User manual
Footprint calculator for schools FPCS

TU Graz University of Technology
www.fussabdrucksrechner.at/schulen

pht Pädagogische Hochschule Tirol
STRATECO
ÖKOLOG Österreichs größtes Netzwerk für Schule und Umwelt
TU Graz
e-LISA academy
Bundesministerium Bildung, Wissenschaft und Forschung

Imprint:

Publisher:
Federal Ministry for Education, Science and Research
1010 Wien, Minoritenplatz 5

Authors:
Mag. Michael Eder; Institut für Prozess- und Partikeltechnik, TU Graz, 8010 Graz
Dr. Hans Schuster, 5400 Hallein

Editor:
Mag. Angela Kohl, e-Lisa academy, 1010 Wien

Translation:
Dr. Christine Lechner, PHT

Layout:
Reiterer-Grafik, 1170 Wien

Layout English Version:
Jasmin Lunze

Print:
Own duplication.
Reprinted: November 2014

Table of contents

1. Introduction

This user manual is intended to give you a brief insight into the topic of the **Ecological Footprint** and an overview of the contents of the **footprint calculator**. The **instruction manual** will help you to fill in the calculator by providing additional and background information on the individual areas. You will find our contact details at the end of this manual. Please do not hesitate to contact us if you have any questions.

Note: S.4
This calculator was first developed for the Austrian context and has now been internationalised for the member countries of the former ENSI-network (https://ensi.org/) and cooperation partners. This is reflected by the menu items and the metric scale units. If you do not find the exact option that you need, choose a similar one. Do not hesitate to make estimations. The result should show the magnitude of the ecological footprint (according to the Sustainable Process Index) and show you the areas where you have the greatest potential for improvement.

2.The Ecological Footprint

and its calculation according to the Sustainable Process Index (SPI®) - Method

Sustainable Development: The Background to the Ecological Footprint
The aim of sustainable development is to use natural resources only to a degree that will ensure the same basis for life for future generations as we have today. That will only be possible if we do not consume more resources than can be renewed and if we do not pollute the soil, the air and water more than can be degraded again.

The Ecological Footprint
In search of a statement on sustainable action, which can be supported by figures, scientists have developed the concept of the ecological footprint.

The ecological footprint is a measure of how much we change and burden nature through our human actions. The more raw materials we consume and the more pollutants we produce, the greater our ecological footprint will be and the less sustainable life will be.

Sustainability is only possible on the basis of renewable resources. All renewable resources depend on solar radiation as a natural “source of income”. For the conversion of solar radiation into products and services a certain area is always necessary. However, as the earth‘s surface is limited, the possible use of land is also limited. For this reason, “area” is the calculation unit for the Ecological Footprint.

The Calculation

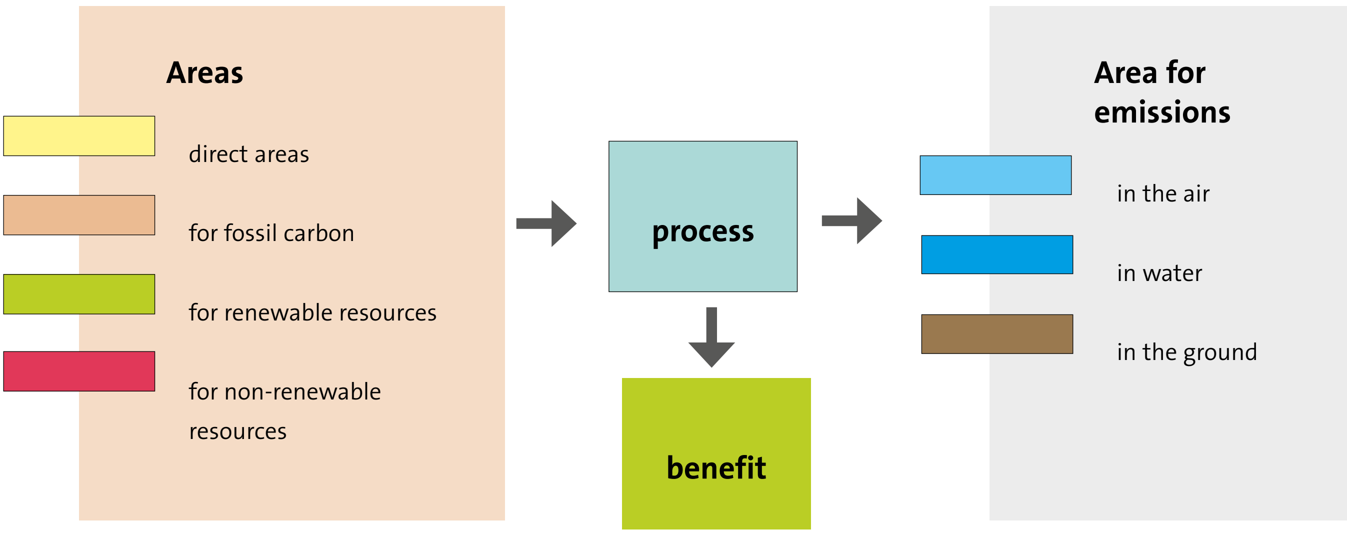
There are different types of ecological footprints that take human behaviour into account to varying degrees. One type of calculation is the Sustainable Process Index (SPI®). With this method, all **material and energy flows** required for a product or service are converted into areas. This normally concerns both the **manufacture and the use of a product** and also includes the resulting emissions.

