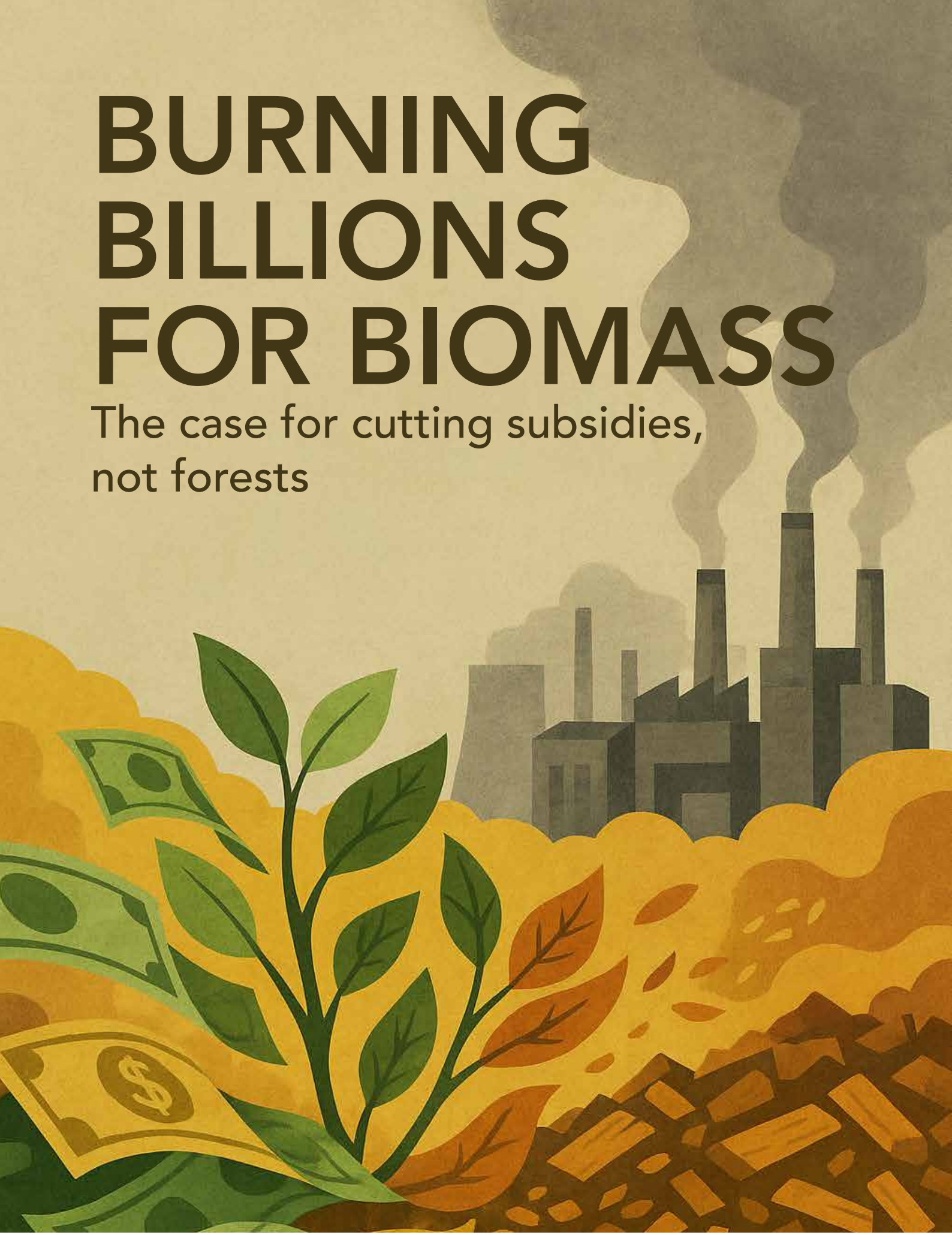
BURNING BILLIONS FOR BIOMASS

The case for cutting subsidies, not forests



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BURNING BILLIONS FOR BIOMASS

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Contents

1. Key Recommendations

The Biomass Action Network calls for:

1. **An end to subsidies** for biomass energy throughout the supply chains;

2. **The Convention on Biological Diversity and all Parties** to it, to identify subsidy supports for biomass energy as "most harmful subsidies" to biodiversity under its Global Biodiversity Framework Target 18, and therefore prioritise them for elimination under the 2022-30 plan;

3. **The United Nations Framework Convention on Climate Change and all Parties** to it, to recognise finance flows (including subsidies) to forest biomass energy as inconsistent with a pathway towards low greenhouse gas emissions and climate-resilient development, and therefore that they are in contravention of the Paris Agreement;

4. **All public and private sources of finance** to exclude biomass energy from green finance criteria immediately.

For the purposes of this report, we define these terms in the following way:

Bioenergy: This term refers to energy generated from burning solid biomass, liquid biofuels and gases.

Biofuels: This term includes the fuel sources; solid biomass and charcoal, liquid biofuels and gases.

Biomass energy: This term refers only to energy produced from burning solid biomass.

Forest biomass: A subset of woody biomass, this term refers to wood taken directly from forests.

Woody biomass: A subset of solid biomass, this term includes wood taken from both forests and plantations, as well as non-forest ecosystems such as savannas. It also includes wood processing by-products.

2. Executive summary

Subsidies for renewable energy are valuable tools for the essential transition away from climate-destroying fossil fuels. Unfortunately, however, a large portion of those subsidies, amounting to many billions of dollars globally, have been misdirected to support burning wood (pellets and chips) for electricity and heat, alongside cleaner renewables like wind and solar. The effect has been to support the expansion of a biomass industry that is driving deforestation and forest degradation, polluting communities, and releasing more CO_2 than the fossil fuels it is intended to replace.

Biomass subsidies come in many forms. Some offer support to producers of biomass power, heat or combined heat and power. Some oblige utilities and consumers to purchase biomass power. Biomass power can be subsidised directly through payments, grants, tax incentives, etc., or indirectly, such as when carbon markets ignore the emissions from biomass, giving it a free pass.

Directing subsidies to biomass heat and power means less support is available for cleaner renewables like wind and solar and for developing energy efficiencies; far better uses for limited funds. This "opportunity cost" has serious economic consequences, since biomass power has remained very expensive, while the costs for wind and solar have steadily declined with technological improvements. Many biomass facilities are not economically viable, even with subsidies. Taxpayers are generally forced to carry the burden of that expense.

This report offers a series of case studies on the subsidies provided for biomass in various countries. These case studies show us that policies offering subsidies for biomass power and heat often face strong and growing opposition and therefore a high degree of instability that should give investors pause.

Subsidies can have profound effects on the economy and environment. They can be helpful in developing new industries and technologies, or they can be drivers of social and environmental damage. Subsidies supporting biomass, facilitate the expansion of an industry that undermines urgently necessary efforts to reduce emissions, pollutes communities and degrades forests and biodiversity.

The Biomass Action Network, a coalition of 200+ groups in 70 countries, therefore demands that subsidy support for biomass be eliminated and redirected to better uses.

The case studies presented in this report provide insights into the subsidies offered for biomass in various countries, and offer some intriguing analysis of how those subsidy supports and policies have changed over time. Each region has a unique "story" to tell about how biomass subsidies have evolved and reflects on the lessons to be learned.

The largest subsidiser of biomass in the world.

UK goes bigger on biomass subsidies

The UK has been and currently remains the largest subsidiser of biomass in the world. According to a 2024 government-issued report, some £22 billion in subsidies went to biomass electricity and heat between 2002 and 2023. Those have been provided via a "Renewable Obligation" which offers "certificates" to producers of renewable energy. DRAX, the largest wood-burning power facility in the world, has been a major recipient. A second pathway is Contracts for Difference, which award a guaranteed "strike price" for power purchase that is non-rescindable for a 15 year period. Successful campaigning established a high efficiency requirement for earning a Contracts for Difference award as of 2018, but this was reversed in 2025, and pending legislation may eliminate all constraints on CfD awards for biomass facilities. The UK government is now subsidizing the development of new energy intensive datacenters and "AI Growth Zones". Drax has submitted a bid to supply the power, now pending.

Poland reversing course

Poland began offering "green certificates" for renewable energy, including biomass, in 2004. Certificates are then traded on a market. Between 2011 and 2020, electricity producers from solid biomass alone received PLN 21 billion in support under the green certificate system. In 2016, a new auction-based system was instituted, in which producers auction their power for 15-year contract periods (a contract for difference, CfD). Biomass power did not fare well in this system, even though it was granted a higher reference price than other renewables. Subsidies have also provided funding for the construction of power plants, combined heat and power facilities and for household biomass boilers. In sum, these measures led to a 150-fold increase in wood burning in the commercial energy sector, with serious impacts on Poland's forests and also on other industries like wood-panel manufacturers who compete for wood resources. A political declaration was recently made to ban wood burning for commercial power and put an end to support for biomass power in Poland.

A political declaration to ban burning wood in commercial energy sector.

Efforts to reform met with pushback.

Germany: No progress at the federal level as subsidies for biomass are turned into a culture war issue

Subsidies are provided for biomass power and heat, at commercial and residential scale through a variety of federal and local/regional mechanisms. Germany burns more wood than any other European country, much of it for heat. Burning wood in residential wood stoves is entrenched in the culture, and efforts to establish limitations and regulations have led to a right-wing push back, a trend that appears poised to further undermine attempts to limit subsidy supports for biomass.

Netherlands makes big steps in the right direction

Biomass power (but not domestic uses) is subsidised via a policy mechanism called "Stimulation of sustainable energy production and climate transition". As in other places, an indirect subsidy comes from the fact that there is no carbon price on power from biomass. Even in spite of subsidies, biomass power has failed to compete with wind and solar. In 2022, the Dutch government made the bold decision to halt further subsidy supports for the most part. This stands as a shining success, but requires vigilance to protect against any revocation by a future government.

The bold decision to halt further subsidies.

The slow pace of implementation for reforms is troubling.

South Korea and Japan: Vast demand for wood in Asia raising questions

South Korea established a Renewable Portfolio Standard (for power only) in 2012, with marketable credits weighted favorably for biomass power, sold by producers to utilities that are required to demonstrate a growing percentage of renewables. Following public opposition, a Presidential Commission opened stakeholder consultations, noting a sharp increase in pellet and roundwood imports, especially from Vietnam, Russia and Indonesia. Concerns about the import-dependence led to a government proposal to scale back support, especially for new biopower, and to favor power generated from domestic "unused forest biomass". The slow pace of implementation for reforms is troubling, as is the potential for ever more damage to South Korea's domestic forests.

Japan established a Feed In Tariff (FIT) in 2012, mandating power companies to purchase biomass power at above-market prices, paid for via a levy on consumers' energy bills. Wood pellets, as well as palm kernel shells, are imported. Updated FIT guidelines, which only apply to the very few facilities certified after 2022, include a requirement for greenhouse gas emission reductions relative to fossil fuels. But those fail to recognise CO_2 from biomass burning, giving it a free pass. Guidelines for traceability and sustainability of wood sourcing are also now required, but are far too weak to be protective. Other mechanisms put in place after the FIT risk being an alternative source of support with even weaker guidelines.

Guidelines too weak to be protective.

Direct support for logging and pellet production.

Canada and the USA: High costs, shifting policies and false wildfire rhetoric

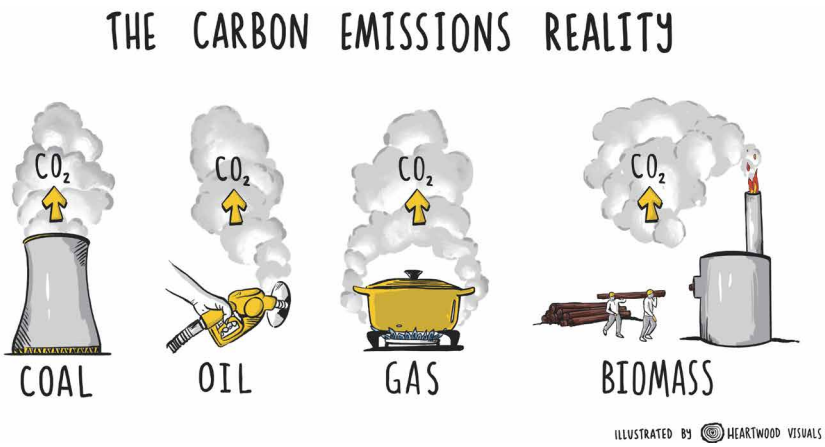
The US is a major producer of wood pellets for export, hence subsidy supports for pellet manufacturers are a major focus, and logging operators supplying the wood to those producers are beneficiaries with a powerful lobby. In the USA, national level subsidies are offered via the Department of Agriculture, Department of Energy and the Forest Service and through legislation, including provisions within the Farm Bill. State-level supports come, for example, via Renewable Portfolio Standards and engagement with regional market-based GHG initiatives. Biomass power producers struggle, given the very high cost relative to wind and solar. Efforts to bolster these facilities have, in numerous cases, left ratepayers and taxpayers footing excessive bills for outdated, costly and polluting energy generation, in some cases ending in the shutdown of facilities.

Canada offers some 50 different programs, federal and provincial, that support biomass. Quebec, Ontario and British Columbia are especially supportive. Western Canada and the USA have been plagued by wildfires in recent years. The biomass industry, loggers, power producers and pellet manufacturers have all used "wildfire risk mitigation" as a powerful rhetorical tool to win over policy support. British Columbia, one of the major pellet producing regions in the world, for example, offers support directly to logging operations providing wood to pellet industries under the guise of protecting against fires, even though the science indicates that logging worsens rather than prevents wildfires.

Offers 50 programs, that support biomass.

3. Introduction

A rapid expansion of the development and use of energy generation from biomass burning has occurred over the last two decades, encouraged by the misclassification of this energy source as renewable and by claims that it is carbon neutral. However both assertions are hotly disputed, especially for solid biomass which is mostly wood.



IPCC emission factors show that burning wood emits at least as much CO_2 per unit of energy as burning fossil fuels and multiple lifecycle assessments have demonstrated that net emissions from burning woody biomass frequently exceed those from fossil fuels for decades to centuries, for the simple reason that burning wood emits carbon faster than trees can regrow to sequester it.

Forests are an extremely precious and exhaustible resource that take decades—if not centuries—to regenerate. According to a peer reviewed study, after clearcutting, it takes between 44-104 years to repay the resulting carbon debt in natural forests of the eastern US, even if trees are replanted. Some ecosystems take even longer to recover. When it comes to the biomass industry, "None of the companies can guarantee they can regrow untouched forest to capture the same amount of carbon released." In practice, "replanting" actually means either maintaining industrial tree plantations or converting biodiverse forest ecosystems to such plantations, thus causing permanent harm to biodiversity and to carbon stocks and sinks.

