SECNIR: A Multi-Year Electricity Consumption Dataset of 881 French Companies in Islands and Overseas Regions

PIERRE-ALEXIS CHEVREUIL[1,*], ANTOINE TAVANT[1],
PIERRE COSTINI[1], CÉDRIC SIMI[1], JORIS COSTES[1,2]

[1]Eco CO2, France
[2]Université Paris-Saclay, ENS Paris-Saclay, CNRS, Centre Borelli, Gif-sur-Yvette, France
*pierrealexis.chevreuil@gmail.com

ENERGY 2025 conference, March 2025, Lisbon, Portugal

Pierre-Alexis Chevreuil

R&D engineer, Eco CO2

Physics PhD, ETH Zurich

Previously responsible for the analysis of electrical consumption data at Eco CO2

pierrealexis.chevreuil@gmail.com

OUR

IDENTITY

Key figures

2009
Creation date

+ 3 000
Companies and local authorities sensitized to the energy transition

+ 3 200
Companies accompanied in reducing transport and logistics GHG emissions

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Mission

Helping businesses and communities gain in **performance** and **sustainability**

Expertise

CSR consulting firm

Domains

CSR & **Climate**

Strong expertise in decarbonization in transport and mobility

Main activities

ESG Reporting CSRD

Structure CSR approach and comply with regulations

Carbon accounting

Evaluate greenhouse gas emissions and identify challenges

Climate Strategy

Build or evaluate climate strategy, in line with national and international objectives

Decarbonization plan

Build and manage impact reduction plans for transport, logistics and mobility.

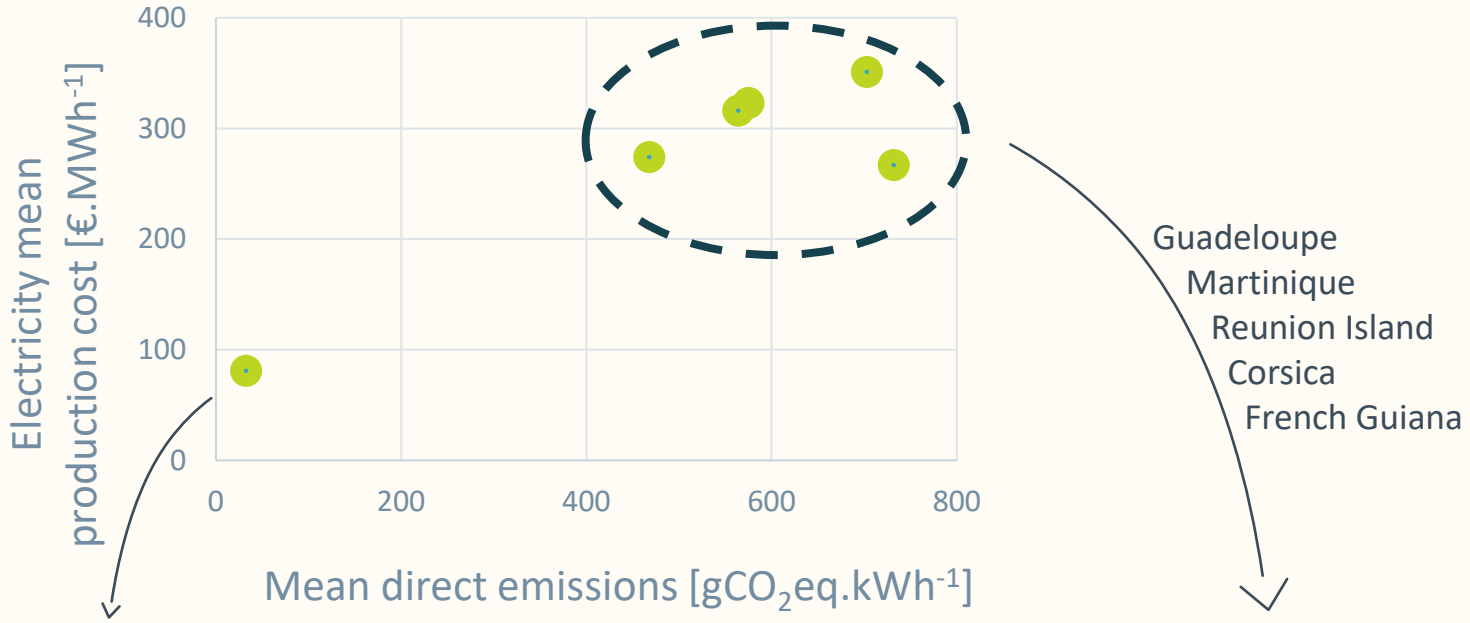
CSR certification

Prepare for CSR certification, improve CSR scores and promote commitments to stakeholders

