

Risky Biomass Business

The reputational and financial risks of investing in forest biomass energy

Investors in electricity generated from burning forest wood are facing increasing reputational risks, as well as facing serious financial risks.

Reputational risks stem from the growing awareness and body of evidence showing that forest biomass is far from being a low carbon or even carbon neutral energy source. The climate impacts of forest biomass energy are in many cases as bad as those of coal (for the same amount of energy generated). Furthermore, biomass energy is linked to accelerating forest and biodiversity destruction, as well as to air pollution affecting public health.

Reputational risks can translate into financial risks given the high level of dependence of this form of energy on public subsidies. Failure to fully disclose environmental, social and governance (ESG) risks in portfolios exposes financial institutions to regulatory risk. Furthermore, there are additional financial risks:

- Biomass energy provides poor value for money compared to low-carbon forms of renewable energy such as wind and solar power - a trend that will only accelerate as the cost of wind and solar power continues to fall, unlike that of biomass energy;
- Bioenergy plants are highly dependent of public renewable energy subsidies and thus vulnerable to any changes in the opinion of policy makers and to reviews of legislation;
- Even with subsidies in place, several large biomass power projects have resulted in substantial financial losses for energy companies;
- 'State of the art' or 'advanced', high-efficiency biomass projects carry a higher risk of technical failure;
- Processing and burning woodchips and pellets for energy are associated with a high risk of fires and explosions.

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Reputational risks

Energy from forest biomass¹ is increasingly recognised as a high-carbon source of energy, linked to forest and biodiversity destruction and threats to public health. In January 2018, an [Open Letter signed by 800 scientists](#) was submitted to the European Parliament, stating: "Even if forests are allowed to regrow, using wood deliberately harvested for burning will increase carbon in the atmosphere and warming for decades to centuries ... even when wood replaces coal, oil or natural gas. The reasons are fundamental and occur regardless of whether forest management is 'sustainable.'"

A [subsequent peer-reviewed study](#) found that even bioenergy sourced from burning forest residues results in such a high carbon debt that it cannot contribute to the goal of the Paris Agreement to limit warming to 1.5 or even 2 degrees.

In 2018, 136 NGOs signed an [Open Letter denouncing the 'Biomass Delusion'](#). The signatory NGOs warn that energy from forest biomass harms the climate, harms forests, harms people, and harms the transition to clean energy. They "call on governments, financiers, companies and civil society to avoid expansion of the forest biomass-based energy industry and move away from its use".

As the negative impacts of biomass energy become clearer and more widespread, opposition and resistance to projects from local communities and campaign groups is mounting in several countries and regions such as in various regions [in the Netherlands](#), in [Gardanne](#) in Southern France, [across the UK](#) and in the [Southern United States](#).



Financial risks

1. Poor value for money

Generating electricity from biomass is more expensive than generating it from other forms of renewable energy.

A [IRENA report published in January 2018](#) found that the average global levelised cost of electricity (LCOE) for bioenergy projects commissioned in 2017 was \$0.07/kWh, but up to \$0.08/kWh in Europe and North America. Lower costs were associated with poorer environmental standards. By comparison, the average LCOE of new onshore wind commissioned in 2017 was \$0.06/kWh. For solar PV in at least five countries, an LCOE of \$0.03/kWh was reported. In 2016 and 2017, auction results for offshore wind and concentrated solar power showed that an LCOE as low as \$0.06/kWh would be achieved by 2020.

The report further shows significant and ongoing falls in the cost of wind and solar power, with no such recent

trends for bioenergy. It also states that the feedstock costs account for 20-50% of the cost of electricity from biomass, with the cheapest source being agricultural residues. Wood prices are strongly affected by demand, hence they cannot be expected to fall if bioenergy from forest wood continues to increase – particularly since the energy sector competes with the pulp and paper and other industries for the same wood resources.

A [2016 study by Vivid Economics](#), commissioned by the Natural Resources Defense Council, looked at the economics of coal-to-biomass conversions in the UK context, widely considered cheaper than dedicated biomass power stations or cogeneration plants. It found that: "wind and solar are likely to be the lowest-cost technologies to ensure the reliability of U.K. electricity supply in the period 2020 to 2025".

