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### **Trump Wants to Create US Manufacturing Jobs. We Offer a Plan that can Help.**

**The strategy that the Trump administration could follow will have significant benefits for regions that desperately need the jobs: the coal mining sector and the forest products sector.**

By William Strauss, PhD – November 2024

The plan that this white paper discusses will create many tens of thousands of new jobs. The plan will stimulate billions of dollars of new investment in new US manufacturing plants. It will enhance US national energy security and cost competitive diversification of baseload generation.

The cost to ratepayers, as shown in detail in this white paper, is imperceptible. The cost to taxpayers is zero.

This well-proven co-firing strategy, which is already in place in many other countries, can provide certainty for the need for US produced coal, certainty for US coal mining jobs, and stimulate billions of dollars of new capital investment for the production of solid fuel derived from the by-products of the primary forest products sector. The permanent direct job creation for the forest products sector and multiplier effect jobs under this strategy are significant.

By supporting the blending of 15% US produced bioresource derived solid fuel with 85% US produced coal in coal-fueled power plants, the strategy will support the continued operation of those power plants and therefore will sustain the demand for coal as part of the power generation fuel mix. The plan will also strongly support the otherwise fading markets for residual forest products (more on residual forest products below).

The cost of generating a megawatt-hour of electricity at a 15% co-firing ratio is only marginally higher than the cost of generating on 100% coal. Diluted across the overall power supply, the end user impact on ratepayers is imperceptible.

The job creation and the economic multipliers resulting from wages and the supply chain commerce are significant.

**And in both the coal and forest products sectors, those jobs are in areas that are traditionally economically depressed.**

The strategy this paper proposes as a policy is based on proven low-cost and easy to implement minor modifications of coal fired power stations to allow them to blend upgraded bioresource derived solid fuel with coal. These modifications are widely deployed in England, western Europe, South Korea, and Japan.

It is remarkable that England, western Europe, and Japan import a significant proportion of that fuel from the US while the US does not use any of that fuel in its power stations! All US production in industrial grade wood pellet fuel is exported.



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The US will export nearly 10 million metric tonnes<sup>1</sup> of pellet fuel in 2024 (see Figure 1). That is about one large Panamax sized shipload (65,000 tonnes) every other day of the year.

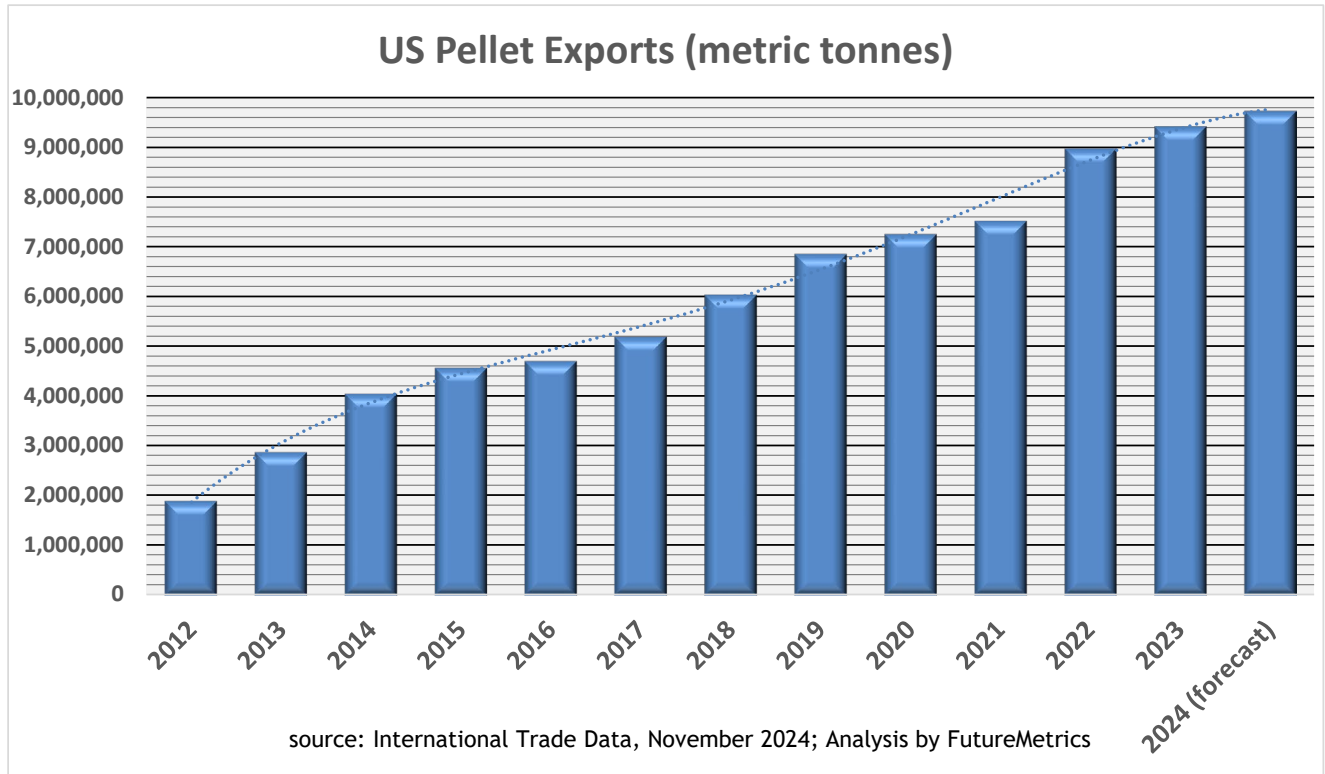


Figure 1 - US Industrial Wood Pellet Exports

The global market for bioresource derived solid fuel is a large and growing market. Total global exports reached nearly 25 million metric tonnes with the US being the largest producer and exporter.

**The plan outlined herein leverages existing US power plants with the US's strength in producing competitively priced coal substitute fuel that is derived from the by-products of the primary forest products industries.**

<sup>1</sup> All references to tonnes in this report are to metric tonnes. 1000 kilograms (a metric tonne) equals approximately 2,200 pounds.



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### The Coal Fueled Power Plants in the US and their Demand for Fuel

The map below shows the locations of the 342 still operating coal fueled power plant units<sup>2</sup> in the US that are larger than 150 megawatts (MW's)<sup>3</sup>. Go to the interactive Google Map [HERE](#) or click on the map below. Once open in your browser, click on any station to see details and a link to an online description of that station.