Sensitization Training

Mobilize organizations and enhance CSR skills

Context



Mainland France

- > 95% nuclear and renewables
- Electricity mix = mostly decarbonized
- Relatively cheap
- Strong thermosensitivity
- Lots of data (> 90 % smart meters)

Isolated areas

- “conventional” nuclear power plants too big
- Electricity mix = mostly fossil energies
- Expensive + dependence on other countries
- Low thermosensitivity
- Very few data available

[1] G. Gilboire et al., “Energy balance Reunion Island 2021 + Key Figures 2021 (2022 edition),” France, Tech. Rep., 2022, INIS-FR–23-0083, p. 130.
[2] RTE France, “Electrical Balance 2023,” Tech. Rep., Jul. 2024, p. 30.
[3] Cour des comptes, “Les soutiens aux zones non interconnectées (ZNI),” Cour des comptes, Observations définitives, S2023-1177, Apr. 2023, p. 5.
[4] CRE, Transition énergétique dans les ZNI, https://www.cre.fr/electricite/transition-energetique-dans-les-zni.html, accessed on the 6th, September, 2024.
[5] Cour des comptes, L’analyse des couts complets du système de production électrique en France, Dec. 2021

SEIZE presentation

Energy saving certificates (CEE)

👉 **Energy producers** are legally obliged to finance energy-saving actions

SEIZE

👉 Energy-saving program

👉 For **companies** and **local authorities**

👉 For French **Non-Interconnected Regions**

👉 **Free** for beneficiaries

”Polluter pays” principle

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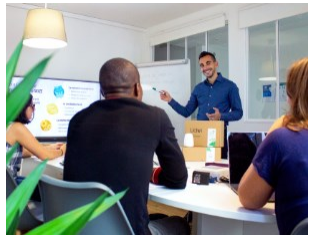
Technical visits

Technical visits of buildings and delivery of recommendations concerning the management of the building or its energy renovation.

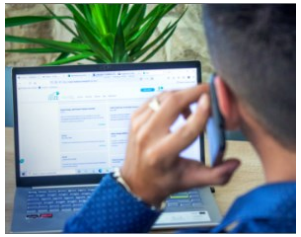


Workshops

Environmental awareness workshops for managers and employees, aiming at raising attention about energy-saving actions in organizations.

Smart meters

Installation of smart meters and comfort sensors, with access to the consumption data through an online visualization platform.



