1 INTRODUCTION/MESSAGES

Saturday, August 22, 2020 is Earth Overshoot Day!

On this occasion, Luxembourg's Higher Council for Sustainable Development (Conseil supérieur pour un développement durable - CSDD) will present the latest figures on Luxembourg's ecological footprint.

This year, the „Earth Overshoot Day" exceptionally lands on 22 August, more than three weeks later than in 2019 (in 2019 it was on 29 July), which is due to the Covid-19 pandemic and the temporary decrease in CO2 emissions worldwide. Earth Overshoot Day marks the date when humanity's demand for natural resources in a given year exceeds what Earth can regenerate in that year. It is calculated every year by Global Footprint Network and illustrates the ecological limits of our planet. The Luxembourg Earth Overshoot Day 2020 is estimated by Global Footprint Network to be 16 February. In other words, if the world population's resource consumption were as high as in Luxembourg, by that day it would have already used up the regenerative resources available to it for the entire year. In order to sustainably cover our consumption of resources, as calculated for Luxembourg, humanity would currently need a total of eight earths. According to this estimate, from mid-February onwards, people in this country will therefore live at the expense of future generations and people in the Global South, who consume significantly less but are more affected by the ecological consequences.

The latest figures for Luxembourg (basis 2018) have been compiled and verified by the "Institut fir biologësch Landwirtschaft an Agrarkultur Luxemburg" (IBLA) on behalf Luxembourg's Higher Council for Sustainable Development (CSDD) in scientific cooperation with Global Footprint Network (GFN), mainly from available STATEC data. The complete study (1*) will be available on the CSDD website (www.csdd.lu).

1 - The study to calculate the ecological footprint of Luxembourg was carried out by the 'Institut fir Biologesch Landwirtschaft und Agrarkultur Luxemburg asbl' (IBLA) on behalf of the Luxembourg Sustainability Council, the Conseil Supérieur pour un Développement Durable (CSDD). The contractor alone is responsible for the content, including the conclusions. -

How do these eight planets come about? What needs to be taken into account when considering the specific situation of Luxembourg? What courses of action result from this? IBLA already provides some basic approaches to solving this problem. Furthermore, in the coming months, the CSDD wants to analyse the ecological footprint of Luxembourg in a joint process with the key players in Luxembourg society, to identify real potential for savings and possible alternative courses of action, and to discuss the political decisions necessary to reduce Luxembourg‘s ecological footprint together and to make our country more sustainable accordingly.

The CSDD accompanies the national sustainable development policy with research, studies and recommendations to Luxembourg‘s political and economic decision makers.

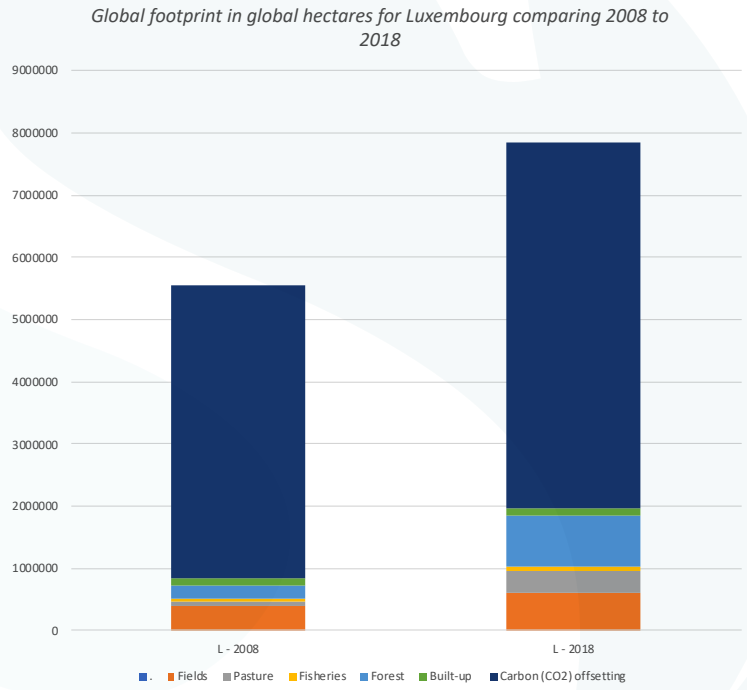
2 MAIN RESULTS OF THE IBLA STUDY (2020)

