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Why the Drax and Lynemouth Power Stations in the UK may Consider Thermally Treated Wood Pellets

The UK “Bridge” policy will create unprecedented challenges in the pellet fuel supply chain.

This white paper explains why there are challenges, describes what the challenges are, and offers a solution.

This white paper is complimented with a new interactive dashboard.

June 17, 2025

By William Strauss, PhD

Currently in England...

The world’s largest consumers of wood pellet fuel for power generation are the [Drax](#) and [Lynemouth](#) power stations in the UK. The Drax station has four 650 MW units that were converted from coal to 100% pellet fuel. The Lynemouth station has three 140 MW units that were converted from coal to 100% pellet fuel.

The two power plants essentially produce baseload power for England’s power grid.

The two stations currently consume 8 to 9 million tonnes per year of pellet fuel. The pellet fuel cannot be exposed to rain or snow. It must be kept dry during storage.

The supply of pellet fuel to both Lynemouth and Drax is more or less continuous.

The pellet factories that supply the UK station with a steady flow of shiploads are mostly in north America (see Figure 1).

The steady flow has some buffers (intermediate storage).

Some pellet fuel is stored and kept dry at the power stations and at the ports. Several commodity traders have some storage as well.

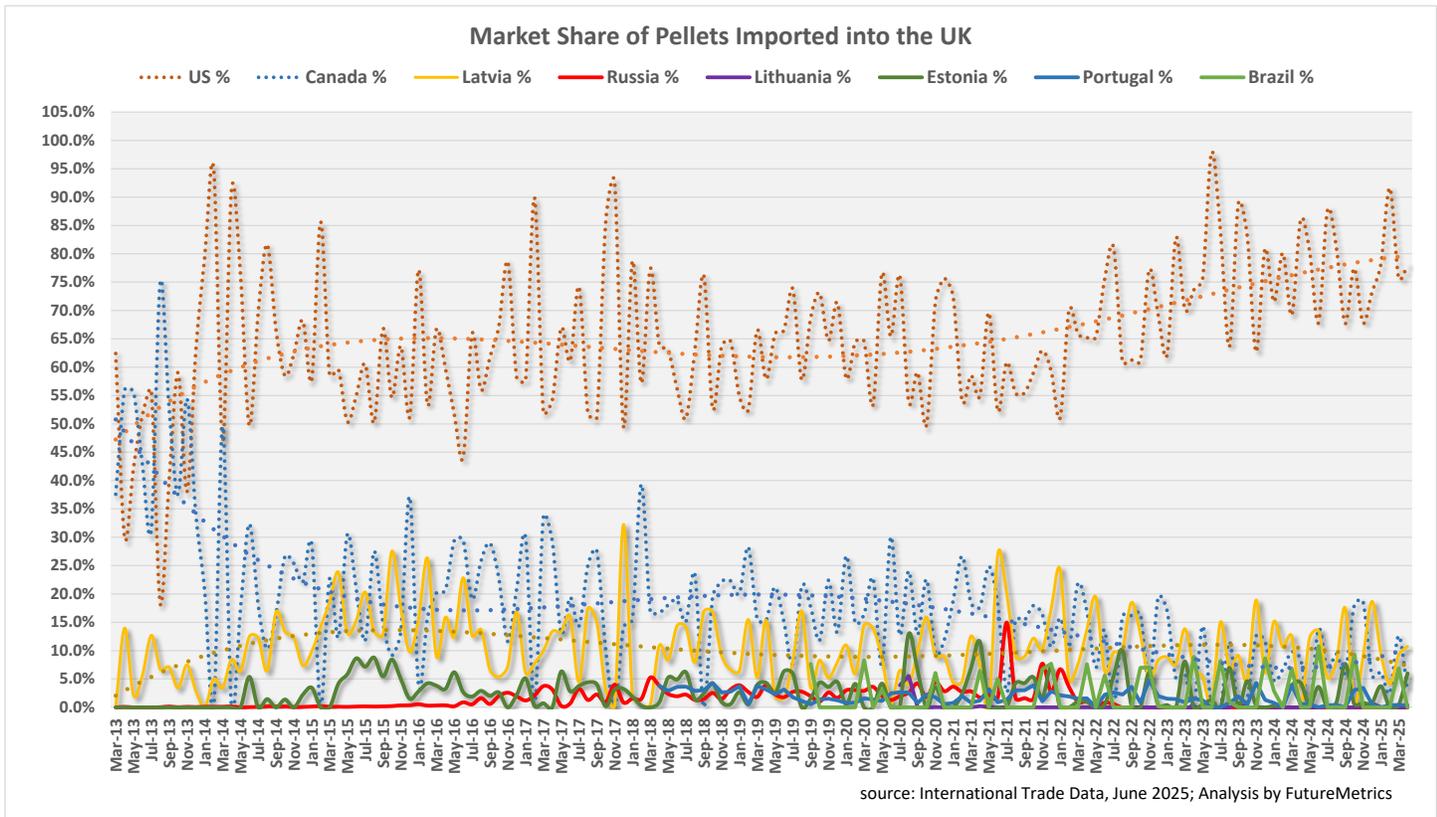


Figure 1 - Market Share of Pellet Imports into the UK

Limited Storage is the Foundation of the Problem that the Bridge Policy will Create

Lynemouth has about 50,000 tonnes of storage and Drax has about 300,000. 300,000 tonnes of onsite storage may sound like a lot but, assuming Drax produces near its recent annual output of about 14 TWh's, the station will consume about 7.1 million metric tonnes of pellet fuel per year. At the estimated average capacity factor that equates to generating 14 TWh's, the daily consumption of pellet fuel is about 32,000 tonnes (about 223,500 tonnes per week). In other words, on average Drax has less than 10 days of fuel on site inside of their four storage domes.

Storage at ports is typically not much greater than what a ship can hold. At some loading ports that can berth Panamax vessels, the dry storage capacity would be around 65,000 tonnes. At unloading ports, Drax and Lynemouth use trains with specially designed wagons (rail cars) that are immediately moving most of the pellet fuel from the unloading ports to the power station. The ships have to be unloaded as fast as possible to avoid demurrage costs and the pellets are moved to the power stations more or less contemporaneously.

This continuous semi-just-in-time system works because the supply of wood pellet fuel on a daily basis more or less matches the demand.

