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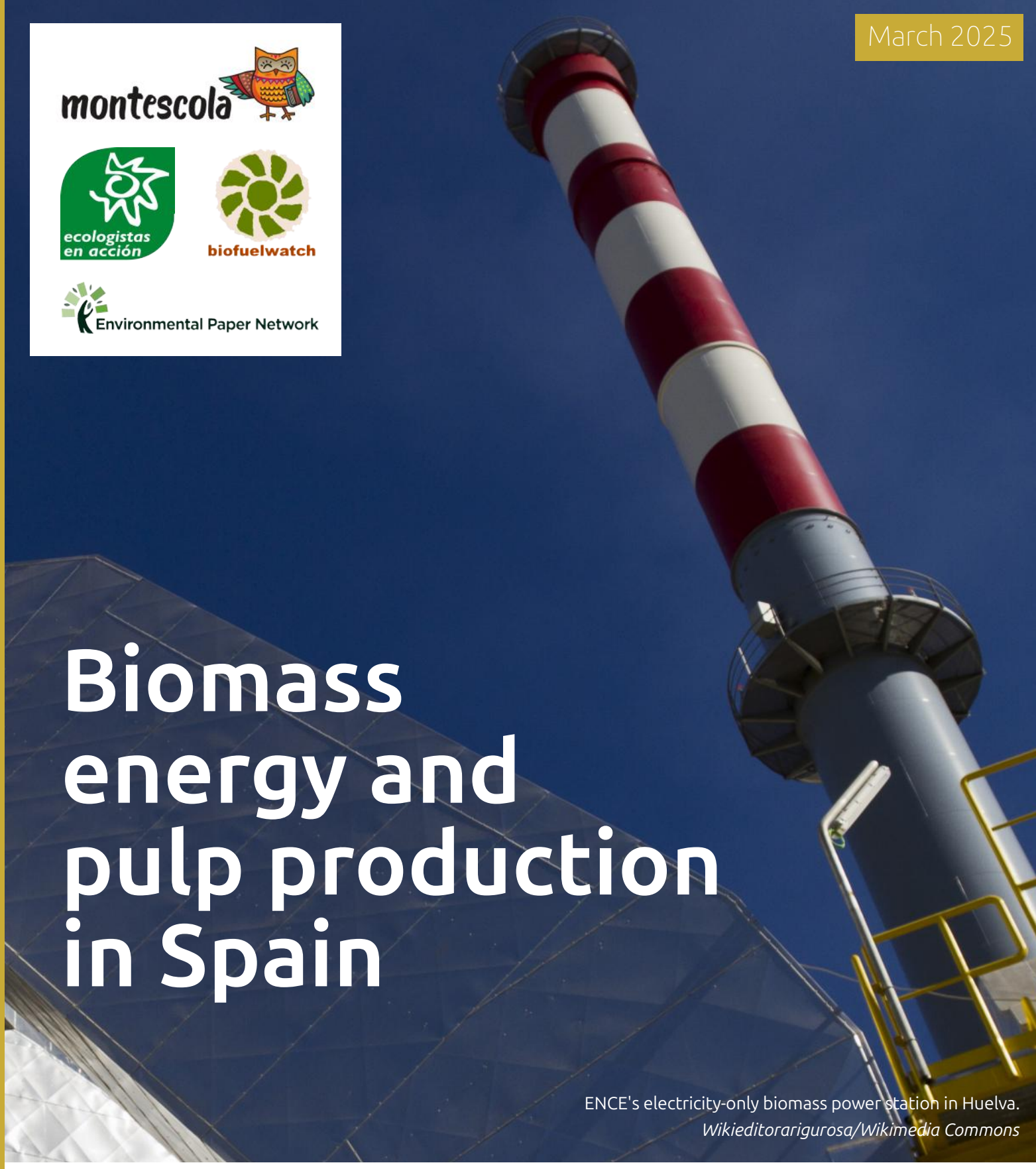
Biomass energy and pulp production in Spain



ENCE's electricity-only biomass power station in Huelva.
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Spain is Europe's 5th largest wood pulp producer. In 2022 it produced 1.5 million tonnes of pulp, equivalent to 4.4% of European production. It has an installed biomass electricity capacity of 615MW and produces some 7.3 million dry tonnes of woody biomass each year to generate energy, which includes primary woody biomass and industrial by-products such as bark, as well as wood used for domestic heating and wood pellets. A government study published in 2010 concluded that Spain has a potential annual residual forest biomass availability of around 6.6 million tonnes, of which 4.5 million tonnes would come from forestry operations.

