The Future of Energy in Fuchstal

Efficiency increase in regional power and heat networks through a whole-system approach and energy storage

A whole-system approach and energy storage are important approaches to the reduction of CO_2 emissions. A whole-system approach describes the integration and networking of the power, heat and transport segments, which until now have largely been considered separately. In this way, potential energy can be used better. But how does this work in practice? Can this also be achieved in an idyllic rural community?

The Fuchstal municipality in the Landsberg am Lech district is taking up this challenge. Together with the bifa Umweltinstitut and the consultants, Ingenieurbüro Sing, it started an ambitious implementation project. With photovoltaic systems, a hydropower plant, four modern wind turbines, a biogas plant and an innovative district heating network, which will be expanded, Fuchstal offers the best preconditions for this. Several levers are applied in a coordinated way:
Waste biogas CHP heat, which cannot be fully used in the summer, is routed to a central seasonal heat store. It is then available to supply heat during the cold season.
Equally, surplus electricity from the wind turbines is either used to generate heat or charges a battery storage system. This in turn provides the opportunity of providing balancing power or heat pumps in buildings, which are not integrated in the district heating network.
The operation of all components is coordinated using intelligent control technology. Direct sale of the heat and electricity generated locally by regenerative means increases regional added value.
With this project, the project partners want to demonstrate how cross-sector energy management can be implemented with large benefits for residents. Overall, the project approach is making a large contribution to the turn of energy policies and climate protection. The three-year project is being funded by the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit) on the basis of a resolution passed by the federal parliament, the German Bundestag.

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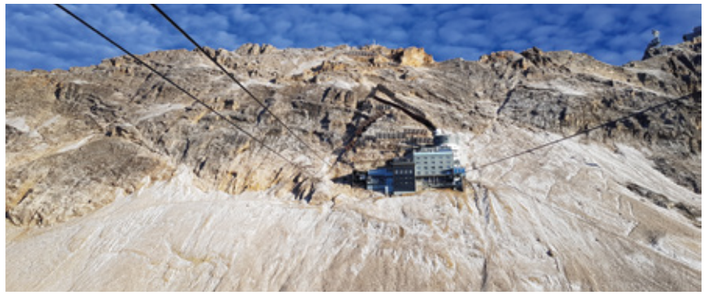
Alpine data analysis centre

bifa assists in setting up an alpine environmental data analysis centre

The high-altitude alpine research stations in Italy, France, Slovenia, Switzerland, Austria and Germany have begun to consolidate their research activities in the form of the virtual "Alpine data analysis centre" (AlpEnDAC). The Norwegian ALOMAR observatory and Georgian Abastumani Astrophysical Observatory are associated participants.



Based on the existing data analysis centre of the environmental research station Schneefernerhaus (Umweltforschungsstation Schneefernerhaus - UFS), a new information architecture will be developed to support climate change investigations in the Alps: The AlpEnDAC is being set up by the German remote sensing data centre of the DLR, the Leibniz data processing centre (LRZ), the University of Augsburg and the UFS as well as bifa in a specialised work-sharing cooperation.
The data of the research stations is merged in the AlpEnDAC. The collection, management, analysis, use and publication of research data are supported by infrastructure especially developed for this purpose. For example, the AlpEnDAC offers the following services:

> Simple data exchange between participating scientists
> Access to global satellite data by linking to the World Data Centre for Remote Sensing of the Atmosphere (WDC-RSAT)
> Access to computation-intensive computer models for applications in near realtime at the LRZ
> Prospects of access to a large number of instruments for the researchers
> The interested public can upload its own data (e.g. from private weather stations) or download public data

This enables more precise statements about the consequences of climate change, especially in the Bavarian alpine region. The forecasts help political and economic decision-makers to coordinate their actions in fields such as tourism, water management, georisks and health issues. Development of the AlpEnDAC is due for completion in 2021.

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4.2018

European Eco-Solar Factory project completed

Three-year project funded by the EU Commission ended

In the project the manufacturing processes and products along the entire added-value chain, from the production of silicon mono-crystals to sawing the wafers, the production of solar cells and modules through to the recycling of by-products and modules, were optimised to consume the lowest possible energy and resources and to save costs.

