



Freie Universität Berlin on the Way to Climate Neutrality

24th REFORM Group Meeting, Raitenhaslach
How to Reach Carbon Neutrality / Climate Neutrality?

August 27, 2020



Agenda

- 1 Introduction**
 - Sustainability at Universities...
... and at FUB at a Glance

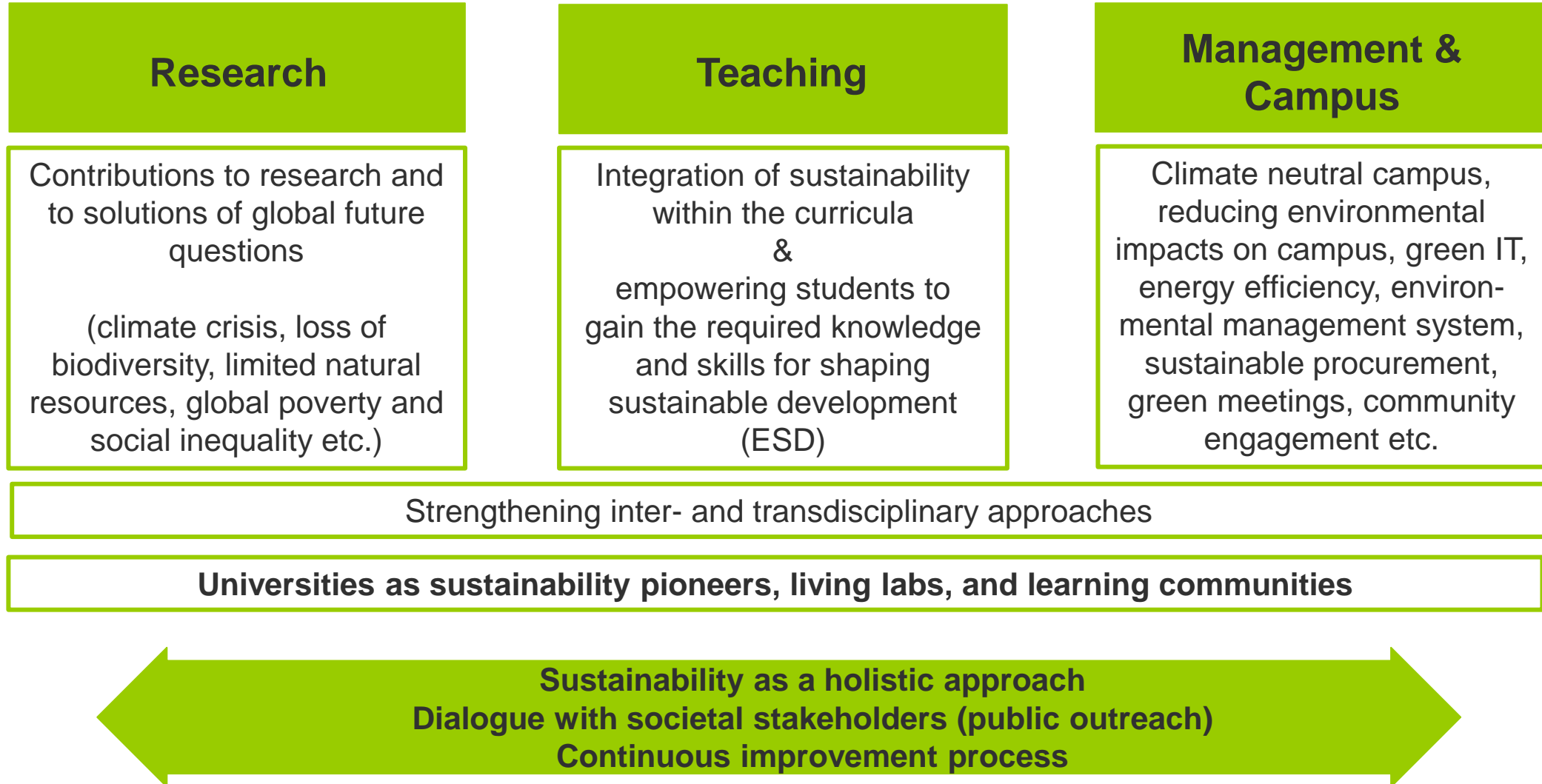
- 2 From Energy to Sustainability Management**
 - Chronology and Milestones
 - Outcomes