The Ecological Footprint is a tool that allows a kind of accounting for natural resources and applies a holistic approach. It captures most of the competing demands for earth‘s renewability in terms of biomass. More specifically, the Ecological Footprint measures the use of six categories of productive land: Arable land, grazing land, fishing grounds, built-up land, forest land and carbon sequestration. On the other hand, the ability of ecosystems to renew biomass is called „biocapacity“. In order to be able to compare the ecological footprint of different countries or various other areas, the values are given in „global hectares“ per person and year (abbreviated „gha“). The global hectare corresponds to one hectare of average global biological productivity.

The general objectives of the IBLA study were to: first, compare international data used by Global Footprint Network with national data; second, update the Footprint and biocapacity calculation for 2018; and third, to specifically examine the impact of fuel tourism and commuting.

According to the IBLA study, 7.99 planets (figures from 2018) would be consumed if all the earth's inhabitants lived like Luxembourgers (compared to 1.69 planets worldwide), giving a total figure for Luxembourg of 7.8 million global hectares (gha) and 13 gha per capita.

For Luxembourg, the Ecological Footprint impressively shows the overuse of available resources and points out that especially the use of energy (fossil fuels and electricity based on fossil fuels) with 7.75 gha per capita (i.e. a consumption of 4.75 planets extrapolated or about 60% of the total Luxembourg Footprint) leads to this a priori catastrophic picture. Nevertheless, the Food Footprint, which is 2.09 gha per capita (i.e., consumption of 1.28 planets extrapolated), shows that each individual can contribute to a more sustainable society by rethinking and changing his or her own consumption and living habits. For example, a consumption of about 0.65 planets is directly attributable to the consumption of meat and animal products.



Between the first Luxembourg Footprint study published in 2010 (figures from 2008) and 2018, the evolution of Luxembourg's needs was as follows

- Increase of agricultural and forest land by about 1.1 million gha (plus 155%) ;
- Increase of carbon offsetting land by about 1.1 million gha (plus 25%) ;
- Decrease of the total biocapacity of the Luxembourg territory to about 800,000 gha in 2018, which means a decrease of 10% in 10 years.

The results of the study show some special effects for Luxembourg. For example

- The calculation of the EF/capita (Ecological Footprint/capita) is problematic for Luxembourg: the number of „residents" and thus the EF/capita does not take into account the relatively high number of commuters, whose local consumption has an impact on the EF (and also on the economic performance GNP and GDP) → the CSDD has calculated the EF separately, showing the consumption of cross-border commuters and „fuel tourism" separately (see below)
- The energy consumption of some energy-intensive industries is attributed to Luxembourg, based on the methodology of the GFN. For example, „imported secondary raw materials" such as steel and tyres have the same energy content as the finished products that are exported. This is also the case for the services sector whose energy consumption is integrally attributed to the Luxembourg population, including the not insignificant part of the services that are exported.
- The energy consumption of the Luxembourg logistics sector (lorries, flights, etc.) is integrally attributed to the Luxembourg population. Similarly, the energy consumption of the local service sector is comparable to that of energy-intensive heavy industry (steel, aluminium, tyres,..) and is also allocated integrally per capita. The present study does not allow any precise conclusions to be drawn to show these sector-specific energy consumption figures separately.