Continuous demand matches continuous supply.



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Pellet factories manufacture pellet fuel as close to a 24x7x365 level as possible. There are two major reasons: (1) The business model for a pellet operation needs maximum up time to make the significant capital investment in the plant make sense. And equally important, (2) the suppliers of woody biomass feedstock to the pellet factory do not normally operate intermittently. The flow of feedstock to the pellet mill will keep coming even if the pellet mill is not running. The upstream sawmills that generate and support the mill and forest residuals that are pellet feedstock also operate as near to 24x7x365 as possible. The procurement of feedstock by the pellet factory needs to be as consistent as possible to support the upstream stakeholders and keep them happy as suppliers.

The Bridge Policy

The “problem” with the bridge policy is that it will make the demand intermittent.

Using the word “problem” misrepresents the overall policy. The policy, as is shown in more detail below, is a well-thought out solution that balances the need to decarbonize with the objective of doing so in the most cost-effective way for ratepayers and taxpayers.

The “problem” is manifested in how the policy will impact pellet fuel supply chains.

If supply is constantly flowing but demand is intermittent, intermediate inventorying of the product is required.

As this paper shows, working out how to store the pellet fuel when supply keeps producing but the generating stations are not making power and consuming fuel turns into a major challenge.

The UK government is committed to carbon emissions reduction goals. In support of those goals, both Drax and Lynmouth have been producing low carbon baseload electricity with carbon beneficial pellet fuel¹ under the Contract for Difference (CfD) scheme². However, that policy support ends in March of 2027.

In discussions with both Drax and Lynemouth, the Department of Energy Security and Net Zero (DESNZ) has formulated the so-called bridge policy³. The policy guidelines, as of the date of this white paper, have only been published for Drax. However, it is expected that Lynemouth will have similar support.

The policy will extend the CfD scheme for all of the Drax and Lynemouth units with the expectation that by the year 2031 or so bioenergy carbon capture and storage (BECCS) will be implemented. The revenues from permanent carbon removals are expected to allow both stations to generate power using sustainably sourced pellet fuel and sell the power into the grid without CfD support.

¹ FutureMetrics has a number of white papers discussing how sustainably source bioresource derived solid fuel is carbon neutral in combustion. <https://www.FutureMetrics.com>.

