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## Social acceptance of alternative and mixed biomass pellets

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DTI - Danish Technological Institute  
Protecma – Energia Y Media Ambiente S.L.  
CTI - Italian Thermotechnical Committee

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**I N T E L L I G E N T E N E R G Y**  
**E U R O P E**





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# 1 Introduction

The following report gives an overview of important analysed factors regarding the social acceptance of the energetic utilisation of alternative biomass. Apart from the legal framework, the market constraints and the economics of the usage of alternative pellets, the social acceptance of such pellets is also essential for enlarging user groups and utilisation.

Social Acceptance is an often used term in policy and strategy papers, but clear definitions are rarely given. Therefore important aspects of social acceptance were identified and analysed.

**The objective of this task was the analysis of following relevant aspects of the social acceptance of alternative biomass, especially alternative pellets:**

- Existing predictions on future trends,
- Reactions on fluctuating oil and gas prices
- Confidence in the technology for and availability of alternative pellets
- Status of the ethical discussion.

In this report the methodical approach is presented first. In the following, the results of the investigation on social acceptance and conclusions are presented.



## 2 Approach

Key actors and legal authorities who were identified within the project as well as the project partners in the considered regions were interviewed with regard to the current status quo and possible changes in the future.

In order to provide an effective questionnaire, investigations on previous and ongoing projects as well as on available literature had been carried out before. Thus, the following aspects were identified as results of the research on ongoing and previous projects:

- Availability related aspects
  - Low confidence in availability of alternative pellets
- Sustainability related aspects
  - Negative effects of dust to surrounding flora and fauna
  - Landscape and agricultural change
  - Low benefits to local community compared to associated social and environmental costs
  - Negative effect on property prices
  - Competition to food production

Building upon the results of this research the questionnaire for the interviews was prepared by BE2020+.

The main part of the report is the analysis of the conducted interviews. The social acceptance of alternative pellets is essential for enlarging the user groups and utilisation. In order to assess the social acceptance and to identify possible measures to increase it, interviews with key actors, project partners and local authorities in all partner regions had been carried out.

For the investigation BE2020+ prepared a questionnaire for the project partners. The Swedish partners carried out narrative interviews with experts using the prepared questionnaire just as a guideline. The analysis of the interviews was conducted by DBFZ and BE2020+.



### 3 Previous and ongoing projects

The project partners carried out an investigation on previous and ongoing projects as well as available literature about social acceptance of the energetic utilisation of solid biomass. The results of the investigation show that only a few projects deal with topics concerning “Social acceptance”. Furthermore, none of these projects treats exclusively the topic “solid biomass”.

One important project for assessing the social acceptance of renewable energy technologies was the EU project “Create Acceptance”. This project was supported by the European Commission within the Sixth Framework Programme Priority. The project “Create Acceptance” was finalised in 2008. The main outcome of the project is the ESTEEM tool (Engage stakeholders through a systematic toolbox to manage new energy projects). This tool was developed for project managers of new energy projects who want to improve the societal acceptance of their project by stimulating the participation of stakeholders. Thereby following aspects are considered: technology context, policy context, socio-economic context, cultural and geographical context. The ESTEEM tool, including the manual of the tool and interesting background information is available free of charge via [www.esteem-tool.eu](http://www.esteem-tool.eu).

Furthermore, some surveys on social acceptance/ public perception of bioenergy were done. In the final report of the study “Improving the public perception of Bioenergy in the EU” (Rohracher et al. s.a.), done for the European Commission DG TREN, different surveys on the awareness of Bioenergy were outlined.

The requirements of the European and national energy policies increased the use and the public awareness of renewable energy resources in the last years. However, within the investigation on ongoing and previous projects following concerns in public regarding the energetic use of biomass had been identified:

- Health related aspects
  - Emission and health hazards
  - Close proximity to local residents
  - Increase of traffic movement and noise
- Technology related aspects
  - Low confidence in combustion technology

The list with the ongoing and previous projects can be found in the annex.



## 4 Social acceptance of the energetic utilisation of biomass

Regarding the topic “social acceptance of alternative biomass (pellets) for combustion purpose” only few data is available. Therefore, this following part of the report is based on the results of the conducted interviews.

The results of the investigation show that there are regional differences regarding the social acceptance of the energetic utilisation of biomass. In none of the countries an intense ethic debate about the energetic utilisation of alternative biomass could be identified. However, in the geographically close countries the results of the investigation are very similar. The main problems regarding the social acceptance are summarised in Table 1.

