

FACT SHEETS

FOR TECHNOLOGY SITE VISITS

12th INTERNATIONAL CIRCULAR ECONOMY WEEK

25th - 29th OCTOBER 2021

ENVIRONMENTAL CAMPUS BIRKENFELD



PREAMBLE

VIDE ET CREDE

Technology Site Visits [TSVs] you are about to embark on is a unique feature of the International Circular Economy Week [ICEW] that distinguishes it from any other contemporary event of its kind. With the firm belief; '*seeing is believing*', IfaS has annually organized TSVs for our guests at the ICEW since 2010 with the principal objective of providing firsthand experience of the German energy transition, or better known as the '*Energiewende*', and its sustainable technology portfolio. Evolved over the years and with the popular demand by our international guests, we have included more and more Green Technologies and Sustainable Environmental Solutions to the TSVs portfolio providing a unique experience.

Meticulously planned TSVs of the ICEW include;

- ▶ Zero Emission Technologies for energy efficiency, renewable energy generation, water, wastewater and waste management

- ▶ Renewable Energy integrated energy landscapes
- ▶ Sustainable technology solutions for Integrated Water Resource Management
- ▶ Integrated infrastructure for efficient resource management
- ▶ State-of-the-art technologies for solid waste management and waste-to-energy

The document you are holding presents a brief introduction to the technologies, some snippets and useful web-links for further information on the TSVs.

We hope that you will make use of this truly very unique opportunity and enjoy the visits. We'd be very pleased to hear your suggestions and feedback as well. Please feel free to drop us an email at: e.hubig@umwelt-campus.com

Europe's First Zero Emission Campus

BIRKENFELD

A UNIQUE PLACE ON EARTH

Inaugurated in 1996, the Environmental Campus Birkenfeld [ECB] is part of the Trier University of Applied Sciences that offers interdisciplinary higher education in the fields of; a.) Environmental Planning & Technology, and b.) Environmental Business Management & Law. Home for more than 2700 students specializing in environmental education, ECB is designed as an incubator and a demonstration site for environmental technologies and innovations. ECB's eco-compatible building stock complemented by its sustainable utilities has helped achieve 'Zero Emission Campus' and 'Germany's #1 Green Campus' status.

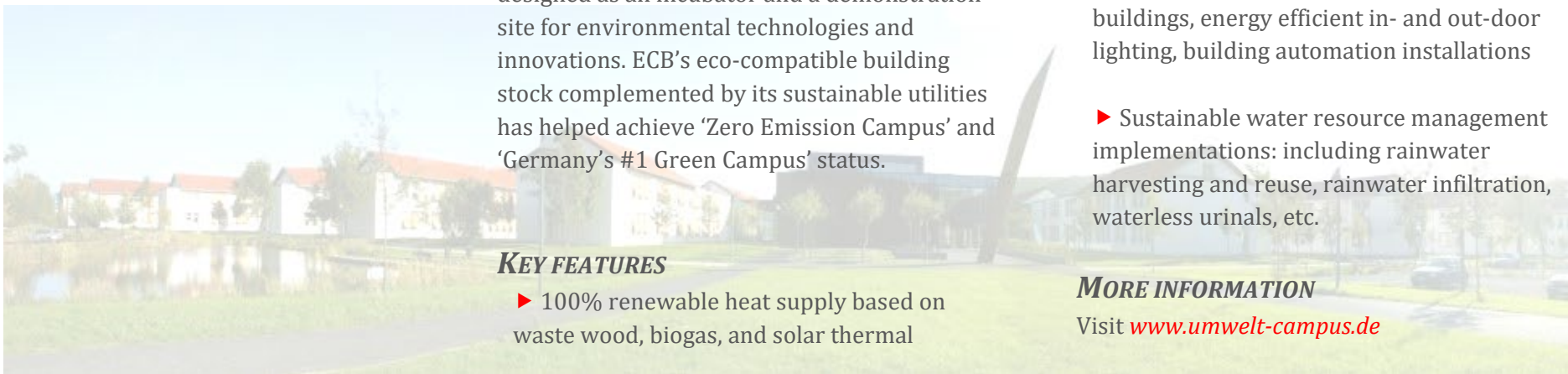
KEY FEATURES

- ▶ 100% renewable heat supply based on waste wood, biogas, and solar thermal

- ▶ 100% renewable electricity supply based on biomass and PV [includes; 492 kWp roof- and façade mounted PV covering up to 40% of the electricity demand]
- ▶ 100% renewable cooling based on geothermal, solar adsorption and biomass
- ▶ Highest standards of energy efficiency achieved by; passive and plus-energy buildings, energy efficient in- and out-door lighting, building automation installations
- ▶ Sustainable water resource management implementations: including rainwater harvesting and reuse, rainwater infiltration, waterless urinals, etc.

