ZETA SYMPOSIUM

March 11-13, 2024 // AUSTRIA

On the Climate Pathway: From Sustainable Engineering to Roll-Out of Green Investments

Thomas Gosmann

Sustainability Lead Pharma Engineering

FROM FEEL GOOD TOPIC TO LICENSE TO OPERATE – OUR MINIMUM TARGETS TO STAY IN THE GAME

Ecological - Economical - Social: Sustainability @ Bayer Pharma

// Provide 100m women in LMIC with access to modern contraceptives and increase availability and affordability of our products in LMIC

// **Reduce 42% CO2 emissions in manufacturing sites (Scope 1 & 2)**
i.e. direct emissions from Bayer sources (Scope 1) and indirect emissions from purchased energy (Scope 2) by 2029 vs. baseline 2019 of 0.4 m t CO_2e[1]

// **Reduce 25 ~~12.3~~% CO2 emissions in the value chain (Scope 3)**
i.e. emissions that are a consequence of the operations, but not directly owned/ controlled by Bayer by 2029 vs. baseline 2019 of 1.4 m t CO_2e[1]

// **Drive sustainable water use**
i.e. continue path of intermediate water goal and co-create future Bayer water strategy

// **Meet regulatory requirements and address customer requests**
incl. NetZero 2050 (Circularity, Green Chemistry) and EU Green Deal/ Taxonomy

// Foster Culture Change and integrate sustainability as priority

// Commitment to corporate values, diversity, and equality of opportunities

LOOKING BACK TO FOUR YEARS OF PROGRESS

A lot of enthusiasm across the company

December 2019

- Sustainability **targets set** 100 million challenges & new climate targets

July 2020

- Decision to go for Green Energy SOL1 in LEV using **geothermal energy**

December 2020

- 5-years-Contract signed for **tracking tool M2030** for 138 Bayer sites

January 2022

- First heatpumps installed for Biotech site in Berkeley US

November 2023

- Acceptance of our Net-zero 2050 plan by SBTi

April 2024

- Start of supply out of geothermal energy SOL1

April 2020

- New **compensation system** for the member of the Board of Management

September 2020

- Publication of **internal CO_2 premium to 100 €/ton CO_2**

February 2021

- Divisional Environmental Footprint Program started

March 2022

- Pharmaceutical Environmental Group joined

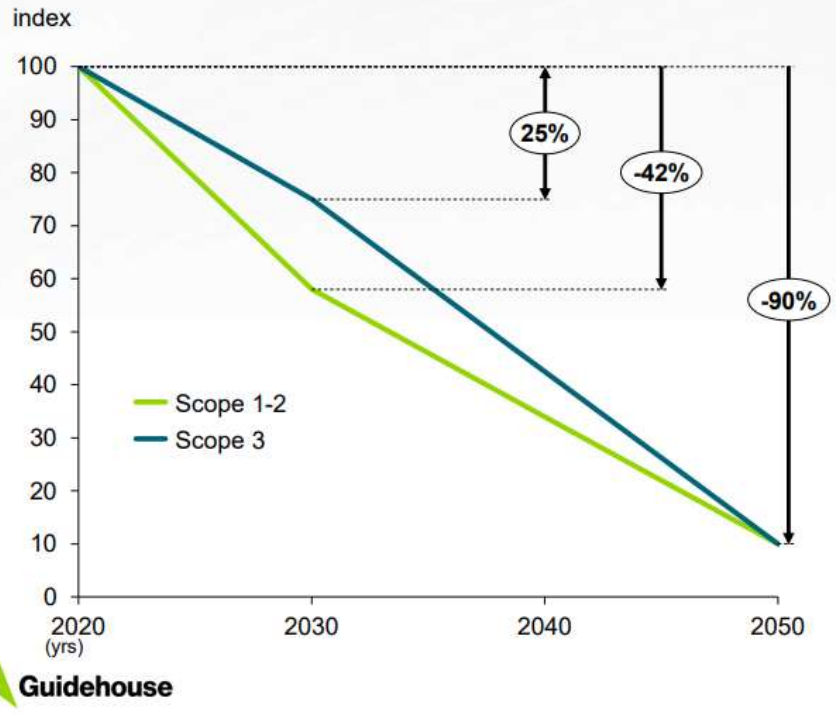
February 2023

- Roll-out of energy monitoring system started

NET-ZERO-CHALLENGE JUST APPROVED BY SBTI

The current criteria visualized in a graph

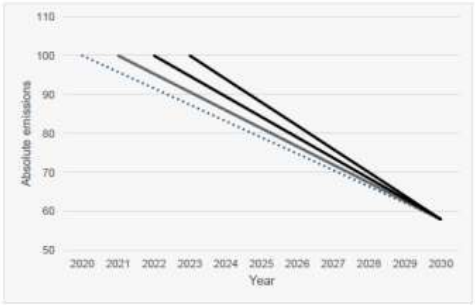
Scope 1-2 near term target needs a strong decline in the coming years



Guidehouse

Selection base year is important

- Science-Based Targets initiative changed the criteria for baselines and related reduction ambitions for Near Term targets (April 2023). The cross-sector absolute reduction approach is base year-dependent. This means:
  - For a base year of 2020 or earlier, the absolute reduction approach prescribes a 4.2% minimum linear annual rate of reduction for Scope 1-2. For Scope 3 it's 2.5% LAR.
  - For a base year later than 2020, the target is adjusted to ensure that companies still reduce their scope 1 and 2 emissions by a minimum of 42% in 2030 relative to base year emissions.



May 5, 2023

WE ARE ON A GOOD TRACK REACHING THE 1.5-DEGREE TARGET

Carbon emissions already reduced by 27% vs. 12.6% interim target for 2022

Iberdrola signs PPA with Bayer for 590MW Spanish solar project

By NS Energy Staff Writer 18 Nov 2020

POWER SOLAR PLANT

The company will deliver 100 % renewable electricity for the entire electricity requirements of the nine Bayer sites in Spain

The agreement will be effective in 100 % of Bayer centres in Spain from 2022. (Credit: Sebastian Ganzo from Pixabay)

Evwind, News Menu, Uncategorized, Wind Energy, wind energy

Iberdrola will supply wind energy to Bayer in Mexico

August 26, 2020 reve

Iberdrola has completed a contract with the German chemical and pharmaceutical group Bayer for the supply of long-term wind energy (PPA) in Mexico, through its Santiago onshore wind farm, with 105 megawatts (MW) of capacity and located in the State of Guanajuato.

