

ENERGY HUBS

The paper industry's potential
as a renewable energy producer





Executive summary

This AFRY report, commissioned by Ceperi, shows that the paper industry has a notable potential for additional renewable energy production. This additional potential could be used internally, be sold, or converted to production. It is clear that the paper industry can contribute to solving the European energy crisis – but it cannot solve it alone.

Paper mill sites already produce energy and can be seen as “energy hubs”. This means that a paper mill can use all available means that make sense, including e.g. solar and wind power, to optimise renewable energy on-site potential. The AFRY report shows that our industry could increase the amount of generated heat and electricity in many cases. One solution does not fit all sites, but becoming less dependent on external energy factors is crucial.



HOW MUCH MORE RENEWABLE ENERGY COULD BE GENERATED AT CEPI MILL SITES?

The paper industry is very heterogeneous. Some mills produce a large surplus of energy, others run a large deficit of energy. The AFRY report estimates that across Europe about 31 TWh of additional energy (power and heat) could be produced on-site using a mix of renewable energy sources. This corresponds to:

- ▶ Almost 10% of Ceperi association member mills’ energy consumption in 2020.
- ▶ 30% of electricity produced on-site in 2020.
- ▶ Almost 6% of heat generated on-site in 2020.
- ▶ About 0.8% of European overall natural gas use before the 2022 energy crisis.



HOW THE ADDITIONAL POTENTIAL CAN BE USED?

In a business model of “swing” between competing end uses, the additional potential can be used in many ways:

- ▶ Space: could be used for additional production capacity or energy production,
- ▶ Water: could be recirculated, or an energy source,
- ▶ Gases: are energy for the mill, but could also be sold,
- ▶ Sludges: could become materials, energy, or sold as is for further treatment,
- ▶ Lignin: is already an energy source – it can also be valorised as materials and chemicals apart from fuels.

In the AFRY report, double counting has been avoided by defining typical mills, with size, space and other properties, and using these resources efficiently – but only once.



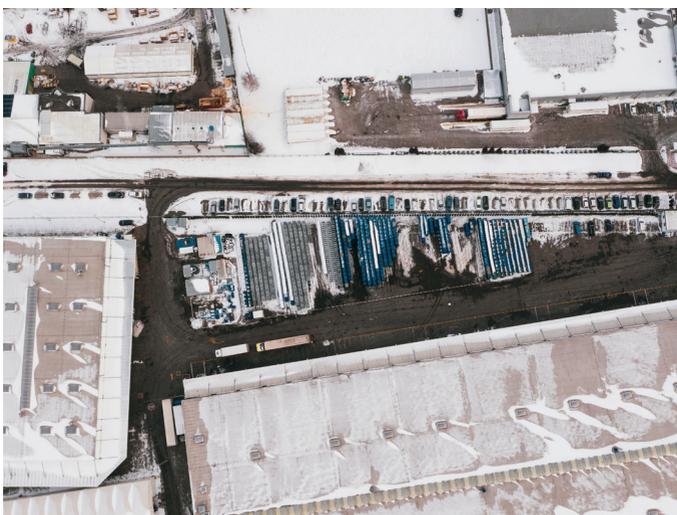
HOW THE ADDITIONAL POTENTIAL CAN BE REALISED?

The European policy can support the paper industry in contributing to decrease Europe’s dependency on fossil energy. The transition to greater on-site energy production requires a policy framework that:

- ▶ Promotes, supports and rewards investments in renewable energy generation on-site,
- ▶ Supports new business models which leverage their on-site renewable energy potential,
- ▶ Facilitates connecting industrial sites into industrial symbiosis networks,
- ▶ Accelerates permitting processes for new renewable energy installations on-site.

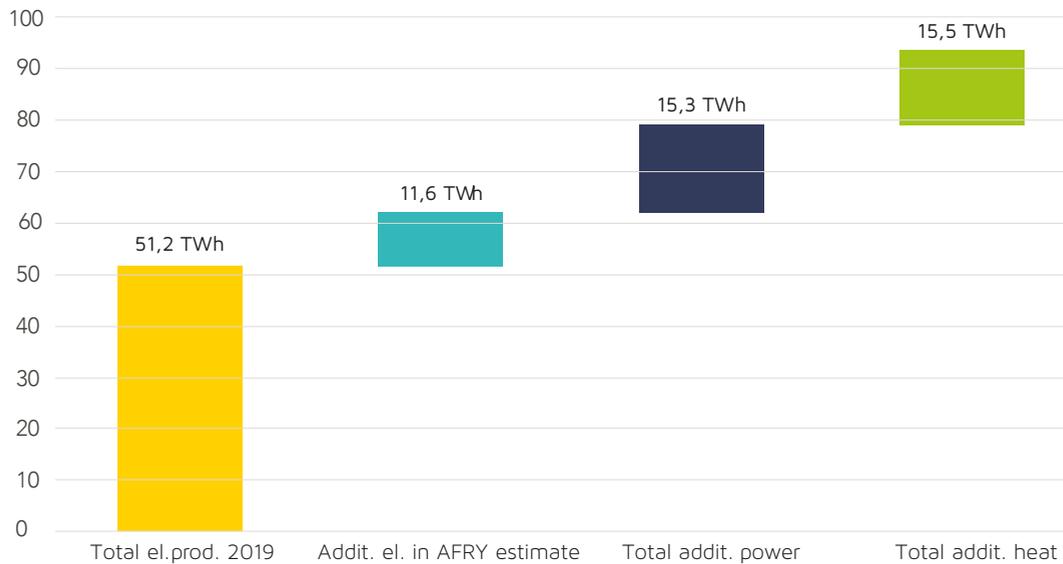
Example of use of satellite data for potential renewable energy output estimates

How much solar or wind power can be placed on an industrial site? Coupled with AFRY data, satellite imagery was used to estimate space available for renewable energy installations. The yellow area represents potential for roof-top solar, the blue area the potential for wind power. This is a non-paper industry site, shown as an example.



AFRY estimate in TWh, compared to electricity produced by the paper industry according to Ceper statistics

- Ceper statistics
- AFRY methodology leads to a slightly larger figure: to be consistent, additional power is counted from that level
- Additional potential of heat and power, converted to TWh, are the sum of all the means listed employed (wherever possible)



Depending on mill type and amount, the greatest absolute additional potential is on-site at integrated chemical pulp and paper/board mills

Proportion of additional TWh, %

- Non-integrated tissue **9%**
- Non-integrated paper **5%**
- Integrated recycled pulp and paper/board **14%**
- Integrated mechanical pulp and paper/board **14%**
- Integrated chemical pulp and paper/board **39%**
- Non-integrated chemical pulp **19%**