MORE INFORMATION

Visit www.umwelt-campus.de



Biogas and Fertilizer from Bio-Waste

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HOPPSTÄDTEN-WEIERSBACH

VALORIZATION OF WASTE

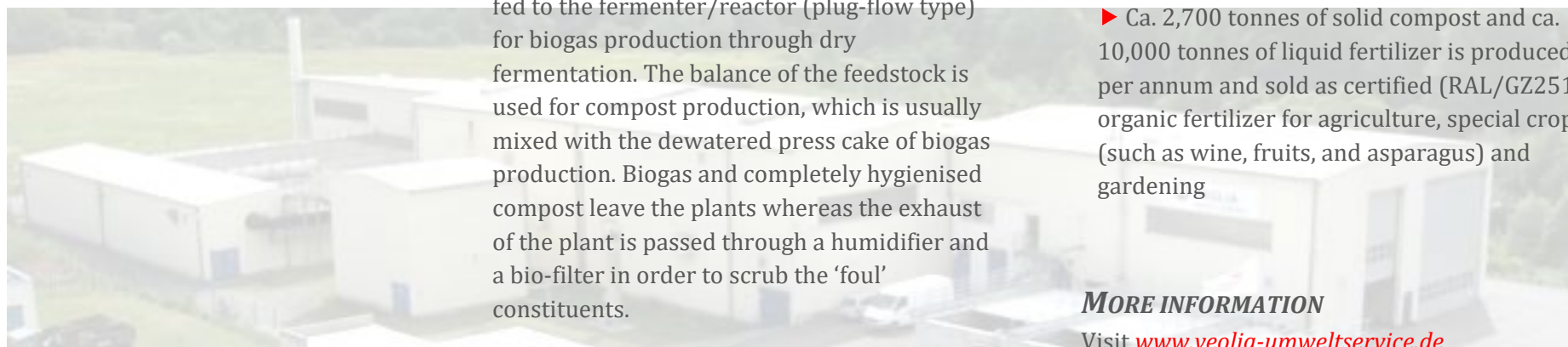
Veolia facility, commissioned in 2002 and refurbished in 2008, is a modern 'encapsulated' bio-waste processing plant that converts bio-waste to biogas and soil amendments (compost). The facility receives bio-waste from two counties, viz. Bad Kreuznach and Birkenfeld. Part of the received bio-waste at the plant is pre-treated (principally; comminution, removal of metals and other contaminants and sieving) and subsequently fed to the fermenter/reactor (plug-flow type) for biogas production through dry fermentation. The balance of the feedstock is used for compost production, which is usually mixed with the dewatered press cake of biogas production. Biogas and completely hygienised compost leave the plants whereas the exhaust of the plant is passed through a humidifier and a bio-filter in order to scrub the 'foul' constituents.

KEY FEATURES

- ▶ Separately collected organic household and food industry waste and greenery waste is used as the raw material that amounts to ca. 24,500 tonnes per year
- ▶ 75% of the pre-treated bio-waste is directly fed to the 1,500 m³ fermenter (18 kt/a) and produces 1.4 – 1.8 million m³ of biogas per annum (80-100 Nm³/tonne bio-waste)
- ▶ Ca. 2,700 tonnes of solid compost and ca. 10,000 tonnes of liquid fertilizer is produced per annum and sold as certified (RAL/GZ251) organic fertilizer for agriculture, special crops (such as wine, fruits, and asparagus) and gardening

MORE INFORMATION

Visit www.veolia-umweltservice.de



Biomass-based Cogeneration of Heat & Electricity

HOPPSTÄDTEN-WEIERSBACH

LIGNIN TO THE RESCUE

A champion in sustainable heat and electricity generation, OIE AG serves many municipalities of Nahe-Hunsrück-Glantal region by supplying biomass-based heat and electricity. The principal source of fuel employed is woodchips, derived from residual and forest wood. Acquired from the previous operators in the late '90s, the cogeneration plant at Hoppstädten-Weiersbach was refurbished in 2002 by OIE and retrofitted with state-of-the-art technologies with an investment of EUR 15 million. This plant exclusively uses wood chips from sustainable sources and produces heat and electricity that feed the respective local grids. This facility is among the largest 'green energy' producers in the region and reputed for employing an efficient fuel management system in its innovative power plant.

