

Are power stations flood-proof?

By Nick Higham
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Flooding in central England and tidal surges on the coast of East Anglia have highlighted the damage that can be caused by changes in water levels.

But how secure are the UK's power stations against the threat of rising tides?

When torrential rains this summer caused the Severn and its tributaries to burst their banks, it was not just homes and private businesses that were inundated in the resulting floods.



Vital infrastructure, too, was affected. A water treatment works near Gloucester was put out of action, depriving 150,000 homes of clean water.

Kingsnorth power station sits on the banks of the Medway

Floodwaters also threatened to submerge an electricity substation, jeopardising power supplies to half a million homes.

An internal Environment Agency report later concluded that nearly 5,000 sites of "critical infrastructure" were built on flood plains and most had little or no protection.

The threat comes not just from rainwater and from rivers, but from the sea as well - and nowhere is that threat greater than in the low lying North Sea coasts of south-east England.

Protection barriers

So at first sight it is unnerving to realise there are no fewer than six large power stations - not substations, like the one threatened in the summer, but massive generating plants - sitting in the flood plain on the banks of the Thames and Medway.

How vulnerable are they to flooding from a storm surge like that which menaced the coasts of East Anglia last week, threatening to breach or overtop seawalls?

And what would happen if they were flooded?

Together the six plants can generate more than 7,800MW - more than 10% of the UK's entire generating capacity of just above 77,000MW.

Some are "baseload" stations, which run continuously, and others operate only intermittently at periods of peak demand.

RWE Npower operates a 1000MW coal-fired baseload power station at Tilbury, on the north bank of the Thames, and a 2000MW oil-fired station on the south bank at Littlebrook, near Dartford.



“A small change in what's normal can mean very large changes in” extremes

Matt Huddlestone
Met Office

The company says both stations are protected by flood protection barriers strengthened in the 1970s, in the wake of the disastrous East Coast flood of January 1953, which killed more than 300 people and inundated 24,000 homes.

If there were a threat to the defences, the company says it would deploy pumps and sandbags to protect what is, after all, a multimillion pound asset.

Only in the last resort, it says, would it shut the plant down, with the safety of its staff the most important consideration.

And it points out that in half a century of operation the Tilbury plant's flood defences have never been breached.

E.on UK operates two power stations on the north bank of the Medway.

Kingsnorth is a 2000MW coal-fired station. Grain is a 1300MW oil-fired plant on the Isle of Grain. The company says both are protected by sea walls designed to withstand the kind of flood that comes along just once in 250 years.

A second power station on the Isle of Grain, a 700MW gas-fired plant, is run by Scottish & Southern Energy. This enjoys the same level of protection as the nearby E.on plant.

In addition, the company says it was constructed, in the early 1990s, on an artificial platform 3m (10ft) higher than the surrounding landscape.

A fourth power station in the Medway area, the 800MW gas-fired Damhead Creek, sits close to Kingsnorth and is owned by Scottish Power.

Warning bells

The power companies clearly believe their sites are not at risk. E.on is building a second £350m power station at Grain and has a controversial £1bn plan to build a second coal-fired station at Kingsnorth.

RWE Npower is also proposing a new plant at Tilbury - the existing power station is due to close in 2015.

The Environment Agency - which maintains many of the seawalls along the Thames and Medway estuaries - seems equally confident.

It says the Thames defences were designed in the 1970s to cope, up until 2030, with the kind of floods that happen once every 1000 years. And the 1970s designers in fact over-estimated the rate of sea level rise, so the defences should still meet that standard well beyond 2030.

The interactive flood risk map on the agency's website shows Kingsnorth on the Medway is not protected by flood defences - but the agency says the map is wrong and indeed the Medway defences also reach the 1 in 1,000 standard.

Nonetheless, warning bells have been sounded by some experts.

Last week the Met Office said that storm surges were likely to become higher and more frequent as the century progressed, thanks to climate change - and that floods that currently occur once in every 100 years on the East Coast could happen once every 10 years by the end of the century.

"It's quite a scary story," says the Met Office's Matt Huddleston. "A small change in what's normal can mean very large changes in extremes."

Insurers too say climate change and resulting sea level rises are likely to increase flood risk in the future.

The Association of British Insurers recently called on the government to invest more money in strengthening defences for areas of significant residential development like the Thames Gateway, in which Tilbury and Littlebrook both sit.



The summer floods left towns like Tewkesbury under water

Ambiental, a company that specialises in flood modelling and risk assessment, says there is a residual risk that even defences built to cope with the kind of floods that occur once every 200 or 250 years can be overtopped or breached. Human error - a floodgate left open, perhaps - can never be ruled out.

And in June the National Audit Office reported that fewer than half the flood defences in the Thames region classified as "high risk" by the Environment Agency were at their target condition.

Between them the power stations in the Thames and Medway can supply enough power for around eight million homes. If one goes offline, the National Grid diverts power from elsewhere to keep the lights on - and most of the time not all the stations are operating anyway.

Equally, a storm surge that breached defences in the Thames would not necessarily affect the Medway, and vice versa, so it is unlikely all the stations would be affected simultaneously.

Nonetheless if they were, and at a time like midwinter when electricity demand is at its peak and all six were operating, millions living in London and the South East might be affected.