CHAPTER 9

Action is what counts: Sustainability at ETH Zurich and EPFL

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Tackling the challenges of sustainable development requires critical thinking, innovative technologies and an open dialogue between science, industry, and society. As Swiss-based universities that are consistently high in the leading international university rankings, the Swiss Federal Institute of Technology Zurich (ETH Zurich) and the Ecole Polytechnique Fédérale de Lausanne (EPFL) are committed to playing a key role in addressing these challenges on a national, European and global scale. Sustainability must be at the core of the main areas of academics: research, education and knowledge transfer. The following article illustrates the general commitment of EPFL and ETH Zurich to improve their sustainability performances.

THE COMMITMENT TO ETH ZURICH AND EPFL SUSTAINABILITY

Integrating sustainability into the institutional mindset

In research, EPFL and ETH Zurich stress inter- and transdisciplinary collaborations, as these are particularly fruitful for generating ground-breaking innovations. In education, the two technical universities focus on teaching methods that are tightly integrated with cutting-edge research projects in order to enable the leaders of tomorrow to make real world change. Between 2009 and 2010, ETH Zurich and EPFL were also successful in supporting the foundation

of 44 and 34 spin-off companies respectively, not only to transfer research results into marketable products, but also to create qualified jobs for agents of change with regard to sustainability.

In addition, EPFL and ETH Zurich recognize that addressing complex environmental problems requires an ongoing exchange between science, stakeholder groups and decision-makers. Therefore, both schools support public policy debates as an "honest broker", providing impartial scientific information to all parties concerned, with due emphasis on the assumptions and uncertainties that are unavoidable in all scientific studies.

ETH Zurich and EPFL also act as role models for the decarbonization of society by sharing their own operation management techniques and fostering a sustainable campus environment for working and living. For instance, ETH Zurich has developed an energy strategy based on three pillars: energy efficiency, renewable energy and electrification. To underline the commitment to low carbon emissions, ETH Zurich is currently constructing underground storage fields to dynamically store and circulate energy from geothermal and waste sources across the Science City campus, both for heating in winter and cooling in summer. In 2009, EPFL received the International Sustainable Campus Award for its efforts regarding criteria like heating (thermopump), sustainable architecture and mobility. At present, the largest photovoltaic power station in Switzerland is under construction on the flat roofs of the EPFL buildings.

ISCN/GULF network: Linking strong partners to make a change

EPFL and ETH Zurich are aware that sustainability encompasses more than just environmental issues. Both universities are working towards a sustainable workplace in other ways, such as by placing strong emphasis on diversity in the student body, faculty and staff. This is not only an issue of equal opportunity, but is also essential for creating the dynamic mix of ideas and people crucial for generating innovation. For this reason, the two universities have taken a leading role in setting up, funding and supporting the ISCN/GULF Sustainable Campus Charter.

The Charter is a joint initiative of the Global University Leaders Forum (GULF), which convenes higher education representatives within the World Economic Forum (WEF) and the International Sustainable Campus Network (ISCN), a global organization that brings together sustainability managers, academics and senior administrators from universities around the world.

The aim of the ISCN/GULF network is to pool global knowledge on how universities can best support sustainable development through their research and education, and by walking the talk in their own operations in order to

inspire future leaders. ETH Zurich and EPFL jointly host the ISCN secretariat, which magnifies the conviction that organizations of research and higher education have a particular responsibility in our society's journey towards a sustainable future.

Sharing a common vision: 30 world leading universities take action for sustainability

In January 2010, after four years of preparation, the partnership between ISCN and GULF led to the development and dissemination of the ISCN/GULF Sustainable Campus Charter. The Charter asks endorsing organizations to acknowledge shared principles regarding the sustainability impacts of their buildings, their campus-wide planning and target-setting processes, and their integration of research, teaching, outreach and facilities into a "living laboratory" for sustainable development. Each Charter member commits to setting its own concrete goals related to these shared principles, and to report publicly on its progress in realizing these goals.

Since the endorsement ceremony in 2010, 30 universities have committed to the ISCN-GULF Charter as members (an alphabetic list of all members is attached at the end of this text).

Three principles, measurable goals and regular reporting for improving campus performance

The signatories of the ISCN/GULF Sustainable Campus Charter acknowledge that organizations of research and higher education have a unique role to play in developing the technologies, strategies, citizens and leaders required for a more sustainable future. Signing on as a Charter member represents an organization's public commitment to aligning its operations, research and teaching with the goal of sustainability. The signatories commit to:

- implement the three ISCN/GULF sustainable campus principles described below;
- set concrete and measurable goals for each of the three principles and strive to achieve them;
- and report regularly and publicly on their organizations' performance in this regard.

Charter principle 1

The signatories of the ISCN/GULF Sustainable Campus Charter demonstrate respect for nature and society, and agree that sustainability considerations should be an integral part of planning, construction, renovation and operation of buildings on campus.