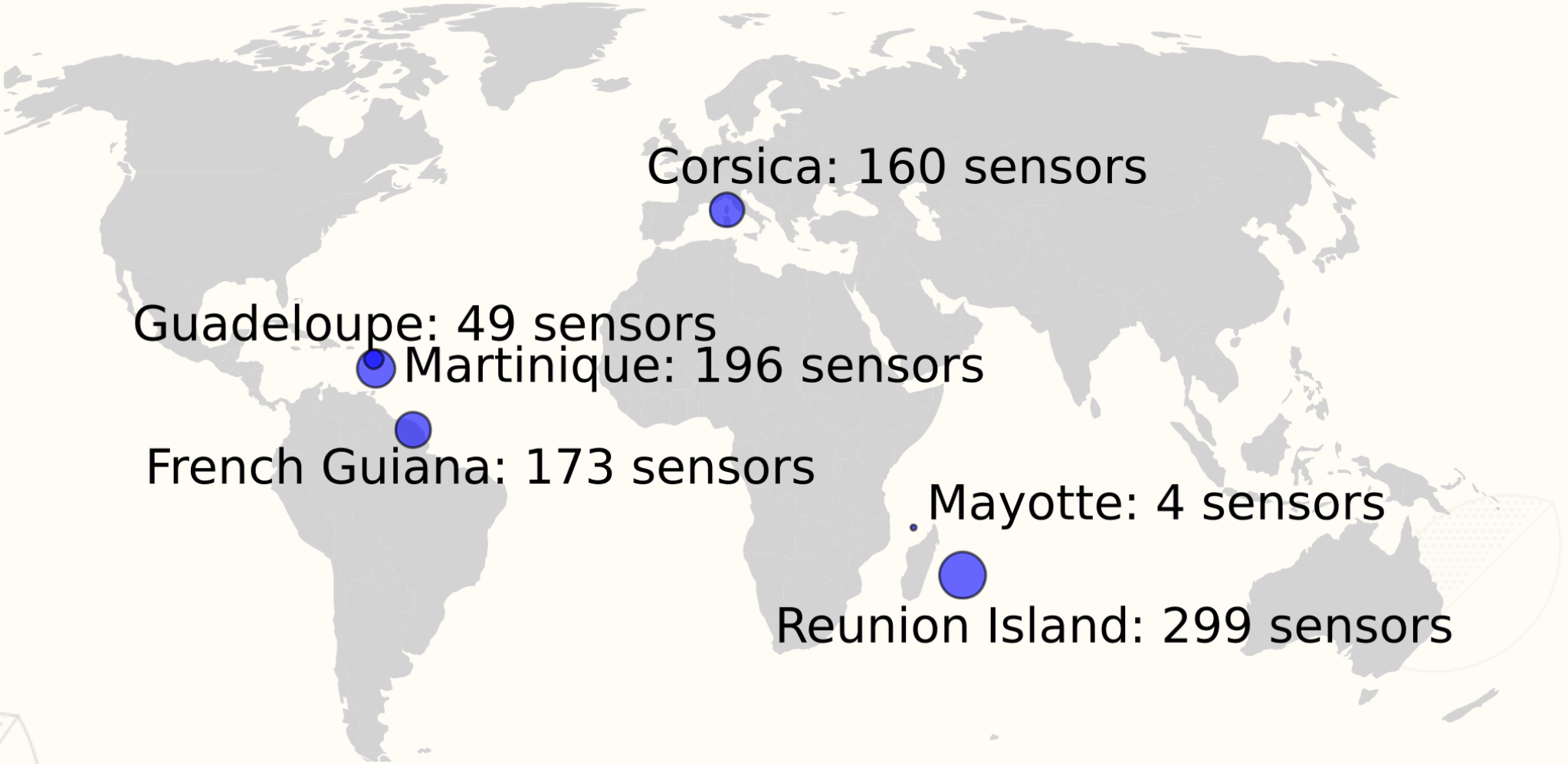
Support for aids

Orientation towards financial aid schemes or technical advice and telephone/face-to-face appointment to redirect the professional to solutions adapted to their needs.

Ambassadors

Access to a network of ambassadors, who are professionals committed to promoting the program.

Sensors' location



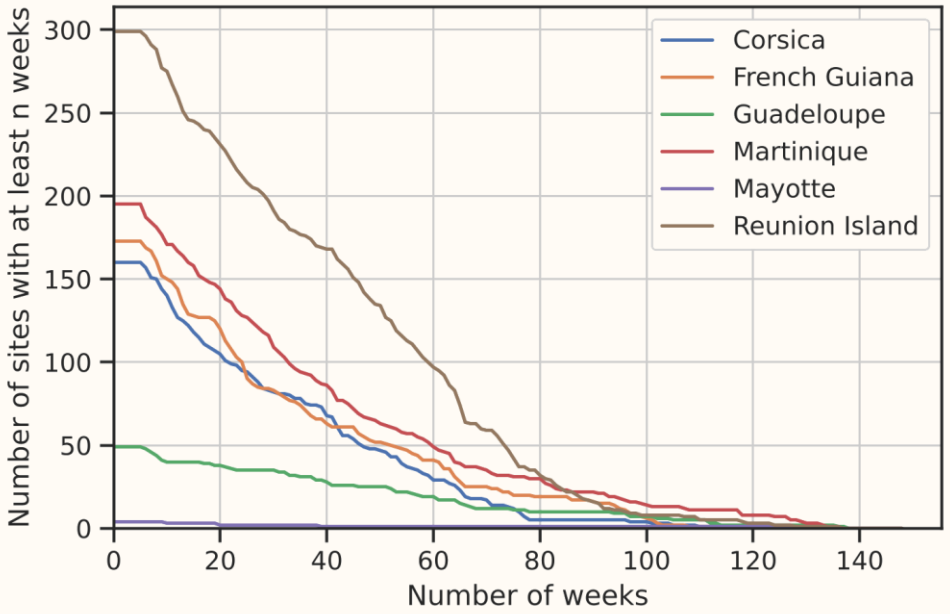
SECNIR Dataset

Survey of **E**lectricity **C**onsumption in **N**on-**I**nterconnected **R**egions

