

Decision-Making Factors for Agrowood Cultivation- A Qualitative Research for Brandenburg/Germany

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Abstract: Agrowood has increased in significance after German nuclear phase-out. The actual agrowood acreage is developing sluggishly despite its high bio-physical potential especially in Brandenburg.

We analyzed 34 qualitative interviews with agrowood producers and related actors in Brandenburg to identify constraints and incentives perceived as crucial for agrowood production. As expected, economic risk like insecure income plays a major hampering role. An outstanding negative factor is the market situation. Other restraints as availability of land, machines and capital were confirmed. Unexpectedly support programs and laws are not perceived inhibiting. As presumed, suitability for poor sites, diversification of income and resistance towards weather variations are in favor. Actors' assessment of the decisive factors differs depending on independent or contractually-bounded production: Cooperation contracts dismantle economic, trade and machinery related constraints, offer long-term income and increase creditworthiness. Thus contracts contribute to an expansion of acreage while counteracting strongly market development, fundamental for independent producers.

Keywords: Bioenergy, agrowood, decision-making factors, governance structures, farm level, Brandenburg, qualitative research

Introduction

Agrowood which in this research comprises agroforestry systems (AFS) and short rotation coppice (SRC) shows very particular characteristics concerning the production process. For agrowood as a relatively new land use option fast growing species with the ability of stump shooting, mostly poplar, willow and robinia, were cultivated on agricultural land. In agroforestry systems stripes of groves alternate with stripes of other agricultural uses while in short rotation coppice the trees stand in a compact way. One important advantage is the fact that agrowood is able to grow even under harsh conditions why Brandenburg is considered as particularly suitable (Murach et al. 2009). Brandenburg with its poor soils shows unfavorable agricultural conditions. This is not only due to the fact that 60% of arable land presents an index of land quality less than 30 (Murach 2007), but also because of the low average of annual precipitation of 555mm compared to the national average of 789mm (Deutscher Wetterdienst 2004).

The following aspects of the production are of particular importance and necessary to know when dealing with agrowood: Initial investments of 2500- 3500 €/ha (Stockmann et al. 2010) are necessary and the first cash flow can be expected after harvesting for the first time, 3-5 years later. Thus, revenues are received with a time delay and then irregular. As trees are a permanent crop a life cycle of 20 years is assumed. This implies a fixing of the acreage for such a long time inducing a loss of flexibility of planting decisions depending on price developments at crop markets. But even more important this means that normally only owned land can be taken for this crop

because lease contracts have a shorter duration. Furthermore specialized machines are needed for planting and harvesting and the marketing differs widely from traditional agricultural crops.

The significance of agroforestry systems and short rotation coppice has increased in the last years. One purpose, the generation of energy by using wood chips from those farming systems, is gaining the attention of political, industrial and social actors at the latest since the final decision of German government of nuclear phase out in June 2011. Furthermore agrowood can contribute to fulfill the EU climate targets from January 2008 that Germany strives for. The concrete aim targeted by all signed countries is to reduce their CO² emissions by 20% until 2020 with reference to the level of 1990 (Bundeszentrale für politische Bildung 2008). Additionally Germany has set an even more ambitious national target with the reduction of 40% of CO² emissions also until 2020 (Deutscher Bundestag 2012).

A first political step towards the promotion of agrowood was done by the amendment of the National Forest Act in 2010. Hereby a legal gap was filled which has been responsible for great uncertainty related to the status of land: Since then it is legally defined that the areas of agrowood cultivation remain agricultural land and will not become forest land as long as there is at least one harvest in a period of 20 years.

Not only the political level showed interest and has taken action for an expansion of the production of agrowood in Brandenburg: Also industrial enterprises have taken strategic decisions in favor of this wooden energy crop: Energy suppliers like Vattenfall and RWE, but also smaller companies like Choren (now Lignovis) have invested in different concepts all for achieving the common purpose to establish and develop this farming system successfully in the region.

