In 1979, German activists and politicians began using the term ‘Energiewende’, loosely translated as Energy Transition.

By 1983 a fledgling Green Party had won 28 seats in the German law-making institution, known as the Bundestag.

By 2019 the Green Party was firmly established as a pillar of mainstream German politics, co-governing 11 of Germany’s 16 states and winning a record 20.5% of the German votes in the recent European Parliament elections.

The Energiewende concept has been embraced by the majority of the now unified German population and the last remaining black coal mines are now closed.

In December 2019 the Bundestag approved a package of legislation called the Climate Action Programme 2030 which aims to make reductions to 1990 greenhouse gas emission levels of 55% by 2030, 70% by 2040, and up to 95% by 2050.

But Chancellor Merkel recently had to admit that her administration was struggling to meet the promises she made as part of the 2015 Paris climate accord, and that the targeted 40 percent reduction in emissions by the end of 2020 may not be met.

So what’s going on?

Hello and welcome to Just Have a Think,

Quick 101 on Coal, (to be honest, as much for my benefit as yours!)

Peat is the precursor to coal. Add heat and pressure to peat and you get lignite and sub-bitumous coal, sometimes referred to as soft coal or brown coal. Add more heat and pressure and you get bitumous coal, also regarded in the United States as soft coal, but generally categorised in Europe as hard brown coal.

Keep going with the heat and the pressure and you create anthracite or hard black coal. Anthracite has the highest available carbon and heat content of all the categories.

At the height of its production peak in 1957, Germany was a mighty coal producer, digging up 150 million tons of hard coal in that year and employing more than 600 thousand workers.

But production volumes of hard coal have been declining ever since and the last two remaining mines, in North Rhine Westphalia were closed down in 2018.

So how come coal still makes up nearly a third of Germany’s energy mix?

Well, like so many aspects of our global journey towards a sustainable future, the answer to that question turns out to be complicated.

Germany’s decision to close hard coal mines was arguably taken more for economic reasons, than environmental ones

According to this analysis by Kirstinn Appunn for Clean Energy Wire dot com

The average cost for mining one tonne of hard coal in Germany is about 180 euros compared to about 90 Euros a tonne for an imported product of similar quality. So, Germany started importing.

In 2018 they brought in 44 million tonnes in total. About 19 million tonnes of that came from Russia and 9 million tonnes was shipped in all the way from the good old U.S. of A!!

And Germany also still produces about 169 million tonnes a year of lignite, or brown coal, which is the dirtiest and least efficient variety.

Events took an unexpected turn in 2011 as a result of the Fukushima Nuclear disaster in Japan.

That accident convinced Angela Merkel, who has a Phd in Physics, that she could no longer guarantee that a nuclear disaster would never occur in her country.

And so, supported by 65% of the German population, the Chancellor ordered the “Atomausstieg,” the exit from nuclear energy once and for all, closing the oldest half of the German Nuclear estate immediately and targeting the complete closure of all facilities by the end of 2022.

That move caused an upward spike in coal production, taking it to 45% of power generation by 2013.

But this report in The Economist shows that number falling to 36% by 2018.

Despite this gradual reduction, by the end of the last decade the German government was getting pilloried all over Europe and the wider world for their continuing reliance on coal and the increasing likelihood that they were on track to miss their 2020 emissions reductions targets.

So, in 2019 the industry witnessed a sharp 25% drop in both hard coal imports and lignite production.

The overall result is that, since the original announcement of the nuclear phase-out, coal production has actually fallen by 35%, from 262 Terawatt hours to 171 Terawatt hours, dropping its share of overall power generation from 45% to 28%.

Nevertheless, according to the IEA, coal was still the largest source of electricity generation in Germany in 2018, making up 38% of grid capacity.

Dr Fatih Birol, Executive Director of the IEA points out that renewables have replaced a large share of nuclear over the last decade.

Birol highlights a 2010 policy called the Energy Concept, which aimed for renewables to account for 35% of gross electricity consumption by 2020.