A sustainable campus infrastructure is governed by respect for natural resources and social responsibility, and embraces the principle of a low carbon economy. Concrete goals embodied in individual buildings can include minimizing environmental impacts (such as energy and water consumption or waste), furthering equal access (such as nondiscrimination of the disabled), and optimizing the integration of the built and natural environments. To ensure buildings on campus can meet these goals in the long term and in a flexible manner, useful processes include participatory planning (integrating end-users such as faculty, staff and students) and life cycle cost analysis (taking into account future cost-savings from sustainable construction).

Charter principle 2

The signatories of the ISCN/GULF Sustainable Campus Charter ensure long-term sustainable campus development, and that campus-wide master planning and target-setting should include environmental and social goals.

Sustainable campus development needs to rely on forward-looking planning processes that consider the campus as a whole, not just individual buildings. These processes can include comprehensive master planning with goals for impact management (for example, limiting use of land and other natural resources and protecting ecosystems), responsible operation (such as encouraging environmentally compatible transport modes and efficiently managing urban flows), and social integration (ensuring user diversity, creating indoor and outdoor spaces for social exchange and shared learning, and supporting ease of access to commerce and services). Integrated planning can benefit from including users and neighbours, and can be strengthened by organization-wide goals (for example, reducing greenhouse gas emissions). Existing low-carbon lifestyles and practices within individual campuses that foster sustainability, such as easy access for pedestrians, grey water recycling and low levels of resource use and waste generation, need to be identified, expanded and disseminated widely.

Charter principle 3

The signatories of the "ISCN/GULF Sustainable Campus Charter" align the organization's core mission with sustainable development, facilities, research, and education should be linked to create a "living laboratory" for sustainability.

On a sustainable campus, the built environment, operational systems, research, scholarship and education are linked as a "living laboratory" for sustainability. Users (such as students, faculty and staff) have access to research, teaching and learning opportunities on the connections between environmental, social, and economic issues. Campus sustainability programs have

concrete goals and can bring together campus residents with external partners, such as industry, government and organized civil society. Beyond exploring a sustainable future in general, such programs can address issues pertinent to research and higher education (such as environmental impacts of research facilities), participatory teaching, and interdisciplinary research. Institutional commitments (such as a sustainability policy) and dedicated resources (such as a person or team in the administration focused on this task) contribute to success.

"Walk the talk" of sustainability

As signatories of the ISCN/GULF Sustainable Campus Charter, EPFL and ETH Zurich strive to share the goals and experiences on sustainable campus initiatives among peers and other stakeholders. A key instrument for this is the regular reporting on progress under the Charter. At the last GULF meeting, which took place during the 2011 WEF Davos event, ETH Zurich and EPFL were among the first to submit their reports in order to disseminate best practices among the GULF members.

Final or draft reports were also available from more than half of the other GULF members that endorse the Charter: Brown University, Georgetown University, Harvard University, Indian Institute of Technology Madras, Johns Hopkins University, Massachusetts Institute of Technology, National University of Singapore, University of Cambridge, University of Oxford, University of Pennsylvania, and Yale University. In addition to these GULF schools, further Charter members that have already reported include Carnegie Mellon University and the University of Luxembourg.

ISCN/GULF Charter offers option for comprehensive sustainability reports

The ISCN-GULF Charter Reporting Guidelines provide not only the option of short, freestanding Charter Reports with goal and performance tables, but also more comprehensive sustainability reports for example following the guidelines of the Global Reporting Initiative (GRI). The GRI "is a network-based organization that pioneered the world's most widely used sustainability reporting framework. […] GRI's core goals include the mainstreaming of disclosure on environmental, social, and governance performance" (www.globalreporting.org, May 2011). The GRI-framework for sustainability reporting receives wide acceptance as a standard for high quality, independency and confidence, particularly within the corporate sector. Since the first idea of a disclosure framework for sustainability information was conceived in 1997, the GRI-framework has become the most widely used standard for sustainably reporting. Today, more than 2,700 organizations apply the GRI reporting

framework worldwide. Among them, however, only two dozen pioneer universities have committed to disclosing their sustainability performance according to this independent standard.

By referencing the GRI framework for sustainability reporting, the ISCN/GULF Charter Reporting Guidelines offer a format that enables more intense experience exchange on sustainability between universities and corporations, which often choose this framework for their ongoing reporting on corporate sustainability.

Outlook

After the GULF meeting in January 2011, all ISCN-GULF Charter Reports were finalized and published on the ISCN website (www.isc-network.org), including that of EPFL and ETH Zurich. Since that time, Charter membership has opened to all organizations of research and higher education, including corporations with research and development campuses.

The two technical universities in Switzerland, ETH Zurich and EPFL, are convinced that the ISCN/GULF Charter process will help enhance the reputation of each charter member as an international centre of excellence in the field of sustainability. Therefore, EPFL and ETH Zurich will continue to support the ISCN network strategically, financially and logistically over the next two years.

