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Grangemouth Renewable Energy biomass power station: An unsustainable, high-risk potential investment

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In June 2013, the Scottish Government approved a highly controversial planning application by Forth Energy for a 120 MWe biomass "combined heat and power plant" at Grangemouth Port[1].
The proposal had faced strong opposition, including by three local Community Councils, because of concerns over impacts on air quality, sustainability, visual amenity, fisheries and water pollution. Falkirk Council objected because of concerns over visual impacts. Then, in March 2014, Forth Energy announced that it was pulling out of the project, after SSE had decided not to invest. However, the company said it would look for another developer interested in taking over the plans and the planning consent[2].

Now, Grangemouth Renewable Energy Ltd, subsidiary of start-up company Silva Renewable Energy, is seeking to develop the plant. It has won a Contract for Difference for a smaller, but still large, plant of 85 MWe capacity. A Contract for Difference is a subsidy taking the form of a guaranteed purchase price for electricity set above the wholesale market price, called a "strike price"[3].

There are serious concerns that Silva Renewables could be looking to source wood pellets from highly biodiverse coastal hardwood forests in the South-Eastern USA, some of which are being clearcut for wood pellets. This would be disastrous for biodiversity in a region designated as Biodiversity Hotspot, and it would result in overall greenhouse gas emissions no lower than those from a coal power plant of the same size.

However, there are also serious questions about the viability of the proposal and the credibility of Grangemouth/Silva Renewable Energy as a power station developer:

- The directors have no track record of developing any power project, and have had little financial success with previous ventures;
- The level of subsidies awarded to the proposed plant is well below that for any existing biomass power plant in the UK and the strike price awarded to the plant is much less than estimates for the levelised cost of electricity for biomass power plants, let alone biomass CHP plants;
- There is no longer a credible prospect for supplying heat from the plant, which means that the planning conditions and the conditions for receiving the Contract for Difference may not be met;
- The Scottish Government has set a new legal limit for fine particulate (PM2.5) concentrations from 31.12.2020. Existing PM2.5 levels in Grangemouth are near that legal limit. In order to obtain a Pollution Prevention and Control permit from the Scottish Environmental Protection Agency (SEPA), PM2.5 emissions would need to be set and kept below what a power station of this size can be expected to achieve.

Who are Grangemouth/Silva Renewable Energy Ltd?

Silva Renewable Energy and its subsidiary, Grangemouth Renewable Energy (referred to as "Silva" below) were founded in 2014. The directors and shareholders are Adam Daniel Barnard and Philip Heasman. The Grangemouth biomass plant would be Silva's first development.

Between them A.D. Bernard and P. Heasman are directors of six other UK companies, and they were formerly directors of a total of nine companies that have been dissolved. Neither has any background in power plant development. According to Companycheck, which collects data on UK companies, the companies of which A.D. Bernard is a director have a total net worth of £92,300, and those of which P. Heasman is a director have a total net worth of £89,000 (with overlaps between both figures). A negative net worth means that those companies have greater liabilities than assets[4]. A.D. Bernard is director of a company called Ceres BioVentures which claims to be developing biomass supplies, but its website appears to not have been updated since 2010, and Biofuelwatch could find no published record of it having supplied any biomass at all[5].

Until 2014, A.D. Bernard was managing director of a pellet company in the southern US, International WoodFuels LLC[6]. This company had advanced plans to build a pellet mill in North Carolina, although those have not materialised. Its president publicly defended practices by the largest US pellet producer, Enviva, which involve the use of wood from the clearcutting of old-growth coastal hardwood forests[7].

Where might the wood come from?

Silva plans to import all its wood as pellets[8], but it has not declared where it seeks to source those pellets. However, director A.D. Bernard's past record with International WoodFuels LLC suggests that he is well connected with the pellet industry in the south-eastern US, already the largest pellet supplying region to the UK.

The southern US region where pellet mills are concentrated is a global biodiversity hotspot, with an unusually high number of endemic species of plants, fish, amphibians and reptiles[9]. US conservation NGOs and media reporters have documented evidence of highly biodiverse coastal hardwood forests, including swamp forests, being clearcut, with the majority of the wood from clearcuts being turned into pellets for export, especially to the UK[10]. Different studies[11], one of them published by the UK government[12], show that burning such pellets for electricity results in very high carbon emissions, even when compared to coal.

US Southeastern forests
Photo by Dogwood Alliance

Will the power station be economically viable?