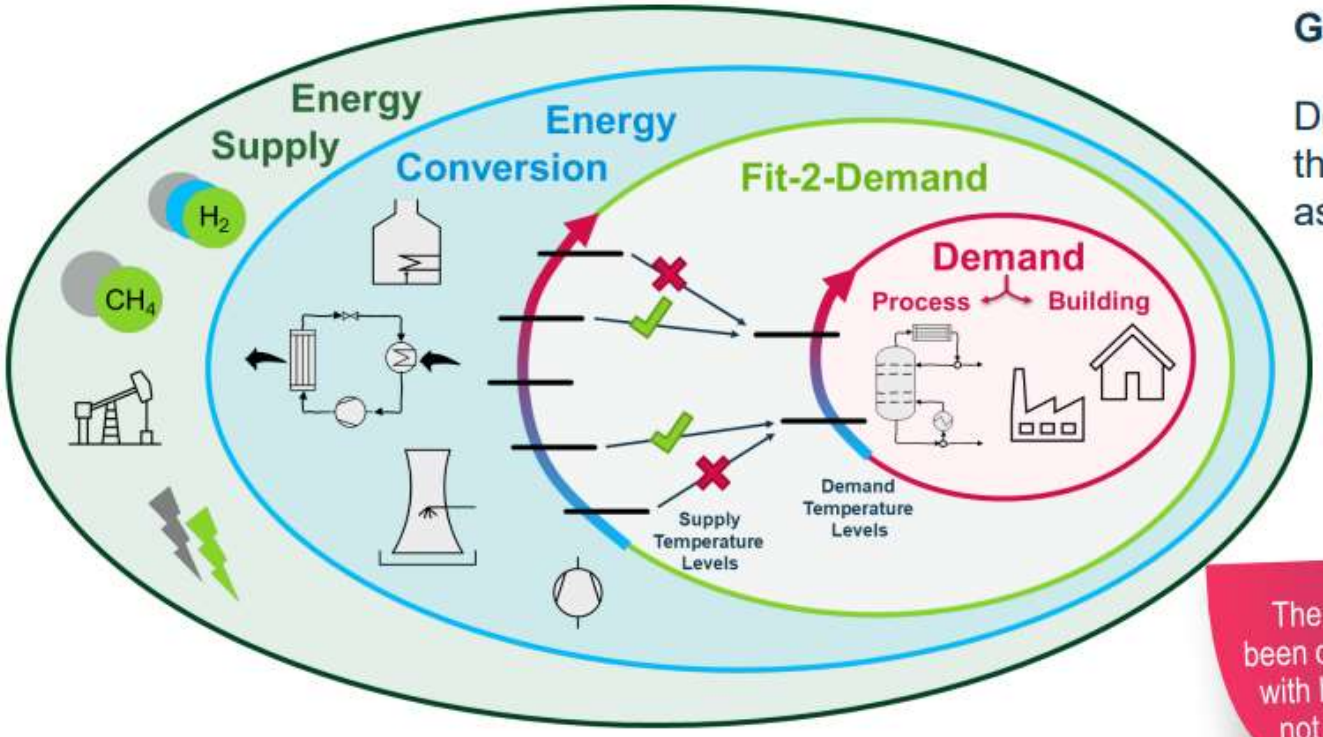
The contract will be for a period of 15 years, reported the German company, which frames the agreement within its strategy of being a climate-neutral company by 2030 and highlights that the alliance with Iberdrola will allow it to reduce its carbon footprint.

70 Prozent weniger CO2-Ausstoß im Vergleich zu herkömmlichen Betrieben

Bayer feiert Richtfest für neue Anlage zur Arzneimittelproduktion in Leverkusen

THE „ SUSTAINABILITY CHECK“ IN CAPEX PROJECTS

The current „ sustainability Check“ focusses on Energy demand and related CO_2e Emissions



Guiding Philosophy:

Does the concept developed in the project consider the relevant aspects of sustainability – from end-to-end?

Focus of the current version is on emissions of CO_2e from energy use.

The current ‘Sustainability Check’ has been developed based on production sites with high energy demand and thus does not cover all aspects of sustainability.

see: Knowledge Abstract “Energy Demand and Supply Options” (Sustainability@E&T)

BAYER INTERNAL REQUIREMENTS

Applicable environmental procedures/ assessments for investment projects

Investment Project CapEx (mio €)	Corporate Procedure: Ecological & Sustainability Assessments (ESA) CHS-PUB-9-352025	Corporate Procedure: HSE Part of Investment Projects CHS-PUB-9-299917	Site Env. Assessment: Legacy Monsanto: Management of Change ESH016 (for seeds sites)
< 5	-	(recommended)	✓
5-10	-	✓	(✓)
> 10	✓	✓	(✓)

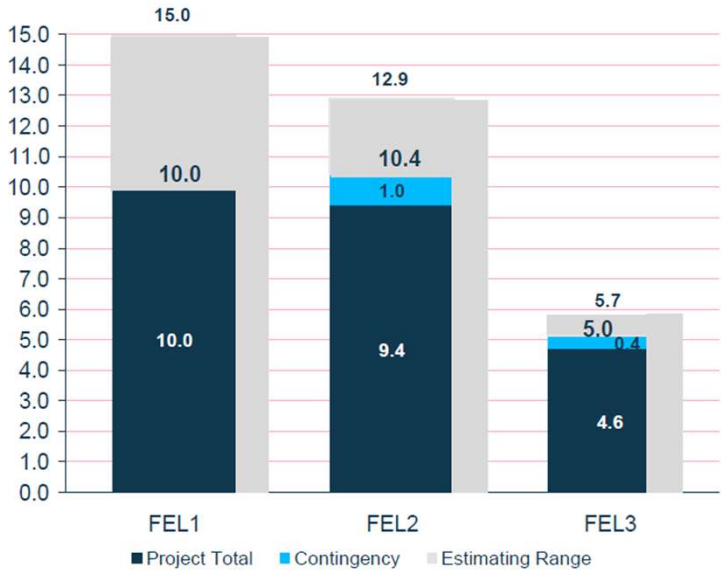
Certificate required for the internal investment approval

