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## Background

The Fraunhofer Institute is a scientific institution of applied research with various experiences with material from landscape management and its energetic use. The institute gained this knowledge in the context of projects on state, federal and EU level and in direct customer order through, among other things, development, scientific studies and field tests.

*Best4VarioUse* A major project in this regard was the project Best4VarioUse where a German and a Spanish region were involved. The project did not aim to establish a particular method but examined a variety of processes in terms of their economic and environmental feasibility and reasonability. Generally in the course of the project, the biomass from landscape management was used in the view of the cascade utilization. This means material use as a priority and as alternative energy production. In addition to the material and energy use, it basically also possible to compost the biomass or leave it on site. During Best4VarioUse it has been worked on the utilization of residues from forestry, landscape maintenance and agriculture, while the options leaving the biomass on site and composting were reduced and the material or energy use supported.

## Policies, finance tools and legal regulations

*Feedstock* In the project Best4VarioUse the parties have not dealt specifically with regulations. However, for the work with the feedstock also during the project different legal regulations applied. On the one hand basic things like the weather and the seasons had to be taken into account during the harvest, as

well as various restrictions from the Forest Act or the Fire Protection Act. In addition there are usually infrastructural issues, starting from the track width, via loads of bridges, to the presence of barriers and drive on opportunities (soil protection). Also in the field of nature conservation several guidelines must be considered.

For 80% or more of the measures such regulations play a role. It may happen that not every owner of the areas necessarily has the knowledge of all applicable requirements. In Best4VarioUse it was however mostly worked with partners from the forestry sector, including forestry service providers, which had appropriate knowledge of the applicable regulations.

To determine the owner of landscaping material it must be differentiated between two points along the process chain. Before the operation the biomass either belongs to the owner of the area or to the user of the area (e.g. tenant). After the maintenance work, there are different ownership arrangements, which depend on the made contracts. In the project Best4VarioUse different scenarios occurred and hence different regulations. For instance the owner of the biomass could either be directly the owner of the land, or the implementation of the action was contractually regulated such that the material is then owned by the service provider, which then processed and sold it. A special form is the so called "Stockkauf" of the material. Here the land owner makes a contract with the power plant operator that the material to be harvested is purchased by the buyer while still "standing". The harvesting and processing is then done by the buyer, whom the material also belongs.

*Harvest and processing*

The legal basis at harvest generally depends on the area on which it takes place. There are different regulations to be taken into account, depending on whether the work is done on an outer edge of a forest, shrubs, roadside vegetation, protected areas, firebreaks, or (in the forest) the opening of an alleyway for forestry work is done.

Guidelines from e.g. regional development plans did not play a relevant role in the work of Best4VarioUse. The motivation for this project was purely economic and there were mainly operational tasks respectively obligations in focus.

*Transport and logistics*

The legal requirements for the transport of landscaping material depend on different situations of need. For instance there are guidelines, on the basis of which the material has either to be removed (e.g. firebreaks or roadside) or must be left in place (nutrient cycle). If it has to be transported away, the

disposal of the material is prescribed.

In addition, when transporting the material the Working Hours Act, the traffic regulations, permitted total weights, dimensions of vehicles, immission standards, security restrictions in the infrastructure (bridges, guardrails, bridge height, etc.), etc. must be respected. When it comes to planning, e.g. the allowed driving time in the working hours is very important, but also technical regulations as permissible gross weights and load securing.

### *Sale*

Contractual basis of the material sales is a so-called **contract of sale** between the material supplier and processor. Suppliers can either be the area user or a service provider or dealer, which in the sales contract agree on e.g. the type, quantity, quality and time of delivery of the material. **Service contracts** for the harvesting and processing of the material regulate the time of harvest, the technology to be used respectively the method specifications for harvesting and processing. In the case of the sale of the material by the area owner to a purchaser, the quality parameters of the customer play a role as well. Seller and buyer of the material agree on quality characteristics and frequently take as a basis the available standards (e.g. ÖNorm), respectively orientate themselves on their classification features.

In the project Best4VarioUse it was found that in many process chains the **requirements of the processors** (material or energy), which took the available standards as basis, **could not be met** due to many different reasons (moisture, impurities, chip size, etc.). Thus, the buyer then has the problem that the material first has to be processed before further using it (sieve, sort and/or mix) and then the overall process is no longer ecologically and economically reasonable. The seller, in turn, has the problem that the contract price for the offered material is not achieved and his expenses may not be covered.

**This discrepancy is not necessarily due to the material but rather the process chain.** Again and again, the material is processed directly at the harvesting area, some even with over- or undersized technique for the individual actions. Here the question arises how the chain can be (better) arranged so that the pre-processing (chipping) rather happens through the purchaser. He would then use technology that is fitting to his system. Experience has shown that changes in the planning of the process chain thus should definitely be considered. The commonly voiced objection that with that that transport would increase due to "empty units" is not quite accurate, as cargo quantities are legally limited (max. 40 t) and currently rather the problem of overloading of biomass transports subsists. Additionally, suitable compression methods

during loading can reduce the empty freight in an appropriate manner.