KEY FEATURES

- ▶ With an installed capacity of 29 MW, the plant's heat and electrical energy generation amounts to 13 GWh and 60 GWh per annum respectively that maintains a fuel demand of ca. 60,000 tonnes per annum
- ▶ Steam generation rate of the plant is 37.5 tonnes per hour at 60 bar pressure and 450°C
- ▶ Manages a district heating system with a length of ca. 8 km
- ▶ Estimated greenhouse gas abatement capacity of the plant amounts to 38 kt CO₂-eq/a
- ▶ Service life of the plant is 20 years, comparable to a conventional coal-fired power plant

MORE INFORMATION

Visit www.oie-ag.de





Repurposed Landscape with Renewable Energies

MORBACH

REPURPOSE AT ITS BEST

In 1996, Morbach—formerly home for the largest ammunition depot of the US Air Force in Europe—was repurposed as an energy landscape with the intention of offsetting many GHG equivalents as possible through renewable energy implementation to create a ‘Zero Emission’ community. Since then, various renewable energy technologies including, wind, PV, biomass energy were implemented abating ca. 32,500 tons of CO_{2-e} per annum through 50 million kWh/a of electrical energy generation. Besides renewable energy generation, direct GHG emission reduction through energy efficiency improvement and integrated environmental protection technologies and strategies are also implemented at Energy Landscape Morbach.

KEY FEATURES

- ▶ Originally, there were 14 wind turbines with an installed capacity of 2 MW each. They

were replaced by 7 wind turbines with a capacity of 4.2 MW each, which generate about 70 million kWh per year,

twice as much as the 14 old wind turbines.

- ▶ 40,000 m² of PV modules amounting to 4.2 MWp installed capacity, produces 4 million kWh/a

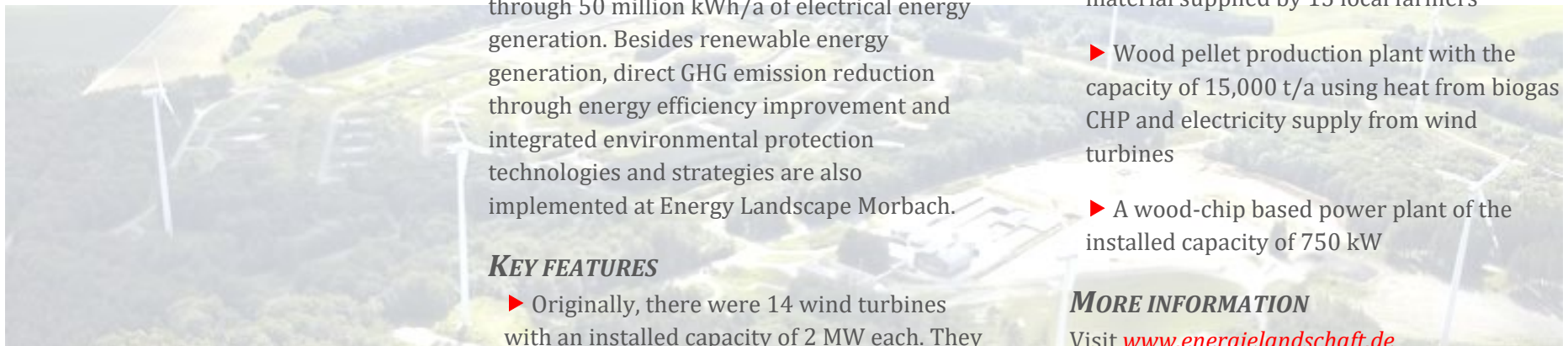
- ▶ Biogas plant (500 kW_{el} & 700 kW_{th}) exclusively operated with renewable raw material supplied by 15 local farmers

- ▶ Wood pellet production plant with the capacity of 15,000 t/a using heat from biogas CHP and electricity supply from wind turbines

- ▶ A wood-chip based power plant of the installed capacity of 750 kW

MORE INFORMATION

Visit www.energielandschaft.de



THE WAY TO A BIOENERGY VILLAGE

GIMBWEILER



A MODEL THAT SHOULD BE COPIED

Gimbweiler is a village with about 480 inhabitants. While the idea of a bioenergy village is becoming more important and is ignored by some communities, the community of Gimbweiler has not hidden its enthusiasm for renewable energy. In 2014, initial assessments were already carried out with regard to setting up a local heating network, increasing the number of charging stations for electric vehicles, etc. This commitment, which also contributes to reducing CO₂, has made Gimbweiler a pioneer in the region.