Table 1: Main problems regarding the social acceptance in the partner countries

Country	Problems
Sweden, Denmark, Finland	<ul style="list-style-type: none"> <li>▪ Low confidence in technology</li> <li>▪ Concerns about the sustainability               <ul style="list-style-type: none"> <li>○ Nutrition losses</li> <li>○ Negative impacts on the landscape</li> </ul> </li> </ul>
Austria, Germany	<ul style="list-style-type: none"> <li>▪ Uncertainty about legal framework</li> <li>▪ Concerns about negative impacts on the landscape</li> </ul>
Italy, Spain	<ul style="list-style-type: none"> <li>▪ Lack of information and knowledge</li> <li>▪ Concerns about health issues</li> </ul>

### Sweden, Denmark and Finland

In the Scandinavian countries biomass, particularly woody biomass, as energy source has a long tradition and is widely accepted. The growing and utilisation of biomass has not been subject of extensive ethical debates in recent years. In Sweden, there was a debate in the late 80's, when the Swedish government recommended going from subsidies for surplus production to non subsidized use of agricultural land. One of the results was plantation of short rotation forests (willow). The decision initiated a debate. One common argument against the plantation of willow was that the land should be used for food production instead. However, the ethical aspects have never been prominent. Though far from intensive debate, the most common arguments against bioenergy in Sweden are:

- Competition with food production (energy crops)
- Competition with traditional wood working industries (bioenergy from forests)
- Nutrition losses in forests (outtake of biomass)
- Uglifying of landscape (short rotation forest)

In Finland and Denmark one main problem is that nobody wants to live near a big plant or production area. However, climate change is seen as a major challenge for humanity and people feel their responsibility to try



to solve the problem. If humanity does not take the responsibility it could become subject to questioning from an ethical perspective. Most Swedes, Danes and Finns are convinced that bioenergy plays an important role in counteracting climate change. Today, bioenergy and bioenergy production is perceived as something good.

## Austria and Germany

In Austria and Germany renewable sources for energy generation are popular and the use of wood as heating fuel has a long tradition. The logistic and heating systems are well established and the utilisation of renewable energy sources increases. However, the energetic utilisation of alternative pellets is not widely spread. One big problem in both countries is the confusing legal situation which makes it difficult to use alternative biomass for energy production in rural areas. Furthermore, the emission thresholds provide a challenge for the technology manufactures. Adequate flue gas cleaning systems at an acceptable price are needed. Also many people do not want to live near production or heating plants and they are afraid that the characteristic landscape will be ruined by increasing the use of renewable energy resources. Apart from that growing and using of biomass for energy production has not been subject to intensive ethical debates.

## Italy and Spain

Currently, renewable energy sources are not widely used in the southern European countries Italy and Spain. In fact renewable energy sources find a large interest and support in Italy when speaking in abstract, but the situation may be different when a real plant and/or practical initiative is planned somewhere in any region. As a consequence, Italy has significant difficulties in reaching the Kyoto commitments and the targets of the RES directive. The debate on energy matter leads to contradictory feelings in the public opinion - not only for the case of alternative energy but, moreover, for fossil and nuclear power plants. More problems arise in regions with a high population density and are mainly linked to the emissions and to the possible loss of economic value of buildings and land. The same situation applies to biomass plants even on small and medium scale ranges (e.g.: up to 5 MW thermal input). In particular, the following problems can be identified:

- energy is produced by a combustion process and combustion is perceived to be, almost always, synonymous with air pollution;
- people tend to compare the biomass to municipal waste (biomass plant = incinerator).

Among all renewable sources, biomass is generally the one that is most strongly integrated within the region and its economy. The local population is therefore more sensitive to the potential negative effects not only for the environment, but also for the local economic situation as a whole. The environmental aspects and their potential negative effects on health and on some sides of the local economy are the main reason for the lack of confidence in the biomass power plants. In contrast, less attention, is paid to other economic aspects (e.g.: new employment) and to the environmental sustainability of the installation.

In Spain the public awareness of renewable energy is relatively limited. The new regulations for the construction sector (CTE) have enabled a push towards a more systematic integration of renewable energy sources. According to the CTE, in all buildings there have to be at least a certain amount of solar collectors,



or alternatively other renewable energy technologies. Although the regulation is not very ambitious, it has opened the door to the market. However, this regulation came quite late, as the construction sector is suffering the financial crisis seriously.

## 4.1 Fuel quality and combustion technology

The results of the interviews show that in all partner countries the utilisation of alternative biomass is considered to be, at least in some cases, problematic. The reasons for this appreciation are presented in Figure 1. The main problems are concerns about combustion and sustainability problems. Especially in Italy and Spain there is a lack of information as well as knowledge about this topic. Therefore it is necessary to promote these fuels and to develop appropriate heating systems with affordable flue gas cleaning systems.