As a result of the ongoing measures from both the political and the industrial level, Brandenburg leads amongst all German Federal States regarding the acreage of agrowood: 1854 ha in 2012 are proved which represents nearly 40% of the with a total of 5000ha (InVeKoS Brandenburg 2012). Higher agrowood numbers for Brandenburg are likely but not documented due to a lack of a complete data collection. Despite these good numbers, the current agrowood acreage differs a lot from its preferential sites for Brandenburg which range between 100.000 and 300.000 ha. This amount is based on pure biophysical characteristics: soil value numbers (under 35 for poplar and willow and under 23 for robinia) and the supply of water in the root zone of the groves between 0,5 and 2,5m depth either by groundwater or capillary rise. The outcome represents those areas where theoretically agrowood can be economically competitive in comparison with other crops. On at least 100.000 ha agrowood can be equal or even economically superior to alternative farming systems (Murach et al. 2008). The Brandenburg Ministry states in its Biomass Strategy that 10.000 ha of SRC and AFS are feasible until 2020 (Ministerium für Umwelt, Gesundheit und Verbraucherschutz des Landes Brandenburg 2010).

Consequently not only biophysical properties play a role for land use allocation but other aspects matter as well. Otherwise the huge discrepancy between the current acreage and the preferential sites respectively the outlook for 2020 obviously cannot be explained. Farmers actually show a reluctant behavior towards the cultivation of agrowood preferring other crops. Hence a qualitative investigation of the decision making processes of planting decisions of land users, mostly farmers is appropriate. It gives insights in the living situations of actors while taking planting decisions. By determining their perceptions influencing factors can be revealed, restraints and incentive structures identified and needs shown. Knowing about the perceived general conditions and the crucial factors is the key for firstly understanding the current prevailing attitude and secondly developing strategies to overcome them.

More than 30 guided interviews were conducted with agrowood producers and related actors such as service companies, energy suppliers/ contracts providers, scientists, authorities/ administration

and consultant facilities. All interviews were documented by taking notes and almost all were recorded additionally. One part was transcribed, others summarized and all were analyzed by the qualitative content analysis following Mayring 2008 and Schreier 2012 using MaxQDA software.

Results

Characteristics of Agrowood

There are no doubts about the ecological advantages of agrowood compared with intensive land uses like the production of corn or rye. Several studies prove the positive effects on biodiversity, soil, habitat function and water balance (see Nabu Bundesverband and Bosch & Partner GmbH 2012, BUND 2010, Strohm et al. 2012). But farmers perceive other factors as more important for planting decisions. As the data analysis shows it is favorable for land users to cultivate agrowood at locations with marginal agricultural yields which otherwise would lie fallow or would be used very extensively without any economic revenue. By growing agrowood the farmer earns at least a little money instead of having no income at all. Statements like: "I see it as one of the few possibilities to keep all these very poor sites usable for us in the long run." (S2, 88) verifies that agrowood is seen as a useful alternative land use option for poor soils where no food production is economically feasible. By this especially sandy soils are meant located far from the groundwater layers widespread in Brandenburg that until then always have constituted a problem for the farmer. Also small acreages located far away from the farm were named as potential agrowood areas due to its specific labor extensive cultivation practice (own data). Even special sites as post-mine landscape are worth considering agrowood cultivation (Bemmann 2012a).

At the farm level the inclusion of agrowood is also a business decision for income diversification. Agrowood can contribute to more income security as additional pillar for the farm. A wide range of crops makes farmers more independent from temporary price fluctuations of single products at the commodity market. As trees are permanent crops they can have a similar function for the farmers as the woodland ownership of farmers in the south of Germany, as one interviewee revealed: They can be used as a bank. The invested money can be withdrawn by a harvest when additional money is needed because the harvest time is somehow flexible within certain limits. It was significant that this comment was not made by a farmer (S6). The perception of farmers and actors from organizations or other companies differs in several interesting points.