² <https://www.gov.uk/government/collections/contracts-for-difference>

³ <https://www.gov.uk/cma-cases/referral-of-the-proposed-subsidy-to-drax-power-limited-by-the-department-for-energy-security-and-net-zero>



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But the bridge policy will create significant changes to the generation profiles. A key component of the policy will significantly limit how much generation is supported.

“The proposed CfD arrangement...will include a generation collar with a cap for the load factor eligible for subsidies set at 27%, representing a significant reduction compared to existing support. **This means Drax will only be supported to generate power when the system and consumers really need it. When intermittent renewables are abundant, Drax won’t generate, and consumers will benefit from cheaper wind and solar instead.**” [Text made bold by FutureMetrics]

FutureMetrics estimates that pellet fuel demand into the UK could drop by three to four million tonnes per year after March of 2027. But even more importantly, Drax and Lynemouth are incentivized to generate mostly in the colder months when UK demand is high and solar generation is low.

Why the Bridge Policy Makes Good Economic and Regulatory Sense

Demand for electricity in the UK varies significantly from summer to winter. As Figure 2 shows, winter power demand, on average, is about 48% higher than summer demand.

This demand profile does not match the supply profile. In the winter months, solar power generation is almost nonexistent. Short days, low sun angle, and frequent cloud covers do not support solar output.

Figure 4 and Figure 5 on pages 6 show this clearly.

On June 8, 2025, as shown on Figure 4, demand was almost completely filled by nuclear baseload plus wind plus solar. Natural gas generation was at its minimum and the combination of Drax and Lynemouth output was curtailed.



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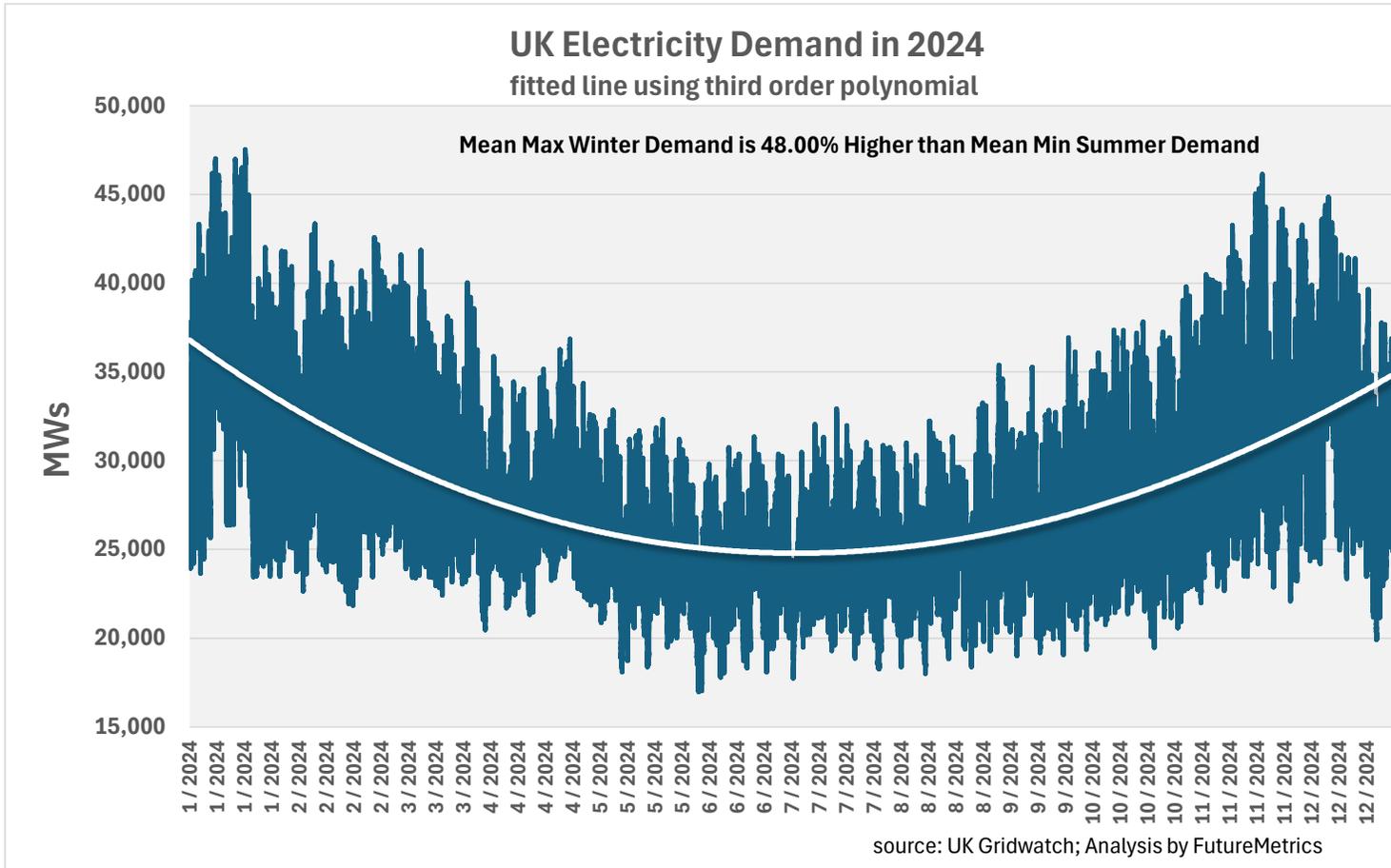