The modelling in this study indicates that in 2020, when power plant emissions from burning biomass and their associated carbon costs are accurately accounted for, biomass is uneconomical relative to wind and solar alternatives². Even in scenarios that do not fully account for biomass carbon emissions, the total economic cost of biomass is comparable to or higher than that of onshore wind and solar. The analysis also finds that as their costs continue to fall, in 2025 wind and solar are likely to be the least costly way to ensure the UK meets its energy needs.

¹ For the purpose of this briefing, the term 'forests biomass' refers to wood sourced from either or both forest ecosystems or industrial tree plantations. This reflects the reality that the same installations may source a mixture of wood from both sources. It does not in any way imply that the organisations publishing the briefing agree with classifying industrial tree plantations as forests.

² See figure 2 in the Vivid Economics 2016 study

2. Dependence on subsidies

Our organisations could find no evidence of any power station, combined heat and power plant or larger biomass heat plant in the world that is reliant on forest biomass and operates without subsidies (including direct subsidies, indirect subsidies paid via electricity bills, and preferential loans from publicly funded or owned bodies).

As the negative impacts of energy from forest biomass are becoming more widely known, pressure on policy-makers is increasing to shift subsidies towards lower-carbon forms of renewable energy. This was well exemplified in the Belgian region of Flanders where disagreements over biomass sustainability and public criticism of high subsidies [stopped the operation](#) of the large MaxGreen power station, which had been converted to biomass³, and [cancelled the plans to build another](#).

Such a policy shift could well mirror the drastic reduction and then withdrawal of subsidies for heat and power from palm oil burning: [in the Netherlands](#), 15.9 PJ of bioliquids, most of it palm oil, were co-fired in coal power stations in 2006, and this was cut to 0.6 PJ in 2007 (before ceasing altogether), due to subsidies being first drastically reduced and then stopped.

3. Financial losses even with subsidies

Several large biomass power projects have resulted in financial losses for operators, despite generous subsidies.

4. Risk of technical failure

The technical risks involved in building low-efficiency small and medium-sized biomass combustion plants is no greater than that involved in other energy schemes, except for the risk of fires and explosions. However, technical challenges involved in plants using 'state of the art' or 'advanced' and high-efficiency technologies, are significant and examples of technical failures are mounting.

Projects which have resulted in financial losses despite subsidies

- In Rotterdam, in the Netherlands, Uniper was awarded renewable energy [subsidies of 930 million € in 2016 for co-firing wood pellets](#) in its new Maasvlakte 3 coal power station opened the year before. In the same year, the book value of this power plant was [written down from 1.5 billion to just 700 million €](#). This was well in advance of the Dutch government's decision to phase-out coal-fired power plants by the end of 2029. In 2019 technical upgrades to permit [30% co-firing](#) were finally completed, but the Dutch government has already announced that there won't be any new subsidies [after 2026](#). Under these conditions, the power plant will hardly meet its targeted investment return and will inevitably be further depreciated.
- A [2018 study by researchers of the Georgia Institute of Technology, commissioned by the Natural Resources Defense Council](#) looked at Dominion Power's full conversion of three coal power stations to biomass in Virginia and the conversion to biomass co-firing of a fourth station. It found that the cost of producing one MWh of electricity from biomass across the four plants was 88% more expensive than electricity generated from other sources, including solar and wind power. A [Dominion spokesperson](#) had stated that it made sense to operate the plants with biomass due to tax credits and renewable energy credits. In August 2018, Dominion quietly mothballed one of the converted power stations because it could no longer receive tax credits and thus keep it financially viable. The company also decided to close two other dedicated biomass plants, in Virginia and Minnesota.
- In the UK, Drax Group plc received [£729 million in renewable energy subsidies](#) during 2017 for burning biomass in its three converted coal power station units. Nonetheless, it incurred a net loss of £151 million, of which £10 million were due to a fire. In the first half of 2018, [Drax recorded a loss of £4 million \(after taxes\)](#), despite receiving subsidies at a similar rate as during 2017.

