Interreg North-West Europe THREE C

European Regional Development Fund

NEWS

December 2021

Succesful Excursion to Baden Baden

Despite all the pandemic-related circumstances, a two-day meeting of the THREE C project could finally take place.

On 18 and 19 November, more than 40 people met for an excursion in Baden-Baden. In addition to the direct project partners, many participants of the THREE C professional development course started in autumn also joined the event. After the numerous elements of the so-called "integrated biomass and carbon management - IBCM" had already been presented in the purely virtual course format, the participants participants from six north west EU countries were now able to get a first-hand impression of some of the cornerstones of the IBCM:

- **the city's green waste processing facility**
- **the pyrolysis plant**
- **a PFC-contaminated agricultural area on which miscanthus is grown**

green waste processing facility

As a THREE C expert, Bernhard Schäfer, the former managing director of the City of Baden-Baden's own environmental technology company, together with Thomas Seiter, the responsible department head, led the excursion participants on the first day of the event to the main operational branches of the city's integrated biomass concept.

Participants are impressed by the heat that the biomass generates.

First they went to the municipal green waste processing facility, where the delivered green waste is first pre-sorted into the fractions woody biomass, grass/leaves and earth-blended biomass. The woody biomass (branches, twigs, etc.) is shredded and then sieved. The fines go into the composting process together with the soil biomass. The screened woodchips are used as solid fuel in combined heat and power plants.
The "soft" biomass grass and leaves are either

A mobile device for separating the different biomass fractions.

Thomas Seiter presents the green waste site to the group. In the background, newly delivered green waste is being chopped.

chopped up and ensiled or go to composting together with the soil-amended biomass, depending on requirements. The externally produced compost is then sold at the green waste processing facility to small customers or horticultural businesses.
In addition to green cuttings, the city of Baden-Baden collects and processes large amounts of biowaste from households and accommodation facilities (hotels, guesthouses, old people's homes, etc.), which is processed separately at the municipal wastewater treatment plant:
The biowaste is coarsely shredded, mixed with water and dewatered after removal of the impurities.
The energy-rich pressed juice is converted into biogas in the sewage treatment plant's digestion towers, which in turn is used in combined heat and power plants to produce electricity and heat.
The press cake produced during dewatering is dried and can be used either as solid fuel or to

Woodchips are separated according to their size.

One of the tallest participants stands next to the field and makes it clear where the nickname "elephant grass" comes from.

produce biochar. The washing process removes significant amounts of minerals such as chlorine, potassium, nitrogen, etc. from the press cake that interfere with thermal treatment.

miscanthus field

Another point of interest visited during the excursion was a field where miscanthus, the so-called "elephant grass", is cultivated.

The problem: The field is located in the glacial valley of the Rhine and actually has very fertile soil. However, in the past, industrial residues from paper production and sewage sludge were applied to an area of over 1000 hectares, contaminating the soil with harmful PFCs (polyfluorinated chemicals). Since then, these fields can no longer be used for agriculture. With the cultivation of Miscanthus and the development of innovative value chains, it is now being investigated whether use is now possible again after all.

As a so-called C4 plant, *Miscanthus x giganteus* is characterised by a particularly fast and water-saving metabolism. It converts a lot of CO_2 from the air and accordingly produces a lot of biomass that can be harvested every year. For this reason, miscanthus is already being used more frequently for energy production. In this case, the otherwise very controversial competition with food production due to the PFC contamination of the fields is not up for discussion anyway.

The trial field is being used to investigate how heavily the miscanthus biomass is contaminated and to what extent it can be used or may be used at all.

An interesting variant is the carbonisation of the miscanthus to activated biochar. This activated carbon could then also be used to purify the polluted groundwater, as the groundwater is used for sprinkling and thus also re-contaminates originally unpolluted areas.

A close-up of the cut Miscanthus stem.

the pyrolysis plant

The pyrolysis of residual biomass is a core element of new and sustainable value chains in the sense of the Circular Carbon Economy.
The THREE C excursion to Baden-Baden therefore also included a visit to the first large-scale pyrolysis plant of its kind, which is also located on the grounds of the sewage treatment plant.
Installed as part of the predecessor project RE-DIRECT, the pyrolysis plant was actually intended to produce activated carbon for the 4th purification stage of the wastewater treatment plant. However, direct activation by steam does not yet work as desired with this pilot plant.
Nevertheless, these large pyrolysis plants are in great demand. Especially due to the large CO_2 storage potential and a possible remuneration for this CO_2 sequestration, the demand for them is increasing. The interest of the excursion participants was correspondingly high.
The high demand was also confirmed by Helmut Gerber, founder of the company PYREG, which built this pilot plant. He also came to Baden-Baden for this part of the THREE C excursion to present the exact functioning of this plant to the participants.
This type of plant is characterised above all by its continuous process. Unlike "batch" processes such as the well-known Kontiki process, the biomass is continuously fed into the reactor. At the other end, the finished, quenched biochar comes out continuously. This process is therefore particularly attractive for large, industrial scales.

Helmut Gerber from PYREG explains how the pyrolysis plant works.

Various applications are currently being investigated in Baden-Baden for the biochar produced there, such as in viticulture, soil improvement, building materials, etc. In addition, further attempts are to be made to optimise the activation of the biochar.

Work groups & the THREE C Net

Inspired by the impressions of the excursion, the participants went on to discuss in the plenary. Four working groups were formed (thematically divided into: agriculture, CO_2 certification & economy, biochar quality and municipal processes) which dealt with the question:

What does the community need? What should and what can THREE C do for us?

Industrial scale: the biochar is filled directly into "big packs".

The reactor of the pyrolysis plant. The pyrolysis material is fed through from left to right and quenched at the end.

On Thursday afternoon, intensive discussions in four working groups went on.

Final plenary in the Baden-Baden town hall. The city welcomed the excursion participants and also gave a presentation about the city as part of the "Great Spa Towns of Europe".

The conversations also continued through the informal programme points of the event, such as the dinner at Mount Merkur and the presentation by the city of Baden-Baden about their new title as UNESCO World Heritage Site.

After the numerous online events over the last 1.5 years, the value of this real event for THREE C has now been impressively proven. There is a great need for interregional exchange on the topic of circular economy based on biochar!
The findings of this meeting thus offer the project partners valuable starting points for the growing THREE C Net - the next steps are being planned.
A second round of the THREE C "Professional Development" course is also planned for 2022. The event will again take place in a hybrid format of virtual offerings and real meetings. The course will start in May 2022. Further information will be available from the beginning of 2022 via the project website www.threec.eu, on the project's LinkedIn page and via the email newsletter.

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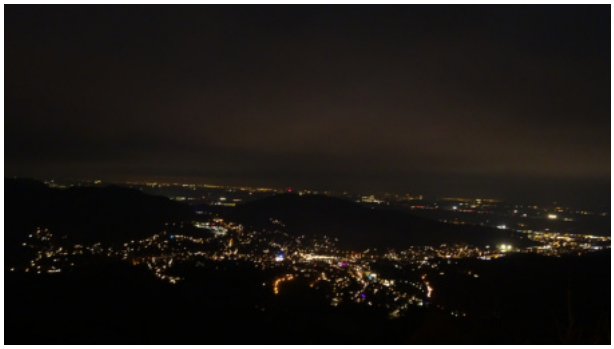
The venue: a hotel in the typical architectural style of the city.



Dinner with a view - Baden-Baden by night from the top of the Mount Merkur.