Reducing the Commission's carbon and ecological footprint

BUILDINGS

EXECUTIVE SUMMARY

Buildings represent more than half of the European Commission's carbon footprint[1]. Tackling the climate and ecological crisis is a Commission priority and we must lead by example. This is only possible through exemplary building management.

Decarbonising the EU building stock with a view to achieving high environmental efficiency is an obligation for Member States under EU law. The EU institutions should not only ensure high energy performance and decarbonisation by 2050, but should go well beyond, excelling in terms of biodiversity protection and regeneration, circular economy and sustainable construction.

All Commission buildings should be exemplary in terms of their carbon and ecological footprint during all phases of their lifecycle (planning, design, construction, renovation, operation and maintenance).

We propose the following 10 guidelines for the planning, design, renovation, maintenance and operation of buildings:

1. Apply the "**reduce-reuse-recycle**" principle where possible;
2. Standardise the '**sufficiency- efficiency- renewables**[1] principle ;
3. At the very least, **neutralise** the Commission's building carbon footprint;
4. Focus on environmental **restoration**, creating a **positive** urban, social and natural impact;
5. New building design must be based on principles of **bio-cooling/bio-climatic solutions.**
6. Ensure new buildings meet **minimum energy performance** standards and aim for **net-positive** buildings (buildings which produce more energy than they consume).
7. Respect **circular economy principles** at all stages in terms of operability, maintainability, **flexibility**, **reuse**, and future proof design.
8. **Each project including construction sites** must aim for **zero waste**;
9. **Ambitious** and effective requirements must be imposed from the design stage.
10. Lead on **innovation** (or low tech) and showcase **academic research**.

As a first step, and based on audit and operational data, a **masterplan** which sets out priorities for the transformation of the Commission's building stock (including both existing owned and leased buildings, as well as planned acquisitions and construction) should be established for the next 10 years in a consultative approach with staff.

[1]EC Environmental Statement, *Corporate summary for 2018.*

In concrete terms, **building management must achieve carbon neutrality and where possible regeneration in all dedicated areas**, such as:

- Bio-climatic solutions as a basic principle;
- Systemic water management and use of rain water;
- Biodiversity: Increased integration of fauna and flora (e.g. green roofs);
- Sustainable materials by life-cycle analysis;
- Quality of the air inside and outside;
- Waste management (ensuring exemplary works towards zero waste .g. on building sites);
- The circular economy as a new paradigm;
- Urban planning as a tool of social linkages;
- Effective use of artificial intelligence and behavioural adjustment;
- Mobility to, from and around buildings;
- Energy efficiency.

1. Background: Why it matters

The European institutions, with the Commission as the frontrunner, must lead by example on combatting the climate and ecological crisis and, in particular, through exemplary building management which is environmentally sound. By environmentally sound, we mean building management that considers the carbon, ecological, social and urban dimensions.

The Commission must raise its ambitions to the highest level. This paper sets out principles which should be implemented from the programming stage of a project, to its design, construction, operation, renovation and maintenance, until the end of life of a building.

2. State of play

The Commission's 2018 Environmental Statement reveals that emissions related to the operation of its buildings (fixed assets included for the first time in 2018, see figure below) accounted for more than half (93 877 tCO_2e) of total emissions linked to the Commission's activities (180 983 tCO_2e). Brussels and JRC Ispra together account for nearly two thirds of CO_2 emissions, with JRC Seville and Grange responsible for very small amounts. Overall, the Commission has reduced emissions gradually since all sites have been included in reporting in 2011[2] but there is still a long way towards a zero carbon footprint.