Although the Ecological Footprint measures the impact of our consumption behaviour on global bio-resources, the model literally reaches its limits due to the small size of the country and the high number of cross-border commuters. As in the studies commissioned by the CSDD in 2010 and 2013, an attempt has been made to show the proportion of cross-border commuters separately from the proportion of inhabitants, also in order to be able to break down the national Footprint of „residents" in a more differentiated way. This separate break-

1 - Hild P, Schmitt B, Decoville A, Mey M, Welfring J (2010) : The Ecological Footprint of Luxembourg : Technical Report (version 4.0–extended Scoping Study Report). Research Centre for Environmental Technologies, Luxembourg.

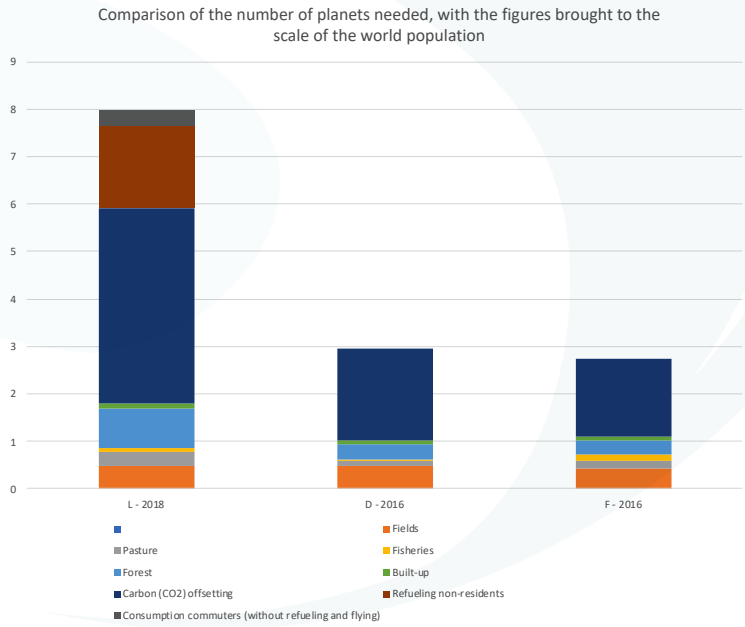
down of the indicator can be used to some extent to take account of the special features of Luxembourg, but not with the aim of “whitewashing calculations”. In addition, the high consumption value of fuel tourism and transit refuelling, i.e. diesel and petrol filled up by non-residents and businesses, was also taken into account. However, this approach also clearly shows Luxembourg‘s weaknesses with regard to its commuters and fuel tourism in terms of sustainability!

A comparison with our direct neighbours Germany and France shows the following results :

After taking into account the special effects of „non-resident refuelling“ and the consumption of cross-border commuters in Luxembourg, there still remains a consumption of almost 6 planets, more than double the consumption of our neighbours (note: particularly large areas of woodland and carbon compensation areas are needed compared to our neighbours!). The other special effects mentioned above will be investigated at a later stage in the process described.

The calculation method of the ecological footprint still has some weaknesses, e.g.

- Unfortunately, the Footprint does not take into account the biodiversity loss and land consumption in Luxembourg ;
- The limited availability of resources such as drinking water for Luxembourg is not taken into account ;
- With the population of Luxembourg increasing rapidly, the biocapacity per inhabitant of our country is decreasing and the per capita Footprint does not take into account the increasing total Footprint.



3 PRIORITIES OF LUXEMBOURG

Based on the IBLA study, the following is a rough breakdown of the key aspects of Luxembourg's ecological footprint.

The roughly listed approaches are to be discussed with the stakeholders during the planned process, to be supplemented, deepened and strengthened. They are by no means to be understood as proposals or even demands at this stage.

3.1 ENERGY

3.1.1 Direct energy consumption

4.75 planets total, 3 planets after adjustment for fuel tourism/transit

Direct energy consumption accounts for about 60% of Luxembourg's footprint (i.e. about 4.75 planets). The export of fuel to transit drivers, border crossers and tank tourists alone causes 1.75 planets. This leaves 3 planets that are attributable to the inhabitants of Luxembourg.

