MEGAlux2019

Ecological Footprint

What is an eco footprint?

The ecological footprint:

- **measures** human demand on nature
- i.e. the **quantity of nature** it takes to support people

The Challenge:

- energy and waste management are highly specialized fields
- information is compartmentalized and fragmentary
- difficult to obtain an overview
- lack of expert knowledge & complex subject

A **big thanks** to the administration, my headmaster and the staff for being so patient and making this possible.

Qualitative vs. quantitative approach

Qualitative activism

Qualitative activism is particularly suitable for **exploratory research**. It is primarily used to gain an in-depth **understanding** of certain problems.

Primary functions:

1) Raise awareness
2) Symbolic gestures
3) Make value propositions

for example:
- "this is a problem…"
- "something needs to be changed…"
- "this situation is not good…"
- "we need to do something about…"
- "it should be…"

Quantitative activism

Quantitative activism is all about **numbers and figures**. It is used to **measure the extent** of a certain problem.

Primary functions:

1) Set clear goals
2) Measure the severity of a problem
3) Gain a sense of perspective

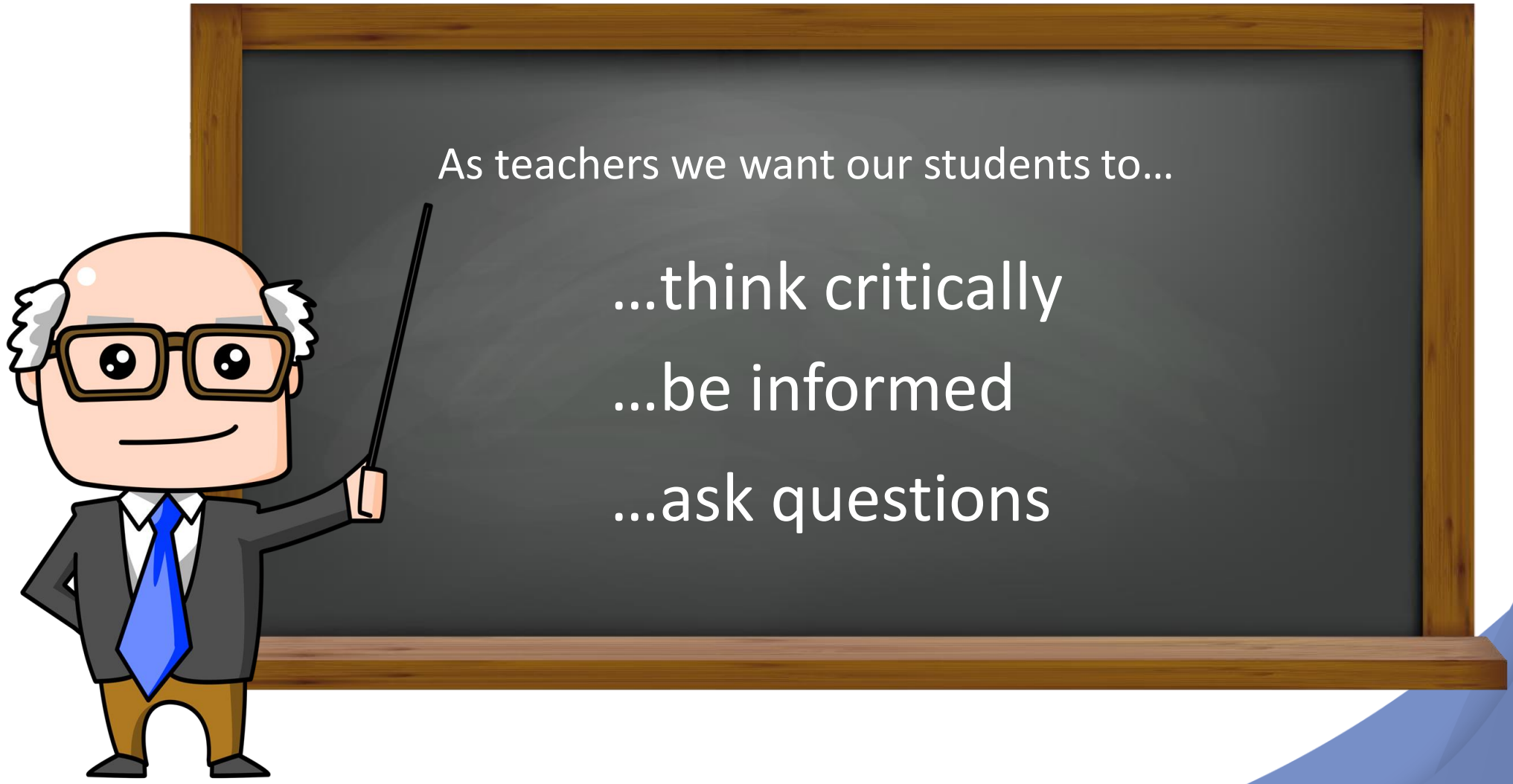
for example:

"The EU's total carbon footprint was equal to **7.2 tonnes** of CO_2 per person in 2017…"

"The European plastics demand reached **49.9 million tonnes** in 2016…"

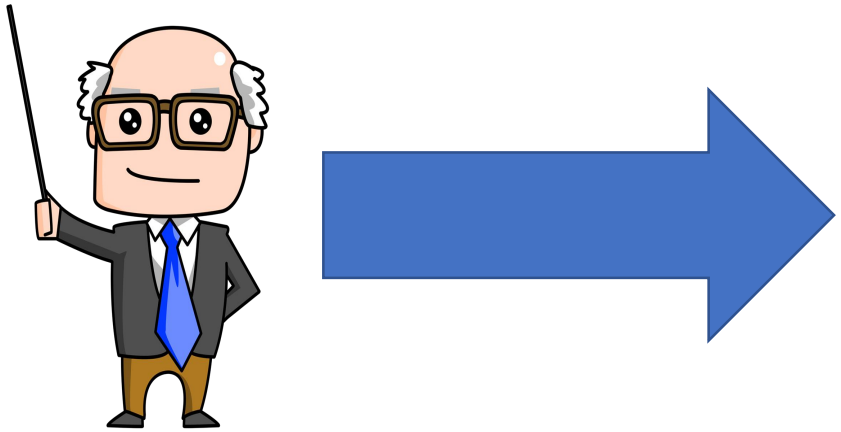
Examples for qualitative activism

Why quantitative knowledge matters

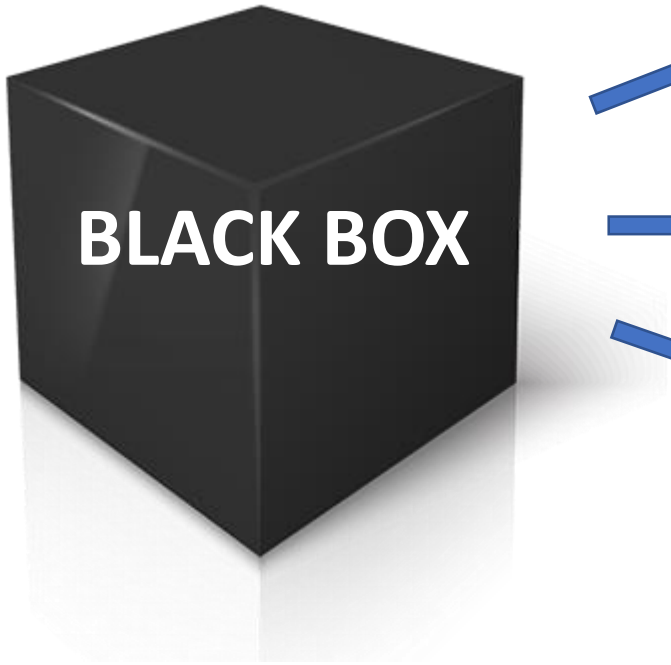


Why quantitative knowledge matters

But when it comes to our own school environment, most of us remain ignorant.



When considering the eco-footprint of our schools, they remain a…



We don't ask important questions like:

How much energy do we consume?

How much waste do we produce?

How big is our impact on the environment?

Quantitative knowledge gives us perspective

Quantitative knowledge allows us to put things **into perspective**.

- It gives us a sense of **scale and scope**.
- It tells us if our actions **are successful** or not.
- Most importantly, it can show us that our **individual changes** in behaviour **do make a difference!**

For example:

Wouldn't it be nice to be able to show our students (and staff) that the switch to reusable drinking bottles and drinking fountains also lead to a **factual** decrease in actual plastic waste?

=

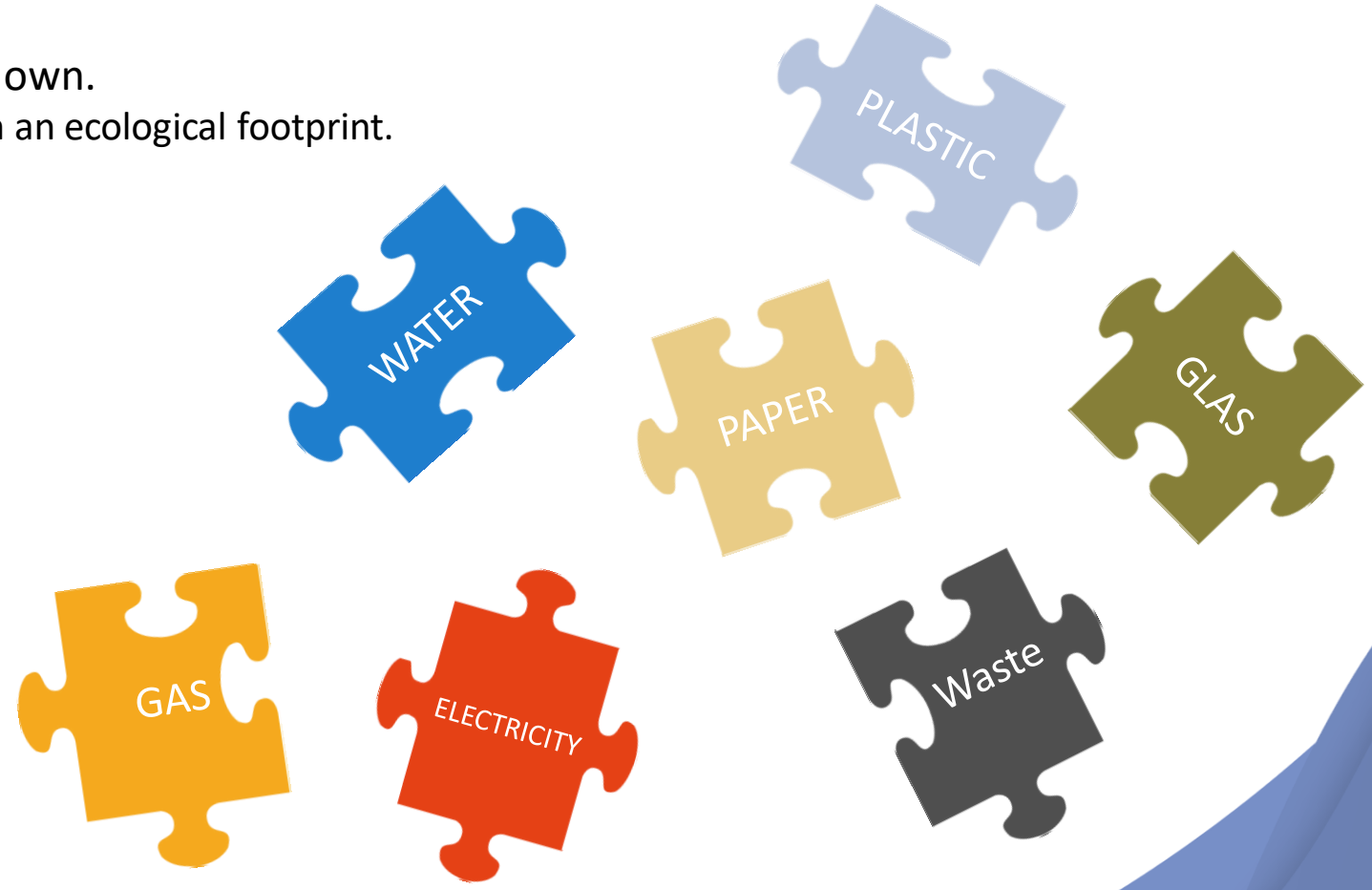
Quantitative knowledge is difficult to obtain

The problem:

Schools are complex eco-systems on their own.
Sometimes it might be very difficult to establish an ecological footprint.