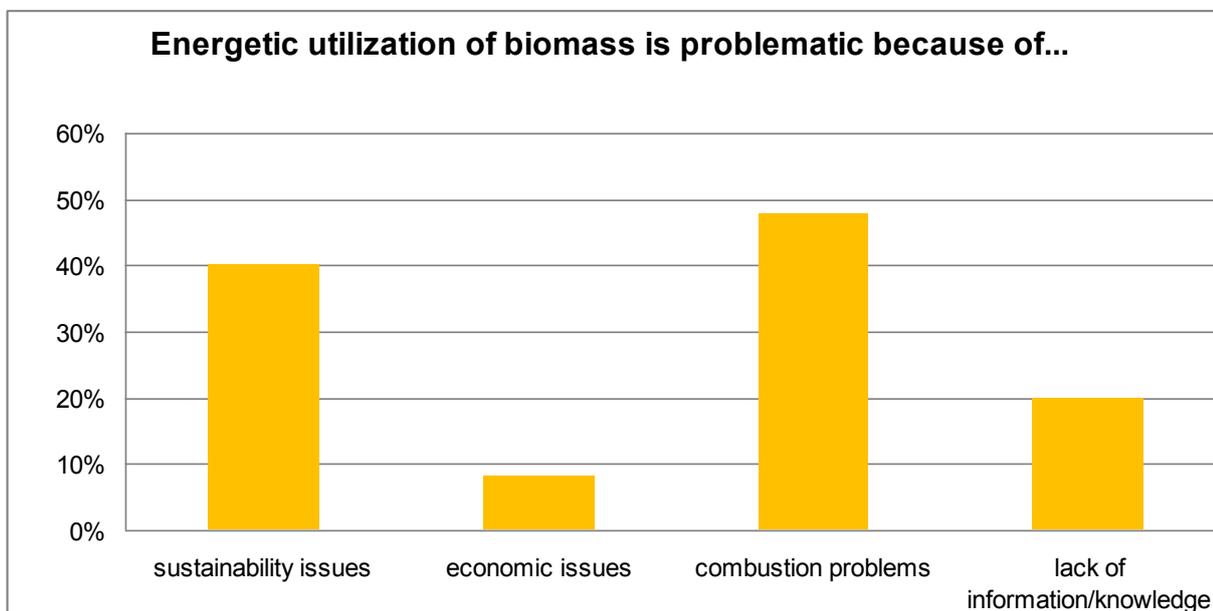


Figure 1: Concerns about the energetic utilization of alternative biomass  
Source: Interviews

The energetic utilisation of various raw materials is considered to be problematic for different reasons. Table 2 gives an overview of the different alternative raw material classes and corresponding problems. The problems can be classified in following categories:

- Quality problems
- Combustion problems
- Problems regarding the sustainability



Table 2: Overview of suspected problems for the utilisation of different types of raw material

Raw material	Problem description	Type of problem
Energy crops	Competition with food production	Sustainability
	Might cause nutrient loss if grown intensively	
	High chlorine content	Combustion behaviour
	High ash content	
	Problematic for feed boiler	
	Low energy efficiency	
Residues from agriculture	Might cause nutrient loss if grown intensively	Sustainability
	High ash content	Combustion behaviour
Residues from landscape gardening	They could also be used for composting	Sustainability
	Might cause nutrient loss if grown intensively	
	High ash content	Combustion behaviour
	Emissions	
	Too heterogeneous materials	Fuel quality
	Variability in content	
	High moisture content	
Residues from processing of olives or grapes	High ash content	Fuel quality
	They could also be used for composting	Sustainability
Residues from processing of citrus fruits	High moisture content	Fuel quality
Residues from processing of other agricultural commodities	They could also be used for composting	Sustainability

The results of the investigation show that agricultural biomass is considered as difficult to handle. This means that following concerns regarding the safety and technical development of available combustion systems for alternative (mixed) biofuels still exist:

- Cost-effectiveness due to high maintenance efforts and reduced service life
- Lack of clarity regarding subsidies, legal conditions, standardisation
- Inadequate development of technology
- Combustion behaviour



Over 40 % of the interviewed persons (49 answers) are not concerned about emissions from the combustion of alternative (mixed) biomass and possible effects on human health. But still almost 25 % think that there are problems with dust emissions. None of the interviewed persons is concerned about noise emissions. Figure 2 shows the distribution of the answers by percentage.