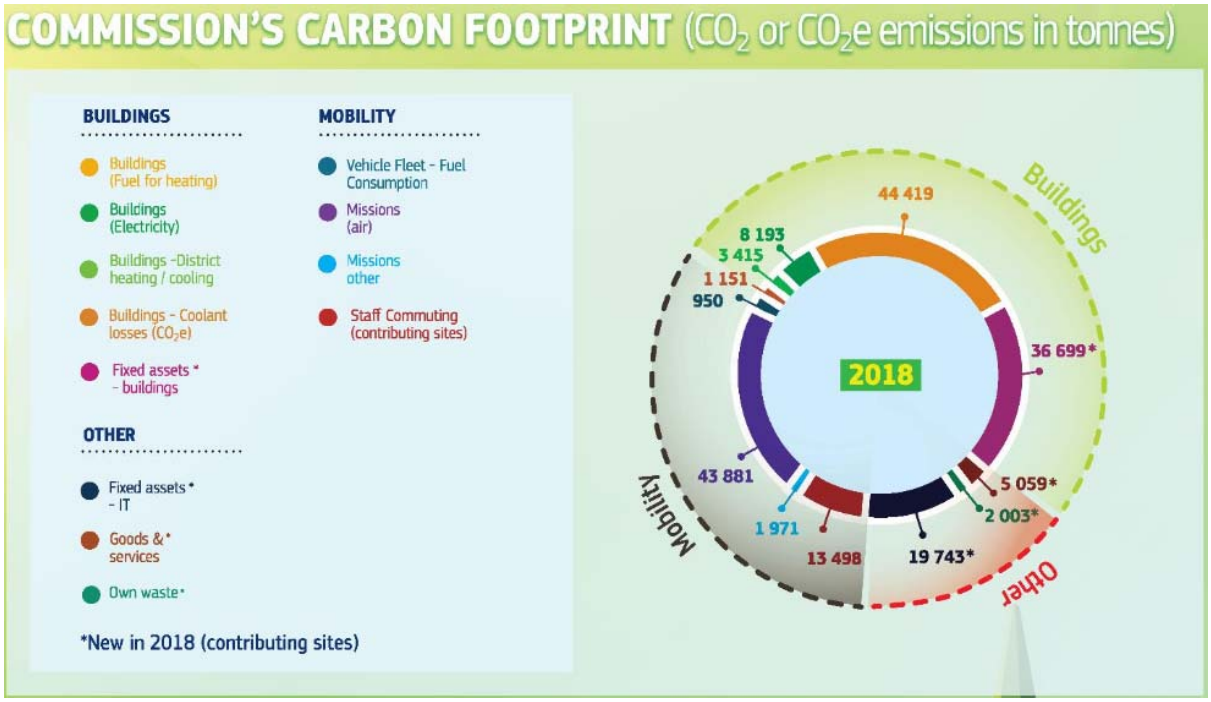

Figure 1: Carbon footprint per field. Buildings account for more than half of the total emissions (source: EC Environmental Statement 2018)

[2]EC Environmental Statement, *Corporate summary for 2018* (see also "Proposal to achieve Carbon Neutrality of the European Commission Business Trips").

The planned large real estate project LOI 130, with a building complex of over 175,000 m², will include offices for over 5,000 staff members, 2 childcare centres, a visitors centre, restaurants and shops and public spaces with green areas. The project gives the Commission an opportunity to highlight its commitment to leading by example. Planning, design, consultation and ambitious performance objectives in relation to the carbon and ecological aspects of the project will be crucial.

In the context of the LOI 130 project, but also in more general terms, the impact related to the demolition of the existing buildings on the site (and the embodied carbon therein) as well as the embodied carbon associated with the new construction should also be taken into account. This begs the question – could, for example, some of the existing buildings be maintained and renovated instead of demolished?

3. Areas for immediate and future action

Given the urgency, some actions must be taken immediately.

Existing buildings

The first action would be to launch a **Masterplan** for carbon neutrality and even offset, which sets out the priorities and hierarchy of major maintenance and building projects. It is to be carried out over the next 10 years[3]. It can be based on an audit associated with full monitoring including all flows.[4]

More than energy, the management of real estate projects must exceed current engineering best practices in order to take a holistic view of environmental issues.

Principles in all projects

All areas related to the environment must be considered, in particular:

1. **Bio-climatic solutions as a basic principle**
   - Construction projects must adapt to geographical data, solar orientation, wind exposure, value and use the topography;
   - Passive systems must always be preferred to active systems;
   - Bioclimatic solutions are considered outdoors and indoors in terms of comfort, neutral climate concepts, maximum use of daylight, temperature and humidity gradients;
   - The buildings must limit the effect of heat islands, and take better account of the albedo.
2. **New approach to water management**
   - Distinction between all flows (yellow, grey water,...) should be made possible;
   - Collect rainwater wherever it is not directly used by the planted areas;
   - Use should be made of different sources of water according to quality (drinking, surface water, irrigation water...);

[3] going beyond PLAGE.
[4] However, the maintenance services are familiar with their assets.

- Multiple cycles by filtration, feeding, treatment, purification, lagooning, gravity use rather than pumps;
- Promote rational consumption amongst staff;
- Toilets by suction, or flow separation.