- Where to get the information?
- How to put it all together?
- How to make sense of it?
- Who to ask?
- …

You will find that in many cases,
there is a severe lack of transparency



Our situation

Not every school is the same:

Here is the situation of our (public) school

Our school is part of a larger campus that houses 6 educational facilities.

The campus also includes:

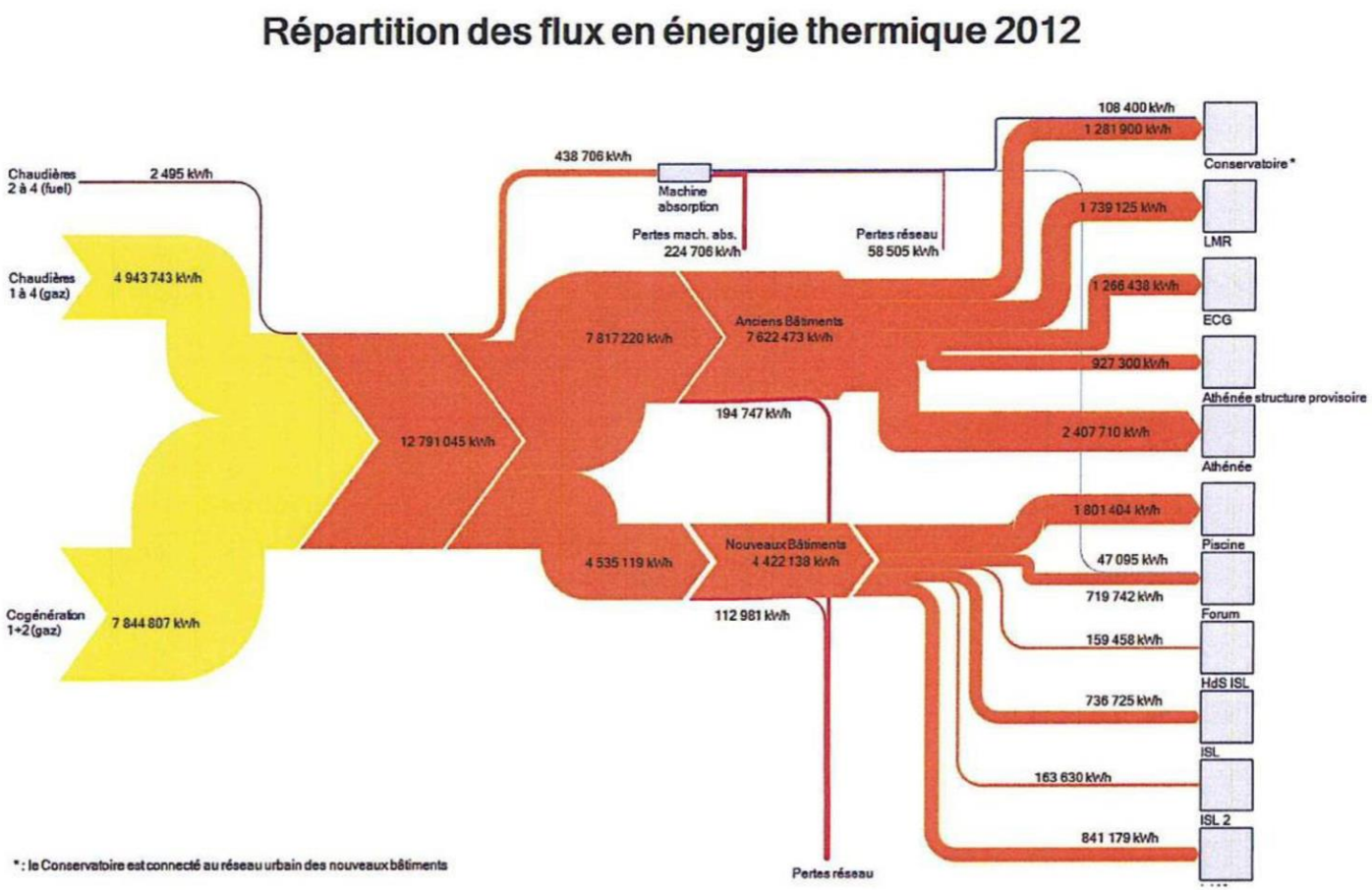
- 1 large swimming pool
- 5 gym halls
- 3 underground parking lots
- 1 pedagogical convention centre "Forum"
- Etc…

This complex infrastructure is maintained by many different public and private organizations.

GLOBAL FACILITIES
THE PROPERTY MANAGERS

a+p kieffer omnitec sàrl
advance in technology

Our situation



Cogeneration (also combined heat and power, CHP) is the use of a heat engine or a power station to simultaneously generate both electricity and useful heat.

The reduction of CO2 using cogeneration amounts to a reduction in the order of 23 % compared to classical solutions.

Campus “Geesseknäppchen”

Tabelle 1: Statistische Kennzahlen nach Anhang XIV Teil 1 der EED [Quelle: Eurostat und Statec]

	Einheit	2013	2014	2015
i) Primärenergieverbrauch[1)]	GWh	50.003	48.675	48.143
ii) Gesamtendenergieverbrauch	GWh	47.966	46.533	46.356
iii) Endenergieverbrauch nach Sektor				
- Industrie	GWh	7.507	7.608	7.580
- Verkehr	GWh	29.745	29.190	28.272
davon Durchgangsverkehr	GWh	20.477	20.104	18.397
	GWh	5.833	5.456	5.774
	GWh	4.800	4.210	4.663
		82	69	66

Nearly **6.000 students** and almost **700 teachers and staff members** work and live at the campus nearly every day of the week.

The water and energy consumption reflects this situation:

Ressource	Moyenne 2006-2009	Année 2018	Δ
THERMIQUE [kWh_{th}/a]	12 404 450	11 279 130	-9,97%
ELECTRIQUE [$kWh_{él}/a$]	7 461 054	6 701 179	-11,33%
EAU POTABLE [m^3/a]	47 392	37835	-25,25%

On average, the whole campus consumes on average almost **20 mio. kWh a year**

that is 0.7% of the energy needs of our capital
or
0.04% of the national energy consumption

Campus “Geesseknäppchen”

To put things into **perspective**:

20 mio. kWh a year represent

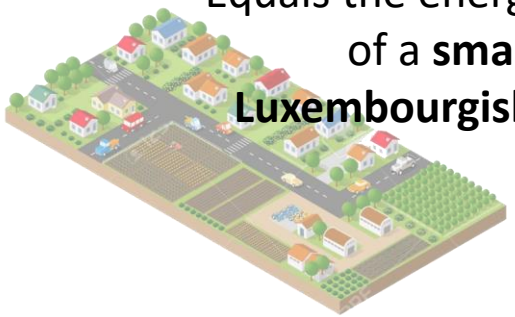
The EU yearly average energy needs of

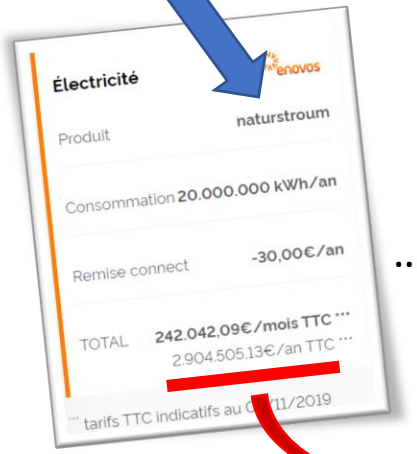
7.000 people

or

2.500 households

Equals the energy needs of a **small Luxembourgish town**





…an electricity bill of 3mio. Euros

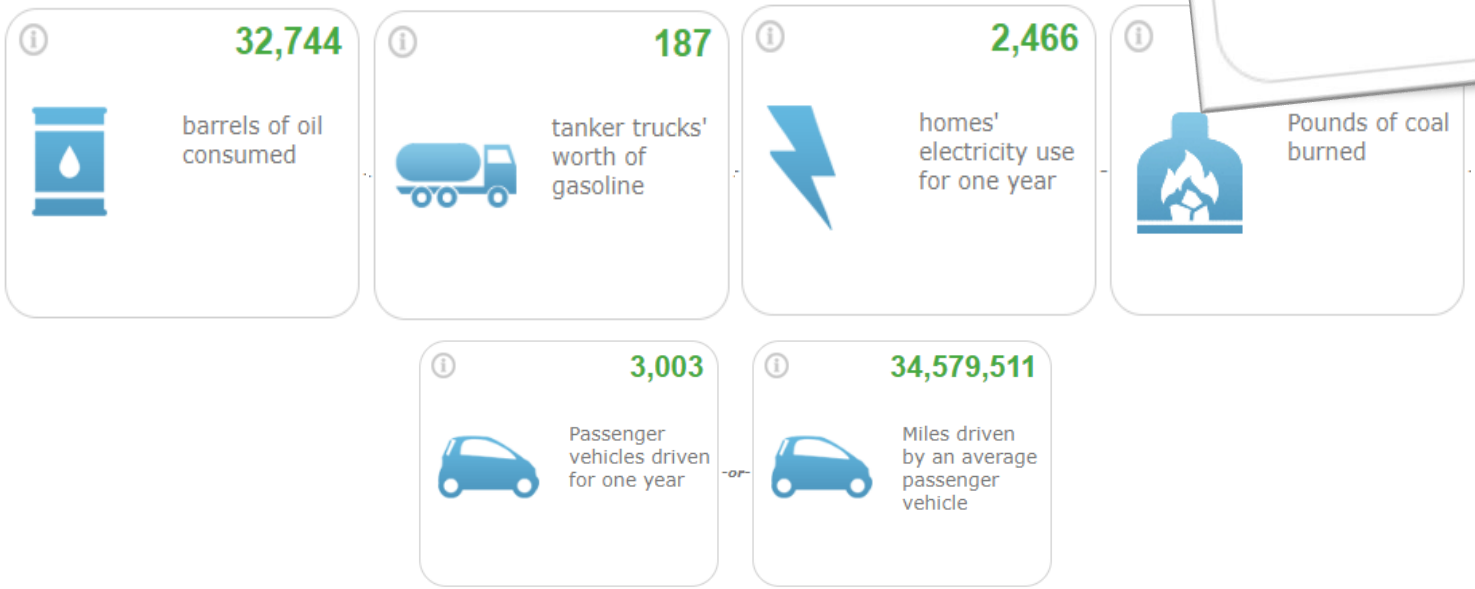
Campus “Geesseknäppchen”

To put things into **perspective**:

20 mio. kWh a year represent

14,143 Metric Tons of Co2

https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator



Campus “Geesseknäppchen”

To put things into **perspective**:

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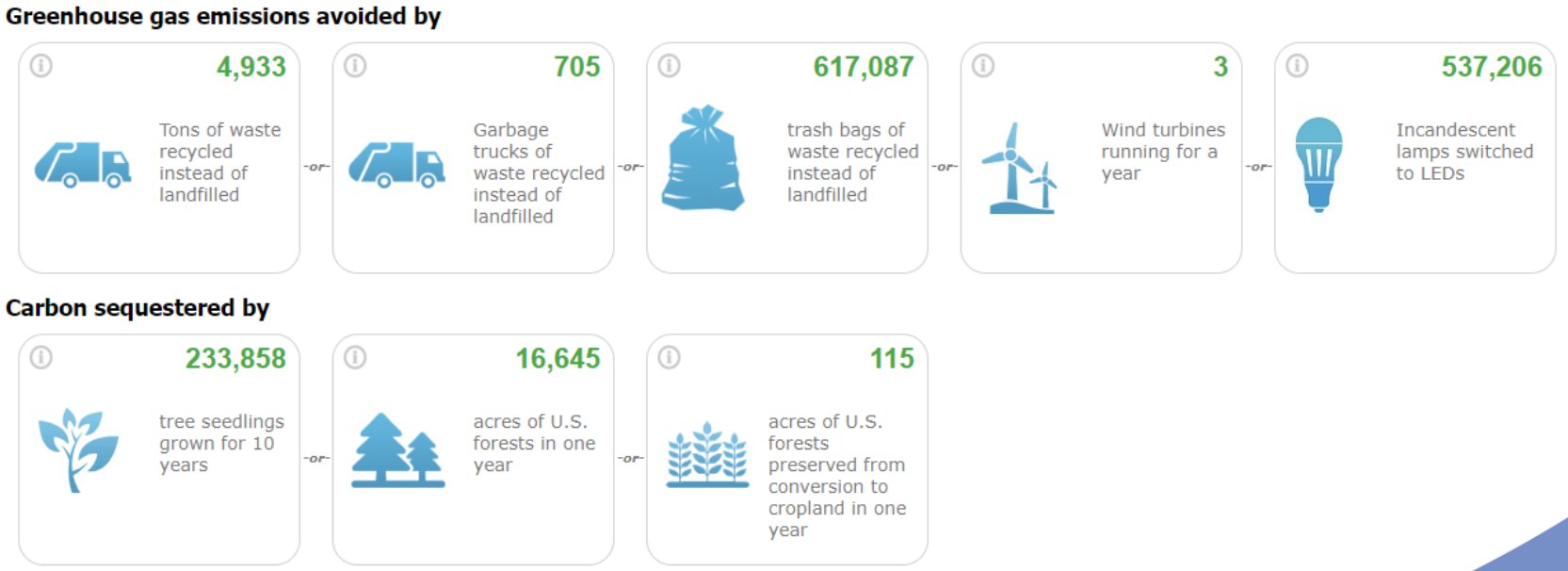


LMRL: Energy Efficiency

Baujahr Gebäude	1971
Energiebezugsfläche	20.626 m²
davon mechanisch belüftet	1.577 m²

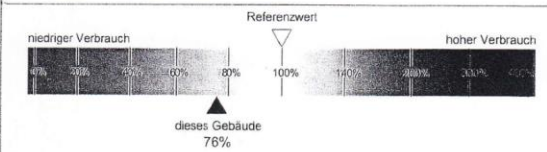
Energiepass

auf Basis des gemessenen Verbrauchs

Ausweis über die Gesamtenergieeffizienz eines Nichtwohngebäudes 1/5

Passnummer	Nr. Aussteller	Erstellt am	Nachtrag Verbrauch		Gültig bis
P.20110803.1430.30.c.V	LUXEEB.R.00020	03.08.2011	2015	2018	03.08.2021

Verbrauchsindex für Wärme



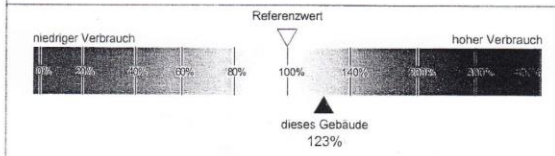
dieses Gebäude erreicht ... 73,8 kWh/(m²a)

der Vergleichswert liegt bei ... 97,5 kWh/(m²a)

Der Wert enthält den Energieverbrauch für:

☑ Heizen ☑ Trinkwarmwasser ☐ Kühlen ☐ Be-/Entfeuchten

Verbrauchsindex für Strom



dieses Gebäude erreicht ... 32,5 kWh/(m²a)

der Vergleichswert liegt bei ... 26,4 kWh/(m²a)

Der Wert enthält den Stromverbrauch für:

☐ Heizen ☐ Trinkwarmwasser ☑ Lüften ☐ Kühlen ☑ Beleuchten ☐ Be-/Entfeuchten ☑ Arbeitshilfen, EDV, ...

Bemerkungen zu sonstigen Energieverbrauchern und regenerativen Energien

Separate Zähler pro Gebäude sind spätestens 1 Jahr nach Austellungsdatum des Energiepasses zu instalieren

Gebäudezonen nach Nutzungsarten

Nr.	Zone	Fläche in m²	in %	Heizen	Kühlen	Beleuchten	mech. Lüfte
001	Büro	334	1,6%	•		•	
002	Bespechungsräum	185	0,9%	•		•	
003	Klassenzimmer	6.304	30,0%	•		•	
004	Hörsaal	425	2,0%	•		•	•
005	Kantine	274	1,3%	•		•	
006	Gewerbeküche	24	0,1%	•		•	
007	WC + Sanitärräu...	1.035	4,9%	•		•	•
008	Sonstige Aufent...	1.049	5,0%	•		•	
009	Nebenflächen oh...	139	0,7%	•		•	
010	Verkersfläche	9.500	45,3%	•		•	
011	Lager	527	2,5%	•		•	
012	Werkstatt	212	1,0%	•		•	
013	Theater	117	0,6%	•		•	•
014	Bibliothek	501	2,4%	•		•	
015	Parkhäuser	359	1,7%			•	

(73,8 + 32,5) x 20.626 = 2.129.534 kwh/m2a

+ 356.247 (gym hall)

2.485.781 kwh/m2a

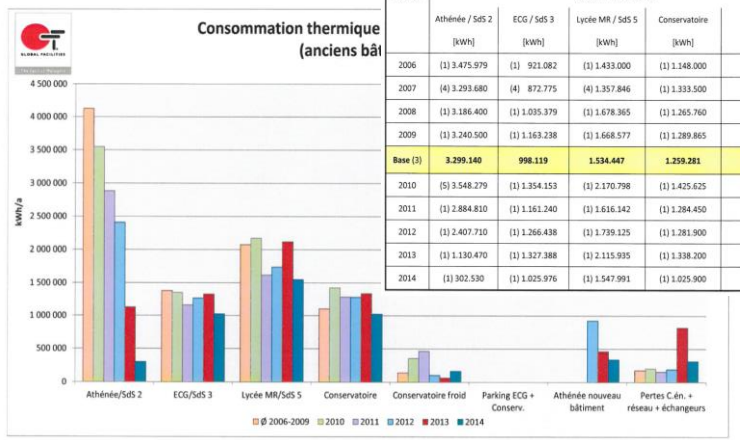
Darstellung zum Zeitpunkt der Ausstellung des Energiepasses

	2007	2008	2009	Verbrauchs-kennwert	Referenz-kennwert		Verhältnis
Wärme	77	72	72	74	97	kWh/(m²a)	76%
Strom	34	31	32	33	26	kWh/(m²a)	123%
Primärenergie	176	163	167	168	178	kWh/(m²a)	94%
CO_2-Emissionen	43	40	41	41	44	$kgCO_2/(m²a)$	94%

(41 x 20.626) + (89 x 1.682) = **995.364kg Co2/year**

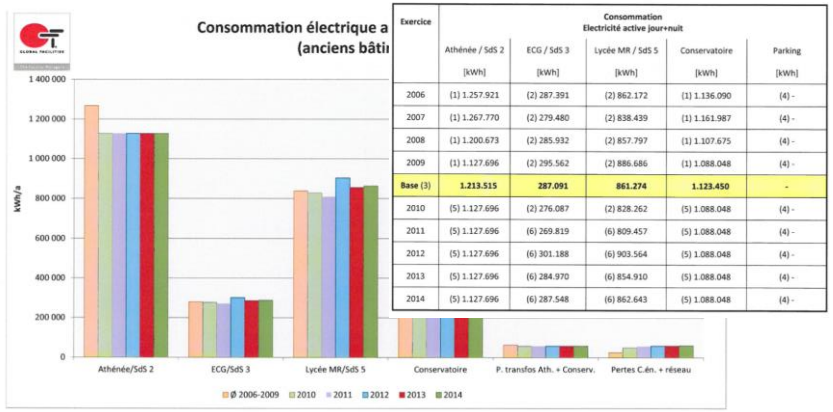
Main Building + Gym Hall

LMRL: Energy Consumption



Relevé des **consommations thermiques** *Anciens bâtiments*

Exercice	Consommation réelle				
	Athénée / SdS 2 [kWh]	ECG / SdS 3 [kWh]	Lycée MR / SdS 5 [kWh]	Conservatoire [kWh]	Parking [kWh]
2006	(1) 3.475.979	(1) 921.082	(1) 1.433.000	(1) 1.148.000	(2) -
2007	(4) 3.293.680	(4) 872.775	(4) 1.357.846	(1) 1.333.500	(2) -
2008	(1) 3.186.400	(1) 1.035.379	(1) 1.678.365	(1) 1.265.760	(2) -
2009	(1) 3.240.500	(1) 1.163.238	(1) 1.668.577	(1) 1.289.865	(2) -
Base (3)	**3.299.140**	**998.119**	**1.534.447**	**1.259.281**	
2010	(5) 3.548.279	(1) 1.354.153	(1) 2.170.798	(1) 1.425.625	(2) -
2011	(1) 2.884.810	(1) 1.161.240	(1) 1.616.142	(1) 1.284.450	(2) -
2012	(1) 2.407.710	(1) 1.266.438	(1) 1.739.125	(1) 1.281.900	(2) -
2013	(1) 1.130.470	(1) 1.327.388	(1) 2.115.935	(1) 1.338.200	(2) -
2014	(1) 302.530	(1) 1.025.976	(1) 1.547.991	(1) 1.025.900	(2) -



Relevé des **consommations électriques** *Anciens bâtiments*

Exercice	Consommation Electricité active jour+nuit				
	Athénée / SdS 2 [kWh]	ECG / SdS 3 [kWh]	Lycée MR / SdS 5 [kWh]	Conservatoire [kWh]	Parking [kWh]
2006	(1) 1.257.921	(2) 287.391	(2) 862.172	(1) 1.136.090	(4) -
2007	(1) 1.267.770	(2) 279.480	(2) 838.439	(1) 1.161.987	(4) -
2008	(1) 1.200.673	(2) 285.932	(2) 857.797	(1) 1.107.675	(4) -
2009	(1) 1.127.696	(2) 295.562	(2) 886.686	(1) 1.088.048	(4) -
Base (3)	**1.213.515**	**287.091**	**861.274**	**1.123.450**	-
2010	(5) 1.127.696	(2) 276.087	(2) 828.262	(5) 1.088.048	(4) -
2011	(5) 1.127.696	(6) 269.819	(6) 809.457	(5) 1.088.048	(4) -
2012	(5) 1.127.696	(6) 301.188	(6) 903.564	(5) 1.088.048	(4) -
2013	(5) 1.127.696	(6) 284.970	(6) 854.910	(5) 1.088.048	(4) -
2014	(5) 1.127.696	(6) 287.548	(6) 862.643	(5) 1.088.048	(4) -

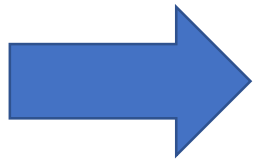
Our electricity bill amounts to **60.500€** a year.
(0,079€ / kwh)

On average, our school requires
1.534.447 (heating) + 861.274 (electricity) = **2.395.721 kwh/year**

Our school has about
1,400 students + 200 teachers and staff members
In total about **1,600 people**

Each person:

- Consumes 1.500 kwh/year
- Uses 7m3 (= **7.000 litres**) of water a year



If you ride your bike for 1h you produce 100Wh (= 0.1kwh)

You would need to ride your bike for **15.000 hours** to produce 1.500kwh

LMRL: Carbon footprint per person

Each person at our school
needs 1.500 kwh/year

This is the equivalent of 1.1 Metric Tons of Co2

450
litres of gas consumed

135,256
number of smartphones charged

Carbon sequestered by **17.5**
tree seedlings grown for 10 years

Co2 avoided by **46.3**
trash bags of waste recycled instead of landfilled

Of course, this is merely the carbon footprint of the **6 hours of presence** that we have on average **at our school**.
These energy needs **do not take into account the consumption at home**.

LMRL: Old vs. New Building

Consommation thermique	Athénée / SdS 2	ECG / SdS 3	Lycée MR / SdS 5	Conservatoire	Athénée nouveau bâtiment
[kWh]	1.519.700	1.114.519	1.282.201	1.135.800	243.560
Répartition	25,08%	18,42%	21,19%	18,77%	4,03%
[kWh/m² a] réel	51	112	77	71	-
[kWh/m² a] autorisé	-	-	-	-	-

La production totale de l'année 2018 s'élève à **11 279 130 kWh/a** (dont 973 611kWh/a (8.6%) pour les pertes réseaux et installations), représentant **5 228 005 kWh/a** (46.35%) pour les nouveaux bâtiments, **5 293 980 kWh/a** (46,93%) pour les anciens bâtiments, et **238 650 kWh/a** (2.11%) pour la production froid.