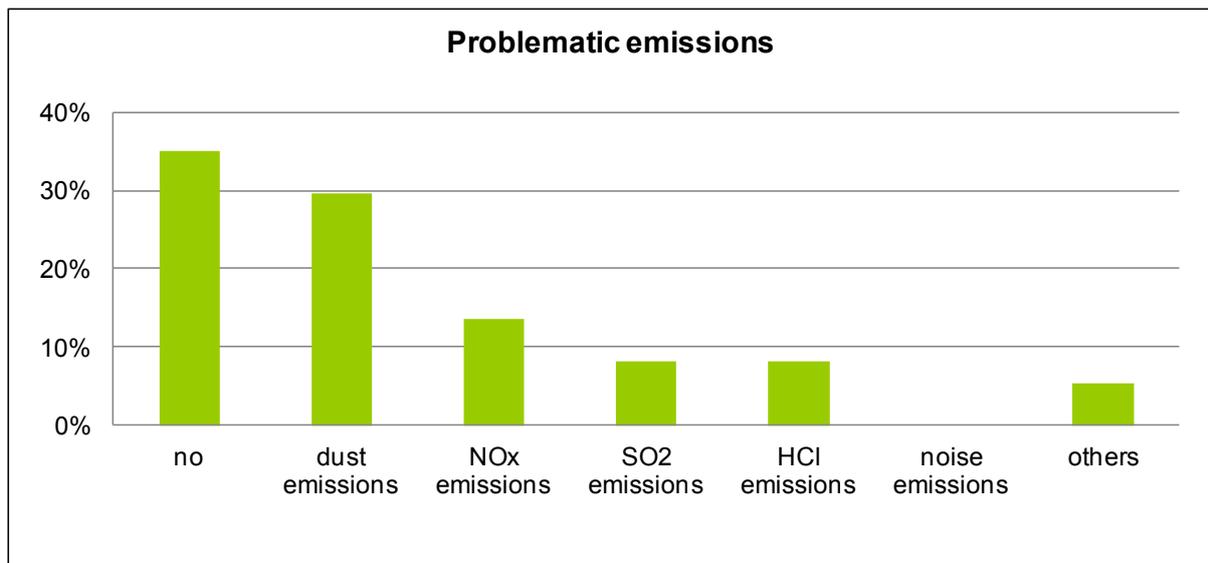


Figure 2: As problematic regarded emissions from the combustion of alternative biomass  
Source: Interviews

Figure 3 presents the raw materials which are considered to be problematic for combustion purpose (distribution by percentage). Over 20 % of the interviewed people think that energy crops and residues from agriculture / landscape gardening will cause problems during combustion.

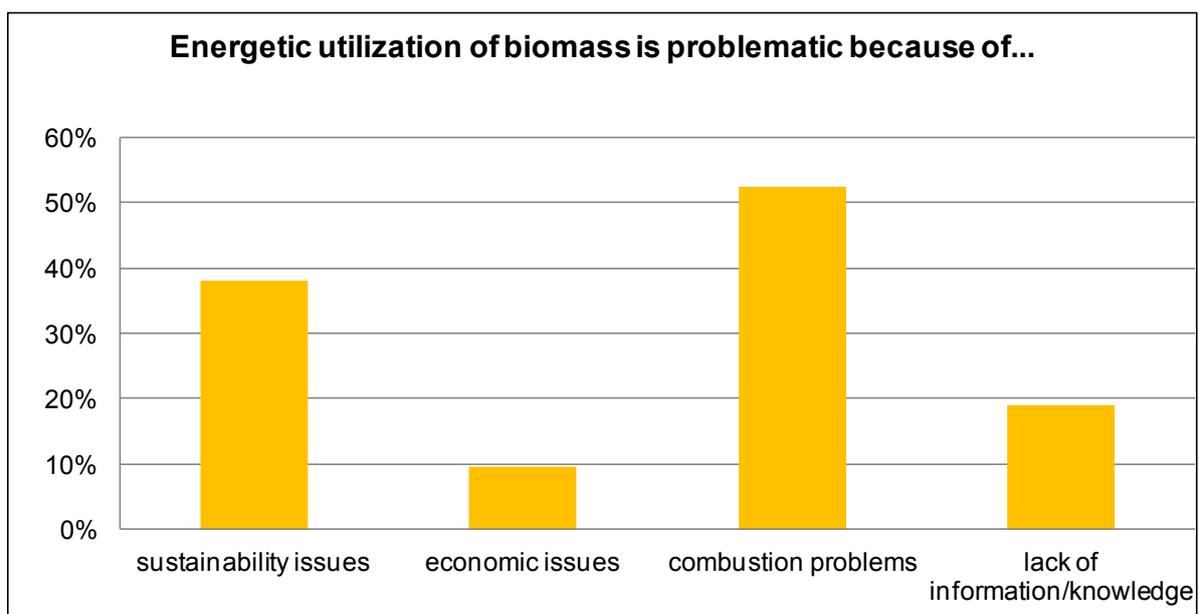


Figure 3: Raw materials which are suspected to cause problems during combustion  
Source: Interviews



Especially the high chlorine and ash contents of these types of biomass are responsible for the concerns. In addition there are concerns about the low energy efficiency of these raw materials.

