THE GERMAN BIOMASS OPPORTUNITY

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ENVIVA’S OPERATIONAL FOOTPRINT – OVERVIEW

PLANTS: Nine U.S. pellet production facilities with a total annual production capacity of 4.9 million metric tons

- Ahoskie, NC (AHO)
- Northampton, NC (NOR)
- Amory, MS (AMO)
- Sampson, NC (SAM)
- Cottondale, FL (COT)
- Southampton, VA (SOU)
- Greenwood, SC (GRE)
- Waycross, GA (WAY)
- Hamlet, NC (HAM)

PORTS: Five deep-water marine export terminals

- Port of Chesapeake, VA (CHE)
- Port of Savannah, GA (SAV)
- Port of Mobile, AL (MOB)
- Port of Wilmington, NC (WIL)
- Port of Panama City, FL (PAN)
Enviva established an office in Berlin in January 2020 to drive market engagement onsite

Key areas of engagement:

• Policy level
• End-users, mainly Stadtwerke
• Local supply chain, e.g., forestry associations, local pellet producers
• NGOs, scientists and think tanks
ENVIVA
THE OPPORTUNITY IN GERMANY
BIOENERGY OFFERS SUBSTANTIAL GHG SAVINGS COMPARED TO COAL AND GAS

Why sustainably sourced woody biomass is a vital component of Germany’s energy transition:

- Provides substantial, fast carbon savings
- Is an important element of the renewable energy mix, especially to decarbonize the heat sector (green heat)
- Prolongs the lifespan of existing assets
- Has the ability to support intermittent wind and solar

Fossil GHG emissions
kgCO2e/MWh

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<thead>
<tr>
<th></th>
<th>Supply chain</th>
<th>Power generation</th>
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</thead>
<tbody>
<tr>
<td>Hard coal</td>
<td>937</td>
<td>-87%</td>
</tr>
<tr>
<td>CCGT</td>
<td>394</td>
<td>-69%</td>
</tr>
<tr>
<td>Biomass</td>
<td>121</td>
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Source: Electricinsights.co.uk
There are still more than 100 active coal-fired combined power and heat (CHP) plants in Germany with a total capacity of around 28 GW. (Bundesnetzagentur)

A selected number of system-critical facilities (around 4 GW) could be converted to biomass, offering huge carbon savings. (Pöyry)

German coal exit: woody bioenergy enables Germany to reduce fossil CO2 emissions and its dependence on coal and gas, especially for heat where there is no viable alternative.

Recycling infrastructure: coal-fired power stations have their lifespan extended when converted to biomass. This retains existing infrastructure and jobs.

There are German pellet producers. Today they mainly serve heating market – but there is potential to use more of the forest residuals and improve forest health. (DBFZ/BMWW)
GERMANY’S COAL EXIT LAW: OVERVIEW

On 3 July 2020 Germany’s parliament adopted legislation to end coal-fired power generation by no later than 2038.

The coal exit law sets out the roadmap for shutting down the country’s remaining coal power capacity, clearly distinguishing between the pathways for lignite and hard coal. (A lignite phase-out has greater effect on mining regions and workers than a hard coal phase-out. Germany’s last hard coal mine closed in 2018.)

The law foresees a shutdown schedule for individual lignite power plants as well as compensation payments for operators.

For hard coal the law foresees auctioned compensation payments for plant operators to take capacity off the grid.

It also settles compensation claims by coal plant operators and paves the way for economic support programmes in coal regions worth 40 billion euros.

The law also determined a legally binding target of 65% of gross energy consumption on the basis of renewable energy by 2030. A review of the current renewable energy law will take place by end 2020.

Coal Exit Law sets out an end to coal-fired power generation by no later than 2038.

The law explicitly recognizes conversion to woody biomass fuel as an option to exit.

Reduction to 15 GW hard coal and 15 GW lignite by end of 2022 (from 22.8 GW and 21.1 GW in 2019).

Legally binding renewable energy target of 65% of gross energy consumption by 2030.
GERMANY’S COAL EXIT LAW - CONTINUED

• Different financial support mechanisms to drive the energy transition.

• Coal replacement & switch bonus for power plant conversions are planned.

• Policy discussions are ongoing to operationalize ongoing support

Three-stage exit:
1. 15 gigawatt (GW) hard coal and 15 GW lignite capacity by the end of 2022 (from 22.8 GW hard coal and 21.1 GW lignite in 2019).

2. 8 GW hard coal and about 9 GW lignite are to remain by 2030. Coal phase-out in Germany Capacity reduction path following the decision of the federal cabinet on 29 January 2020 on the draft coal exit law (KVBG) Article 6 Change of renewable energy law New 65% RE target Art. 7, § 7c Coal replacement bonus Tiered bonus Art. 7, § 7d Southern bonus Support for southern area CHP § 58 Subsidy program for climate neutral heat 1 billion euros 2

3. By the end of 2038 at the latest, there will be no coal power capacities left as the phase-out is completed. Three reviews in 2026, 2029, and 2032 are scheduled to decide whether the phase-out can be completed by 2035. The coal exit law prescribes equal annual reductions of lignite and hard coal capacity combined. Thus, in years in which a smaller amount of lignite capacity is set to go offline (as agreed in the lignite phase-out schedule), more hard coal plants will be shut down and vice versa.
Sustainable supply chains for end-users:

- Flexibility: Local production and international supply chains complement each other, offering more flexibility and security of supply for end-users.

- Enviva thrives for partnerships with local stakeholders from the German forestry, wood pellet and energy industries.

- Woody biomass for energetic use in power stations offers new income streams for German forestry amid aggravating forest dieback.

- Germany’s Ministry for Food and Agriculture estimates that 2020 will see a total of 55 million cubic meters of deadwood as a result of bark beetle infestations, storm damage and drought.

- Using this low-value wood to produce industrial pellets will enable the local forestry industry to generate an income and benefit the health of German forests at large as infested and damaged timber is removed.
COAL EXIT – BIOMASS CAN FILL THE GAP

- Despite strong growth in wind and solar there will still be a need for firm capacity.
- There is presently no fossil-free fuel alternative for CHP plants.
- Detailing the biomass regulatory support is on the legislative agenda for 2021.
- Coal-to-biomass conversions can move forward in 2022 and deliver by 2024/25.