With their interdisciplinary expertise in natural, engineering and applied sciences, ETH Zurich and EPFL are in an excellent position to play a pioneering role in the development of sustainable technologies, but also with practical actions towards sustainability. Commitment to the ISCN/GULF network illustrates that EPFL and ETH Zurich aim not only to be leading academic institutions, but to contribute significantly to solving some of the world's most pressing environmental and social problems.

PRACTICAL EXPERIENCES FROM ETH ZURICH

In the first year of ISCN/GULF reporting, ETH Zurich produced a comprehensive GRI-standard report to meet the requirements of the ISCN/GULF Sustainable Campus Charter. First experiences gained with the new reporting format and selected results are illustrated below.

ETH Zurich as pioneer: Benchmarking standard for sustainability performance in academia

ETH Zurich sees sustainable development as a central issue for society, and is committed to contributing to this goal through its research, education and knowledge transfer, as well as through its own operations. Therefore, the president of ETH Zurich decided to apply a more comprehensive sustainability

report for the reporting period of 2009 to 2010. In order to increase transparency for all stakeholders, this ETH-sustainability report combines the annual ISCN-GULF Charter Report with an overview of ETH Zurich's sustainability goals, initiatives and achievements (see attachment).

In May 2011, ETH Zurich received its first approval of the GRI Application Level Check (B-Level). This report includes detailed information on research, education and knowledge transfer related to sustainability. It comprises facts about students, faculty and staff. It refers to ETH Zurich's sustainability performance in terms of facility management and environmental issues. Finally, the report illustrates ETH Zurich's commitment as an "honest broker", and its role to inform society and decision-makers is demonstrated in detail. Aspects of funding and governance are also discussed in the context of sustainability.

Selected results from ETH Zurich's Sustainably Report 2009 to 2010

The following chapter illustrates ETH Zurich's reporting standard by means of environmental parameters. It provides insight into aspects such as energy demand, greenhouse gas emissions, paper use and waste management.

Savings in relative energy demand

ETH Zurich's total direct energy use (defined as fuels like natural gas burned in own facilities) was 39.6GWh in 2009 and 41.7GWh in 2010. Indirect energy use (mainly electricity and district heating from outside providers) was 123GWh (2009) and 122.5GWh (2010). Thereof, almost 28GWh in 2009 and 31GWh in 2010 were sold as heating energy to third parties in the district heating networks around the two campuses of ETH Zurich. Electricity consumption at ETH Zurich has increased over the last few years due to several reasons: expansion of the building portfolio, increased use of highly electricity demanding instruments and facilities (which are essential to ensure cutting-edge research at a technical university), and the shift from heating with fossil fuels to electricity (which requires the use of heat pumps). The increase of ETH's electricity consumption does not, however, cause significantly higher greenhouse gas emissions, as electricity in Switzerland is mostly generated by hydropower (55.8%) and nuclear production (39.8%). In addition, relative energy demand expressed per person (full-time equivalent, or FTE, campus users) and per floor area has steadily fallen. As new and renovated high efficiency buildings will be added to the energy budget over the coming years, relative energy use figures are expected to drop. Also, a focus on more efficient use of floor area will allow ETH Zurich to limit further needs of work space, even as student and staff numbers grow.

Waste heat recovery

ETH Zurich owns and operates seven large central cooling plants. In addition to cooling, each of their chillers produces waste heat. By optimizing the waste heat recovery units (WHRC) over the last few years, ETH Zurich was able to use 10.6 GWh of waste heat in 2009 and 10.9 GWh in 2010 that would otherwise have been lost. In addition to environmental benefits, waste heat recovery led to energy cost savings that allow the university to amortize the investment in the optimization of the WHRCs in less than two years.

Closely monitoring greenhouse gas emissions

ETH Zurich has a strong tradition of measuring and managing its carbon emissions. In 2009/2010, direct or "Scope 1" carbon emissions, mainly from fossil fuels like natural gas burned at in-house facilities, were 8,240t/7,868t expressed in CO_2-equivalents. Indirect or "Scope 2" emissions caused by ETH Zurich's consumption of electricity were 1,445t/1,462t. In order to address the overall carbon footprint of ETH Zurich, further "Scope 3" emissions outside the organization's boundaries are considered, for example emissions from students and staff commuting, and from business travel. This part is responsible for more than 14,200t/15,900t expressed in CO_2-equivalents.

Carbon reduction as a key goal

Comparing emission contributions and options for improvement, key areas for action have been identified. More than 50% of the current CO_2 emissions caused by burning natural gas will be reduced by 2020 by implementation of the new energy concept, Science City. Other measures include closely monitoring and, wherever possible, reducing emissions caused by business travel. By using more electricity in favour of less fossil fuel consumption, the university reduces carbon emissions. One example is a big heat pump in the river Limmat, where some additional electricity replaces larger amounts of CO_2 loaded district heating.