3. Biodiversity: Increased vegetation and promoted fauna

- Plant all horizontal and vertical surfaces not suitable for renewable energy with native species that are resilient or able to withstand the climate for 30 years;
- Make systematic use of urban agriculture (underground, in the parking spaces, on the roof or inside the buildings) possibly by contracting organic producers;
- Plant fruit trees, giving preference to full earth plantation or substrates of more than 50 cm;
- Mow lawns minimally and reduce lawn-areas to a minimum;
- Offer pollinators foraging spaces of deliberately chosen species (e.g. melliferous plants);
- Nesting spaces for birds should be provided at appropriate heights for local species;
- Reduce light pollution to a minimum;
- The site schedule must take into account the periodicity of the local fauna.

4. Sustainable materials

- Combat resource depletion by systematically looking for solutions on the re-use market;
- Impose a minimum of 4% of the value of contracts resulting from the re-use market;
- Systematise and impose the selection of materials by Life Cycle Analysis;
- Take into account the societal costs (environmental, social and health) of materials;
- Impose the creation and use of material passport from the Circular Economy Package.

5. Perfect air quality

- Indoor and outdoor air quality should be controlled and optimised;
- Design spaces with no toxic products or chemical solvents on building sites;
- Avoid household products containing endocrine disruptors;
- Monitor carbon capture by structural components and vegetation;
- Use vegetation for air treatment and to improve the air quality of the area.

6. Waste limitation - resource recycling

- Prioritise urban mining5, Building As Bank Material6, Cradle to Cradle;
- Impose waste sorting by the contractor at the end of the collection procedure;
- Create spaces for composting:
- Avoid demolition, prioritise renovation;
- Systematically impose pre-demolition inventory on the re-use or donation market;

[5]Exploitation and recovery of stocks of resources (in particular rare metals) in the local environment.
[6] https://www.bamb2020.eu/

- Ensure exemplary building sites towards zero waste;
- Sites must be balanced, participative and characterised by mutualisation, reduced footprint, renewable energy, rationalisation of water, limitation of nuisances and of waste, but must also be educational, fun;
- Lean management7 is a requirement of sobriety;
- Add a phase of negotiation with the suppliers to negotiate the reduction of packaging, or the return to delivery of the unnecessary inputs, or the measuring device, or the instructions for the containers (including paint): the producer takes responsibility for the waste from its products;
- Impose dismantling training on dismantlers in order to guarantee the final value of the dismantled materials;
- Preliminary assessment of the outputs and outputs of the site > optimisation;
- Recruitment of a "valoriste" from the social and solidarity-based economy to ensure that all businesses behave correctly with regard to recycling. The "valoriste" works with all the partners and helps the change of behaviour. He/she can also manage a free "resourcery"8 open to the public for reusable products before sending them to the waste centre (legal and insurance clause to be drawn up, there are examples of success);
- Envisage process chains where the material and energy waste can be reused in other locations or other activities;
- Conceive projects inspired by nature (bio-memetic and permaculture);
- Integration by coordination of building sites at local level to minimise the impact (in particular of mobility);
- Pooling and storage of tools is possible through a centralised management. Moreover, it gives other advantages such as the cleaning and maintenance of tools;
- Promote water recovery and renewable energy production on the building site.

7. The circular economy as a new paradigm

- Build Local and Build Light;
- Use the EU programme « Level(s) »9 inside the institution;
- Promote reversible construction and dismantling by design;
- Modularity, evolution and flexibility to cope with technological and social changes and developments;
- Intelligent use by modularity and standardisation;
- Simplicity of operation and installation management (open source?);
- Extension of the lifespan, product requalification, recycling, valuing local know-how, reuse of the maximum of ex situ/in situ materials, decontamination of the soil, reuse of inert soil, reuse

[7] https://en.wikipedia.org/wiki/Lean_construction https://www.ffbatiment.fr/federation-francaise-du-batiment/laffb/mediatheque/batimetiers.html?ID_ARTICLE=2321

[8] https://www.ecopertica.com/aller-plus-loin/reemploi/

[9] Level(s) is a voluntary reporting framework to improve the sustainability of buildings. Using existing standards, Level(s) provides a common EU approach to the assessment of environmental performance in the built environment.http://ec.europa.eu/environment/eussd/buildings.htm

of the soil recovered from excavation, keeping the hierarchy of soil strata, priority to short supply and supply circuits;

- Go to a functionality economy where the producer take entire charge of his production from conception to recycling.

8. Creating links through urban planning

- Restore urban, human and environmental links;
- Limit emissions and pollution in the broad sense (soil, light, noise, mobility, water, etc.);
- Creation of 'third places' in buildings10.