For kerosene consumption of our national airport alone, 0.7 planets are consumed (more than ten times as much as our neighbours per capita!). This figure still needs to be examined in detail, but it is probably a direct consequence of the Cargocenter on Findel.

Luxembourg's service sector consumes more energy than all households and almost as much electricity as our industry. According to the Footprint methodology of the GFN, unlike industrial products, this is passed on to the Luxembourg population alone. This is all the more important for a possible benchmarking, because many of these services are exported and account for the majority of Luxembourg's economic performance, which is not the case for our neighbours. This is a more detailed analysis to determine the Footprint of the financial services sector, to better understand the Luxembourg result and to define the scope for action.

In the coming months, the focus will be on advancing the decarbonisation of the economy, building on the reforms already planned (e.g. energy and climate plan, promotion of renewables). Among other things, the energy consumption of the service industry (including financial companies) and the aviation sector will be analysed in more detail and proposals made for reducing this consumption.

Possible solutions

a. Energy savings/promotion of energy efficiency

b. Decarbonisation of economic production processes, renewable energies for electrical production

c. Use of hydrogen on the basis of renewable electrical production where battery technology finds its limits (airplanes, trucks,...)

d. Remote communication and targeted mobility

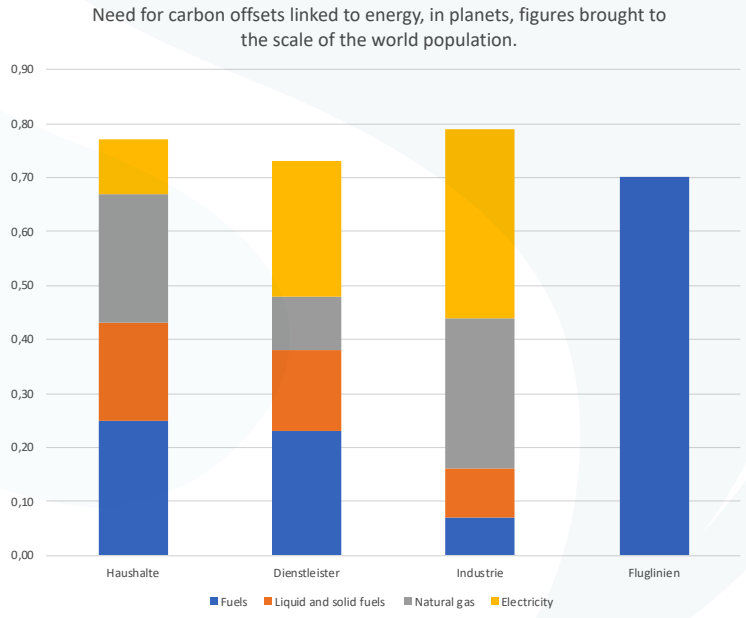
e. Closed Substance Cycle Waste Management

f. Specific analysis of energy consumption in the service sector

g. Promotion of additional uses of electricity from alternative energy sources and the hydrogen economy

h. Responsibility in developing an alternative to kerosene (based on hydrogen)

i. Deceleration of growth



3.1.2 Consumption of grey energy

more than 1.25 planet grey energy, i.e. energy used in the production of consumer goods

Luxembourg has a high standard of living, and therefore, in relation to our neighbouring countries, the consumption of goods is increasing, and with it the indirect energy consumption through the purchase and use of these consumer goods. The consumption of cross-border commuters in Luxembourg only accounts for 0.13 planets, so that there are still 1.12 planets per inhabitant. The next task is certainly to break down this consumption of „grey energy“ for Luxembourg more precisely (construction, consumer goods, ...) and to propose possible solutions.