These material and energy flows are converted according to two principles:

1. *Human material flows* must not change **global material cycles**.
   This principle relates primarily to the carbon cycle and means that no more fossil carbon (from coal, oil, natural gas,.....) may be circulated than the oceans can absorb and sediment. If we put more into circulation (which we do by far), a larger area is needed.

2. *Human material flows* must not change the quality of the **local environment**.
   This means that pollutant inputs into the soil, air and water must not exceed the carrying capacity of the local environment. If pollutant inputs exceed capacity, we again need a larger area so as not to exceed the natural absorption capacity.

The **total area of the footprint** consists of the following subareas:
- Direct land consumption for infrastructure
- Land consumption for non-renewable resources
- Land consumption for renewable resources
- Land consumption for the absorbtion of fossil carbon (C)
- Land consumption for the absorption of emissions in water
- Land consumption for the absorption of emissions in soil
- Land consumption for the absorption of airborne emissions



The larger the ecological footprint, the worse for the environment!

3. Footprint Calculator for Schools

The footprint calculator for schools is a tool **to evaluate schools ecologically in their entirety.** To this end, the calculator examines the areas of electrical energy, thermal energy, water, waste, food, mobility and procurement are highlighted.

Environmental Assessment

The evaluation is based on the Sustainable Process Index (SPI®) method described above. In this way, school leaders, as well as teachers and students, can determine how school operations affect the environment, which areas are most significant and where changes are most effective.

The goal of the calculator is therefore to **create awareness** and to provide **concrete figures** that directly demonstrate the positive effects of environmentally friendly changes. These changes can also be entered as a test to see how changes would affect the footprint.

Short and Long Version

In order to achieve user-friendlinessness and accuracy of results, there is a short and a long version for the areas **of energy, water and mobility.** The latter in particular shows ways of using the calculator in class, as the comprehensive survey tasks can be divided among groups of students.

4. Operating instructions and technical background

4.1. Homepage, Introduction and General Information

On the start page you will find additional information about the calculator and links to the organisations involved. The print version of the calculator and of the Excel files for the mobility survey are intended to simplify data collection. The child-friendly powerpoint presentation on the ecological footprint is annotated to illustrate what is shown on the individual slides.

The **introduction** briefly describes the handling of the calculator. At the end of the page, select:

a) `Enter values` if values are being entered for the first time or

b) `Reload values` if you would like to edit already saved data.

Ad a) `Enter values` :

This button takes you to the next page, to **General information**. At the beginning of the survey, you will be asked to enter the school code, which is needed later, if entered data is to be later reloaded. Further general data are collected such as the number of students and teachers, total floor area, year of construction or the number of days the school is open per calendar year.

If your school is located in a **school centre** or your school building used additionally for other purposes, please estimate the **proportion** for your school for the different questions either according to duration of use or floor area. For schools with high student fluctuation (e.g. vocational schools for apprentices) there are specific explanatory notes.

The red framed input fields are mandatory. You can only continue when these have been filled in. Please enter the numbers without spaces or dividing points. The remaining fields may be filled in, but are not mandatory.

Schools with high student fluctuation (e.g. vocational schools for apprentices) should enter the number of pupils at school at an average time.

The usable area concerns all rooms on all floors that are in use.
This is not the total area of the school.

On all the pages where entries are made, you can `save to continue later` . When saving for the first time, you must enter a password and the year to which the data refer.
If you edit stored data and click on `save to continue later` you will be able to “overwrite” existing data or create a new dataset for another year thus documenting the development of the school over time.

Ad b) Reload values :
Here you enter the school code and the password that you chose when saving for the first time. Then select the year that you want to edit or add.

When using the Back and Next buttons entries will be saved from page to page, regardless of whether they are cached or not. (If you press the "Next" and "Back"-buttons of your browser only stored data is displayed.)

4.2. Electric power

As described on the page, you can choose between the
a) Average electricity mix and
b) the mix of your own electricity provider.