Promoting burning woody biomass as "carbon neutral" or "low carbon" renewable energy ignores these basic realities and has led to deforestation, destruction of carbon stocks and sinks, degradation of natural forests, the conversion of natural ecosystems and community land to monoculture plantations, and adverse health and socio-economic impacts on Indigenous peoples and local communities.

The channelling of funds into the biomass industry by way of government subsidies has supported and promoted the production, expansion and uptake of this contentious form of energy, at the expense of forest conservation, people's well being, and genuine climate solutions.

As such, we - The Biomass Action Network - hold that all financial support for the biomass industry should be abolished.

This report outlines the issues, and presents a series of case studies which illustrate the various subsidy policies applied in some of the most globally significant jurisdictions for woody biomass combustion and use for energy, and for the production and manufacturing of biomass feedstocks. Changes to incentives are occurring and the case studies, contributed by NGOs participating in the Biomass Action Network, make this a collaborative effort to understand the role of subsidies, their evolution, and the trends. ●

4. What are subsidies and how do they work?

A subsidy is a financial contribution by a government or agent of a government that confers a benefit on its recipients, according to the World Trade Organisation (WTO). Subsidies can take many forms. A variety of terms is associated with them, including "support", "aid", "assistance", and "incentive".

Subsidies can have profound effects on the economy and environment; in fact that is their purpose, and hence it is important to ensure that they serve the public good. They may have a strong impact on the relative economic competitiveness of different activities and products, such as different materials, energy sources, and geographic location of production.

4.1 Renewable energy subsidies

Most countries have developed policy mechanisms to increase the percentage of power and heat generated from 'renewable' sources, as a key aspect of their transition away from the use of fossil fuels.

Many governments in the Global North have created tax breaks, feed-in tariffs (FITs), and other subsidies to encourage renewable energy technologies, which in practice mean wind, solar, and bioenergy. While it is imperative that the world urgently replaces fossil fuels with renewable energy, this must not include carbon emissive fuels like woody biomass.

4.2. Biomass - A false climate solution

Contrary to the latest science, many climate pledges include burning woody biomass for energy as a mitigation option. This is a false solution with demonstrated negative consequences for the climate and biodiversity. It has been encouraged due to the misapprehension that it is carbon neutral, created by carbon accounting flaws for woody biomass that fail to indicate the large immediate greenhouse gas (GHG) emissions of combustion for energy production in the energy sector, unlike those of fossil fuels.

Instead of counting biomass emissions at the smokestack, the GHG emissions from biomass energy are supposedly accounted for in the land sector where the biomass is sourced. However, in the land sector, the emissions sources are never broken down to show emissions resulting from biomass burning for energy, instead they show only the overall change in forest carbon stock from all causes. This is in stark contrast to how emissions are recorded for all other energy sources, which are accounted for in the energy sector of the country where they are consumed. When biomass is

exported from one country to another, even if the negative impacts on the exporting country's land sector are captured inside the accounts, it doesn't prevent the importing country that burns these wood pellets claiming zero emissions.

Treating woody biomass differently creates a false impression of zero emissions for biomass energy, in comparison to emissions from burning fossil fuels.

4.3. Harmful subsidies

At the international level, there is a focus on identifying and reducing "environmentally harmful subsidies". This generally refers to subsidies that support production, transport or consumption that ends up damaging the environment.

The Convention on Biological Diversity (CBD) developed its second strategic plan, the 2022 Global Biodiversity Framework (GBF), which includes 23 targets for the period 2022 – 2030. An important element that identifies the need to tackle the impacts of subsidies is **Target 18**.

Global Biodiversity Framework: TARGET 18

"Identify by 2025, and eliminate, phase out or reform incentives, including subsidies, harmful for biodiversity, in a proportionate, just, fair, effective and equitable way, while substantially and progressively reducing them by at least $500 billion per year by 2030, starting with the most harmful incentives, and scale up positive incentives for the conservation and sustainable use of biodiversity."

The UN Convention on Climate Change also contains a provision that can be read as applying to subsidies, embedded within a broader commitment for financial flows to address climate change:

Paris Agreement - Article 2

"1. This Agreement, in enhancing the implementation of the Convention, including its objective, aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including by:

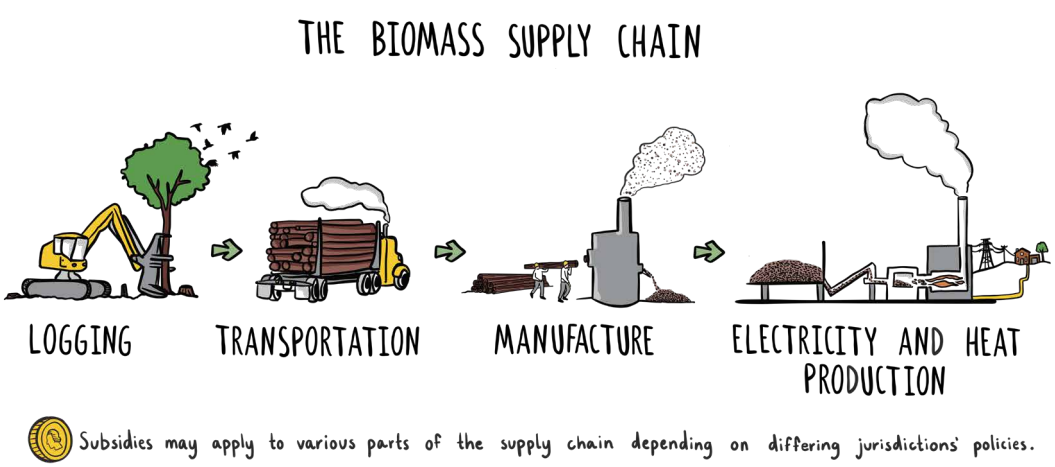
(c) Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development."

Support for biomass is the textbook case of subsidies harmful for biodiversity being justified only by abusing the carbon accounting loophole. Such subsidies should be subject to a substantial and rapid phase-out.

4.4. Biomass energy subsidies

Subsidies given to the biomass industry take many forms, varying from jurisdiction to jurisdiction, within and between countries. The case studies contained in this report illustrate a range of different types applied to support and promote the production, expansion and uptake of biomass energy.

Subsidies may be applied to all parts of the supply chain, including for biomass feedstock production, transport, manufacture, combustion, and consumption. In some instances there are indirect subsidies, and exemptions from payments and other provisions.



5. Why biomass energy should not be subsidised

5.1. Biomass energy is failing on cost and innovation

Peter Riggs, Pivot Point

Biomass energy has had a hand up as a renewable energy (RE) via hand outs, but on economic terms alone has failed to deliver in comparison with other renewables.

Large-scale biomass power has only achieved a foothold as a result of subsidies and (in some polities) the use of feed-in tariffs. Initially, this was also true of wind and solar. Fifteen years ago, subsidizing woody biomass burning, as a form of baseload energy that could innovate and reduce costs, arguably made sense. However, it is clear that biomass energy has failed to innovate, failed to reduce unit costs, and as a result, is now being badly outcompeted by other RE technologies.

Decreased competitive position vis-à-vis wind and solar.

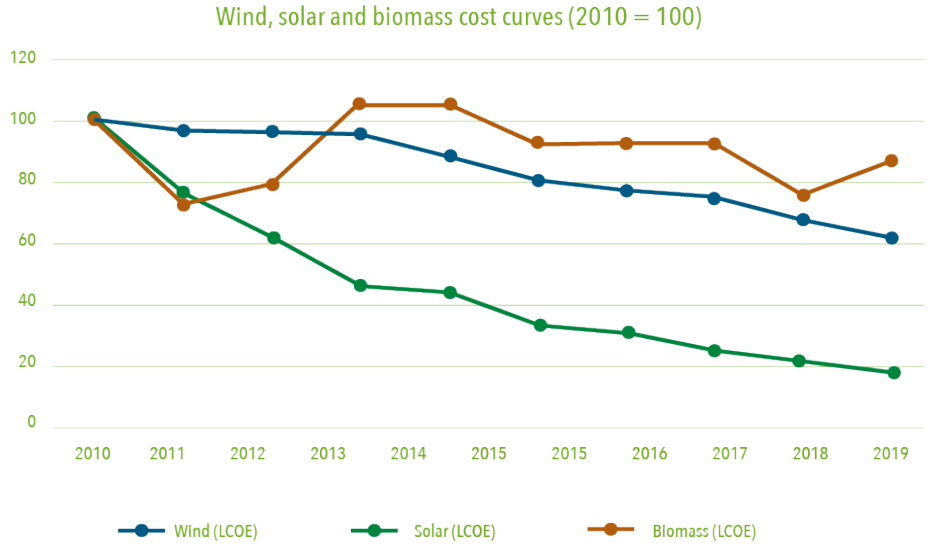
The graph (1) below describes very different cost and innovation curves experienced by the three major (non-hydro) renewable energy technologies since 2010:

The unit cost of wind power has declined steadily for over a decade and the declining cost profile of solar power is even more dramatic. Biomass, however, shows no such downward trend. Below the case is made for why continued subsidization of biomass is just throwing good money after bad:

Limited space for further innovation in biomass power and heat.

Theoretically innovation could occur through improved operational modalities, better supply chain integration, more efficient utilization of raw materials, and higher plant efficiencies, although it is important to note that solid fuel combustion technologies are mature technologies with little room for further improving efficiencies.

There has been almost no innovation in production line technologies between 2018 and today. Supply chain integration can reduce some non-fiber costs, such as through reductions in storage time, or optimizing the use of truck, rail and shipping delivery modes, but raw material costs remain persistent and (and a source of ongoing comparative disadvantage with wind and solar. The cost of biomass energy relies heavily on the cost of wood whereas the wind and sun are free. Wood is also vulnerable to price shocks whenever demand grows faster than supply.



Graph 1: Wind, solar and biomass cost curves over time.

Further, while numerous attempts have been made to develop higher-density pellets ("black", "torrefied", "steam exploded", or "HTC" pellets), due to technological constraints, higher costs and safety concerns, large-scale production of such pellets has yet to materialize. Simply put, there is no evidence of a sourcing shift toward torrefied pellets. Black pellets do not seem to be any more cost-competitive than the 'white pellets' now dominating global biomass energy trade.

Erosion of 'baseload' arguments for biomass power.

Industry proponents have argued that it is unfair to use levelized costs of wind and solar capacity in comparison with biomass power, because biomass is always dispatchable, whereas wind and solar are not. However, biomass power here is challenged by the dramatic decreases in the costs of energy storage over the last five years – with this trend toward lower-cost storage likely to further accelerate in this decade. A 2024 report by the respected energy think tank Rocky Mountain Institute predicts continued cost reductions through increases in battery energy density plus a decrease in battery cell costs. The rapid increase in demand for battery storage has led to various innovations that are now rapidly decreasing the per-unit cost of storage - further undercutting one of the key arguments about the importance of biomass as a form of baseload power. ●

5.2. Wind and solar are better for people and communities

Joy Reeves, Rachel Carson Council

Wind-generated power is one of the cheapest and most job-yielding forms of electricity generation. Wind projects can benefit rural and coastal communities alike with jobs and revenue. In the US, the wind industry is acclaimed for creating sizable quantities of employment across the country, contributing a total of $20 billion to the economy in just 2022. Wind turbine service technicians are the fastest-growing job of the decade, with solar photovoltaic installers in second place (2024-2034), according to the U.S. Bureau of Labor Statistics.

In countries such as the United States, this widespread employment is not concentrated in already-prosperous parts of the nation. Wind energy generates revenue in rural areas, particularly amongst agricultural communities that tend to have the best sites for wind infrastructure. Because turbines only use a fraction of the land, farmers and ranchers can continue their operations, as is often the case with solar "agrivoltaics." This starkly contrasts to the experience of landowners and residents unfortunate enough to live near wood pellet facilities, which impose such levels of dust, noise, odor, traffic, and pollution that up to 80% of community members face concerns going outside. Farmers or landowners also receive wind or solar rent payments from the plant owners as additional income. Wind projects deliver around $2 billion each year in land-lease payments as well as state and local tax payments. ●

5.3. Biomass energy has environmental and social costs

Michél Legendre, Dogwood Alliance, Southern United States:

Industrial biomass production is destroying forests, polluting air and water and turning areas such as the rural southern US into sacrifice zones. From pollution to forest degradation, communities in regions such as these are burdened by an industry backed by billions of dollars in subsidies globally.

Before taking a deeper dive on subsidies, it's important to understand how the biomass industry has built its business in producer countries. The US South is one of the world's leading exporters of pellets and serves as the best example of just how bad this industry is for public health, forests, and communities. Over the last decade, millions of (US) tons of wood pellets have been produced here for export to primarily European markets by clearcutting over 1 million acres in the region. The growth of the biomass industry has negatively impacted wildlife, biodiversity, sustainability of forests, and reduced communities' ability to prepare for increased extreme weather and flooding.

The domestic subsidies for this industry are typically awarded for supposed job creation and yet-to-be-proven economic benefits, however what we have seen instead is more resources drained from communities, greater economic inequalities created, and the loss of potential regenerative economic jobs and industries due to the increased pollution and loss of forests. Subsidizing biomass not only indicates a lack of seriousness about greenhouse gas emission reductions, but also a belief that communities in the places where the biomass is produced are somehow disposable and not worth protecting, and that forests are better logged than standing. ●

Taxpayers pick up the bill for biomass in Gainesville, Florida.

Joy Reeves, Rachel Carson Council

In the US, biomass power plants have taken billions of dollars in subsidies from the federal government. Yet, many plants are still forced to close because the cost of energy they produce is too high. Others are forced to shut down because their adverse environmental effects on the surrounding communities are too severe. These plants burn a medley of biomass sources, such as agricultural wastes, wood and wood byproducts, animal waste, and more in order to produce energy for fuel. Wood pellets are a part of this mix. Pellets are unique, since they can be used in biomass plants as well as co-fired in preexisting coal plants. But this does not pose an implicit fiscal advantage. A close examination of current industrial facilities reveals that further dependence and investment in such plants would be financially irresponsible, as demonstrated by the case of Gainesville's Deerhaven plant.

