УДК 620.95:662.638

DEVELOPING WOOD CHIPS AND PELLETS AS SOURCE OF ENERGY. CHALLENGES AND SOLUTIONS

Christian Rakos, CEO, Dipl. Ing. Dr.
proPellets Austria
(Wolfsgraben, Austria), e-mail: rakos@propellets.at

ПРИМЕНЕНИЕ ДРЕВЕСНОЙ ЩЕПЫ И ПЕЛЛЕТ КАК ИСТОЧНИК ЭНЕРГИИ. ПРОБЛЕМЫ И РЕШЕНИЯ

Христиан Ракос, Исполнительный директор, инж.
Ассоциация proPellets Austria
(Вольфсграбен, Австрия)

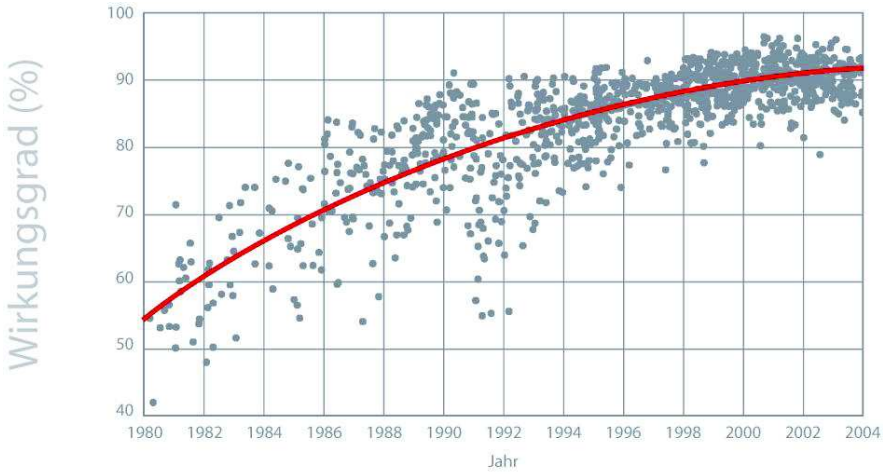
Abstract

The development of wood chips and pellets as source of energy is a complex process which involves technology development as well learning processes among all persons involved in market development and technology deployment. Austrian experiences show that technology development took decades to reach todays level of fully mature technology. The proper integration of these systems with energy demanding systems such as buildings or district heating systems is another challenge that must be carefully addressed. Finally, organizing an efficient fuel supply chain is a complex task that needs to be carefully addressed and developed. Training of all persons relevant for technology deployment and use is a critical success factor. This includes professionals such as architects, engineering consultants, installers, maintenance professionals as well as all persons active in the fuel supply chain. Quality management schemes for planning of installations as well as for fuel supply chains as the ENplus system for pellets have been critical for bioenergy success in Austria.

Bioenergy systems need higher upfront investment that fossil fuel systems. Even if operation costs can be significantly lower than with fossil fuels and levelized costs are lower than for fossil systems experiences have shown that investment support or taxation of fossil fuels are critical for technology deployment.

Technology development

The improvement of biomass combustion technology started in 1980 and took several decades as shown by figure 1. Starting point of technology development was the requirement to reduce emissions of biomass combustion equipment. In the course of time significant research and development capacities were developed in Austria making it a center of competence in biomass combustion.



Wirkungsgrad von österreichischen Holzfeuerungen gemessen an der Bundesanstalt für Landtechnik Wieselburg (BLT), 2005

Figure 1 – Efficiency of biomass boiler models tested in the Austrian official testing lab BLT

Today Austrian biomass boiler manufacturers are exporting state-of-the-art technology worldwide and are cooperating with companies that produce parts or entire biomass combustion systems on their behalf or based on license agreements.

System integration and training requirements

The integration of biomass combustion systems is a challenge because they have different operational characteristics then fossil fuel systems such as gas or oil boilers. Bioass boilers react slower that oil or gas burners and need to be controlled in a way that prevents permanent stop and go operation. Mistakes in control strategy and hydraulic installations have led to many problems of technology deployment and a need to offer extensive training activities for related professionals such as planners and installers emerged. As a consequence the European Union has required member states in its Renewable Energy Directive (Directive 2009/28/EC) to establish qualification and certification schemes for these professionals to facilitate renewable energy deployment.