Working in close cooperation with ten international project partners: Sintef Materials and Chemistry (coordinator, Norway), Norsun AS (Norway), UAB Soli Tek R&D (Lithuania), International Solar Energy Research Center Konstanz (Germany), Apollon Solar (France), Garbo Srl (Italy), Boukje.com Consulting BV (Netherlands), Asociacion de Investigacion Metalurgica del Noroeste (Spain), >>

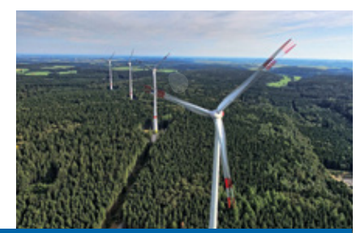
Dear Readers, Dear Partners and Customers of bifa,

The approaching end of the year is cause for most of us to stop for a moment and reflect on the past year. I don't know what you think, but I have very ambivalent feelings.
We experienced the second hottest summer on record with possibly the lowest rainfall since weather records began in our country. The human population is growing even faster than forecast 10 years ago. The carbon dioxide concentration in the atmosphere continues to rise unchecked, just like the consumption of worldwide resources. Yet according to the Federal Environmental Agency, only one fifth of our population considers environmental protection to be one of the most important problems we currently face. The risks are also perceived very differently. 74 % consider plastic waste in the oceans to be the greatest environmental risk, while only 55 % rank climate change first and 34 % the scarcity of resources. Nonetheless, anxiety about the future is a poor guide.
Christmas is an ideal time to reflect and to think about what each one of us can do as individuals to contribute to sustainable development.
Ever since bifa was founded, we have worked on new climate and environmentally compatible technologies and have achieved important successes.
Finally, I would like to thank you for the many interesting tasks you have set us and which we were allowed to work on on your behalf. Equally, our employees, without whose committed work this would not have been possible. We look forward to continuing this in the new year and wish you a contemplative Christmas period and all the best for the New Year.

W. Rommel

Yours, Wolfgang Rommel

Also in this issue:



>> Steuler Solar Technology AS (Norway) and Inesea Automation SL (Spain), the respective environmental effects of the individual process steps were examined at the bifa Umweltinstitut. For comparison, the status of the production of so-called standard modules was examined in a life cycle and eco-efficiency analysis at the start of the project, at the project half-time and at the end of the project.

Many of the project objectives were fully achieved, and some were even exceeded:

> Recycling of argon in the melting furnace for the silicon
> Development of reusable moulds for the silicon crystallisation
> Recycling of saw particles
> Recirculation of the water used in solar cell production
> Reducing silver consumption in solar cell production
> Development of new frameless and glass-glass solar modules, dispensing with encapsulation materials made of plastic
> Simplification of recycling and
> Possibility of repairing solar cells (cell doctor) and modules

The argon recycling system has already been introduced successfully in production; repeated use of the ceramics was successfully demonstrated in the laboratory. New solar cell types allow far fewer quantities of silver to be used, whereby the consumption of ultra-pure water in cell production was successfully reduced. The dispensing with aluminium frames and encapsulation materials was demonstrated successfully; small quantities of polymers are still needed to fix the solar cells in the module, for edge sealing and for the junction box. The targeted saving of silicon through further reduction of the sawing wire thicknesses and the changeover to even thinner wafers is expected in the near future.
Furthermore, working in close cooperation with its partners, bifa is examining the recycling of by-products and waste such as quartz from the crucibles and moulds for decorative applications such as gabions, graphite from the furnace, the recycling and recovery routes of the

Crucible shards made of fused silica for decorative purposes using the example of a bench for employees of bifa Umweltinstitut.

solar cells, the glass and the complete modules. To this end, new chemical recipes for cleaning the solar cells and the glass were developed and methods for separating the modules by means of cutting and flashing light technology were tested.
Eco-Solar Factory was a three-year project with a budget of 5.64 million euros, which was fully implemented through the Horizon 2020 research and innovation programme of the European Union under the project ID 679692.

More at: http://ecosolar.eu.com

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Demonstrating the Zwickauer turn of energy policies (ZED)

"Marienthaler forum" – for the development of a sustainable district

In the ongoing ZED project in which bifa Umweltinstitut is involved, not only technologies for environmentally friendly and energy-saving living are being researched. In addition, in the Zwickau district of Marienthal, new ways of public participation are also being used to match the targeted technological innovations to the skills and interests of potential users.