This different assessment among the actor groups is also the case when dealing with agrowood in relation to the prognosticated climate change. Scientists emphasize the potential of agrowood as climate-friendly energy crop with a low carbon footprint (Bemmann 2012a) and the exceptional relationship between energy output and energy input of poplar SRC "free field" with 60:1 compared to other crops like corn (10-15:1) or rape seeds (7:1) (Bemmann 2012b, see also Strohm et al. 2012). A very well known and often quoted report of the Agricultural Policy Advisory Council of the German Federal Ministry for Food, Agriculture and Consumer Protection certifies wood chips used for heat production or fed into a combined heat and power plant the lowest CO₂ equivalent-abatement costs in comparison with other types of bioenergy (Wissenschaftlicher Beirat Agrarpolitik 2007).

However in most cases for farmers climate change related aspects are not decisive for their land use patterns. Extreme weather events already occurring in Brandenburg like long periods of drought in the early summer or heavy rainfalls that might be classified as effects of climate change are noticed by farmers. But in their perception they are not linked to the context of climate change but seen as single weather events that also have happened in the past.

In contrast interviewees mostly without own production assessed agrowood as a good choice for land use given the increased occurrence of extreme weather events. Annual crops have not these

abilities and are more endangered by such incidents resulting in partial or total failure of the harvest affecting severely the income of the farmer. This group of actors argues that the groves after having planted and having passed successfully the first one or two years are much more resistant to droughts and flooding. Practical experiences and experiments from the Eberswalde University of Applied Sciences (HNEE) confirm both (Murach et al. 2013).

Restraints for Agrowood

The present research started in autumn 2010. At that time only few studies had investigated the reasons for the slowly progressing expansion of agrowood in Germany or especially Brandenburg. In the meanwhile there have been some investigations at the national level starting at a similar initial question: Which restraints hinder the expansion of agrowood? (See Strohm et al. 2012, Neubert et al. 2013, Bemann 2012b) Contrary to others, this research is focused on the Federal State of Brandenburg as the agrowood- leading region throughout Germany and applies a qualitative approach in order to enable deep insights in decision-making processes, the complex reasoning and reveal the decision factors that cannot be considered in isolation because they are interlinked in many ways.

Recent studies concur in that the economic risk plays the major role for land user's reluctance towards agrowood. This means that uncertainties concerning the achievable yields prevail. Linked with the uncertainty about the prices obtainable at the market at the time of harvesting, normally two to five years after planting, no reliable predictions about the amount of income can be made. This problem is depending very strongly on the market situation. The difficulty to find buyers for the agrowood products has been mentioned by Setzer (2013) while Bemann (2012b) identifies the doubts of the farmers regarding secure long-term prices as constrain.

In the present research this assessment is shared but a large number of interdependencies exist between the different aspects. They all are related to the very young age of this land use at least when considering the recent developments and research activities in Germany since the early 1990's disregarding temporary activities in the 1970s after the oil crisis and before (Strohm et al. 2012). Both, the lack of experiences regarding price developments like they exist for several decades for traditional crops and the lack of practical experiences with this farming system have an inhibitory effect. Latter include nearly all steps of the production process like soil preparation, choice of varieties, planting, pest and disease control, irrigation, harvest, drying, storage and marketing. At all these stages mistakes can occur due to ignorance with far-reaching consequences up to the total failure of the plantation.

For the interviewed actors one of the most important constraints was not to know to whom they sell the product. One underlying problem already mentioned is the relatively long time lag between planting and harvesting. Additionally they had only little overview about the potential buyers in their region. Only regional marketing is economically reasonable because of the high transport costs compared to the value of the good due to its large volume. Market transparency is lacking because no directory of trade partners enables a targeted search for potential buyers. Also neither well-established intermediate trade nor a functioning sales platform exists where offer and demand are channeled. But potential producers would like and are advised by consultant facilities to know already at the time of planting to whom they will sell and at what price. Otherwise they are not able to perform a calculation. If this is not the case the economic insecurity considering the high initial investments necessary might pose too high a risk for the individual farmer.