- 3 Climate Neutral University 2025**
 - Climate Emergency Declaration 2019
 - CO₂-Factors und Emissions
 - Strategy and next steps

- 4 Challenges**



1 Sustainability at Universities



37,000 students
(incl. 4,000 PhD students)

founded in 1948

5,180 employees
incl. **562 professors**
(incl. 343 tenured professorships)

11 faculties
4 central institutes
228 courses

Excellence-Status
International Network
University

ca. 230 buildings
with **575,000 m²**

government grant: 340 million €
third-party funds: 138 million €

energy costs
13.6 million €

water costs
1.5 million €

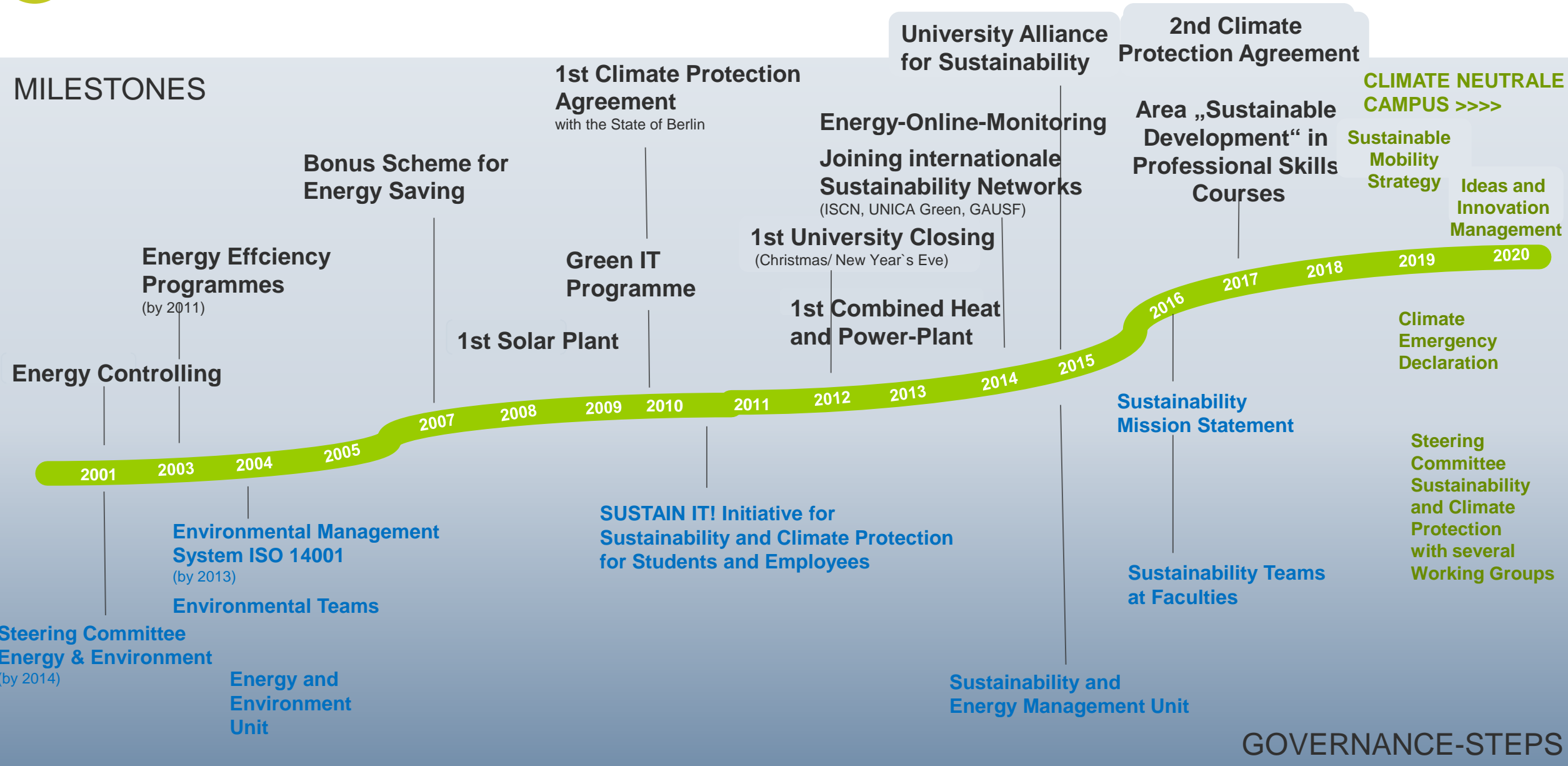
disposal costs
0.33 million €

Energy costs:2019; water and disposal costs: 2018

-  Grünfläche
-  Gewässerfläche
-  Thielallee Wichtige Hauptstraße
-  Schloßstr. Hauptstraße
-  Gerystr. Nebenstraße
-  Buslinie mit Haltestelle
-  S-Bahn Linie mit Bahnhof
-  U-Bahn Linie mit Bahnhof
-  Bushaltestelle