Possible solutions

a. Reduction of consumption of non-sustainable goods

b. Application of True Cost Accounting to consumer goods

c. Dematerialization

d. Circular economy (repair, reuse, remanufacture, share, service models, performance models, ...)

e. Cradle to cradle products, recycling

3.2 MOBILITY | REMOTE COMMUNICATION

There is a high energy consumption/infrastructure/landscape consumption and loss of time due to daily commute between home and work, especially for cross-border commuters. CO2 savings are possible if more digital transformation is implemented in industry, businesses and government agencies. Digitalisation allows more „remote working“ (reducing the commuter footprint). Digital shareholder meetings and supervisory board meetings will reduce travel activities and simplify and increase participation while consumption of paper resources will also decrease. As electricity consumption increases in turn (data centres and communications), it is all the more important that electricity is generated from renewable energy. In addition, Luxembourg must become more involved in the Greater Region (public transport). Indeed, regional economic performance also brings regional responsibility.

Furthermore, there are high environmental costs for air transport (0.7 planets!), although a breakdown between air travel and freight transport remains to be made.

Possible solutions

a. Expansion of local public transport

b. Balance energy consumption of physical movements with energy consumption of digital communication

c. Analysis, where and with which energy data centres should be operated

d. Legal expansion and social security of „home-officing“ (also across borders)

e. Development of the “Grande Région”

f. Adaptation of labour market strategies

3.3 FOOD | 1,28 planets

The supply of the population with high-quality food, which is produced seasonally, regionally and in accordance with the requirements of pesticide-free agriculture without the use of artificial fertilizers, and with consideration of animal welfare, must become the primary goal of sustainable and thus future-oriented agriculture. The protection of common goods such as biodiversity, soil, water and air must therefore be a basic criterion for public funding (EU, national). For Luxembourg, the consumption of meat and animal products, which is very high in comparison to its neighbouring countries, stands out and represents the consumption of about 0.65 planets (without considering methane production!). Luxembourg should reduce the number of animals kept for export only, which is associated with high water pollution of nitrates, and focus more on loss-making production branches (reduction of milk production and beef, promotion of fruit and vegetable production as well as pork and poultry).

Possible solutions

a. Reduction of meat consumption

b. Seasonal and regional products / organic or sustainable agriculture (pesticide-free, without artificial fertilizers)

c. Quality label based on sustainability features

d. Avoiding waste of food

e. Orient agriculture towards sustainable food production and not energy production (agrofuels, maize cultivation, biogas plants, etc.)

f. Discontinuation/reduction of soya cultivation/import

3.4 NON - FOOD

Luxembourg has a very high level of consumption. For example, the extraordinarily high consumption of paper (about 0.45 planets) is striking, which is probably largely attributable to the service sector. As these are factors, both of a systemic nature and dependent on the sustainable behaviour of the individual, there is an acute need for consumer education and, for example, systematic education in the school system.

Possible solutions

a. Reduction of consumption/luxury goods (promote repair instead of new purchase, e.g. by making repair services VAT-free or subject to the „taux réduit“ and therefore cheaper than new purchases)

b. Reduction in (short-haul) air travel (0.7 planets)

c. Promotion of „paperless“ functioning of administrations and the service sector (paper consumption approx. 0.45 planets)

d. Taxation of energy-intensive streaming services

e. Circular Economy (repair, reuse, performance models, service models, sharing models, ...)

3.5 DECOUPLING FROM GROWTH

Luxembourg‘s population increased from 313,050 to 613,894 between 1960 and 2019, corresponding to a population growth of 96.1%, many times higher than that of most EU Member States during the same period. Population growth in Luxembourg has increased particularly after 1985 and has been accelerating steadily since then, currently at 12,000 inhabitants per year. Between 2000 and 2018 alone, the population grew by 38.8% (Germany, 0.7%; France 10.5%).

While the Luxembourg growth model is intended to finance social benefits (health care, pensions), biocapacity is continuously decreasing at the same time with a continuing net influx of currently about 12,000 inhabitants per year. It is obvious that the Luxembourg pension system, and the economic model emerging from it, can thus be considered a prime example of an unsustainable economic model. In order to reduce the ecological footprint per capita, a medium- and long-term decoupling of social security and economic growth is inevitable. This also shows a weakness of the Footprint per capita: Although the total Foot-

print of the country is continuously and strongly growing, increase of Footprint per capita remains far behind due to Luxembourg's demographic growth, which is unique in Europe. For example, between 2016 and 2018, the total Footprint grew 13 times faster than the per capita Footprint. However, a comparison of the total Footprint of the country on the basis of the land area in relation to the land area of the planet was not possible within the framework of this study. An analysis of the EF in relation to GDP was not dealt with in the study either.