Germany actually overachieved on that target, reaching 38% in 2018 and overtaking coal to reach 44% in the first half of 2019.

Despite that apparent success, the integration of renewables onto Germany’s grid is not proving to be a smooth process.

Most wind capacity is in northern Germany and most demand comes from urban and industrial areas in the south and west.

There’s been significant public opposition to north-south high-voltage transmission lines, and regulatory conflicts with aviation authorities, all of which has slowed progress of new overhead line construction considerably and forced the government to install a much costlier network of underground interconnectors.

The result is that, In the first half of 2019, the net addition of new wind turbines fell to the lowest level in two decades.

These delays in grid expansion mean that, at the moment, northern states are facing power surpluses and southern states are experiencing deficits that cost hundreds of millions of Euros each year to rectify with power station ramp ups in the south and curtailments in the north.

That’s an imbalance that’ll get worse when the last of the nuclear plants closes in 2022, unless stronger measures are put in place.

The latest Climate Action Programme has actually targeted renewable energy to provide 65 percent of total power consumption by 2030, so in an attempt to alleviate public concerns the plan proposes that any new turbines must be built at least 1 kilometre from the nearest residential area.

On top of that, all municipalities will receive a regional bonus in guaranteed remuneration for any turbines built on their land. The aim is to get wind turbines distributed more evenly across the country and not primarily in the more windy northern states.

Running alongside these measures, the German Commission on Growth, Structural Change and Employment has recommended the complete phase out of coal power by 2038 at the latest, with almost 13 gigawatts of the overall 43GW being phased out by 2022 and 25.6 Gigawatts by 2030.

According to Kerstine Appun,

“The future use of coal is at the centre of Germany's political debate on the energy transition and its efforts to mitigate climate change after the country has seen a stagnation in greenhouse gas emission [reductions] despite growing use of renewable sources.”

Two questions often arise from conversations around the phase out of fossil fuels, both of which are perfectly reasonable.

The first is how will baseload electricity be maintained without coal, and without nuclear power?

The International Energy Agency makes this assessment.

“Though Germany has ambitious plans to increase its reliance on variable renewable electricity, it will also become more dependent on natural gas for electricity generation.”

Although the combustion of natural gas emits only about 55% of the CO2 of lignite combustion, it is still a fossil fuel and that means it’s not really a viable long-term option from an environmental point of view.

One of the main objectives of a distributed European Smart grid is to minimise the requirement for centralised power generation plants. Cross border interconnectors are being constructed in many parts of Europe so that electricity can be moved from location to location, controlled by powerful computer algorithms, just like data on the internet, arriving where and when it’s required in fractions of a second.

Most auto industry people accept that we’re on the cusp of a sharp increase in the number of fully electric vehicles on our roads. Vehicle to grid connectors allow electricity to flow back into the grid from the vehicle when it’s not in use, which means an Electric Vehicle can support the grid at peak times like early evenings and then be automatically replenished by the grid during off peak times overnight. The driver still gets into a fully charged vehicle each morning with no inkling whatsoever of the intricate interchanges that have occurred.

And it’s not just vehicles. Static units like electric boilers for domestic heating systems now exist that can also send power into the grid as well as receive it. That could effectively mean a roll out of millions of distributed micro energy storage units all over the continent.

And then… there’s hydrogen.

[Sören Amelang](https://www.cleanenergywire.org/about-us-clew-team), writing for Clean Energy Wire, explains

“In the fight against climate change, hydrogen made via electrolysis with renewable electricity is increasingly seen as a silver bullet for sectors with particularly stubborn emissions, such as heavy industry and aviation.”

Germany is right now finalising the details of its highly anticipated National Hydrogen Strategy, which they’re expected to publish in the coming weeks, and we’ll definitely be looking very carefully at that on this channel as soon as it’s released.

The IEA also tells us that Germany is planning to convert older power plants into large, centralised energy storage sites. Existing grid connections at these plants make them an ideal option.