Biomass district heating systems

Particular problems emerged with the installation of biomass district heating systems. Benchmarking studies revealed a wide variation of technical performance, plan efficiency, electricity demand, specific investment costs and other relevant parameters. (Rakos, 1997).

The reason for these problems was the lack of experience update engage engineering consultants as well as the lack of monitoring and benchmarking of plant performance. As a consequence a quality management scheme was installed in Switzerland Austria and part of Germany: https://www.klimaaktiv.at/erneuerbare/effiziente_heizwerke.html. Participation in this quality management scheme was established as a precondition to receive subsidies for the construction of biomass district heating plants.

Development of fuel supply chains

As with conventional fuels the standardization of fuel quality is critical for the operation of bioenergy plants. Supply chains for wood chips where are developed in Austria mainly by farmers. As these farmers where frequently also the operators of the bioenergy systems they quickly learned to understand the operational problems caused by inconsistent or contaminated woodchips. Adequate logistic concepts where developed to store and predry piles of logs at the forest roads before chipping. Also logistic hubs for wood fuels where established to supply the increasing number of biomass district heating systems.

Inconsistent quality and contamination also caused numerous problems when wood pellets where introduced as the fuel in the late 1990s. The establishment of standards and qualities certification schemes proved critical for a successful market development. Today the ENplus quality certification for wood pellets is used worldwide and has become the industry's standard for quality for the use of pellets in heating installations (Figure 2).

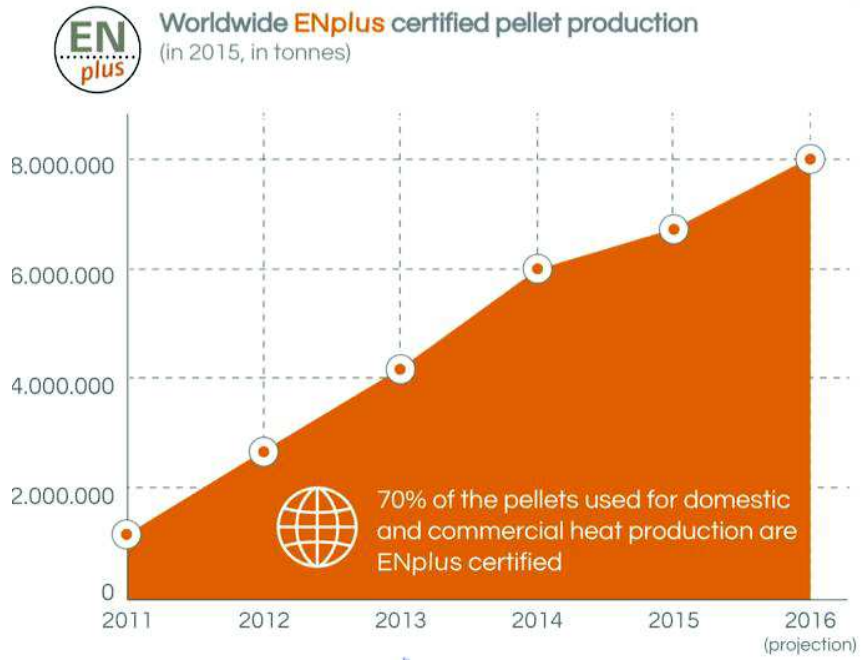


Figure 2 – Worldwide ENplus certified pellet production (Source: AEBIOM statistical report 2016)

Financial incentives

The main driving force for developing bioenergy use in Austria was the political intention to support rural economic development. Consequently investment support was offered mainly to farmers groups that developed small biomass district heating schemes or individual woodchip heating systems. Later also utilities actively participated in the development of such systems. Investment support reached 50% in the beginning and was later reduced to 30% on average. Other countries such as Sweden were able to convert large parts of fossil energy demand to bioenergy by introducting Carbon taxation. Today Sweden is supplying almost 50% of final energy demand from renewable energy.

REFERENCES

Rakos (1997): Dissertation “15 Jahre Biomasse Nahwärmenetze in Österreich”, TU Wien 1997.