## 4.2 Economic effects

The results of the questions concerning economic effects are presented in Figure 4. There is consensus about the importance of the regional value chain of alternative (mixed) pellets for the rural development. These alternative pellets are produced in and for the region. So the utilisation of these pellets plays an important role for job preservation in rural areas. Furthermore, the utilisation of biomass pellets is believed to contribute to a decrease on energy imports and to an equal distribution of energetic resources.

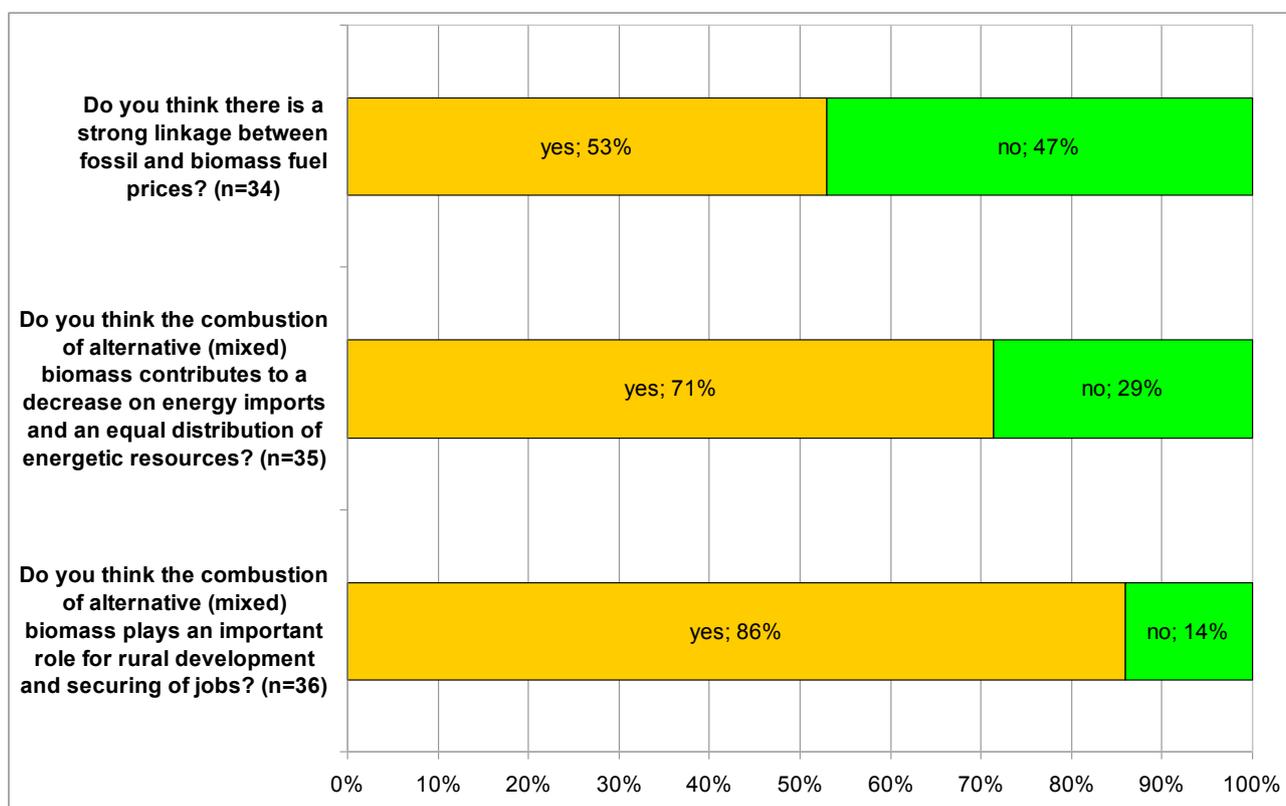


Figure 4: Economic effects of alternative biomass

Regarding the biomass prices people think that there is a linkage between fossil and biomass fuel prices. At least in Austria this linkage could be verified. According to the annual evaluation of combustion systems of the Austrian Chamber of Agriculture the installation of pellets combustion systems increases if the price of heating oil increases and vice versa.