Ad a) Average electricity mix:

Background information about calculation:

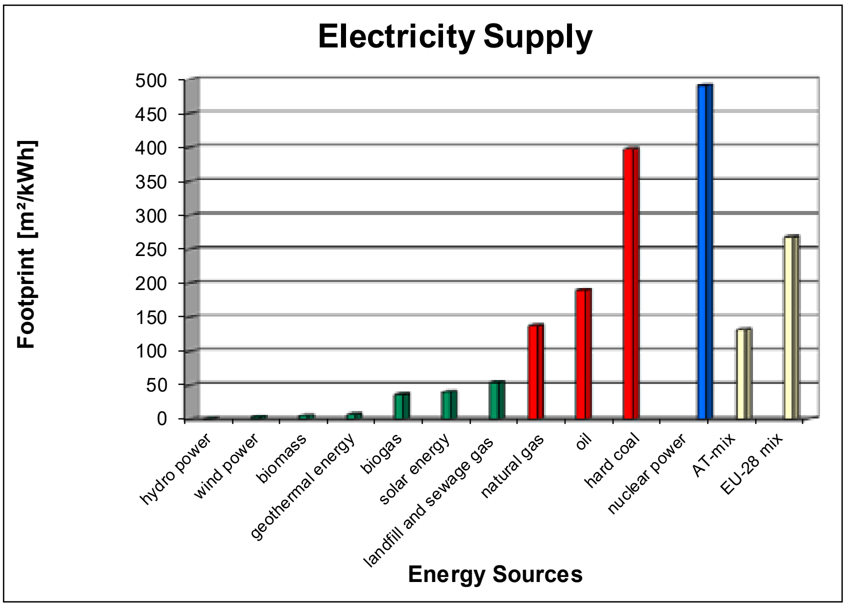
Electricity is generated from renewable, fossil and nuclear sources. The proportion of these components varies greatly from country to country and from electricity supplier to electricity supplier. Therefore, the footprints of the electricity mixes can vary greatly.

Ad b) Own mix:
If absolute accuracy is important here, click on "My mix". For Austria, you will find the percentage composition of your provider in the file Übersicht_Stromanbieter_AUT.pdf, which is available for download on the website.

Background information about the calculation:

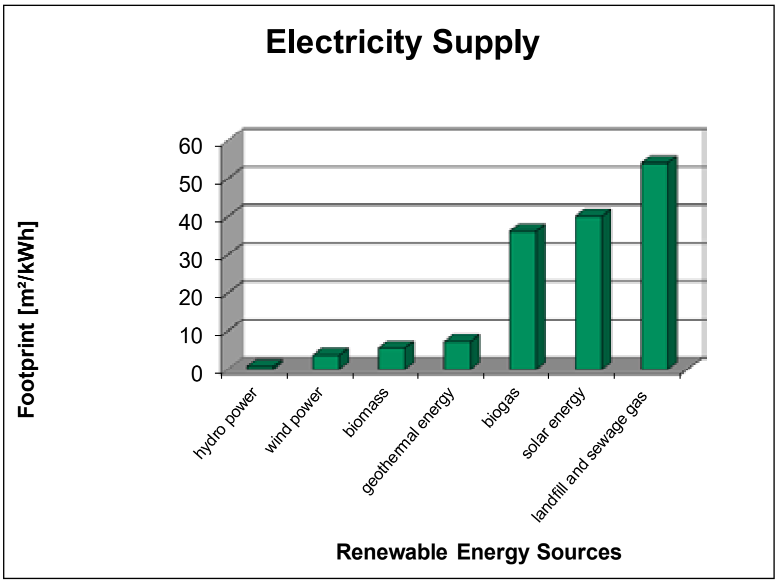
For an electricity provider with a high proportion of renewable energy sources, the footprint of one kWh will be proportionately smaller compared to the average Austrian electricity mix.

The following diagram shows the footprint of the different types of energy:
The green bars in the diagram represent renewable energy sources, the red fossil fuels. The electricity mix in Austria is on the far right in the area of fossil energy supply. This shows that there is still a great need for optimization in order to make the mains current "greener". This is what it looks like in detail:



Energy sources	m²/kWh
hydro power	0.7
wind power	3.7
biomass	5.6
geothermal energy	7.4
biogas	36.3
solar energy	40.1
landfill and sewage gas	54.2
natural gas	137.7
oil	397.6
hard coal	190.2
nuclear power	491.3
AT-mix	131.7
EU-28 mix	268.0

Renewable Energy Sources



Hydropower appears to be an ideal case, as no fuels are used and thus no emissions are produced during operation. Since the operating life of hydroelectric power plants is very long, the use of materials does not play a major role in relation to a kWh.

N.B.: In the footprint calculation, however, it cannot be taken into account that hydropower causes major impact on nature as far as the river habitat is concerned. For this reason electricity from hydropower - although it has a small footprint - should also be used sparingly!

As with the photovoltaic system, the footprint is generated during the production of the wind turbine. However, in contrast to photovoltaics, wind power has a lower energy input in production and a higher yield during its service life.

The use of ***biomass*** (wood) makes ecological sense, as it has previously absorbed the CO_2 produced during combustion by photosynthesis and is therefore CO_2-neutral during combustion. Only the extraction and transport of the wood cause emissions.

From an ecological point of view, electricity from ***geothermal*** energy is at about the same level as biomass. However, this form of energy cannot be optimally deployed everywhere geographically and requires drilling kilometres deep into the ground, which is correspondingly expensive. This is why geothermal energy is not used very often to generate electricity.

Biogas is produced by the fermentation of dung and slurry. The energy yield can be increased by the addition of other organic materials, whereby agricultural residues can be re-used.