The Contract for Difference guarantees Silva a "strike price" of £74.75 per MWh of electricity sold. By comparison, the average wholesale price of electricity for the year ending 31.7.2017 was £47.67/MWh[13]. Based on this wholesale electricity price, Silva would receive a subsidy of just £27.08/MWh.

This is far less than any existing UK biomass power plant has received. All dedicated biomass plants currently in operation receive Renewable Obligation Certificates, each worth £45.64 on average during the year ending 30.9.2017[14]. Electricity-only biomass power plants attract 1.4 ROCs per MWh[15] – approximately £63.90/MWh. Biomass CHP (Combined Heat and Power) plants attract 1.8 ROCs per MWh, (approx £82.15/MWh) – over three times the level of subsidy for the Grangemouth plant.

A biomass CHP plant is under construction in Teesside, having been awarded a strike price of £125/MWh, subsequently increased to £134.87/MW[16], which, based on recent wholesale electricity prices, represents a subsidy of £87.20/MWh – 3.2 times the level Silva will receive.

A 2016 study by Arup[17], commissioned and published by the then Department for Energy and Climate change, provided estimates for the levelised cost of electricity for different technologies classified as renewable. For dedicated biomass power stations, the lowest estimate, based on 214 prices, was a cost of £96/MWh. The levelised cost of electricity for biomass CHP plants was even higher.

A recent analysis by Vivid Economics looked at coal-to-biomass conversions rather than dedicated biomass plants with or without CHP. It is widely agreed that the cost of biomass conversions is lower than that of new-build biomass plants. Vivid Economics[18] calculated that the levelised cost of electricity for biomass conversions would be £89/MWh in both 2020 and 2025.

This estimate may be an optimistic one because an economic forecast by FutureMetrics commissioned by Argus Biomass Report predicts global wood pellet prices to rise steeply from 2017 onwards[19].

The strike price awarded to the Grangemouth biomass plant is thus well below any estimate for the levelised costs of electricity production. It is difficult to see how this plant could ever operate without incurring ongoing losses.

No credible heat supply

In order to be paid the Contract for Difference, Silva will have to submit annual operating data to show that the plant meets the criteria of "Good Quality Combined Heat and Power"[20]. This will require Silva to supply sufficient heat from the plant to one or more customers.

Back in 2013, Forth Energy had convinced the Reporter and the Scottish Government that it had a realistic prospect of selling steam from the plant to the nearby INEOS refinery, with whom it was in discussions about such a heat supply. No other likely heat customer was identified during the planning application and public inquiry.

However, in June this year, INEOS announced plans to build its own energy plant to supply steam to its refinery[21]. This shows that INEOS is no longer looking to buy steam from a new biomass plant. Another larger industrial heat user, Cala Chem, had a planning application for its own combined heat and power station approved by Falkirk Council in January 2017[22]. This means that Silva would likely find it very difficult to comply with the Contract for Difference requirement to operate the plant as a Combined Heat and Power plant.

Air pollution

The proposed power station will require a Pollution Prevention and Control Permit from SEPA. This will set conditions on emissions limits to ensure compliance with the Industrial Emissions Directive and with Air Quality Regulations. From 31.12.2020, a new legal limit for annual average $PM^{2.5}$ concentrations of 10µg/m^3 will come into force across Scotland[23]. Falkirk Council's Air Quality Progress Report 2016 shows that this level was exceeded outside the Town Hall in Grangemouth in 2011, 2012, 2013 and 2014, and was only just met in 2015[24].

Wood combustion is the single biggest cause of $PM^{2.5}$ emissions in the UK[25], and evidence from the UK's largest coal-to-biomass conversion, by Drax Plc., shows that particulate emissions are significant higher from wood rather than coal burning in power stations[26]. It is therefore difficult to see how a biomass power station of

the size proposed by Silva could operate within particulate emissions which would have to be imposed by SEPA in order to comply with the new Air Quality regulations.

Conclusion

There are serious concerns about the local impacts of the power plant proposed by Silva, and about the impacts on forests and climate, particularly since one of the two directors of Silva has had close links to the pellet industry in North Carolina, where highly destructive logging practices inside a global biodiversity hotspot have been well-documented and are increasingly linked to pellet production.

There are also serious questions about the viability of the proposal: The company directors have no background in delivering any power or other infrastructure projects. Silva's ability to comply with the "good quality CHP" requirement for the Contract for Difference is question, as is its ability to operate such a large power plant in compliance with new Scottish air quality regulations on small particulates ($PM^{2.5}$). Finally, the subsidy level awarded for this plant is so low that it is highly questionable whether the plant could ever operate without incurring ongoing losses.

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