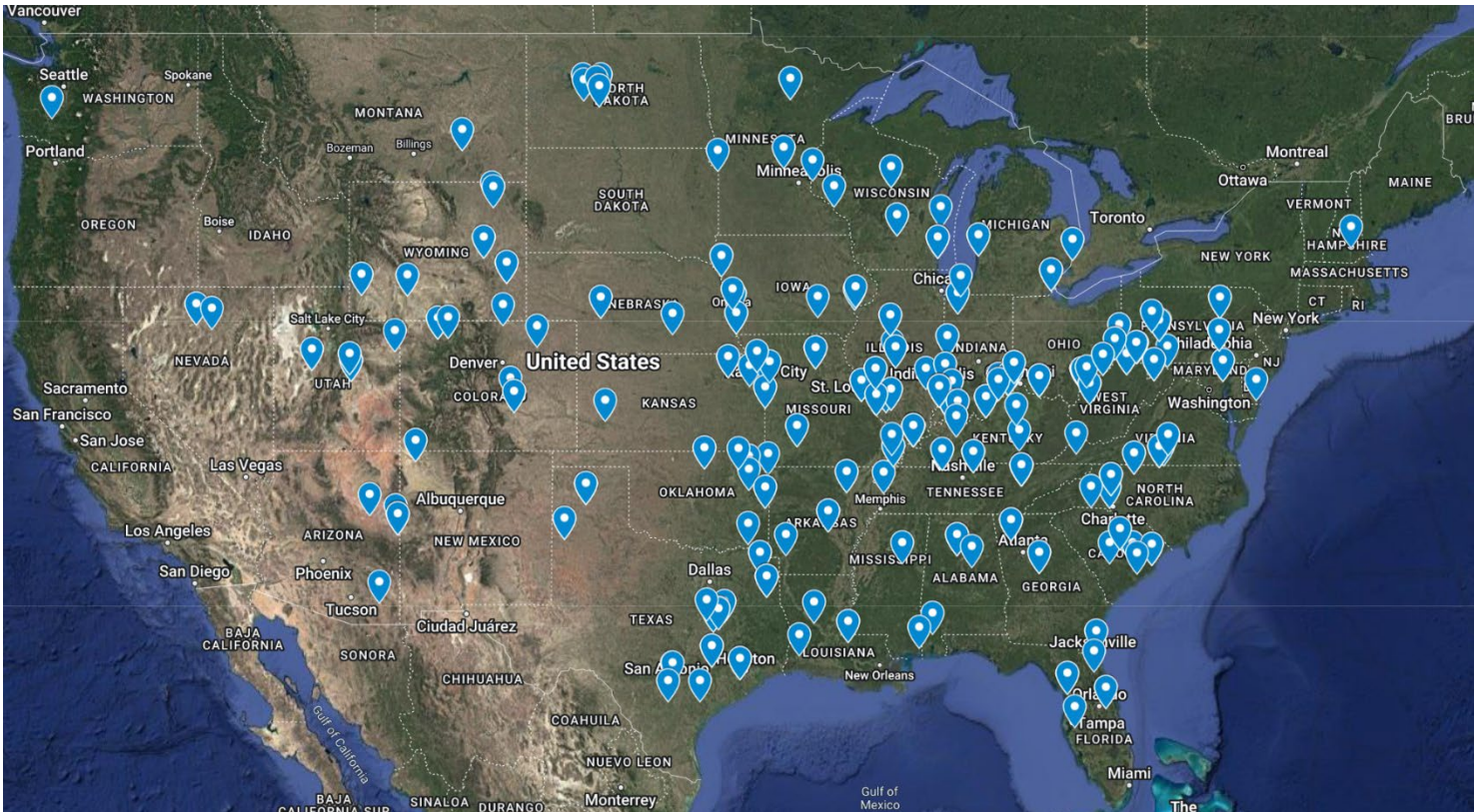


Figure 2 - US Operating Coal Fueled Generation Units greater than 150 MWs

All of the 342 operating units shown in the map use pulverized coal (PC) technology. PC power plants are easily modified to use a blend of 85% coal and 15% solid fuel derived from bioresources. With proper low-cost easy to implement modifications, there is no derating and no loss of reliability.

The US power generation sector has changed significantly over the last several decades in ways that are significantly reducing the jobs needed to power the electricity grid.

Hydraulic fracturing (fracking) in shale formations has opened up massive reserves and a flood of natural gas (NG) resulting in very low prices. As a result of current and expected future low-cost NG, the power sector has been shifting from coal to NG by building new NG fueled power plants and retiring older coal fueled units.

<sup>2</sup> Many power stations have more than one generating unit.

<sup>3</sup> Data from Global Energy Monitor, Global Coal Plant Tracker, October 2024.



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As the Figure 3 on the next page shows, the shift has been dramatic.

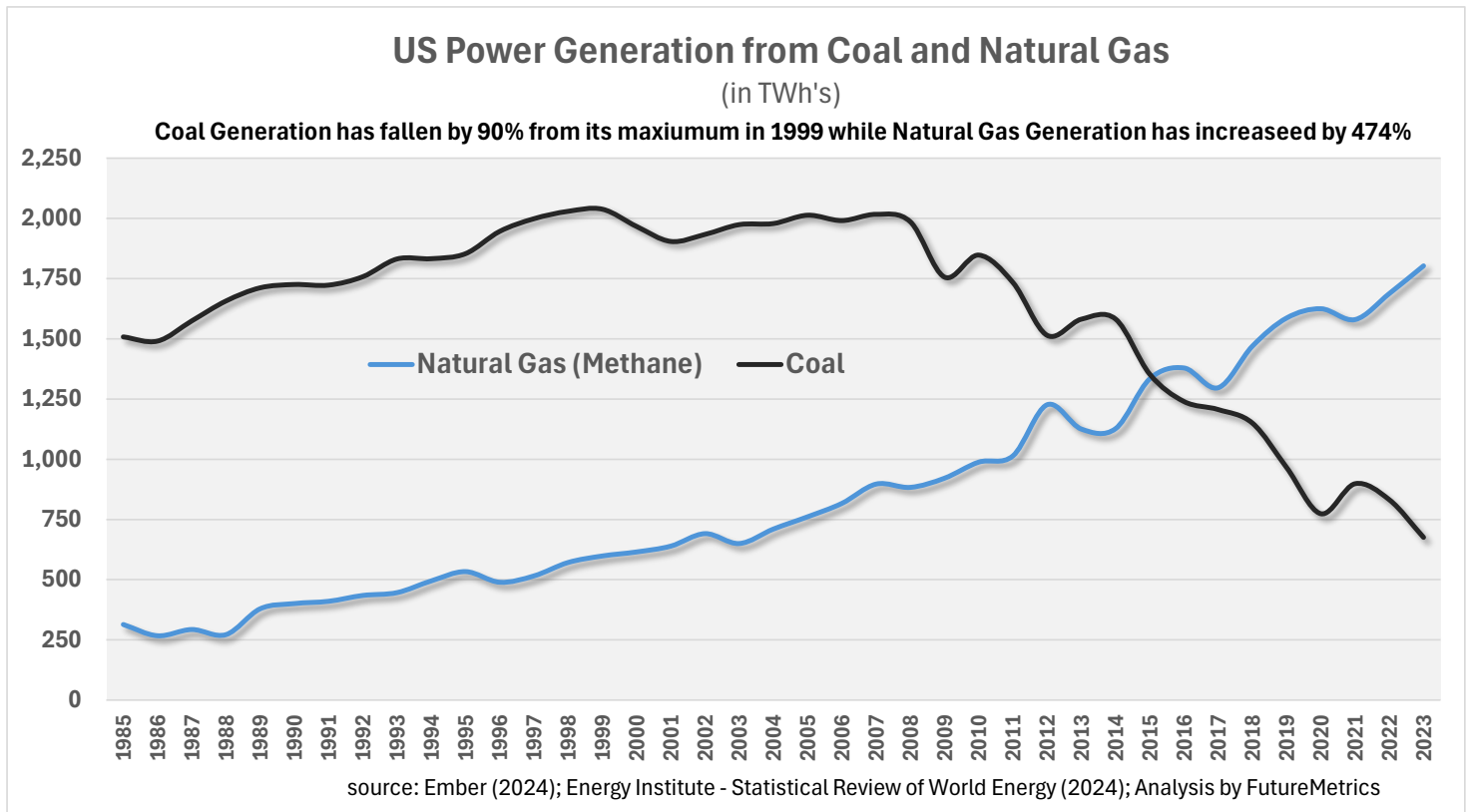


Figure 3 - US Power Generation from Coal and Natural Gas 1985 to 2023

The shift from coal to NG has created very challenging conditions in the coal mining sector (see Figure 4).