ENCE and Magnon Renewable Energy: Spain's largest pulp and biomass electricity producers

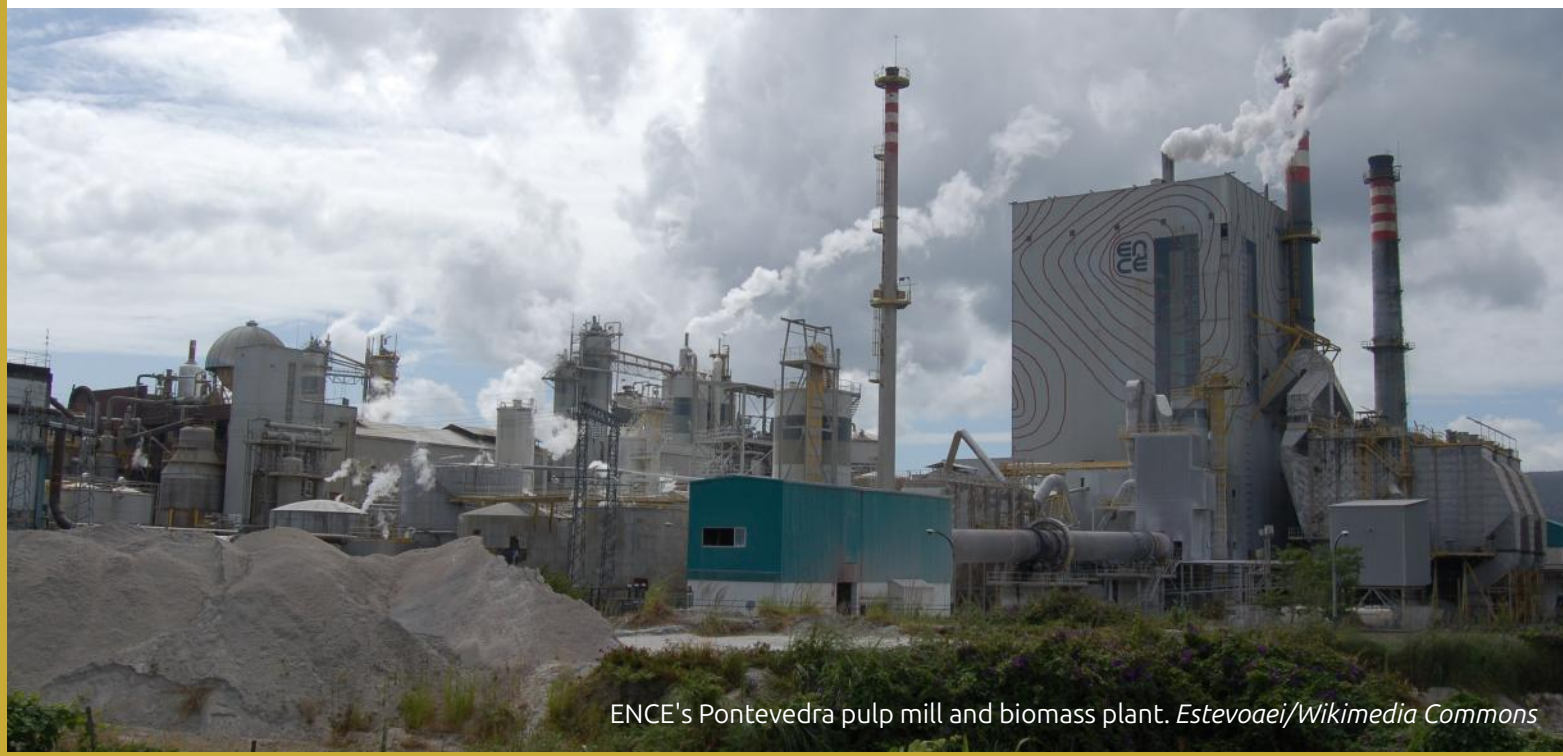
ENCE Energía & Celulosa is Spain's largest producer of both pulp and biomass electricity. The company operates two pulp mills in Galicia and Asturias with a combined capacity of over one million tonnes of pulp, and both mills have biomass CHP plants that burn woody biomass alongside recovery boilers that burn black liquor.

ENCE's subsidiary, Magnon Renewable Energy, operates another eight electricity-only biomass power stations in various parts of the country that aren't associated with pulp mills, with a combined electricity capacity of 266MW. Put together, ENCE's combined biomass electricity capacity is 378MW, equivalent to over 60% of Spain's total installed biomass electricity capacity.

