

Marcel GYGER ⁽¹⁾, Xavier WAROT ⁽¹⁾, Aurore NEMBRINI ⁽²⁾, Philippe VOLLICHARD ⁽²⁾,

Violaine MAGAUD ⁽³⁾, Caroline COQUEREL ⁽³⁾

⁽¹⁾ Center of PhenoGenomics and ⁽²⁾ Sustainable Campus, Vice-Presidency for Planning & Logistics, EPFL, Lausanne, Switzerland

⁽³⁾ Quantis, Parc scientifique de l'EPFL, Lausanne, Switzerland

POSTER N° P-146

Contact persons: caroline.coquerel@quantis-intl.com; marcel.gyger@epfl.ch

Introduction

In the name of sustainability, a **Life Cycle Assessment (LCA)** of the EPFL animal facility was performed in collaboration with Quantis (www.quantis-intl.ch). Activities at the facility require a lot of energy to properly control housing conditions and to respect hygiene requirements, and the activities generate a high quantity of waste.

Why LCA? It is a multi-stage approach from the cradle to the grave. It is also a multi-criteria approach, allowing for impact assessment on **climate change** and other environmental indicators such as **human health** and **ecosystem quality**. One of the purposes of LCA is to avoid displacing environmental impacts (between life cycle stages, geographic locations, environmental compartments, impact categories or generations).

The goal of the study is to assess the environmental impacts of the EPFL animal facility and to identify how to reduce those impacts.

EPFL animal facilities assessed

- One species: mice (around 13'000 cages)
- Specific pathogen free, conventional and phenotyping units (total surface: 3'900 m²)
- Individually ventilated cages
- P1 & P2 labs
- Cage and rack washing & autoclaving
- Energy distribution usage :
 - ✓ 76% for steam production (natural gas)
 - ✓ 10% for heating (heat pump)
 - ✓ 9% for ventilation (electricity)
 - ✓ 2% for lighting (electricity)
 - ✓ 3% for others (electricity)

Which activities were monitored?

The monitoring of the EPFL animal facility during 2012 included the following activities:

- Administration and back office
- Mice husbandry
- Cage and rack washing & disinfection
- Ventilation
- Import and export of animals
- Scientific procedures
- Waste management
- Transportation

Environmental impact indicators



Climate change from:

- Global warming

Human health from:

- Human toxicity
- Ionizing radiation
- Respiratory effects
- Ozone depletion
- Photochemical oxidation

Ecosystem quality from:

- Aquatic acidification
- Aquatic ecotoxicity
- Aquatic eutrophication
- Terrestrial acidification/nitrification
- Terrestrial ecotoxicity
- Land occupation
- Water turbidity

Results

For one year of activities:

Climate change: 3'095 tonnes CO₂-eq



- ~ 1'100 flights (travellers) Geneva-New-York roundtrip
- Emissions of ~ 300 average Europeans per year