Replaced CP 716 (Dec 2020)

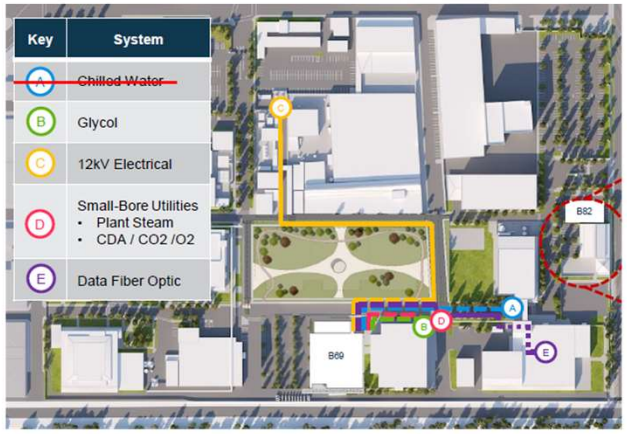
- Site-internal assessment for all investment projects / changes
- Content of the ESA procedure can be used as guide, but formal assessment process by CHS not required
- Reference:
  - Site Env. Mgmt system
  - Bayer Key Requirements (CP 2055)
  - Management of Change (ONE Bayer: CP 2019, Leg. Monsanto: ESH016)
  - Others: See References

HEATPUMP SOLUTION SAVED 50% CAPEX AND 600 TO CO_2

Chilled water capacity extension in B82 could be avoided



All data in EUR m

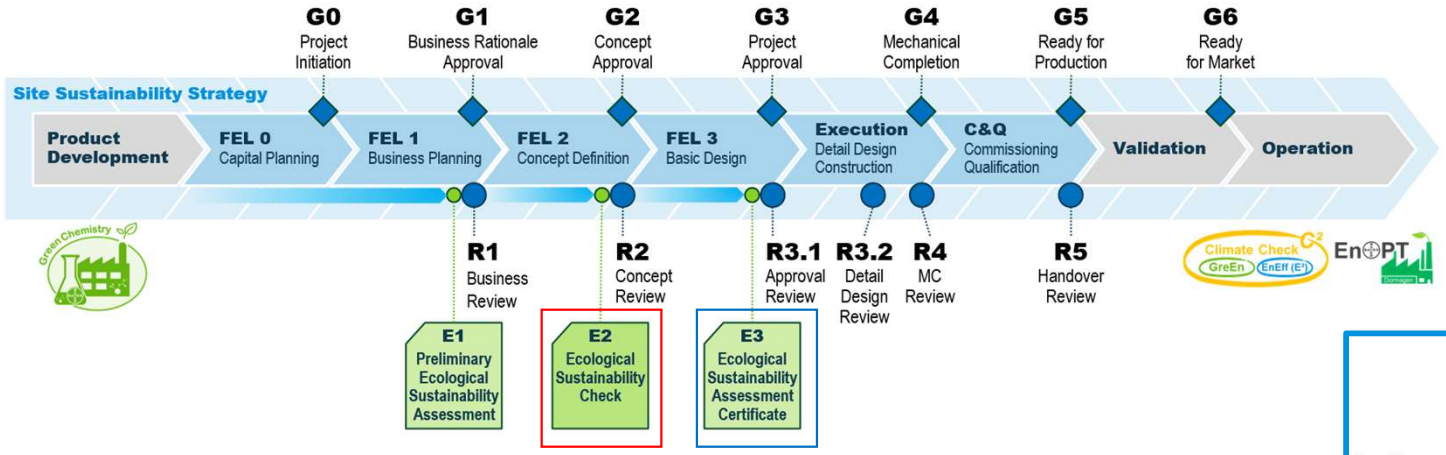


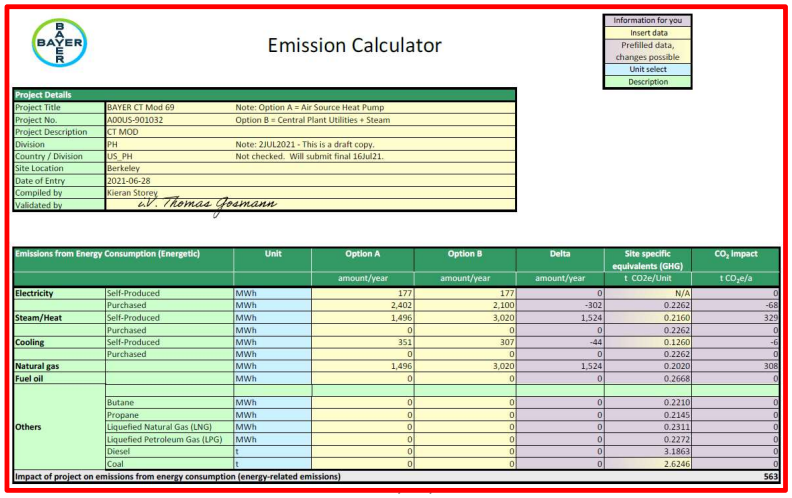
- Modular system that allows future expansion (GT Mod)
- Will be used on future buildings at the Berkeley site
- Implements Sustainability GEPs (ISPE)
- Modernizes the site utility concept
- Eliminates the need for plant steam and chilled water for the HVAC load

/// Pharma Earth Week 2023 /// March 2023

ECOLOGICAL ASSESSMENT

Streamlined according to CAPEX efficiency program



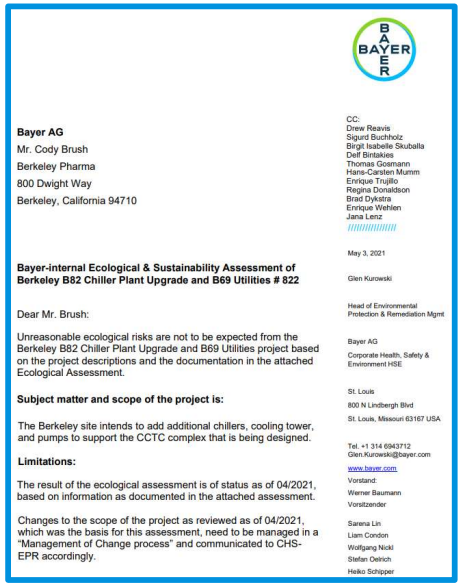


Emission Calculator

Information for you
Insert data
Prefilled data, changes possible
Unit select
Description