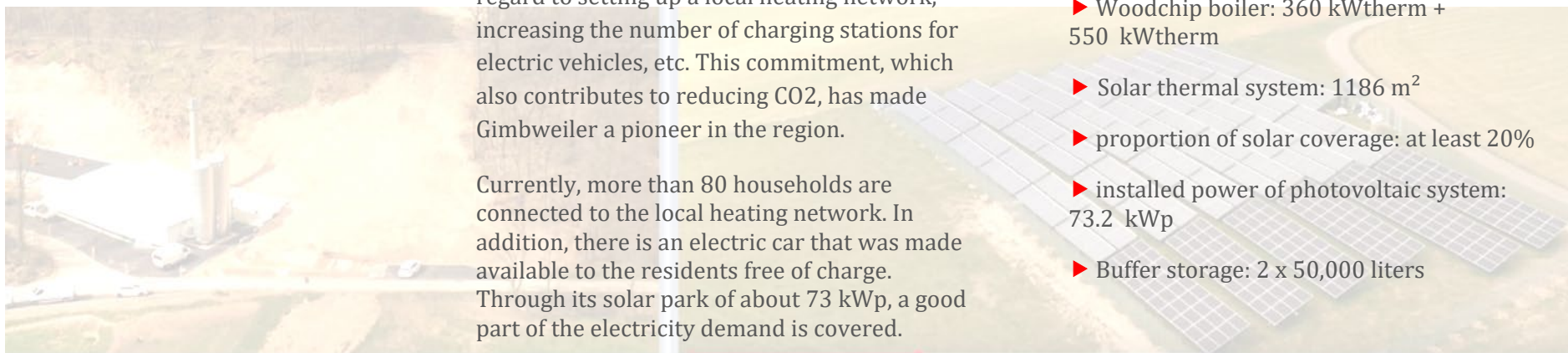
Currently, more than 80 households are connected to the local heating network. In addition, there is an electric car that was made available to the residents free of charge. Through its solar park of about 73 kWp, a good part of the electricity demand is covered.

KEY FEATURES

- ▶ Local heating pipeline: approx. 4.4 km
- ▶ Connected users: 86 (at the end of the project)
- ▶ Woodchip boiler: 360 kW_{therm} + 550 kW_{therm}
- ▶ Solar thermal system: 1186 m²
- ▶ proportion of solar coverage: at least 20%
- ▶ installed power of photovoltaic system: 73.2 kWp
- ▶ Buffer storage: 2 x 50,000 liters

MORE INFORMATION

Visit www.gimbweiler.de





Sustainable Utility & Infrastructure Through Synergies

TRIER

FRONTIERS IN UTILITY

Stadtwerke Trier [SWT] is a utility and infrastructure service provider that supplies electricity, gas, drinking water, wastewater management, public transportation etc. to the city of Trier. What sets apart SWT from any other utility and infrastructure service provider is its unique management model, which is essentially based on cooperation between different business entities creating synergies for efficient 'Regional Material Flow Management' toward a higher degree of climate protection. To achieve triple-bottom-line sustainability and climate protection, renewable resources and sustainable technologies utilisation are systemic to SWT's work. This model could be an archetypal example of how sustainable utility and infrastructure may be implemented in conventional municipalities around the world.

KEY FEATURES

- ▶ Installed wind energy capacity (three wind parks) amounts to 45.9 MW through which 79 million kWh/a could be generated offsetting 38.5 kt of CO_{2-eq}/a
- ▶ Installed capacity of PV plants (total of 13) amounts to ca. 44.25 MW that collectively have the capacity to produce ca. 44.4 million kWh/a offsetting ca. 57.3 kt of CO_{2-eq}/a
- ▶ The two hydroelectricity plants (2.4 million kWh/a installed) have the capacity to offset 1.2 kt of CO_{2-eq}/a
- ▶ Both direct and indirect provision of employment amounts to 1,500 in the region

MORE INFORMATION

Visit www.swt.de



Energy and Technology Park

TRIER

SYNERGY AMONG TECHNOLOGIES

Despite its key focus in water and sewage treatment, Stadtwerke Trier [SWT] has ventured into energy sector in which energy efficiency improvement as well as renewable energy [REN] generation is done. Through the energy efficiency initiative, SWT has reduced electrical energy consumption by 20 per cent recently.

SWT also has expanded the REN-based decentralized power generation for which two combined heat and power plants [CHP], photovoltaic [PV] systems, and a hydropower plant, etc. are employed. These RENs together ensure the energy self-sufficiency of the main sewerage treatment plant since 2016.

