

[Firmenname]

Learning portfolio

Author: Sören Pollmann
Student number: 304106
Course: Bioenergy markets and policies

11.01.2019

Today was the second lecture in biomass markets and policies. Since we covered the organization of the course on the 10.01. the topic of today was an introduction to bioenergy. To understand the markets and policies behind it, we first had to understand what bioenergy was. We quickly found that bioenergy was the energy that is emitted when biomass is processed. This leads us to the definition of biomass, which we stated as “organic matter, that emits light and heat when burned”. Having these definitions, we would focus on the history of bioenergy. It started about six million years ago, when humans learned to use fire. The next step was the control of it to get heat which is said to have been about six thousand years ago. Finally, with the invention of trains, humans used fire to get power. This marks an important part in human history. In Germany the railway was one of the reasons why a war between two neighboring monarchies was won. Since wood only emits 15 Mj per kg and not all of it could be used in trains, the more efficient fuel was coal and even more so oil. Since the days of coal and oil usage, wood has begun to come back into the economy. Blas Molas reason for this is that the technology and efficiency of our wood use has increased, so that wood can compete with the other materials. This can be seen in the rapid increase in wood products and their durability, like buildings being constructed to a big part of wood. After this short history of bioenergy, we were given three assignments. First, we should make a list of biomass sources. These were:

- Agricultural products and byproducts like corn, rape, jatropha, straw
- Forestry products and byproducts like firewood, wood chips, pellets
- Biowaste and sewage
- Algae

The second assignment was a list of forest wood biomass sources. For example, stumps, roots, small diameter trees, wood chips, saw dust, black liquor. This exercise showed us, that there were many byproducts to trees, which all can be used differently. What we did not take into account was the availability of those materials. In Germany the roots and stumps are left in the forest, because the work is not worth the outcome of more biomass. There are many drawbacks to taking out whole trees, which were not mentioned. Of course, is it not part of the course to think about the economic results of this work, but it could be worth mentioning that there are drawbacks.

In the final assignment we had to construct supply chains. It turned out that these would vary greatly in complexity, depending on the product we focused on and the makeup of the scenario. The supply chain for boards could be very simple: A harvester cuts down the trees and loads them on a track, which takes them to a sawmill where they are cut up. The supply chain for pellets would be a lot more complex, because they are in general not a primary product, so the making involves more steps. In my opinion these supply chains, although necessary, make the logistics appear to simple, which is the reason they are just models. As Blas said in the lecture they vary greatly depending on the product, the region and the funding. Cutting up tree trunks into boards is a very common action in a sawmill, but a chipper might not be available.

14.01.2019

The topic for this lecture was bioenergy development. At first, we were asked for the reason of the development of bioenergy. I thought it was an environmental concern, but we would see the true reason behind it at the end of the lecture. After this Blas told us about the oil crises in the 1970s and 80s. To understand this, we had to look further back in history. In the year 1922 oil gets commercially used, till then it had been privately exploited. Many of the companies, which bought land to use the oil, became part of different countries economy in the 1960s. Many of these countries were in the middle east. These would form a block and ally with Syria and Egypt and therefore with the Soviet Union. In 1973 Syria and Egypt started invading Israel, which was an ally of the United States of America. These invasions were countered, and Israel managed to gain more territory than before. The allies of Syria and Egypt lowered or stopped their export of oil to western countries to weaken the USA. As a result, many western countries, who relied heavily on oil, had to quickly adapt, which caused the first oil crisis. About a decade later, in 1980, Persia and Iran joined the Soviet Union, after revolutions and riots. These political shifts caused panic in western countries, that were still very dependent on oil, which caused oil prices to rise again. Different countries reacted differently to these crises. Northern countries could adapt rather quickly, because their system of district heating just needed to change the fuel from oil to biomass. In countries like Germany these adaptations would take far longer, because the infrastructure was not built. For this reason, Germany used coal as a substitute for oil. In northern Europe the substitute was bioenergy, which is why in 1970 plantations were promoted. The only goal here was to produce as much biomass as possible. In 1980 it was commercially used and by 1990 the system around the usage of biomass for energy was working. This system collapsed in 2000, the reasons for this will be explained in future lectures. After this view on history Blas explained why the usage of biomass for heat is so important. Statistically about 50% of energy consumption comes from heat. The rest is mainly electricity and transportation. This is the reason, why many countries worked on the way they produced heat first. We concluded that the driving force behind the development of bioenergy was not a concern for the environment but for the economy. For me this makes sense, because those countries that try to fix their economy are usually willing to try many things and do them quickly. However the motivation behind the development of bioenergy has shifted towards the environmental side, which I think is a good thing.