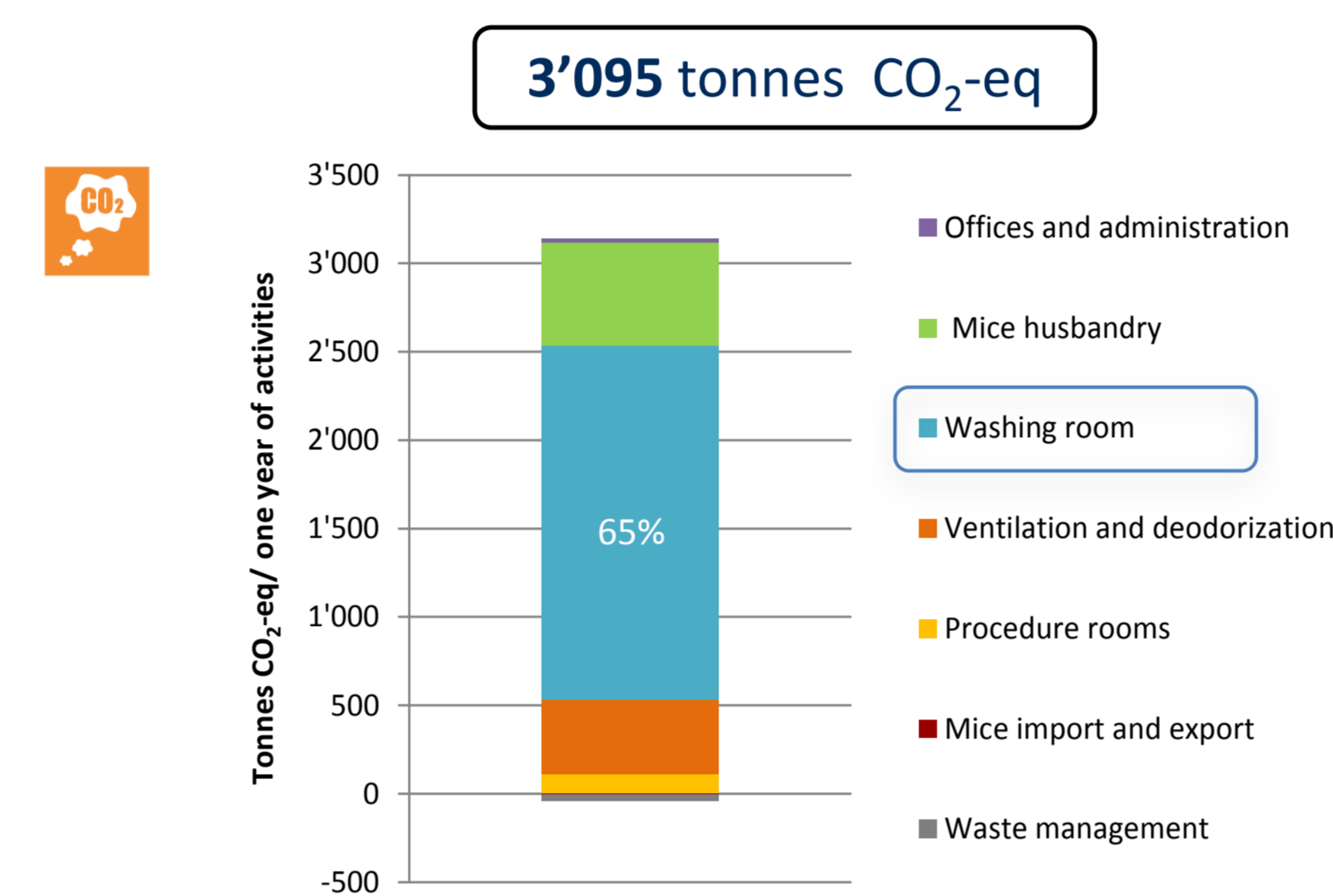
Human health

- Impact of ~130 