Because of the lack of real experiences a lot of scientists examine the economic feasibility of agrowood with very different results: While one study confirms the economic competitiveness of agrowood compared to rye in Brandenburg (Grundmann and Eberts 2009), others conclude that

annual crops are still more efficient in most of the assumed scenarios. Latter is the case of the report from Johann Heinrich von Thünen- Institut (Strohm et al. 2012) where out of 648 different variation calculus only in 22% of the cases SRC achieves a greater profit than crop rotations. By doing an analysis of eleven calculations of profitability the study also states that only limited comparisons of these can be made due to differing methods, assumptions and reference systems (Strohm et al. 2012). These results are very confusing for farmers looking for reliable information (see Bemmann 2012b) what is consistent with the statements and the doubts of the interview partners that they have to handle contradictory information from experts and media (e.g. internet) concerning that key factor for their decision-making process.

Another important topic is the availability of land. Here the situation in Brandenburg is very special compared with the land-ownership issues in the south or the west of Germany. In 2010 in Brandenburg only 25.2% of the utilized agricultural area belonged to the farmer while 73.6% was leased land (Statistik Berlin Brandenburg 2012). Because of its long lifetime lease contracts with the same duration would be needed. Right after the German reunification the body in charge of the administration of the agricultural land in Brandenburg and the other New Federal States, the BVVG (Bodenverwertungs- und -verwaltungs GmbH), was giving almost exclusively 12 years lease contracts that could be prolonged at the end of the term for another 6 years. After their expiring in 2011 or later the BVVG is currently giving lease contracts for periods of five or six years (A2). At the private lease market differing durations of lease contracts are available often depending on the relationship between tenant and lessor. Some interviewees report from very short lease periods of only one or two years due to the very dynamic and strongly rising price level for land at the land market. But not only leased land is becoming more expensive but also owned land. As a result agrowood can actually only been grown on already existing land property. Only in one interview was reported that an agrarian company produces SRC at leased land without any safeguarding to complete the production cycle. In most of the cases the owned land poses the relatively best quality land a farmer has in consideration of the generally limited soil quality in Brandenburg. Usually this land is used intensively for the production of annual crops to ensure farmer's income and livelihood. Therefore farmers often have no other choice than taking small pieces of land at the edges or disadvantaged by a bad form, poor soils or moist but not large continuous areas for agrowood production. As a consequence at these sites it is even more difficult to have an economically competitive outcome taking into account also the effective economies of scale.

Also the availability of specialized machinery poses an obstacle. Here two different aspects are important. Both are reflected in high costs for the use of machinery: on the one hand machine development has not yet been solved in a satisfactory way in particularly regarding harvesters and here especially for the usage on small areas (Mühlhausen 2013). "Technology for small areas is not available- to be clear about that- that is...that is a problem." „Cost-effective harvesting technology is lacking for such small areas (R2, 75). Accordingly some actors recommend to harvest small SRC or AFC manually, a very work-intensive procedure (C3). The existing harvesters, mostly very large machinery, are too expensive to purchase for farmers. Thus they have to instruct a service company for their harvest that entails additional costs that can be significantly high depending on the transportation distance between the machine location and the place of action. Interviewees confirm that costs for machine transport in some cases, especially when dealing with small areas, exceed the costs for the machinery use itself. This is due to the fact that only a manageable number of companies for machine development are active in this field due to the lack of market potential for their developments. They are waiting for the expansion of agrowood acreage by the producers to increase their commitment while farmers are waiting for more cost-effective machinery. The hesitant behavior of both parties causes delays in the establishment of proper structures for the further development of agrowood. But some companies and research institutes are currently working on machine solutions for smaller areas at a reasonable price.