Project Details		
Project Title	BAYER CT Mod 69	Note: Option A = Air Source Heat Pump
Project No.	A00US-901032	Option B = Central Plant Utilities + Steam
Project Description	CT MOD	
Division	PH	Note: 2JUL2021 - This is a draft copy.
Country / Division	US PH	Not checked. Will submit final 16Jul21.
Site Location	Berkeley	
Date of Entry	2021-06-28	
Compiled by	Kieran Storey	
Validated by	i.V. Thomas Gosmann	

Emissions from Energy Consumption (Energetic)		Unit	Option A	Option B	Delta	Site specific equivalents (GHG)	CO_2 impact
			amount/year	amount/year	amount/year	t CO2e/Unit	t CO_2e/a
Electricity	Self-Produced	MWh	177	177	0	N/A	0
	Purchased	MWh	2,402	2,100	-302	0.2262	-68
Steam/Heat	Self-Produced	MWh	1,496	3,020	1,524	0.2160	329
	Purchased	MWh	0	0	0	0.2262	0
Cooling	Self-Produced	MWh	351	307	-44	0.1260	-6
	Purchased	MWh	0	0	0	0.2262	0
Natural gas		MWh	1,496	3,020	1,524	0.2020	308
Fuel oil		MWh	0	0	0	0.2668	0
Others	Butane	MWh	0	0	0	0.2210	0
	Propane	MWh	0	0	0	0.2145	0
	Liquefied Natural Gas (LNG)	MWh	0	0	0	0.2311	0
	Liquefied Petroleum Gas (LPG)	MWh	0	0	0	0.2272	0
	Diesel	t	0	0	0	3.1863	0
	Coal	t	0	0	0	2.6246	0
Impact of project on emissions from energy consumption (energy-related emissions)							563



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May 3, 2021

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Bayer-internal Ecological & Sustainability Assessment of Berkeley B82 Chiller Plant Upgrade and B69 Utilities # 822

Dear Mr. Brush:

Unreasonable ecological risks are not to be expected from the Berkeley B82 Chiller Plant Upgrade and B69 Utilities project based on the project descriptions and the documentation in the attached Ecological Assessment.

Subject matter and scope of the project is:

The Berkeley site intends to add additional chillers, cooling tower, and pumps to support the CCTC complex that is being designed.

Limitations:

The result of the ecological assessment is of status as of 04/2021, based on information as documented in the attached assessment.

Changes to the scope of the project as reviewed as of 04/2021, which was the basis for this assessment, need to be managed in a "Management of Change process" and communicated to CHS-EPR accordingly.

PRINCIPLES

Carbon Reduction

- Basically under control
- Externalize, whenever possible
- Prioritize strictly

Energy Cost Reduction

- Increase Gas Resilience
- Increase Energy Efficiency
- Provide **better prognosis data** for effective energy procurement

Overview Dashboard

Carbond Bridge Dashboard

Compact CBD Dashboard

Abatement Cost Bubblechart ...