Figure 2 - UK Power Demand in 2024



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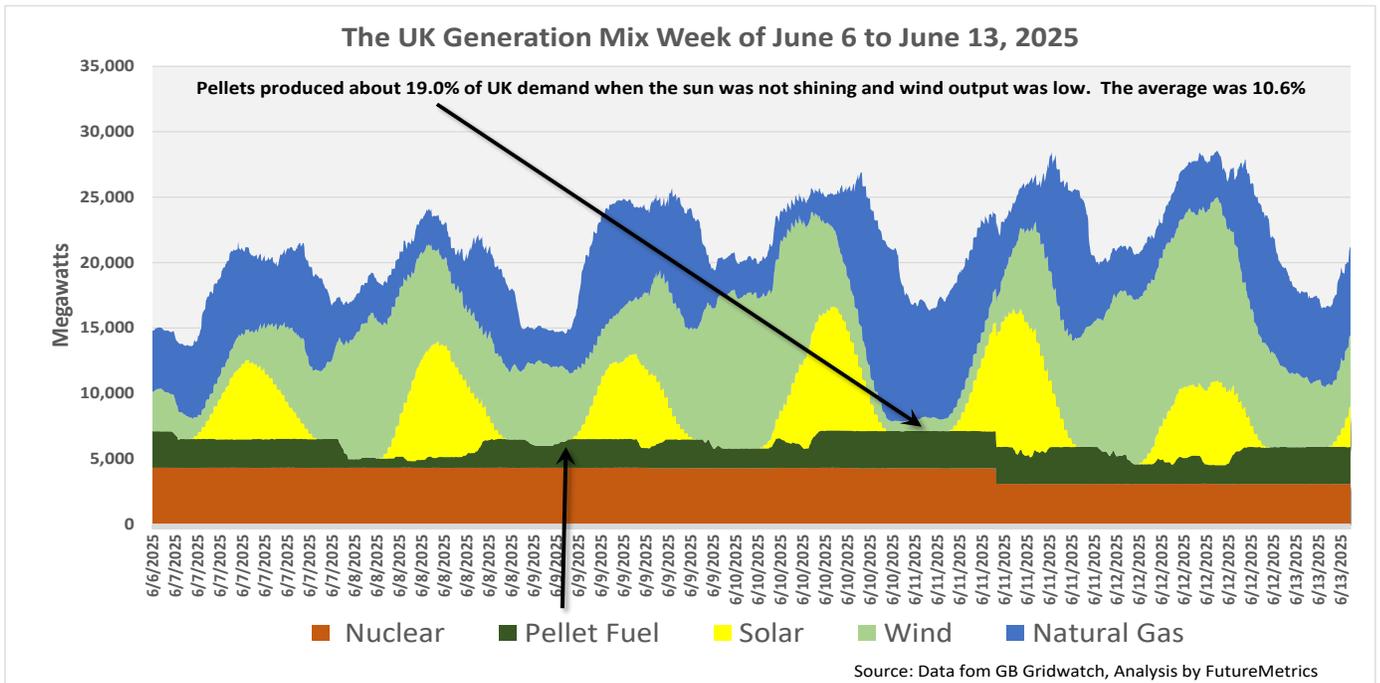