Under the 2009 stimulus (Recovery Act), the federal government in Gainesville, Florida awarded over $1 billion in grants to biomass power projects by converting the 30% Investment Tax Credit into upfront cash. According to the Partnership for Policy Integrity, just 25 power plants were given $856.7 million of these grants. At least seven of the most heavily subsidized plants have since closed or idled due to high costs, as seen with Gainesville's Deerhaven plant, which received $116 million in grants and unfortunately locked the city into a 30-year, $2.1 billion-dollar power purchase agreement before being bought out at local taxpayer expense. Citizens effectively paid $70 million dollars a year through their electricity bill for a power plant that had not produced electricity for most of its life. In order to get out of this PPA, the City of Gainesville purchased the plant for over $750 million and then faced hundreds of millions in utility debt and loan interest to pay off the plant (not to mention three subsequent fires that briefly halted its operations). ●

Communities in the US fight back against wood pellet producer Enviva. Photo Credit: Dogwood Alliance.

6. Quantifying global subsidies for biomass energy

It is not possible to make a credible estimate of the total amount of money globally that is dedicated to subsidies and the various forms of support for solid biomass energy, however, what is clear is that the amount runs into many billions of dollars. The problem is that some jurisdictions are transparent about this expenditure whereas others are not.

This lack of transparency when it comes to biomass subsidies, is in itself cause for concern. Additionally, there are so many national and sub-national subsidy regimes that it is a huge undertaking to amass information on each of them. In this context we can supply some **snapshots of expenditure[1] for a few major consuming locations**.

$10.6bn in 2023 but some are "hidden"

Europe:

The European Commission presented the "2024 Report on Energy subsidies in the EU" to the European Parliament, the European Council, and the European Economic and Social Committee of the Regions on 28th January 2025. This report shows that subsidies for biomass energy sat at around €20 billion ($23.5bn) per year from 2015 - 2021 and declined to €16bn ($18.8bn) in 2022 and to €9bn ($10.6bn) in 2023. However, these figures are incomplete because they do not include subsidies for biomass "hidden" within general renewable energy subsidies. Poland, for example, wrongly appears as having zero biomass subsidies.

UK:

The UK's National Audit Office in 2024 released a report "The government's support for biomass - Department for Energy Security & Net Zero" that showed £22bn ($29.6bn) in subsidies for biomass electricity and heat between 2002 and 2023, of which £16.1bn ($21.7bn) went to electricity generation.

$29.6bn 2002-2023

$62bn over a 20 year period

Japan:

The subsidies predicted to be received by current biomass power plants (a total capacity of 4.7 million kW as of Dec. 2024), is ¥9.2 trillion ($62bn) under the Feed-in-Tariff (FIT) scheme, over a 20 year period (commencing from the start of operation of each power plant.)

South Korea

The Renewable Portfolio Standard (RPS) settlement costs for biomass rose to approximately ₩900 bn ($689m) annually by 2024.

$689m annually

$248m annually

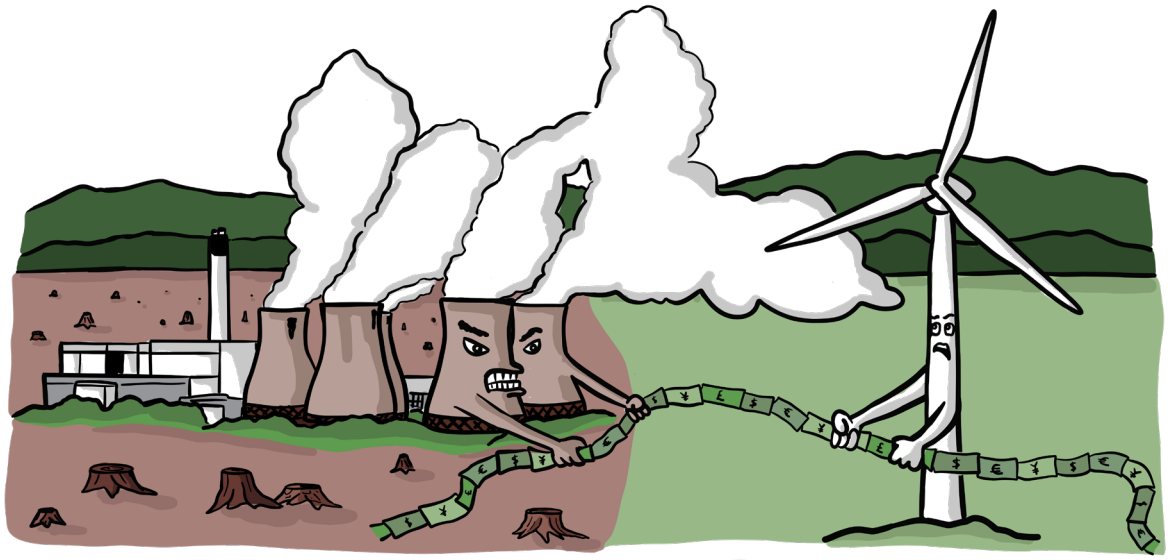
Canada:

Total biomass-related public funding peaked at C$578 million ($414m) in 2022, with an average annual cost of C$346m ($248m) from 2021 through 2026. This indicates a significant, though fluctuating, public sector role in subsidizing biomass initiatives across Canada.

(1) Subsidy figures are provided in cash terms i.e they have not been adjusted for inflation

7. Biomass subsidies could be put to better use

The opportunity costs of applying subsidies and incentives to biomass energy are an important consideration. What could be achieved if that money and support was directed elsewhere? Several reports have made estimates about this topic.



In their report "Government subsidies for electricity generation and combined heat and power (CHP) from solid biomass - updated 2022" for NRDC, Trinomics calculated what could be achieved if European subsidies were reallocated to home insulation and heat pumps. It was found that:

- If subsidies for generating electricity from biomass were directed to home insulation, energy use in those homes would be reduced by 15-20% with cost savings of hundreds of euros per household, and that reallocating all European subsidies could insulate more than 700,000 households.

- If subsidies for generating electricity from biomass were directed to heat pumps, natural gas use could be eliminated in those households - saving energy and reducing imports. Renewable electricity could be used for heating, and reallocating all biomass subsidies in the UK to heat pumps could reduce emissions by 1.6 $MtCO_2$/year.

In the report "Renewable Energy and Climate Change Strategy: Paths away from primary solid Biomass" (RECCS) for Wild Europe Foundation, Trinomics comprehensively assessed the cumulative impacts of withdrawal of subsidies for electricity and heat from forest biomass and reallocation to a range of alternative measures. These comprise:

- Redirection to genuine low emissions renewable energy (predominantly wind and solar) and grid strengthening

- Redirection to high carbon nature-based systems (predominantly forest protection and restoration, with a smaller element to high carbon wetland ecosystems)

- Energy efficiency measures (including insulation and other measures in buildings, industrial heat pumps, and industrial hydrogen).

The summary of impacts across the active measures shows that implementing advised Renewable Energy and Climate Change Strategies (RECCS) would result in emissions savings of 177 $MtCO_2e$ per year by 2030 and 870 $MtCO_2e$ per year until 2050. This equates to 15.5% and 27% contribution to the EU net zero goals for 2030 and 2050, respectively. The measures would also contribute substantially to protecting EU forest and wetland carbon stocks, protecting stocks of around 34 $GtCO_2e$ by 2050. ●

Clean alternatives to biomass heating are available and increasingly affordable

Almuth Ernsting, Biofuelwatch

Most European countries as well as many other regions in the global North have extensive district heat networks, many of which get a proportion of their heat from biomass heat or heat and power plants. As well as harming climate and forests and causing more air pollution, this locks utilities and households into long-term reliance on a heat source with a high operating cost. Europe Beyond Fossil Fuels has analysed the key alternatives:

Industrial (i.e. large-scale) heat pumps, geothermal energy, solar thermal, waste heat from industrial processes, and heat storage. Compared to biomass energy, heat pumps have significantly higher initial capital costs, but far lower operating costs. Large-scale heat pumps remain a novel approach to heating, with the largest one, based in Esbjerg, Denmark, having a capacity of 60 MW. Much larger ones are now being built, such as a 150 MW heat pump in the German city of Mannheim. Judging by the majority of technologies, costs can be expected to drop significantly as experience grows. However, biomass subsidies are reducing the economic incentive for those important developments. ●

In their Fact Sheet on U.S. Biomass Subsidies, Taxpayers for Common Sense conclude:
"Taxpayer dollars wasted on biomass could instead be spent on real climate solutions, such as protecting old growth forests, conserving wetlands and grasslands, and investing in agricultural conservation practices. Forests and agricultural lands provide significant opportunity for carbon sequestration, but currently, misguided bioenergy policies are distorting markets, exacerbating the costs and impacts of climate change, and jeopardizing real solutions for a more sustainable future."

8. The policy landscape

Subsidy policies are subject to change and modification in many jurisdictions. Generally the supports are subject to reformulation and reduction, but not complete abandonment. It is usually the case that such changes apply to new applications for support, whilst existing subsidy regimes are maintained for those entities already subject to them. For changes that are applied to existing arrangements, lead times for change are lengthy – especially for private industry operations. All of this means that solid biomass energy will continue to be subsidised for many years, but with reducing quantums of support.

The rationale for modification and abandonment of subsidy regimes varies. It seems that the original rationale for enticing biomass energy to become established is seen by some governments to have been achieved or to have run its course. In some jurisdictions it is recognised that the supports given to biomass are comparatively more favourable than those to wind and solar, although there is not a reasonable rationale for such uneven treatment. In some instances it is recognised that adverse and unintended impacts have resulted, especially in relation to destruction and degradation of forests. No awareness of the counter-productive impact on climate change via the large immediate emissions, nor by the opportunity cost of intensified logging to long term carbon storage and ongoing sequestration is evident.

Change is slow and not comprehensive.

Political pressure via campaigns targeting subsidies for biomass have had some impacts, mostly of an incremental nature. The problem is somewhat intractable because of the reliance of countries on the integration of biomass energy into the range of measures they employ to achieve their emissions reduction targets on paper, regardless of the actual impacts on climate, biodiversity, people, and the uptake of other genuine renewable energies. ●

9. A snapshot of subsidy regimes around the world

The case studies that follow are demonstrative of the types of financial support available to the biomass industry at the points of both production and consumption. We have intentionally included countries which have seen interesting shifts in subsidy policy in recent years, notably the UK, the Netherlands, South Korea, and Japan, and offered commentary on what the implications of this may be.

9.1. Case study: United Kingdom

Almuth Ernsting, Biofuelwatch

It has paved the way for other countries to use this incredibly damaging and expensive technology. The billions already spent on bioenergy could have been put to much better use. Analysis by Trinomics shows that if £600 million of biomass subsidies had been spent on energy efficiency, then over 400,000 of the UK's coldest homes could have been insulated. This would have brought down energy bills.

According to a 2024 report on UK biomass subsidies published by the National Audit Office, £22 billion in subsidies went to biomass electricity and heat between 2002 and 2023, of which £16.1bn went to electricity generation. Out of that, Drax received £6.5bn. Around £5.35bn went to subsidies for renewable heat. Although those subsidy schemes closed for new applicants in 2023, there are new subsidies to upgrade domestic fossil fuel boilers which can be used for a switch to biomass instead of installing a heat pump. Those figures do not include indirect subsidies resulting from biomass electricity being exempt from carbon pricing.

A protest in the UK in 2024 against new Drax subsidies. Photo credits @CrispinHughes

Most subsidies for biomass electricity have been paid through the **Renewables Obligation**. Under that scheme, a subsidy is paid per MWh of renewable electricity and woody biomass energy is controversially included. The **Renewables Obligation** closed to new applicants in 2017. The rate of the subsidy depends on the amount of **Renewables Obligation Certificates** (ROCs) on the market at any time, and it has been going up steeply in recent years. Until 2027, Drax (a company which operates the largest biomass-burning plant in the world) will continue getting ROCs for burning wood pellets in two units.

Since 2014, renewable electricity generators have been able to apply for Contracts for Difference (CfDs) instead of ROCs and, since 2017, that has been the only such subsidy option. CfDs are awarded for a 15-year period according to criteria set by the government. Once a CfD has been awarded, it turns into a private law contract between a state-owned company and the electricity generator. This means that the government cannot rescind them (unlike, in theory, ROCs). The operator will always be paid the "strike price", i.e. a set amount of money per unit of electricity generated. This is normally far above the market price for electricity although, in 2022/23, electricity prices rose so high that CfDs turned into a 'negative subsidy', i.e.operators had to pay money back. This led Drax and Lynemouth Power to not operate their "CfD units" very much. CfDs are being awarded by competitive auction, with the exception of the first 2014 allocations: this is when the only CfDs for power plants burning imported wood pellets were awarded, namely to Drax for a third biomass unit, to Lynemouth Power, and to MGT Teesside. The first two of these CfDs end in 2027.

A great campaigning success - which is sadly being reversed

Following years of campaigns against biomass subsidies, in 2018 the UK government announced a very welcome policy change: in future, no new CfDs would be awarded for biomass electricity unless it was burned in combined heat and power plants with at least 70% efficiency. In addition, maximum greenhouse gas life-cycle emissions were set at a level that in practice excludes imported wood pellets, even though very few emissions apart from fossil-fuel-based emissions (including in shipping and pellet production) are taken into account. Given that there has been virtually no investment in district heat networks in the UK, this decision meant an end to new biomass power plants. It should also have meant an end to Drax and Lynemouth Power's subsidies and thus their power stations' operation in 2027.

However, in February 2025, the government announced that they would award four years of further CfDs for Drax and possibly Lynemouth Power from 2027. Although Drax would receive subsidies for only half the biomass capacity they have been operating in recent years (albeit at a higher pound per unit of electricity rate than presently), the energy efficiency and life-cycle greenhouse gas emission criteria set out in 2018 are being set aside. As of September 2025, the actual subsidy awards have not yet been made.

Even more alarming, in June 2025, the government is pushing through secondary legislation which will, in future, allow new CfDs for any existing biomass plant for up to 15 years without any further parliamentary debate, with no reference to the previous 2018 commitments on emissions and energy efficiency. This includes Drax, once the planned additional four years of subsidies end in 2031. Finally, the UK government is providing financial and regulatory support for the expansion of datacentres to attract tech companies to build new data centres, in the form of subsidies and other support measures for so-called AI Growth Zones. Drax has submitted a joint bid with the combined local authority and York University. If successful, this could see Drax burn no less wood in future than they are burning today!

The UK has been and currently remains the largest subsidiser of biomass in the world.