Our new temporal building (called the "Blumm") requires **33% less energy per m2** for the heating.

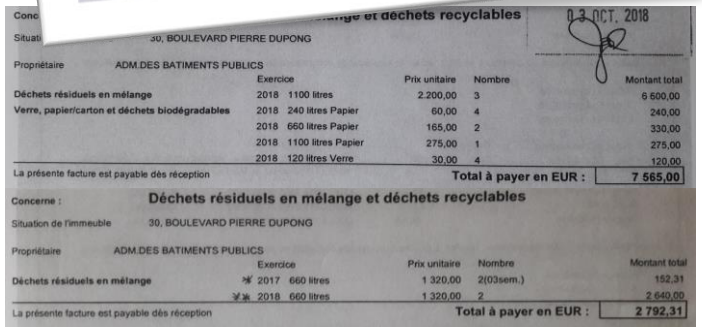
Consommation électrique (active jour+nuit)	Athénée / SdS 2	ECG / SdS 3	Lycée MR / SdS 5	Conservatoire	Parking
[kWh]	1.127.696	209.797	629.391	1.088.048	-
Répartition	35,4%	6,6%	19,8%	34,2%	-
[kWh/m² a] réel	38	18	38	68	-
[kWh/m² a] autorisé	-	-	-	-	-

La consommation totale de l'année 2018 s'élève à **6 701 179 kWh/a** (dont 332 257 kWh/a (4,9%) pour les pertes réseaux et installations), représentant **3 520 055 kWh/a** (52.5%) pour les nouveaux bâtiments et **3 181 124 kWh/a** (47.4%) pour les anciens bâtiments.

But it still requires the same amount of electricity per m2.

LMRL: Regular/Mixed Waste Management

Waste



Déchets résiduels en mélange et déchets recyclables

30, BOULEVARD PIERRE DUPONG

ADM.DES BATIMENTS PUBLICS

	Exercice		Prix unitaire	Nombre	Montant total
Déchets résiduels en mélange	2018	1100 litres	2.200,00	3	6 600,00
Verre, papier/carton et déchets biodégradables	2018	240 litres Papier	60,00	4	240,00
	2018	660 litres Papier	165,00	2	330,00
	2018	1100 litres Papier	275,00	1	275,00
	2018	120 litres Verre	30,00	4	120,00

La présente facture est payable dès réception — Total à payer en EUR : 7 565,00

Concerne : Déchets résiduels en mélange et déchets recyclables

Situation de l'immeuble: 30, BOULEVARD PIERRE DUPONG

Propriétaire: ADM.DES BATIMENTS PUBLICS

	Exercice		Prix unitaire	Nombre	Montant total
Déchets résiduels en mélange	2017	660 litres	1 320,00	2(03sem.)	152,31
	2018	660 litres	1 320,00	2	2 640,00

La présente facture est payable dès réception — Total à payer en EUR : 2 792,31

Our school has 5 containers to store regular household waste which are emptied weekly:

3 x 1.100 litre containers
2 x 660 litre containers

A total volume of **4.620 litres**.

Assuming that only 4 of these 5 containers are emptied each week
&
Considering that a regular year of school has about 40 weeks

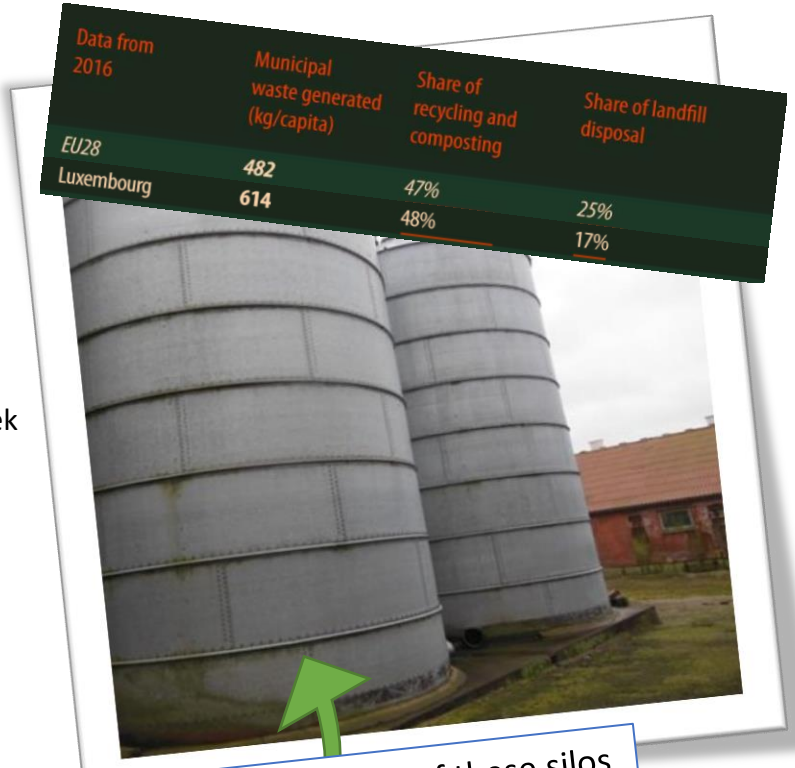
Our school produces:

4.000 x 40 = **160.000 L**

or

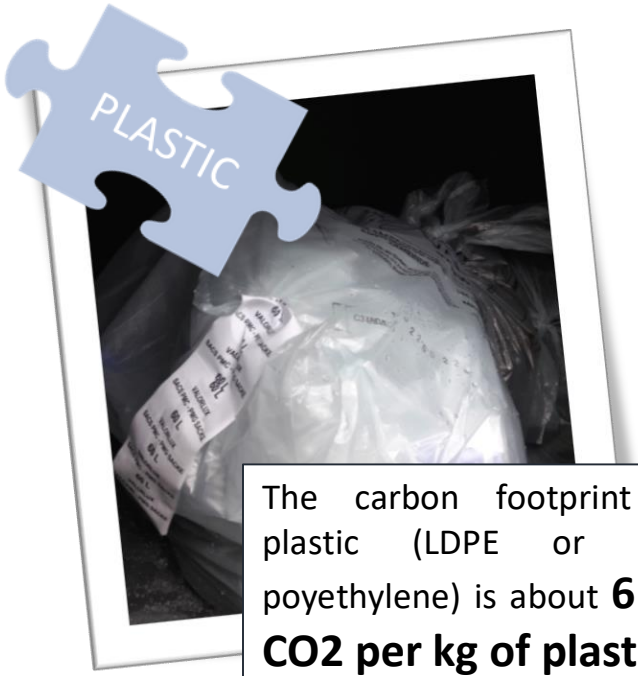
160m3 of mixed solid waste

Data from 2016	Municipal waste generated (kg/capita)	Share of recycling and composting	Share of landfill disposal
EU28	482	47%	25%
Luxembourg	614	48%	17%



about the size of one of these silos

LMRL: Plastic (Valorlux)



The carbon footprint of plastic (LDPE or PET, poyethylene) is about **6 kg CO2 per kg of plastic**.

If you know the weight of your plastic bags, you can multiply it with the number of plastic bag you are using per year. Then you can easily calculate the carbon dioxide emitted by your own usage of plastic bags.

Source: https://timeforchange.org/plastic-bags-and-plastic-bottles-co2-emissions-during-their-lifetime/

The average weight of a 60l Valorlux plastic rubbish bag is about **2kg**.
A **single** Valorlux bag represents **12kg of Co2**.

Our Valorlux bags are stored in **3x 660l (= 1.980l) containers**, which are emptied **weekly**.

According to our cleaning crew, the containers are usually filled to the brim before the collection:

1.980 x 40 = **79.200l of plastic waste / year**
or 1.320 plastic bags
or 2.640kg of plastic waste

This equals 10 tons of Co2
(for recycled PET polymer)

LMRL: Paper

PAPER

On average, our school makes **1 million copies** **(500.000 double sided-prints)** each year

	Total B&W						Total Color	Total
	Bizhub 950	Kyo 8051 NB		Kyo 8051 col1	Kyo 8051 col2	Kyo 8051 col3		
2015	680000	149000	**829000**	27000	37000	114000	**178000**	**1.007.000**
2016	702000	98000	**800000**	31000	32000	118000	**181000**	**981.000**
2017	763000	90000	**853000**	25000	36000	121000	**182000**	**1.035.000**
2018	749000	188000	**937000**	66000	64400	110000	**240400**	**1.177.000**

That is the equivalent of **2.5 tons** of paper

or 60 trees

(It takes 24 trees to make 1 ton of paper)

Luckily, we use **100% recycled paper**, so **no trees** are wasted.
But the production of paper still uses a lot of energy and water and produces Co2:

9,5 tons of Co2

12.500 kwh

875.000 L or 875 m3

(1 ton of paper uses 350m3 of water)

Online calculator for the environmental impact of paper production:
https://c.environmentalpaper.org/individual.html

LMRL: Paper

We weighed our weekly paper waste:

On average, we throw away

200kg of paper & carton

(a total volume of 2000L)

every week

Educational institutions are still very much dependent on paper. Despite the introduction of tablets/Ipads we still produce a lot of paper waste.

Our school produces:

200 x 40 = **8.000kg of paper waste per year**

or

8 tons of paper & carton

The equivalent of **192 trees**

GHG

30 tons of Co2

Total Energy

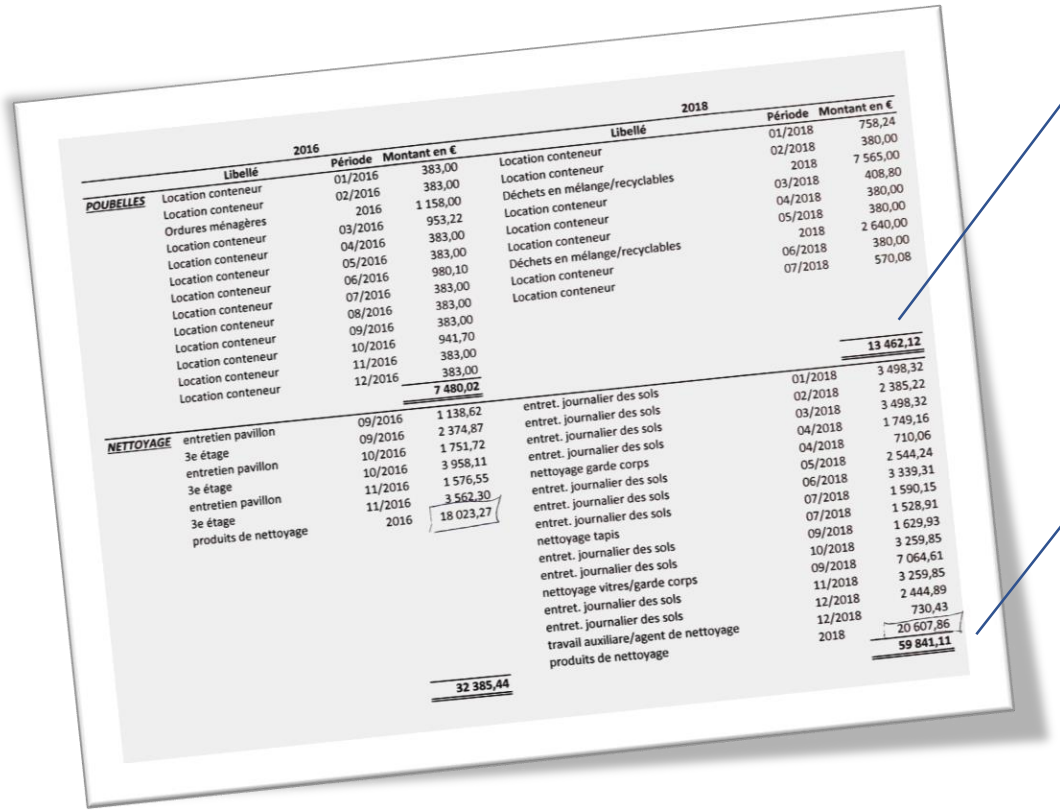
52.700 kwh

Water Usage

2.800.000 L

(1 ton of paper uses 350m3 of water)

