MONEY TO BURN? THE U.K. NEEDS TO DUMP BIOMASS AND REPLACE ITS COAL PLANTS WITH TRULY CLEAN ENERGY

The United Kingdom’s electricity system is undergoing a major transformation. Under the Climate Change Act of 2008, the U.K. committed to cutting greenhouse gas (GHG) emissions by at least 80 percent from 1990 levels by 2050. The U.K. also has an aging power sector and a program of scheduled retirements of all coal plants by 2025, and so needs new investment to ensure reliability of supply in the period 2020–2025 and beyond.

The U.K. has relied heavily on biomass—basically plant matter used for energy—to build new electricity capacity and meet climate targets. Today, biomass represents the lion’s share of U.K. “renewable” electricity generation. However, recent science shows that many forms of biomass—especially biomass from forests—result in higher carbon emissions than do coal and natural gas. At the same time, the costs of building low-carbon alternatives to biomass, like wind and solar, have fallen rapidly and are expected to continue declining.

A new study commissioned by the Natural Resources Defense Council and executed by Vivid Economics, a London-based consultancy with expertise in U.K. energy systems, examines the economics of biomass relative to these alternatives for meeting reliability of supply and decarbonisation objectives for the U.K. power system over the next decade. The study concludes that in the period 2020–2025, wind and solar are likely to be the least-cost way to ensure U.K. reliability of supply while also achieving power sector decarbonisation goals, not biomass.

U.K. RULES STILL FAIL TO FULLY ACCOUNT FOR THE CARBON TOLL OF BURNING BIOMASS

Recent science—including research from the U.K. government’s own previous Department of Energy and Climate Change (DECC)—has found that burning biomass derived from whole trees and other large-diameter wood increases emissions relative to coal and natural gas for decades.\(^1,2\) The emissions risk associated with biomass has been reflected to a limited degree in government safeguards, including overall emissions limits on biomass. However, all biomass is still treated as a “carbon neutral” fuel; U.K. policy only requires utilities to account for emissions associated with the cultivation, processing, and transport of biomass, not power plant emissions when biomass is combusted for electricity or forgone carbon sequestration in the forest from the additional harvest of biomass for energy.\(^3\)

WIND AND SOLAR ARE THE LEAST-COST WAY TO POWER THE U.K., NOT BIOMASS

The study compares the economics of biomass and other renewables (onshore wind, offshore wind, and large-scale solar photovoltaic) under varying assumptions about the total economic cost of each. Total economic cost includes technology costs (capital and operating costs), the costs of ensuring reliability of supply,\(^i\) and the costs of carbon pollution, based on three assumed levels of biomass carbon intensity. Two reflect only partial emissions accounting, and one reflects a conservative estimate of the full emissions associated with biomass, based on the U.K. government’s own calculator (see Table 1). The Technical Appendix provides a detailed description of all cost assumptions and the WeSim model.

---

\(^i\) Represents the number of hours per annum in which, over the long-term, it is statistically expected that supply will not meet demand. Our modelling assumed this is three hours per year, in line with the current standard for the U.K. power system.

\(^i\) Known as system integration costs (SICs), these include the costs associated with backup generation required to “firm up” wind and solar, as well as the costs associated with increasing the flexibility of the system to adapt to fluctuations in demand.
TABLE I: BIOMASS EMISSIONS SCENARIOS MODELLED

<table>
<thead>
<tr>
<th>SCENARIO DESCRIPTION</th>
<th>EMISSIONS ACCOUNTING</th>
<th>KGCO₂/KWH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimate of Drax biomass</td>
<td>Partial accounting, including cultivation, processing, transport</td>
<td>122</td>
</tr>
<tr>
<td>U.K. emissions limits for 2020–2025</td>
<td>Partial accounting, including cultivation, processing, transport</td>
<td>200</td>
</tr>
<tr>
<td>SELC low estimate using BEAC calculator</td>
<td>Full emissions accounting</td>
<td>1,277</td>
</tr>
</tbody>
</table>


In 2020, accurately accounting for power plant emissions from burning biomass and their associated carbon costs results in biomass being uneconomic relative to alternatives (see Figure 1). Even for scenarios that do not include a full accounting of biomass carbon emissions, the total economic cost of biomass is comparable to or higher than the total economic cost of onshore wind and solar. In 2025, as their costs continue to fall, wind and solar are likely to be the least-cost way to ensure U.K. reliability of supply, not biomass. This holds true across all emissions scenarios examined (see Figure 2).

RENEWABLES ARE THE CHEAPEST, CLEANEST, AND FASTEST-DEPLOYING TECHNOLOGIES TO REPLACE COAL

A further review of cost data shows that the costs of building low-carbon alternatives to biomass, in particular wind and solar energy, have been falling rapidly and are expected to continue declining. By contrast, the potential for biomass technology costs to fall is limited. Biomass conversion is already a mature technology, so comparatively little capital cost reduction is expected over time; fuel costs, which make up the bulk of biomass costs, are highly uncertain; and it is now widely understood that biomass emits more carbon than coal within timeframes relevant for solving climate change.

U.K. policymakers seeking to achieve both reliability of supply and power sector decarbonisation should not plan to replace retired coal plants with expensive and dirty biomass conversions and should instead invest in lower-cost wind and solar. Policymakers should also curb biomass subsidies, strengthen sustainability requirements for biomass sourcing, require utilities to fully account for biomass emissions, and place an overall cap on biomass for energy to reflect limited supplies of truly sustainable low-carbon sources.
ENDNOTES