Another important obstacle is the high initial investment for farmers. According to Strohm et al. (2012) the costs for planting including all related working steps and costs for the cuttings until the planting itself are the highest cost factor. Interviewees calculate with 2000-3000 €/ha and agreed that farmers in Brandenburg mostly have an insufficient capital cover that does not allow them to make such large investments. The investment capacity may differ from the willingness to invest. Latter is relevant when a farmer or an agrarian company dispose of financial resources but do not want to invest because of a negative risk assessment. In the perception of some interviewed actors the costs are disproportionate to the risk so far. Both costs and risks are subject to changes when agrowood production develops further.

Ambivalent decision-making factors

Former studies about constraining factors show that the inadequate legal situation especially the variety and the doubted reliability of laws are responsible for the hesitating behavior of potential producers (Wirkner 2010; Bemann 2012b). As a result of my research it can be stated that at least for producers in Brandenburg the legal situation is not decisive for their decision-making process. Firstly they are very well informed about the legal requirements. Nearly everyone knows about the amendment of the National Forest Act in 2010 and assesses it as very helpful. The land will not become forest land, as until then, many people had feared due to the lack of a clear legal regulation (see Skodawessely and Pretzsch 2009). After the amendment was announced experts had expressed the hope that the agrowood acreage would increase suddenly as one of the supposed main restraints was solved. But this did not happen in the expected way, as the InVeKoS numbers for SRC in Brandenburg indicate (InVekoS Brandenburg 2012):

| Year | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|------------------------|------|------|------|------|------|------|
| Agrowood Acreage in ha | 10 | 119 | 688 | 1247 | 1620 | 1854 |

The current legal situation in Brandenburg was perceived by the interviewees mostly as clear, even as simple. “That is easy.” responded one producer when asked about the legal conditions of SRC (P5, 83). Only a few interviewees classified it as hindering but interestingly no one of the actual producers. Also regarding the number of relevant laws the results could contradict other studies because the interlocutors mentioned that they have to comply only with few laws- which is true.

When dealing with agrowood the call for support programs can quickly be heard as prerequisite for a positive decision by the farmer. This implies that high financial incentives for agrowood influence the decision-making of producers significantly. Whereas the interviewed key actors, the producers mainly farmers did not mention support programs as decisive: “I would have done it also if we wouldn’t have received any support because there is a concept behind.” (P5, 98). One representative of a service company got it to the point by saying about the promotional situation: „It isn’t really bad at all.“ (S6, 79). He and another colleague supposed that it is not just a matter of money but that other reasons have to exist why farmers do not adopt agrowood (S6, S2). In his opinion the obstacle of the initial investment was substantially reduced by the support program (S6). But even more, one stated that he does not want to receive any monetary incentives because the product itself convinces him enough: “I do not want any funding because we have such a super product that is so great, we only have to get the market.” (P5, 101). Another farmer said that he does not believe that an expansion of the agrowood acreage could be achieved by support programs (P3). Five interviewees, the majority of them farmers, assessed support programs in the agricultural sector even as critical and expressed their concerns about their incalculable or uncon-

trollable consequences e.g. the strong increase of the corn production after the introduction of the Renewable Energy Law (EEG) for biogas plants (P5, S6, P1, P3, P11).

Interestingly other interviewees, mainly non-producers, demanded better support programs for the cultivation of agrowood. Some of them argued that this would be one of the few options to convince farmers and to reach the critical mass of agrowood that would entail a structural change of the framework conditions for instance market and machine development resulting in decreasing production costs.

Another important finding regarding support programs was that three out of seven active producers of SRC at the time of conducting the interviews did not know about the promotion possibilities in Brandenburg which then were the best one at the national level: Within the framework of the EAFRD Regulation up to 45% of the planting costs were financed. This support program for the purpose of the promotion of individual enterprises, more specific for investments in diversification, demanded a minimum investment of 10.000 € and has just expired on 31th of December 2013 (Anonymus 2011). The shown lack of knowledge about the existing support schemes was also perceived by other actors as a statement from a scientist illustrates: “But not everyone knows about it, it should be better known.“ (R2, 120).