LMRL: The Cost of Cleaning



2016

	Libellé	Période	Montant en €
POUBELLES	Location conteneur	01/2016	383,00
	Location conteneur	02/2016	383,00
	Ordures ménagères	2016	1 158,00
	Location conteneur	03/2016	953,22
	Location conteneur	04/2016	383,00
	Location conteneur	05/2016	383,00
	Location conteneur	06/2016	980,10
	Location conteneur	07/2016	383,00
	Location conteneur	08/2016	383,00
	Location conteneur	09/2016	383,00
	Location conteneur	10/2016	941,70
	Location conteneur	11/2016	383,00
	Location conteneur	12/2016	383,00
			7 480,02
NETTOYAGE	entretien pavillon	09/2016	1 138,62
	3e étage	09/2016	2 374,87
	entretien pavillon	10/2016	1 751,72
	3e étage	10/2016	3 958,11
	entretien pavillon	11/2016	1 576,55
	3e étage	11/2016	3 562,30
	produits de nettoyage	2016	18 023,27
			32 385,44

2018

Libellé	Période	Montant en €
Location conteneur	01/2018	758,24
Location conteneur	02/2018	380,00
Déchets en mélange/recyclables	2018	7 565,00
Location conteneur	03/2018	408,80
Location conteneur	04/2018	380,00
Location conteneur	05/2018	380,00
Déchets en mélange/recyclables	2018	2 640,00
Location conteneur	06/2018	380,00
Location conteneur	07/2018	570,08
		13 462,12
entret. journalier des sols	01/2018	3 498,32
entret. journalier des sols	02/2018	2 385,22
entret. journalier des sols	03/2018	3 498,32
entret. journalier des sols	04/2018	1 749,16
nettoyage garde corps	04/2018	710,06
entret. journalier des sols	05/2018	2 544,24
entret. journalier des sols	06/2018	3 339,31
entret. journalier des sols	07/2018	1 590,15
nettoyage tapis	07/2018	1 528,91
entret. journalier des sols	09/2018	1 629,93
entret. journalier des sols	10/2018	3 259,85
nettoyage vitres/garde corps	09/2018	7 064,61
entret. journalier des sols	11/2018	3 259,85
entret. journalier des sols	12/2018	2 444,89
travail auxiliare/agent de nettoyage	12/2018	730,43
produits de nettoyage	2018	20 607,86
		59 841,11

In 2018, our school paid

13.462 €

for waste disposal.

(the cost has almost doubled, since our old building had a trash compactor)

In 2018, our school paid

59.841 €

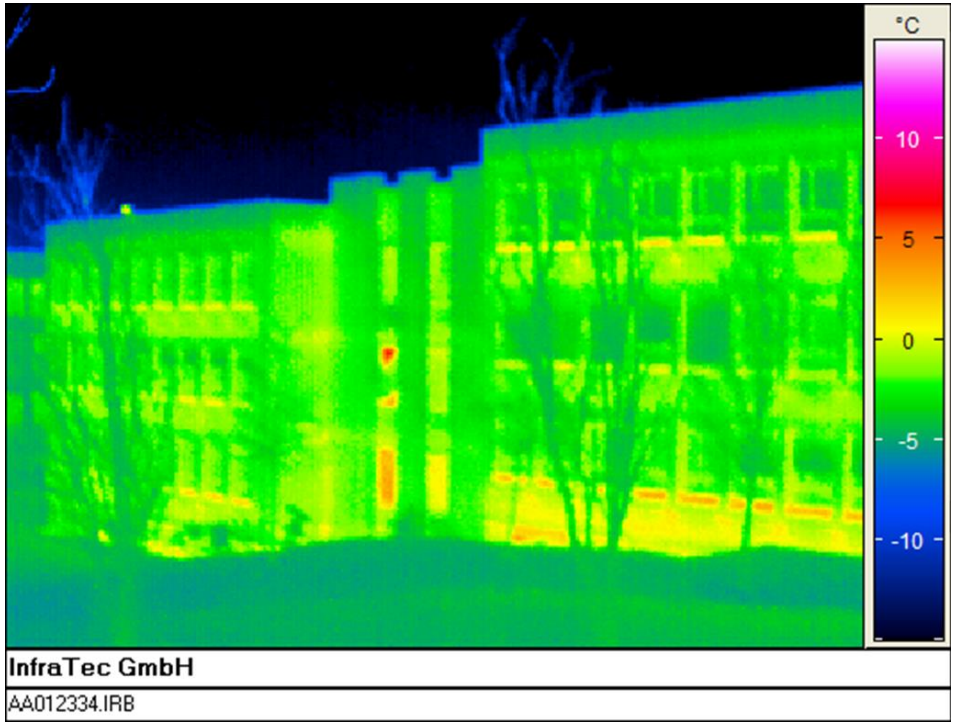
(20.607€ are spent on cleaning products)

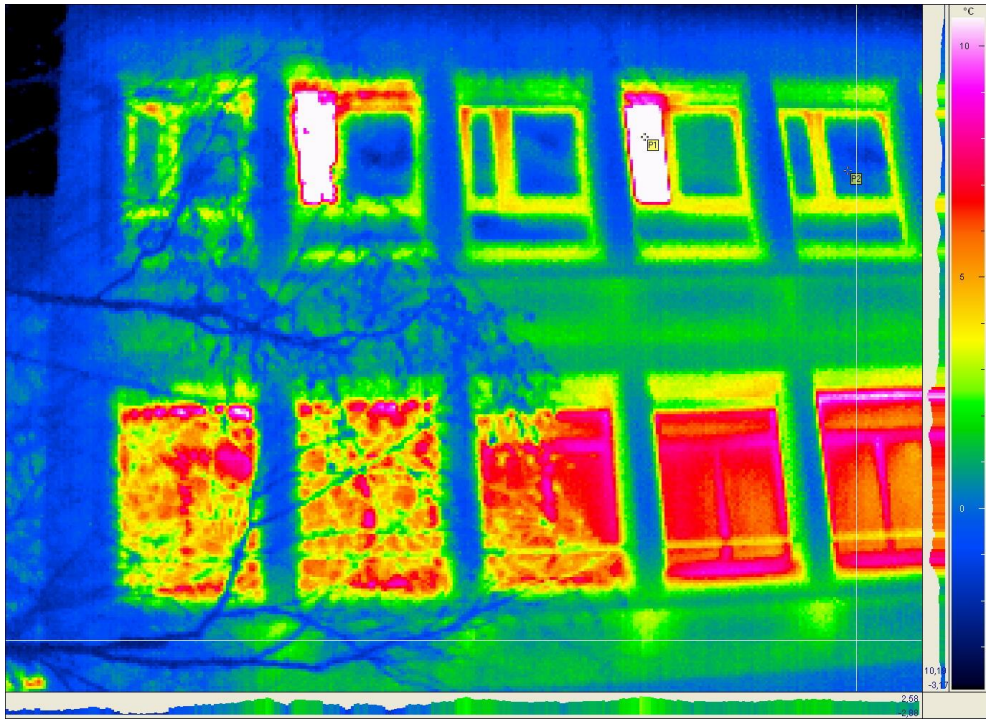
to keep our school clean.

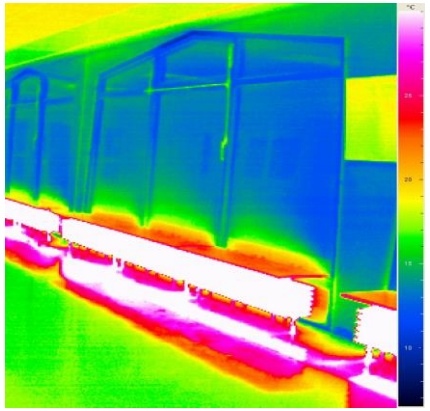
(the cost has almost doubled, since our old building employed an external private company paid by the state)

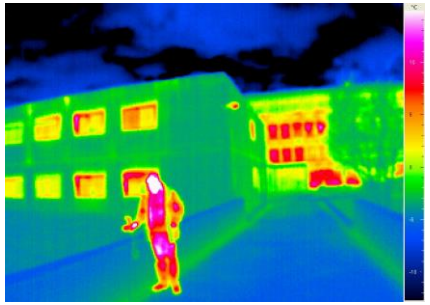
A team of Janitors make sure that students and teachers can return to clean classrooms every day.
Unfortunately, some people still do not respect our waste separation system or leave the classrooms dirty.

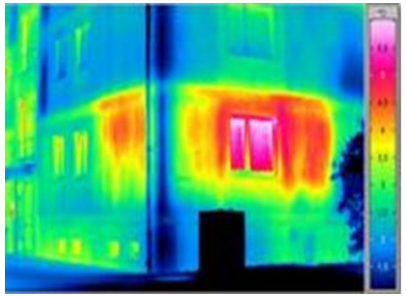
LMRL: Thermal Imaging

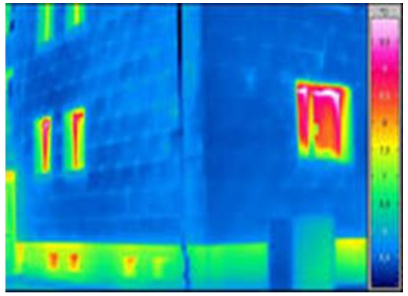












Thermal imaging allows the visualization of heat losses and the importance of proper isolation and insulated windows.

LMRL: Our Eco Footprint

2.400.000 kwh
950 tons of Co2

10,5 tons of paper waste
260 trees
3.675.000 L of water
40 tons of Co2

160 m3 of mixed solid waste
45 tons of waste
100 tons of Co2

2.640 kg of plastic waste
1.320 bags
10 tons of Co2

This footprint is far from complete!

To do list:

- Food consumption & food waste
  (our cafeteria has its own waste disposal)
- Glass
- Transportation

Establishing and keeping track of your eco footprint is a **work in progress**.

Online Calculators

	Material consumption ($kgCO_2e$/tonne)			Waste disposal ($kgCO_2e$/tonne)				
	Primary material	Recycled open loop	Recycled closed loop	Recycled open loop	Recycled closed loop	Waste to energy	Compost	Landfill
Paper	955		680		21	21	21	553
Cardboard	1038		680		21	21	21	553
Food and drink	3590					21	6	570
Metal cans (mixed)	4964		1,054		21	21		21
Glass	895		508	21	21	21		26
Plastic (average)	3179	693	1,977	21	21	21		34
Plastic - Film	2591	599	1,528	21	21	21		34
Plastic - Rigid	3281	599	2,138	21	21	21		34
Mixed Electrical	1149			21		21		17

Table B.13 CO_2e emission factors for material consumption and waste disposal (source: DEFRA, 2012)

	LCI data cradle-to-gate (EU data)					
polymer	energy (GJ $tonne^{-1}$)	water (kL $tonne^{-1}$)	CO_2-e[a] (t $tonne^{-1}$)	Usage[b] (ktonne)	closed-loop recycling	effectiveness in current recycling processes
PET	82.7	66	3.4	2160	yes	high with clear PET from bottles coloured PET is mostly used for fibre additional issues with CPET trays, PET-G
HDPE	76.7	32	1.9	5468	some	high with natural HDPE bottles, but more complex for opaque bottles and trays because of wide variety of grades and colour and mixtures with LDPE and PP
PVC	56.7	46	1.9	6509	some	poor recovery because of cross-contamination with PET PVC packages and labels present a major issue with PET bottle and mixed plastics recycling
LDPE	78.1	47	2.1	7899	some	poor recovery rates, mostly as mixed polyolefins that can have sufficient properties for some applications. Most post-consumer flexible packaging not recovered
PP	73.4	43	2.0	7779	in theory	not widely recycled yet from post-consumer, but has potential. Needs action on sorting and separation, plus development of further outlets for recycled PP
PS	87.4	140	3.4	2600	in theory	poor, extremely difficult to cost-effectively separate from co-mingled collection, separate collection of industrial packaging and EPS foam can be effective
recycled plastics	8–55	typical 3.5[c]	typical 1.4	3130	some	considerable variability in energy, water and emissions from recycling processes as it is a developing industry and affected by efficiency of collection, process type and product mix, etc.