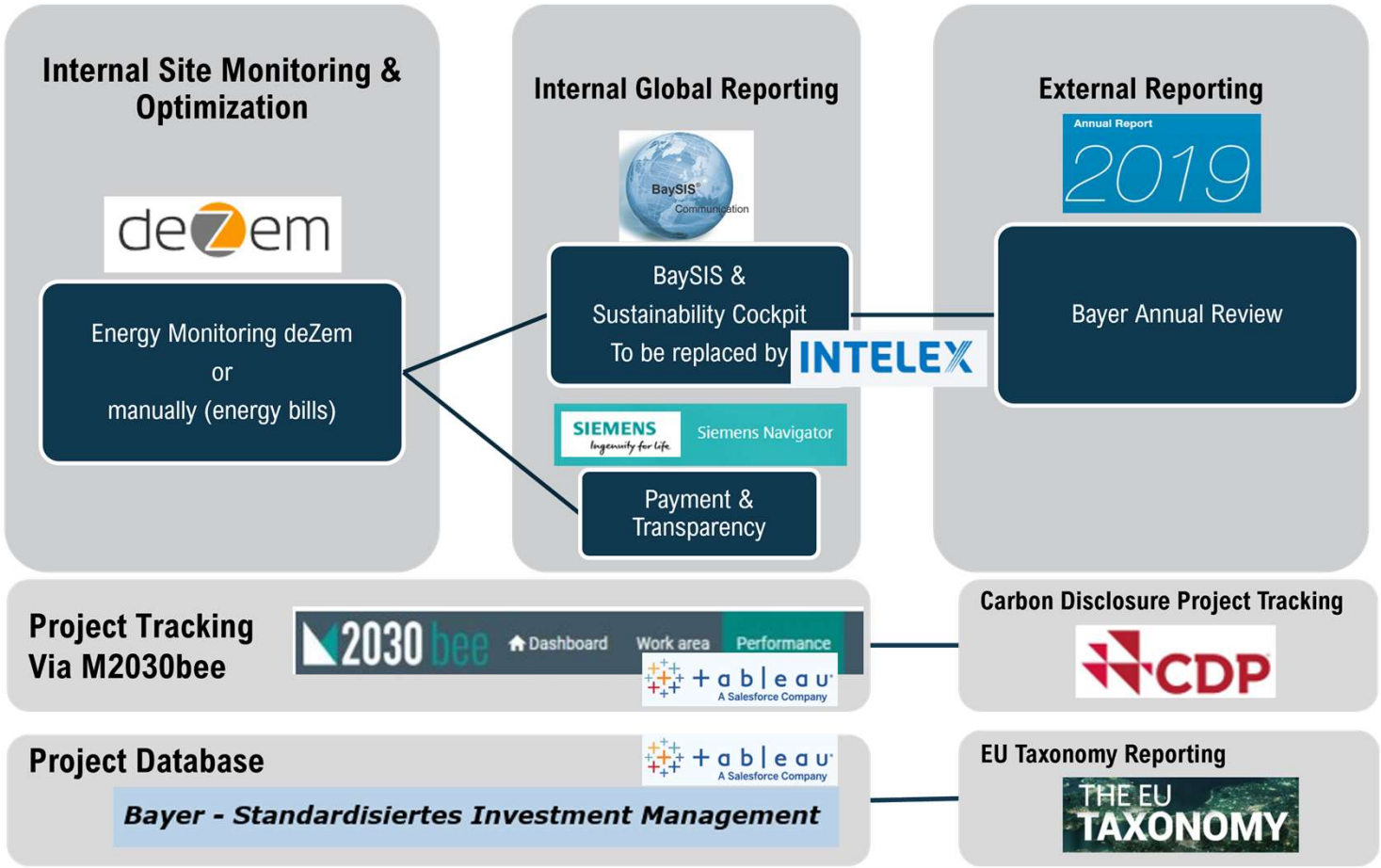
M2030 Action List Dashboard

Abatement Cost Dashboard

Provide all energy data digitally in ONE dashboard

dezem
sense | check | act

DATA MANAGEMENT & REPORTING



Greenhouse Gas Emissions Dashboard

Advanced Visualization of BaySIS and M2030 Data to achieve transparency of Bayer emissions vs. targets on all levels

RESTRICTED

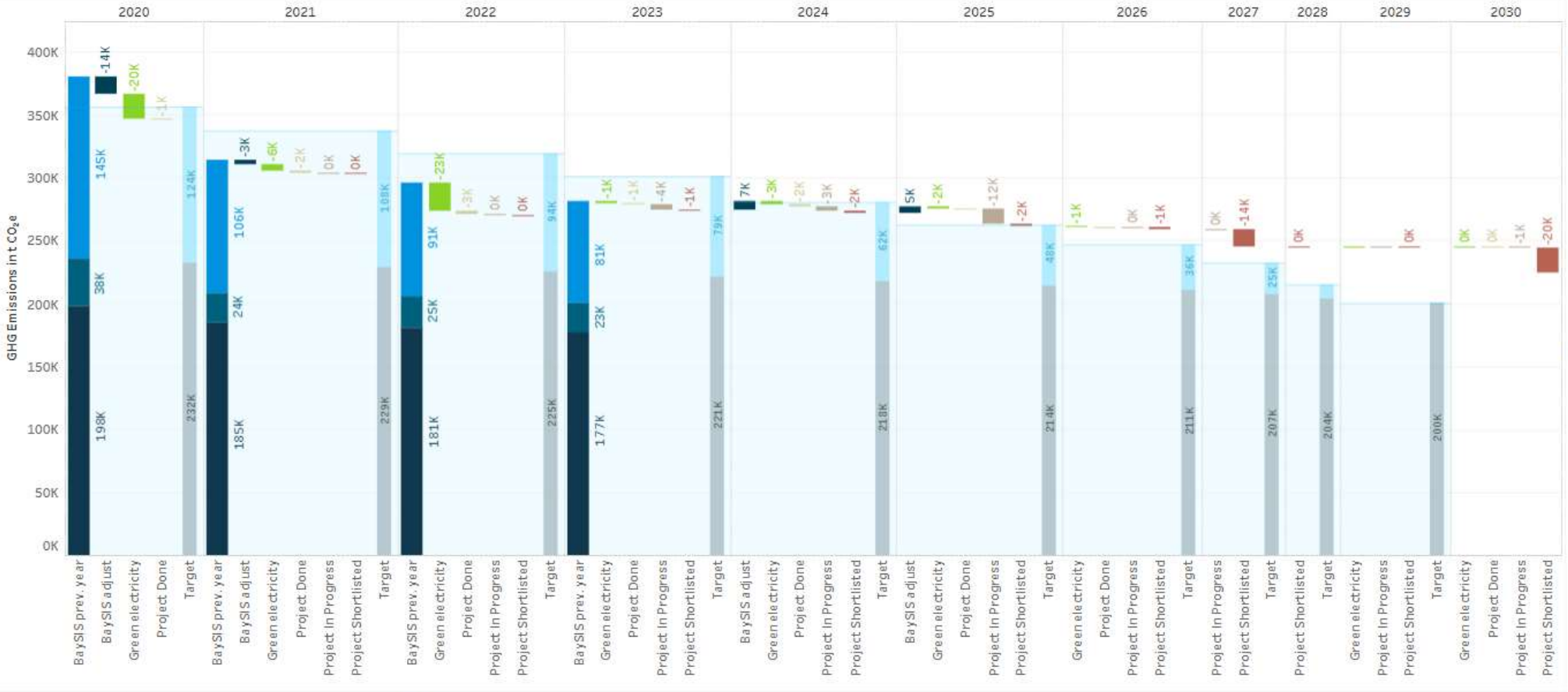
// Overview | // Carbon Bridge | // Abatement Cost | // CapEx | // Action List

Division: PH | Country: (Alle) | Region: (Alle) | Subregion: (Alle) | Unit: (Alle) | Subunit: Null | Location: (Alle) | 2020 – 2030

Carbon Bridge - Actual vs. Target Emissions with M2030 prediction

Thick blue bars represent actual GHG emissions from BaySIS. Thin blue bars represent emission targets for each year. Waterfall elements represent M2030 actions and are divided into categories (see legend). *Hover over element to see details.*

Compact Overlay



Emission type

- Project Shortlisted
- Project In Progress
- Project Done
- Green electricity
- BaySIS adjust
- Scope 2e
- Scope 2ne
- Scope 1

Emission targets

- Scope 2e
- Scope 1&2ne

Contact Support | Documentation | Data Sources: BaySIS | M2030

Last Patch: 05/2023 (V47) // Last Data Update: 24.10.2023 14:39:38

Greenhouse Gas Emissions Dashboard

Advanced Visualization of BaySIS and M2030 Data to achieve transparency of our emissions vs. targets on all levels