In addition, an artificial neural network regulates the power generation and consumption in real-time at the SWT technology park, which is among the pioneers

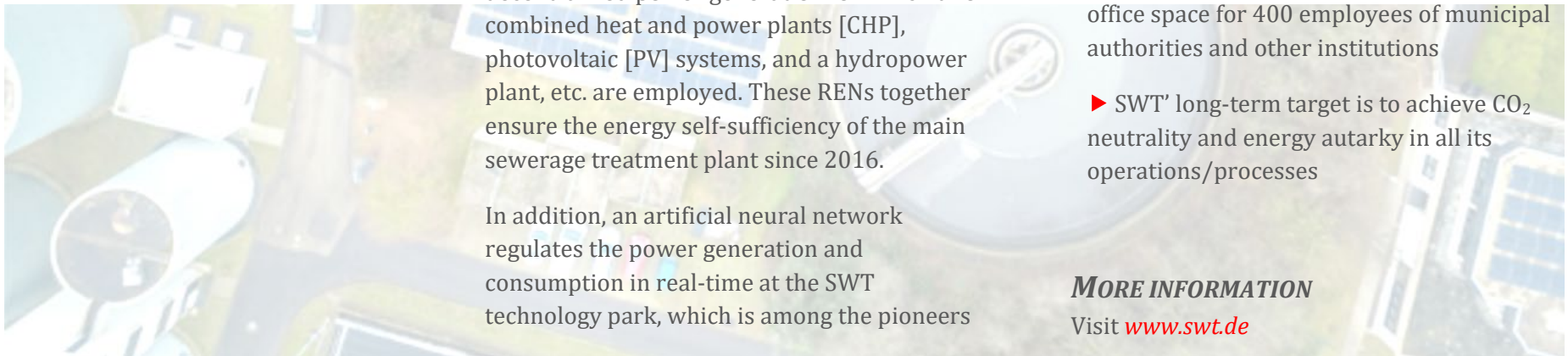
employing such technology. SWT also aims to make the complete facility and its operations energy autonomous in the long run.

KEY FEATURES

- ▶ SWT' technology park has been recognised and certified as a 'Sustainable Business Park' and its buildings are DGNB certified
- ▶ SWT' ETP creates synergies by offering office space for 400 employees of municipal authorities and other institutions
- ▶ SWT' long-term target is to achieve CO₂ neutrality and energy autarky in all its operations/processes

MORE INFORMATION

Visit www.swt.de





Energy Autarky Wastewater Treatment

TRIER

AN UNCOMMON SOURCE OF ENERGY

Energy consumption of wastewater treatment being one of the largest cost components, Stadtwerke Trier [SWT] took a major step forward in 2013 to improve the energy and resource efficiency of its WWTP not only to reduce the costs but also to improve the environmental compatibility of its operations. Key drivers for resource efficiency at SWT WWTP include process optimisation, energy-efficient technologies, onsite renewable energy generation, and integrated intelligent process management technology.

A key highlight of this plant is the production of renewable energy i.) via the utilization of organic matter of sewage sludge in an anaerobic digester (ca. 2.7 million kWh/a), ii.) through a roof-mounted PV plant (ca. 70,000 kWh/a), and iii.) through flow-turbines and energy recovery etc. (ca. 0.51 million kWh/a) making the complete wastewater treatment

process an energy autarky system. As can be seen, the bulk of the energy is produced through biogas.

KEY FEATURES

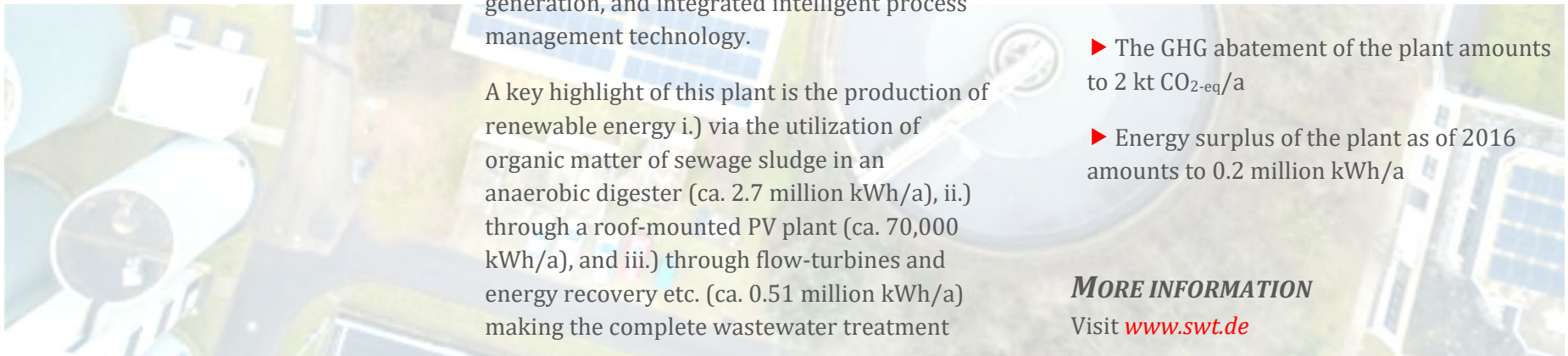
► SWT WWTP annually repurposes eight million m³ of wastewater. It saves ca. one million kWh of energy through energy efficiency measures and produces ca. 3.3 million kWh of renewable energy each year