Photovoltaic energy does not produce any emissions during operation, but a lot of energy is needed during the production of the plant to bring the cells to the required purity. Thus, the footprint is generated during production. The size of the footprint per kilowatt hour can vary greatly, as this depends on the yields of the plant and the service life. These, in turn, are affected by weather conditions and location. In the graph above, a photovoltaic mix of different photovoltaic systems was used.

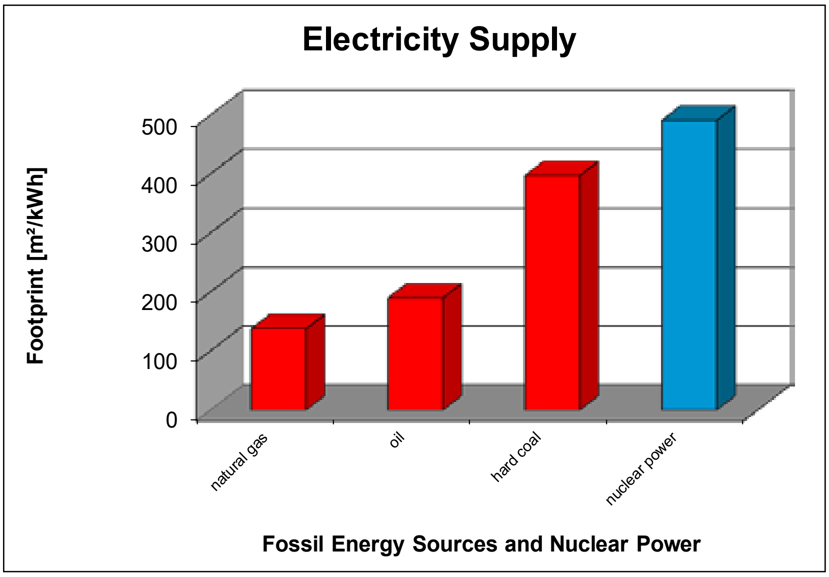
The largest footprint of renewable technologies is ***electricity from landfill and sewage gas*** (D&K). Although the footprint is still smaller than that of the best fossil technology, it is very large compared to other renewable technologies. This is mainly due to the fact that electricity must also be used to produce the D&K (e.g.: agitator, pumps, etc.). This required electricity is not taken directly from the plant, but sourced from the grid, as this is more economical for the operator.

The footprint for ***other renewable energy sources*** *i*s an average of all renewable energy sources.

Fossil Fuels & Nuclear Energy

Nuclear energy has by far the largest footprint. The reasons for this lie in uranium ore, which has to be mined at great expense, transported to the power plants and enriched with high energy expenditure in order to make it usable for nuclear fission, as well as for the extensive nuclear waste storage. In addition, a large amount of cooling water is required, which has an adverse effect on the ecological footprint.
In addition, the radioactive radiation generates a high environmental pressure.

Natural gas is the best energy source among fossil fuels. It consists almost exclusively of methane (CH_4), which is converted into CO_2 and H_2O during combustion. In contrast, **coal** and **oil** produce more emissions during combustion, which pollute the environment.



In the second part of the electricity survey you can again choose between a) short version and b) long version.

In the **a) short version**, simply enter the number of kilowatt hours the school consumes per year.

If there are several schools in a building and there is only one electricity meter, calculate the share based on your usable area in relation to the total usable area or use the long version to roughly calculate the amount of electricity needed.

In the **b) long version** you can (together with the students) measure the performance of the individual electronic devices, estimate the service life for a device and select whether the respective device switches to standby.

The long version serves more to raise awareness of which appliances consume how much electricity rather than to accurately record the amount of electricity consumed. The estimates in the long version are, of course, less accurate than the electricity meter. However, you can also use this version if you cannot access the electricity meter.

If the power demand of a device is not visible, use the average power demand of the device indicated on the left with an * or take a look at the manufacturer’s homepage.

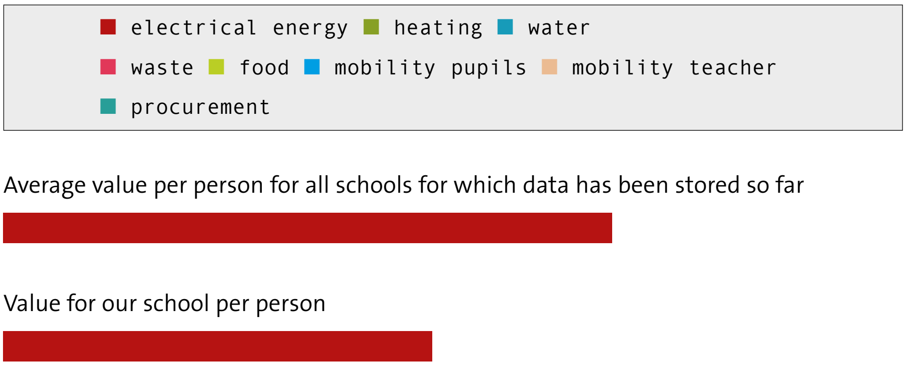
However, if you know that the annual power consumption and the value calculated using the long version differs greatly from the value, you can either correct the estimate of the useful life of the individual devices or switch to the short version and enter the actual number of kWh consumed.