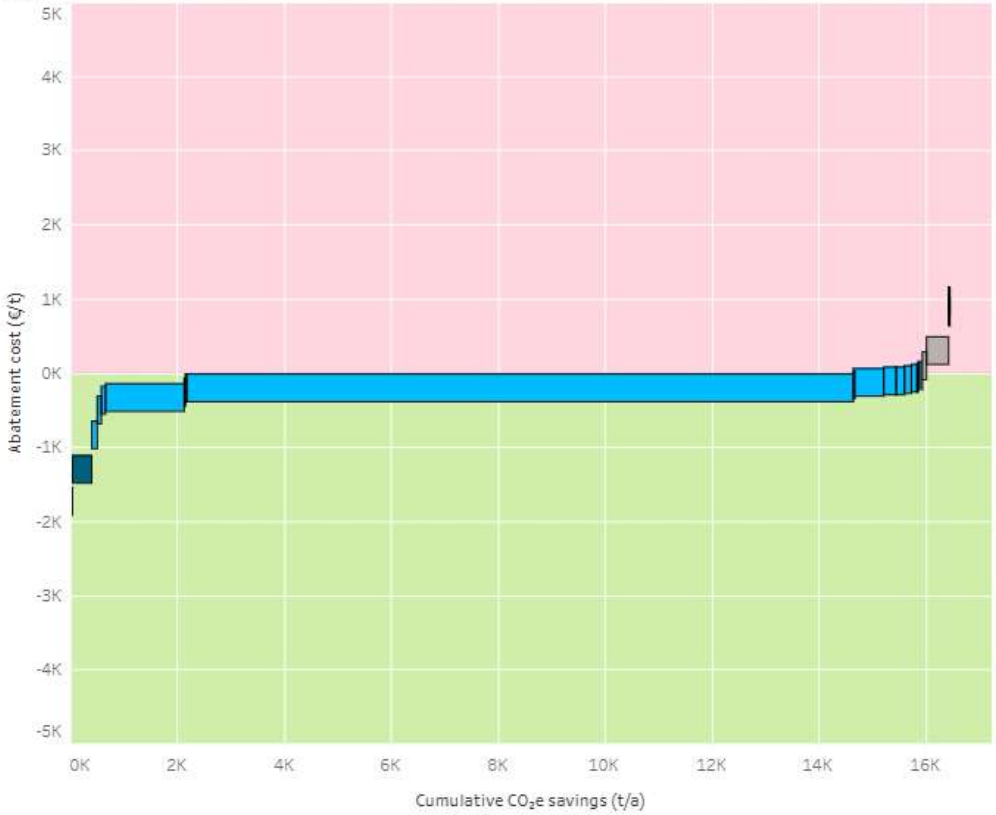
RESTRICTED

// Overview // Carbon Bridge // Abatement Cost // CapEx // Action List

Division PH | Country (Alle) | Region (Alle) | Subregion (Alle) | Unit (Alle) | Subunit Null | Location (Alle) | 2020 | 2030

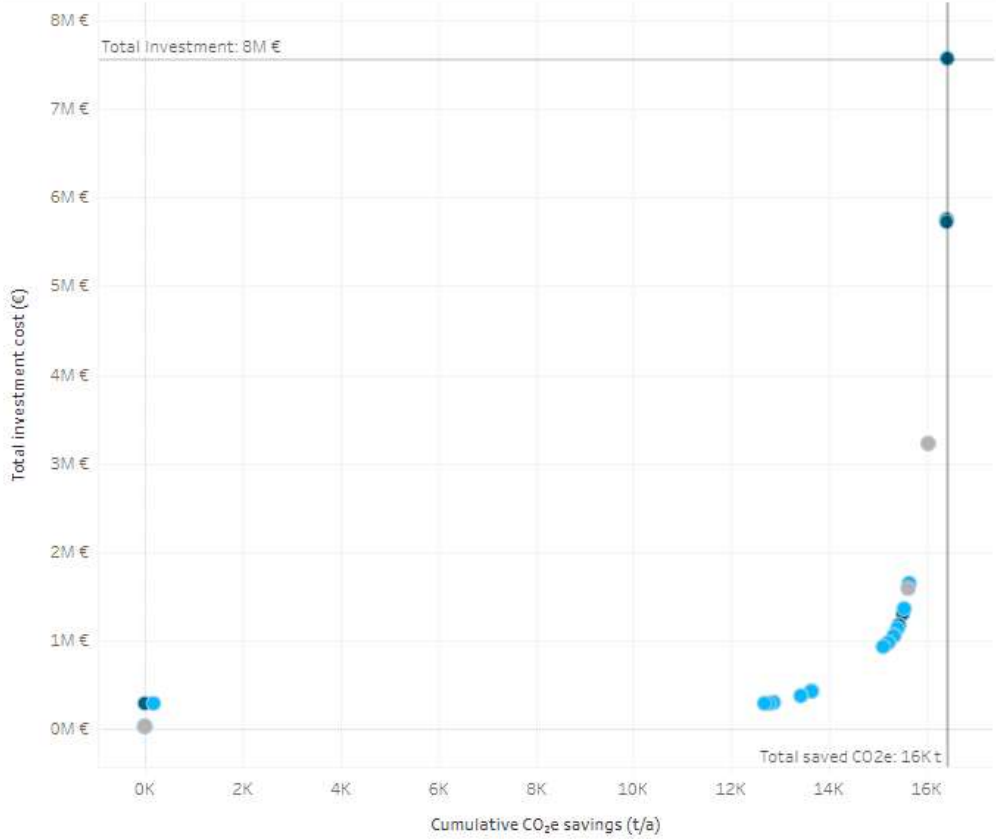
Marginal Abatement Cost Curves (NPV View)

Each bar is an M2030 action. The x-axis shows annual CO2 savings in t/a. The bar width is the savings of a specific project. The y-axis shows specific abatement costs (if positive) or savings (if negative "costs"), which is a normalized NPV (taken after 10 years) divided by the accumulated CO2 savings in the same period (10 years). For better representation, cost are shown as a bandwidth, but the real value is the band middle. Projects are ordered left to right from lowest to highest abatement cost (€/t).



Cumulative CO_2e Savings and Invest Costs (CapEx View)

Each dot is an M2030 action. The x-axis shows annual CO2 savings in t/a and the y-axis the associated CapEx. The representation is cumulative from left to right, meaning that the "origin" of dot "n" is dot "n-1" immediately to the left. The order is from projects with the lowest specific Capex per ton/a of CO2 saved to the highest.



Drill down

Cost below 5K € / t CO_2e and payback time < 5 years.