## 5 Creating acceptance and future trend

Due to the fact that the acceptance of the energetic utilisation of biomass is still in some cases problematic, the experts in all partner regions agree that the acceptance for the combustion of alternative (mixed) biomass pellets can be increased

- by intensifying communication and dissemination activities,
- by improving technical systems such as combustion and precipitator technologies and fuels and
- others such as improved legal framework and provision of subsidies (Figure 5).

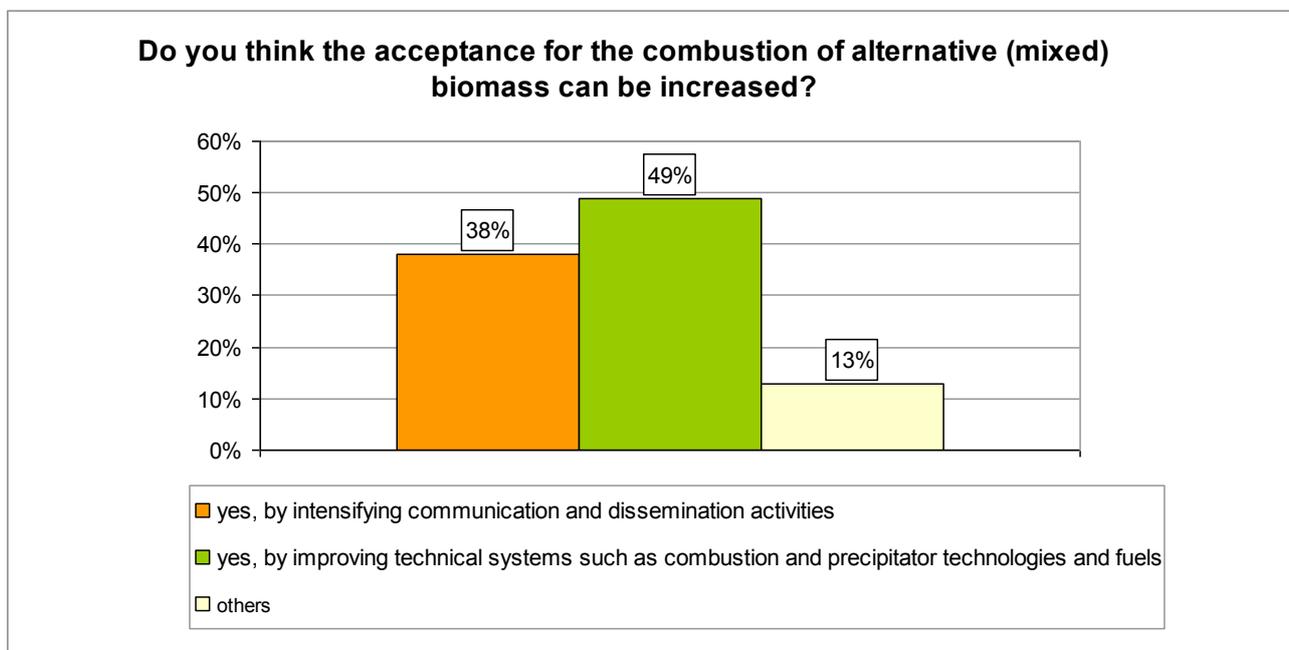


Figure 5: Measures to increase social acceptance

### Creating acceptance

An important instrument to create acceptance is the publication and dissemination of best practice examples. Furthermore, installation of demonstration plants and realisation of pilot projects could increase awareness for the alternative pellets. However, an adequate legal framework is essential for implementing case studies and demonstration plants.

At the level of technologies such as pellet heating systems a broader set of measures which improve and strengthen the whole system of bioenergy production, distribution and utilisation is necessary. This includes well defined regulatory measures such as quality or emission standards as well as build-up of a supply and distribution infrastructure in order to increase the fuel availability. Furthermore, the knowledge exchange



between the corresponding key actors should be improved. Besides marketing and information instruments investment costs or fuel costs of bioenergy installations should be reduced.

In this framework, the following actions could be useful:

- promote fair and balanced technical and general information;
- underline the relationship between the positive impacts of well planned and designed biomass plants and the local knowledge and employment;
- underline the technical possibility to control environmental effects of plants.

### Future trend

Concerns about the future competition between cultivation of alternative biomass, particularly energy crops, with food production only exist in Germany and Finland. There the majority of the interviewed stakeholders expressed their concerns in this field. In Germany the interviewed persons are worried about the negative impact of the cultivation of alternative biomass for energetic utilization on the future landscape development. Furthermore, they are afraid of a decrease in biodiversity. Therefore, these aspects should be taken into account when planning new alternative biomass projects.