<u>Background to Calculation for Photovoltaic Systems:</u>

The electricity that you produce with your photovoltaic system is credited to you after your previous power selection. For example, if you have chosen the Austrian electricity mix with a footprint of 131.7 m^2/kWh, 131.7 m^2 will be deducted for each kWh produced by the photovoltaic system.

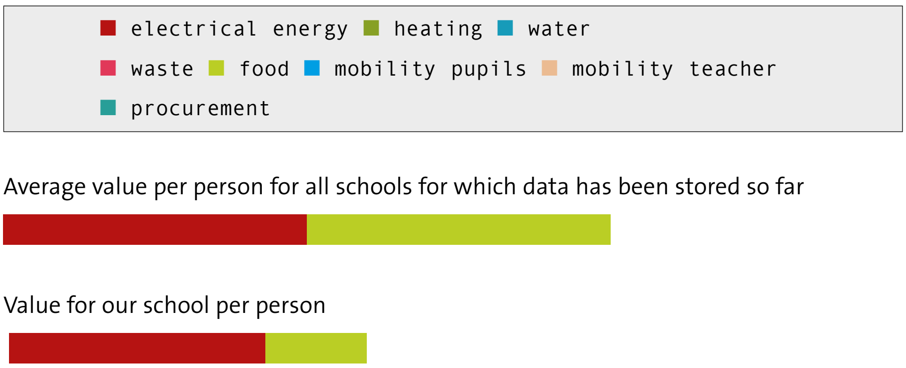
Footprint Bar

The footprint bar appears on the following page where there are questions about heating systems.



The upper bar shows the average footprint (calculated from the data previously stored in the database) for the individual areas per person (students, teachers and staff) in your country.

The bar below shows the values you have entered for your school. The bars grow from area to area.



This allows comparison of footprints per person with other schools.

N.B.

Of course, this comparison should always be seen against the background that different schools have different requirements.

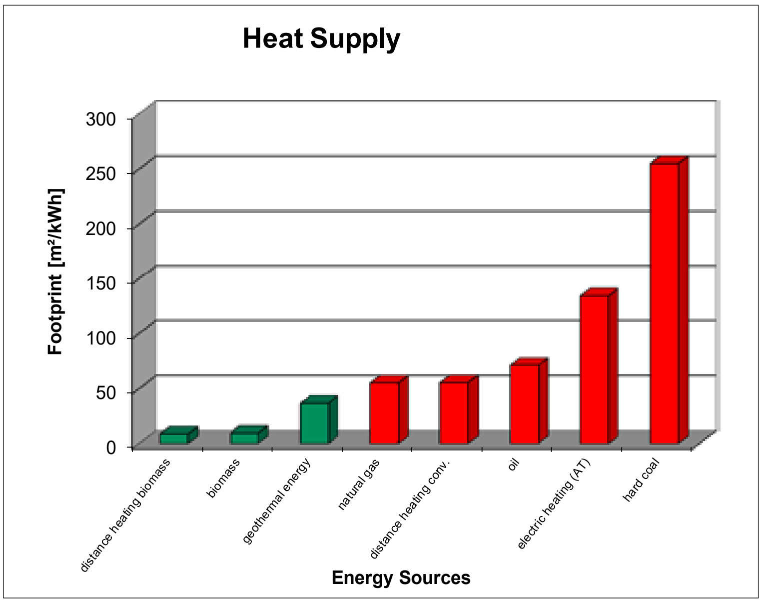
For example, a rural school usually has a higher mobility footprint than a school in the city and an older (poorly insulated building) has a higher heating footprint than a newer building.

4.3. Heating

There is also a choice between a) a short and b) a long version for heating.
Ad **a) Short version**: Only the fuel quantity per year is asked here.
Ad **b) Long version:** By entering the data of the building shell (building material, insulation, glazing), the fuel quantity is automatically calculated with the selection of the heating type.

Background to the calculation:

Electricity, there are sometimes large differences in the footprint between the individual energy sources when it comes to heating. Fossil fuels have a much larger footprint than renewable energy sources.



Energy sources	m²/kWh
distance heating biomass	8.5
biomass	9.1
geothermal energy	36.8
natural gas	55.0
distance heating conv.	55.2
oil	71.1
electric heating (AT)	134.4
hard coal	254.7
electric heating,	214.8
brown coal	437.1

The footprint for hard coal is the largest of the energy sources for heat supply, due to the high emissions.

Electric heating also has a very large footprint. The efficiency of the heating is very high at approximately 98%, but the generation of electricity is extremely complex. Electricity is a higher-quality form of energy than heat and therefore it makes little sense to convert this energy generated at great expense back into lower-grade heat.

Natural gas has the smallest footprint among the fossil energy sources.
The use of biomass (wood) is the most favourable.

4.4. Water

Similar to the heating system, the **a) short version** offers the possibility to enter the water consumption directly and the **b) long version** offers the option to determine the water quantities via the devices that consume water.

