Case Study 6. Power Plants for co-generation of electricity from wood-based biomass in Chile - *by Eduardo Giesen, Viento Sur, Chile*

Description and Location

This study addresses the proliferation of electricity co-generation[1] projects from wood-based biomass in Chile. In this process, biomass is used directly for the generation of electricity, and the so-called 'residual heat', in the form of steam or hot gases, is then used for drying wood. This method is also used in the pulp and paper industry, where heat requirements are low.

The main source of biomass used as fuel is waste from the forestry and timber industry such as:
- Bark (the outer layer of roundwood)
- Mops (the side sections of the log obtained in the sawmilling process)
- Sawdust (small particles obtained from the sawing process and sizing of the timber)
- Chips (thin ribbons of wood of varying thickness)

We searched through the records of projects entered into Chile's Environmental Impact Assessment (EIA) System, as all energy projects with more than 3 MW of installed capacity must undergo an EIA. Likewise, we looked for this type of project in the registry of projects of the Clean Development Mechanism (CDM) of the United Nations Framework Convention on Climate Change (UNFCCC).

Thus we find a representative sample of projects, as shown in the Annex table at the end of this document. [2]

From this search, and from official information, it is evident that a high concentration of biomass co-generation plants are found in the region with the largest area of forest plantations in Chile, that is the Bio-Bio, as shown in the table below:*

Region	Tree plantations area[3] [has]	No. of biomass electricity plants
5 - Valparaíso	51,575	1
6 – O'Higgins	101,591	1
7 – Maule	439,084	1
8 – Bio-Bío	861,248	13
9 - Araucanía	434,185	3
14 – Los Ríos	182,076	1
10 – Los Lagos	60,531	1
**Co-generation plants from Region 12 and Metropolitan Region were not included because in these areas monoculture tree plantations are not representative.*		

[1] Cogeneration is defined as the joint production of electricity and thermal energy, from the same source.
[2] The tables shown in this case study have been created by the authors based on the cited sources.
[3] Tree plantations area, from Coquimbo to Aysén regions, updated on Dec 2008, INFOR.

National Context

Dictatorship and state subsidies

The problematic that the forestry model has generated is well known. Implemented in Chile by the Pinochet dictatorship (1973-1989) and subsequently maintained by successive governments, forestry in Chile has been based on strong support for tree plantations, which have been subsidised by the state through the provision of Decree 701, 1974. The extension of this decree is currently under discussion in Parliament.

These policies have been instrumental in the expansion and concentration of industrial plantations of exotic trees, mainly *radiata pine* and *eucalyptus*, and extensive development of the timber processing and pulp and paper industries.

These financial incentives have effectively reduced the costs associated with obtaining wood residues for use as fuel. As a result the forestry, timber and pulp industries are highly concentrated and are the main owners of biomass co-generation plants, which allows for a further increase in profits generated from the plantations.

Wood-based biomass cogeneration in Chile is, by far, dominated by the two largest forestry companies in Chile, namely Arauco and CMPC, which generate 572 MW and 220 MW respectively. No other company generates more than 20 MW.

'Environmental' Incentives

On the other hand, electricity generation from biomass is considered a source of non-conventional renewable energy (NCRE) by the Chilean government, and is thus subject to policies promoting this type of energy. In fact, together with wind energy, biomass-based energy is considered the NCRE with the highest development potential. The UNFCCC considers that biomass has 'zero' net carbon emissions, so the combustion of biomass instead of fossil fuels is permitted as a means of generating carbon credits. This represents a new economic benefit for these projects, and for the forestry industry's profits.

Indeed, in the records of the UNFCCC's Clean Development Mechanism[4] we found at least a dozen CDM projects focusing on energy generation from biomass in Chile. We consider this to be highly irregular as projects associated with tree plantations relate to productive processes already receiving state subsidies, making them unsuitable for certification and the commercialisation of emission reductions under the CDM.

The electricity generated in these processes is primarily intended for use during the same logging operations, sawmills or pulp mills, or for injection into the Central Interconnected System, the main private-owned electricity transmission system in Chile.

Social and Environmental Impacts

Wood-based biomass co-generation provides additional financial incentives to industries based on the use of timber produced in tree plantations. This means that its development intensifies the impacts of plantations which include erosion and destruction of soils, drought due to over-consumption of groundwater, surface water pollution, biodiversity loss, the loss of local economies and traditional ways of life, job insecurity, and destruction of the landscape and sites of cultural or ancestral significance. More directly, the combustion

[4] CDM projects can be searched here: https://cdm.unfccc.int/Projects/projsearch.html

of forest biomass involves a local loss of water and the nutrients it contains, that cannot be returned to the ground.

There is also a risk of air pollution resulting from incomplete combustion of forest biomass and the consequent emission of carbon monoxide (CO), hydrocarbons (such as methane), nitrous oxide (N_2O) and other materials, with effects on human health and ecosystems.

Finally, due to the previously mentioned concentration of this 'energy' activity in the hands of the timber and forestry industry, the loss of energy sovereignty is added to the loss of land, food, political and economic sovereignty suffered by communities.