2 From Energy to Sustainability Management



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Energy Efficiency Activities on Campus

- **ENERGY MONITORING (2001-today)**
 - Installation of energy meters (2001/02)
 - Online energy monitoring since 2014
- **ANNUAL ENERGY EFFICIENCY-PROGRAMMES (2003-2011)**
 - Based on building analyses of engineering offices
 - Focused on optimisation of operational technologies
 - Investment costs of 1.5 to 2.5 million €
 - Payback times < 5 years
- **BONUS SCHEME FOR ENERGY SAVING (2007-today)**
 - Incentives for faculties to save energy
- **GREEN IT PROGRAMME (2010-today)**
 - Modernisation of the cooling generation and supply of 2 data centers
 - Central power management
 - Incentives for replacing old and inefficient computers
- **4 COMBINED HEAT AND POWER PLANTS (715 kW_{el})**
- **9 SOLAR PLANTS (657 kW_p)**

KEY OUTCOMES

CHANGES BETWEEN 2000/01 AND 2019

- 29% energy consumption (without increased floor space)
- 27% energy consumption (including increased floor space)
- 98% heating oil
- 35% heat consumption
- 11% electricity consumption
- 19% electricity procurement

CARBON DIOXIDE EMISSIONS

(Energy Consumption on Campus)

- 80 % (based on CO₂-emission factors of energy suppliers and electricity supply contract)