*Support*

The monetary support of energy from biomass through the Renewable Energies Act (EEG) was discussed at Best4VarioUse but not considered in detail. The interest of the project partners (economy) was to seek for ways to optimize economically independent of subsidies and to find for the material appropriate utilization pathways with the highest possible added value.

The promotion through programs and guidelines is currently strong (see FNR with the complete program), but what is actually fundamentally necessary in the field of development and establishing of supply chains cannot be found.

**Methods for processing are supported but there is too little done to remove the real barriers which arise in the development of the production chain from the beginning on.** On the contrary, there are even some programs that disagree with this.

However, there is a change in the support noticeable. The topic of the perception of the public and research regarding (regional and national) economic, environmental and social consequences of efforts to remove certain areas from utilization, are points at which in addition to technical and organizational aspects has to be worked at.

*Certification*

Regarding certification systems it is often noted that they measure their success simply on how many companies were certified and how known the logo is. They measure neither the economic, ecological and social effects nor any other achievements. Therefore, one should be very careful in this issue (see also section on public acceptance).

*Best practices*

When considering best practices in waste management or logistics of landscaping material it must be noted that there **are functioning methods which are not necessarily economically and/or ecologically**. Functioning processes are not always useful for all stakeholders involved, which is also related to the drafting of contracts, respectively the cooperation of the contract partners.

*Difficulties & barriers*

In addition to these infrastructural and technical obstacles, there is great tension in the ratio of effort and gained quantity, but also in the environmental aspects (energy balance). So much technical, personnel and time effort is put into the exploitation of the material, that it is necessary to raise the question of the ecological reasonability, in particular when the material has to be

transported over long distances.

Additionally, there is certainly a split between the technical utilization potential and the technically feasible potential. There are always potential studies on biomass and landscaping material originating from assumptions that are far away from practice. The technical utilization potential is defined as such that it starts from the processing, so what is available/can be processed with current technical methods. However, this does not include the question what is actually technically feasible. **The technical restrictions in the delivery chain are therefore not deducted.** This is a very large block, because of which it is mostly accounted with much higher potentials than there are actually technically available.

To change this situation, a rethink has to take place in many places. This does not necessarily requires a promotion of processing, thus of the energy use, or the development of processing techniques, because in this area already much promotion was done. **What were completely neglected were the support and the development of complete systems reaching beyond the process chain and the removing of barriers. Instead the development of special technology was promoted too much, which in this area is not a priority due to the frequent changes in operating conditions, the per part small amounts of material and the variability of the actions.** The best approach in these cases is to use universal technology, which if possible is based on technology that is used in other areas and which can be used flexibly for alongside measures such as landscape maintenance. **A complete business with landscaping material is unlikely; it is rather a lucrative additional business that can be economical.**

### *Solutions*

In the case of Best4VarioUse everyone could benefit, by recognizing where they actively can **initiate changes and make improvements in their processes, where the pitfalls are and how the communication in the process and with each other can be improved.** The key issues were therefore planning, coordination and cooperation, because it is not so that landscaping material is not usable or marketable, but the threshold limit for economic efficiency must be found and exceeded.

In part, solving the problem is prevented by the structure of companies, that is, by their size and thereby their investment power. Because of this, technological innovations, solutions to improve planning (IT) or investments in the technical development of universal technology can often not be done.

## Good governance & public support

*Support of biomass projects*

In many areas of economic or regional funding biomass projects were realized or promoted, particularly plant technology. It is critical that those who have been assigning funding have often not verified the long-term availability of the raw materials. **When a new plant is built, the real economic interest and concept should be manageable and not base primarily on financial support.** That a certain start-up funding is necessary is clear, but many new projects originate from false assumptions. To justify the termination of an unsuccessful project with the lack of public acceptance is the wrong approach. In the moment in which a project is implemented entrepreneurial, with an overall concept that needs no promotion, it also presents itself in a different way to the population.

There are two ways to support biomass projects. A region (municipality, country, etc.) announces funds with which the construction of plants is promoted. Once the description is published, those who like the idea come and build a new plant without having a long-term concept.

The other approach is that partners get together, have a common idea and are looking for a grant for one or the other part of the investment, by which they then turn to a funder with a certain question. This second way, but also how to build these business models and the sustainable supply of raw materials, is to be supported. Because it is one of the main sticking points, how long it can be assumed safely and under what conditions that the raw material for a plant is available and what alternatives exist.

In the project Best4VarioUse also the situation from the perspective of the suppliers and service providers was considered. These do not directly depend on the raw material, but they treat or process it and have to get a certain price. They will definitely not exploit and use the material if the whole process from harvesting, transporting and processing is at the end not cost-covering (minimum requirement). **Therefore, the interaction between suppliers and consumers, including service providers, is very important, so that always the entire business model must be considered.**

At last it has also to be noted that the area owner often has absolutely no pressure to harvest the landscape material and that he can let it continue to grow for a few years or simply cut it and leave it on site.