ENCE's two biomass CHP plants burn both bark produced as a by-product of pulp production and primary woody biomass sourced directly from forestry operations, that take place mainly in industrial eucalyptus plantations. According to Magnon, two of the electricity-only power stations it operates burn residues from olive oil production processes, and the others burn a mixture of biomass from forestry operations and agricultural residues. Put together, ENCE's biomass plants consumed almost 2.2 million tonnes of woody biomass in 2022, equivalent to almost a third of all woody biomass-based fuels used in Spain each year.

ENCE only discloses total biomass use at each of its power plants, and has refused to provide a breakdown of biomass types and their origins. However, it is estimated (see table below) that up to 1.8 million tonnes of biomass burned by the company could have come directly from forestry operations. If this figure is compared to the estimated annual availability of residual primary biomass from forestry operations for energy use, it is equivalent to 40% of the nation-wide figure.

The ENCE and Magnon biomass plants are certified through the SURE certification scheme, which companies sign up to voluntarily and relies on self-reporting. It was implemented to ensure compliance with the EU's REDII legislation and certify the sustainability of power station feedstocks. However, it does not require companies to make sourcing information available to the public. On top of this, ENCE's Sustainability Manager is a member of the SURE Technical Committee (another pulp company, Stora Enso, is also represented on the committee), and the Spanish Biomass Association, the biomass industry's trade representative, is the SURE national partner for Spain. These conflicts of interest clearly undermine the credibility of the scheme.



ENCE's Pontevedra pulp mill and biomass plant. *Estevoaei/Wikimedia Commons*

Altri, Greenalia and Greenfibre: A new pulp mill and biomass plant in Galicia

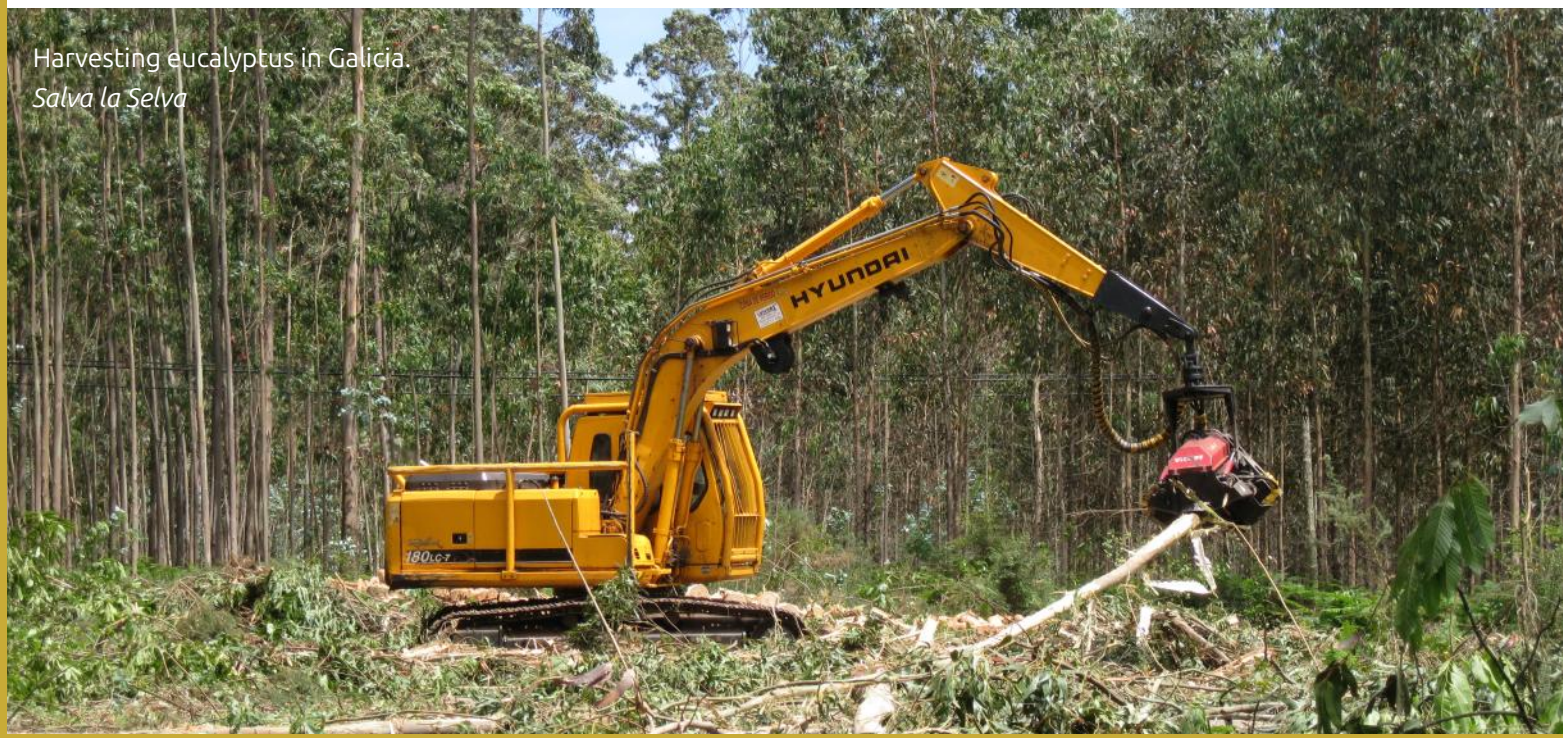
Portuguese pulp and paper giant Altri announced in 2022 its intention to build "the most sustainable cellulosic based fiber plant in the world," *a 200,000 tonne capacity* "sustainable fibre biofactory" *geared towards the production of lyocell, from which textile fibres can be produced, in Palas de Rei, in central Galicia. The project is being developed by Greenfibre, a Spanish company created by Altri, and in which Altri has a 75% stake. The other 25% stake is held by Greenalia, a Spanish company with a 50MW electricity-only biomass plant in Galicia and plans to construct two more of a similar size in Galicia and Asturias. .*