Source: Jefferson Hopewell: Plastic recycling - challenges and opportunities, 2009

General conversion calculator:
https://www.aqua-calc.com/calculate/volume-to-weight

Paper conversions:

http://www.colorpress.com.pl/kalkulator_wagi_papieru_en.html

https://c.environmentalpaper.org/individual.html

Co2 calculators:
https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

https://www.carbonfootprint.com/calculator.aspx
https://www.eea.europa.eu/data-and-maps/daviz/ghg-emissions-by-aggregated-sector-2#tab-dashboard-01
https://www.rensmart.com/Calculators/KWH-to-CO2

Conversion figures (to convert m^3 to t) (Environment Agency standard)	
Mixed waste / recycling	0.27
Paper or card	0.21
Green waste	0.35
Food waste	0.20
Cooking oil	0.61
Glass	0.33
Plastic	0.14
EPS	0.03
Plasterboard	0.61
Wood (Clean)	0.19
Wood (Contaminated)	0.23
WEEE	0.21
Fluorescent tubes	0.19
Metal	0.23
Soil & hardcore	0.86
Paint	0.57
Textiles	0.20

Source: UK Department for Environment Food & Rural Affairs

Table 16: Waste management/treatment processes and the standard emission factors presented in the AEA study, 2001

Waste management/treatment process	Standard emission factor (in kg CO_2 eq/tonne waste treated)	Reference (in AEA study)
Mixed waste not collected or disposed of in landfills with no or limited gas collection	833 kg CO_2 eq/t, of which - 7 Fossil CO_2 from transport - 1 Fossil CO_2 from energy use - 825 CH_4 from landfill	Fig 9, p. 28 Table A2.31, p. 104
Mixed waste going directly to compliant landfill	298, of which - 7 Fossil CO_2 from transport - 1 Fossil CO_2 from energy use - 290 CH_4 from landfill	Fig 9, p. 28 Table A2.31, p. 104
Mixed waste going directly to incineration	253, of which - 8 Fossil CO_2 from transport - 230 Fossil CO_2 from incineration - 15 N_2O from incineration	Table A3.39, p. 120

Personal Notes

Groups

Group 1

Jean-Claude	Hemmer	Luxembourg City	Luxembourg
Olaf	**Mertens**	**Champion**	**Belgium**
Pierre	Janssens	Champion	Belgium
Dominique	Rappe	Champion	Belgium
Jean-François	Scaillet	Champion	Belgium
Marion	Laloux	Champion	Belgium
Hans	Vanhulle	Dendermonde	Belgium
Pascal	Carpentier	Dendermonde	Belgium
Lieselot	Claeys	Dendermonde	Belgium
Koen	Van Cauwenberge	Dendermonde	Belgium
Eberhard	Hagemeier	Lübbecke	Germany
Petra	Müller	Lübbecke	Germany
Dorothee	Röwekamp	Lübbecke	Germany
Silke	Horst	Lübbecke	Germany
Jessica	Stefener	Lübbecke	Germany

Group 2

Daniel	Szczygiel	Torun	Poland
Magdalena	Bania	Torun	Poland
Viktor	Tanító	Zilina	Slovakia
Janka	Mládenková	Zilina	Slovakia
Imrich	**Milo**	**Zilina**	**Slovakia**
Lucia	Hrúzová	Zilina	Slovakia
Lucia	Máhriková	Zilina	Slovakia
Eva	Kristan	Postojna	Slovenia
Mika	Rantala	Jyväskylä	Finland
Satu	**Syyrakki**	**Jyväskylä**	**Finland**
Mervi	Kapanen	Jyväskylä	Finland
Marjo	Oikarinen	Jyväskylä	Finland

Group 3

Julie	**Wittrup**	**Bagsværd**	**Denmark**
Nine	Wartacz	Bagsværd	Denmark
Jérome	**Blokkeel**	**Armentières**	**France**
Olivier	Berthe	Armentières	France
Nathalie	Marette	Armentières	France
Marie Line	Cappelaere	Armentières	France
Ioannis	Bougias	Kalamaria	Greece
Georgios	Nikolakakis	Kalamaria	Greece
Pilar	Pena	Zaragoza	Spain
Pilar	Moreno	Zaragoza	Spain
Alcinda	Goulart	Leiria	Portugal
Carla	Ervilha	Leiria	Portugal

Group 4

Georg	Schurli Latzke	Vienna	Austria
Karin	**Dobler**	**Vienna**	**Austria**
Roland	Trabe	Vienna	Austria
Birgit	Calabek	Vienna	Austria
Natascia	Poli	Imola	Italy
Rossella	D'Ercole	Imola	Italy
Jean	**Theis**	**Esch-sur-Alzette**	**Luxembourg**
Rupert	Kraushofer	Esch-sur-Alzette	Luxembourg
Michel	Fabeck	Esch-sur-Alzette	Luxembourg
Caroline	Konnen	Esch-sur-Alzette	Luxembourg
Pascale	Krier	Esch-sur-Alzette	Luxembourg
Yvonne	Leenen	Geldrop	Netherlands
Yvette	Beernink	Geldrop	Netherlands
Monique	Rosink	Geldrop	Netherlands

Group Task

Step 1

Present and evaluate your own results within your group:

Insert text here…

Group Task

Step 2

Try to put your results into perspective (for example by using the online calculators and conversions):

Insert text here…

Group Task

Step 3

Discuss and share the challenges that you've encountered with the completion of this task :

Insert text here…

Group Task

Step 4

General feedback on the workshop and the presentation:

Insert text here…

Eco-Footprint: Saint Jude (France)

Find out about your monthly/yearly/quarterly needs in cost, volume, production and consumption of:

- **Energy: Electricity : 402 313 KWH, gas : 950 047 KWH**
- **Natural resources: Water : 1 731 M3**
- **Waste disposal & recycling: NA**

…as well as the total number of students : 1.597 teachers : 125 and personnel : 45

Eco-Footprint: Bagsværd Kostskole og Gymnasium (Denmark)

In Denmark almost every house hold sort their waste. It is very easy to hand in e.g glass, metal, cardboard, news papers, and biodegradable waste for recycling. In Bagsværd all these different types of waste are picked up outside the houses without any costs (exept taxes of course). We are even provided with reusable bags made out of corn flour for food leftovers og other biodegradable waste. Every household has a long line of different garbage cans outside the house. All other types of reusable items can be handed in at recycling centers.

The school has to pay quite a lot for this possibility because it is a private school. Public schools don't pay extra money for waste disposal- they have the same possibilities as every other household in Denmark.

Therefore at our school we only sort waste in the following categories:

Plastic	Metal	Electronics	Paper	Chemical waste

Another class (second grade) sort their waste every day after lunch, but the teachers are frustrated as they can't dispose it at school as the school can't handle different types of waste. The teacher brings the waste to her own house to show the students that she cares.

At school we are: 975 students / 95 teachers / 10 teachers assistants / 9 preschool teachers / 6 office workers / 4 janitors / 2 chefs / 2 cleaning assistents (TOTAL: 1.103)

Yearly costs and consumptions:

Heating: 60.620 m3 gas; cost 142.960 dkr.
Electricity: 256.475 Kwh; cost 527.189 dkr.
Water: 2270 m3; cost 106.803 dkr.

Eco-Footprint: Gymnazium Bilingvalne (Slovakia)

Remarks:
We did this kind of research in our school for the first time, it was really interesting to solve this challenge, speaking about the waste. The numbers are, of course, based on a fast research, but can serve as a basic idea.

Nuclear and water energy production in creates **NO** CO2 emissions.
Thanks to many mountains, woods and protected areas Slovakia has cleaner air than industrial regions. The problem is overpopulated basins and Bratislava region.

I. Energy and water (based on invoices):

	Electricity - SSE MWh	Heating - steam - GJ	Water - SEVAK m3
10/2018	4128	91,327	134
11/2018	3771	158,804	
12/2018	3995	295,243	
1/2019	4388	207,888	194
2/2019	3654	184,139	
3/2019	3131	147,112	
4/2019	2745	52,849	228
5/2019	3291	73,12	
6/2019	2082	0	
7/2019	1226	0	190
8/2019	1208	0	
9/2019	3098	0	
12 months	**36717**	**1210,482**	**746**
People	480		
Per person	76,49375	2,5218375	1,554166667

II. Waste disposal (based on fast research – average of 8 days):

Mixed waste (daily)	Paper (daily)	Plastics
6,5 kg	5,2 kg	0,75 kg
2372,5 kg yearly	1898 kg yearly	273,75 kg yearly

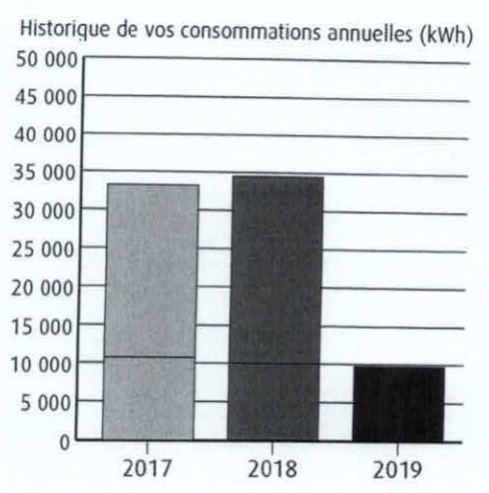
Pictures:

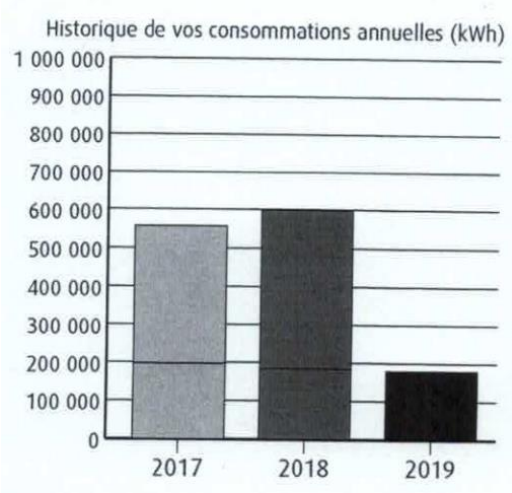
Recycling in our school

Interpretations (examples):

- Altogether we produce approximately 4,5 tons of waste a year
- A year paper waste equals to 48 trees
- A year plastic waste equals to 1642 kg of CO2 created during production, which equals to 1642 people breathing out CO2 a day

Eco-Footprint: LHCE (Luxembourg)





[redacted]

CHAUFFAGE
LYCEE HUBERT CLEMENT ESCH
RUE J.P. MICHELS
L-4243 ESCH/ALZETTE

						HTVA	(EUR)
Coûts de l'énergie	A. index	N. index	F.C.	Nm3	EUR/Nm3	EUR	EUR
01.03.2019 - 31.03.2019	550216	568697		18.481	0,385	7.115,19	
	Prime de puissance					104,00	
Coûts d'utilisation réseau	Redevance mensuelle fixe					157,33	
Taxes	Accises catégorie B					113,42	
Réductions	Réduction domiciliation					0,00	
	Réduction globale sur consommation					-21,96	
Sous-total HTVA						**7.467,98**	

Electricity: 34.000 + 600.000 = 634.000 kwh

Heating in March:
18.481 nm3 = 184.810 kwh
(1 nm3 of natural gas = 10 kwh)

Total heating based on this monthly consumption:
1.800.000 kwh / year (rough estimate)

Total energy consumption:
634.000 (electricity) + 1.800.0000 (heating) = **2.434.000 kwh / year**