Figure 3 - UK Generation Mix Summer

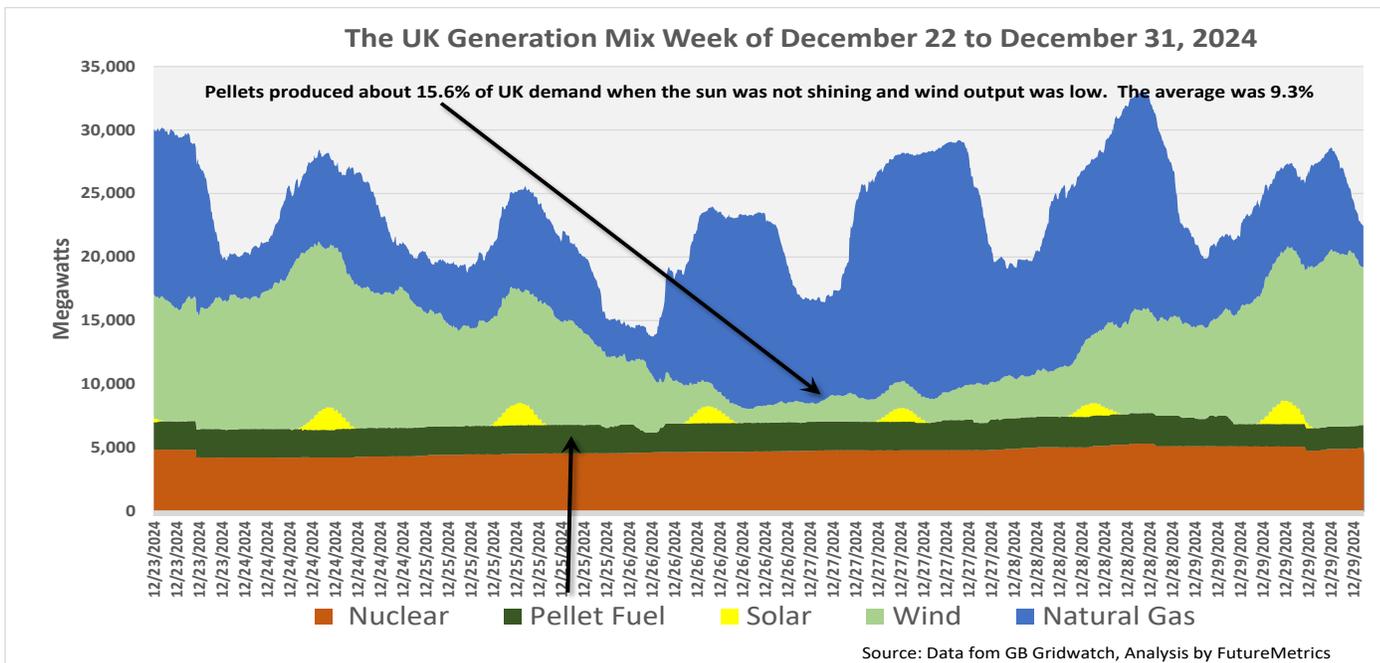


Figure 4 - UK Generation Mix Winter



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It is therefore rational for DESNZ to formulate a policy that optimizes the use of nuclear, renewable, and natural gas generating assets for reliability and lowest cost balanced with the overarching goal of minimizing CO₂ emissions. And the policy supports the continued and profitable operation of the Drax and Lynemouth stations (albeit at lower total cash values than currently) as they work towards the goal of being carbon negative via BECCS.

But the Bridge Policy will Add a Significant Challenge to the Supply Chain

To illustrate how the bridge policy will create challenges in the supply chain, let us work through a hypothetical scenario for the Drax station.

The scenario could be called “worst case”, but it will serve to show how intermittent generation by Drax and Lynemouth will create significant problems with managing the supply of pellet fuel.

Suppose that Drax meets the regulatory limit on TWh output by generating continuously during the coldest months during which demand is peaking and solar generation is very limited. That is, Drax fires up in say November and runs without interruption until they hit the maximum output under the bridge policy.

With assumptions on power station efficiency (40%), pellet fuel net energy (17.6 gigajoules or 4.9 MWh per metric tonne), and assuming that all four 650 MW units are available 24x7, Drax will hit the upper limit of 6 TWh's of output over 3.16 months. They will consume about 3,056,000 tonnes of pellets in the 3.16 months of full output generation. The estimated capacity factor for the station four units (total of 2,600 MW's) would be about 26.3%.

