficiency thinking that promotes mechanical solutions through regulation and rating systems, there is a shift forwards to ideas of designing for energy sufficiency, reducing the need for using energy at all:  

Prof. Sue Roaf says ‘efficiency is part of the solution but for too long has been treated as the whole solution’:  

A recent UKERC posting by a new member of the CCC team called for more innovative energy thinking:  

Well, energy sufficiency is one candidate. CAT’s Clean Slate (112) also explored the idea of energy sufficiency- planning consumption equitably & ecologically to meet needs within planetary limits:  

Also inspirational on PV:  

19
The Long Goodbye to fossil fuels

A new very timely Palgrave Handbook, edited by Geoff Wood & Keith Baker, on how to manage the decline of fossil fuel use is on the way: www.palgrave.com/gp/book/9783030280758 It says that there is a paradox in the global energy transition as it has occurred so far: we have had growth in renewables & low carbon energy sources, but no concomitant decline in fossil fuels. ‘Simply put, there needs to be a decoupling of fossil fuels & renewable/low carbon energy; the latter cannot just simply pick up the slack of increasing demand or serve difficult to reach places. Unaddressed & unresolved, all this will do is serve to bloat the energy system with the same problems for issues such as climate change and energy security.’

It notes that, though renewables are expected to continue to be the fastest growing energy source (7.6% p.a.), the global fossil fuel share will remain more-or-less constant. Indeed BP says that fossil fuels will continue to gain market share to 2030 on the back of increasing energy demand, albeit at different speeds: oil (0.8%), coal (1.2%), gas (2%), with overall growth in part due to strong growth in production from shale gas & oil. So it won’t be easy…

Well yes, but the main underlying reason is that, globally, we have had continued growth in energy use, fuelled by economic growth. So renewables may have expanded, but so has energy demand & the renewables percentage share barely rises. Some say we must cut demand & maybe halt growth - except for renewables! Though stabilising growth would have big social equity issues. Dave Elliott is working on a new book on all that.

Climate politics

‘The battle over the environment is entrenching divisions over class, political attitudes and tribal affiliation. Younger voters tend to be deeply concerned about global warming. They blame climate change on the alleged self-absorption of a consumerist older generation greedy for more GDP growth than the poor old planet can handle. The radicals want immediate action against cars, planes & gas boilers. And they are convinced they are unimpeachably right. There is a snag. The evidence of recent years is that bossy middle-class people lecturing their supposed inferiors (educationally & economically) is not going well. Resentment and a desire to kick back against sanctimonious, hectoring elites played a notable part in the Brexit referendum result.’

Iain Martin, The Times, 19/7/19


Electric Vehicles booming in Norway https://twitter.com/PPchef/status/1146669314466111488
EV with 720km range www.euractiv.com/section/electric-cars/news/dutch-launch-prototype-solar-car-with-720km-range
Forgotten EV tire pollution https://ektalks.blogspot.com/2019/03/air-pollution-part-2-particulate-matter.html
Transport optimals - a UKERC view www.ukerc.ac.uk/publications/team-energy-for-mobility.html

Goodbye to Godfrey

We are very sad to report the death of Prof. Godfrey Boyle

He was one of the key pioneers in renewable energy in the UK, moving in the 1970s from his shared editorship of the famed AT magazine Undercurrents to lead courses and research on renewables at the Open University. He was a stalwart supporter of NATTA & Renew. His OUP book Renewable Energy is still the seminal text, its 4th edition having been updated and edited by Stephen Peake. He really was a one-off.

A busy productive life At the OU, Godfrey set up ATG, the Alternative Technology Group, later to become EERU, the Energy & Environment Research Unit. It was all very productive and path-finding. For example, in addition to work on wind power with Dr Derek Taylor, including a novel V-configuration device tested at the OU, Godfrey carried out research into electric tricycles, which predates the current upsurge in interest in electric bicycles. He also developed an innovative energy model called DREAM that predates many similar projects. Extra-murally, he was instrumental in establishing the Rainbow Housing Co-operative in Spenser Street, New Bradwell, Milton Keynes in the 1980s, one of the first such housing co-operatives and one that is still operating successfully. On a similar theme Godfrey played a key role in trying to establish The Green Town project as an eco-community in one of Milton Keynes’s grid squares. It came close to realisation until policy changes derailed it. Again a project that predates many plans for eco-towns/eco-villages and co-housing projects.

All the above and more was trailed in his famed Undercurrents book, with Peter Harper, Radical Technology. In terms of OU courses and outreach work, Godfrey played a leading role in the early 1990s project to develop a Renewable Energy Teaching Pack for Tertiary Education for the (then) DTI (Department of Trade & Industry) The pack won many awards, including a EuroSolar Award and helped to educate many thousands of students around the world. It made the OU the world’s leading provider of renewable energy education- it formed the basis of the OU’s various courses on Renewables since the mid 1990s, studied by over 10,000 students. The linked text book ‘Renewable Energy: Power for a Sustainable Future’ co-published by Oxford University Press is frequently cited as the best book on renewable energy. The first three editions were edited by Godfrey. The current version of the course (T313) is still going strong. In parallel, in his last years, in retirement, Godfrey adapted part of this course as an online version for the OU’s Future Learn platform- for a large new audience.

Derek Taylor & Dave Elliott - who, with his other colleagues and friends, will miss his vision & unfailing wit.