Minimizing air emissions

ETH Zurich closely monitors NO_x emissions from its heating plants as well as VOC emissions from its laboratory activities. In 2009, NO_x emissions were 64 mg/m^3 compared to 80 mg/m^3 in 2008. New, state-of-the-art gas boilers contribute to the lower concentrations. Overall, VOC emissions were 18t in 2009 compared to > 20t in 2008.

Lowering amount and impacts of paper use

"Papers" are still key products at any research organization. This does not preclude a strong focus on reducing paper consumption and on improving the environmental output of the remaining consumption. In 2009 and 2010, paper

use was 60.8 million pages and 61.6 million pages respectively (compared to 63.9 million in 2008). Key to the paper-reduction strategy is increasing use of online documents in education and administration, and raising awareness among students and staff. Paper sourcing at ETH Zurich is increasingly being shifted to recycled fibres, corresponding to about 46.5% (2009) and 44.3% (2010) of paper consumption by weight. For the remaining virgin paper, ETH Zurich promotes the use of paper that meets the criteria of the Forest Stewardship Council for responsible forest management (FSC label). The goal is to eliminate non-recycled, non-sustainably forested paper sources completely.

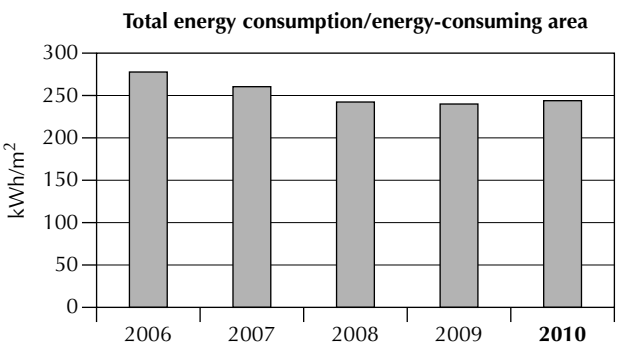
Staff and students boost recycling

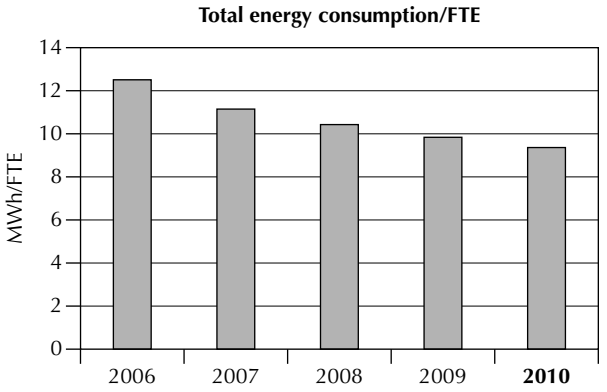
A key environmental goal of ETH Zurich is increasing the recyclable portion of its waste stream. Reuse of chemical substances by introducing storage rooms, and recycling of solvents and other materials such as CDs/DVDs and electrical waste contribute to this. High awareness and consistent support of students and staff have been essential for reaching ETH Zurich's recycling goals, from large volume waste streams down to the small "Nespresso" coffee pods.

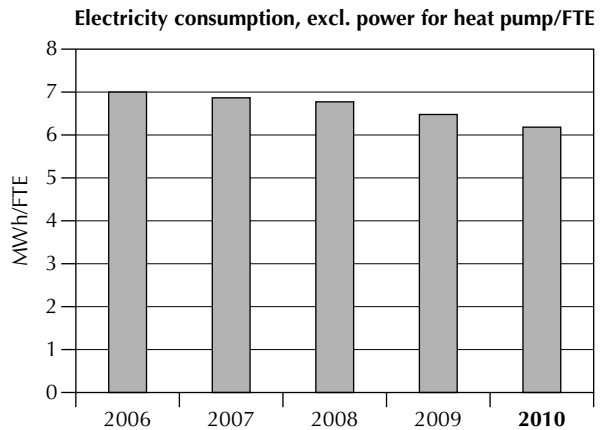
Safe handling of hazardous waste

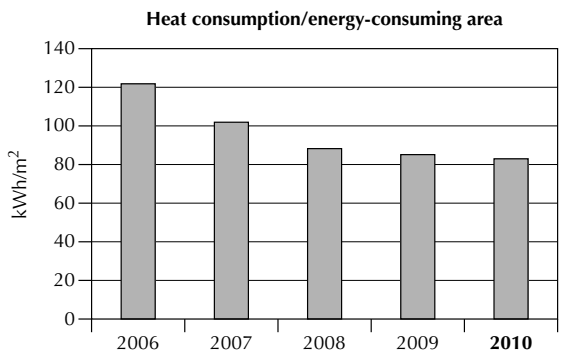
As a top international research institution, hazardous materials have to be used for certain research activities. ETH Zurich promotes economical use of hazardous material. Staff and students are trained to ensure correct and safe disposal. In 2009/2010, ETH Zurich disposed of 108t/95t of hazardous material, of which 51t/47t were waste solvents sent to treatment facilities for safe incineration or reuse as fuel in the cement industry, depending on the concentration of chemicals such as chloride. Only small amounts of waste, approximately 5 tons/year (e.g. heavy metals) are directed to underground landfill (old salt mine). This compares to 1210t (2009) and 1170t (2010) of non-hazardous waste disposed of via the municipal waste stream, and destined for incineration.