Here, too, the long version is intended more to raise awareness of where (warm) water is used rather than as a precise record of the amount of water consumed. The estimates in the long version are of course less accurate than the water meter.

If the actual water consumption of the school is known and the value calculated using the long version differs greatly from this, there are two possibilities: You can either correct the usage estimates or switch to the short version and enter the amount of water read from the water meter.

Background to calculation:

The footprint for water is usually very small compared to other areas because the supply and disposal of drinking water requires little infrastructure and energy. However, it is not completely irrelevant how much water is consumed. This applies above all to hot water, the treatment of which is already included in the "Electricity" or "Heating" areas. In order to make responsible use of water visible, there is an additional bar here.

4.5. Waste

You can determine the footprint for the waste either by the container sizes and their quantity or by the quantity in kilograms. For the first variant, the different fractions are listed twice in order to be able to select different container sizes.

If the dustbins are not completely filled, you can reduce either the number of tons or the number of emptyings accordingly for the calculation.

Background to calculation:

Here the removal of the waste is calculated. This means that the more waste produced, the higher the transport volume and the larger the ecological footprint. The landfilling of residual waste is also taken into account.

Here, too, there is a separate bar that visualizes the changes more clearly when there is less waste, since here too the proportion of the total footprint is usually small.

4.6. Food

In the case of food, it is possible to put together a survey in modular form - depending on what the school has to offer. "School milk campaign", "buffet", "kitchen catering" and "catering" are available. This type of survey offers the possibility to specify the proportion of organic and local suppliers.

> School-milk programme and school meals:
> Here, again, vocational schools for apprentices should indicate the average number of students per year.

Background to calculation:

Meat dishes have a larger footprint than vegetarian dishes. The reason for this is that more energy is needed for livestock farming than for vegetables and cereals.

Organic products have a smaller print than conventionally produced products. One reason for this is the high consumption of fertilizers and chemicals in conventional agriculture. For the organic crop production, other fertilizers and crop protection products are used that have a much smaller footprint. In return, this also has an effect on meat production. If the feed already has a smaller footprint, the meat itself will also have a smaller impact on the environment.

For local supply products, a much shorter transport distance is assumed than for "standard" products.

> Buffet / school meals:
> If products in the selection list do not exactly match your products, please select the most similar ones.

As in the two previous sections, there is a separate bar that shows changes more clearly.

4.7. Mobility

When entering mobility, you can choose a) the short version or b) the long version again. For vocational schools for apprentices it is recommended (due to different numbers of pupils during a school year) to choose the short version and to use an average annual number of pupils.

Ad a) Short version:
In the short version there are the sub-areas of the daily mobility of students and teachers and school trips.

Daily mobility of pupils and teachers:

For a simpler estimation of the average percentage distribution of the means of transport used over the entire school year and the median catchment area, you can use the Excel file “Template_Mobility_short version.xls“.

Select a class (if possible representative) of your school and enter the total daily distance travelled per pupil (column C) and the distribution of this number of kilometres among the individual means of transport (columns D-K).

The last line (turquoise) shows the average distance travelled per pupil (or per teacher) as well as the percentage allocation to the individual means of transport, which you can then enter in the footprint calculator for schools.

An ***example*** for illustration:

Student 1 has a distance of 20 km to and from school and in fine weather goes by moped. In bad weather and in winter, however, Student 1 uses the bus, but is occasionally also taken to school by car.

Student 2 lives only 4 km from the school, so she has a daily distance of 8 km. Taking the year as a whole she travels half of the distance by tram and half by bicycle.

Student 3 practically always uses the school bus for the entire 40 km he has to cover every day. He walks the short distance to the school bus.

The entry in the white cells of the table sheet and the result in the turquoise fields would then look like this:

Person	daily distance	travelled with							
	[km]	car [km]	moped [km]	motor cycle [km]	bus [km]	train [km]	tram/sub way [km]	bicycle [km]	by foot [km]
1	20	2	10	0	8	0	0	0	0
2	8	0	0	0	0	0	4	4	0
3	40	0	0	0	39	0	0	0	1
Medium catchment area	22.7	0.7	3.3	0.0	15.7	0.0	1.3	1.3	0.3
Distribution on the individual means of transport	100.0	2.9	14.7	0.0	69.1	0.0	5.9	5.9	1.5

The following values would then have to be entered into the footprint calculator:

Car	**2.9**	**%**	**moped**	**14.7**	**%**
motorcycle	**0.0**	**%**	**Bus**	**69.1**	**%**
railway	**0.0**	**%**	**tram / subway**	**5.9**	**%**
bike	**5.9**	**%**	**by foot**	**1.5**	**%**

Medium catchment area: 22.7 km/day

Note on the entries:
If 100.0% appears in the first field (cell C42) for the “breakdown of individual means of transport”, then you know that you have not made any mistakes in the kilometre distribution.

School Trips
For school trips you need a simple pre-calculation to be able to make the entry in person-kilometres (kpp). You can also use the Excel file “Template_Mobility_short version.xls” mentioned above.