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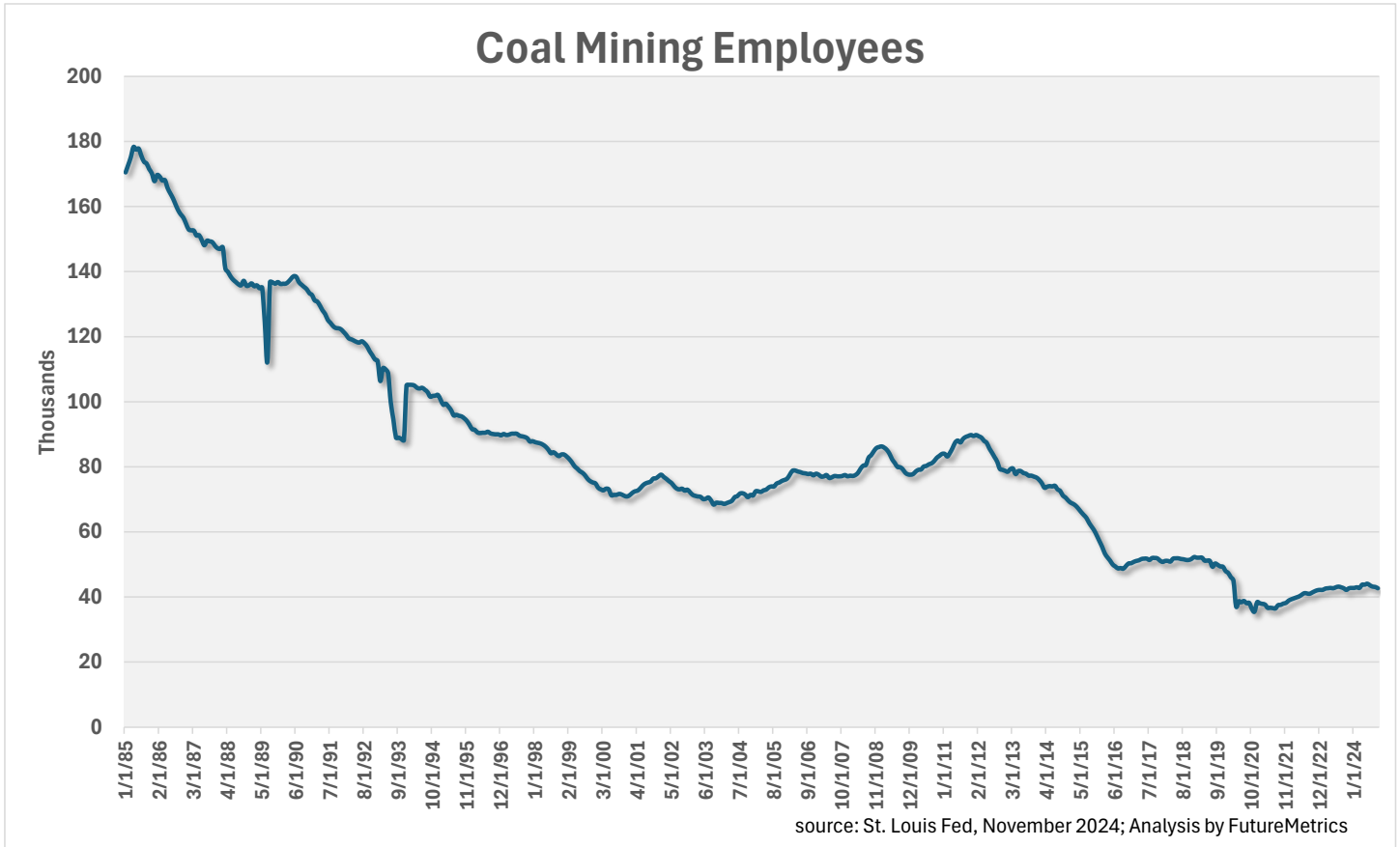


Figure 4 - Coal Mining Employees

Given current conditions, there is no reason to think that the downward trends will not continue.

Furthermore, the US coal fired power plant fleet is aging. The median age of utility scale pulverized coal fueled power plants larger than 150 MW's is 46 years. As the chart below shows, 75% of larger PC plants are 40 years old or older and many are nearing 50 years old. 50 years is often the defined useful life of a coal unit.



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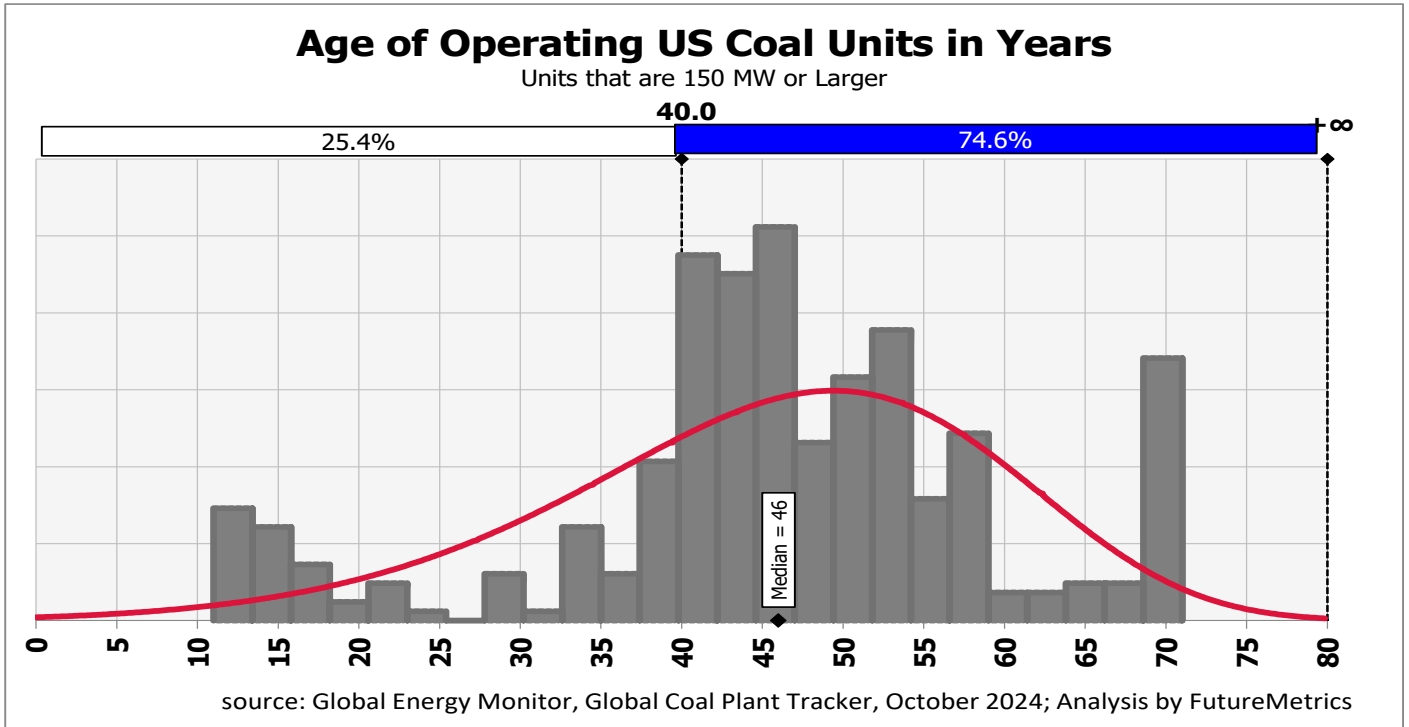


Figure 5 - Age of US Coal Fueled Generation

762 units have already been retired since the year 2000.