average Europeans per year

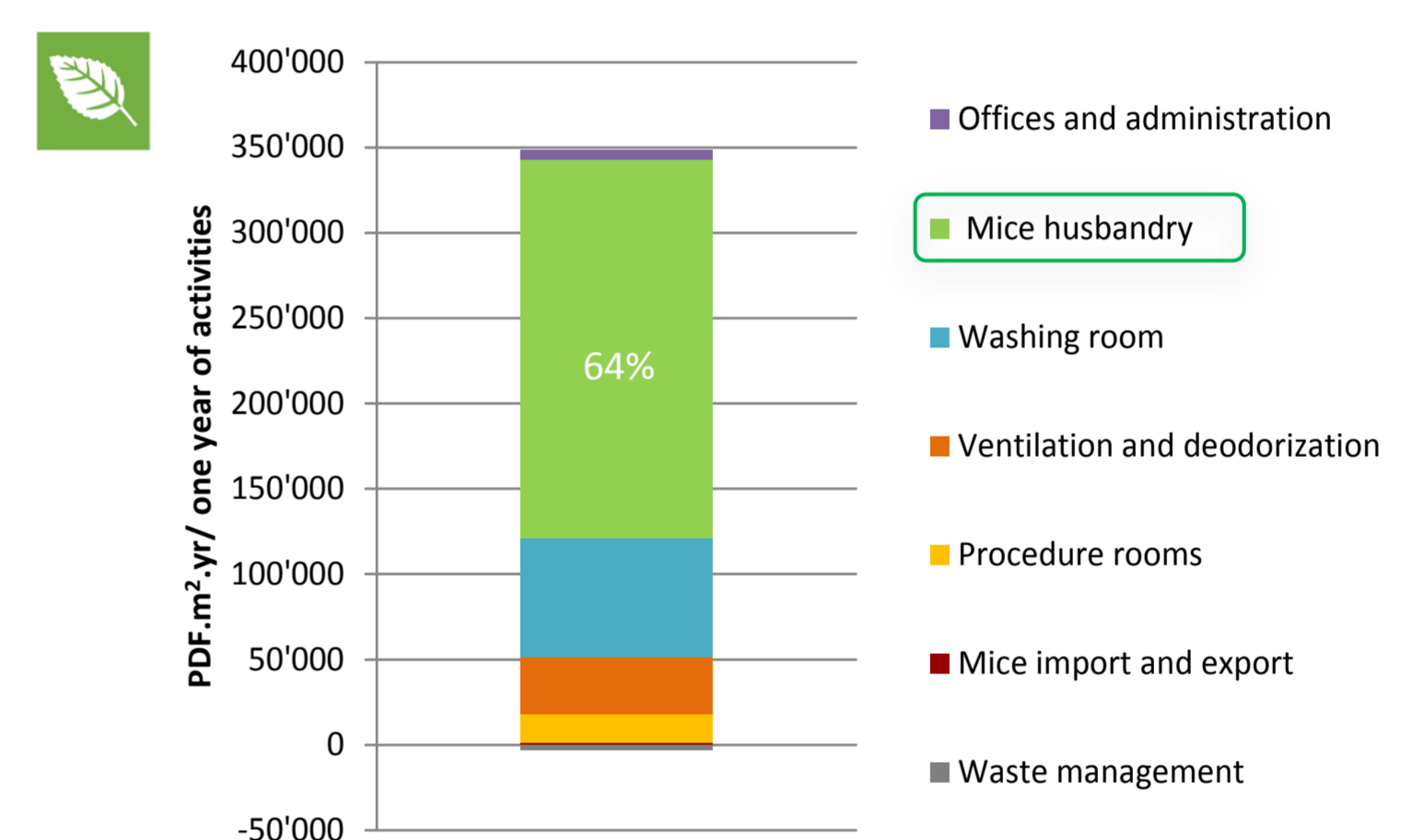
