International Circular Economy Week (ICEW)

Fact Sheets for Technology Site Visits

Institute of Applied Material Flow Management- IfaS

www.stoffstrom.org

IfaS Institut für angewandtes Stoffstrommanagement

Umwelt-Campus Birkenfeld | HOCHSCHULE TRIER

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 1st 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 outdoor lighting, and building automation installations
- ► Sustainable water resource management implementations: including rainwater harvesting and reuse, rainwater infiltration, waterless urinals, etc.

MORE INFORMATION

www.umwelt-campus.de

Repurposed Landscape with Renewable Energies

MORBACH

REPURPOSE AT ITS BEST

In 1996, Morbach - formerly home to the largest ammunition depot of the US Air Force in Europe - was repurposed as an energy landscape with the intention of offsetting as many GHG equivalents as possible through renewable energy implementation to create a 'Zero Emission' community. Since then, various renewable energy technologies, wind, PV, and biomass energy were implemented, abating ca. 32,500 tons of $CO_{2\text{-}e}$ 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 m^2 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

www.energielandschaft.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 to a home for the elderly in the neighbourhood. Added to the portfolio of green energy production, RHE has also invested in a sizable PV plant through which it completely fulfils its own energy requirement in administrative buildings and supplies the balance to the regional grid

KEY FEATURES

- ▶ Gross thermal energy production in the two counties amounts 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 $CO_{2\text{-eq}}$/a
- ▶ Maintains three district heating networks of 2.75 km in length
- ▶ Installed capacity of PV plant amounts to 1.7 MWp, which produces ca. 1.36 MWh of electrical energy per annum

MORE INFORMATION

www.energielandschaft.de



Treatment Facility for Municipal Organic Waste

KIRCHBERG/SIMMERN

INNOVATION WASTE RECYCLING PROCESS

Employing modern technology in its waste management, the city of Kirchberg has managed to drastically reduce the amount of recyclable waste generated and disposed of in landfills. The intelligent technology can recycle the wastes produced by more than 103,000 inhabitants from 137 communities

KEY FEATURES

- 40% of residual waste is converted into a fuel substitute
- 20% of waste in the process of rotting is turned into water and CO_2
- Rest 40% is taken to the landfill and disposed of in environmentally friendly measures

WASTE FACTS

Waste type	Amount
Residual waste	10,000 tons
Biowaste	14,000 tons
Green waste	24,000 tons
Paper	9,000 tons
Light packaging	4,000 tons
Bulky waste	2,000 tons
Wood waste	3,000 tons

MORE INFORMATION

www.rh-entsorgung.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 cogeneration of heat and electricity [CHP] of biomass is done on-site at an 88-ha facility. The centralization of 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

www.zak-kl.de



Kläranlage Felsalbe

Stadt Pirmasens

SUSTAINABLE WASTEWATER TREATMENT FOR URBAN WATER PROTECTION

The **Felsalbe wastewater treatment plant (Kläranlage Felsalbe)**, operated by the municipal utility of the **City of Pirmasens**, is a key infrastructure facility for protecting local water bodies and ensuring compliance with environmental water quality standards. The plant treats municipal and, where applicable, industrial wastewater from the catchment area before safely discharging treated effluent back into the natural water cycle.

Through a combination of mechanical, biological, and chemical treatment stages, the facility removes organic matter, nutrients, and other pollutants. In doing so, it contributes significantly to safeguarding aquatic ecosystems in the Felsalbe river system and downstream waters, while also supporting public health and regional environmental protection goals.

KEY FEATURES

- Mechanical pre-treatment for the removal of coarse solids and suspended materials
- Biological treatment processes for the degradation of organic pollutants
- Nutrient removal (nitrogen and phosphorus) to prevent eutrophication in receiving water
- Sedimentation and sludge treatment for safe handling of residual materials
- Continuous compliance with EU and German wastewater discharge standards
- Contribution to local water quality protection and aquatic ecosystem preservation
- Integrated municipal infrastructure ensuring reliable wastewater management for Pirmasens

MORE INFORMATION

www.pirmasens.de/downloads/abwasserbetrieb/klaeranlage/klaeranlagefelsalbe.pdf

Battery Storage Park

Föhren

ENABLING ENERGY TRANSITION THROUGH FLEXIBLE STORAGE

The Battery Storage Park in Föhren, operated by **Schoenergie**, is a key infrastructure asset supporting the integration of renewable energy into the power grid. Located in Rhineland-Palatinate, the facility plays a crucial role in balancing electricity supply and demand by storing surplus renewable energy, primarily from solar and wind, and releasing it when needed.

As electricity generation from renewable sources becomes increasingly decentralized and variable, large-scale battery storage systems are essential for ensuring grid stability, enhancing energy security, and reducing reliance on fossil-fuel-based balancing power plants. The Föhren site demonstrates how modern battery storage technology can be effectively integrated into regional energy systems to support Germany's Energiewende.

KEY FEATURES

- Large-scale battery energy storage system (BESS) supporting grid stability and flexibility
- Stores excess renewable electricity and feeds it back during peak demand periods
- Enables better integration of intermittent renewable energy sources such as wind and solar
- Provides fast-response balancing power services to the electricity grid
- Supports decarbonisation of the energy system and reduction of CO_2 emissions
- Part of Schoenergie's portfolio of renewable energy and storage solutions

MORE INFORMATION

www.schoenergie.de