Passenger kilometres are the number of kilometres covered by a person using a particular means of transport. These are calculated by multiplying the distance travelled by the number of persons participating for each mode of transport and then adding the passenger kilometres for each mode of transport.

The following ***example*** explains this pre-calculation:
A school class in Linz with 22 pupils takes three school trips: A ski course in Salzburg (distance there and back and trips on site: 500 km by bus), a trip to Vienna (distance there and back: 400 km by train; 20 km by subway on site) and another trip to Wels (distance there and back and trips on site: 100 km).

The calculation would look like this:

Klasse	Class school trip (skiing course, language week, project week, excursion ...)	Transportation (bus, train, tram / metro or plane)	Distance traveled km	Number of partici-pating students	Passenger km (= kilometres traveled * number of participating students)
	Ski course Salzburg	bus	500	22	11000
	Wien	train	380	22	8360
		tram / metro	20	22	440
	Wels	plane	100	22	2200

On the homepage the values in the turquoise field, summarized by means of transport, would then have to be entered:

Bus:	**13200 Person-km/Year (11000 + 2200)**
Train:	**8360 Person-km/Year**
Tram/Metro:	**440 Person-km/Year**

Since the short version is intended to allow data to be entered relatively quickly, the requirement for accuracy is also lower than for the long version. You should therefore only make a rough estimate of the number of kilometres covered and the number of participating students. Furthermore, it is sufficient to use one school class per school level as an example and to make a projection for the number of classes in the school level.

Ad **b) Long version:**

An Excel file is available for the Summer and the Winter terms to find out more about mobility. The reason for this is that mobility can vary greatly in Summer and Winter.

Attention:
Before you open the files “Mobility Survey_WS.xls” or “Mobility Survey_SS.xls”, please set the macro security to “**Medium**” in the Microsoft Excel program under **Extras - Macro - Security**. Save the file to your hard disk. When you open the file, click on “**activate macros**”.

The Excel files provide two ways to calculate the footprint: either by using example classes for all school levels (Variant 1) or by increasing mobility for each class individually (Variant 2).

Variant 1: Here you select an example class per school level with which you would like to survey mobility. This footprint is extrapolated to the entire school level. For the extraordinary mobility (excursions, language trips, etc.) all classes of the respective year level are used. For the first variant, the Excel folder is only used once.

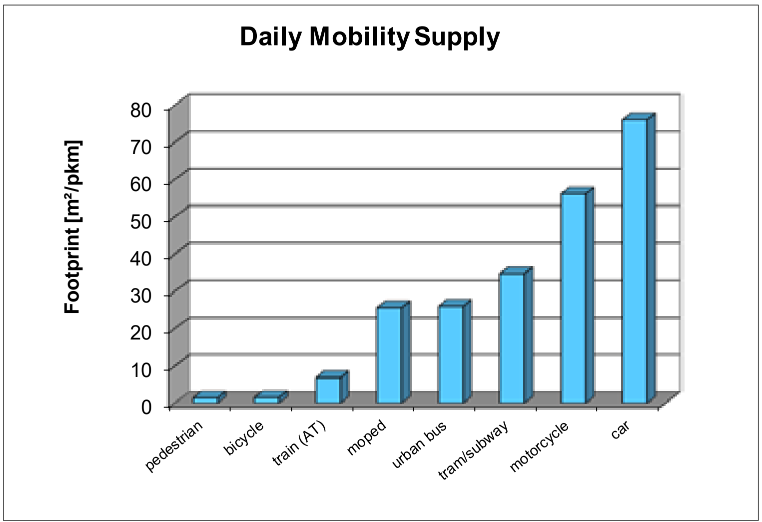
Variant 2: This variant is the most accurate, but also the most complex type of survey. Here you can use the Excel file more than once. For “Number of students” and “Number of students in the sample class”, enter the number of students in the class you wish to survey and add the results of all classes. The mobility of the teachers then adds up to the overall result of the school.

The number of students and teachers on the following pages is defined by the information on the first page.

Attention:
to go from one page to the next, please always use the “Next” or “Back” buttons to take the calculations from one page to the next. The “Reset” - button deletes the entries of the form.

The results are calculated at the end from all entries on the individual pages. Please transfer them to the footprint calculator.

Background for the calculation of the daily mobility footprint:



Means of transport	m^2/pkm
pedestrian	1.4
bicycle	1.5
train (AT)	6.9
moped	25.6
urban bus	26.0
tram/subway	34.8
motorcycle	56.3
car	76.1

The ***car*** has the largest footprint in this comparison. This is due to the use of fossil fuels and the resulting emissions. In addition, cars have a low average occupancy rate. This footprint relates to Austria, because in countries with a higher proportion of petrol-driven cars the footprint increases slightly.

That ***motorcycle*** performs equally poorly as a means of transport in terms of passenger kilometres (pkm). The reasons for this are, on the one hand, the high fuel consumption and, on the other hand, the fact that normally only one person travels.