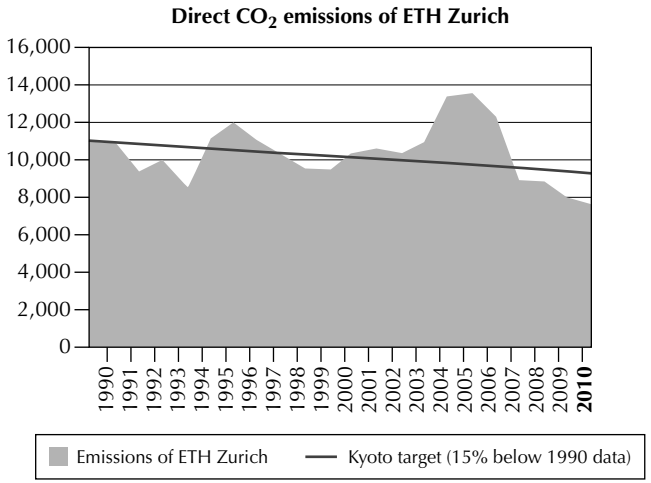
Energy: trend to lower use at ETH Zurich

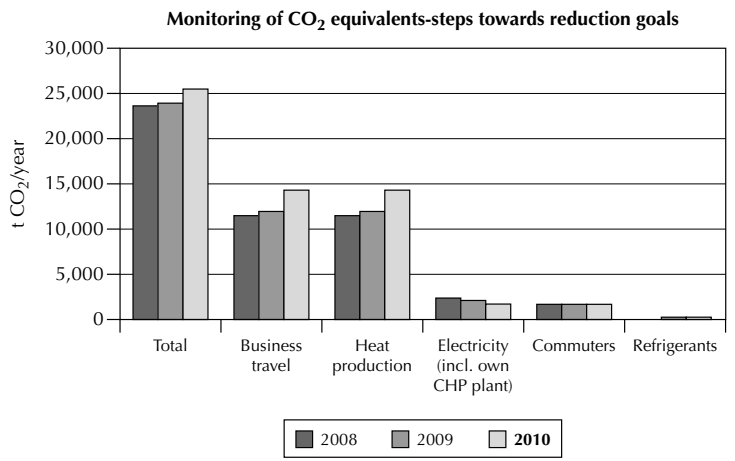


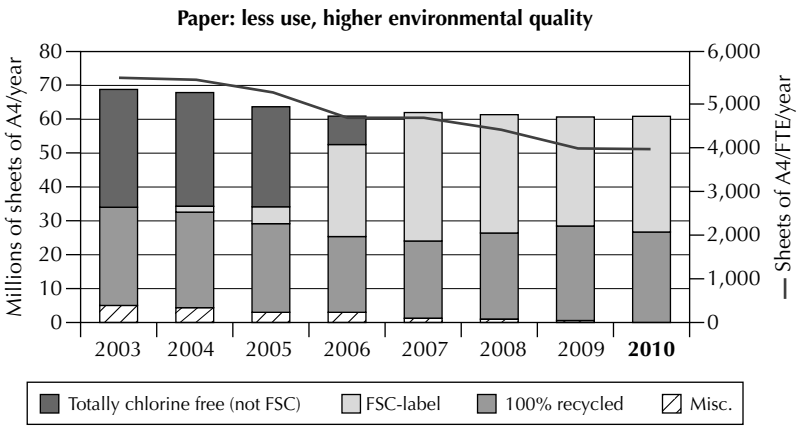

Total energy consumption/FTE
MWh/FTE
14
12
10
8
6
4
2
0
2006
2007
2008
2009
2010


Electricity consumption, excl. power for heat pump/FTE
MWh/FTE
8
7
6
5
4
3
2
1
0
2006
2007
2008
2009
2010


Heat consumption/energy-consuming area
kWh/m2
140
120
100
80
60
40
20
0
2006
2007
2008
2009
2010


Direct CO_2 emissions of ETH Zurich
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
Emissions of ETH Zurich
Kyoto target (15% below 1990 data)


Monitoring of CO_2 equivalents-steps towards reduction goals
t CO_2/year
30,000
25,000
20,000
15,000
10,000
5,000
0
Total
Business travel
Heat production
Electricity (incl. own CHP plant)
Commuters
Refrigerants
2008
2009
2010


Paper: less use, higher environmental quality
Millions of sheets of A4/year
80
70
60
50
40
30
20
10
0
6,000
5,000
4,000
3,000
2,000
1,000
0
Sheets of A4/FTE/year
2003
2004
2005
2006
2007
2008
2009
2010
Totally chlorine free (not FSC)
FSC-label
100% recycled
Misc.