Agrowood production- but with which business model? Contractual vs. independent agrowood production

Once a person has taken the decision to grow agrowood he/she has to face the above described constraining factors at the levels of capital, land, economy, machinery and marketing. But within different business models (e.g. independent or contractual production, contracting) these factors were addressed in different ways. In the following the model of independent production and contractual production, more precisely cooperation agreements, are compared:

For the actually offered cooperation agreements by Vattenfall respectively its subsidiary Energy Crops a kind of standard model exists fixing the tasks and responsibilities of each party. Nevertheless each contract is finally individually negotiated between the producer, mostly farmers, and Energy Crops. Therefore there are many contract variations but here I will refer only to the standard model that is quite popular: The agreement shall be in force for a duration of 15 to 20 years. While the farmer/producer remains the land manager, Energy Crops assumes the costs of planting (including planting material), harvesting, transport and recultivation at the end of the contract period (if desired). The farmer is responsible for the soil preparation and the maintenance of the plantation supported by technical advice by Energy Crops. Vattenfall gets the raw material for its power plants. The model also known as “annual pension-model” ensures the farmers a guaranteed annual remuneration per hectare depending on the yield expectations and the transport distance, starting in the year of the planting. Furthermore the farmers have a share in case the yield expectations would be exceeded. In case of necessary follow-up plantings or replacement planting due to e.g. weather events or pest infestations Energy Crops also bears the expenses (Ehm 2013).

The interviewed farmers that are producing agrowood within this type of contract expressed their satisfaction with their experiences. In particular interviewees associated with the producers consider these contracts as one of the few options to achieve a significant expansion of agrowood acreage in Brandenburg and as great opportunity for farmers. The reasons for this are obvious: The majority of the mentioned obstacles from the point of view of the producers can be reduced or even removed. The initial investments and cultivation risks are covered by the energy supplier, knowledge transfer takes place and economic insecurities are lowered by a guaranteed annual income, harvesters are organized and paid by Energy Crops and the purchase is ensured. Another positive effect is the increase of the creditworthiness as mentioned by two interviewees (E1; P3). In 2012 in fact about 700ha, almost 40% of the 1854 ha agrowood in Brandenburg belongs to

Energy Crops's contracts. For 2013 a total of more than 1100 ha of contractual acreage is planned (Ehm 2013).

Although innovative business models are demanded for a further development of this energy crop (Bemmann 2012b) and Energy Crops's success surely cannot be denied, some actors assessed Vattenfall's activities critically while others refused them for moral reasons. Vattenfall respectively Energy Crops as global company is seen as a too powerful contracting partner and its position concerning the other energy related activities of the company especially related to regional projects in Brandenburg (e.g. lignite, CCS technology) is criticized.

These cooperation agreements have severe adverse effects: As the underdeveloped market is one of the main obstacles, perceived by both interviewees and experts, more traded agrowood is demanded for an expansion of the market and a stabilization of its structures. But the produced wooden biomass out of the contractual acreages is sold directly without entering the market. This impedes strongly a healthy market development fundamental for independent producers. So far latter have to assume all the described risks and marketing activities themselves without any guaranteed success or benefit. Because of the suboptimal conditions for independent producers, there are only few of them. Furthermore they have very different motivations and situations: from a part-time farmer with a small test plot to a farmer producing at large scale with an innovative utilization concept to a leading agribusiness in Europe with a strategic planning. As a consequence it must be stated that out of ten interviewed actual or future agrowood producers only three to four are producing for the commodity market of raw material e.g. wood chips, in contrast the others strive for direct sales or alternative utilizations e.g. own use or other use concepts.