15.01.2019

In the beginning of this lecture we summarized the last one. This helped to underline the causes of the oil price fluctuation from 1980 to 2010. We found out that the oil prices varied not because the countries that distribute the oil raised the prize, but because of panics caused by political changes. The Iraq war caused a raise in oil prices, because the countries that received oil feared another embargo. To summarize the conditions for the oil crisis were the nationalization and concentration of oil production, as well as a geopolitical turmoil. Some of the consequences were limited economic growth and the individual search for substitutes in each country. From here we started with the next topic “the roles of policy”.

To understand the role, we first had to understand the reasons for and against the support of bioenergy. Reasons to support bioenergy include better waste management, increased rural development and a decrease in local pollution. The use of bioenergy might cause local prices to increase, so that the economy in that area becomes weaker. It also requires more space than other renewable energy sources like windmills. Now that we understood the reasons, we focused on the mechanisms that a policy maker could use to support bioenergy. Some of these were subsidies, investment, taxation on other energy sources, social information or enforcement by law. The mechanisms can be placed at any point in any production chain. After we had an idea of the many ways in which bioenergy could be promoted, we thought about the consequences. A subsidization of bioenergy could lead to an increase in taxes, which would lead to less expenses by the population in other areas. After an increase in taxes on fossil fuels, there would be increased transportation costs which might lead to more expensive grocery products. The basic rule here is, that there will always be an unfair negative effect on some other industry or group.

This is problematic in my opinion, because the government would have to force the tax payer to pay more, which is never liked. The reasons in these cases are good, but another way might be to cut costs on some other end. Here lies another problem, because the consequences of these cuts can not be foreseen, so it might develop into a vicious cycle.

17.01.2019

Today's lecture was on the topic of "the role of policy". We started off with a summary of the last lecture. Before the last lecture I always thought that bioenergy was meant to be a substitute for fossil fuels, but Blas showed that there is no way to be completely independent of oil. Therefore, the policy makers should try to raise the percentage of bioenergy in the consumption of the countries as high as possible. Following this, we were introduced to the four types of policies which are used by governments.

- Distributive (example: public health)
- Redistributive (example: taxes)
- Regulative (example: certain amounts of bio fuel in gasoline from gas stations)
- Constitutive: (example: make up of parliament)

Now that we knew the policies, we defined two types of goods. First normal goods, for example bread, and second public goods, for example education. The difference between the two is, that the amount of normal goods changes if some are consumed. Public goods on the other hand are nonrival and nonexcludable, which means that everybody has access to them and they are not consumed in a literal sense. These goods are a trade between two parties, one produces it and the other consumes it in exchange for something, in many cases money. For example, a forest owner cuts down a tree and delivers it to a sawmill. The tree in this case would be a normal good. An example for a public good would be a park or botanical garden with no entrance fee. The reason for this is, that the number of visitors does not affect the size of the park and everybody can visit it. However, these are just models and they are missing an important part. In every production there are unfair effects on a third party, that is not involved in the trade.

These are called externalities and describe for example the pollution that occurs in the production process of furniture.

They might be unwanted but cannot be avoided and so they do not appear in the market price. Although, there are regulations for externalities like a special period in which tree cannot be cut down. On the topic of externalities Blas introduced us to the concept of a shadowprice. This describes the money that gets saved by choosing an alternative method, that can then be used to promote that method. As an example: In a specific area the pollution is very high. The local government has the option to cut down on every industry in that area, which would cost 100.000\$. The other method would be a reforestation in the area which would cost 50.000\$. Now the local government could use the rest of the money and give it to landowners that start planting trees. This concept is very difficult in calculation and the making of the prices.

Personally, I think the method is a good way to promote bioenergy or any environmental issue. But since it is a very complex system, it is understandable when it does not work to the full potential. This lecture has shown me again, that economics is much more complex than I thought.