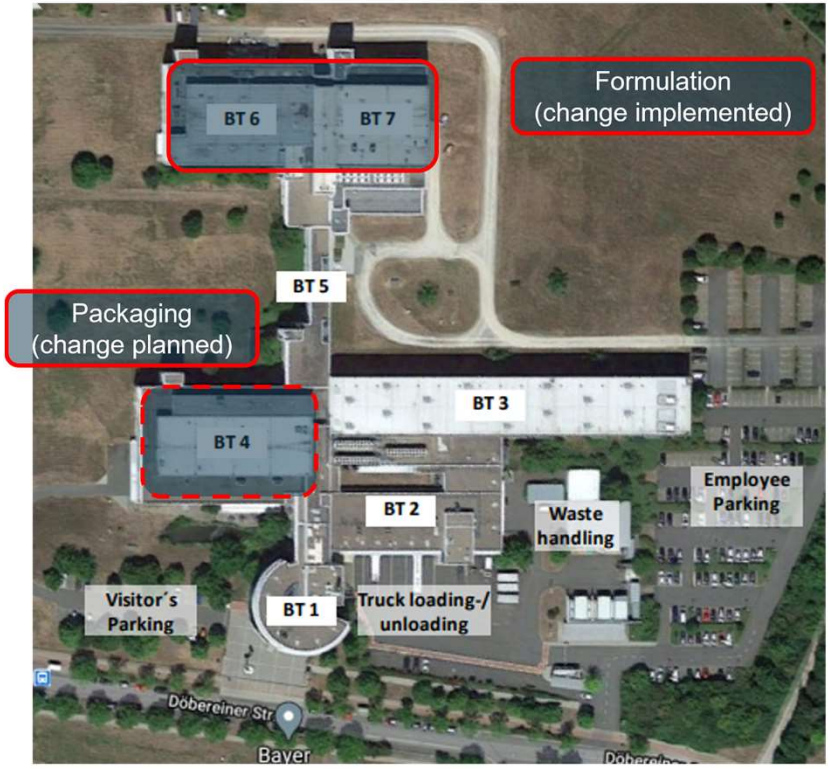
Project status
- ☐ Project Done
- ☐ Project In Progress
- ☑ Project Shortlisted

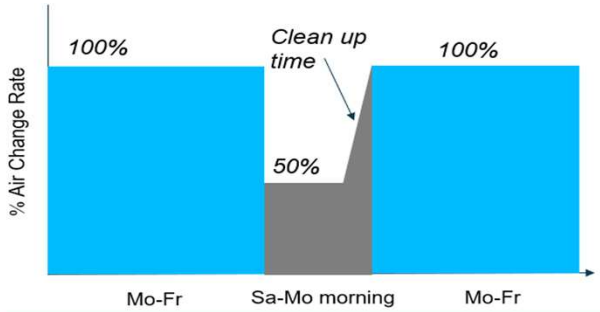
Feasibility window
- Entries missing
- In window
- Not in window

Contact Support | Documentation

Last Patch: 05/2023 (V47) // Last Data Update: 24.10.2023 14:39:38

SC WEIMAR – RAMP DOWN IN NON-PRODUCTION TIMES
EFFORT VS. BENEFITS SUMMARY





EFFORT

- Change request
- Room cleaning before start
- Shut doors and attach signs ‚do not enter'
- 9 measurements x 3 rooms = 27 measurements
- Documentation

BENEFITS

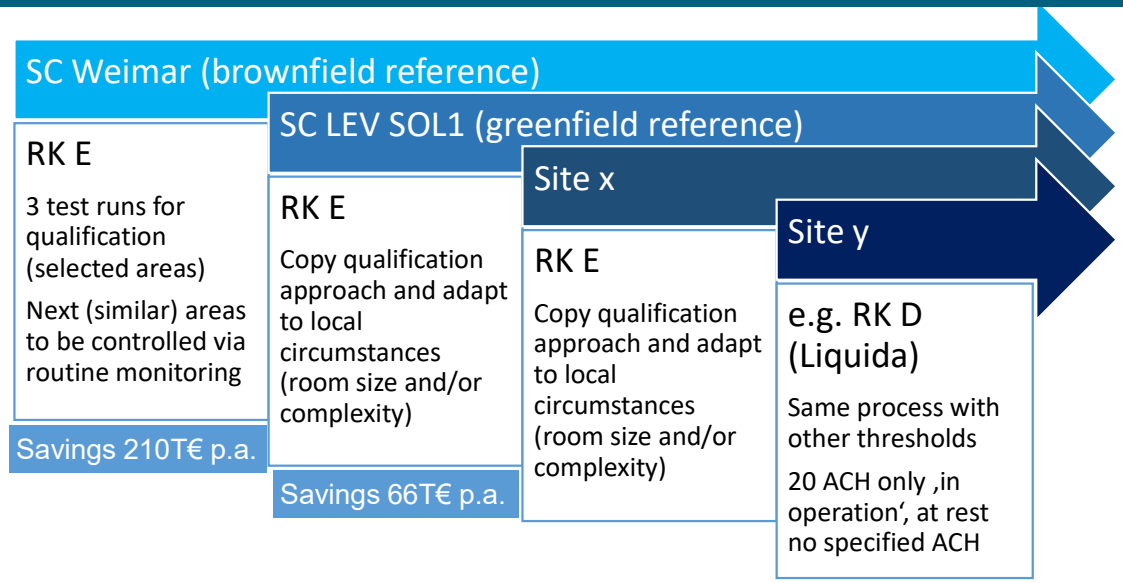
- ✓ Savings 210 T€ energy costs every year
- ✓ Carbon reduction 370 tons ≈ 10% of site footprint
- ✓ NO need for Capex

ROLL-OUT CONCEPT ‚RAMP DOWN AT WEEKENDS‘

Already implemented in other Pharma companies

Pilot SC Weimar successfully finalized, to be extended to all sites where applicable

All sites informed August 11th and requested to copy and realize this change ASAP



RK = Reinheitsklasse / Cleanliness Class
ACH = air change rate

THANK YOU

Thomas Gosmann

WHAT CAN BAYER DO: OUR COMMITMENTS

Value Water

- As we consider water a scarce and essential resource for life, we will start to **incorporate in 2024 water** quality and quantity **into business decisions and investment**.
- **We will develop a method to value water** and incorporate it into investment processes.