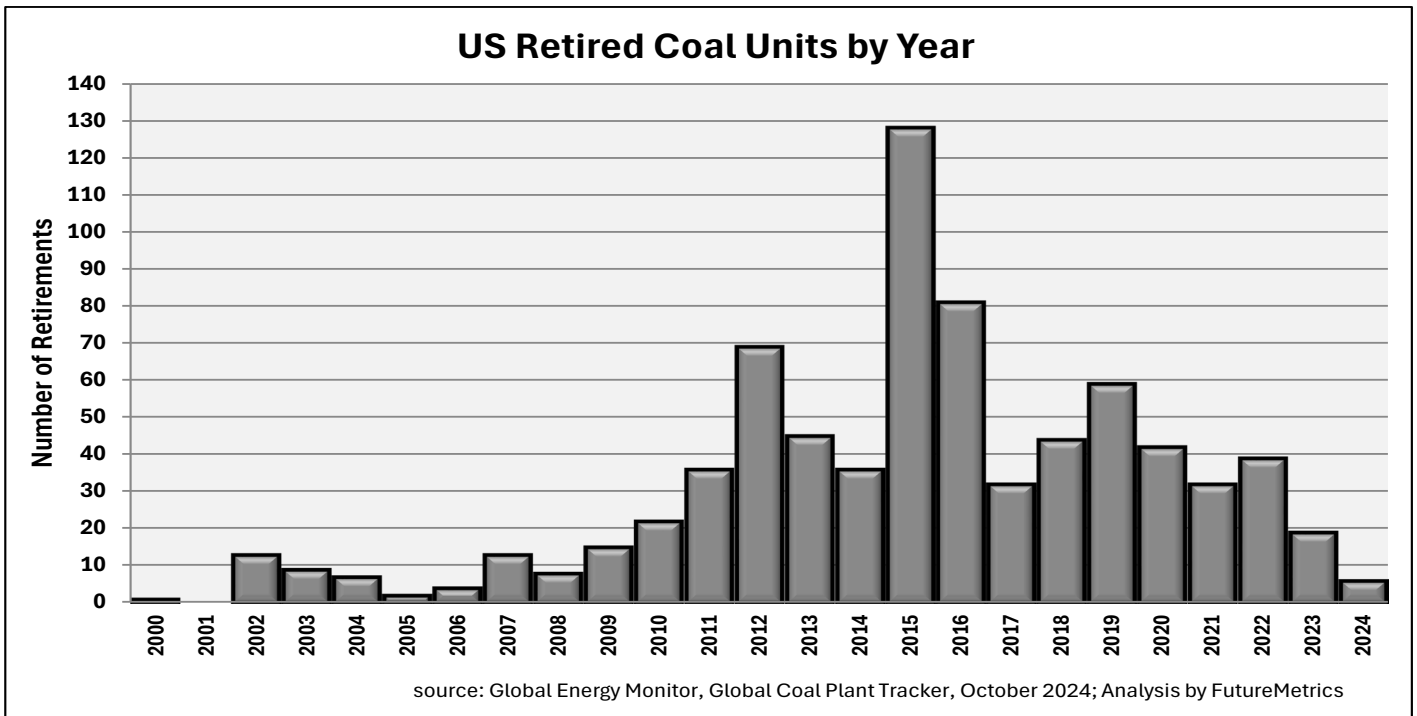


Figure 6 - US Retired Coal Stations by Year



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As the coal generation fleet ages, given low-cost natural gas, there is little incentive to build new coal plants.

**The phasing out of coal is not a result of environmental strictures. It is a function of low-cost NG and an aging fleet of coal fueled generating units.**

## Job Losses in the Forest Products Sector

The primary forest products industry converts the high-value portion of trees to lumber, flooring, cabinetry, and furniture. As logs are processed into those products, between 35% and 55% of the log becomes residual by-products (chips and sawdust). A significant portion of those sawmill residuals are used to produce other products including wood pellets (see Figure 7 below).

There are also residuals produced from the initial harvest. When the trees in tree farms that are managed to grow the feedstock for the primary industries are harvested at maturity, there are portions of the tree that are not suitable for being sawn. Those so-called forest residuals (tops, limbs, crooked stems, and stems that are rotted in the center) are made into chips and find their way to pulp and paper mills, engineered wood products factories (for example, oriented strand board or “OSB”), and to pellet factories. Figure 7 shows the wood flows in North America in 2023.