18.01.2019

In the beginning of today's lecture we looked at different layers of policy. These were regional, national and European. Between those policies there can be tension, for example if the regional government wants to build a new power plant, which would be against European regulations for decreasing pollution. In cases like these the top layer will determine the outcome. In these layers there are three types of policies, that affect bioenergy. Environmental policies, such as regulations for biodiversity, can affect every part of the production chain of bioenergy. Agricultural policies, for example subsidies for energy crops, can have a big impact depending on the regions or countries dependence on energy crops. In Germany there are many landowners who grow corn for the production of bio gas. The effect of a shift in European agricultural policy on the bioenergy market would be much bigger than in Finland. The last type of policy regards energy, for example quotas or taxes. On the basis of this Blas quickly showed us a few changes in the policies of the EU. It comes down to three principles: environmental protection, secure energy supply and promote competition. More on this topic will be discussed in future lectures.

Following this we started learning the basics of the making of prices. The point where supply and demand meet determines the market size. This can be influenced by the policy maker by either increasing the supply via subsidies or decreasing the consumption by taxations. However, the costs that result from such a method must be paid by someone or the market will collapse. A market can be elastic, which means that supply and demand have a relatively similar incline. An example for such a market would be any kind of food, but not food as a whole. The reason for this is that food is necessary for human survival, which makes the market inelastic. This means that either supply or demand are very steep. Another example would be gasoline. In the case of inelastic markets taxes or subsidies become very high, which is the reason why gasoline prices are to 90% taxes. Due to this problem, the effects on one side can be extremely high if the other side is only mildly changed and vice versa. Policy makers can use two methods to influence the market. The first is increasing the supply, which can occur when research in the

field is subsidies and benefits the technology used. The second method is a decrease in demand, which could be the result of a public campaign.

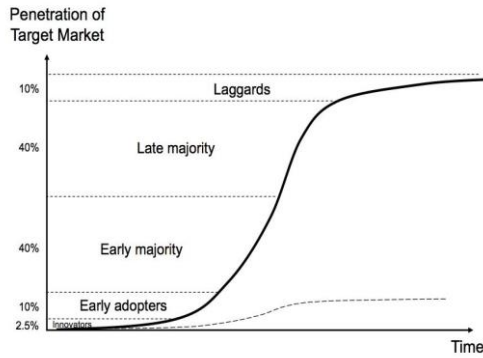
Now that we understood the basics of economics, we took a look at the energy policy in Sweden during and after the oil crisis. In the 1970s the subsidies of research on and the development of bioenergy were heavily increased, so that the market would become competitive enough in the 1980s. When this point was reached the subsidies were decreased and the taxation on oil was increased drastically. At the beginning of the 1990s the subsidies were low again and the taxation was high. It has been this way since then and these policies have worked.

To me this system seems to easy. There are probably many actions that must be made to reorganize the market in such a way and not bringing the market to a collapse. Every single step in that increases or decreases subsidies or taxes must be precisely planned and executed or else the whole plan will fail. Nevertheless, this process is very interesting and as long as it helped to cut back on the usage of fossil fuels it is a good example for ways to change the energy use of any country.

21.01.2019

Today we started a new topic that is adoption dynamics of bioenergy. As an introduction we focused on fast growing plantations, which were tested by a Finnish scientist in Sweden. This method involves 15.000 – 20.000 plants per hectare and a harvest every four years. This works due to the capability of some tree species to regrow, after they were cut when the root is still intact. That way you could harvest one of these plantations up to five times without the need to plant new trees. The history of fast growing plantations starts in the 1970s. During this time research was conducted and investments increased. This led to the first commercial plantations in the 1980s. After this went well, the government made plans to deregulate the market, so it can act freely. However, the market was still subsidized in the 1990s. These involved a subsidy of 1200 €/ha for non-cereal plantation and a subsidy of 1330 €/ha specifically for the plantation of willow. After Sweden joined the EU, the subsidies had to be lowered due to a directive. This directive forbids that any subsidy could be higher than 50% of the production costs. As a result, few new plantations were grown and the market stagnated, but is still intact. In Finland, where reed canary grass was grown on the plantations, the market collapsed due to the missing subsidies.