Own operations

- We are committed to provide ***safe* drinking water, sanitation and hygiene to all employees** in our sites
- We **apply safe discharges limits** in all our API/AI sites
- We will have a **good water management system* in relevant sites in water scarce areas** by 2030 (50 sites**)
- By 2025 we will **set context-relevant water targets (e.g. reduction/reuse targets) for own operations** to be achieved by 2030

Upstream

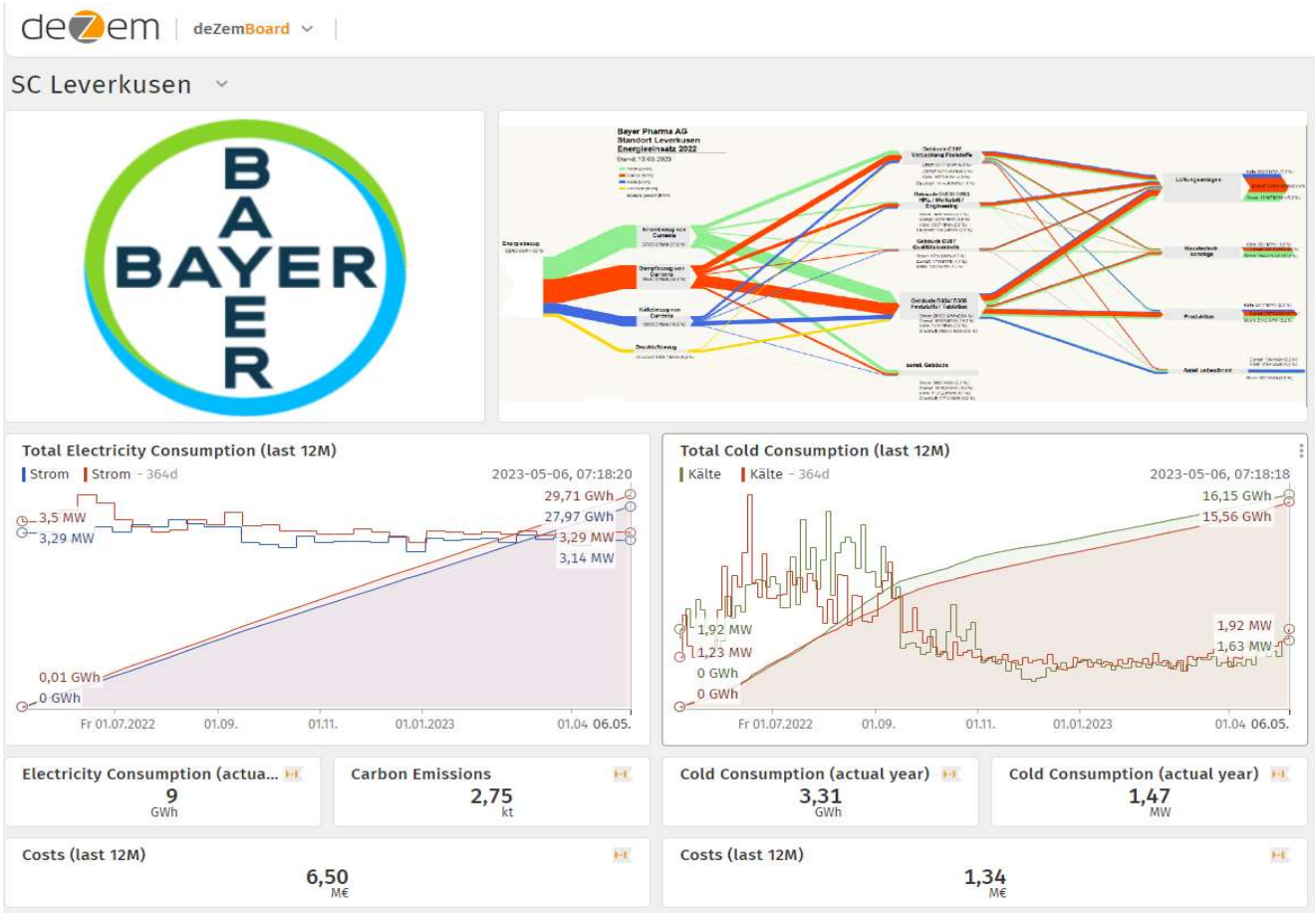
- In 2022 we updated the Bayer Supplier Code of Conduct (SCoC) with **strengthened and dedicated topics addressing water and wastewater**.
- **We evaluate the sustainability performance of all Key Suppliers and of selected high-sustainability-risk suppliers**, using a sustainability risk classification that includes water-risks with a priority-weighting. **We continuously raise suppliers' sustainability awareness** by leveraging our sustainability initiatives TfS and PSCI whose tools contain water aspects.
- We will continue to drive improvements in water use efficiency with growers across the seed production footprint

Downstream

- Drive positive change in water productivity in water scarce regional cropping systems- starting with rice where we commit **to improve water use per kg of crop by 25%** in 2030 by transforming **rice** cropping system for **our smallholder customers** in the relevant regions where Bayer operates.
- By 2030, we will reduce the environmental impact of our crop protection portfolio by 30%, which contributes to water quality.

ROLL-OUT EFFECTIVE ENERGY MONITORING

WORK IN PROGRESS



GOAL: ESTABLISH BASELINE ENERGY CONSUMPTION

		Energy consumption Data			Significant energy use [SEU's] areas defined	Relevant Variables			Specific energy performance indicators [EnPI's] defined
		15 min	monthly	deZem		m²	Kg product	others	
API	Wuppertal	X	X	X	yes (ISO50001 certified)				e.g. COP, EUI*
	Bergkamen/ Charlottenburg	X	X	X	yes (ISO50001 certified)				
	La Felguera	X	X	X					
	Orizaba Proquina								
PH OP	Berlin	X	X	X	yes (ISO50001 certified)				
	Leverkusen	X	X	X	yes (ISO50001 certified)				
	Weimar				yes (ISO50001 certified)				
	Garbagnate	X	X	X	yes (ISO50001 certified)				
	Orizaba								
	Bejing	X (electr)	X (electr)	X (electr)					
	Shiga								
MD	Turku	X	X	X	ISO50001 cert. in 2024				
	Indianola		X (Siemens)						
	Saxonburg		X (Siemens)						
	O'Hara		X (Siemens)						
	Alajuela	Schneider							
BT	Berkeley	X	X (Siemens)	X					
COM	Whippany		X (Siemens)						

1

2

3