► The GHG abatement of the plant amounts to 2 kt CO₂-eq/a

► Energy surplus of the plant as of 2016 amounts to 0.2 million kWh/a

MORE INFORMATION

Visit www.swt.de





Centralized Waste Management System

KAISERSLAUTERN

TRAILBLAZING IN WASTE MANAGEMENT

The Central Waste Management Kaiserslautern [CWMK] serves the administrative territory of Kaiserslautern with 250,000 inhabitants. The solid waste management is entirely handled by CWMK, an ISO 9001 & 14001 certified company, in which, Mechanical-Biological Treatment [MBT] of waste and the co-generation of heat and electricity [CHP] of biomass is done on-site at an 88 ha facility. The centralization of the waste management to handle large volumes of biomass waste efficiently and effectively with state-of-the-art technologies achieving substantial economic, environmental and social benefits is clearly demonstrated at CWMK.

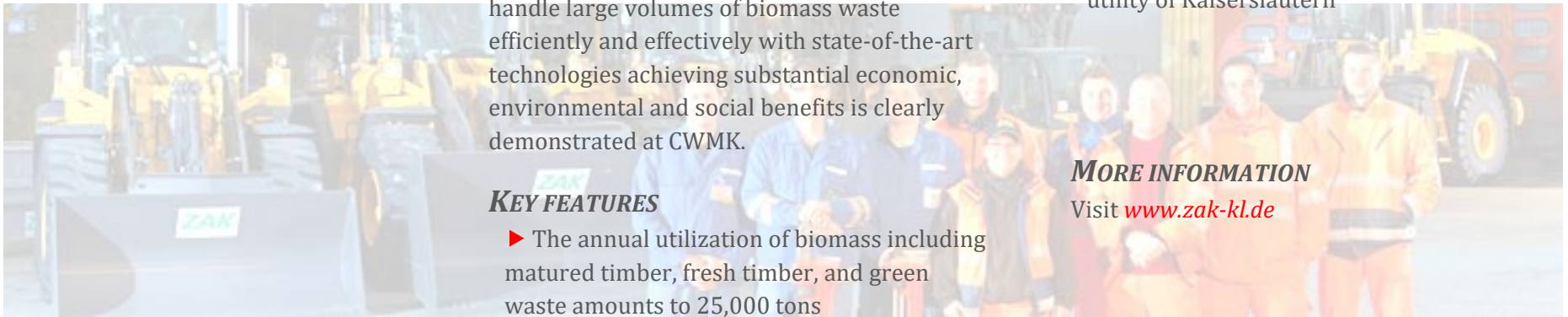
KEY FEATURES

- ▶ The annual utilization of biomass including matured timber, fresh timber, and green waste amounts to 25,000 tons

- ▶ Installed capacity of thermal energy amounts to 13.3 MW
- ▶ Electrical energy generation capacity amounts to 3.3. MW
- ▶ Generates ca. 18 million kWh of electricity which ensures energy self-sufficiency and feeds 12 GWh to the grid
- ▶ Generates 42 million kWh of heat, which is fed to the grid and sold to the municipal utility of Kaiserslautern

MORE INFORMATION

Visit www.zak-kl.de



Greenery Waste Treatment and Energy Production

KIRCHBERG/SIMMERN

HEATING WITHOUT GLOBAL WARMING

Environmentally benign district heating is a priority of Rhein-Hunsrück Entsorgung [RHE] thus actively invested in biomass-based heating in the Kirchberg, Simmern, and Emmelshausen communities since 2010. Focusing strongly on the Regional Added Value of its actions, RHE utilises regionally available woody biomass residue (trees and shrubs) to produce biomass fuel (fuel processing involves: cutting, sorting, drying, shredding, etc.) that is subsequently used in biomass burners to produce climate neutral heat energy for district heating. Produced heat energy is supplied to a school building in Simmern, a swimming pool and the town hall in Kirchberg, a library in Emmelshausen, and also to a home for the elders in the neighbourhood. Added to the portfolio of green energy production RHE has also invested in a sizable PV plant through which completely fulfils its own energy

