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**Sustainable Energy Competence (SENCE)**

## **Project 2**

***Analysis of the technical, economical and ecological  
feasibility of off-grid biomass power generation with  
particular reference to local conditions in the Araucanía  
Andina***

by

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## ABSTRACT

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25 years ago half of Chile's rural population did not have access to electricity. As electricity is a very important factor in today's life, Chile initiated a rural electrification program in the early 1990s to improve the situation. Thanks to this program today almost every Chilean house has access to electricity – even in off-grid areas. The problem is that this success was made at the cost of the environment as the majority of the solutions generating electricity is based on conventional non-renewable technologies causing pollution, e. g. CO<sub>2</sub>. But Chile has a huge potential of renewable energies due to its extension as well as diversity of climates and landscapes. One of these non-conventional resources is the biomass.

The scope of this elaboration is thus the analysis of the technical, economical and ecological feasibility of off-grid biomass power generation with particular reference to local conditions in the Araucanía Andina. In the course of the study local conditions are examined, e. g. the determination of heat and electricity demand. With the help of mainly European studies an energy generating system is selected that meets the local requirements. In the end this biomass system is economically and ecologically compared with the existing conventional solutions.

In this example the best option is a pellet driven cogeneration system (CHP). Regarding the economy of this system the study shows that it has lower costs than the conventional system after seven years at an occupation rate of 100 % whereas it is not competitive in the case of only 20 % occupation. Secondly the elaboration shows that it has almost no environmental impact regarding CO<sub>2</sub> emissions whereas the conventional system emits 9.6 respectively 7.6 tons of CO<sub>2</sub> per year.

In summary the study clarifies that the technology is generally feasible and can be an economic alternative to the existing systems. Although the CHP uses renewable fuel the handling of resources in this case is not at its best as 14 % of the generated electricity cannot be used at an occupation rate of 100 %, respectively 86 % in case of 20 % occupation. Another sticking point is the missing availability of the technology in Chile and thus the obstacles one must overcome in purchasing and driving the system.