This is compared with the average estimated capacity factor of 82.0% for the equivalent of three units that Drax has normally operated. Under typical current operation with an annual production of 14 TWh's, the Drax station consumes an estimated 7,150,000 tonnes per year.

If we assume that Drax's fuel suppliers produce pellet fuel at a more or less consistent output every month, producers will need to produce about 255,000 tonnes per month.

The “problem” is illustrated in Table 1 on the next page in which pellet inventory grows every month by the steady production but consumption is only over 3.16 months (about 13.7 weeks).



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Drax Operating 4 Units for 13.7 Weeks per Year

Producing 6.0 TWh's per year and thus consuming 3,056,000 tonnes per year of pellets		
	Pellet Inventory	Pellets Consumed
June	1,155,000	0
July	1,410,000	0
August	1,665,000	0
September	1,920,000	0
October	2,175,000	0
November	1,461,000	968,314
December	747,000	968,314
January	33,000	968,314
February	137,000	151,057
March	392,000	0
April	647,000	0
May	902,000	0

Analysis by FutureMetrics

Table 1 - Example of Potential Inventory Challenge

Given the assumptions in this “worst case” scenario, nearly 2.2 million tonnes of pellet fuel must be stored somewhere! The maximum could be higher if Drax is uncomfortable with a minimum inventory of only 33,000 tonnes.

It is likely that generation over the cold months will be more intermittent rather than continuous. But nonetheless, if winter peaking is realized, even if not entirely continuous, the problem of where to store millions of tonnes of pellet fuel does not go away.

Pellet Storage in Domes, Silos, or Large Warehouses is Costly and Has Risks

The current pellet fuel supply chain operates in a semi-just-in-time model with limited buffer points. Several commodity traders have some storage capacity, but most of that is to buffer the heating pellet markets’ seasonal demand profile.

The current pellet fuel supply chain does not have the ability to store millions of tonnes of pellet fuel.

Building large storage solutions for white pellets has significant cost. This can be illustrated with an example.

Suppose the storage needed for the Drax station includes a 3 week minimum supply. To hold the minimum, the four 75,000 tonne domes will be full, and some storage will be needed at the port. The total storage requirement that will build up over the months during which Drax is not generating will be about 2.5 million tonnes. Given the typical bulk density for white pellets of about 650 kg/m³, this will require about 3.8 million cubic meters of storage space. Assuming that the cost of acquiring a site and building storage is US\$250 per cubic meter, the total cost for



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building out that storage would be about US\$960,000,000. If that cost is amortized over 15 years at a discount rate of 8% and is applied to each MWh that Drax generates (for a total of 6 TWh's per year), it will add the equivalent of about US\$40 per tonne to the delivered cost of pellet fuel.

This does not include the cost of operating, maintaining, and monitoring the storage solutions; and it does not include a profit margin for the owners of the storage solutions.

Nor does this include the cost of insurance for storing white pellets. White pellets carry the potential for so-called “self-heating”⁴. This risk of a catastrophic outcome can be mitigated with proper monitoring, and by procuring white wood pellets from well-operated pellet factories. However, the probability of an incident cannot be 100% eliminated.



Figure 5 - White Pellet Storage Silo Fire and Collapse from a Self-Heating Incident

⁴ FutureMetrics, The Wood Pellet Association of Canada (WPAC), and Ørsted are hosting a one-day workshop—*Safe Wood Pellet Storage: Preventing, Detecting, and Managing Self-Heating Incidents* in Copenhagen, Denmark, on September 3, 2025. See [HERE](#).



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A Solution that May Result in a Lower Cost for the Power Station

What if the need for dry storage solutions can be eliminated? Suppose that the Drax and Lynemouth stations could store carbon beneficial bioresource derived solid fuel in the outside yards that used to store coal?

This would eliminate the need for costly dry storage and would open up the potential so store a significant portion of the needed inventory on site in the currently unused coal yards.

This solution is entirely possible with the use of thermally treated wood pellets (TTWP)⁵.

TTWP's made using torrefaction or steam treatment are more costly per net GJ of energy delivered to the power station than white pellets (see other FutureMetrics white papers on this topic).