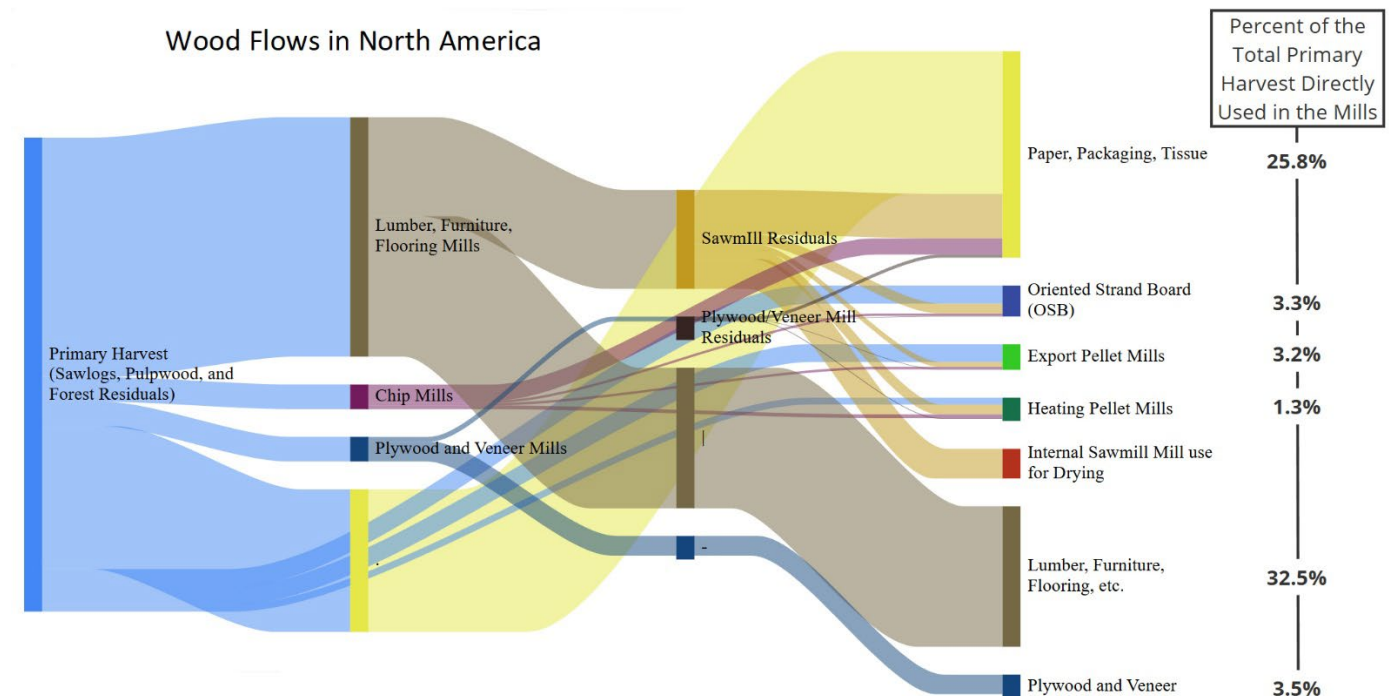


Figure 7 - Wood Flows in North America

The flow into the paper, packaging, and tissue sector is challenged by the dramatic fall in demand for paper for printing. In some parts of the US, pulp and paper mill closures have destroyed not only those mill jobs but also all



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of the jobs in the supply chain that was delivering millions of tonnes per year of non-sawlog quality wood to the pulp mills. In some locations, sawmills have no feasible market anymore for their residuals thus causing them to charge higher prices for the lumber.

The impacts in many rural forested areas with generations of history sustainably supporting those operations has been devastating.

These areas are ripe for renewal. This strategy can bring many of those jobs back.

As Figure 7 above shows, a significant portion of the primary harvest turns into paper, packaging, and tissue. The higher value sawlog portions of the harvest, as noted above, become lumber, flooring, etc.

Changes in demand for printed media and offshore competition have been extremely challenging for the pulp and paper sector.

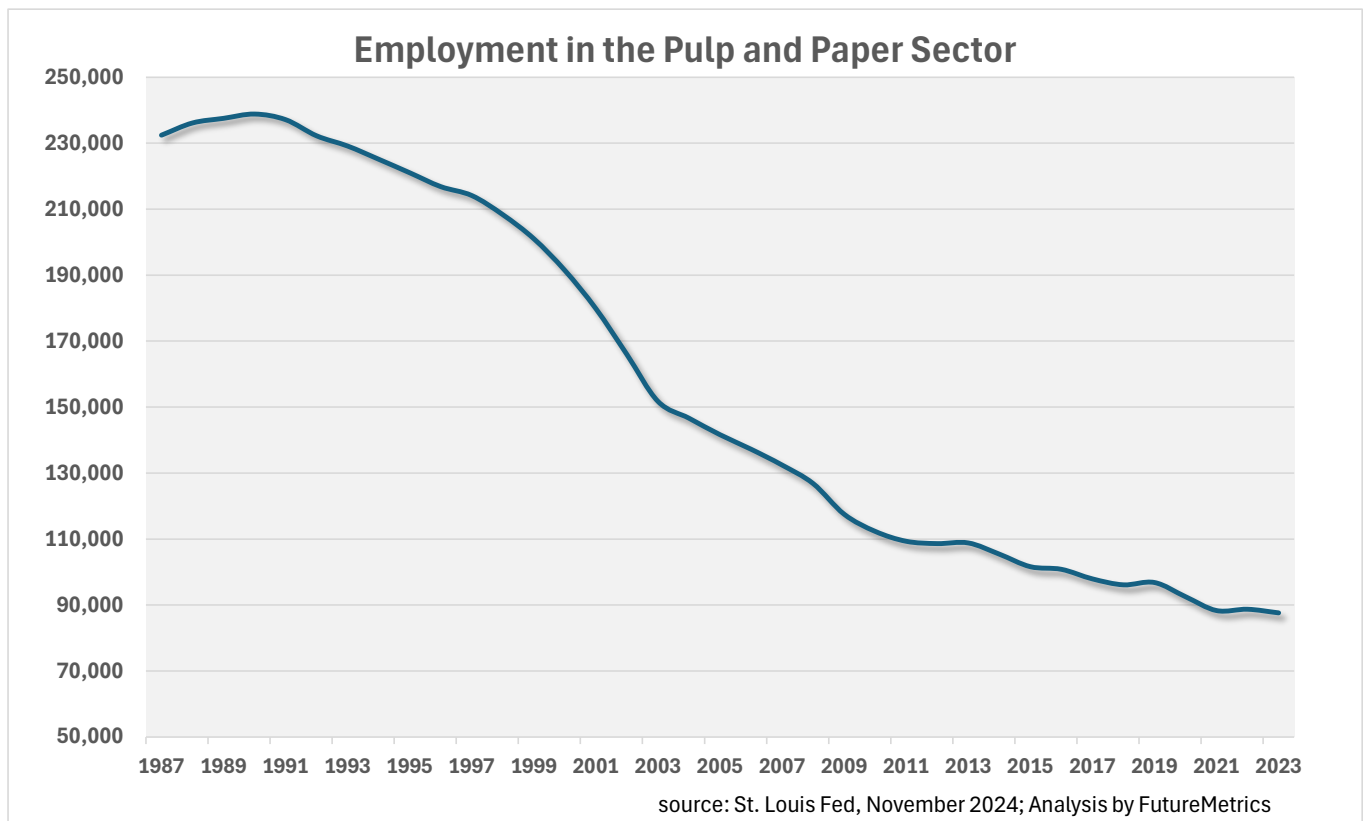


Figure 8 - Employment in the Pulp and Paper Sector

As Figure 8 shows, employment in that sector, which typically benefits workers in rural areas, has crashed. The drop in the demand for pulpwood has also had a significant negative impact on the upstream supply chain. For example, Figure 9 shows that logging jobs are evaporating. This loss of jobs is mostly in very rural areas that already face poor employment opportunities.