Examples of technical failures of 'state of the art' or 'advanced' biomass energy projects

- In [Gardanne](#), France, E.On started converting the Province 4 coal power station to biomass in 2015, made possible by a 70 million € annual government subsidy guaranteed for 20 years. This was to be the world's first conversion of a coal power station to burn woodchips. Since it first produced biomass electricity in 2017, the plant is reported to never have operated for more than two weeks without being shut down due to technical problems. In 2017, it operated at just 8% of its load and in 2018 at 25%. Furthermore, the French government has announced a coal phase-out by the end of 2021 and the operator of the plant, Uniper has said that it ["couldn't absorb a blow like this with our remaining business in France"](#).
- In Ontario, Canada, the state energy company OPG had one of its 153 MW coal power station units converted to 'advanced biomass', i.e. black wood pellets, in 2015. The Norwegian company Arbaflame carried out the conversion and supplied the pellets. That same year, [Ontario's Auditor General](#) warned that the cost of generating one megawatt hour of electricity was many times as high as for other power plants in the province. In 2017, [it transpired](#) that the plant had only operated around 2% of the time, far less than anticipated. In July 2018, [OPG announced](#) the plant's closure caused by severe boiler erosion which would require prohibitively expensive repairs.
- A [2015 Biofuelwatch report](#) looked at the 9 biomass gasification plants built in the UK between 2001 and 2015. It found that 8 had failed during or shortly after commissioning. Just one was still operating, but at less than one-tenth of its capacity, indicating serious technical problems. Just two of the failed projects cost investors a total of £50m.

3 The government subsequently decided to re-grant subsidies, and this resulted in the plant re-opening. Nonetheless, this example shows how sensitive operators are to political decisions about subsidies.

5. High risk of fires and explosions

Biomass plants are associated with a particularly high risk of fires and explosions, especially those burning pellets. Woodchips and especially pellets can self-heat and ignite during storage and wood dust from the chips and pellets can self-ignite and lead to explosions. There are [additional risks associated with biomass gasification and pyrolysis](#) linked to the need for constant tight pressure control.

Although the risks are well recognised and widely mitigated, there has been a high number of accidents involving biomass plants and pellet mills already.

Fires and explosions associated with biomass and wood pellet plants

- In the UK, three coal power stations have so far been converted to wood pellets and all three experienced major fires after being converted. Two of them - Tilbury B and Ironbridge - were subsequently shut down. The third one is Drax, which [suffered a £10m loss](#) from a fire in a biomass unit in October 2017.
- Other accidents include an [explosion and fire](#) at a wood pellet conveyor belt at DONG's (now Ørsted) power station in Copenhagen in 2016, four years after a similar, albeit fatal, accident at the same plant.
- A [large fire](#) occurred at a woodchip-burning power station operated by E.On in England in 2018 and another one at a large [woodchip burning power station in Gainesville](#), Florida. In 2016, 35.000 tonnes of woodchips on its way to Gardanne [burned](#) in the port of Fos.

Worldwide, at least [76 fires and explosions associated with wood pellets](#) occurred between 2008 and 2012.

Regulatory and legal risks

The failure to fully disclose environmental, social and governance (ESG) risks in portfolios exposes financial institutions to regulatory risk. Similarly, failure to meet new requirements on the inclusion of ESG risk criteria in due diligence and risk weighting forms a regulatory risk for investors.

In 2018, the European Commission launched an [action plan on sustainable finance](#), which has as one of its key goals to improve corporate disclosure of climate related information.

In the USA, a group of civil society organizations filed a [petition at the Securities and Exchange Commission](#) in 2019, which calls for more transparent rules about how biogenic carbon emissions should be disclosed.

Financial institutions are also exposed to legal risks as they can be held accountable for the impacts of their investments and for breaches in fiduciary duty from failure to integrate ESG risks.

The EU has already become the target of a [lawsuit, filed in March 2019 at the European Court](#) by an international group of plaintiffs. They challenged the status of forest biomass as „renewable energy,“ based on the harms from logging and biomass burning they have already suffered and the anticipation of future impacts as financial support for bio-energy continues to soar.