9.2. Case study: Poland

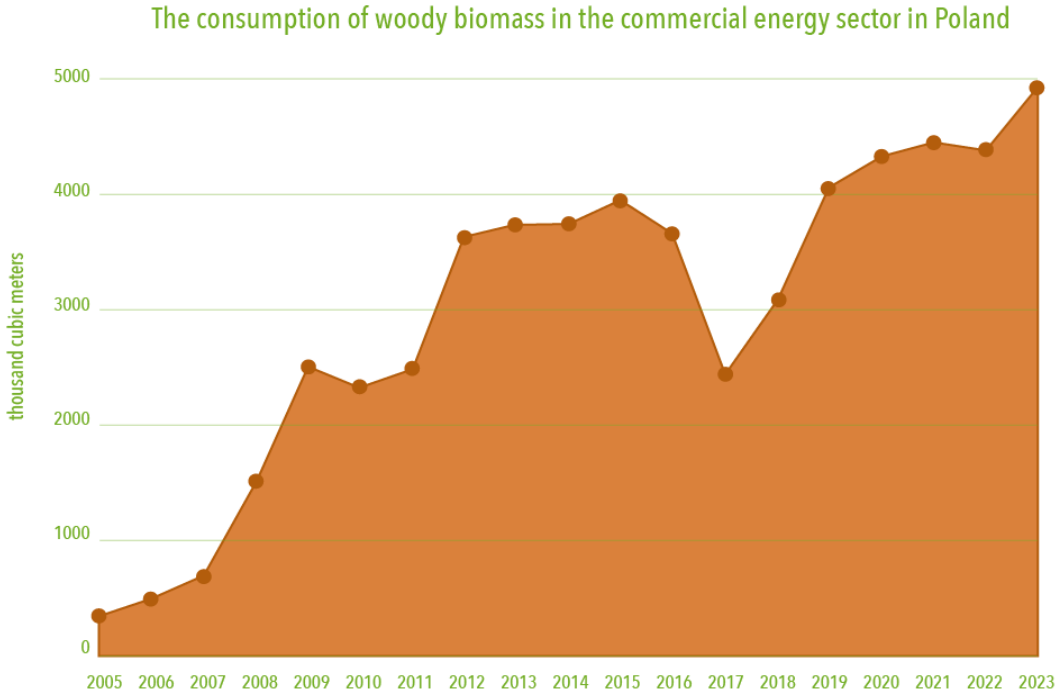
Augustyn Mikos, EPN & Workshop for All Beings

Subsidies for energy generated by burning biomass began on a large scale in Poland after the country joined the European Union in 2004. At that time, a system of so-called green certificates was introduced. Under this system, producers of energy from renewable sources (including woody biomass) receive certificates of origin (so-called green certificates) for the electricity they generate, which they can sell on the market to generate additional revenue. Green certificates are purchased by energy suppliers, who are required to retire a number of RES certificates corresponding to their percentage share in total energy sales. Between 2011 and 2020, electricity producers from solid biomass alone received PLN 21 billion in support under the green certificate system.

The best evidence of the link between subsidies and the amount of wood burned in power plants and combined heat and power plants was the temporary, drastic decline in woody biomass consumption in the commercial energy sector in Poland between 2015 and 2017 (graph 2). This decline was caused by the collapse of the green certificate market and a drop in their price on the Polish Power Exchange by about 75% between July 2015 and July 2017.

Since 2016, the green certificates system has been gradually replaced by a renewable energy (RE) auction system designed to provide market-based support for new renewable installations. In this system, producers of renewable electricity compete in auctions, offering the lowest price at which they are willing to sell energy over a 15-year support period. Winners receive a guaranteed price (contract for difference) if market prices fall below their bid, ensuring investment security while controlling public expenditure. Since this system was introduced, biomass projects have received almost no support, with only isolated cases of successful bids. This outcome is largely due to their lack of cost competitiveness compared to wind and solar technologies. Although the system allows for significantly higher reference prices for biomass—often 25% to 75% above those set for wind and photovoltaic installations—biomass developers have largely refrained from submitting offers, suggesting that even with generous price ceilings, such projects remain economically unviable within the auction framework.

In addition to operational support, biomass energy producers in Poland can count on investment support, for example, for the installation of solid biomass boilers in heating plants and combined heat and power plants. Such support is provided through a number of programs, most of which are co-financed by national and EU funds. Since 2007,



Graph 2: The consumption of woody biomass (in thousands of cubic meters) in the commercial energy sector in Poland over time. Source: Workshop for All Beings, 2025

at least 30 projects involving the construction of biomass power plants, heat plants and combined heat and power plants, or the conversion of coal-fired energy plants to biomass, have received support totalling over €100 million from EU funds allocated to Poland. Subsidies for replacing heat sources with biomass boilers are also granted to households. Under the 'Clean Air' programme, which aims to replace old coal and wood-fired heating systems, nearly 225,000 applications for subsidies to purchase biomass boilers have been submitted since 2018.

Subsidies for burning wood biomass have led to a 150-fold increase in its consumption in the Polish commercial energy sector in just two decades, from 33,000 m³ in 2004 to 5 mln m³ in 2023. This sharp increase in demand for wood in the energy sector has contributed to increased harvesting in Polish forests, and is becoming one of the main barriers to the creation of new protected areas in Polish forests. This is met with huge opposition from Polish environmental organisations: 300 non-governmental organisations and social movements called for an end to the burning of wood in energy plants in the recent Forest Manifesto. Moreover, by burning more and more wood, the bioenergy sector has begun to compete for woody biomass with the processing industry. This is especially seen with manufacturers of wood-based panels, who can successfully use even very low-quality wood for material production. Industry representatives attribute to the practice of subsidies the fact that energy companies can pay up to 20% more for wood, leading to market distortions and limiting the competitiveness of the domestic industry.

Faced with opposition from both environmental organisations and the wood industry, the Polish government made a political declaration in the current coalition agreement to ban the burning of wood in commercial energy generation. Although this declaration has not yet been implemented (as of September 2025), Polish authorities are taking certain steps to move away from burning wood in the energy sector. A new definition of energy wood has been developed, limiting wood biomass eligible for public support to only wood of very small dimensions (max. 5 cm in diameter). Furthermore, the Polish Ministry of Climate and Environment has prepared a draft update of the **National Energy and Climate Plan**, which provides for a gradual phase-out of solid biomass in the energy sector, including through the phasing out of subsidies and a refraining from new investments in biomass energy. However, the implementation of these plans is seriously threatened, as jurisdiction over energy has been taken over by the newly created Ministry of Energy following recent changes in the current government. The head minister announced that the draft update of the NECP will be revised, including by increasing the assumed role of biomass energy ●

Combined heat and power plant in Siekierki in Warsaw, co-firing coal with biomass burns approximately 350 metric tonnes of solid biomass a year. Photo Credit: Workshop for All Beings, Poland.

9.3. Case study: France

Jean-Marie Taupin, unaffiliated BAN member

In France woody biomass is mostly used for heat: in domestic housing, small and larger public buildings, and for district heating. In the electricity sector, dominated by nuclear power, bioenergy accounts for just 2% in total. However, that figure includes biogas. The biggest wood biomass power station in Metropolitan France is based in Gardanne, near Marseille. It belongs to the Czech energy conglomerate EPH and burns up to 545,000 tonnes of wood annually, sourced from France, Brazil, Italy and Spain.

The largest biomass power station capacity is located in La Réunion, with two converted coal power plants operated by Albioma totalling 174 MW. Albioma is converting a 135 MW coal plant in Guadeloupe to two-thirds wood (likely imported pellets from Canada and the south-eastern USA) and one-third sugar cane residues (bagasse). They also run a 35 MW power plant in Martinique.

All of those power stations are subsidised through generous Power Purchase Agreements called Certificats d'Economie d'Energie (CEE). Those are administered by the French Energy Regulatory Commission (CRE). In the case of Gardanne, those amount to 800m euros in subsidies over 8 years. CEE certificates are also available for district heating run on biomass energy.

In Metropolitan France, the majority of large and medium-size biomass plants that burn wood, generate all or mostly heat. Even more wood is burned in domestic heating. In district heating, biomass has overtaken fossil gas as the main energy source, while the role of large heat pumps, geothermal energy and solar thermal remains very small. There is no heat capture and distribution from larger power plants, including nuclear plants.

District heating networks supplied with woody biomass are widely pushed by the French Agency for Ecological Transition, ADEME, which provides studies, engineering support and administers large amounts of public subsidies. ADEME's total budget (not just for woody biomass) was around 4.2bn euros in 2024.

ADEME administers the **Fond-Chaleur** which has provided a total of €5.1bn in public subsidies over the past 16 years. Its 2023 budget was €513m, €221m of which went to biomass power plants, and €198m to district heat networks that burn primarily carbon-rich fuels including wood.

A woman protests outside a biomass power station in Guyane (French Guiana). Photo Credit: Maiouri Nature

In 2024, the budget of **Fond-Chaleur** was increased by 60% to €820m. Out of this, woody biomass heat plants received 328m, a 50% increase. The proportion of **Fond-Chaleur** subsidies going to burning wood increased from 47% in 2023 to 68% in 2024. The total **Fond-Chaleur** budget is expected to be €800m in 2025.

ADEME's **Fond Chaleur** support is allocated according to technical guidance set out in "EnerChoix" (Energy Choice). According to that guidance, woody biomass energy is the last choice after, for example, reusing waste heat, thermal solar or geothermal energy. However, there is no support for electrification of heating, including heat pumps. By not supporting heat pumps, ADEME ends up prioritising woody biomass. ADEME has even paid for the purchase of forest harvesting machinery out of another fund, in the name of the energy transition.

Some administrative regions in France also provide subsidies for wood-based energy, including for district heating. This scheme is called "Soutien au bois-énergie", and it covers installations too small to attract money from ADEME's **Fond Chaleur**. This subsidy covers 40-70% of the total cost of eligible wood-based energy projects.

Further subsidies for woody biomass energy come from the National Housing Agency, ANAH (Agence Nationale de l'Habitat). ANAH provides a subsidy scheme called "MaPrimeRenov". This fund, opened in 2020, supports domestic energy by funding either home insulation or change of a heating system. The total budget in 2024 was €3.4bn, and around 237m went to woody biomass installations. This fund supports heat pumps as well as wood boilers to replace oil and fossil gas boilers. In 2024, around 100,000 wood stoves and boilers and 70,000 heat pumps were funded. In 2025, MaPrimeRenov was suspended for a period following reports of fraudulent subsidy claims and resumed with quite a small budget. Woody biomass boilers will be excluded in 2026.

Woody biomass is also subsidised indirectly, for example, via a reduced, 10% VAT rate, whereas wood used for construction or wood products is subject to the standard 20% VAT rate. The "Eco-prêt taux 0" scheme provides public subsidies to wood biomass installations via 0% interest loans for building renovation projects, which include switching to wood-based heating. However, the take-up of those 0% interest loans has been lower than expected.

In general there is some optimism that energy provision under the direct control of the French government makes space for wind and solar, and thereby electrification of uses such as heating. However a big drawback is that ADEME, a large organisation with thousands of employees and expending multiple billions of euros in public funds, has a fairly independent governance that strongly favours woody biomass energy. Furthermore, in the French overseas territories, including French Guiana, Martinique and Réunion, large biomass electricity subsidies, including for coal-to-biomass conversions based on wood pellet imports, have been granted without considering the untapped potential for wind, solar and geothermal power.

9.4. Case study: Germany

Almuth Ernsting, Biofuelwatch

Germany burns more wood than any other European country, with almost all of it sourced domestically and most of it burned for heat. According to a 2021 report by the consultancy Trinomics, Germany spent more money on biomass subsidies than any other EU country, albeit less than the UK (which means that UK biomass subsidies are significantly more generous).

Government figures for biomass subsidies include both solid biomass (mostly wood) and biogas and biomethane. Therefore, no recent figure for solid biomass subsidies is available. Here is an overview of the most important current subsidy schemes under which wood biomass is being supported:

In addition, different grants are available for burning wood to "decarbonise" industry. However, the great majority of wood burned for energy in Germany is burned for heat, especially in domestic biomass stoves.

A promising start by the previous government

He previous government took some measures to limit reliance on biomass, especially in heat networks. It also ignored calls by energy companies operating coal power stations to subsidise conversions to biomass. However, when the GEG, i.e. the law about decarbonising domestic heating, went through parliament, it came under attack not just from the coalition partner, FDP, but also from right-wing media and parts of the forestry industry. Right-wing news outlets effectively turned wood biomass into a "culture war" issue. As a result, previously planned measures to restrict wood burning in the domestic sector and beyond were shelved. Even existing limits to biomass subsidies, especially in district heat networks, may well come under attack following the 2025 federal elections.

Interestingly, although biomass subsidies have not been reduced, the expansion of wind energy in particular is making biomass electricity less competitive, even with subsidies. The biomass power plant shown in the photo above and another similar one will close in coming months unless another company chooses to purchase assets which the operators publicly say now incur significant losses.

> Germany burns more wood than any other country in Europe.

Biomassekraftwerk (biomass power plant) Bischofferode receives EEG biomass subsidies. Photo Credit: Jana Ballenthien, Robin Wood

Subsidy scheme	Explanation
Erneuerbare-Energien-Gesetz (EEG) - Renewable Energy Law	This is Germany's renewable electricity subsidy scheme. Wood biomass plants up to a net electric capacity of 20 MW are eligible. Initial EEG subsidies are made for 20 years and, depending on the outcome of competitive auctions, they can then be renewed for a further 10 years. Shockingly, the EEG was amended so that new subsidies can only be granted for burning virgin wood (including roundwood) and not post-consumption waste wood. It was also recently amended to ensure that biomass electricity generation in combined heat and power plants is prioritised over electricity-only plants. However, there is no minimum efficiency requirement, which means that only a token amount of heat could be supplied.
Bundesförderung für effiziente Wärmenetze (BEW) - Federal Subsidy for Efficient Heat Networks	This is a federal subsidy scheme for new or expanding efficient district heat networks with a high percentage of renewable energy. It is also available for "decarbonising" existing heat networks. The definition of "renewable energy" includes wood biomass. However, there are limits to biomass in the BEW: if a heat network is 20-50 km in length, biomass must make up no more than 25% of heat; if it is larger, then the maximum biomass share is 15%. For smaller networks, there is no such cap. Subsidies are also available for up to 40% the capital investment cost of heat-only biomass plants, however, this is subject to limits of annual operating hours.
Wärmeplanungsgesetz (WPG)	Since early 2024, local authorities have been required to develop Heat Transition Plans. Depending on their size, they can get up to €500 million in subsidies for those plans. Furthermore, when implementing plans, local authorities themselves can subsidise developments. Biomass heat and CHP plants are commonly included in heat transition plans, including new ones, subject to the limits set out by the BEW (see above).
Gebäudeenergiegesetz (GEG) - Law on Energy for Buildings	This law came into force in 2020 and was revised in 2023. It requires all new housing to be equipped to use at least 65% renewable energy, a requirement which will extend to new heat installations in existing buildings in the near future. This renewable energy can, for example, come from solar thermal, from a heat pump, or from heat supplied by a district heat network. However, biomass stoves are also included. The original plan had been to limit eligibility for subsidies for wood stoves, however, those limits were abandoned after attacks from parts of the media as well as the then opposition in Parliament.