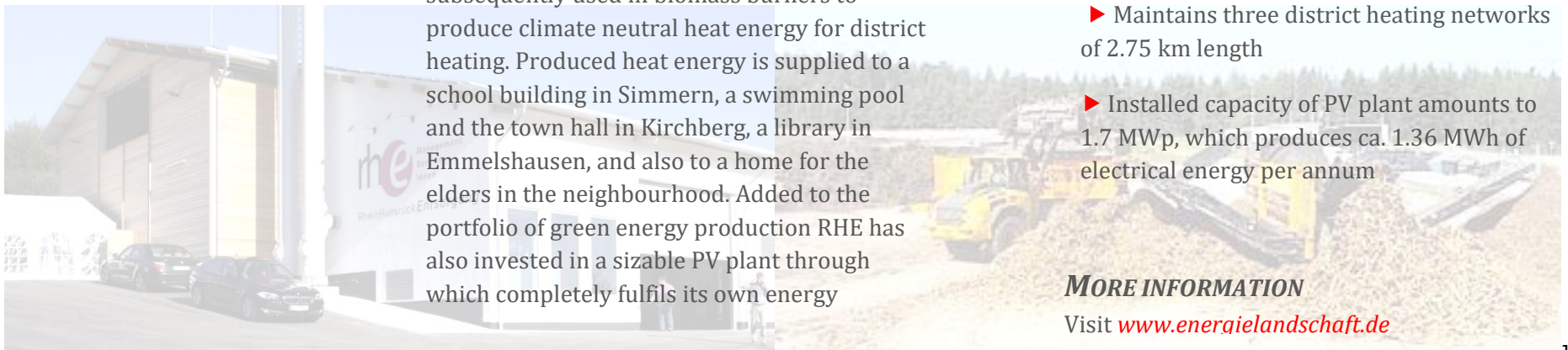
requirement in administrative buildings and supply the balance to the regional grid.

KEY FEATURES

- ▶ Gross thermal energy production in the two counties amount to 8.4 million kWh/a (equivalent avoidance of heating oil is 610 kL/a) through 2.25 MW capacity biomass burners
- ▶ Total GHG offset (through biomass heat use) amounts to 1,045 t CO₂-eq/a
- ▶ Maintains three district heating networks of 2.75 km length
- ▶ Installed capacity of PV plant amounts to 1.7 MWp, which produces ca. 1.36 MWh of electrical energy per annum

MORE INFORMATION

Visit www.energielandschaft.de



IMPRINT

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www.stoffstrom.org

October 2021

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COOPERATION

IfaS Institut für angewandtes
Stoffstrommanagement

 **Rheinland-Pfalz**
MINISTERIUM FÜR
KLIMASCHUTZ, UMWELT,
ENERGIE UND MOBILITÄT


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Förderinstrument des Interregionalen Regionalen (Europäischer Fonds für regionale Entwicklung)

W-LAN

W-LAN Profile: ucb-guest

User Name: ICEC

Password: e3FfzU7P

ICEW AGENDA

SUNDAY, 24TH OCTOBER

N/A Individual Arrival in Germany
Transfer to Neubrücke or St. Wendel by train

18:30 Dinner Reception | Gleis 4 - Restaurant Neubrücke Train-Station

MONDAY, 25TH OCTOBER

Loretta - 9928 Building

09:00 **Welcome & Keynote Address: Zero Emission & Circular Economy**
Professor Dr. Peter Heck | Managing Director, IfaS

ECB, BIRKENFELD with *Sven Beck and Erica Tettamanti*

11:00 **Guided Technology Site Visit - 1**
Technologies for Zero Emission at Europe's premier Zero Emission campus

12:00 Lunch | Mensa, ECB

13:00 Transfer to Neubrücke (Nahe) **Starting from Mensa**

NEUBRÜCKE (NAHE) with *Gustavo Garcia und Erica Tettamanti*

Guided Technology Site Visit - 2
Biomass-to-Energy - VEOLIA and OIE

13:15 Transfer to Morbach

MORBACH - Guide *Michael Grehl*

14:00 **Guided Technology Site Visit - 3**
Renewable Energy landscape, Morbach: repurposing a waste land for RE generation

15:30 Transfer to Gimbweiler

GIMBWEILER - *Mayor Mr. Linn*

16:15 **Guided Technology Site Visit - 4**
Gimbweiler - the Way to a Bioenergy Village