The project, referred to as Projecto GAMA, was recently granted "Strategic Industrial Project" status by the governing Galícian Xunta, which released a public consultation in early March 2024. The consultation describes the project in more detail, and highlights the fact that the mill will be significantly more geared towards producing pulp for paper products than for use in the textile industry. In its first phase of operation, the mill will produce 250,000 tonnes of pulp each year and 60,000 tonnes of lyocell, which would require 1.2 million cubic metres of eucalyptus wood. When fully operational, the mill will produce up to 400,000 tonnes of pulp and 200,000 tonnes of lyocell annually, making it the largest pulp mill in Spain.

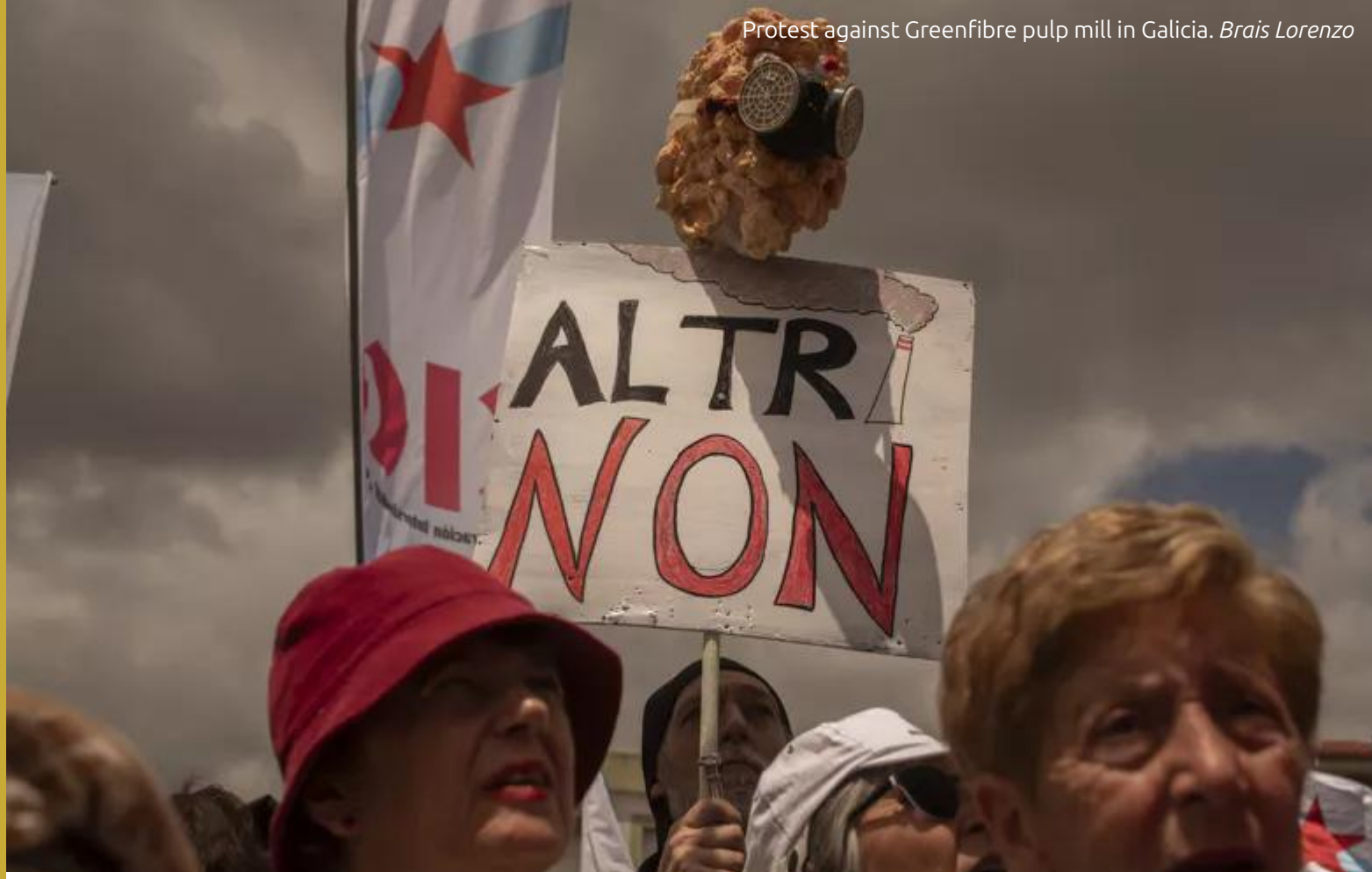
Energy generation will be a key part of the project, and Altri intends to *"Sell excess green energy to the grid."* The only publicly available information about the mill's energy generation infrastructure is that it will have a 500MWt recovery boiler (powered by black liquor) and a 250MW_t biomass boiler (powered by woody biomass), as well as a 45MWt lime furnace (powered by gas). It is unclear whether the biomass boiler will be an electricity-only or CHP plant, but it is likely to be the former, given that Altri operates four electricity-only biomass plants at its three pulp mills in Portugal (see Portugal case study), and that Greenalia already operates a large electricity-only biomass power station in Galicia and has plans to construct two more in Spain. When running at full capacity, the biomass boiler could require up to 820,000 tonnes of biomass [1]and the mill is likely to produce around 120,000 tonnes of bark.[2] This means that up to 700,000 tonnes of primary woody biomass sourced directly from forestry operations could be required each year.

Local resident groups such as the Plataforma Ulloa Viva and NGOs such as Greenpeace have strongly opposed the plans. Chief amongst the criticism is the fact that the mill will use up to 45 million litres of water a day in a

[1] Assuming that the energy density of woodchip is 0.8 MWh/m^3, and that one m^3 of woodchip weighs 0.3 tonnes. 250 MW_t = 2,190,000 MWh per year, equivalent to 2,737,500 m^3 of woodchip or 821,250 tonnes.
[2] Assuming that each tonne of pulp produces 0.2 tonnes of bark. 600,000 tonnes of pulp is therefore equivalent to 120,000 tonnes of bark.



Harvesting eucalyptus in Galicia.
Salva la Selva



Protest against Greenfibre pulp mill in Galicia. *Brais Lorenzo*

region that suffers regular water shortages in the summer months, equivalent to the daily consumption of over 300,000 people. 30 million litres of water per day will also be discharged back into the Ulla river. Galicia's largest trade union has questioned the "dubious legality" of the Xunta's planned award of a water extraction licence to Greenfibre, and points out that the mill will consume as much water as the whole of the Lugo municipality, were the mill will be situated, each day.