After this view on history, we were introduced to the dynamics of adoption. To start the adoption of something new by a market there must be two types of benefits for the producers. The first is used to compensate for the risk and the second to make it more profitable. An example could be a farmer, who has grown corn ever since he started the farm. To get him to change from corn to willow, first the risk of switching to something new has to be compensated. The risks involve longer periods between harvest, an unknown plant and an unclear future of the market. If all these have been calculated, the profit of willow and corn should be equal. At this point it is unlikely that the farmer will change the crop, because the two are equal and he/she is familiar with one of them. Now the second benefit has to be big enough, that it is worth the change. Of course the amount of money that is necessary to induce such a change is very subjective. These personal factors include the knowledge of the new crop of the farmer, the crops of neighbors and the overall courage of the farmer.

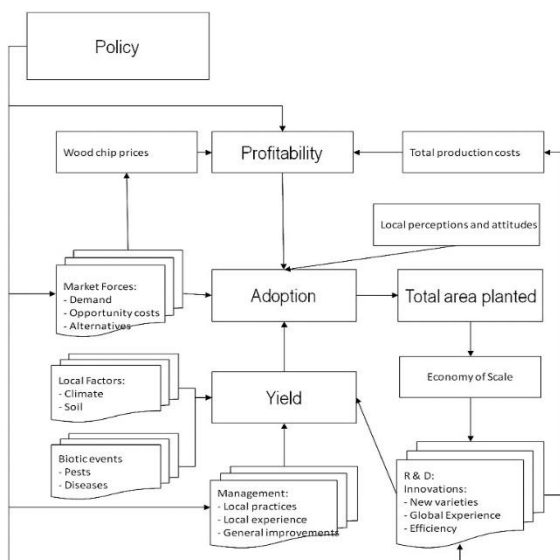


also adopt the new product.

This is the theory which describes the process of adoption. At first, when a new product is introduced, only a few people will adopt it. These so called “innovators” are high risk takers. It takes some time till the new product is adopted by the early adopters, which are less risk taking as the innovators. After this group was successful, the growth increases drastically until almost everybody has adopted the new product. The last group a the least risk taking and it takes a long time until they

From the events in Sweden we can learn an important lesson. The building of a market follows three steps:

1. advertisement, to make people more likely to adopt the new product
2. subsidies, to promote market growth
3. keeping this framework as constant as possible to allow the market to grow



If this framework is changed in major ways, the result can be a total market collapse. Changes to this framework have to be subtle to assure the continuing growth.

However the growth of a market is more complex as this image shows.

The circuit of adoption, total area planted, economy of scale, innovations and yield is automotive. This means the bigger the area is where energy crops are planted, the bigger the economy. This leads to more demand for innovations, which lead to bigger yield. When the annual yield or something similar is big enough, more people will adopt it, which again leads to a bigger area of plantations. If this the policy

maker can get this system to run, then it will lead to growth.

This lecture was very useful, because we learned that the model of the process of adoption is actually very close to reality. It is important to know how new products are adopted, so that you can choose the right measures at the right time and are able to make assumptions on growth. The second model is more useful in my opinion, because it shows the complexity of markets. This helps with understanding the effects of different factors. Also knowing about the automatic cycle is important, if a new product should be introduced and the growth must be promoted.

22.01.2019

This lecture was an introduction to EU policies. First of we were told that the EU does not have specific forestry policies. This means that every country could work with its forests differently. Only the European Forestry Institute defends the interests of forest owners. The EU has implemented the “common agricultural policy” or CAP for short, that should reach guarantee several goals:

- increase in productivity
- fair standard of living for the agricultural population
- guarantee of secure supply of food
- reasonable retail price for the consumer