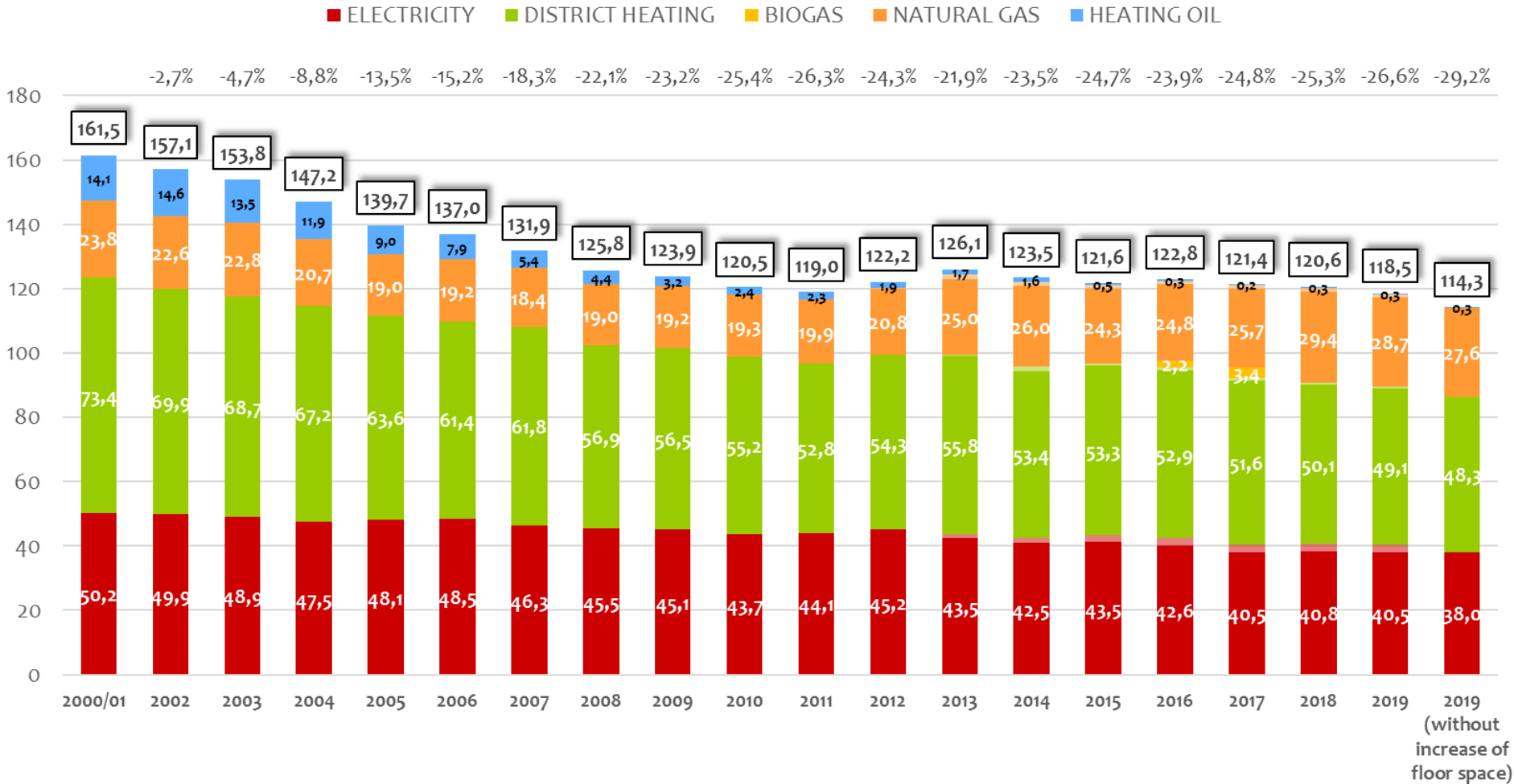
AVOIDED COSTS

- 5.0 mill. € (2019 compared to 2000/01)
- 52.1 mill. € (accumulated since 2003)

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Energy Procurement 2000–2019

in mill. kWh, weather adjusted



-27%
(-29%)

-98%
(-98%)
Heating Oil

+21%
(+16%)
Natural Gas /
Biogas

-33%
(-31%)
District
Heating

-19%
(-24%)
Electricity

Climate Emergency Declaration (Dec. 2019)

“For Freie Universität Berlin, declaring a climate emergency stems from a sense of urgency and comprises the following resolutions:

- **Considering** the possible consequences for the **climate in all decisions and plans**
- Achieving **climate neutrality** at Freie Universität Berlin **by 2025**
- **Comprehensively integrating** climate protection and sustainability **in the curricula** at Freie Universität Berlin
- Making sustainability and climate protection even **more visible** in research, teaching, and transfer in the future and systematically embedding these themes in our **international networks**
- Supporting the personal dedication to sustainability and climate protection of all members of the university through **ideas and innovation management**
- **Continuing our efforts** to promote sustainability and climate protection in our own areas of responsibility, i.e., **within the administration and on campus**
- Assessing and documenting our progress through **periodic reports**”

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How did the decision come about? Key discussion points

Politics and Society

- Scientific evidence of climate change
- Rising importance of science in global climate policy
- Fridays-for-Future and Scientist-for-Future Movement („from climate change to climate crisis“)
- A growing number of prominent universities signing a climate emergency declaration

University

- Student General Assembly in June 2020 with a list of demands addressing the president of the university
- Several meetings with student representatives at the executive level and at the unit for sustainability
- At an early stage: The decision to establish a new steering committee for sustainability and climate protection with members representing all status groups, appointed by the Academic Senate
- Long-standing experiences in climate mitigation

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How did the decision come about? Procedure and Key Arguments

June 2019

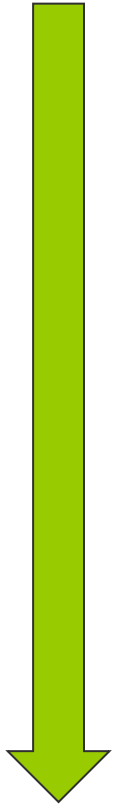
Student General Assembly

Several meetings with students

Involvement of all members of the Executive Board in writing the climate emergency declaration

**Final meeting with final editing and fixing the date for climate neutrality.
Arguments for choosing 2025: urgency of climate crisis, signal to start immediately**

Dec. 2019



Climate Neutral University – Which CO₂-Factors?

CO₂-Factors in g/kWh 2017

	District Heating	Natural Gas	Heating Oil	Electricity
CO ₂ factors according to Federal Environment Agency *	194	202	268	486
CO ₂ -factors according to Office for Statistics Berlin-Brandenburg **	239	201	266	507
CO ₂ factors according to energy suppliers / supply contracts	129	176	268	0

* = National average data ** = District Heating: Berlin average data, Electricity: National average data

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Climate-neutral University – Which Balance Limits?