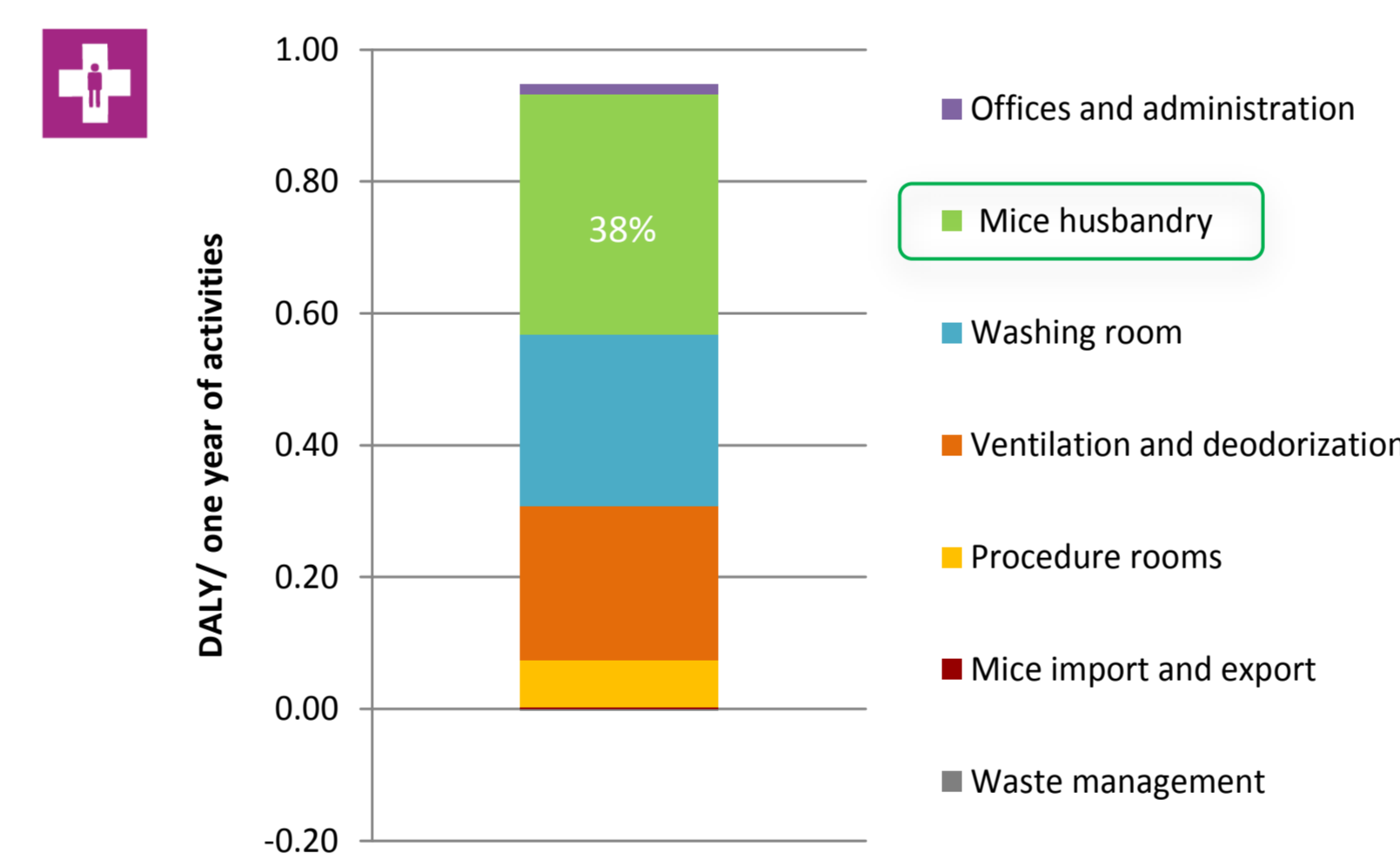
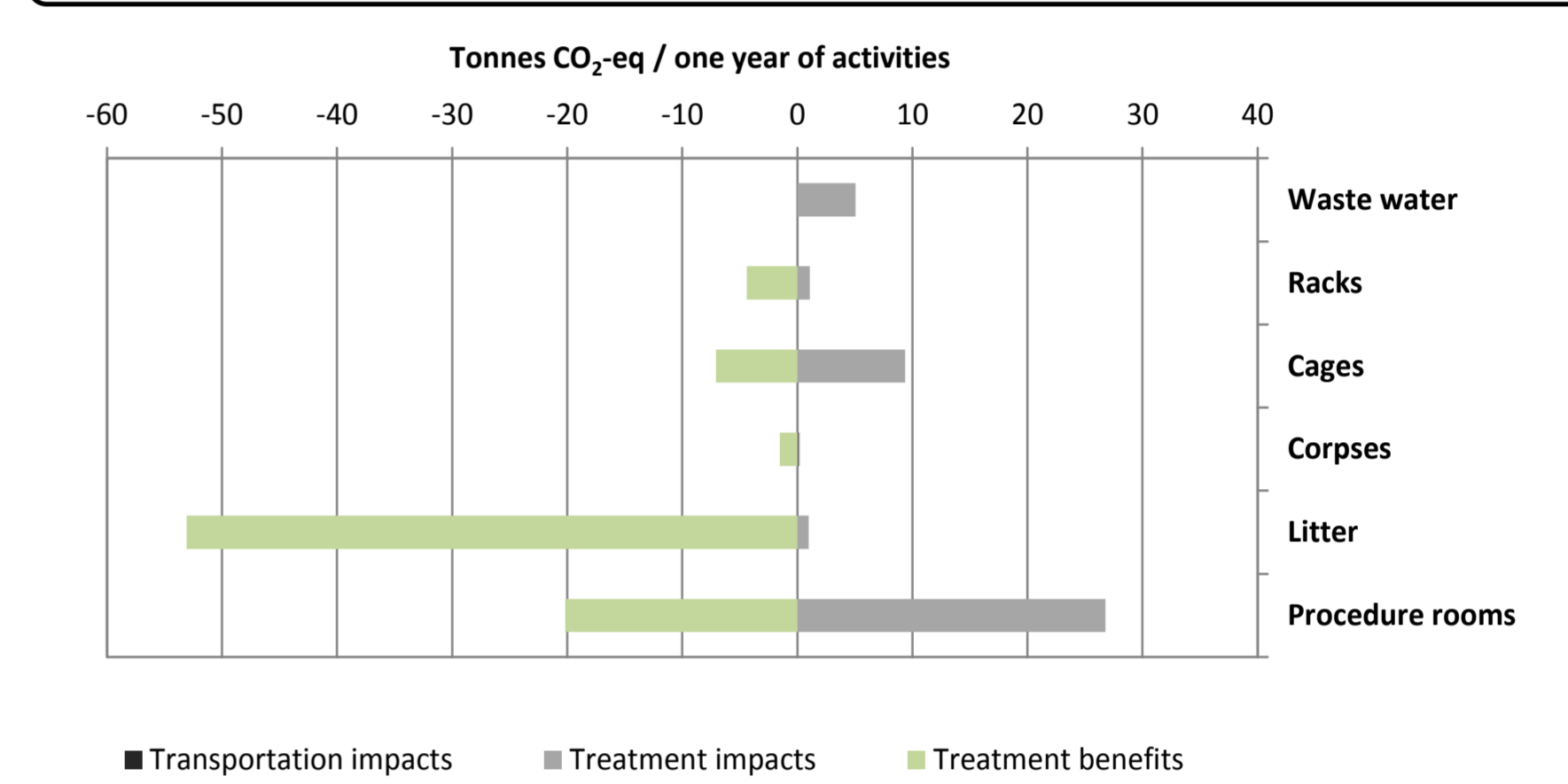