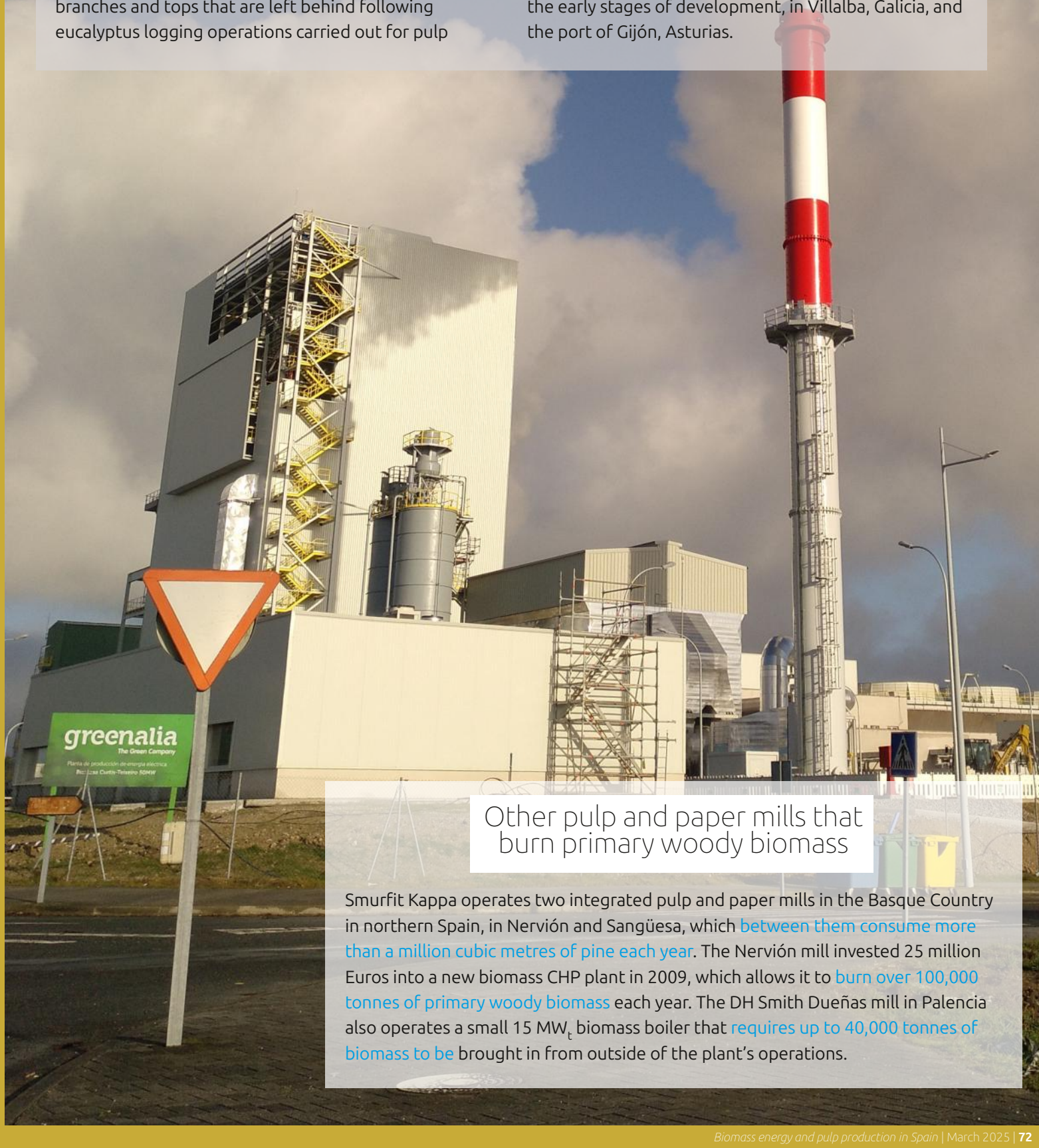
Another significant concern is the impact that the mill would have on eucalyptus plantation expansion. Greenpeace Spain describes how, at full capacity, the mill would require 2.4 million tonnes of wood yearly from eucalyptus plantations, equivalent to almost 40% of what was harvested in Galicia in 2022. The mill would compete for wood with Ence's two pulp mills in the region (Pontevedra in Galicia and Navia in neighbouring Asturias), and with Altri's Portuguese rival, The Navigator Company, which also sources wood from eucalyptus plantations in Galicia and Asturias. The Galician Society of Natural History also highlights the fact that *"ENCE's pulp mills in Pontevedra and Navia are directly responsible for the fact that 28% of Galicia's forest land is covered by eucalyptus (409,000 ha)"* and that the new mill would increase pulp production by 33% and result in the expansion of eucalyptus plantations in the Galician mountains, with enormous impacts on terrestrial and aquatic ecosystems as well as increased fire risks.

In terms of finance, the first phase of the project will require an investment of 900 million Euros, and Altri is hoping that some 250 million Euros of this will be financed through state funding, following the Spanish Government's agreement to support Galician industry with more than 2.1 billion Euros from EU funds and state budgets. In particular, finance is likely to arrive via the NextGenerationEU fund, which was designed to help in the post-pandemic recovery. Greenpeace Spain also points out the fact that Greenalia's new Corporate Affairs & Sustainability Director, Beatriz Mato, was a Minister in the Galician Xunta for almost 10 years, and questions whether this revolving door between government office and the pulp mill developers is designed to facilitate Altri's access to public finance.