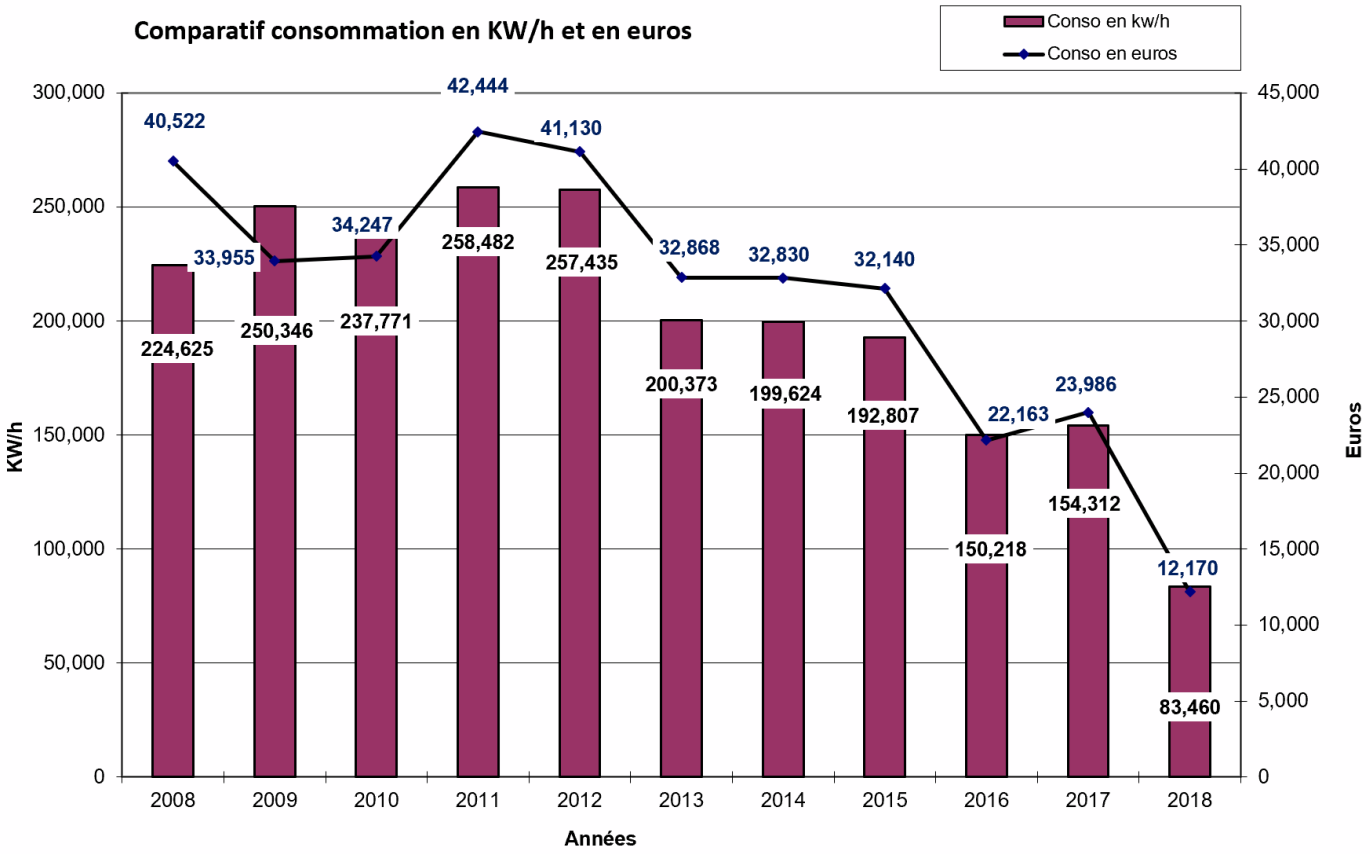
950 students + 100 teachers + 30 staff = 1.080 people

2.250 kwh / person
(this includes a large swimming pool)

Paper waste: 10 x 660L per month

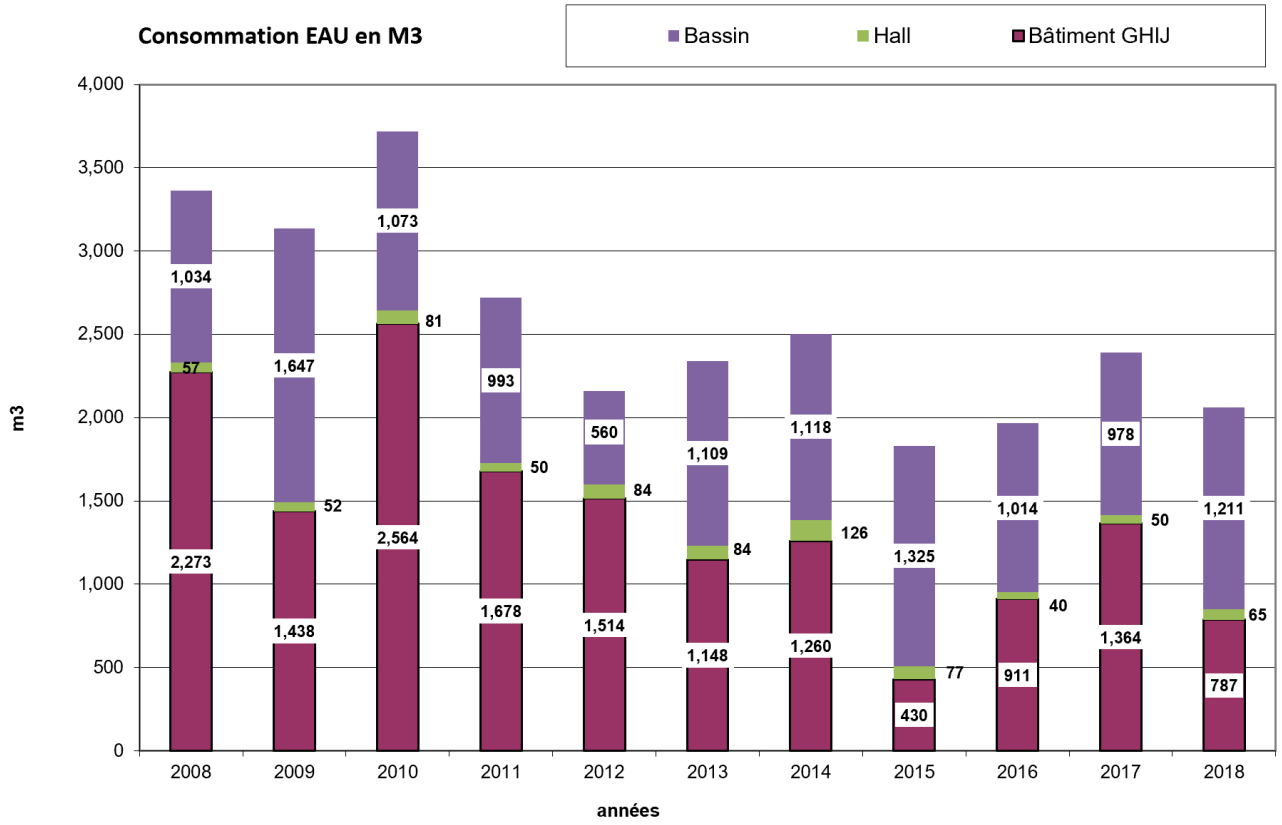
Solid mixed waste: 8 x 660 L emptied about 4-5 times a month
roughly **250m3 of waste** each year

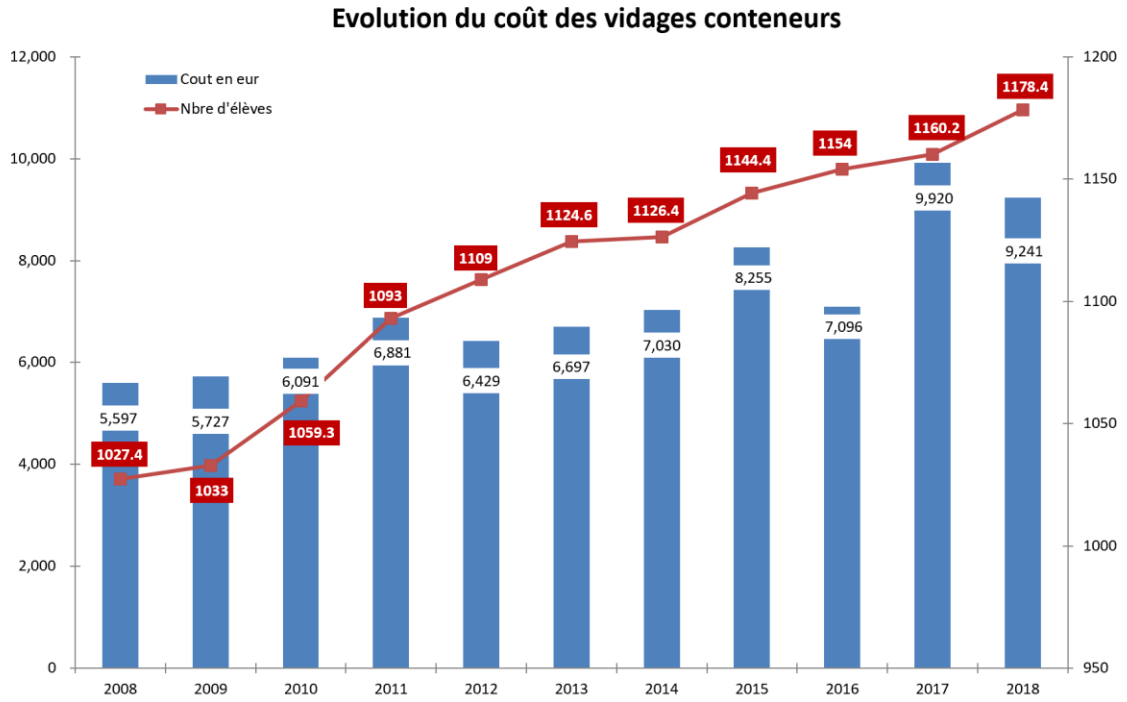
Eco-Footprint: Providence Champion (Namur)



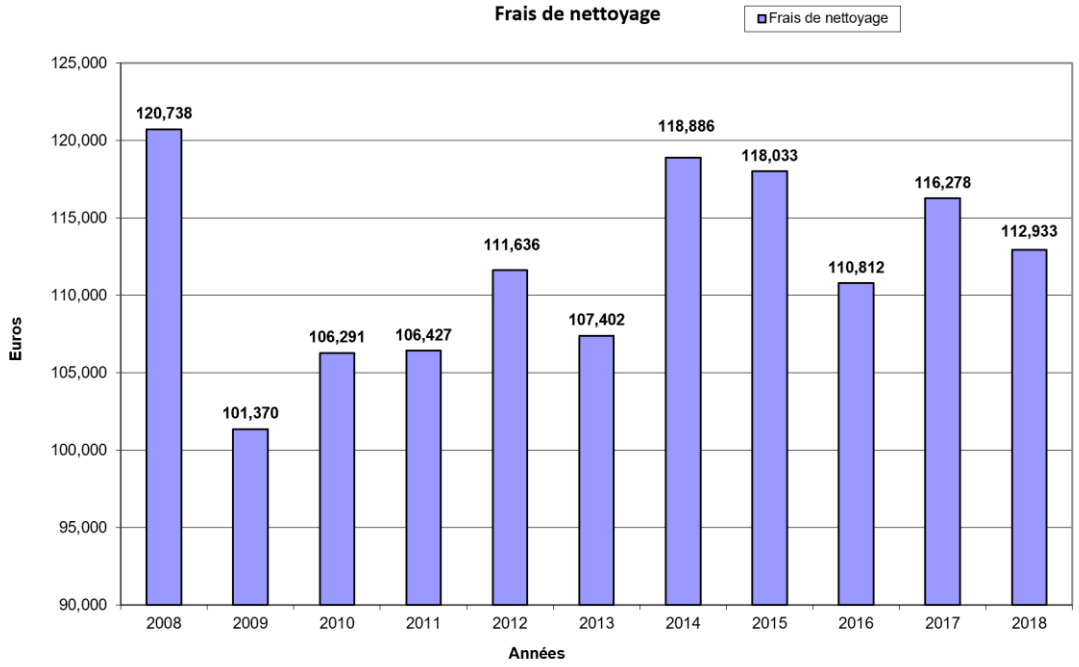
Année	Prod. Hall	Prix KW/h	Gain Hall	Prod. Bâtiments	Prix KW/h	Gain Bâtiments	Gain Total
2014	9,349	0.2188	€ 2,045.56	9,643	0.1631	€ 1,572.77	€ 3,618.33
C. Vert	79 C.V.	65 € / CV	€ 5,135	58 C.V.	65 € / CV	€ 3,770	€ 8,905.00
Total 2014			€ 7,180.56			€ 5,342.77	€ 12,523.33
2015	10,056	0.2319	€ 2,331.99	10,083	0.1654	€ 1,667.73	€ 3,999.71
C. Vert	97 C.V.	65 € / CV	€ 6,305	94 C.V.	65 € / CV	€ 6,110	€ 12,415.00
Total 2015			€ 8,636.99			€ 7,777.73	€ 16,414.71
2016	9,055	0.2009	€ 1,819.15	9,587	0.1454	€ 1,393.95	€ 3,213.10
C. Vert	55 C.V.	65 € / CV	€ 3,575	58 C.V.	65 € / CV	3,770 €	€ 7,345.00
Total 2016			€ 5,394.15			€ 5,163.95	€ 10,558.10
2017	7,180	0.3064	€ 2,199.95	9,176	0.1488	€ 1,365.39	€ 3,565.34
C. Vert	24 C.V.	65 € / CV	€ 1,560	27 C.V.	65 € / CV	1,755 €	€ 3,315.00
Total 2017			€ 3,759.95			€ 3,120.39	€ 6,880.34
2018	9,684	0.1881	€ 1,821.56	9,166	0.1435	€ 1,315.32	€ 3,136.88
C. Vert	59 C.V.	65 € / CV	€ 3,835	72 C.V.	65 € / CV	4,680 €	€ 8,515.00
Total 2018			€ 5,656.56			€ 5,995.32	€ 11,651.88
							€ 116,056.74