*Public support*

During the time of Best4VarioUse, whose focus was the sustainable production of raw materials, no resistance came from the population. This was different for another project in which only the issue of certification was looked at. In this case, opposing arguments of the population were quite massive. The German legislation is above average in terms of sustainability compared to other

European and world standards. Certification systems however, add a lot on top of the legal regulations and increase the requirements for land owners and users, but also to their service providers and processors.

Another point, which leads to discussions in the society, is the public use of nature. In Germany, the principle applies of maintaining the multifunctionality of e.g. forests (utilization, protection and recovery) during the management. The increasing demands on the recreational function lead to problems in the field of production of raw material and amongst others also in the preservation of the state of forests and forest protection (increasingly stringent requirement in the control of pests, which occur more frequently due to climatic changes). **In this area of the use of raw materials the public perception should be defined broader.**

**However, it should be taken care of not to focus the centre of public acceptance on bioenergy or the energetic use of biomass.** Rather ways should be sought in the general public to explain that **if the energy transition, biodiversity and the preservation of nature are to be achieved, renewable raw materials must be used.** The compatibility with a social use of the land must be given high attention. There is a growing problem that has been noted in several projects that cyclists, walkers, etc. do not worry about the harmful effects of their behaviour on nature. Especially on certified areas this kind of behaviour also shows no consideration for the performance of those who maintain and take care of the land.

The whole issue of landscape conservation and sustainable production of bio-resources will depend crucially on that in the public acceptance something is done; not only in individual projects, but that the overall context is clear. Deliberately it is accounted with in Germany that the availability of such woody biomass in the long term is not sufficient, because in the current energy policies (energy transition, etc.) increasing import of raw materials is assumed. That means, the demand to use less in the own country increases in the society, to protect nature, but simultaneously imports are accepted. In this field of tension where the energy transition, alternative raw materials and regionality are socially strongly desired but necessary measures in the own country are not accept, a different understanding exists, which must be addressed in public relations work.

## Messages

*Policies, finance tools and legal regulations*

- Regulations at harvest:
  - weather and season
  - Forestry Act
  - fire protection
  - Infrastructural issues (track width, loads of bridges, presence of guardrails, drive on opportunities (soil protection), etc.)
  - nature protection
  - regulations depending on area (forest, roadside, reserve, etc.)
  - etc.
  
- Owner of landscape material:
  - before the maintenance work → land owners or users of the surface (e.g tenant)
  - after the maintenance work → depending on contracts concluded
  
- Regulations during transport:
  - depending on requirements → material must be removed (as firebreaks or roadside) or be left on site (nutrient cycle)
  - working Hours Act
  - highway Code
  - total allowable weights
  - dimensions
  - immission
  - security restrictions in infrastructure
  - etc.
  
- Arrangements for sale:
  - contract between owners and potential service providers (service contract)
  - contract between buyer and seller (purchase agreement for material)
    - It was found that in many process chains the requirements of the processors could not be met due to many different reasons. This discrepancy is not necessarily due to the material but rather the process chain. Here the question arises how the chain can be (better) arranged so that the pre-processing (chipping) rather happens through the purchaser.
  
- Promotion:
  - Methods for processing are supported but there is too little done to remove the real barriers which arise in the development of the production chain from the beginning on.

### *Problems and solutions*

- Difficulties and obstacles:

- ecological reasonability should be given
  - split between technical utilization potential and technically feasible potential in the delivery chain (technically feasible exploitation)
  - support and development of complete systems reaching beyond the process chain and removing barriers was completely neglected
  - development of universal technology was not promoted enough
  - a business relying completely on landscape material is rarely advisable, it is always work done additionally
- Solutions:
- Actors need to learn :
    - where they can actively initiate changes in their processes
    - where they can improve
    - where pitfalls are
    - how communication in the process and with each other can be improved
 → core issues planning, coordination and cooperation
  - real economic interest and concept should be manageable and not base primarily on financial support
  - interaction between suppliers and consumers, including service providers, is very important, so that always the entire business model must be considered

### *Public acceptance*

- certification often misses its targets , effects are not detectable
- population does not perceives the efforts of the raw material production sectors (primary production, forestry) for the preservation and development of natural habitats
  - often resistance to corresponding measures and projects (perception as "nature destroyer ")
- field of tension in the population between desire of the energy transition, biodiversity, preservation of nature, the use of alternative raw materials and regionality and the therefore necessary measures
  - different understanding of the issue, which must be addressed in public relations work
  - in the area of the use of raw materials the public perception should be defined broader
  - do not focus the centre of public acceptance on bioenergy or the energetic use of biomass, rather search ways in the general public to explain that if the energy transition, biodiversity and the preservation of nature are to be achieved, renewable raw materials must be used
  - the compatibility with a social use of the land must be given high attention
  - economic, ecological and social effects of the use of regional biomass must be made measurable/ tangible/assessable

- The whole issue of landscape conservation and sustainable production of bio-resources will depend crucially on that in the public acceptance something is done; not only in individual projects, but that the overall context is clear