These goals, while being necessary are also contradictory to each other. A reasonable price for the consumer would be the lowest possible, but a fair standard of living for the producer would most likely involve some price higher than the absolute minimum. To overcome this, the CAP has a budget, that is high enough to help stabilize the markets in Europe. This seems necessary to me, because it promotes changes. An example: Since governments usually have limited monetary resources they will usually invest them in projects that promote growth. These projects might not be beneficial to everyone, but they are important for the economy of the country itself. Given this scenario the government would not have the ability to achieve the optimal result and this is where the CAP budget is needed. Usage of some resources could be necessary to help kickstart a change in the market, so that it can be more effective and beneficial. Another point in this lecture were the difficulties surrounding the evaluation of biodiversity. This originated in the thought that for example forest owners usually only get money for the primary products of their land, which would be timber. There are however more benefits to woodland. It is commonly known that woodland improves water quality, stabilizes the ground and acts as a space where people can enjoy some leisure activities. From this foundation comes another problem. It arises when plantations are converted into woodland. Since water quality will improve after the change, but the products of the land will take longer to grow and therefore make profit, there needs to be some incentive to do so. This is another example of a shadowprice. The calculation of such a price can be done in two ways. First by using the price of fixing the problem otherwise. In the case of higher water quality, the price of a better filtering system for drinking water could be used. The money that was saved by converting a plantation into woodland which made a better filtration unnecessary could then be given to the landowner. The other way would be by taking the cost that is generated by unusable land. If there is an area that is not used for any purpose, it generates costs, which in turn could be avoided if the area would be replanted.

This usually is the case for Greenland next to roads, which could act as a sound barrier, if there would be some plants in high density. Another positive side effect of a conversion to woodland would be higher biodiversity. The price of this is even more difficult to evaluate, because the benefits of higher biodiversity can not be converted to a price. One way that is used in Germany is, that the farmers, who are usually hunters, are shown, that this will create better hunting opportunities. The farmer will then convert some small parts of his land, that are not very profitable if cultivated with cereal, to woodland, to increase the density of game on his land. In my opinion this is a good way to work around the problem, because everybody benefits from it. Also the evaluation of biodiversity is too complex and individual, so it can not be done efficiently on a big scale.

24.01.2019

In this lecture we took part in a game, that was designed to give us an idea on how markets work. For this we sat in rows and the first and last were given a specific role. The first row was representing biomass producers, the last took on the role of biomass plants. Every person in between was part of the logistic chain. The students of the first row were given cards that represent biomass. They each had a certain amount given to them that they would have to sell for a certain price to make profit. The biomass plants had to reach a certain amount to make profit and the logistic chain was supposed to transport as much as possible. We were given three minutes and started the game. After the first try we analyzed the situation and tried to deal make the market work more effectively by introducing some policy measures. We repeated this three times. Each time we would choose another method. In the end none of our tries was successful.

This showed us, that the difficult part of policy making is not the concept but the actual actions of the participants. An example of this could be a very good and detailed plan to promote fast growing plantations. If some parts of the logistic chain refuse to transport the produced woodchips for personal reasons, such as not liking the producer, the system will ultimately fail. This adds another layer of complexity to policy making, because you not only have to find the best solution without testing it, but also have to take into account that people might not operate rationally.

25.01.2019

Today we started the topic of international markets. In the beginning Blas made clear that there is not a big market for biofuels compared to the number of products. The only biofuel that is internationally traded is wood pellets. As we have seen earlier, pellets reduce the needed space, which gives the product a higher energy density per cubic meter, which in turn makes it more compatible with the energy market. A problem that this product has, is the difference between producers. The quality of wood pellets is highly influenced by the contents within. A high percentage of bark or nonwooden substances, will lead to a lower energy output and will affect the incinerator.

The pellets should also be as uniform as possible, because they act like a liquid. As an example for this action we looked at a truck that was delivering pellets to a private household. This truck looked like any other that would transport liquid fuels.

This is important, because the change from fossil fuels to pellets would not involve special transportation vehicles. Looking at the markets it becomes clear that in northern Europe domestic use is rather small and industrial use is relatively big. In central Europe the opposite is the case. This might be a reason why finish pellet heaters are not as technically advanced as for example those produced in Austria. In Finland everything can or has to be done manually, where as in Austria the whole system can be automated. When we looked at the production of different countries and their consumption, we noticed a difference between Sweden and Finland. Although both of them are some of the biggest bioenergy producers, the finish consumption of wood pellets is rather low compared to Sweden, which was the biggest consumer. Other central European countries like Germany had a much higher consumption than Finland.

A possible explanation could be, that pellet production is mostly domestic in Sweden, where as finish pellets are mostly made on large scale industrial production. Another important fact about pellet markets is that they do not react to prices as a market usually would. That is because of their resource is usually a byproduct of other markets revolving around timber. This means that high pellet prices do not lead to an increase in production, because pellet production is not the goal of many forest owners, which means that there will not be an increase in materials that can be used for pellet production.