And that leads us onto the second important challenge of the energy transition, which is how to safeguard the jobs and livelihoods of thousands of workers?

Converting obsolete power plants into energy storage sites in their existing locations would mean increased economic activity and employment in those traditional coal mining regions.

One example is the boiler at the Reuter coal power plant in Berlin. The German Aerospace Center is currently working on a pilot project with the German utility Vattenfall and a start-up company called SaltX to replace the boiler with a molten salt thermal storage tank that will be heated using excess renewable energy. That stored energy can then be released over a relatively long period of time, just like discharging a battery.

The German Coal Commission has also recommended the option to convert coal-fired power station sites in the Lausitz region into modern industrial parks sourced by renewable energy. That would come as huge relief to an area that’s expected to be hit the hardest by the coal phase- out.

The commission also strongly proposes that in coal mining regions, coal miners, electricity customers and coal plant owners should receive 40 billion Euros over 20 years in what they call ‘transitional assistance’.

And importantly, the commission says that money should come out of the federal budget rather than a surcharge on electricity.

So, the Climate Action Programme sets out a national CO₂ pricing mechanism, aimed at companies that sell heating and transportation fuel, with an initial price of 25 euros per tonne of Carbon Dioxide emitted, rising to 30 euros in 2022

35 euros in 2023

45 euros in 2024.

And 55 euros in 2025

The idea is to allow citizens and companies time to get used to the new pricing system and invest in less carbon-intensive alternatives.

The government says that all new revenue generated by carbon pricing will either be invested in new climate action measures or returned to citizens as compensation, and it’s expecting CO2 pricing in the buildings and transport sectors to generate just under 19 billion Euros by 2023.

## According to the IEA’s sister organisation, The International Renewable Energy Agency, 291,000 were employed in the German renewable industry in 2018, half of them in the wind power industry. That means Germany already has the largest renewable technology workforce in Europe

The transition to renewable energy is reaching a critical tipping point in 2020, one that may well be accelerated by changes in public perception and activity as a result of the cleaner air, quieter streets and remote teleworking opportunities that many people have witnessed in recent months.

One thing’s for sure though, the people who control the fossil fuel industry will not give up without the mother of all battles, so we can probably expect very turbulent times over the coming years.

That’s it for this week.

I’m conscious that a fair number of new people have subscribed to the channel following our last program and several of you have asked questions about how the channel is funded, so I just want to take 30 seconds to clarify that.

I started the channel in 2018 and I’ve operated it in on my own ever since. I research, write, film and edit every program during the evenings after I get home from work or at weekends.

I will never utilise the monetisation function on You Tube, so YOU will never see a commercial on any of my videos. I also don’t accept paid endorsements.

BUT covering the cost of buying equipment and materials IS greatly helped by contributions from individuals around the world who support me via my Patreon page.

Like me, those folks are all acutely aware of the existential threat that climate changing is bringing, and we all share a strong desire to understand and communicate the urgency of the predicament and the solutions that may help us navigate our way to species safety throughout this century.

So, the support of Patrons is not just financial, they also act as an objective feedback mechanism to help me keep the channels content as accurate and relevant as possible.

I quite simply could not run this channel without their support.

And in fact, I must just give a quick shout out to the folks who, since our last program, have joined the Patreon team with pledges of ten dollars or more a month.

They are

David Milne

Radoslaw Kurowski

Adam Kirk

Marty Schrader

Joe Dellatorre

Paul Wilkinson

Jett Yang

Jason Strauss

Sol Davidson

Robin Mann

James McManus

And Ryan O’Neill

A huge thank you to all those folks and to everyone else who’s joined the Patreon page since last time.

But of course, you can also show your support for the channel for free by hitting the like button, and by subscribing, both of which raise the channels visibility with the You Tube search algorithm and help to get our message to more and more people each week.

It’s dead easy to subscribe. You just need to click down there or on that icon there. And don’t forget to hit the bell icon so you get notified about new content.

As always, thanks very much for watching,

Have a great week and remember to just have a think

See you next week.