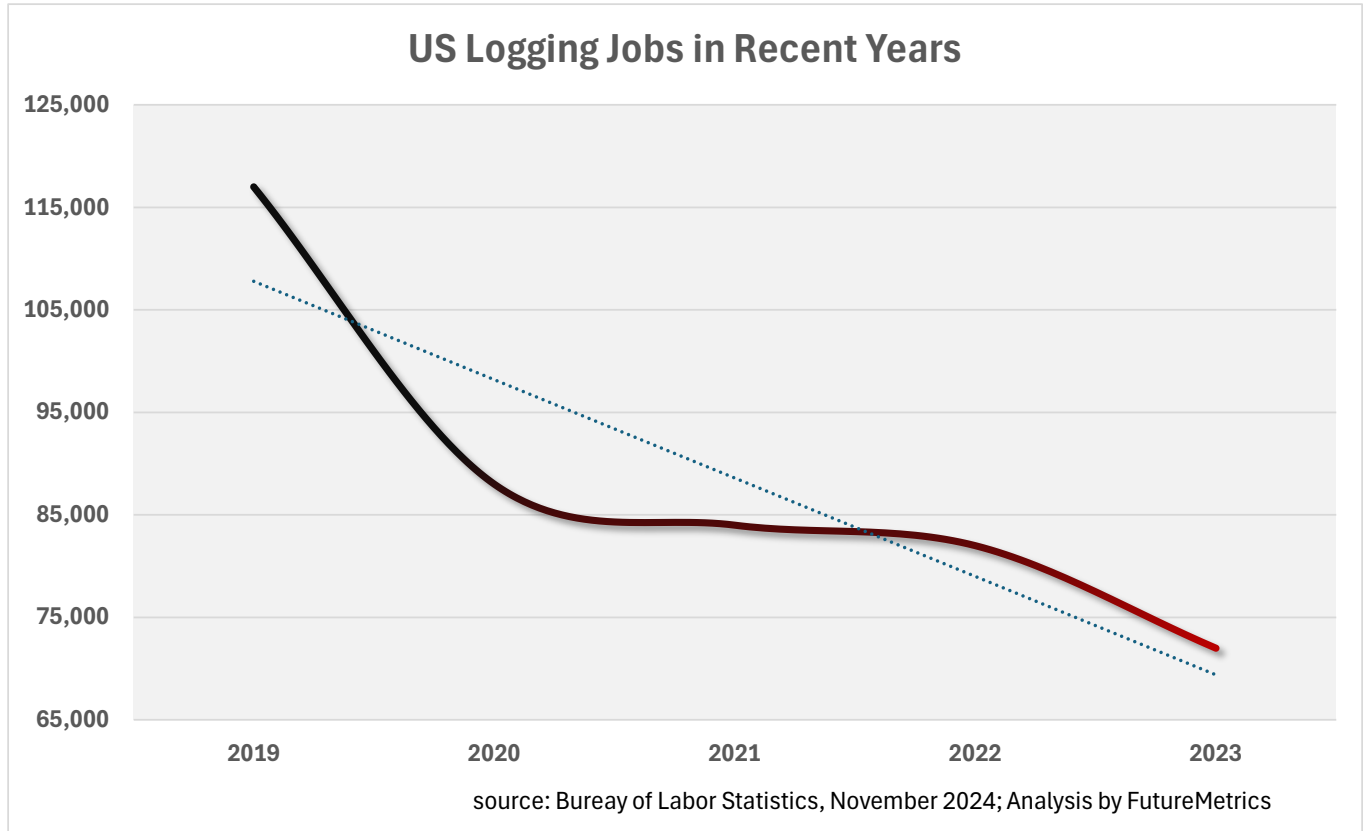


Figure 9 - US Logging Jobs

It is unlikely that trends in the demand for paper will change. While packaging (think online product purchase deliveries) and tissue (think toilet paper!) remains strong, the use of paper for printing is in steady decline. Newsprint has all but disappeared.

There is, however, another sector that uses the same residuals from the primary harvests and the sawmills: It is for the production of upgraded solid pellet fuel that can be used to replace coal in power generation<sup>4</sup>. That sector's current size and recent dramatic growth in the US is shown in Figure 1.

And, as noted above, this strategy also benefits the coal sector.

The need for both solid fuels will sustain and create US manufacturing jobs in regions that need the work!

There is a pathway for recovering lost jobs.

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<sup>4</sup> Wood pellets are also used in heating appliances in the northern tier states.



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### Policy that can Change those Trends

Power generation utilities will continue the trend of shifting into the low cost natural gas that can be used in easy to build, easy to operate, and easy to maintain combined cycle NG power plants. Aging coal stations will likely continue to be closed overtime.

But that trend is destroying well-paying jobs in areas that need them the most.

Figure 10 shows the total jobs that are a result of provisioning a 685-megawatt power station with fuel<sup>5</sup>. The total jobs include the multiplier effects (the indirect and induced jobs that are a result of the direct jobs). The green bar shows the jobs created by fueling a generating unit with a blend of 85% coal and 15% pellet fuel.

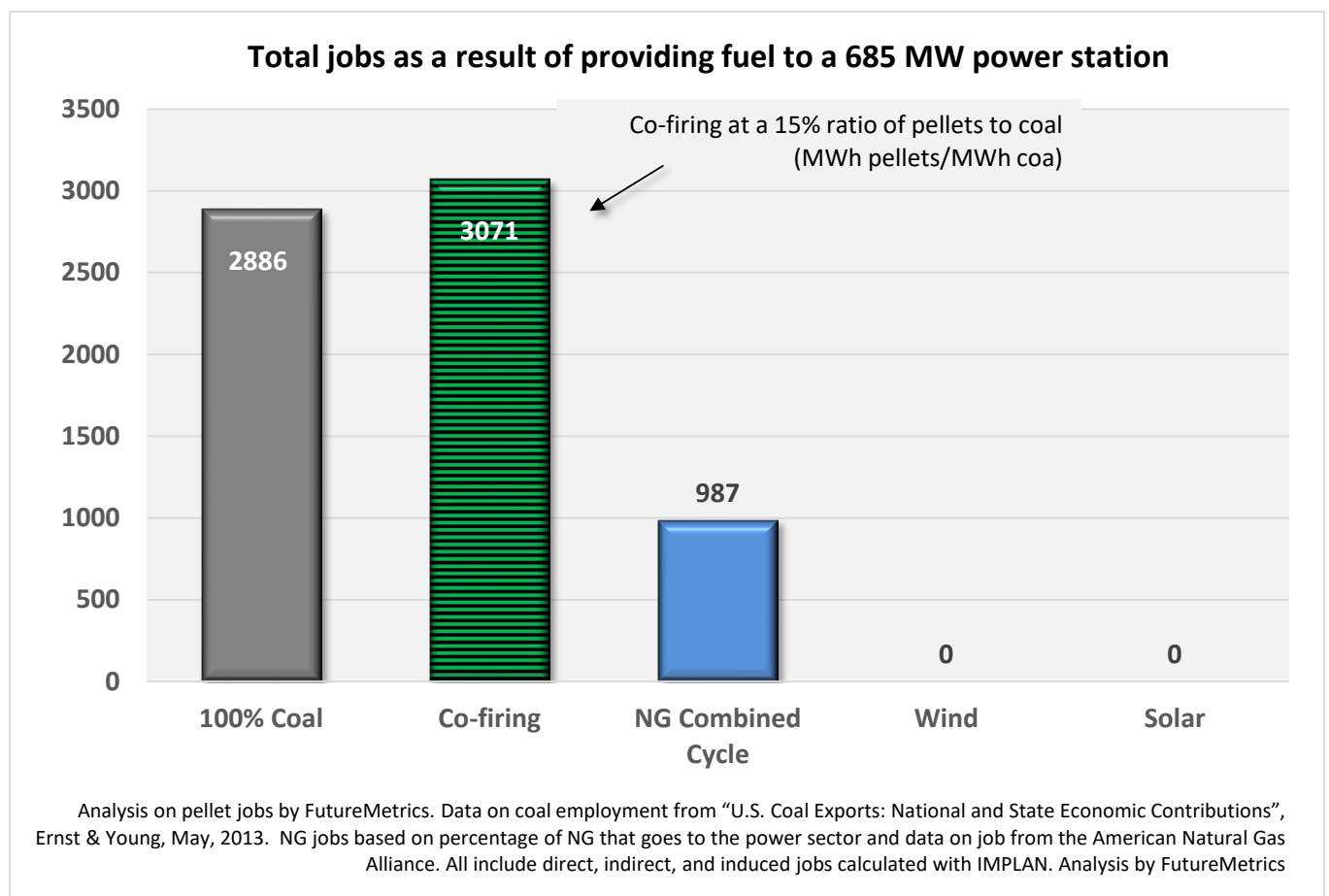


Figure 10 - Jobs Created in the Fuel Supply Chain for Power Generation

<sup>5</sup> Later in this report we show that the average size for a selected group of potential co-firing units is 685 MWs.