Discussion and recommendations for action

All the actors interviewed in our study and also other experts agree that the expansion of agrowood production up to a minimum critical mass is crucial for a further increase of agrowood cultivation. Then, according to the statements, the further development is expected to progress all by itself. However, mostly no exact numbers are given for a critical mass. Bemmann (2012a) postulates a minimum of 50.000- 100.000 ha as critical mass necessary to establish an own "energy path" (p. 2) for wood from SRC. But a maximum of 10.000 ha until 2020 at the national level seems to be realistic (Bemmann 2012b) although the potential is 100.000 to 1 Mio ha for SRC for Germany as a whole (Bemmann 2012a). The official Biomass strategy for the State of Brandenburg assumes the same amount in the same period of time only for Brandenburg (Ministerium für Umwelt, Gesundheit und Verbraucherschutz des Landes Brandenburg 2010). It must be concluded that at the present growth rate none of these objectives can be attained in the medium or short term, unless the existing respectively perceived obstacles are addressed with adequate measures.

A measure demanded by many actors could be a financial support program, mostly desired for the production side, but also for the machine development. However, it should be noted that such a program primarily needs to address the real problems of actors, and only in second place for fitting into a given political framework. A national consistent regulation would help to reduce uncertainties and facilitate a better understanding of the support schemes. Also the high required minimum investment has an inhibiting effect and should be reconsidered. For 2014 there is a draft as part of the "Improvement of Agricultural Structure and Coastal Protection" (GAK) framework plan foreseeing a one-time financial support of up to 1200 €/ ha for SRC under certain conditions (e.g. minimum investment of 7500 €; maximum 10 ha per applicant) at the national level (Anonymus 2013).

As indicated one important problem of agrowood producers is the incompleteness of the market for agrowood products. Interviewees have divided views on whether a state intervention in

market development (e.g. support programs or market promotion) is desirable or not. Others favored financial support for the initial investments as actually included in the GAK framework. At least as important as the support objectives themselves is the fact that the potential agrowood producers should be informed about the existence and the details of the scheme. Also the administrative burdens for the applicants should be manageable, a point also criticized by some interviewees and experts (Strohm et al. 2012).

Knowledge transfer is not only important for the performance of support programs but also for a higher acceptance among possible producers entailing a wider distribution of agrowood in general. The lack of knowledge about nearly all production processes was also an important hindering factor for farmers. A lot of scientific knowledge is produced within funded research projects related to very diverse aspects of agrowood but the dissemination of this knowledge seems not to be working well. Besides scientific knowledge, practitioners particularly highly demand application-related knowledge. Because of the until now insufficient amount of acreage under real large-scale production conditions (e.g. big size, financial setting etc.) consolidated knowledge based on real experiences both cultivation-related and economic-related is missing. Appropriate demonstration projects are carried out (but again mostly by scientists) and platforms and facilities for knowledge transfer are established (e.g. SRC network “KUP-Netzwerk” and B³ counselling facility) to foster the knowledge exchange between scientists and practitioners. Exchanges within both levels are less institutionalized. Some interviewed farmers preferred the contact with other producers to get direct knowledge from their experiences. This need could be integrated in already existing farmer related structures (as e.g. farmer`s association). Alternatively, it could be also addresses by the establishment of future knowledge transfer structures.

In contrast to other renewable energy sources like solar and wind energy or biogas, agrowood gets much less attention at political and society level. This could be also a reason for the existing knowledge gap and surely contributes to the persisting niche existence of agrowood. The lack of lobby organizations promoting agrowood by intensive public relations work with substantial financial means is an important reason for this shortcoming. In the case of solar energy, wind energy and biogas powerful associations exist that represent their interests at the relevant political bodies and in public.

Different actor groups could lobby for agrowood: On the one hand more industrial enterprises (e.g. machine manufacturers) could give support by standing up for a better lobby. It seems that so far financial and political incentives are to low not only at the producer`s level but also at the industrial level. On the other hand and, perhaps, even more sustainable, producers and related actors can take the initiative to drive forward the building of necessary and until now lacking structures, such as interest groups, cooperations, networks of stakeholders and trading platforms. These have to be organized at a regional level, concerning the regional limitations of agrowood. Furthermore these structural innovations should take into consideration as many relevant stakeholders in the value chain as possible for a successful and efficient agrowood production and an increase in regional value added.

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