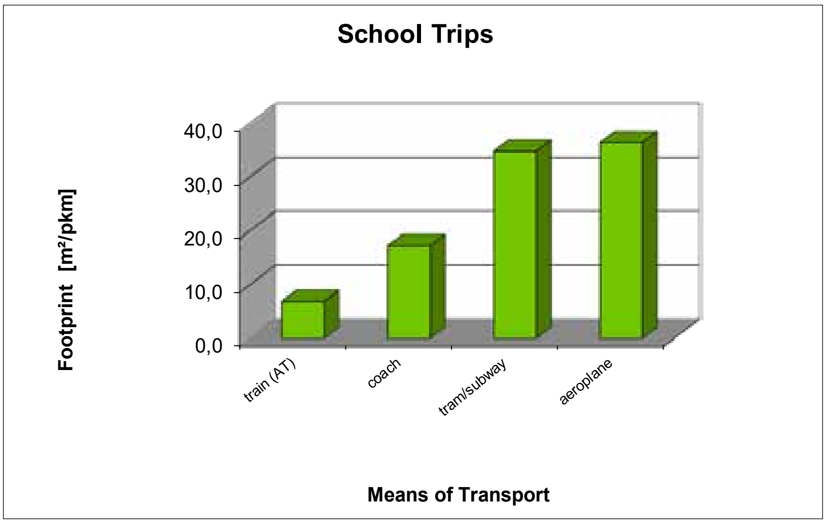
The ***tram*** (or underground) causes a relatively high footprint due to operation with electricity from the Austrian electricity mix. If a local operator relies exclusively on green electricity, this value decreases considerably. Because the tram does not release any pollutants in the city, however, it is again preferable from a health point of view. N.B.: this fact cannot be taken into account when calculating the footprint.

The ***railway*** in Austria is powered exclusively by hydroelectric power, which is why the footprint is very small.

Cyclists and pedestrians naturally only cause a very small ecological footprint - including the bicycle itself and the use of the road infrastructure.

Background to calculation for school trips:

Means of transport	m²/pkm
train (AT)	6.9
coach	17.2
tram/subway	34.8
aeroplane	36.4



For ***rail*** transport, Austria was used as the basis for calculation (see above: "Daily mobility"). Since in some countries not only electricity from hydropower is used, but also from thermal or nuclear power plants, the footprint increases considerably in such cases (eightfold according to the EU electricity mix).

The footprint of one passenger kilometre for a ***long-distance coach*** is smaller than that of an ***urban public transport*** bus bus. The reason for this is that ***urban public transport*** buses have to stop and start more often and can therefore be operated less efficiently.

Aeroplanes are - as far as passenger kilometres are concerned - ecologically less damaging that one would expect. Although kerosene input and emissions into the air weigh heavily, aircraft are well utilized on average. Moreover, infrastructure for road and rail does not occur.

N.B.: Not all effects of air traffic can be represented by the ecological footprint.
This includes, for example, the increased formation of so-called cirrus clouds (ice clouds at high altitudes). These have a great climatic effect because they restrain the radiated heat from the earth particularly strongly. Furthermore, pollutants accumulate in high air layers and are not washed out because they are emitted above the "weather layer". It is also important to bear in mind that the aircraft usually covers very long distances, which in turn generate a very high overall environmental pressure.

4.8. Procurement

The procurement page includes general procurements such as materials and chemicals for different types of technical schools. Select the unit of time for which the data is easiest to obtain.

4.9. Results and Possible Courses for Action

On the last page you will find the evaluations of your entries. The bar is now complete and shows where your footprint is per person in the individual areas and in total.

Next, the calculated footprints per person and the entire school in all sub-areas in absolute numbers are listed.

That **first diagram** illustrates to what extent every area of the school to the ecological footprint. It should therefore show once again where the “need for savings” is greatest.

The footprints for water, waste and food are usually very small. The footprint for the energy sector can also be small if, for example, an electricity supplier is used that produces 100 % of its electricity from hydropower.

The **second diagram** shows the **space** needed to integrate the school‘s entire footprint into the environment in a sustainable way. Depending on the product, different surfaces are required in the manufacture of products. This is the direct area needed for production and the area for renewable and non-renewable resources. Subsequently, it is also about the sea area needed to seal off carbon in the long term and about the areas, which absorb the pollutants in soil, air and water sustainably.

The **diagram for *catering*** compares the food footprint per student with the average Austrian food footprint.

The **last diagram** shows the ***entire footprint of the school*** in comparison to the area that all persons at the school (students, teachers and staff) would be entitled to for all areas of life (per person and year in Austria this is 65,833 m^2). If we only needed the area of 65,833 m^2 per person, we would be living sustainably.

Finally, there is an overview of possible courses of action that should help to reduce the environmental impact of our products. to reduce the size of your footprint. They refer to the individual areas, which were included in the survey and distinguish between possibilities, which each individual person has, and those where school administration or the school management should act.

Last but not least, you have the option of making your data available anonymously for scientific evaluation or of storing only for future reference.

5. Contact details

Do not hesitate to contact us should you have any questions.

Mag. Michael Eder
TU Graz

michael.eder@tugraz.at