This poses a problem in my opinion. The consumption of wood pellets is very high in Germany. If the prices for wood pellets do not react the same way, which means that the production will not increase if the prices do. In this case the demand for pellets, which in many cases are the only form of heating, will not be met by the industry. Since heating is necessary for survival in some cases the pellets have to come from somewhere else. This “somewhere” is usually eastern Europe or North America. Every origin poses a problem. Firstly, it is generally more difficult to impose production standards on products from other countries. Secondly, if biofuels are imported using fossil fuels, it defeats the point of using bioenergy in the first place, because the emissions will be roughly the same and only the emitter changes. A solution to this problem could be the production of wood pellets directly from timber, but this would cause more problems than it fixes. This would not only go against cascade use of wood, which is the best option to make wood more efficient, but also limit any other market of wooden products. Meaning that an increase in pellet production, would result in a decrease in wood chip or furniture production, which would again have negative consequences on other markets. If the other markets should not be influenced, then the annual logging would have to increase, which then could damage the environment and might not be economically reasonable.

28.01.2019

Today's lecture was the first guest lecture on international bioenergy politics, specifically on EU policies and Nordic bioenergy markets. First was a repetition on externalities, which can be both negative, like any form of pollution, and positive, for example improved water quality. To deal with this there are different kinds of policies like taxes or incentives. Prior to the modern system of ETS, a carbon tax was used to evaluate pollution. However, the carbon tax puts small producers at a disadvantage, because it is relative to emissions. This means that a big factory, that can produce a lot of product but also emits a lot of carbon dioxide, will make more profit relative to the carbon tax, because the production is cheaper.

For this reason the EU has launched the “emissions trading system” or ETS. It uses the same quota for everybody, which promotes growth. Additional to this the United Nations have released the Kyoto protocol, which is a nonbinding contract between developed countries, and the CDM, which is for developing countries. In the Kyoto protocol the developed countries agreed on terms to reduce their effects on climate change. To further clarify the goals, the EU has launched the 20/20/20 project. This aims to reduce emissions by 20%, increase the percentage of renewable energies in the mix to 20% and increase energy efficiency by 20%. These goals should all be reached by 2020, while promoting new entries to diversify sources and markets.

This seems to me like the right step, because changes are most effective when every country participates. However, there still is a catch. The countries that fail to reach the goals by 2020 do not have to fear drastic consequences, which makes the goals not a priority in their plans. In hindsight this contract should have been formed earlier and with stronger enforcement. The problem with this is, that it would have been done in a better way if it would have been possible. Often governments refuse to take action in reducing emissions, because they fear it might give them a disadvantage to other countries, that are using their resources to promote growth. It is easy to critique a project like this for its ineffectiveness. What is easily overlooked is the fact that many different governments got together and agreed on terms that all of them deem fair.

29.01.2019

This lecture focused on supply chains. In theory they have up to three parts upstream, midstream and downstream. The upstream is the source of the product. Every characteristic has an effect on the product. In the midstream the product is converted into usable form and the downstream is the final use. It is important to note that these positions can change depending on the product. If we look at the production of furniture from wood, the timber would be the upstream. The midstream would most likely not exist, due to the fact that the timber can be used directly to make furniture. For pellets it would be different, because the making of furniture produces sawdust as a byproduct. This could be the upstream of the pellet production and the downstream would be the conversion into pellets. Learning this showed me that even supply chains can vary greatly. Although it is easily understandable there can get very complex when dealing with multiple products.

31.01.2019

The next guest lecture was on the translation of EU bioenergy policies. First, we were introduced to some concepts and terms. One of them was “boundary effects” which sums up all fields that are affected by EU policies, for example legislation, economy and technology. Another was the concept of “roughing up the surface” which is used to describe the action of making supply chains public and understandable.

The reason for this can be a conflict between a public group and the forest sector. By helping people to understand the reasons behind the actions they do not like, it is possible to increase the acceptance of said action. After this we focused on EU policies, which have some characteristics that we took a closer look at. The problem of EU politics is that they have to be similar but adjustable for every nation or region. Which leads to a few different styles of governance.