Scope 1 Direct emissions from sources within the organization

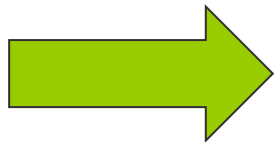
= Emissions from the generation of heat and electricity on campus and the vehicle fleet

Scope 2: Indirect emissions from procured energy, generated outside the organization

= Emissions from procured district heating and electricity

Scope 3: Other indirect emissions from activities of the organization which are from sources outside the organization

= Emissions from business trips as well as the production and transport of procured goods and services



FUB includes the emissions of energy consumption on campus, of the vehicle fleet and of the business trips

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Carbon dioxide emissions in tons 2018

(including energy consumption on campus, vehicle fleet and business trips)

	District Heating t	Natural Gas t	Heating Oil t	Electricity t	Vehicle Fleet* t	Emissions on Campus t	Business Trips (only flights**) t	Total in t
CO₂-emissions (according to emission factors of energy suppliers / electricity supply contract)	6,475	5,154	0,081	0,000	0,190	11,900	5,868	17,768
as a percentage (only campus)	54%	43%	1%	0%	2%	100%		
as a percentage (campus and business trips)	36%	29%	0%	0%	1%	67%	33%	100%

* ca 680,000 km/year (2016/17)

** according to CO₂ emission factors of the Federal Environment Agency, only Flights, which are accounted by the business travel agency

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Strategy towards Climate Neutrality 2025*

- 1. Saving energy and improving energy efficiency on campus**
(energy efficiency of buildings, operational technologies, car pooling etc.)
potential: 10%, ca. 1,200 tons CO₂)
- 2. Use of renewable energy**
(installation of additional PV and solar thermal systems, switching the vehicle fleet to e-mobility, switching from natural gas to biogas?)
Potential: avoided CO₂ emissions of 2,500 to 3,000 tons CO₂

* The following approaches 1-4 are considerations of the Sustainability and Energy Unit which have not yet been officially decided by the Executive Board.

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Strategy towards Climate Neutrality 2025

3. Defining a sustainable business trips policy (as part of a comprehensive sustainable mobility programme), aiming to halve the travel based CO₂ emissions

(Prioritizing train for short distance travels, reducing long distance travels, extending video meetings)

Potential: 3,000 tons CO₂

4. Definition of credible offset-mechanisms

(Feasibility study of CO₂-negative emission technology CarbonThink: closing the cycle of organic waste, production of plant carbon and compost, feeding the heat into the heating system; potential of negative emissions: 1,800 to 2,800 tons CO₂)

Total potential: ?

Strategy towards Climate Neutrality 2025

5. Establishing an idea and innovation management system

(including different sustainability awards, promoting climate protection projects and living labs on campus as well as additional ideas for carbon offset mechanisms; funding will be based on an offset calculation with legal carbon prices (25 €/ton CO₂) = ca. 440,000 Euro)

Goals:

- Promoting sustainability and climate protection as future and priority topics
- Supporting the participation and motivation of students and employees
- Strengthening the identification of students and staff with the university
- Enabling scope for creative and innovation-oriented employees
- Anchoring sustainability and climate protection in all areas of the university

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Challenges

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- Holistic view on technology, organization & communication

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- Involvement of internal and external stakeholders



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- Support by top management

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- Authentic collaboration of middle management

Focus attention on climate neutrality to enforce activities in research, teaching and transfer!

Thank you!



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www.fu-berlin.de/nachhaltigkeit