Lessons learned from ETH Zurich: The process is as important as the result

First experiences with the new ETH Zurich sustainability report revealed positive results: The systematic process to compile GRI-relevant data led to increased internal awareness of the importance of sustainability. Particularly, the integration of social issues launched important and interesting discussions on what to consider as relevant for sustainability within an academic environment. The results show that the analysis of the environmental performance was as important as gender issues, legal aspects or the integration of sustainability in the overall strategic planning process. The report also underlines the importance of a strong intuitional commitment to sustainability on the highest level of decision-making. This is especially true when it comes to the implementation of goals and objectives.

The decision of the Executive Board of ETH Zurich to follow the GRI guidelines highlights the commitment to making the "Ivory Tower" more transparent to all partners in society and industry.

PRACTICAL EXPERIENCES FROM EPFL

This section illustrates the manner in which EPFL manages its environmental impact, monitoring for more than the past ten years essential parameters such as primary energy and CO_2, water and paper consumption, as well as the waste-recycling rate.

EPFL: 40 years of sustainability on its Ecublens site

During the 1970s, at the height of the oil and environmental crises, the people in charge of building the EPFL campus outside the city set very demanding

environmental goals for the time regarding ecological building, which was not yet called sustainable building. Heating and cooling entirely ensured by lake water, with heat pumps and converters, thermal insulation far ahead of its time, natural ventilation and lighting, green roofs, extensive and indigenous landscaping, servicing by a metro line, etc. are many of the responsible and visionary choices that were implemented with great determination.

Certified in 2006, EPFL's environmental management program is modeled on the Swiss Confederation's and keeps the impact of the campus's activity under control year after year. For EPFL, it is now time to make known even more clearly its environmental targets, to set ambitious goals and to report annually on the results using a global tool within the GRI framework. A first report in 2010 carried out within the ISCN-GULF framework shows the way and indicates the necessary adaptations in order to meet GRI criteria.

Key results from the EPFL 2010 report

EPFL required 18GWh of energy to ensure its heating in 2009 and 21GWh in 2010, as well as 55GWh of electricity in 2009 and 67GWh in 2010. The increase in these two figures can be explained by the campus's growth (opening of the Rolex Learning Center, a Minergie-certified building), a particularly harsh winter and the launch of several demanding laboratories (white rooms, IT). With an exceptional level of 56% of heating from renewable sources in 2009, unchanged in 2010, EPFL is setting an example. For electricity, although the Swiss mix is particularly favourable with its share of hydraulic and nuclear, the 0.4% of electricity from renewable sources is low and justified the creation of the Solar Park on the EPFL's rooftops. This will enable a gradual increase of that rate: 1.2 MW will be in production by the end of 2011 and 2 MW by the end of 2012. Related to square metres or number of users, requirements in heating and electricity remain stable over time. As future buildings and renovations conform to high standards of insulation and high occupation rates, it will be possible to keep heating consumption well under control. However, it seems that electricity requirements, in particular for scientific processes, will increase regularly over the coming years.

An innovative Master Energy Management Program for EPFL

The first full environmental assessment of EPFL was carried out in 2001 and clearly showed the stakes. A first calculation indicated 19,830 tons of carbon emissions, of which 1,360 for electricity, 8,530 for buildings (over a duration of 80 years), 8,490 for professional (academic) and private (commuting) travel, 1,280 for heating, 1,070 for water and 685 for paper. Regarding primary energy, it is therefore clearly electricity and its production mode that should be the focus, whereas it is the private and professional mobility, as well as the

buildings' lifecycle, that have the greatest impact on CO_2 emissions. Considering the very rapid evolution of the worldwide energy debate, EPFL's management has decided to put together by the end of 2011 a new Master Energy Management Program that sets ambitious goals for primary energy and CO_2, and to accelerate its implementation over the coming years, with strong measures from the point of view of efficiency, energetic autonomy, resorting to renewable energies and user behaviour.