Ecosystem Quality

- ~ 7'000 m² of primary forest destroyed, i.e., 1.8 × facility surface
- Impacts of ~ 80 average Europeans per year



Waste management represents a credit of 43 tonnes CO₂-eq



Key findings

For all indicators, washing activities and mice husbandry are the main contributors:

✓ **Climate change:**

- Washing is the main contributor, mainly due to the steam produced using gas that is used for autoclaving and water heating
- Mice husbandry is the second contributor, mainly due to steam production using gas for air moisture

✓ **Human health:**

- Mice husbandry is the main contributor, mainly due to the production of polysulfone cages, and to the energy consumption for heating and rack ventilation

✓ **Ecosystem quality:**

- Mice husbandry is the main contributor, mainly due to cereals cultivation for mice feeding

Benefits of the assessment

✓ Allows for comparisons, and evaluating scenarios for further study

✓ Identifies potential areas for reducing environmental impacts

- Sterilisation and washing process
 - Optimisation of the sterilisation process and number of cages per cycle?
 - Steam heat recovery
- Animal husbandry: cages
 - Washable vs. disposable cages?
 - Increase the lifespan of the cages and racks?
 - Use of a «greener» material for cages?
- Waste management
 - Better waste treatment methods: biometanisation of the litter?
 - Heat recovery of the litter on site