The Plataforma Ulloa Viva appealed for public responses to the consultation process in April 2024, and in May 2024 organised a protest that drew 20,000 people to Palas de Rei to show the strength of local feeling against the plans for the new pulp mill. Public protest against the new mill is clearly having an effect, given that Greenfibre suspended its public consultation events, following a raucous reception from local residents.

Greenalia's electricity-only biomass plant

As well as having a 25% stake in Altri's new pulp mill in Galicia, Greenalia also operates the 50 MW Curtis-Teixeiro electricity-only biomass plant in Galicia, which began operating in 2020 with the help of a 50 million Euro EIB loan. Although not directly related to pulp production, the power station mostly burns baled tree branches and tops that are left behind following eucalyptus logging operations carried out for pulp production, and has 30 balers working at logging sites throughout Galicia. According to the company, the plant was supplied with 450,000 tonnes of forest biomass in 2022, which was sourced from an average radius of 73 km from the plant. Greenalia also has two more 50MW electricity-only biomass power stations in the early stages of development, in Villalba, Galicia, and the port of Gijón, Asturias.



Other pulp and paper mills that burn primary woody biomass

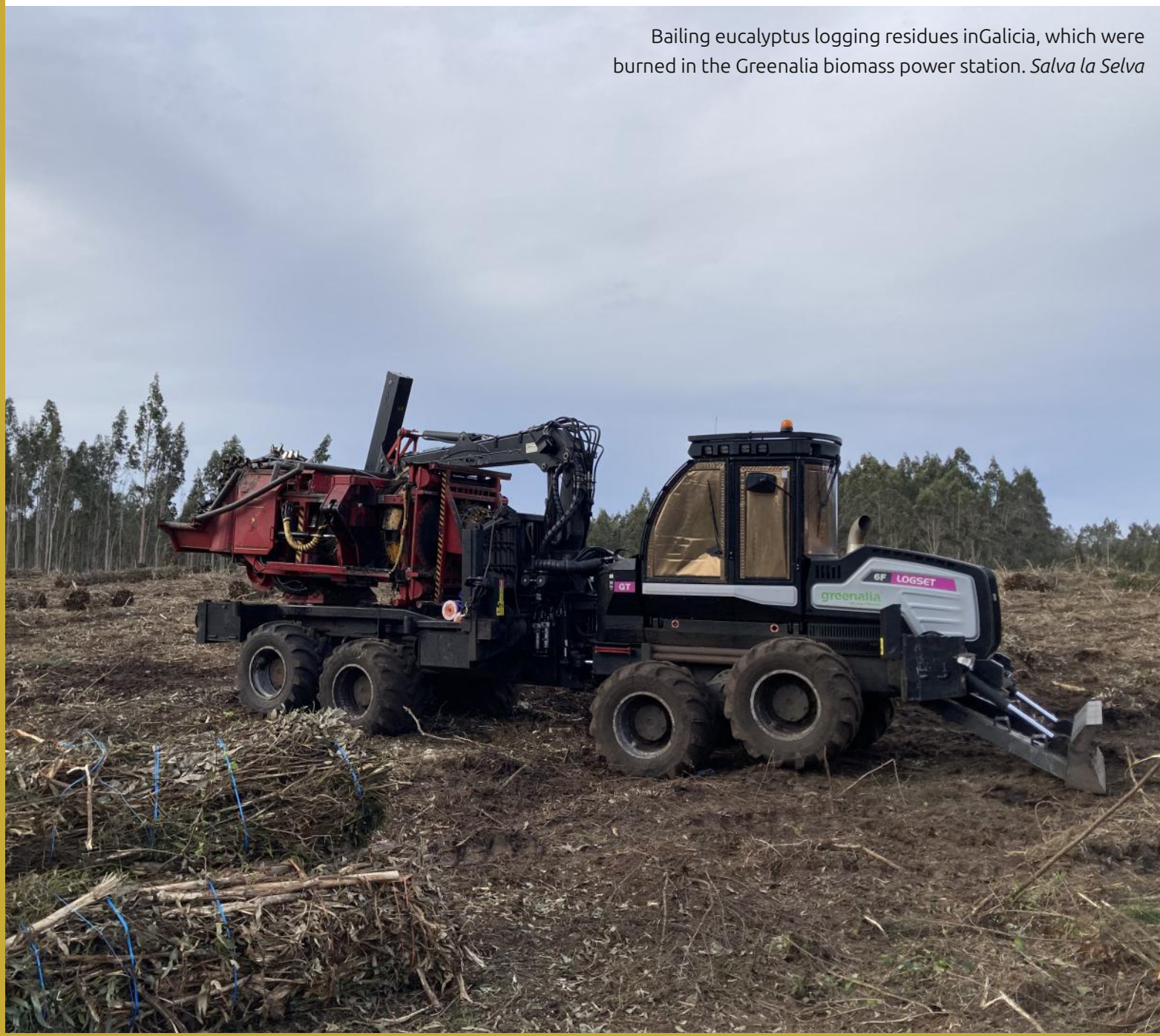
Smurfit Kappa operates two integrated pulp and paper mills in the Basque Country in northern Spain, in Nervión and Sangüesa, which between them consume more than a million cubic metres of pine each year. The Nervión mill invested 25 million Euros into a new biomass CHP plant in 2009, which allows it to burn over 100,000 tonnes of primary woody biomass each year. The DH Smith Dueñas mill in Palencia also operates a small 15 MW_t biomass boiler that requires up to 40,000 tonnes of biomass to be brought in from outside of the plant's operations.