A protest against burning wood in power and heat plants in Berlin. Photo Credit: Uwe Hiksch

9.5. Case study: Netherlands

Fenna Swart, Comité Schone Lucht and Almuth Ernsting, Biofuelwatch

In the Netherlands, biomass is burned in dedicated biomass plants and in large coal power stations, one of which (Amer Power Station) has been fully converted to wood pellets. Around 1 million tonnes of wood are burned in domestic stoves. There are no subsidies for domestic burning of wood.

All direct subsidies are paid via the same mechanism, called "Stimulation of sustainable energy production and climate transition (SDE++)" or its predecessor, SDE+. Indirectly, biomass energy generators also benefit from the fact that there is no carbon price on biomass energy. However, it is unlikely that biomass plants could continue to operate without direct subsidies. In fact, even with subsidies, biomass plant operators have been struggling in the face of competition with cheaper electricity from wind and solar power. Dutch wood pellet imports in 2024 were approximately half of what they had been in 2020, with only one of the three coal power plant operators that had been co-firing wood pellets, (RWE), having burned significant amounts of wood that year.

In April 2022, the then government decided that there should be no new subsidies for burning biomass for electricity, district heating, or to heat greenhouses (i.e. low-temperature heat). This accorded with a parliamentary vote the previous year, when three-quarters of MPs voted against biomass subsidies other than for high-temperature heat required by certain industries. The subsequent government endorsed that same position. Following the government's decision against subsidies for biomass electricity and low-temperature heat, RWE positioned its two power stations as the sites of future BECCS (Bioenergy with Carbon and Storage) projects in December 2022. However, in July 2025, the Dutch parliament voted against any support for BECCS in plants burning imported wood. With or without BECCS, RWE and other energy companies are now very unlikely to procure new subsidies for keeping their biomass plants running in future.

However, in 2025, biomass plants that have already received an operating SDE++-subsidy, will still be eligible for a maximum of around €502 million in subsidies, and the three operators of large coal-and-biomass plants for up to €442 million, assuming they all operate at full capacity, which is unlikely. Subsidies for burning pellets in coal plants will end in 2027. In 2024, the SDE++ subsidy round was opened to Carbon Capture and Storage (CCS) for existing biomass plants up to a maximum capacity of 100 MWe. Whether this will also happen in the 2025 SDE++ subsidy round has not yet been decided.

A big success for campaigners

The Dutch campaign against biomass subsidies has seen the biggest success of any such campaigns across Europe. Although, in theory, a new government could revoke the decision to end biomass subsidies (except for high-temperature heat for industry), there is strong cross-party opposition to future funding for burning wood for power and lower-temperature heat.

People protesting against Vattenfall energy company and its plans to expand biomass burning in the Netherlands. The campaign was ultimately successful. Photo credit: Comité Schone Lucht"

9.6. Case study: South Korea

Hansae Song, Solutions for Our Climate

Key Biomass Subsidy Regime in South Korea

South Korea began supporting biomass in 2012 with the introduction of the Renewable Portfolio Standard (RPS). This renewable energy policy employs a two-pronged approach. On the supply side, renewable energy producers, including biomass power plants, earn Renewable Energy Certificates (RECs) for each megawatt-hour of electricity they produce. These credits can be sold on the market, with prices determined by supply and demand. Given the high cost of renewable energy production in South Korea, REC sales are essential for ensuring profitability.

The value of each REC varies by energy source and facility type, reflecting the differences in generation costs. The baseline for REC weighting is mid-scale solar photovoltaic, with a standard weighting of 1.0. In contrast, forest biomass receives weightings as high as 2.0 for dedicated biomass power plants and up to 1.5 for co-firing with coal. These weightings are on par with, or higher than, those for solar (0.5–1.6) and wind (1.2–2.5).

On the demand side, large fossil fuel utilities with generation capacities of 500 MW or more are required by the RPS to source a portion of their electricity from renewable energy or purchase RECs from renewable producers. In 2025, the national RPS ratio is set at 14%, with plans to increase it to 25% by 2030. South Korea does not provide incentive programs for renewable heat.

RECs therefore act as indirect subsidies. The government establishes support levels through REC weightings, while consumers bear the associated costs through their electricity bills. The high REC weightings assigned to biomass have been the primary driver of its growth. For years, civil society organizations in South Korea and abroad have advocated for reducing these weightings, contending that biomass is a false climate solution.

Unpacked: Stated Reasons for 2024 Biomass Subsidy Reform

Under mounting pressure to address the harmful incentives supporting biomass energy, the South Korean government proposed a major revision to REC weightings for forest biomass on December 18, 2024. Since introducing the initial REC weightings in 2012, the Ministry of Trade, Industry and Energy (MOTIE) has often accommodated forestry sector interests represented by the Korea Forest Service (KFS), particularly by adopting higher weightings for domestic 'unused forest biomass' in 2018. While MOTIE is required to review these weightings every three years, in 2021, it chose to maintain the high weightings despite widespread criticism over the clear-cutting practices they encouraged. Even within the domestic timber industry, concerns arose about increased feedstock competition due to biomass production.

As the 2024 triennial REC review approached, broad industry demands to reduce biomass subsidies intensified. Responding to these concerns, the Presidential Commission on Carbon Neutrality and Green Growth (CNC) facilitated consultations among MOTIE, KFS, and the Ministry of Environment.

The government's official press release, titled "Mitigating Biomass Power's Dependence on Imports," acknowledged rising demands to scale back the biomass industry due to its adverse impacts on climate, biodiversity, and the economy:

"With the expansion of [biomass] power generation facilities, the fuel market has also grown. In 2023, the consumption of woody biomass reached 7.4 million tonnes, marking an approximately 50-fold increase compared to 2012. Notably, wood pellets produced from roundwood accounted for 3.5 million tonnes, 98% of which were imported from countries such as Vietnam, Russia, and Indonesia. The annual import value stands at around 700 billion KRW [536m USD equivalent].

As the market expanded, various issues emerged. The RPS settlement costs for biomass rose to approximately 900 billion KRW [689m USD equivalent] annually, and domestic biomass continues to lack competitiveness compared to imports.

The price subsidy effect of RECs has also led to competition between feedstock for power generation and recycled materials. Furthermore, criticisms regarding forest degradation and carbon emissions associated with biomass power generation persist."

The December reform primarily aimed to reduce reliance on imported wood pellets and redirect power sector demand toward domestically produced feedstocks. This strategy is reflected in phased reductions of RECs for imported biomass categories, effectively reallocating subsidies to domestic biomass. While this move begins to address concerns over forest loss and carbon emissions linked to biomass, it represents a compromise to placate industry stakeholders, stopping short of broader systemic reform.

Analysis: Consensus on No More Biomass, with Caveats

The current biomass REC weightings have remained largely unchanged since 2018, except for a partial reduction applied to state-owned coal-and-biomass co-firing facilities in 2020. While these weightings are intricately segmented by year of operation, feedstock type, combustion method, and ownership structure, the overarching policy trends can be distilled into four key takeaways:

1. Domestic 'unused forest biomass' receives the highest weighting of 2.0 when burned in dedicated power plants and 1.5 when co-fired with coal, regardless of ownership or start date

2. Existing power plants that began operating by 2018 are granted relatively high weightings of 1.5 for dedicated burning and 1.0 for co-firing when using biomass fuels other than 'unused forest biomass'

3. State-owned power plants qualify for the same high weightings for burning 'unused forest biomass' (1.5–2.0) or other feedstocks, such as domestic roundwood, imported pellets, or bio-SRFs, in dedicated facilities (1.5), but co-firing receives a weighing of 0.5

4. New power plants that began operating since 2018 are granted with high weightings (1.5–2.0) only when burning 'unused forest biomass' while dedicated burning of other biomass fuels receives lower weightings of 0.25–0.5, and new co-firing plants are no longer eligible for RECs

The 2024 REC reform proposed significant reductions in weightings across key categories, targeting both new and existing power plants while implementing staggered timelines to ease the transition for affected industries.

MOTIE's official statement explains the revisions as follows:

"The scale of renewable energy policy support for electricity generated from biomass will be reduced. To begin with, new woody biomass power generation facilities will not be granted RECs, effectively restricting their market entry. Other bioenergy sources such as biogas, organic solid fuel, and black liquor will continue to be eligible for the existing REC weighting system.

For facilities currently in commercial operation, the REC weighting will be gradually adjusted to current values [adopted in 2018]. However, this adjustment will be limited to wood pellets and chips produced from roundwood.

Public facilities will see these changes implemented from 2025, while private facilities will be granted a one-year grace period. The adjustment will then be applied progressively based on the years of operation, allowing time to mitigate market disruptions and enable adaptation to the revised policy."

New Biomass: No More RECs Issued

Starting in 2025, new biomass power plants will no longer be eligible for RECs. However, power plants under construction or in planning with approved business permits are exempt from this rule and subject to the phased reduction timelines for existing facilities.

Dedicated Biomass: REC Phase-down

From 2025, REC weightings for dedicated burning in state-owned power plants will be reduced to one-third of their current levels. From 2026, REC weightings for privately owned power plants will also be phased down. Unlike public facilities, the phase-out for private plants is tied to the facility's age to protect the profitability of newer plants. Since most private facilities are only five to six years old, they will continue receiving high REC

weightings well into the 2040s. It remains uncertain whether dedicated plants will reduce input levels or switch to domestic 'unused forest biomass' (industry-claimed forestry residues) and bio-solid refuse fuels (bio-SRFs) that continue to receive high weightings.

Co-firing: No RECs for Public Utilities, Phase-out for Private Utilities

Starting in 2025, state-owned power plants will no longer receive RECs for coal-and-biomass co-firing. However, state-owned co-firing facilities account for only 10% of South Korea's biomass power fleet. From 2026, REC weightings for co-firing at privately owned power plants will be phased out. Unlike public facilities, the phase-out for private plants is tied to the facility's age to protect the profitability of newer plants. With most private co-firing plants 10 to 11 years old, the phase-out will likely take over a decade to complete. It remains uncertain whether dedicated plants will reduce input levels or switch to domestic 'unused forest biomass' and bio-SRFs.

Domestic Forestry Residues: High REC Weightings Remain Unchanged

Burning 'unused forest biomass' will continue to receive high REC weightings. This category, introduced in 2018, has significantly expanded the domestic wood pellet and chip market, raising concerns about local forest sustainability. *REC weightings for other types of biomass, including bio-SRFs made from waste wood and other plant-based materials, remain unchanged.* While these fuels are not directly sourced from forests, the demand for bio-based feedstocks has intensified competition for waste wood, often violating cascading use principles.

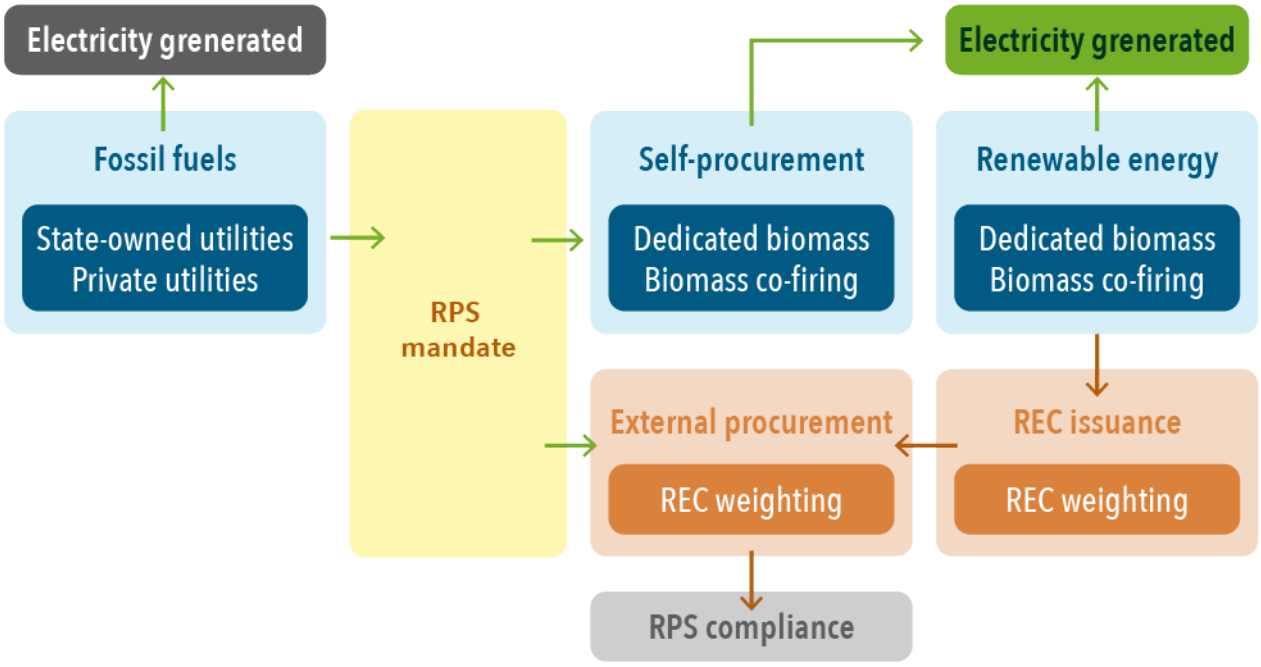
Implications: A Biomass-free Vision for Asia with Limited Immediate Impact

A. No More New Biomass Allowed

The most notable outcome of this reform is the termination of renewable energy support for future biomass power plants. MOTIE has publicly announced its intention to bar new biomass capacity from entering the power market, recognizing that South Korea no longer requires biomass to meet rising renewable energy targets. The country's decision underscores the idea that the narrative of biomass as a „bridge fuel" has outlived its relevance; the country has long since crossed that bridge.