UNIL-EPFL Mobility plan

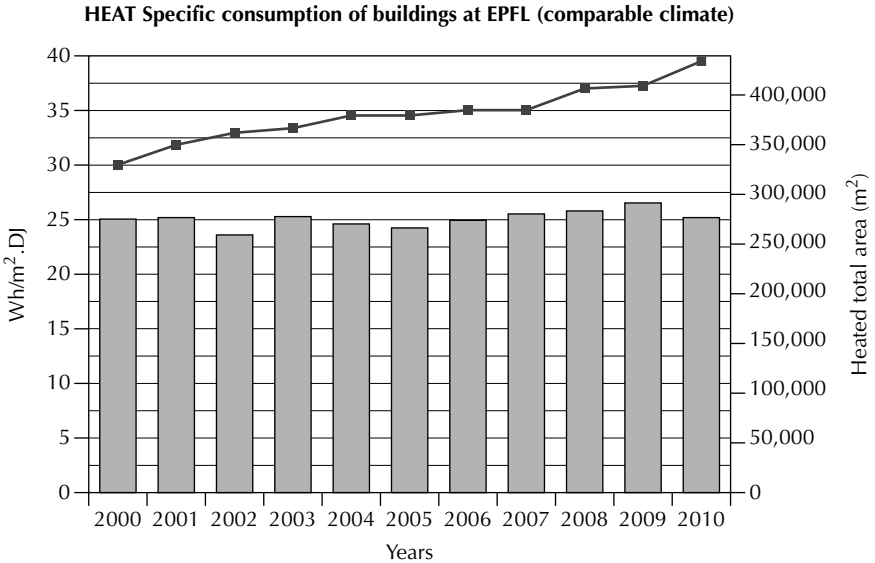
With over 30 tons of CO_2 emitted every semester day by students and staff to get to the campus, 88% of which are caused by car drivers, private mobility is an important challenge for the reduction of impacts. Many measures in favour of soft mobility have curbed these effects, in particular by a 5% increase of the modal proportion allotted to bikes over the past five years. In this, the creation of 1,300 secure bicycle parking places, the restoration of changing rooms and showers, the creation of a repair workshop, the setting up of the first Swiss public bike-sharing system that is free for the staff and students, have opened the way. A Mobility plan shared with Lausanne University will enable further improvements until 2014, thanks to a very comprehensive package of measures connected with soft modes, incentive to use public transport, innovative management of parking lots and campus planning (lodgings for students and staff).