There are coercive policies, which are the same for every government without any adjustments. Then there are voluntary policies, which can be done. Some policies are based on topics so that the outcome of two different countries is different but can still be compared. Lastly there are translated or mutated policies, which have been subjected to the most adjustment. These different types of governance are used for different purposes and different urgencies.

If the goal is vague and the way to achieve it does not really matter, then a translated policy would be favorable, because they are more likely to be done. Following this, we learned about the factors that can effect regional governance. Those can be socio economic for example average wealth of the population, local structures or the availability of some resource in the area. Another factor can be the initiative actors and their goals, concepts and translation of the policy. Lastly the reaction of the population can play a major role.

There are a few examples for this from Germany. There was a project to build a biogas plant in Bavaria to reduce carbon emissions. This plan ultimately failed, because local groups convinced the population that it would have negative effects. They in turn wanted to use fossil gas, which in the end succeeded. The effect of the initiative actors can be seen when comparing nonprofit organizations with private NGOs. Here it is very obvious that the outcome of the project will be very different, due to the fact that the NGO has to worry about keeping their staff employed and paid, which means that they will most likely not pursue the path of best environmental effect, but of most profit.

01.02.2019

This guest lecture touched on the topic of the effects different parties have on each other. First it was made clear, that taxes have the same effect on markets regardless of the payer. This was followed by a repetition of policy measures that can be used to influence certain markets. After this we were set in groups to discuss systems which would work in this way. Our example was pellet production. The process is regulated by regional government and other market participants. Also the production of the resources needed are regulated and controlled by certain institutions, who follow their specific goal. This goal however, has to be inline with the rules of the regional government. Which itself has to follow plans of the government of the country, which is given directives by the EU. This quickly showed us, how complex these systems actually are.

It is important to know, that the regional government can not do anything that would be against EU directive, but the EU is not effected by the regional government. This lecture helped us to understand how complex and sometimes unpredictable these systems are. In my opinion it is good that the regional government or even the producers have to follow at least some of the EU regulations. This will probably help to make the union more homogenous in its markets, which intern would benefit the international European markets.

Pellets for example could be internationally traded with relative ease, since they would all be produced by the same or similar standards. Another positive effect could be that experts from different countries can interact more easily, benefiting the overall productivity and effectiveness of their respective field.

04.02.2019

This guest lecture focused on the topic of governance. In the beginning we got information about different descriptions of governance. A typical way to show the complexity is a picture of a traffic roundabout. This comes down to the fact, that everybody in this system has a starting point and a goal. To reach that goal they have to follow certain rules and work along side others to keep the system running. Projected on governance, this means that there have to be certain boundaries that limit the actions of policy makers. The most important one is the social acceptance. If a new measure is introduced, that is not accepted by the population it will not work and might result in conflict. This also works the other way around. If a group of people has a high influence they can affect the methods and plans made by governments. For this reason, local NGOs often connect to bigger national or international NGOs to gain more influence. This also helps them with building a better network of people and organizations that can help them with future projects. When the social acceptance of a policy is too low it will lead to conflict. There are three types of conflicts, that depend on the intensity of the actions of the population. A restrained conflict consists of open critique, debates and articles. When courts get involved or people start to protest an open conflict develops. If these protests result in violence, the conflict becomes violent. Following this we were set out in groups to discuss local conflicts in our home country. Some examples were the food vs fuel debate or debates about game population densities between forest owners and hunters. After the discussion we had an opportunity to give our opinion on the necessity of conflict. Most of us thought that conflicts are necessary.

For me, conflicts are one of the best ways to make any method the most beneficial. If every party involved has stated their goal and the result is a compromise of all of them, then that would be the best solution. In my opinion understanding conflicts is very important. Although they are not as complex as economic systems, they do pose a threat to causes that would be beneficial. In Germany the production of timber is usually not well received by the public. This is partly due to the fact that many people live in bigger cities and come to parks or forests to relax. For these people trees are necessary for their well being and something special, which is why they do not want them to be cut down. This anxiety of losing the place that they like spending time in is increased through environmental groups. These groups describe machines like harvesters as unnecessary, polluting and damaging to the forest soil. As a forest owner it is very important in my opinion that these arguments are met with an objective description of the actual work that is done.