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There is no fuel supply chain for wind and solar generation<sup>6</sup>. Getting natural gas to a power station does not need the labor intensity at the front of the supply chain.

**Mining/harvesting, upgrading, and delivering solid fuel requires machines, trucks, trains, and labor and, in the case of pellet fuel, new mills that can replace the raw material demand that was lost from pulp mill closures.**

The co-firing strategy outlined in this white paper will do that in a time of great need in distressed sectors of the US economy. Those dire employment trends can be reversed.

Trump wants to bring jobs back to the industrial heartland. Furthermore, the incoming Trump administration does not seem shy about implementing policies that will benefit US manufacturing jobs.

To bring support to the struggling economies in the coal mining regions and to a major part of the forest products sector, the administration will have to implement policy that influences the strategic decision making of utilities. There will have to be a reason that utilities will choose to keep selected coal plants running and co-firing coal with pellet fuel.

The Trump administration need only to mandate that selected currently operating coal fueled generating units continue to operate for at least 10 more years and use a blend of 85% coal and 15% domestically produced pellet fuel. The system operators that purchase power for transmission into the grid will be required to buy that power and pay the regulated price based on the cost of generation.

As is shown below, the cost of generation under this strategy is almost the same as the cost of generation with 100% coal.

**While natural gas generation is lower cost, is not possible, nor strategically wise, the have the entire grid fueled by pipeline delivered natural gas.**

**This strategy supports national energy security and the diversification of the baseload supply of power to the grid.**

Which of the currently operating coal fueled units should be selected?

The analysis below looks at coal fueled units that are less than 15 years old. There may be other units that could be equally or more optimal co-firing choices. The starting premise for this analysis is that selecting the newer plants not only focuses on the most modern and efficient designs, but also avoids the substantial costs associated with the early retirement of major assets.

The classic “stranded asset<sup>7</sup>” scenario for early retirement will shift the as yet unfunded capital cost liability of relatively new power stations onto ratepayers. The costs of early retirement come without any generation

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<sup>6</sup> While wind and solar have an important role in the power generation mix, they both do not provide on-demand (peaking) or baseload power. When the wind is not blowing and/or the sun is not shining, either hydroelectric or thermally generated power (coal, NG, coal/pellet blend, or nuclear) has to make up the shortage to keep the electric grid energized.

<sup>7</sup> See [https://assets.loyds.com/assets/pdf-stranded-assets/1/pdf\\_stranded-assets.pdf](https://assets.loyds.com/assets/pdf-stranded-assets/1/pdf_stranded-assets.pdf) for a detailed analysis.



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benefits. For newer plants, the as yet unfunded liability is substantial. The utilities will pass that along to ratepayers.

This analysis assumes co-firing 85% coal and 15% pellet fuel. Each unit will likely benefit from different ratios.

In the US, of the 342 operating units, there are 23 that are 15 years old or less. The average size of those units is 685 MWs. Click on the map below (or [HERE](#)) to open a Google Map in a browser. Clicking on the icons brings up a link to a more detailed discussion about the unit. Zoom in to any of them for a close view.

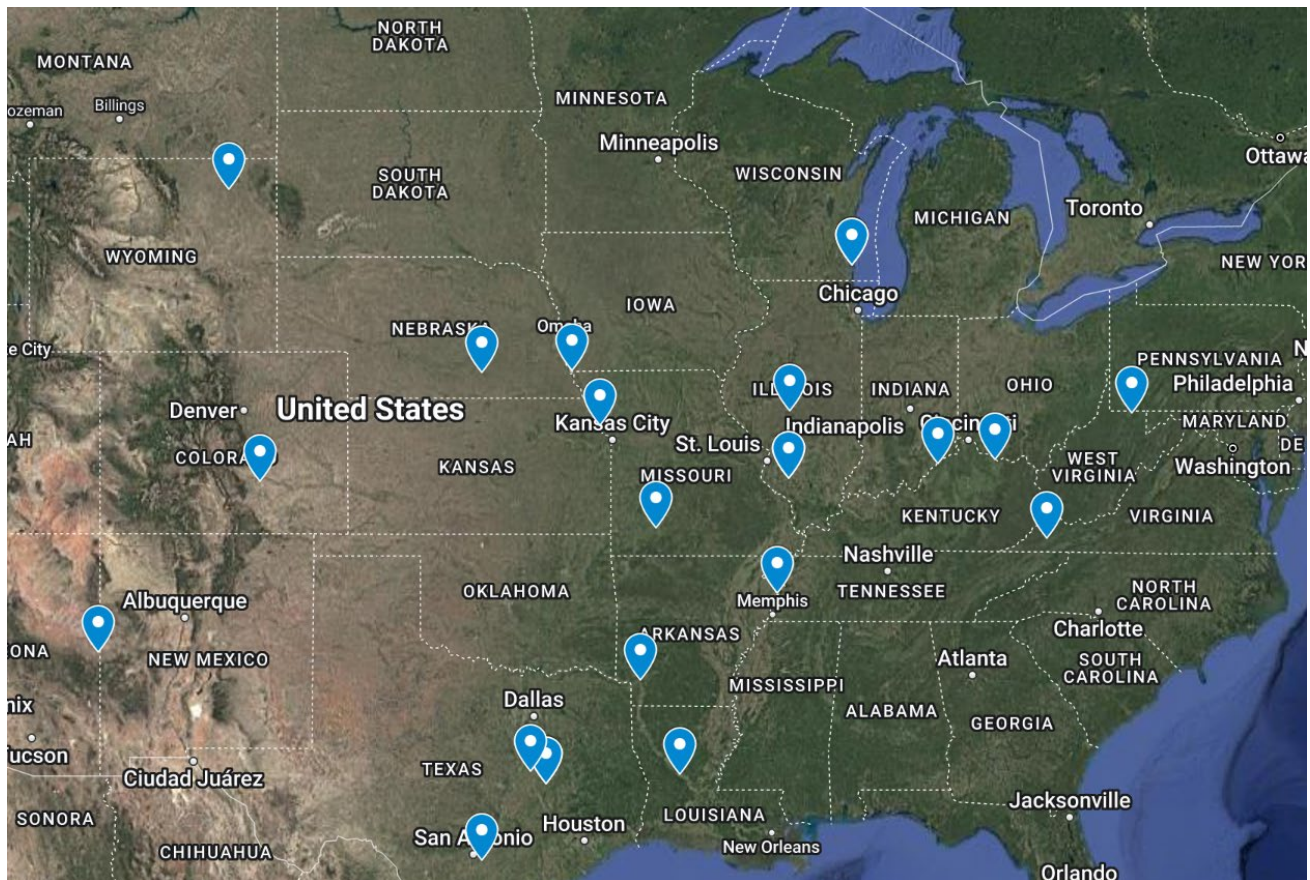


Figure 11 - Coal Fired Units that are Less than 15 Years Old

The total capacity of those units is 15,751 MWs.