To date, both Drax and Lynemouth have essentially been baseload stations. With high capacity factors and a more or less constant consumption of fuel, there is little need for intermediate storage solutions. And with the high capacity factors, there are a lot of MWh's over which to spread the cost of the needed dry storage. The cost added to the delivered cost per tonne of fuel is modest.

Plus, the high turnover in the Drax domes and Lynemouth silos nearly eliminates the risk of self-heating.

But the near future in the UK will be different. As described in detail above, a low capacity factor regime with generation limited to the cold months in the UK changes the analysis⁶.

It may be lower net cost and lower risk to pay a modest premium for the fuel and avoid the massive costs and risks associated with managing the inventory that has to be stored somewhere. TTWP's have low to zero risk of self-heating and, when stored outdoors in the currently unused coal yards, there are no risks of catastrophic losses.

The scenarios described above unambiguously lead to the conclusion that TTWP that can be stored in the existing unused coal yards are the optimal solution in low capacity factor scenarios.

Complementing this white paper is a **new dashboard** that allows the user to experiment with changes to most of the critical inputs to the decision-making model. This dashboard should be considered a tool. Those unfamiliar with the issues may find it a bit confusing. The next page has a screenshot of the default screen. The dashboard can be opened on your web browser from [HERE](#).

⁵ FutureMetrics will publish a new comprehensive and detailed technical analysis of thermal treatment technologies (both torrefaction and steam treatment) from major suppliers of credible solutions approximately in September 2025.

⁶ This situation may be mitigated as demand ramps up once BECCS is implemented in the 2030's.



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Cost Build Up for Pellet Fuel Supply to a Power Station (select country)

Calculate Feedstock Energy Density Using a White Pellet Basis

White Pellet Moisture Content (MC)

White Pellet Net Energy Density in GJ/Tonne

Feedstock Energy Density = 18.62 GJ per Dry Tonne

	Steam Exploded (SE)	Torrefied
Mass Loss	<input type="text" value="12.0%"/>	<input type="text" value="28.0%"/>
Energy Loss	<input type="text" value="6.0%"/>	<input type="text" value="14.0%"/>
Pellet Moisture Content	<input type="text" value="6.0%"/>	<input type="text" value="6.0%"/>

Current Country = United Kingdom

Exchange Rate £/US\$

Wood Cost and Wood Conversion Analysis

Average Moisture Content (MC) of Incoming Feedstock

Price per Green Tonne (US\$) → **£30.00**

Estimated Dryer Fuel Needed as Percent of Total Feedstock Demand → 14.8%

Estimated Outputs

	White	SE	Torrefied
Estimated GJ per Tonne	17.50	18.69	20.90
Total Tonnes of Input Feedstock per Tonne of Pellets (including dryer fuel)	2.10	2.39	2.91

Logistics Costs per Tonne for White Pellets

US\$50.00 → **£37.50**

Decrease Due to Higher Energy Density per Cubic Meter ?

Logistics Costs per Tonne for SE and Torrefied Pellets

US\$47.50 → **£35.63**

White Pellet Storage Calculations

Constant Supply of White Pellets = 56,314 per Month

Weeks of Required Buffer Fuel Storage

White pellet storage needed if 90% of what is delivered during the 9.6 months when not generating requires storage = 681,504 tonnes or 1,048,468 cubic meters (includes buffer).

White Pellet Bulk Density in kg/m³

Percent of Max Needed White Pellet Storage Actually Stored

Dome/Silo Storage Cost per Cubic Meter → **£188**

Total Storage Solution Cost
US\$262,117,000 **£196,588,000**

Cost Build Up Per Tonne Of Pellets In United Kingdom Currency

Conversion Costs per Tonne for White Pellets

US\$35.00 → **£26.25** ?

Increase Over White for SE and Torrefied

SE 15% TOR 15%

Conversion Costs per Tonne for SE and Torrefied Pellets

£30.19 **£30.19**

White Pellet Storage Cost per Tonne used by the Power Station = **£34**

White Pellet Storage Cost per Tonne used by the Power Station = £34

EBITDA per Tonne

US\$35.00 → **£26.25** ?

15 Term of Storage Cost Amortization in Years

8.0% Interest Rate for Financing White Pellet Storage

Show Avoided White Pellet Storage Cost Per Tonne In Cost Buildup?

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