SUSTAINABILITY REPORT 2018

The report is available here:
www.fu-berlin.de/sustainability

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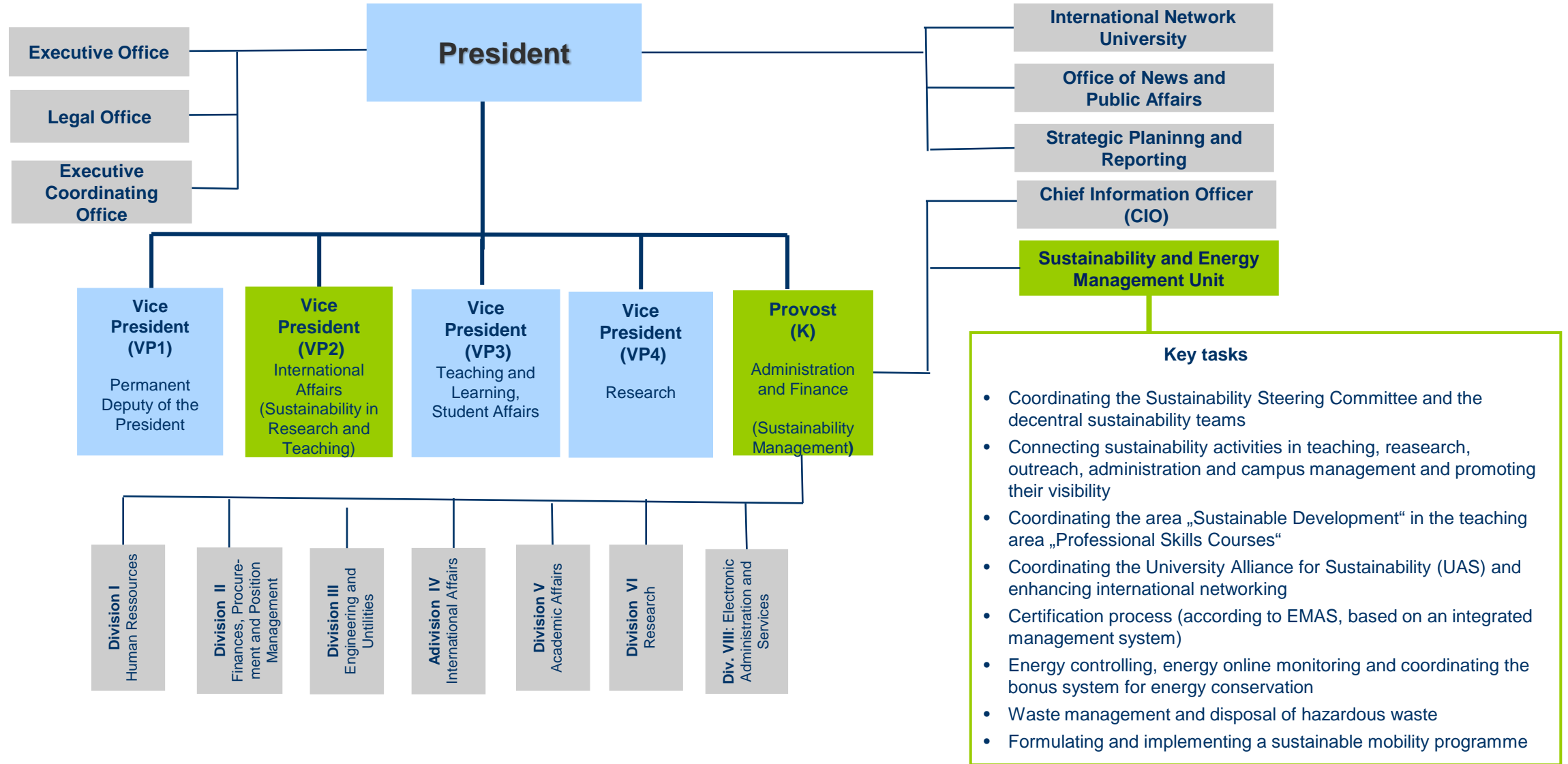
Freie Universität Berlin

Commitments towards climate protection

- 19-year development **from Energy to Sustainability Management**
- Focus on **climate mitigation, environmental management, and participation**
- Founding of **University Alliance for Sustainability in 2015** (funded by DAAD)
- **Sustainability Mission Statement**, signed by the Executive Board in 2016
- **Sustainability and Energy Management Unit**, assigned to the Executive Board since 2015, focusing on an **Whole Institution Approach** – addressing sustainability in research, teaching, transfer and on Campus
- **Sustainability Report**, including the sustainability programme until 2021, published in 2018
- **2nd Climate Protection Agreement** with the State of Berlin in 2018
- **Climate Emergency Declaration** in Dec 2019