Available on kaggle

Dataset content

Energy in kWh
City code (e.g. 97209)
Department (e.g. Mayotte)
Activity sector (NACE code)
Degree days over the week
Indoor climate humidity and temperature and humidity minimum, maximum and average

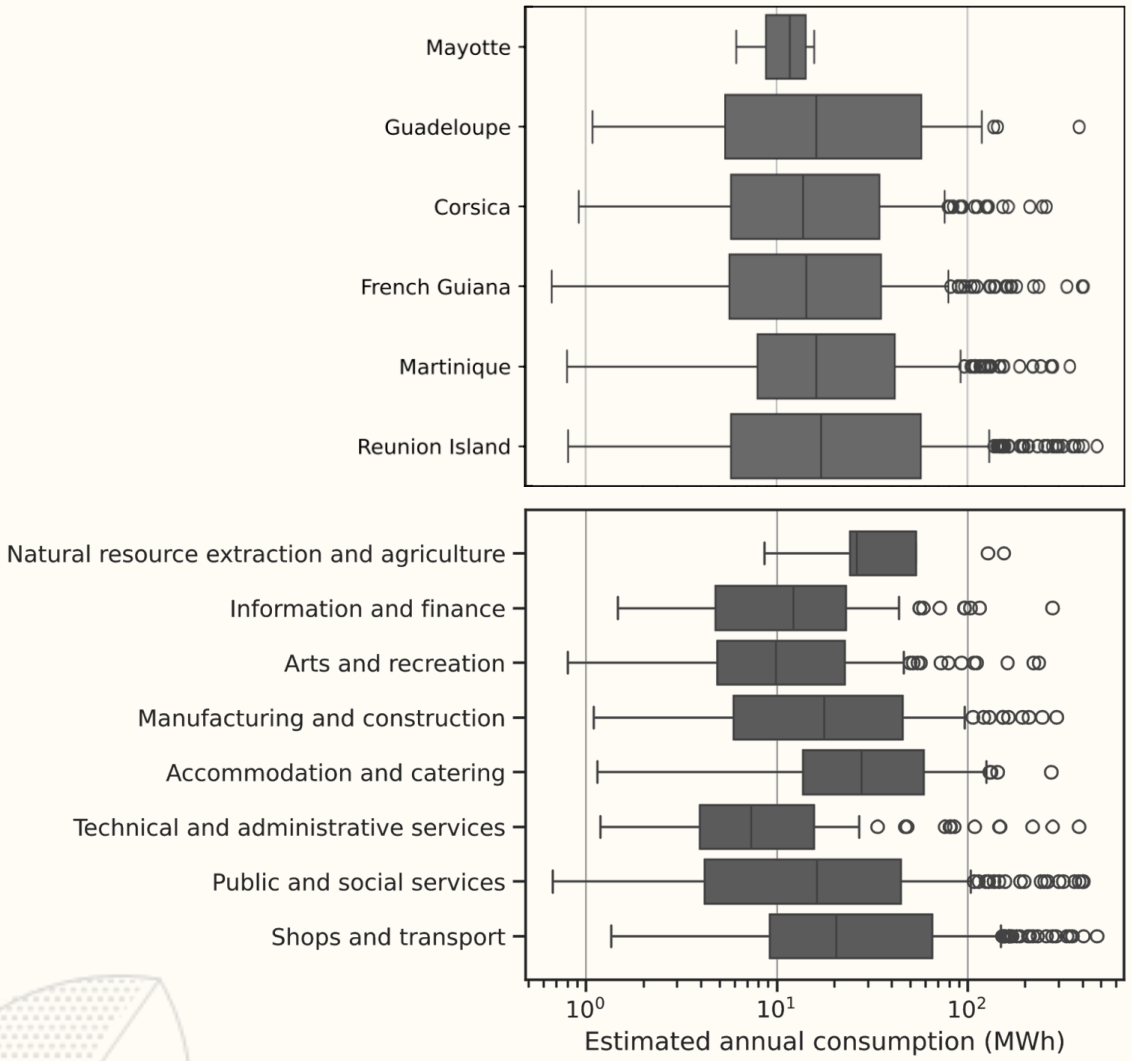


Key Figures

1 csv file
2021 year of first data
881 sensors
42,288 rows/weeks (116 years)
5,358 missing weeks (12.7%)[1]
1 week sampling rate[2]