Possible solutions

a. Rethinking the growth model

b. „GDP of Well-being" instead of GDP

c. Securing the social system through „sustainable" growth (or not GDP-bound)

d. Development of the „Grande Région"

e. Home office

f. Adaptation of labour market strategies and pull factors

4 OUTLOOK

About the method

The present study and its conclusions are largely based on the ecological footprint per capita of the population. This is both a strength and a weakness. The strength of this approach lies in the fact that it

- allows an extrapolation to a hypothetical global Footprint, assuming that all world inhabitants live like the inhabitants of Luxembourg, and
- that it provides a solid basis for the comparison of individual Footprints between different countries

The weakness of the approach is that it largely excludes demographic and thus quantitative growth, although it is exceptional and unique in Europe.

However, it should be noted that the demographic growth in Luxembourg is mainly based on immigration, and here it is also largely from European countries. These new inhabitants then no longer burden the planet in their countries of origin, but possibly at a higher level in Luxembourg. The per capita view does not allow any statement to be made about the consequences of demographic growth on a limited territory. However, population growth causes a greater burden on the local biosphere than the per capita footprint would suggest.

On the results and next steps

Based on the results of the study, we are undoubtedly overshooting the boundaries given to us and are drawing on the Earth‘s reserves, which have been accumulated over millions of years. This will not work. Do we want to continue to consume as if there were no tomorrow, with our children and grandchildren paying the bill? In a world increasingly affected by climate change and scarce resources, ecological deficits pose an increasing risk. How can Luxembourg prepare itself for the future, how can it adapt its financial and economic system to the natural limits of the earth? How can its financial and economic system possibly contribute to a global improvement of its Footprint? What options does it have?

The main addressees of the national Footprint and biocapacity accounts are the representatives of politics and economy (including agriculture and forestry), who have to ensure that Luxembourg develops into a sustainable, largely independent and resilient economy.

On the basis of the available results (a Footprint of 8 planets), the CSDD launches a collaborative process with leaders from the economic, social and political spheres in order to jointly interpret the contents of the study and to develop action plans. The aim is to mobilise all forces, without apportioning blame, to develop a more sustainable Luxembourg. The topics that emerge from the study will be dealt with, including

- The issue of growth and the extent to which the social security model can be decoupled from the productivity of the economy and its consumption of resources ;
- Estimation of the price and risk of inaction ;
- Development of sectoral approaches (energy, mobility, food and consumer goods) that take account of ongoing government efforts
- Possibilities for reducing Luxembourg's energy and resource consumption through subsidies, tax relief and taxation (keyword tax reform)

These multi-stakeholder discussions with economic, social and political leaders over the coming months are intended to help implement integrated governance and policy to ensure policy coherence and effectiveness in the area of resource-efficient planning (e.g. in water management and landscape planning) in all sectors. Furthermore, „good governance" can be seen as the 4th pillar of sustainable development to ensure this coherence at national level. It will also be a matter of encouraging and building up systemic reflexes among decision-makers, especially in times when resilience is required more than ever.

1- Disclaimer - The study to calculate the ecological footprint of Luxembourg was carried out by the 'Institut fir Biologesch Landwirtschaft und Agrarkultur Luxemburg asbl' (IBLA) on behalf of the Luxembourg Sustainability Council, the Conseil Supérieur pour un Développement Durable (CSDD). The contractor alone is responsible for the content, including the conclusions.

2 - Among which PNDD, Luxembourg in transition, PNEC 2020, ODC 2020, NRP 2020 -