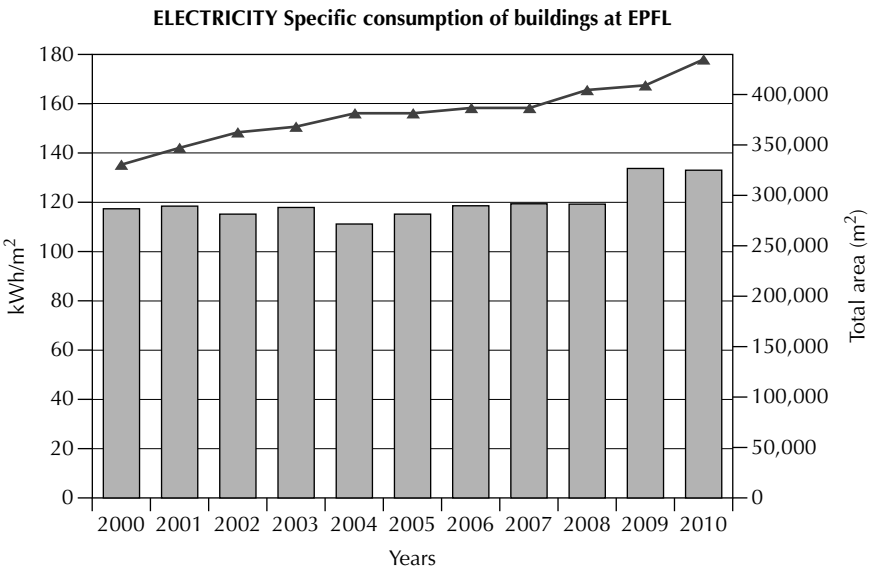
Drinking water, paper, waste

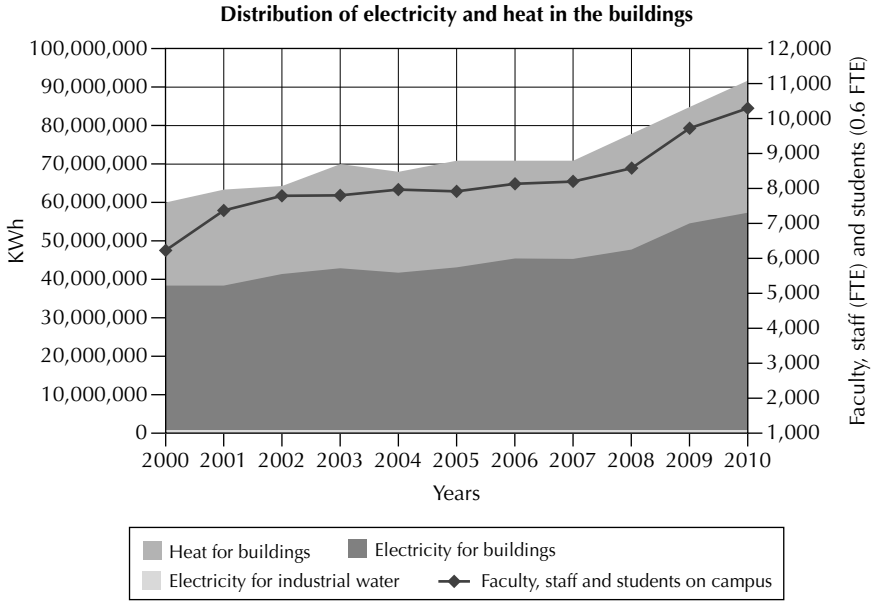
In addition to the efforts that take priority for reducing the consumption of heating, electricity and mobility, other aspects require sustained attention, among which the consumption of drinking water and paper, and the production of waste. Although in international comparison these elements have been well under control for many years, EPFL means to continue leading the way. Whereas water consumption is particularly efficient with 17,885 litres per year and per person (15,996 in 2009), as is paper consumption with 3,384 A4 sheets per year and per person (3,977 in 2009), it is now the proportion of recycled paper certified by the Forest Stewardship Council that is the object of the most attention. Indeed, with 23% of recycled paper in 2010 (27% in 2009), EPFL still has a broad potential for improvement and the paper purchasing and use policy is undergoing revision in order to increase the proportion of recycled paper massively over the next few years.

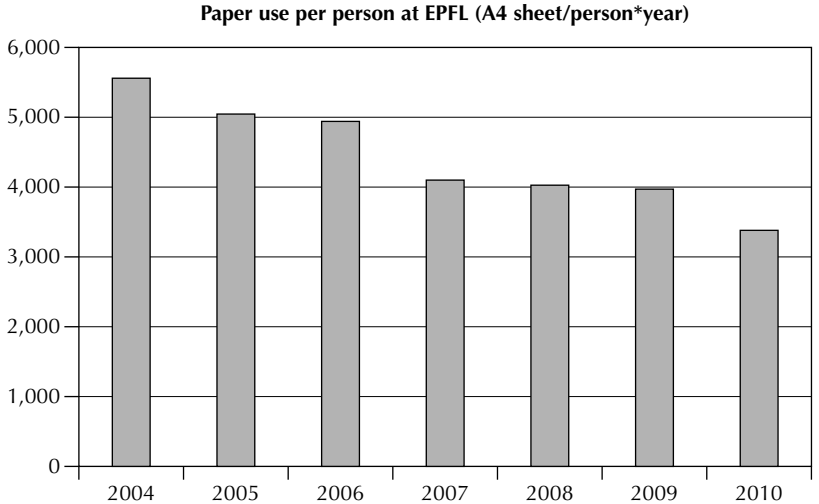
Regarding waste, EPFL produced 1,228 tons of all types of waste in 2010 (1,037 in 2009). The increase is essentially due to the opening of the Rolex Learning Center, which caused an influx of many visitors during the year 2010. However, with a recycling rate of 62%, EPFL has its various waste-treat-

ment chains well under control. In 2010, the delivery of food leftovers from the restaurants to the City of Lausanne's methane production plant noticeably improved the assessment. For special waste, the creation in 2011 of a reinforced safety, prevention and hygiene service will enable to respond ever more appropriately to the increase in requirements.









EPFL 2020

With global climate issues, it is essential for technological universities to continue leading the way in sustainable development and to ensure a responsible running of their campus. Of course, energy issues appear to take priority, but

social dimensions also require constant attention: equal opportunities (male-female, disabled people), social and cultural integration, childhood, safety, physical and psychological health, sport, dietetics, etc. The economic aspect also deserves close attention, for example the cost of studies, grants, students' employability, the institution's efficiency, the ethical management of funds, etc.

The action initiated by ISCN and consolidated through GULF, with the determined support of ETH Zurich and EPFL, will enable the establishment of the standards necessary for the management of technological universities, both consumers of resources and purveyors of solutions for the future, and to lead the way for numerous other university or industrial campuses.

ISCN-GULF Charter Member Universities in Alphabetical Order

1.Brown University
2.Carnegie Mellon University
3.Chatham University
4.Columbia University
5.EPFL
6.ETH Zurich
7.Georgetown University
8.Harvard University
9.Indian Institute of Technology Madras
10.INSEAD
11.Johns Hopkins University
12.Keio University
13.KTH Stockholm
14.London School of Economics and Political Science
15.Massachusetts Institute of Technology
16.Monterrey Institute of Technology and Higher Education
17.National University of Singapore
18.Peking University
19.Pontifical Catholic University of Peru
20.Princeton University
21.Stanford University
22.The University of Hong Kong
23.Tsinghua University
24.University of Cambridge
25.University of Gothenburg
26.University of Luxembourg
27.University of Oxford
28.University of Pennsylvania
29.University of Tokyo
30.Yale University