Ending biomass support also signals a need for wood pellet industries and governments

RPS requires utilities to source a portion of their electricity mix from renewables



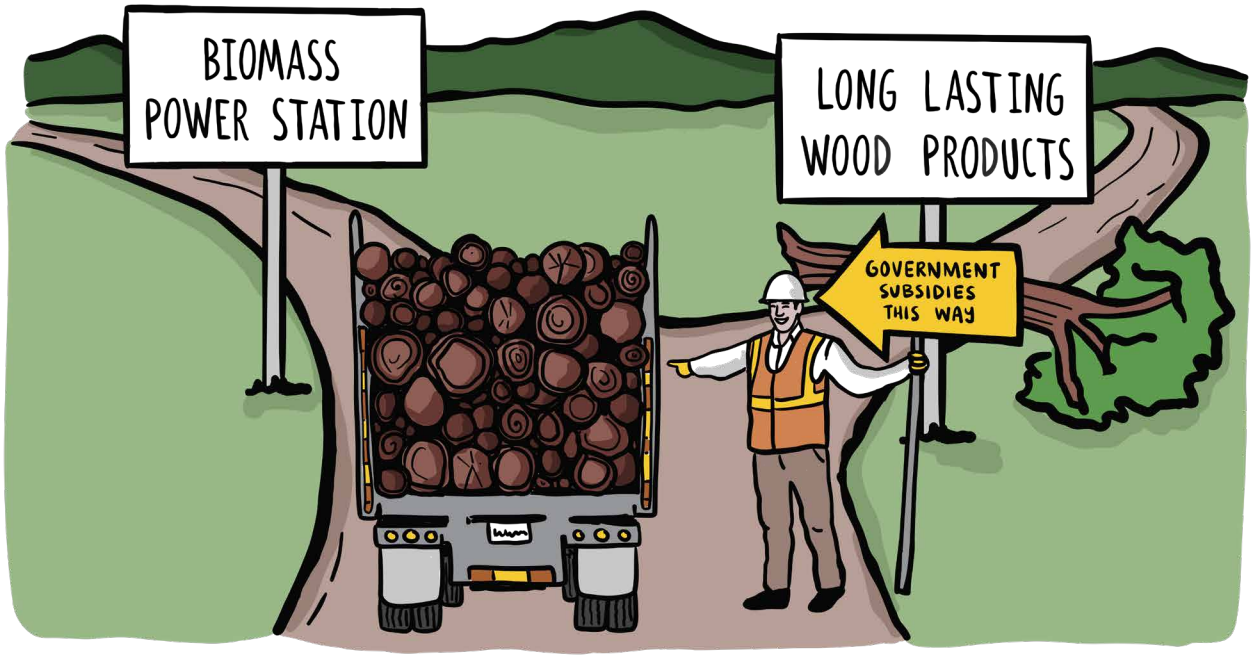
in producer countries across Southeast Asia and North America to reevaluate their market expectations. Industry stakeholders often assume perpetual government backing and demand for biomass fuels. While this assumption may hold for some parts of East Asia, clearing natural forests and converting them to energy plantations for pellet production is likely to face diminishing demand in the long term. Southeast Asia, particularly Vietnam and Indonesia—key suppliers for South Korea's spot-market pellet trade—may experience these shifts first.

B. Slow Phase-out and Domestic Feedstock Loopholes

The gradual phase-out of REC weightings for private utilities and the final approvals for new power plants limit the likelihood of an immediate reduction in wood pellet imports. Most private traders and utilities are expected to maintain their current operations in the short term. Newly approved power plants, benefiting from high REC weightings for regular and imported biomass, will likely offset any reductions. Co-firing stations receiving REC weightings into the mid-2030s, along with dedicated stations receiving reduced yet indefinite support, are poised to extend emissions trajectories beyond the coal phase-out timeline needed to meet Paris Agreement goals.

Further complicating the prospect of reduced biomass usage are the sustained REC weightings for domestic 'unused forest biomass'. During the 2024 reform process, diverse stakeholder groups presented conflicting demands to MOTIE: the pellet industry called for reduced support for imported wood pellets; the board industry sought reduced subsidies for domestic forest biomass; the recycling industry pushed for changes in support for bio-SRFs; and the power industry advocated for maintaining the status quo. MOTIE's compromise resulted in maintaining REC weightings for 'unused forest biomass' and bio-SRFs while reducing those for regular and imported wood pellets, which had the least backing.

This revaluation of domestic wood pellets and chips places South Korea's forests at greater risk. Aggressive clear-cutting, disguised as collecting „residues," is likely to escalate, devastating the country's already fragmented ecosystems. Harvesting trees at younger ages will entrench short-term rotations that yield lower-value products. Competition for feedstock with other timber industries will also intensify, given South Korea's capped annual wood harvest levels. The outcome will likely involve more trees burned, higher carbon emissions, and degraded ecosystems unable to recover.



9.7. Case study: Japan

Katsuhiro Suzushima,
Global Environmental Forum

Support for biomass under FIT/FIP

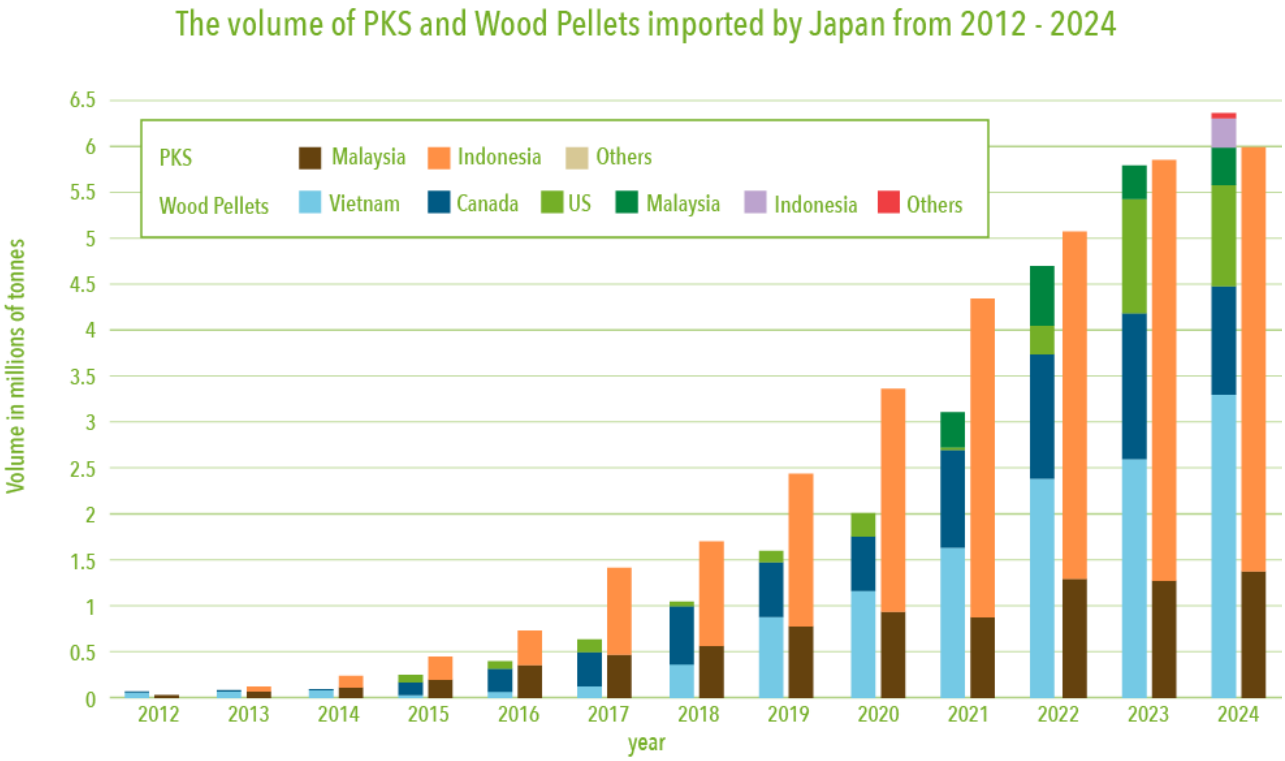
In Japan, biomass power generation has been promoted under the Feed-in Tariff (FIT) system, started in 2012, which mandates electric power companies to purchase renewable energy at above-market prices. To finance the purchase, a "FIT renewable energy levy" is collected from electricity consumers in the form of an additional fee on top of their electricity bill. The system is under the jurisdiction of the Ministry of Economy, Trade and Industry (METI) and purchase prices of each renewable is determined by them.

In order to ensure that power plants are developed and operated in an environmentally and socially appropriate and safe manner, the amendment of FIT Law in 2016 introduced the "Project Plan Development Guidelines for Biomass Power Generation." Compliance with the guidelines is a prerequisite to receiving FIT certification.

The Feed-in Premium (FIP) was introduced in 2022. Under this system, a certain premium is added to the market price of electricity, contrary to a fixed purchase price under the FIT. Renewable energy producers are incentivised to operate based on market supply and demand conditions. Although there are already some instances of power plants that switched from FIT to FIP, the same guidelines still apply, and for the sake of simplicity we mostly refer to "FIT" in this case study.

Volume of subsidies for imported fuel

Looking at what fuels are actually used under FIT, "unused wood" such as thinnings and forest residues sourced domestically account for 10% of the total certified capacity. Imported biomass, which carries the legal label "general wood and agricultural product residue," accounts for around 70% of the total. Most imported biomass is wood pellets and palm kernel shells (PKS). In 2024, 6.38 million tonnes of wood pellets and 6 million tonnes of PKS were imported, an eighty eightfold and two hundred and thirty fold increase respectively, since 2012.



Graph 3. The volume (metric tonnes) of PKS and Wood Pellets imported by Japan from 2012 - 2024.
Source "Biomass White Paper 2025" © Biomass Industrial Society Network https://www.npobin.net/hakusho/2025/topix_02.html

4.7 million kW × 24 hours × 290 days × 20 years × (¥24/kWh - ¥10/kWh) = ¥9.2 trillion

Estimating the amount of FIT subsidies provided to facilities burning imported biomass

Above is an estimation of the amount of FIT subsidies in yen (¥) that we predict will be received by the biomass industry for all imported biomass over 20 years.[2]

How much are the subsidies for biomass fuels?

Annual cost of fuels in 2024 were ¥193.2bn for pellets + ¥141.4bn for PKS = ¥ 334.6 bn

Assuming this is roughly the average annual cost in the long run, the total cost after the 20-year purchase period would be about ¥334.6 x 20 yrs = ¥6.7 trillion

The FIT subsidies for biomass power generated from imported fuels would be ¥9.2 trillion. Of this, ¥6.7 trillion goes to the fuel itself, while the rest would be for construction, maintenance, labor, etc associated with the power plants.

What do the FIT Guidelines say?

1. **Greenhouse gas (GHG) emissions**
   A revision of the Guidelines introduced GHG emission standards which require FIT-certified operators to achieve 50% emissions reduction compared to fossil fuel by the end of FY 2029 and 70% reduction after FY 2030.

   The GHG emission standards are weak in the following ways:

   - A 70% reduction is not consistent with power sector emissions in the net-zero aligned global warming scenario presented by the International Energy Agency (IEA).
   - It does not include CO_2 emissions from biomass combustion.

   Other major loopholes include:

   - Only power plants newly certified in the fiscal year 2022 and after are subject to the criteria, and the number of such plants is almost zero;
   - Power plants already certified up to fiscal year 2021 (780 plants) are only required to make efforts to reduce emissions and disclose and report the details of such efforts on their own website.

2. **Sustainability and legality of fuels**
   The guidelines require companies to acquire "forest certification" to prove the sustainability and legality of fuels for imported woody biomass power generation. However, certification is not always reliable. Some certifications have been prepared by industry associations themselves in order to allow conventional and problematic forestry practices.

   In addition, the FIT Guidelines mention the Forestry Agency's "Wood Legality Guideline (2006)" as a reference for methods of certifying fuel sustainability and legality. This "wood legality guideline" accepts methods other than forest certification (such as "group certification" by industry associations and "company-specific initiatives" such as self-declaration). These methods cannot confirm the sustainability of forests in overseas production areas, but they are considered okay under the FIT and some certified operators actually use them.

3. **Traceability**
   The 2024 revision of the FIT Guidelines now requires operators to confirm the traceability of fuels. However, it is unclear as to "how far

(2) "20 years" here ranges from past to future.
4.7 million kW = the total capacity of imported biomass power plants as of Dec. 2024.
290 days = large scale biomass power plants typically operate at a rate of roughly 80%, which is roughly 290 days a year.
20 years = Legally determined period of purchase for biomass under FIT
¥24 = FIT purchase price for imported biomass
¥10 = rough average of "avoidable costs," which a utility company otherwise would be paying for non-renewable electricity sources. In other words, ¥14/kWh (¥24 - ¥10 is the additional cost of imported biomass power, which is supported by FIT.

traceability should go," and the disclosure of traceability information is not mandatory. According to a report by the Association of Biomass Power Producers presented at the METI's Biomass Sustainability Working Group last September, of the 95 general woody biomass power generators in operation (as of the end of 2023), about 90% did not even disclose information on the country of origin of the biomass used.

Third parties, including civil society, cannot know which power plants are using fuels that are having negative environmental or human rights impacts at the site of production. If there was traceability and information disclosure for specific pellet mills, it would be possible to verify these problems.

Recent policy change of FIT/FIP: No new certification for large-scale imported woody biomass

The METI's Procurement Price Calculation Committee announced on February 3, 2025 that it will exclude general woody biomass (10,000 kW or more) and liquid fuels (the two categories of fuel under FIT that refer to imported fuels) from the scope of new future certifications under the FIT/FIP system for renewable energy, starting from FY2026.

However, ever since certification of biomass power projects under FIT was changed to a bidding system in 2018, there has been only one certified general woody power plant (10,000kW or more), and no projects were certified after 2022. The METI's policy change does not mention already-certified biomass power plants. This means that the imported biomass fuels they burn (which in 2024 was 638m tonnes of wood pellets and 6m tonnes of palm kernel shells) will continue to be imported and burned until the end of a 20-year purchase period under the FIT/FIP.

Support under Capacity Market and Demand-Supply Adjustment Market

What is more concerning is that, at the same time as METI announced this policy change, it also stated that by utilizing other mechanisms such as the "supply-demand adjustment market" and the "capacity market", biomass power generators are expected to continue operating and to make revenue in the future, without relying on the FIT/FIP system.