## 6 Conclusion

- In order to increase the use of alternative biomass for energy production and to increase the social acceptance, the best way is to enhance the necessary technology and to publish “best practice examples” as well as to improve the knowledge transfer between key actors. Certainly the authorities are required to establish an appropriate legal framework to enable the implementation of best practice examples, as the interviews had shown.
- Regarding the biomass prices people think that there is a linkage between fossil and biomass fuel prices. At least in Austria this linkage could be verified.
- Regarding the overall acceptance of the energetic utilisation of alternative biomass it turned out that the most critical aspect is the confidence in and the availability of adequate combustion systems for the utilisation of alternative pellets. Also the availability as well as the sustainability of the raw materials induces concerns of producers and consumers.
- From the view of the end consumers the energetic utilisation of biomass is quite accepted, as long as they do not have to live near a big plant.
- The use of alternative biomass for combustion purpose is only rarely a subject of ethical debates.
- The conducted interviews show that the measures and activities within the MixBioPells project seem to be appropriate to increase the social acceptance of the energetic utilisation of alternative biomass. Taking further local measures seems not to be necessary, because the analysis showed that the energetic utilisation of economically meaningful biomasses is accepted.



# 7 Annex

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## List of ongoing and previous projects

## Questionnaire

## Investigation on previous and ongoing projects "Social acceptance"

Country code	Authors	Year	Original name of project	Name of project in English	Participants	Level
GER	Lenz V., Hartmann H., Gerth J.	2009	Feinstaubemissionen aus häuslichen Holzfeuerungen	Dust emissions from domestic wood combustion systems	DBFZ, TFZ, TUHH	National
AT	Eder, G.; Luisser, M.	2006	Energiekornmonitoring - Erforschung der technischen und wirtschaftlichen Möglichkeiten für die thermische Nutzung von Energiekorn und Strohpellets in Kleinfeuerungsanlagen im Praxisbetrieb	Investigation of technical and economic possibilities for thermal utilisation of energy grain and straw pellets in small scale combustion units (practical experiences)	ABC	National
AT	Eder, G.; Pointner, C.	2008	Energiepflanzenmonitoring des Landes Oberösterreich - Technische Grenzen bei der Verwendung von halmgutartigen Energieträgern in Biomassekleinfeuerungen	Technical limits at the utilisation of lignocellulosic biomass in small scale combustion units	ABC	National
GER	NACHHALTIGKEITSBEIRAT DER LANDESREGIERUNG	2008	Energie aus Biomasse: Potenziale und Empfehlungen für Baden-Württemberg	Energy from biomass: Recommendations for Baden-Württemberg	-	National
GER	Reinhardt G.	2005	Nachhaltige Biomassepotenziale in Baden-Württemberg	Sustainable biomass potential in Baden-Württemberg	IFEU, IUS	National
GER	C. Rösch	2007	Energie aus dem Grünland – eine nachhaltige Entwicklung?	Energy from grassland- a sustainable development?	Forschungszentrum Karlsruhe GmbH	National
GER	Bundesamt für Naturschutz (BfN) (Hrsg.)	2008	Where have all the flowers gone? Grünland im Umbruch	Where have all the flowers gone?	Bundesamt für Naturschutz (BfN)	National
GER	Vattenfall Europe New Energy GmbH (Hrsg.)	2011	Kriterien zur nachhaltigen Beschaffung holzartiger Biomasse für die Strom- und Wärmegegewinnung im Land Berlin	Criteria for a sustainable use of woody biomass for energy production in Berlin	IFEU	National
GER	Federal Environment Agency (Umweltbundesamt) (Hrsg.)	2008	Criteria for a Sustainable Use of Bioenergy on a Global Scale	Criteria for a Sustainable Use of Bioenergy on a Global Scale	IFEU, Heidelberg / FSC Arbeitsgruppe Deutschland, Freiburg	National
DK	Panoutsu, P., Nikolaisen, L., Rathbauer, J.	2003	Mulighederne for at nå målet på 45 MTOE energiforbrøder i EU i 2010	Options for achieving the target of 45 MTOE from Energy Cropping in the EU in 2010	CRES, DTI, BLT,	International
FI	Rouvinen, S., Ihalainen, T. & Matero, J.	2010	Pellettien tuotanto ja kotitalousmarkkinat Suomessa	Production of pellets and markets at the households in Finland	METLA	National
SWE	Berg M., Bubholz M., Forsberg M., Myringer Å., Palm O., Rönnbäck M., Tullin C.	2007	Förstudie - sammanställning och syntes av kunskap och erfarenheter om grödor från åker till energiproduktion	Pre-study – compilation and synthesis of knowledge about energy crops from cultivation to energy production	SP, JTI, Vattenfall, SLU	National
SWE	Paulrud S., Laitila T.	2007	Lantbrukarnas attityder till odling av energigrödor	Farmers' attitudes to energy crops	IVL, Örebro Universitet	National
SWE	Bubholz M., Forsberg M., Gunnarsson C., Rönnbäck M., Olsson J.	2009	Syntes av Värmeforsks forskningsprogram "Grödor från åker till energi"	Synthesis of Värmeforsks' research programme "Crops from field to energy"	Vattenfall, JTI, SP	National
SWE	Lundmark A., Björk L., Wakelin R., Lundmark B.	2008	Rapport Rörlfen	Report Canary Reed Grass	GME, Norut Teknologi	Regional
NL		2008	Create Acceptance	Create acceptance	ECN, CNR, Ecoinstitut Barcelona, IAE Toulouse, INE, IEO, MAKK, NCRC, OEKO-Institut E.V., SURF, ERC	International
	Rohracher, H.; Bogner, T.; Späth, P.; Faber, F.	s.a.	IMPROVING THE PUBLIC PERCEPTION OF BIOENERGY IN THE EU	IMPROVING THE PUBLIC PERCEPTION OF BIOENERGY IN THE EU		International