The Federal Ministries of Economic Affairs and Energy and of Education and Research are funding the ZED project with around 16 mln. euros. The intention is to use these funds to establish a lighthouse for the demonstration of a socially compatible turn of energy policies in Marienthal. The turn of energy policies not only consists of technical innovations; framework conditions are also to be examined in the project: What effects do the changes have on the population? Where do they see advantages? What are their misgivings? It is these aspects that are being

discussed with the persons affected.
To this end, the "Marienthaler Forum" for sustainable district development will be founded in the coming months. Numerous discussions with stakeholders in politics and administration, industry and civil society have already been held in advance. These stakeholders – whether the building control department, the environmental agency, economic development, parish or senior citizens' representatives, whether businesses or initiatives such as "Fackelzauber" (magical torch procession) and "Wir im Quartier" (we in the district) – they have all assured that they will support the forum. The forum is conceived as a common place for all interested Marienthal residents to meet. It will be a place for the development of measures for a sustainable and socially fair district. To achieve this, new formats of communication and development of ideas will be used, with which the focus will be on areas for action such as "mobility", "local economy" or "living and living environment". Methodologically, action groups for senior citizens, young families or start-ups are planned, but there will also be exhibitions, residents' cafés and special design thinking workshops.

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Interfering and foreign substance content in the biowaste of the AZV Augsburg

Investigation of the interfering and foreign substance content during the course of the year

Biowaste is the oldest waste fraction of the human race and yet we have still not solved all the problems it brings. In previous years, motivated by political impetus and requirements to increase the separate collection rates, efforts were made to significantly increase biowaste collection quantities on the municipal level. The efforts focussed on the waste stream from the biobin – so-called biomaterial – not only in the Augsburg region, but also throughout Germany.

However, with increasing quantities of waste, contamination was also found to increase. In other areas in Germany, for example, alarming foreign substance levels of over 10 % were discussed in some cases. Against the background of an increasingly stringent legal framework regarding foreign substance levels in compost, Augsburg's special purpose association for waste (Abfallzweckverband – AZV) had the biowaste collected via the biobin and recovered by AVA GmbH examined for interfering and foreign substance levels.
In a large-scale sorting campaign over a period of a year, AVA GmbH took samples from different deliveries from the AZV area and these samples were analysed in the bifa Umweltinstitut's technical centre. The examination of the foreign substance levels was based on the sorting catalogue of the Federal Compost Quality Association (Bundesgütegemeinschaft Kompost – BGK), to enable comparability with other investigations, some of which were undertaken at the same time in other areas of Germany. During the analysis period, a total of 40 collections from previously specifically determined collection areas of the special purpose waste association were sampled. Two samples were taken from each collection, so that the total number of samples was 80 and the sampled quantity of biowaste was 410 tonnes. From the results it can

be stated that the actual level of foreign substance content is significantly better than initially expected. Assumptions that waste separation functions less well in a catchment area that is more urban than in a rural area were not confirmed. However, it was found that foreign substances such as hygiene products (especially nappies) and plastics (especially dustbin liners) as well as textiles, account for a significant fraction of the foreign substances for all members of the AZV Augsburg.

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Green City of the Future

Planning strategies for handling the pressures caused by limited available space and climate adaptation

The "Green city of the future – climate-resilient districts in a growing city", sponsored by the Federal Research Ministry (Bundesforschungsministerium), is a joint project of four research institutions and the planning and environmental departments of the Bavarian state capital Munich. The project partners met on 6 November 2018 for the kick-off meeting in Munich's Oskar-von-Miller forum.

Especially in rapidly growing cities such as Munich, the increasing demand for residential and commercial space competes with green and open spaces, which are absolutely necessary for climate-resilient urban development. Therefore – despite increasing pressure on residential space – the functions of green structures should be secured and strengthened for climate orientation. The bifa Umweltinstitut is working together with its project partners on the development and implementation of integrative solutions, in order to minimise conflicting objectives and to point out synergies. In addition to balancing climate regulation through green infrastructure and energy efficiency, participative methods are also used. The latter are used to analyse increasing demand for residential space on the one hand and on the other hand, different requirements (access, accessibility and quality of green spaces) of the interest groups in the districts of Munich considered in this project. In this way the issue of the compatibility of space required for green infrastructure and residential space can also be answered from a planning and social science perspective, with the objective of developing joint solutions.

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