Support for Biomass under the Capacity Market and Auction of Power Source for Long-Term Decarbonization

- The "capacity market" is a market for trading the future supply capacity (kW) of power generation facilities with the aim of stabilizing medium to long-term power supply, to avoid supply shortages. The first auction was held in fiscal year 2020, and the monetary value of the supply capacity (kW) for four years later was determined. Once actual supply begins, "contribution fees for capacity" paid by retailers, are used as funds to pay "contract fees for capacity assurance" to power generation operators based on the contracted prices at the time of the auction.
- The auction of power sources for long-term decarbonization is a subset of the capacity market. It covers power sources for decarbonization. Its purpose is to promote investment in decarbonization power sources by enhancing the predictability of investment returns. It targets solar, wind, hydro, and battery storage, as well as the conversion of existing thermal power plants to biomass-only operation (with the condition that conversion be completed by the 2050 fiscal year) and the construction or replacement of dedicated biomass power plants[3]. Regarding the verification of fuel sustainability and legality, the same procedures as those under the FIT and FIP systems are required[4].
- Biomass power plants receiving support under the FIT and FIP system are not eligible to participate in the capacity market
- The "Business Plan Development Guidelines" for FIT and FIP include requirements such as GHG emission standards for biomass power plants and confirmation of traceability of

(3) Recently, METI's committee on the "Auction of Power Source for Long-Term Decarbonization" mentioned that "general woody" biomass / agricultural residues and liquid fuels (all of which are effectively imported) will be excluded from the eligible fuel types in this auction system starting in FY2026, in line with the FIT/FIP where such fuels are not eligible for new certification after this time. Biomass power plants that have graduated from the FIT/FIP support period and those that try to switch outright to dedicated biomass, are also subject to this exclusion.

(4) "Guidelines for Certifying Wood Biomass Used for Power Generation" and "Guideline for Verification on Legality and Sustainability of Wood and Wood Products" by the Forestry Agency

fuels, and further revisions and strengthening are expected in the future. Power sources awarded in the long-term decarbonization power source auction are also required to operate in accordance with these guidelines.

- According to the "Organization for Cross-regional Coordination of Transmission Operators", JAPAN (OCCTO), those power companies that are not in compliance with the FIT/FIP guidelines will get their eligibility to participate in the auction revoked. One concern is that the oversight of companies' compliance is not strong enough, since the capacity market itself is not under the FIT/FIP system and departments / committees in charge are not the same.
- Another concern is that, while the Auction of Power Source for Long-Term Decarbonization somehow requires compliance with the FIT/FIP Guidelines, in the main auction of the capacity market where low-carbon or decarbonization is not the policy goal, there is no reference to the FIT/FIP Guidelines. This means that dedicated biomass power plants or biomass-coal co-firing plants can still be supported in the main auction without any sustainability bars being imposed.

Support in the Supply and Demand Adjustment Market

- "Adjustment capacity" is the capacity of supply that transmission and distribution operators (who are responsible for matching the ever-changing power demand and supply) secure in order to match the supply and demand when an unpredictable gap occurs. The Supply and Demand Adjustment Market is a mechanism whereby power source owners, such as power generation operators, receive compensation for maintaining their output in a state that can be operated for adjustment purposes.
- Participation in the supply and demand adjustment market is possible even if a power generator makes a successful bid in the capacity market.
- Power sources supported under the FIT cannot participate in the supply-demand adjustment market.

Concerns

Currently, only two large-scale biomass power plants have been awarded contracts in the capacity market. Participation in the supply-demand adjustment market is also likely to be minimal at the moment. However, in the future, power sources for which FIT/FIP support periods end, or those which are excluded from FIT/FIP support due to future strengthening of sustainability criteria, may become eligible for support under the systems mentioned above, enabling them to continue operating.

A biomass power plant in Japan. Photo credit: Global Environmental Forum

9.8. Case study: USA

Joy Reeves, Rachel Carson Council

Currently, wood pellet biomass is subsidized in the United States through government agencies—such as the U.S. Department of Agriculture (USDA), the Department of Energy (DOE), and other agencies—as well as within the U.S. tax code. This case study will give an overview of both the production side of subsidies in the USA as well as the consumption side. Additionally, this section will distinguish between national-level subsidies and state-level subsidies in the U.S., which are more variable but often include state-level wood grant programs administered by state government agencies to specific local projects (in partnership with federal agencies like the USDA's U.S. Forest Service). Importantly, at the federal level and in most states, wood pellet biomass has not been categorized as "carbon neutral," a decision which could significantly reshape regulatory landscapes and subsidy allocation.

A history of failed subsidies

Historically, the U.S. government's subsidization of biomass has been fraught with failure and difficulty. Several older programs, such as the federal *Biomass Crop Assistance Program (BCAP)* and *Range Fuels* program, have failed on the basis of poor implementation and company liquidation. BCAP, for example, was a USDA initiative administered by the Farm Service Agency (FSA) designed to offer landowners financial assistance through established payments for entering biomass crop contracts and/or matching payments for selling biomass to qualified conversion facilities. BCAP intended to focus on subsidizing the use of next-generation bioenergy sources (including agricultural residues and perennial grasses) but instead ended up subsidizing "existing woody biomass facilities and pasture pulp and paper companies," which resulted in a huge scale back in Congressional funding in the 2018 Farm Bill. The DOE and USDA-backed Range Fuels program failed similarly. Designed to produce cellulosic ethanol from wood waste in Soperton, Georgia, the Range Fuels company program received millions in federal grants and loans, only to shut down in 2011 after failing to produce fuel outputs. The company later liquidated.

The wood pellet subsidy programs that *have* survived, bolstered by industry lobbying, will likely meet future failures. Whether in the Farm Bill, through U.S. tax credit designations, or through convoluted carbon capture programs incentivized during the Trump Administration, federal dollars are poised for further waste and misguided spending.

Logs ready to be processed at a pellet mill in the USA. Photo Credit: Dogwood Alliance

Production Subsidies

Biomass suppliers like Enviva have been buoyed by the federal government through various departmental grants and programs, federal loan guarantees, and appropriated funding. They have been further bolstered by pro-biomass language in policy and legislation from Congress looking to expand the renewable energy portfolio of the United States.

One of the primary avenues through which wood pellets are subsidized is the U.S. *Farm Bill*, a comprehensive agricultural omnibus typically renewed every five years (most recently in 2018, with an extension). Specifically, the "Energy Title" of the Farm Bill (IX) funds programs such as the *Advanced Biofuel Payment Program* administered by USDA. The program offers biomass sellers (including Enviva) payments based on how much fuel they produce and the duration of production. A continued lobbying focus for industry, the program receives $7 million in annual mandatory funding as of 2018, notably reduced from $15 million in the previous Farm Bill. The failed *Biomass Crop Assistance Program* detailed earlier had its mandatory funding eliminated. Finally, the far-reaching *Rural Energy for America Program (REAP)*, at $50 million mandatory funding per fiscal year, offers loan guarantees and assistance to rural businesses for adopting renewable energy (with little verification of greenhouse gas reduction). There are also Farm Bill-funded programs that trickle into state and local jurisdictions, such as *Wood Innovations Grants* and newer *Community Wood Energy Grants*, which apply to targeted projects.

Another funding avenue for federal subsidies is through energy *tax credits*. Originally, the Inflation Reduction Act of 2022 created new clean energy tax credits and bolstered existing ones, such as the Investment Tax Credit (ITC) and Production Tax Credit (PTC) well-known among solar and wind developers. These expanded incentives were rolled into Sections 45 and 48 of the Inflation Reduction Act. The passage of the Trump Administration's 2025 budget Reconciliation bill means these credits will be phased out early; however, since the U.S. Treasury had not yet qualified biomass production as "carbon neutral" under Section 45Y, **the effect of the 2025 budget overhaul on wood pellet biomass remains unclear**. Certain credits involving carbon capture and storage technology (45Q) and "clean fuels" for transportation (45Z) were preserved and extended, opening further funding avenues for some biomass projects—particularly Bioenergy with Carbon Capture and Storage (BECCS) projects in Gulf South states like Mississippi.

Overall, the state of national production subsidies in the U.S. is categorized by policy threats. Recurringly-proposed budget riders, Farm Bill drafts (FY2025), and even well-intentioned clean energy legislation have all risked "carbon neutrality" language that would direct even more agency funding into the wood pellet industry. It is worth noting that biomass industry players regularly lobby for Congress and agencies to uptake "federal regulatory language affirming biomass as a carbon-neutral, renewable energy source" and "bind" them to recognize it as such in any rulemaking. Some also sought to expand the soon-to-expire Clean Energy Property Credit to include commercial installations, or for the EPA's Renewable Fuels Standard to give wood pellet producers additional qualification pathways. Lastly, it is always possible that Congress could reappropriate funding to defunct programs such as BCAP. Though BCAP was extremely popular with biomass producers, it cost taxpayers $243 million in 2009 and 2010. While these high levels of spending were eventually reduced, taxpayers paid up to $25 million dollars per year to help create energy that produces CO_2 at far higher levels than coal.

State & Local Subsidies for Production

Significant funding for wood pellet producers is also being provided by state governments throughout the country to align with renewable energy goals and expand rural job markets. A clear example can be seen in the relationship between the state of North Carolina and Enviva. North Carolina is one of the top wood-pellet producing states in the U.S. with four plants producing over 2.5 million metric tonnes annually and several seeking to expand.

Within North Carolina, Enviva has received nearly $10 million in taxpayer subsidies to establish facilities in the state. In first establishing its Northampton County plant, Enviva received

subsidies and grants from sources including The Economic Development Agency ($2 million), The Community Development Block Grant Program administered by the Department of Housing and Urban Development ($930,000), North Carolina Rural Center ($220,000), and from the local county (more than $31,000). North Carolina also provided Enviva with millions more in tax breaks to build plants in Hampton and Sampson County, on top of generous local subsidies. Enviva also received *Job Development Investment Grants (JDIGs)* in Sampson and Richmond Counties, offering millions in payments through state personal income tax withholdings for meeting job-creation requirements.

In Mississippi—a state where Drax is also attempting to expand—George County taxpayers shoulder an expensive subsidies package. The Enviva Lucedale plant employs about 90 full-time workers at the plant itself and (supposedly) supports nearly 300 jobs across the broader George County community. The Mississippi Development Authority provided $4 million in grant funds for site development and infrastructure, and George County offered $13 million in property tax breaks over 10 years. According to the Mississippi Center for Public Policy, if all 90 jobs are filled, that amounts to roughly $188,888 spent per job. Notably, it is common for counties to layer state and local subsidies with federal subsidies.

The aforementioned George County plant received a $1.4 million federal grant from the U.S. Economic Development Administration to make room for the Lucedale plant by widening the plant's entrance for truck traffic and other infrastructure updates to its industrial park site.

Another current avenue for states to receive wood pellet project subsidies is through federal wood grant programs, administered by the USFS, which funds projects on a state-by-state scale. Wood Innovations Grants (see breakdown here) and *Community Wood Grants* (see breakdown here) fund projects for innovating wood product manufacturing and wood energy systems, whereas the Wood Products Infrastructure Assistance program provides financial assistance to facilities that process wood "byproducts." These programs were funded heavily in 2022 through the Infrastructure Investment and Jobs Act (IIJA/BIL) on the basis of wildfire management and hazardous fuel removal, and in 2025 by Trump-era Wood Innovation Grants designed to expedite project approvals and spur timber markets.

Much like at the federal level, there are worrying state-level proposals attempting to designate biomass as carbon neutral (with the South Carolina legislature being one example). Advocates remain vigilant for these state-level designations.

Trucks carrying logs to be processed into wood pellets at a facility run by Enviva. Photo Credit: Dogwood Alliance.

Consumption Subsidies

Although most industrial wood pellet products from the U.S. are exported to Europe and Asia for combustion ("consumption"), in the uncertain and volatile political landscape of the U.S., wood pellets could become prominent in domestic biomass energy mixes. Already, biomass power plants have taken billions of dollars in subsidies from the federal government (see box on p 9) And, as biomass power plants prove too costly to keep running, state legislatures are quickly stepping in to save these polluting sources of electricity.

In a pattern seen throughout the U.S., state legislatures are **forcing billpayers to pay millions more for their electricity** in order to keep their biomass power plants online. New Hampshire required utilities, like Eversource, to pay over $100 million above market price for biomass power and passed laws to extend the contracts even after they exceeded cost caps, trapping billpayers. Maine has spent over $250 million since 2008 to bail out its biomass plants, including a 2017 $13.4 million **bailout from the state legislature** that effectively cost $154,000 per job—yet most plants still failed to meet generation targets or remain operational.

The biomass industry in Maine took another hit when Massachusetts and Connecticut decided to no longer grant subsidies to biomass plants in Maine. Instead, subsidies in those states have been redirected to clean, economical energy such as wind and solar. Instead of abandoning the industry as it loses critical subsidies from neighboring states, Maine continued to invest in the sunk cost of biomass energy, causing increased financial stress for its taxpayers.

The excessive cost of biomass energy is not new. Unlike other sources of energy where new technologies have helped make production cheaper and the product more efficient, bioenergy has simply been unable to lower its price. In a study of four biomass power plants in Virginia, Georgia Tech professors found that prices for bioenergy were 40-53% more expensive than wind or solar. The study found that not only were these plants a bad investment in 2012 when they were turned into biomass facilities, but they make even less sense in today's marketplace. Due to the rapidly declining cost of wind and solar, as well as the increase in affordable energy efficiency options, the study advised against investing in large biomass facilities which will be unable to produce energy at a price competitive with other rapidly evolving technologies. Therefore, states must move away from funneling money into expensive bioenergy, and move instead towards supporting clean, affordable energy—and the lower electricity bills that come with it. ●

Table 1: USDA Programs Subsidizing Biomass Energy		
Program	*Description*	*Cost of Subsidy*
Rural Energy for America Program	Grant & loan program intended to support rural renewable energy projects but has also subsidized biomass	Nov. 2010 to Oct. 2024, $48.4 million was spent on biomass projects.6 Overall, program receives $50 million in mandatory funding annually and was appropriated $2 billion in the Inflation Reduction Act.
Biomass Crop Assistance Program	Program for planting, collection, harvesting, storage, and transportation of biomass feedstocks	$330 million from FY09-24.[7]
Section 9003 Biorefinery, Renewable Chemical, and Biobased Product Manufacturing Assistance Program	Loan guarantee program for biorefineries through the Commodity Credit Corporation (CCC)	2009 to 2021, $762 million in final loan guarantees with a $200 million subsidy cost.8 Two loan guarantees,$205 million combined, were for projects with woody biomass.[9]
Biobased Product Market Development and Access Grant Program	Grants to applicants who have been accepted into the Biorefinery, Renewable Chemical and Biobased Product Manufacturing Assistance Program	$200 million available through the Commodity Credit Corporation (CCC). The program was created in Oct. 2024 and awards have not been announced.[10]
Biomass Research & Development Initiative	Grants for biofuels and biobased products R&D and demonstration or commercial projects	$140.5 million dispensed from 2009-2018, with at least $27 million for woody biomass.[11]
Bioenergy Program for Advanced Biofuels (Advanced Biofuel Payment)	Annual payments for production of biofuels, intended to be for advanced biofuels but has also subsidized mature bioenergy	$5.3 million for woody biomass projects from 2009-2016.12 Mandatory funding of $7 million for each year FY19-FY23.
Wood Innovations Grant Program (Wood Innovations)	Grants to expand wood product markets and wood energy markets, including for woody biomass projects	$132 million in grants awarded FY15-FY24.[13]
Community Wood Energy & Wood Facilities Program (Community Wood)	Grants for installing a community wood energy system or building an innovative wood product facility, including for woody biomass projects	$53 million in grants awarded FY20-24.[14]
Sun Grant Program	Grants to land-grant universities for bioenergy, biomass, or bioproducts research	$40.5 million in grants obligated FY10-20.[15]

Tables 1 (above) and 2 (below) include the most prominent programs within the farm bill and tax code.
In addition to these, biomass is also subsidized indirectly through the Renewable Fuel Standard (RFS) mandate, which requires increasing amounts of biofuels to be blended with U.S. gasoline and diesel each year. Credit to Taxpayers for Common Sense.