Eco-Footprint: Providence Champion (Namur)



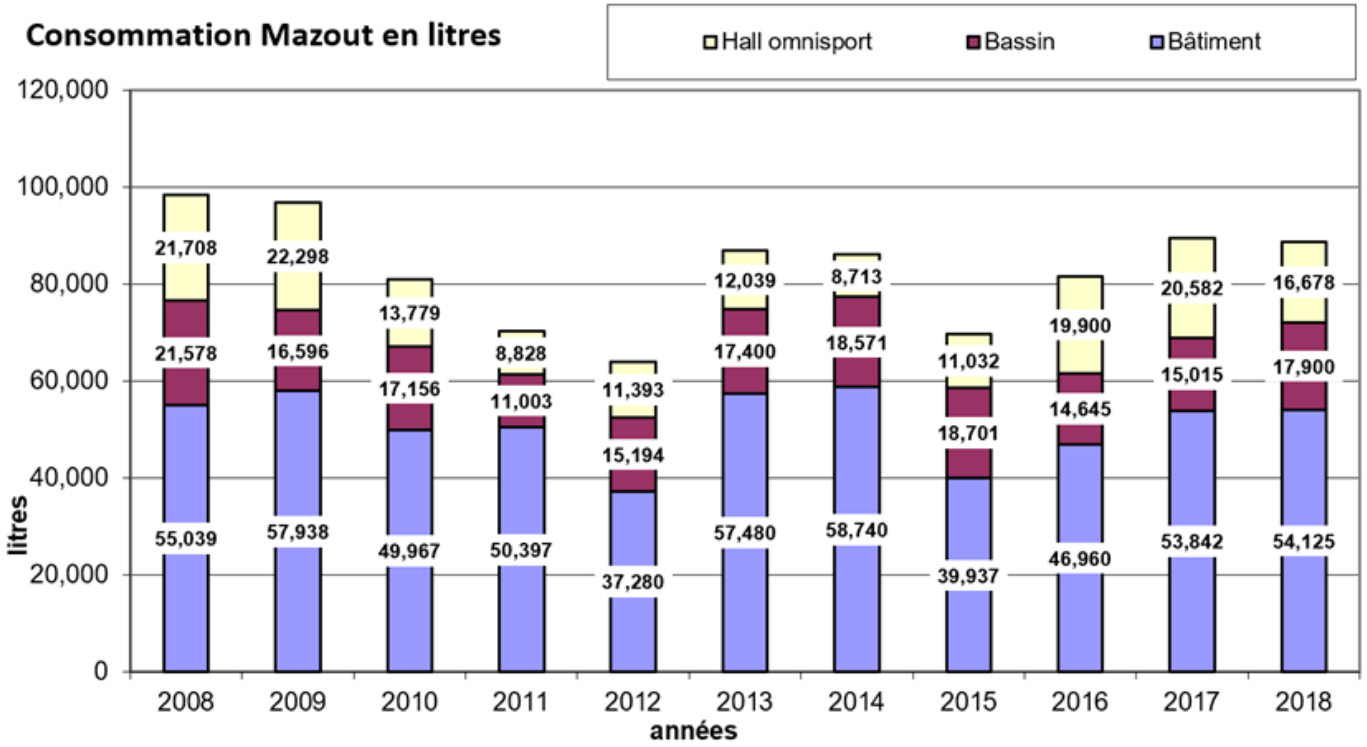


Eco-Footprint: Providence Champion (Namur)



ANNEXE 3

TABLEAUX DE BORD ENERGIES & GROSSES DEPENSES



BRG 19 (Austria)

BRG19 **Energiebilanz 2017/18**

Gesamtausmaß des beheizten verbauten Raumes
→ Kubatur
6.285m^3

	2017	€	2018	€
Fernwärme (auch aus Biomasse):	588 MWh ---	45.315	466 MWh (- 21%) ---	36.786
Elektrische Energie:	110 MWh ---	14.845	114 MWh (+ 4%) ---	15.614
Jahreskosten in € inkl. (MWSt.):		**60.231** €		**52.400** €

Müllgebühren:

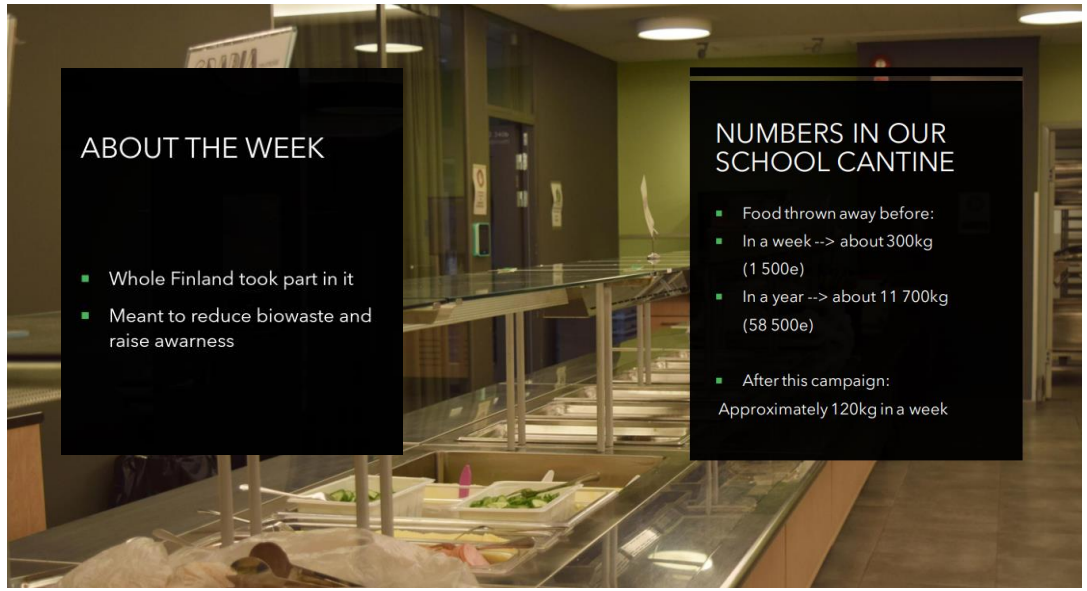
2017: **5.490,06** €
2018: **5.419,81** €

Wasser / Abwasser:

2017: **6.677,53** €
2018: **6.816,06** €

Schildtin Lukio (Finland)

Food Waste Week



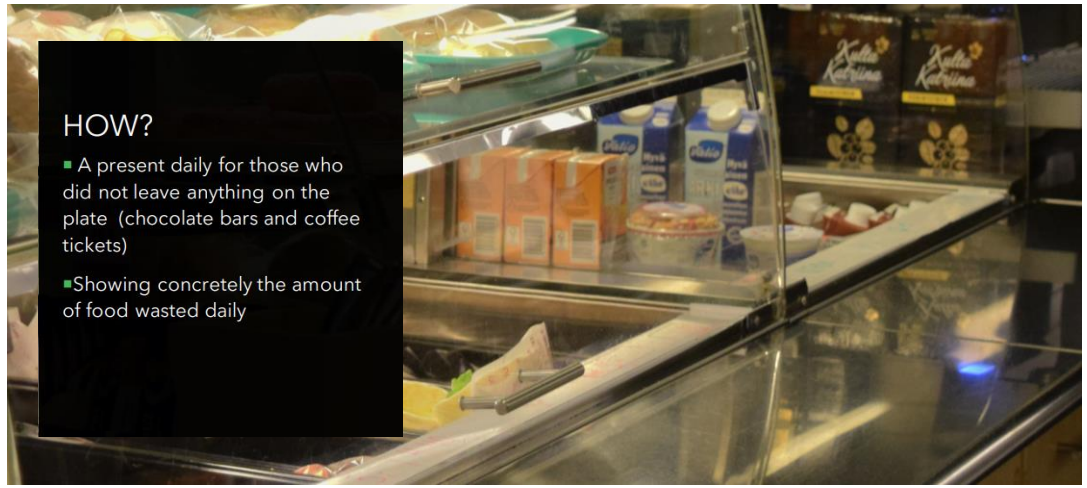
ABOUT THE WEEK

- Whole Finland took part in it
- Meant to reduce biowaste and raise awarness

NUMBERS IN OUR SCHOOL CANTINE

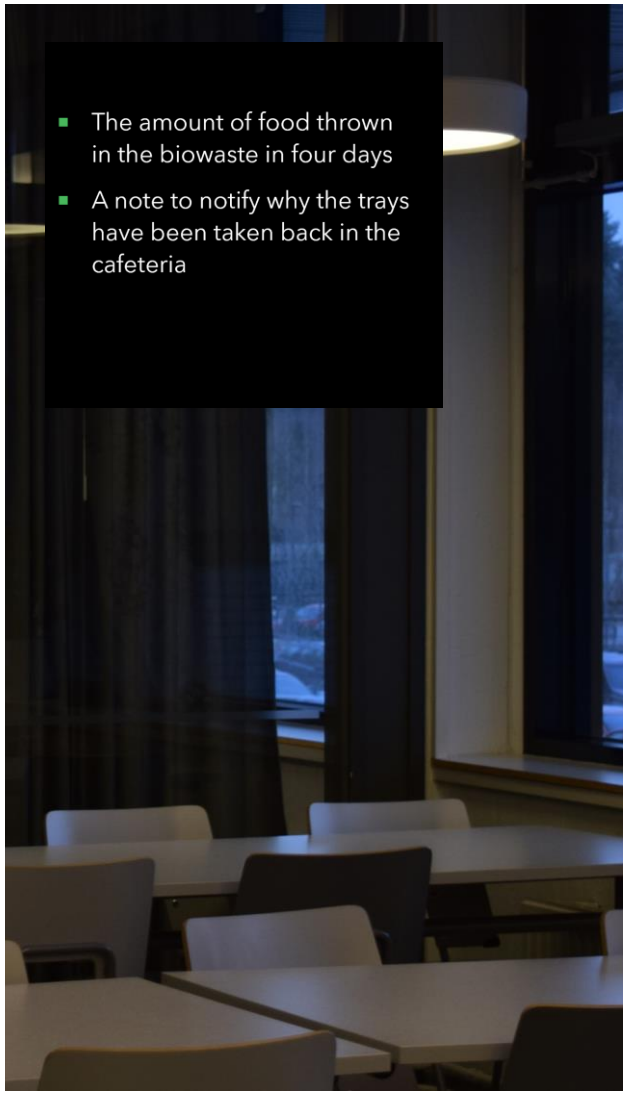
- Food thrown away before:
- In a week --> about 300kg (1 500e)
- In a year --> about 11 700kg (58 500e)
- After this campaign:

Approximately 120kg in a week



HOW?

- A present daily for those who did not leave anything on the plate (chocolate bars and coffee tickets)
- Showing concretely the amount of food wasted daily



- The amount of food thrown in the biowaste in four days
- A note to notify why the trays have been taken back in the cafeteria