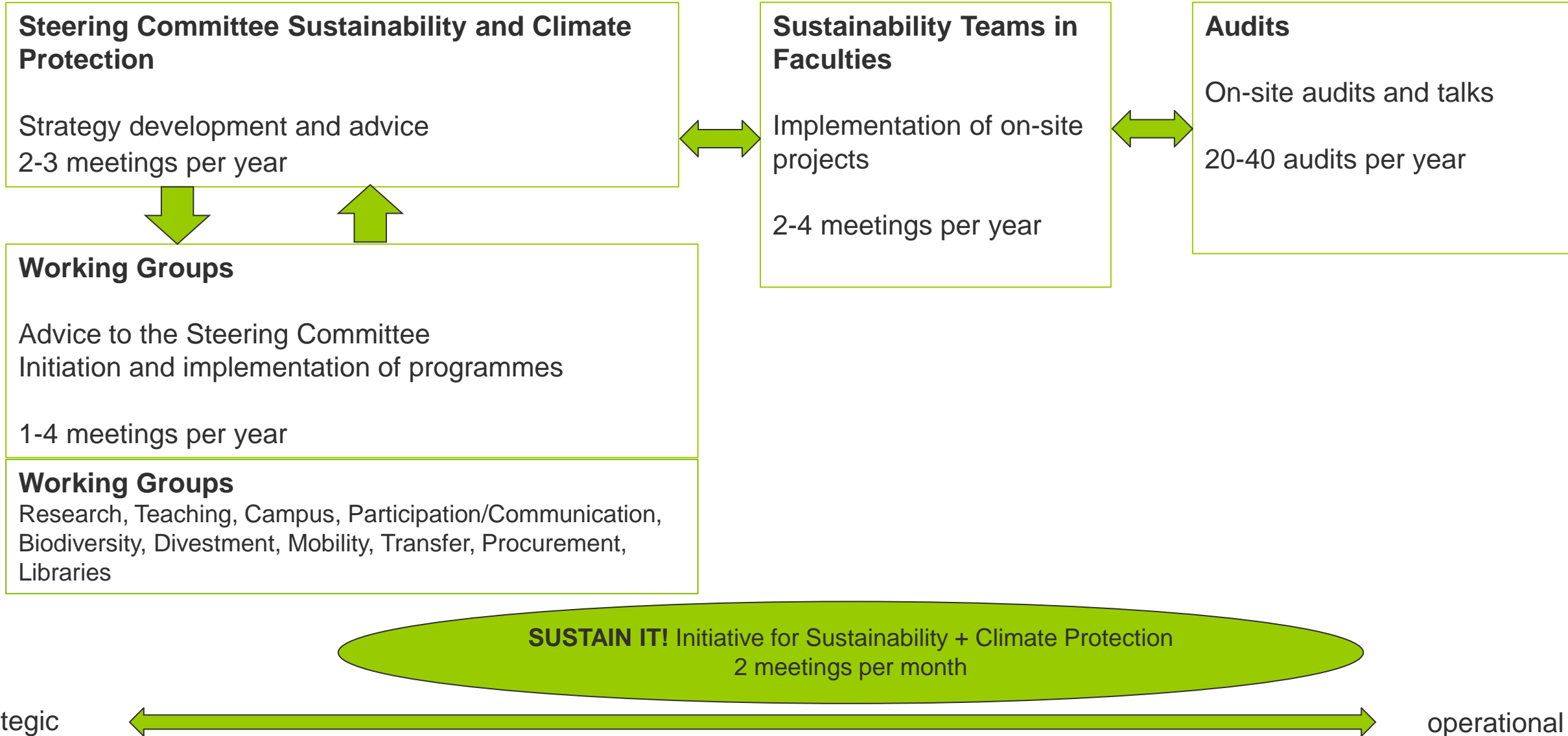
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Governance-Structure of the University Management



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Governance und Participation



BONUS SCHEME FOR ENERGY CONSERVATION

- Bonus payments (50 %), if energy consumption falls below the baseline consumption
- Additional payments (100 %), if energy consumption exceeds the baseline
- Baseline = building-related averaged energy consumption 2004/05
- Consideration of exceptional factors (renovation of buildings, operational technologies, new energy-intensive equipment in labs)
- Baseline adjustments in case of unanticipated events can be negotiated