Table 2: Tax Credits Subsidizing Biomass Energy		
Program	*Description*	*Cost of Subsidy*
Sec. 25C Energy Efficient Home Improvement Credit	Tax credit for qualified energy efficiency improvements, including $2,000/year for biomass stoves or boilers.[16]	$12.4 billion from FY23-27[17]
Sec. 30C Alternative Fuel Vehicle Refueling Property Credit	30 percent tax break for purchasing certain "clean fuel" refueling or electric vehicle recharging equipment, including biomass-derived biofuels.	$11.3 billion from FY24-33[18]
Sec. 40(b)(6) Second Generation Biofuel Producer Credit	$1.01 per gallon producer tax credit for cellulosic biofuel, including from agriculture residues or perennial grasses. Sunsets at the end of 2024.	$54 million from FY22-25[19]
Sec. 40A Biodiesel Tax Credit	$1.00 per gallon tax credit to produce biomass-derived biodiesel. Sunsets at the end of 2024.	$40 million from FY23-24[20]
Sec. 40B Sustainable Aviation Fuel Credit	Tax credit to produce aircraft fuels from qualified sources, including biomass, with low GHG emissions. Sunsets at the end of 2024.	$49 million from FY23-25[21]
Sec. 45 Renewable Electricity Production Tax Credit	Tax credit to produce electricity from certain renewable sources, including open-loop biomass. Sunsets at the end of 2024.	$15 billion from FY22-26, with open-loop biomass costing $600 million[22]
Sec. 45Z Clean Fuel Tax Credit	Tax credit to produce fuels from qualified sources, including biomass, with low GHG emissions. Starts in 2025.	$19.1 billion from FY25-29[23]
Sec. 45Y Clean Energy Production Tax Credit	Tax credit to produce electricity from sources, including biomass, with zero GHG emissions. Starts in 2025.	$11.2 billion from FY25-31[24]
Sec. 48 Energy Investment Tax Credit	Tax credit for investments in energy-related property, including biogas. Sunsets at the end of 2024.	$89.7 billion from FY23-27, with biogas costing $400 million[25]
Sec. 48E Clean Energy Investment Tax Credit	Tax credit for investments in energy-related property, including biogas, with zero GHG emissions. Starts in 2025.	$50.9 billion from FY25-31[26]

9.9. Case study: Canada

An overview of subsidies for biomass in Canada

Canada's federal and provincial governments provide substantial subsidies for wood-based biomass as part of their clean energy strategies. Total public funding is distributed annually across 50 programs at the federal and provincial levels.

Across all six jurisdictions (federal, B.C., Alberta, Ontario, Québec, and New Brunswick), total biomass-related public funding peaked at $578 million in 2022, with an average annual cost of $346 million from 2021 through 2026. This indicates a significant, though fluctuating, public sector role in subsidizing biomass initiatives across Canada:

- **Federal:** Most funding for biomass is moderate, averaging $85 million annually between 2021 and 2026.

- **Québec:** Allocates the highest average annual biomass funding in Canada, at $17 million.

- **Ontario:** The province ranks second in average annual funding, at $47 million.

- **British Columbia:** Provides substantial, though irregular, funding for biomass, averaging $44 million annually.

- **New Brunswick:** Offers limited and sporadic support for biomass, with average annual funding of approximately $0.33 million.

- **Alberta:** The province has not reported any active biomass-related funding during the period 2021 - 2026.

Types of subsidy:

Most subsidies come from Québec, Ontario, and B.C and are direct budget transfers, with few tax measures and limited transparency on financial value.

- **Direct budgetary transfers:** The majority of subsidies (40 out of the 50 programs) are direct transfers of government funds, underscoring the role of direct financial support in the biomass sector.

- **Price support mechanisms:** Four subsidies involve price support for biomass-based energy or products.

- **Tax expenditures:** Four subsidies are provided in the form of tax expenditures.

- **Plan/strategy:** One subsidy is a strategy which outlines priorities and potential funding mechanisms over time.

- **Loan guarantees:** One subsidy involves loan guarantees or other mechanisms for socializing private risk.

Twelve subsidies were phased out prior to 2024, representing approximately $67 million annually. The reason for the phase outs is typically as a result of completing funding cycles or to transitioning to new mechanisms.

Production subsidies for forestry operations

Len Vanderstar, Bulkley Valley Stewardship Coalition & Science Alliance for Forestry Transformation

> Subsidies directly to logging operations under the guise of fire management

In British Colombia, there are two major provincial government subsidization programs for the biomass wood pellet industry:

1) Grade 4 Log Credit System

This program allows timber licensees to receive credit for Grade 4 timber (which is considered lower-value fiber) if it is sent to primary processing facilities like wood pellet plants, rather than to sawmills. This process also allows the timber to be used without counting against the licensee's cut control limit.

2) Forest Enhancement Society (FES)

Via an application process, FES publicly subsidizes truck haul and harvesting operations for the wood pellet industry, making it "economical" to carry out operations, based on project categories of "reducing harvest waste" and "reducing fire risk".

Why these financial incentives are damaging to the environment

Reducing harvest waste is a fallacy since visual inspections by the author indicate there has been no measurable reduction in the amount of logging slash being generated or open-pile slashed burned, from the continued clear cutting of Canada's forests. This is because the primary source of raw material for wood pellets is whole logs, logs that would have been otherwise used for pulp or making cants from grade 4 quality trees. With pulp wood demand at historic lows in north-central and northern B.C., these merchantable logs are largely being toted as "harvest waste" and either burned in slash piles or being subsidized to offset haul costs to pellet mills.

The claim that this practice is effective at reducing fire risk is problematic, since it is well documented that partial canopy removal leads to increased forest temperatures, greater winds, and the drying and proliferation of herbaceous vegetation such as grasses and fireweed (on moderate to dry sites) that, when dry, can increase fire hazard. Removal of ladder fuels (fine lower limbs) can be effective, but the excessive bark to wood ratio observed in cut blocks surpasses what the wood pellet industry desires as source material.

What is clear is that without subsidies there would be no wood pellet industry at the scale required to support large biomass power generation. The solution to our current climate and biodiversity crises is not to log more of our forests, converting Canada's remaining primary forests to rotational plantations that may be used for the biomass industry.

Drax's mill yard in Smithers, B.C., Canada with whole logs obtained from primary forests.
Photo Credit: Bulkley Valley Stewardship Coalition

10. Biomass subsidy policy developments - are campaigns winning or losing?

Successful examples of the removal of biomass subsidies from government policy, are few and far between. Those that do exist have been hard won - the result of years of relentless pressure from local campaigning groups on the ground and with decision-makers.

The Dutch campaign against biomass subsidies in the **Netherlands** achieved the biggest success of any known campaign when, in 2022, the Dutch government decided that there should be no new subsidies for burning biomass. Although, in theory, a new government could revoke the decision to end biomass subsidies, there is strong cross-party opposition to future funding for burning wood for energy.

In **Poland**, the government has made positive moves by declaring its intention to ban the burning of wood in commercial energy generation. Although this has not yet been implemented, Polish authorities are taking steps to move away from burning wood in the energy sector.
However in other cases, ground that has been gained has all too quickly been lost.

In **Germany**, the last government put forward a proposal to significantly limit subsidies for domestic biomass stoves in favour of heat pumps. However, they shelved that plan in the face of subsequent criticism by the right wing media and parts of the forestry industry and because of pushback from the right-wing coalition partner (FDP). Subsequently, the government shelved all measures that would have limited the burning of forest wood in any way, including a long-awaited national bioenergy strategy. The new government, elected in May 2025, is broadly supportive of the forestry industry and not of environmental NGO demands, in regards to biomass. This is limiting campaign strategies and successes at the state and local level.

As the world's third-largest biomass importer with substantial investments in the sector, **South Korea**'s announcement in 2024 to reform public support for biomass energy, represents the largest policy reversal on biomass in Asia. However it does not translate into immediate impact on the ground in all places, with slow phase-out timelines and loopholes continuing to allow the biomass industry to operate. Domestic sourcing of forest biomass has been prioritised over imports, alleviating some pressure on vital southern forests but transferring it to South Korea itself.

In **Japan**, policy changes that have led to the cessation of some subsidy streams can simply be replaced by other, already existing, mechanisms in the future, which allow the biomass industry to continue operating.
Perhaps the most disappointing case for campaigners, is that of the **UK,** where in 2018 the government announced progressive changes to biomass subsidies that should have resulted in an end to any new biomass power plants, as well as funding for biomass burning giants like Drax by 2027. However, by 2025 the government has already backtracked on this plan - an example of how small wins can be quickly rescinded by governments. Nonetheless, interpretations of this decision vary: some experts see the UK Government's decision to extend Drax subsidies after 2027, while extremely disappointing, as possibly opening the door to a phaseout of large-scale biomass subsidies in the future.

The **USA** portrays a mixed picture, presenting us with a few examples of states which have abolished biomass subsidies and instead redirected these funds to clean, economical energy such as wind and solar. However, instead of abandoning the industry as it loses critical subsidies, ratepayers are being forced to pick up the bill for biomass energy by paying millions more for their electricity.

10.1. Challenges and Opportunities

Campaign Challenges

- Any **progress** made on shifting supports away from the biomass industry **can be quickly rescinded by governments.**

- **Subsidies are often phased down over long time periods.** This gradual process allows existing subsidies to stay in place in the immediate future and, as the UK example shows, may even allow them to be prolonged in the future.

- **Policy changes on subsidies may apply to new biomass projects but will not apply retrospectively to projects already operating** under the earlier subsidy regime. The existing supports of the earlier scheme continues to flow to those projects already receiving them.

- When **the biomass industry** loses access to one subsidy stream it **can often access funds through an alternative mechanism.**

- **Limiting subsidies to restrict specific sources of biomass, but not others, can lead to increased logging elsewhere.** This is why ending all biomass subsidies is so vital.

- **The biomass industry is extremely innovative in its drive to access funding.** When one door closes it pushes open another. This can be seen in the case of Bioenergy with carbon capture and storage (BECCS) projects which have opened further funding avenues for some biomass projects and in the recent case of Drax submitting a bid to try to access support measures for so-called AI Growth Zones.

- **The biomass industry is very good at distorting the facts in order to control the narrative** and biomass industry players regularly lobby the government with misinformation.

Campaign Opportunities

- **Bill payers are being forced to pay millions more for their electricity in order to keep biomass power plants online:** At a time when the cost of living is rising and many people struggle to warm their homes, this is a powerful argument to mobilise household consumers to demand more affordable and genuinely green energy.

- **Voices for biomass subsidies to be abolished also come from other segments of the wood processing industry** due to concerns about increased feedstock competition. The European Panel Federation (producing wood-based panels) has called out the biomass industry, in two of their policy recommendations stating: *"Review and revise subsidies promoting the burning of wood resources suitable for materials. Rigorously enforce the cascade hierarchy, reserving energy recovery for end-of-life wood products" and "Reduce woody-biomass pressure by accelerating deployment of diverse renewable energy alternatives (like heat pumps, solar, geothermal) and improving energy efficiency".*

- These **diverse stakeholder groups can at times be viewed as potential allies**.

- **Protection and restoration of forests are more effective climate measures** that are curtailed by logging and burning forest biomass as a competing, alternative climate solution. Cessation of logging brings about a large, immediate reduction of carbon emissions, and forest regeneration adds incrementally (on an ongoing basis) to removals of carbon from the atmosphere via sequestration. Additionally, saving and restoring forests simultaneously combats the biodiversity crisis by fostering the web of life. These are popular measures. The possibilities of synchronicity of action are already receiving international and national attention, but the absurdity of logging and burning as the antithesis to this, is awaiting proper recognition in campaigns for forest protection and restoration

11. Conclusion

In response to climate change and the urgent need to decarbonise, many countries around the world developed policy mechanisms to increase the percentage of power generated from 'renewable' sources. Fifteen years later, the result of the experiment of subsidising the cost of renewables is clear.

Solar and wind have innovated, dramatically decreasing the levelised cost of electricity provided, but biomass has not. The biomass industry (predominantly wood-based) continues to be propped up by public incentives that distort markets and without which it simply cannot compete in global power markets.

On top of this, a mounting pile of evidence has unequivocally shown that the proliferation of large scale biomass energy is having profoundly negative environmental, social and climate impacts around the world, while also diverting funds away from genuinely clean energy solutions. Clean heating options, such as large-scale heat pumps, are being rapidly developed, but their roll-out is hindered by subsidies for biomass heat. The benefits of retaining natural forests are being overlooked.

In response, civil society organisations, campaigners, and other stakeholders, have sought to persuade governments to phase out subsidies for biomass. This has had mixed results around the world and the gains that have been won are often vulnerable to reversals in political will. There are a great many challenges to achieving the change that is urgently needed on a global scale, however the promising example of the Netherlands, shows us that it can be done.

As a result we, The Biomass Action Network, continue to demand: **End subsidies for forest biomass and exclude it from green finance criteria immediately.** ●