# Questionnaire



## Questions about social acceptance of the combustion of alternative (mixed) biomass pellets

**Alternative pellets/briquettes:** Every raw material apart from the chemical and combustion related properties of wood pellet according to prEN 14961-2 (June 2010) is relevant → excluding from 100 % woody biomass and mixtures.

pellets

**Mixed pellets/briquettes:** Mixtures of raw materials from Group 1, 2 or 3 according to the definition in prEN 14961 (woody biomass, herbaceous biomass, biomass from fruits).

### Contact member

Name:

Address:

Phone:

E-mail:

Webpage:

### 1. Background

How would you assess the overall acceptance of the energetic utilization of biomass?

- high or
- in some cases problematic, because \_\_\_\_\_ or
- problematic, because \_\_\_\_\_

Which raw materials can be problematic for combustion purposes?

- Energy crops (e.g. miscanthus, reed canary grass, cereals), because \_\_\_\_\_
- Residues from agriculture (e.g. straw, but also corn cobs), because \_\_\_\_\_
- Residues from landscape gardening (e.g. grass, hay), because \_\_\_\_\_
- Residues from the processing of olives or grapes (e.g. Olive press cake, Pomace of grapes), because \_\_\_\_\_
- Residues from processing of citrus fruits (e.g. the pressings from oranges), because \_\_\_\_\_
- Residues from the processing of other agricultural commodities (such as coffee and tobacco), because \_\_\_\_\_
- Others - please specify, \_\_\_\_\_

Do you think the acceptance for the combustion of alternative (mixed) biomass can be increased?

- no, because \_\_\_\_\_
- yes, by intensifying communication and dissemination activities or
- yes, by improving technical systems such as combustion and precipitator technologies and fuels or
- others, like \_\_\_\_\_

# Questionnaire



## 2. Cultivation

Do you expect negative influences of the cultivation of alternative biomass such as energy crops on the landscape and biodiversity?

- no, because \_\_\_\_\_ or  
 yes, because \_\_\_\_\_

Do you expect competitions between the cultivation of alternative biomass such as energy crops and food?

- no, because \_\_\_\_\_ or  
 yes, because \_\_\_\_\_

## 3. Combustion

Do you have any concerns about the safety and technical development of the available combustion systems for alternative (mixed) biofuels?

- no, because \_\_\_\_\_ or  
 yes, because \_\_\_\_\_

Do you have concerns about emissions from the combustion of alternative (mixed) biomass and possible effects on the human health?

- no, because \_\_\_\_\_ or  
 yes, on dust emissions  
 yes, on NO<sub>x</sub> emissions  
 yes, on SO<sub>2</sub> emissions  
 yes, on HCl emissions  
 yes, on noise emissions

## 4. Economic effects

Do you think the combustion of alternative (mixed) biomass plays an important role for rural development and securing of jobs?

- no, because \_\_\_\_\_ or  
 yes, because \_\_\_\_\_

Do you think the combustion of alternative (mixed) biomass contributes to a decrease on energy imports and an equal distribution of energetic resources?

- no, because \_\_\_\_\_ or  
 yes, because \_\_\_\_\_

Do you think there is a strong linkage between fossil and biomass fuel prices?

- no, because \_\_\_\_\_ or  
 yes, because \_\_\_\_\_

# Questionnaire



## 5. Others

Please make short prospects of further trends for social effects on the combustion of alternative (mixed) biomass fuels:

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**All data will be kept confidential and anonymous.**