9. Efficient artificial intelligence and behavioural change

- Wise use, rational and secure use of data to improve efficiency;
- Refine the technical management of buildings by artificial intelligence;
- Trigger staff change of habits and promote sustainable habits.

10. Mobility to, from and around buildings

- Choose sites by proximity with public transport (renting, building or buying);
- Promote teleworking, compulsory training for managers about teleworking;
- Financially incentivise staff for cycling/walking to work;
- Reduce car parks : increase proximity with bike parking (including cargo-bikes);
- Solar panels for e-bike and e-scooters;
- Free cycle service for bicycle repair.

11. Well-being

Take into account staff well-being. The impact on well-being should be assessed based on the same criteria as, for example, the WELL certification.11

12. Training and obligations

- The Green Public Procurement recommendations should be compulsory and effective;
- A training on GPP must be compulsory for all staff dealing with building projects;
- Every single procurement should be, in itself, green, improving the environmental status of the Commission;
- Inform people through visual signage of the detailed carbon footprint of each building;
- Inform people about the footprint of their data usage, for example emails.

[10] https://en.wikipedia.org/wiki/Third_place
[11] https://www.wellcertified.com/

And finally...

13.Energy

- Go beyond PASSIVE (energy performance of buildings regulations of the Brussels Capital Region), aiming for buildings that consume less than 10 kWh/m²/year,
- Seize the opportunity of major renovations or major projects (such as LOI 130) to deploy a net-positive building stock, i.e. producing more energy than they consume, renewable and with sustainable storage.
- Take into account the regulatory aspects of energy (heating, air conditioning, ventilation, lighting) in addition to operational aspects (catering, IT, equipment, etc.)
- Make feasibility study on district heating and cooling;
- Prioritise renewable energy production. Imposing a minimum of 80 % of renewable production on a new building is now realistic;
- Limit the origin of wood for biomass installations to 300 km;
- Automatic heat recovery of any energy production (kitchens, grey or black water, ventilation, process IT, etc.);
- Location of the server rooms on the basis of the free cooling potential, preference for cooling via water exchanger;
- Carry out awareness-raising campaigns about the energy costs of emails, storage restrictions, etc.;
- Minimise air conditioning to what is strictly necessary, switch to cooling systems if needed;
- Use natural ventilation;
- Internal staff training on advanced energy monitoring, combined with continuous monitoring and alerting in the event of a deviation, Building Management System (BMS) into self-learning (> IA);
- Sensors and actioners on balancing valves;
- Air Handling Unit with air flow regulated by generalised BMS, immediate end of "all new air";
- Generalised variable motors;
- Heating and air conditioning systematically synchronised with schedules, associated with detection of presence or absence;
- Systematic shutdown of heating and air conditioning for low inertia buildings associated with presence detection;
- One person at least needs to be trained to program and maintain each BMS as well as liaise with staff (business correspondent);
- Contract only ethical energy suppliers that guarantee 100% real renewable energy and tractability.

Neutralisation or regeneration?

- In each of the areas related to the environment, the trend should be towards regeneration. At the very least, compensation should neutralise the impact which cannot be reduced;
- Nature-Based Solutions in our own building projects;12
- Surfaces must be rationalised and coherent with the time usage. The mutualisation of all types of spaces (with a good planning service) is one solution.

[12] https://ec.europa.eu/research/environment/index.cfm?pg=nbs

Annex 1:

Benchmarks in Belgium[13]

- Flemish Govt: Herman Teirlinck building : http://www.boydens.be/fr/references/bureaux/batiment_herman_teirlinck_&_8211;_batiment_passif_pour_ladministration_du_gouvernment_flamand_a_bruxelles-876.html
- Bruxelles Environnement building (certified BREEAM Excellent and with 4,5 kwh/m2/yr:

  https://bel.brussels/en/content/eco-friendly-building

And abroad

- The Edge is considered (by some) "the greenest office building in the world" – although it relies very heavily on digitalisation… https://www.bloomberg.com/features/2015-the-edge-the-worlds-greenest-building/
- Woopa, Lyon, France, https://www.woopa.coop/les-etapes-du-projet/
- La cité de l'environnement, Lyon, France
- Epicenter, Stockholm
- 525 golden gate avenue, San Francisco
- https://www.constructionglobal.com/top10/top-10-smart-buildings-world
- https://sfwater.org/index.aspx?page=583

[13] Bâtiments exemplaires Bruxelles Environnement