17:15 Transfer to ECB, Birkenfeld

18:00 Dinner | Mensa, ECB

TUESDAY, 26TH OCTOBER

BIRKENFELD, COMMUNICATIONS CENTRE - ECB

08:30 Registration

09:00

12th International Circular Economy Conference

17:30 Closure of the 12ICEC, Get Together & Networking

18:30 Bus-Transfer to Schwollen - **From Communication Center** - Landgasthof Böß

19:00 Dinner reception | hosted by IfaS - **Professor Dr. Peter Heck**, MD, IfaS

22:00 Bus-Transfer back to ECB

WEDNESDAY, 27TH OCTOBER

09:00 Transfer to Trier - **Starting from Hotel Vicinity**

TRIER with *Marco Angilella*

10:00 **Guided Technology Site Visit - 5**
Energy autarky wastewater treatment

11:00 Transfer to Kaiserslautern - **Via ECB Hotel Vicinity - 12:00 am** Pick up Guests

13:00 Lunch Barbarossahof

Kaiserslautern *CEO Dr. Stadtmüller*

14:15 **Guided Technology Site Visit - 6**
Centralised resources (landfill) management by ZAK

16:30 Transfer to Dhaun Castle

18:00 Dinner reception | hosted by **Mr. Rüdiger Lanz**; CEO, Lanz Manufaktur

21:00 Transfer to ECB, Birkenfeld

THURSDAY, 28TH OCTOBER

09:00 Transfer to Rhein-Hunsrück Entsorgung - **Starting from Hotel Vicinity Kirchberg with *Dr. Felix Flesch***

10:00 **Guided Technology Site Visit - 7 CEO Mr. Hackländer**
Waste-to-energy Solutions: Bio-waste to power, wood waste to heat etc.

12.30 Transfer to Trier

13.30 Lunch at Romiculum Restaurant
Trier

14.30 Sightseeing - See Trier Old Roman Gate: Porta Nigra

17.00 Transfer to ECB, Birkenfeld
BIRKENFELD

18:00 Farewell Dinner | Mensa - Environmental Campus Birkenfeld

FRIDAY, 29TH OCTOBER

N/A Individual departures

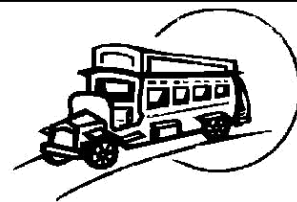
N/A B2B Meetings | **On Request**

Les règles sanitaires

Selon le dernier règlement, il ne faut pas porter un masque hygiénique si tous les participants au voyage en autobus sont vaccinés entièrement ou récupérés. Si ce n'est pas le cas, tous les passagers doivent porter des masques hygiéniques pendant le séjour entier dans l'autobus.

Avant de monter de l'autobus, il faut désinfecter les mains – le désinfectant est disponible dans le bus.

Les toilettes restent fermées pendant le voyage entier pour des raisons d'hygiène.



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Zum Frühlingsplätzchen 6

Tel. 06751-6228

Fax: 06751- 6935

Folgende Hygieneregeln sind zwingend zu befolgen:

Gemäß der letzten Verordnung entfällt die Einhaltung der Maskenpflicht, wenn an der Busreise ausschließlich geimpfte oder genesene Personen teilnehmen.

Wenn dies nicht gewährleistet ist müssen alle Fahrgäste die Mund-Nasen-Bedeckung während des gesamten Aufenthalts im Bus tragen.

Fahrgäste müssen sich vor jedem Betreten des Busses die Hände desinfizieren
– Desinfektionsmittel steht im Bus zur Verfügung.

Die Toilette muss aus hygienischen Gründen während der gesamten Fahrt geschlossen bleiben.

Um die Rückverfolgbarkeit von möglichen Infektionsketten sicherzustellen, sind Sie verpflichtet, Name, Adresse und Telefonnummer der Fahrgäste und den Zeitraum des Aufenthalts im Bus (Datum, Beginn- und Endzeit) schriftlich zu erfassen.

Fahrgäste, die mit der Datenerhebung und den Hygieneregeln nicht einverstanden sind, sind von der Beförderung ausgeschlossen.

Sie sind verpflichtet diese Daten für vier Wochen aufzubewahren.

Die Daten müssen vor dem Zugriff Unbefugter gesichert und nach Ablauf von vier Wochen vollständig vernichtet werden.

Diese Daten müssen der zuständigen Behörde im Bedarfsfall, auf Verlangen, zur Verfügung gestellt werden.