Using the FutureMetrics dashboard shown below in Figure 12<sup>8</sup>, with the input assumptions shown on the dashboard, the demand for coal and pellet fuel for the average size unit would be 1,774,000 tonnes of coal per year and 393,000 tonnes of pellet fuel per year.

<sup>8</sup> The dashboard is interactive and free to use [HERE](#).



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## Levelized Cost of Electricity (LCOE) for Co-Firing Coal and Pellet Fuel

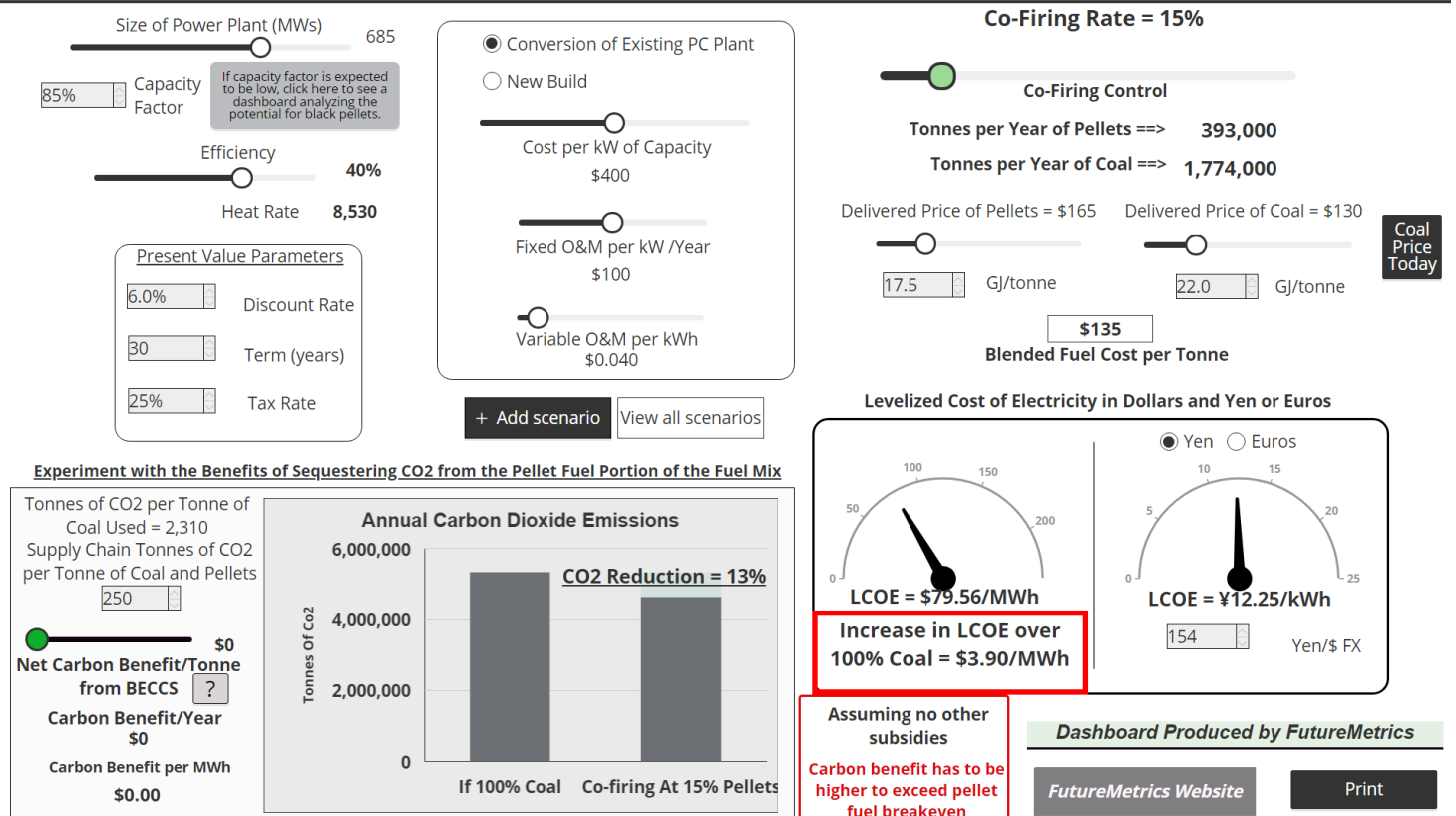


Figure 12 - Cost of Co-firing Dashboard

At the setting shown above in Figure 12, blending 85% coal and 15% pellet fuel results in an increase in the levelized cost of electricity (LCOE) over 100% coal of \$3.90 per megawatt-hour. That is \$0.00386 per kilowatt-hour. A fraction of a penny!

Suppose all 23 coal stations that are less than 15 years old co-fire at 15%. Total pellet fuel demand would be about 8,650,000 tonnes per year (coal demand would be about 39,000,000 tonnes per year). As Figure 1 shows, the US exported nearly 10,000,000 tonnes of pellet fuel in 2023.

**Increasing production from current levels to levels needed if the 15% co-firing scenario were implemented would require capital investments in new pellet manufacturing facilities of about 3 billion dollars.**

**The coal sector would be supported, and tens of thousands of jobs would be created by replacing the lost demand for low grade woody feedstock caused by the shrinkage of the pulp and paper sector.**



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### **Conclusion**

For a policy that cost ratepayers about \$0.004/kWh (less than half a penny!), the Trump administration could save tens of thousands of coal mining jobs and create tens of thousands of new jobs across the pellet fuel supply chain.

All the supply chain and manufacturing jobs would be in regions that desperately need them.

The cost to taxpayers is zero.

The growth of a US co-firing market would spur billions of dollars of investment in new industrial pellet manufacturing plants in the heartlands of the US.

The new administration could have a major win-win with the coal and forest products sectors if it crafts a policy that allows the blending of pellet fuel with coal in a small proportion of our nation's coal fired generation fleet; a fleet that currently is, and should be in the future, the backbone of a secure and reliable power grid.

**The Trump administration need only to mandate that selected currently operating coal fueled generating units continue to operate for at least 10 more years and use a blend of 85% US produced coal and 15% domestically produced pellet fuel. The system operators that purchase power for transmission into the grid will be required to buy that power and pay the regulated price based on the cost of generation.**

### **Afterthought...**

In the bottom left corner of the dashboard are some controls for experimenting with the impact of a net cash benefit from permanent carbon removal from the pellet fuel portion of the fuel mix<sup>9</sup>. The US's Inflation Reduction Act contains support for carbon capture and storage (CCS). Adding CCS and a net positive value to the capture and permanent sequestration of CO<sub>2</sub> to the calculations shows that even with a modest net positive cash flow from the pellet fuel portion of the CCS, the power station would have a lower LCOE versus 100% coal.

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<sup>9</sup> FutureMetrics has several white papers on the topic of bioenergy carbon capture and storage (BECCS). BECCS yields a "carbon negative" result. That is, the CO<sub>2</sub> that is sequestered was taken out of the atmosphere by the bioresources that are the raw material for the solid fuel. CCS with coal is at best carbon neutral. FutureMetrics also has a dashboard illustrating BECCS [HERE](#).