[1] Weeks removed because of sensors' disconnections or low-quality data
[2] Initial sampling rate from 1 minute to 1 hour, resampled to 1 week to comply with GDPR regulations

Consumption analysis



👉Despite large wealth disparities, **all territories have similar consumption distributions → price is likely an important driver** (electricity price is the same as mainland France).

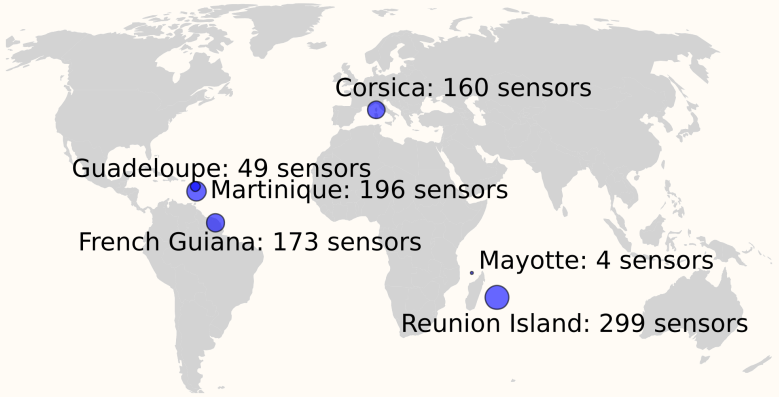
👉Average site consumption:

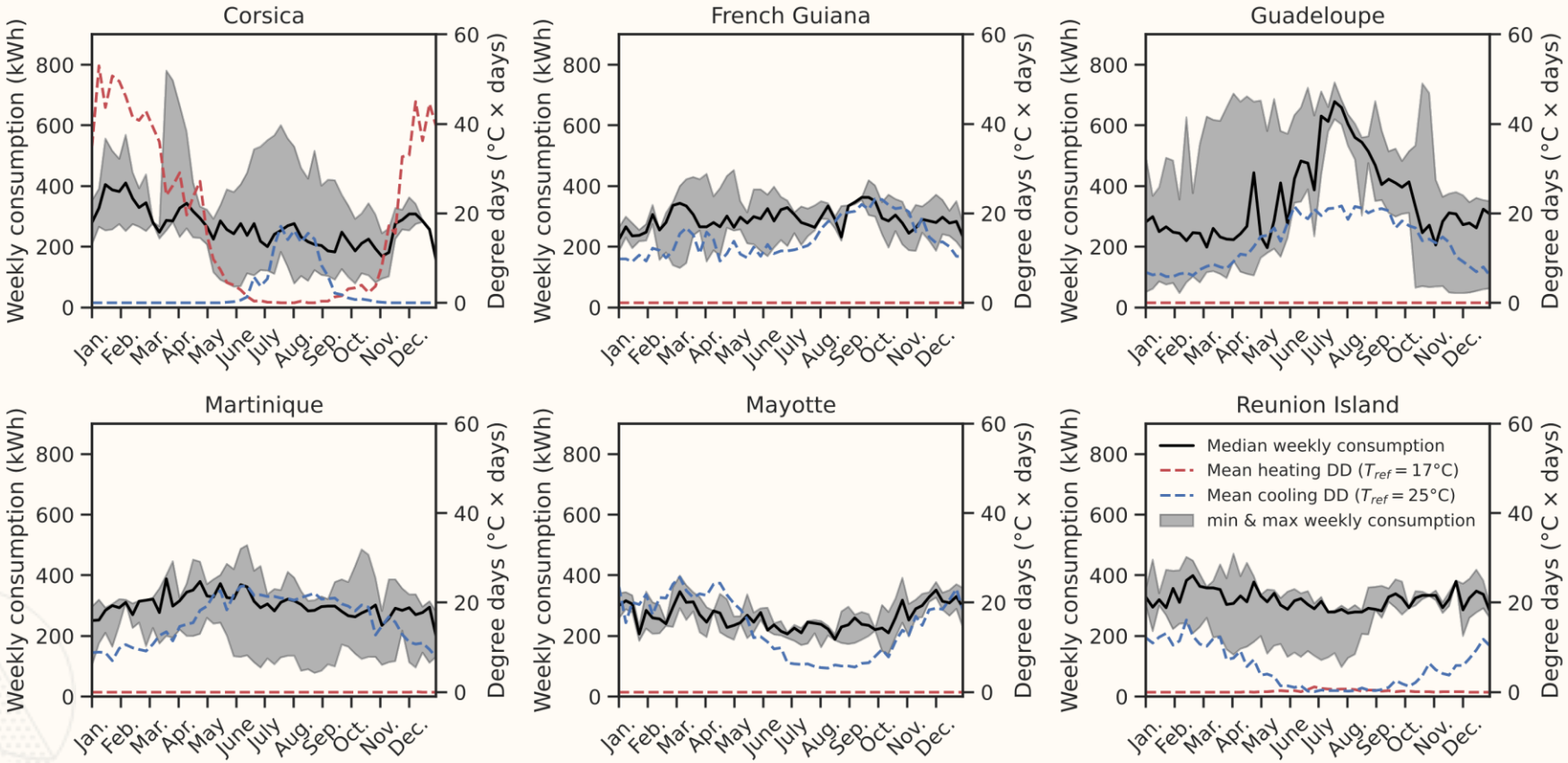
- **779 kWh/week**
- **4.06 MWh/year**

👉**Some sectors consume on average up to one order of magnitude more electricity** compared to other sectors.

👉Over a given economic sector, **spread** between median +/- 1,5 standard deviation is **~2 orders of magnitude**.

Thermosensitivity analysis

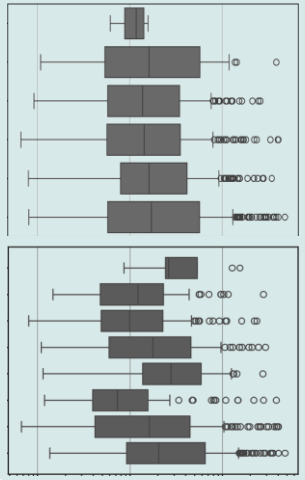




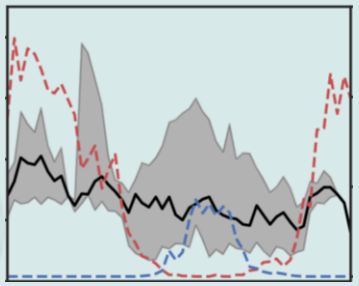
- Very **low thermosensitivity** in tropical regions, except Guadeloupe.
- Further analysis showed **low impact of humidity on consumption**.
- For a given change of temperature, **cooling uses more electricity than heating** (heating can be done with fossil, contrary to cooling).

Conclusions and future work

- **Open** dataset for **professionals** in **islands** and **overseas regions**
- **Data sources:**
  - **Electricity** consumption
  - **Weather**
  - Indoor **comfort data**
- **6 French territories studied over 4 years**
- **881 electrical sensors**



- Consumption distributions **similar in shape and amplitude in all territories** → price equality likely an important driver
- Up to **one order of magnitude** of average **consumption difference between two different sectors**



- **Higher thermosensitivity to cooling than warming**
- **Low thermal and humidity sensitivities** in tropical regions, except Guadeloupe.

Future work

- Explore **intra-day consumption** variations, as done in [1].
- Study **comfort / consumption link** for different sectors and territories.
- **Load curve generator** creating curves depending on the day of the week, weather, activity sector, …

[1] K. Bellinguer, R. Girard, A. Bocquet, and A. Chevalier, "ELMAS: A one-year dataset of hourly electrical load profiles from 424 French industrial and tertiary sectors," Scientific Data, vol. 10, no. 1, p. 686, Oct. 2023, ISSN: 2052-4463. DOI: 10.1038/s41597-023-02542-z

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Pierre-Alexis Chevreuil
pierrealexis.chevreuil@gmail.com

www.ecoco2.com