Conclusions

The pulp and paper industry is clearly the major player in the biomass electricity sector in Spain, and is responsible for a great deal of the primary woody biomass that is burned in the country each year.

Put together, Spain's pulp industry and power stations associated indirectly with the pulp industry account for around 428 MW of electrical capacity, equivalent to more than two-thirds of Spain's overall biomass electricity generating capacity. These plants require in the region of 2.8 million tonnes of biomass each year, of which up to 2.4 million tonnes could come from primary sources, and logging operations in industrial tree plantations in particular. This is equivalent to over a third of all of the woody biomass used for energy generation each year in Spain, and over half of the estimated annual availability of primary residual biomass throughout the whole country.

If Altri's pulp mill and biomass plant are constructed, and if Greenalia's two new biomass plants are developed, this would create an additional overall demand of around 1.7 million tonnes of woody biomass, which would represent a 70% increase on existing demand from biomass power stations linked directly or indirectly to the pulp industry. This highlights the importance of opposing these new developments.



Bailing eucalyptus logging residues inGalicia, which were burned in the Greenalia biomass power station. *Salva la Selva*

Plant name (location)	Operator	Capacity (MWe)	Woody biomass consumption in 2022 (kt)	Estimated primary woody biomass consumption (kt)
Pontevedra pulp mill (Galicia)	Ence Energia y Celulosa SA	50	200	150*
Navia pulp mill (Asturias)	Ence Energia y Celulosa SA	62	360	240
Huelva power stations (x3) (Andalucía)	Magnon Green Energy/Ence Energia y Celulosa SA	137	885	885
Lucena power station (Andalucía)	Magnon Green Energy/Ence Energia y Celulosa SA, Grupo Santamaría	27,1	123	0
La Loma power station (Andalucía)	Magnon Green Energy/Ence Energia y Celulosa SA	16	84	84
Enemansa power station (Castilla-La Mancha)	Magnon Green Energy/ENCE Energía & Celulosa	16	71	0
Biollano power station (Castilla-La Mancha)	Magnon Green Energy/ENCE Energía & Celulosa	50	285	285
Merida power station (Extremadura)	Magnon Green Energy/Ence Energia y Celulosa SA	20	186	186
Nervión pulp mill (País Vasco)	Smurfit Kappa	22,4	>100	100
Curtis-Teixeiro (Galicia)	Greenalia	50	450	450
Dueñas paper mill (Palencia)	DS Smith	15(MWt)	46	39
		450,5	**2790**	**2419**

Table 1: Biomass power stations burning woody biomass associated with the pulp industry.
* Assuming 200 kg of bark are produced per Adt of pulp (range is 100-300 kg).

Plant name (location)	Operator	Capacity	Estimated primary woody biomass consumption (kt)
Gijón, power station (Asturias)	Greenalia	50 MWe	518,000
Villalba power station (Galicia)	Greenalia	50 MWe	500,000
Projecto GAMA (Galicia)	Greenfibre (Altri/Greenalia)	250 MWt	700,000
		450,5	**1,718,000**

Table 2: Planned biomass power plants that will burn woody biomass associated with the pulp industry in Spain.