BONUS SCHEME FOR ENERGY CONSERVATION

OUTCOMES 2007-2018

Faculty	Bonus 2007	Bonus 2009	Bonus 2010	Bonus 2011	Bonus 2012 Baseline: - 2%	Bonus 2013 Baseline: - 4%	Bonus 2014 Baseline: - 6%	Bonus 2015 Baseline: - 8%	Bonus 2016 Baseline: - 8%	Bonus 2017 Baseline: - 8%	Bonus 2018 Baseline: - 8%
Life Science	-47,464 €	211,961 €	220,983 €	270,162 €	212,288 €	176,876 €	166,035 €	113,037 €	137,350 €	151,334 €	142,525 €
Physics	5,670 €	13,333 €	25,049 €	59,206 €	31,602 €	44,481 €	41,851 €	42,407 €	12,041 €	11,304 €	16,190 €
Earth Sciences	5,909 €	4,451 €	4,307 €	4,573 €	536 €	22,732 €	31,220 €	24,063 €	29,330 €	22,229 €	26,927 €

Faculty	Bonus 2007 in €	Bonus 2008 in €	Bonus 2009 in €	Bonus 2010 in €	Bonus 2011 in €	Bonus 2012 in € Baseline: -2%	Bonus 2013 in € Baseline: -4%	Bonus 2014 in € Baseline: -6%	Bonus 2015 in € Baseline: -8%	Bonus 2016 in € Baseline: -8%	Bonus 2017 in € Baseline: -8%	Bonus 2018 in € Baseline: -8%
Veterinary Medicine												45,995
Biology, Chemistry, Pharmac	-47,464	101,583	211,961	220,983	270,162	212,288	176,867	166,035	113,037	137,350	151,334	142,525
Physics	5,670	20,199	13,333	25,049	59,206	31,602	44,481	41,851	42,407	12,041	11,303	16,190
Political and Socia Sciences	13,620	8,837	12,191	9,945	4,461	4,882	3,584	6,723	4,192	2,320	3,346	4,397
History and Cultural Studies	5,740	8,700	12,427	13,877	14,806	15,278	3,781	7,692	3,154	4,449	8,650	5,705
School of Business and Econ	4,058	7,070	8,144	8,736	11,765	11,575	9,304	10,870	7,593	11,240	12,543	15,894
Law	1,412	6,597	14,138	13,505	6,602	7,940	7,114	4,860	2,915	4,960	5,051	5,396
Philosophy and Humanities	4,345	5,522	4,513	7,079	16,328	11,410	6,581	15,192	6,909	3,077	9,039	12,472
Education and Psychology	-5,918	2,601	5,837	5,452	8,218	2,495	1,141	1,451	0,473	4,829	5,346	6,758
Mathematics / Computer Sci	-2,553	2,591	5,419	4,609	4,107	3,187	5,486	1,166	2,254	2,915	2,681	4,439
Earth Sciences	5,909	1,537	4,451	4,307	4,573	0,536	22,732	31,220	24,063	29,330	22,229	26,927
CI OEI	1,994	3,141	4,498	3,498	1,684	2,234	2,313	3,129	459	201	182	181
CI ZFK	486	0	0	684	247	883	-629	214	678	489	1,317	645
CI LAI	361	1,179	971	764	1,365	1,482	738	867	892	1,230	1,151	1,170
total	-12,340	169,557	297,883	318,488	403,524	305,792	283,494	291,270	209,026	214,431	234,172	288,695

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BONUS SCHEME FOR ENERGY CONSERVATION

OUTCOMES



- Significantly intensified energy saving activities and enforced communication at department level
- More suggestions on weak technical and constructional points by university members
- Bonus payments were partially spent on further energy efficiency measures



- Several baseline adaptations in lab buildings
- The audits show further energy saving opportunities in many buildings

- Cut of the baseline by two percent per year between 2012 and 2015
- Closing the university at Christmas / New Year for two weeks, implemented since 2012/13
 - Reduction of the indoor temperature to 12-14 °C in all buildings
 - Exceptions only in areas with plants and animals
 - Savings of annual energy costs between 160.000 € and 260.000 €.
 - Connecting university closure with energy audits

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CO₂-emissions 2000-2019

Campus without Vehicle Fleet and Business Travel

	2000/01 in t (including electricity)	2009 in t (including electricity)	Change in % (2009 to 2000/01)	2010 in t (without electricity)	Change in % (2018 to 2000/01)	2019 in t (without electricity)	Change in % (2019 to 2000/01)
CO₂-emissions according to information of energy suppliers / electricity supply contract	57.194	34.964	-38,9%	12.951	-77,4%	11.448	-80,0%

CO₂-Emissions of Flights 2015-2018 in tons