For example, the benefits of a harvester are for one a higher productivity but more importantly a significant decrease in work related injuries. Using open communication in this conflict would in my mind affect the public opinion positively. Even if it may not resolve the conflict completely.

05.02.2019

Today's guest lecture was on the topic of future trends in bio energy. In recent years there have been major changes in energy politics, which lead to the growth of natural gas and renewable energies. However, this growth has been modest, because oil prices have been decreasing for years. A few other reasons for the slow growth of bioenergy can be the uncertain future policies and the production costs, that have roughly stayed the same.

These developments have not been forecasted in this way. This led us to the concept of foresight. Some methods include forecasting, backcasting, literature reviews and expert interviews. The focus in foresight must be on four perspectives inside, outside, backwards and forwards. Which means that one must understand the sector by itself and the effects of other sectors. Additionally, the past developments and future chances are important. After a discussion on the future trends we came up with a few predictions. The technical development has the chance to solve most of the energy related problems we are facing today. Also, the "rise of Asia" must be taken into account for reasonable predictions. In the future the bioenergy sector will not become much stronger, according to predictions. This change could be made by increasing efficiency and public opinion.

To me predictions should not be taken too seriously, because the future can be unpredictable. The oil crisis for example, could not have been forecasted and it could happen again which would help the bioenergy sector. Another point is that these forecasts heavily influence the actual change. If the predictions say that a certain market will not grow, then fewer people will invest, thus keeping the growth low. These predictions do have a good use, because they can be used by policy makers to adjust their methods. In this case I think they can be very helpful and will make the process of for example creating a free market more effective.

06.02.2019

Today's guest lecture was about willow plantations in Sweden. As an introduction the making of costs was repeated. One way to lower the costs is to decrease the expected risk. This can be done by increasing knowledge, introducing new technology or using subsidies. To understand this further, we had to define "risk", which is the difference between expected income and real income. The risk can be further decreased if farmers have many different plants in their portfolio, which helps them if one of those would have a bad harvest. A problem with new technologies is, that the risk is higher if something is introduced to a small market. Other ways to lower the costs include lower transportation cost or greater yield. When comparing these two it is important to know, that lower transportation costs are more important and effective. The reason for this is that a higher yield leads to greater costs per hectare, because the additional resources have to be transported. Another factor of costs is the cereal price. If the cereal price increases, the opportunity cost of land increases. This means that the farmer would make more money than before when he would grow cereal. As a result the costs of willow production increase as well. What is also important is the soil quality, which affects the yield and therefore the expected production. The yield can be increased using fertilizers, but this poses another source of costs. Another way would be to apply waste water. This does not only lead to higher yields, but also saves the water company 80-90% of the treatment cost.

In my mind this is the most beneficial use of fast growing plantations. The goal should not be to compete with cereal for land, but to save costs by applying more environmentally friendly solutions. If the plantations would have to compete with plants that provide food, they will ultimately lose, because food is more important than a way to produce wood chips. This is also the reason why the most fertile soils, at least in Germany, are normally used for agriculture. As said before the true potential lies in cost reduction of for example waste water treatment while also making profit in the form of wood chips, which can be used locally. In this way the fast growing plantations would have a great effect on the energy mix and the overall efficiency.

Overall

This lecture has taught me many different things.

1. The different types of policies methods: For example subsidies, incentives and taxes. Understanding these and their effects is in my mind very important as a foundation for any further studies on policies.
2. The history of bioenergy: This is important, because we can figure out why the markets today are the way they are. It is also a good way to learn about the effects of different factors on markets. For example the public opinion on a matter has a big impact on its success, which has nothing to do with its actual effectiveness or it being beneficial in some way.
3. The practical approaches: It is important, in my opinion, to learn about the actual events that happen to understand the use. One example is the waste water treatment of willow plantations, which saves costs and benefits the environment. This knowledge and concept alike are very important in the coming years to raise the percentage of bioenergy in the energy mix.
4. The complexity: One of the most important facts to keep in mind in discussions about markets is the difficulty of finding the right methods. In this lecture I have seen how very slight differences can have a big impact on the results. Also, the fact that a market does not function alone, meaning that there is always some effect on uninvolved parties, is important to know.

As conclusion I would say that this lecture will benefit me in my upcoming studies and life in the forestry sector.