Exploiting primary data to estimate datacenters consumption in France

David BALDASSIN, Guillaume URVOY-KELLER, Dino LOPEZ PACHECO
baldassin@i3s.unice.fr

Université Côte d'Azur / CNRS
I3S

Mar. 11, 2026

Context

- Lot of datacenters planned to sustain A.I. needs.
  - Future datacenters requiring more than 1 GW (GAFAM)
- Datacenters are increasing in France
  - RTE announces 4.5 GW of power demands for new datacenters (2024)[1].
  - ADEME institute counts 350 datacenters in France (2025) [2]
    - Installed capacity : 2.6 GW
    - Annual energy consumption : 8.26 TWh
- However, no estimation / statistics based on actual energy consumption

[1] https://www.rte-france.com/bases-electricite/consommation-electricite/essor-data-centers-france
[2] Propospectives d'évolution des consommations des centres de données en France de 2024 à 2060, ADEME

Datacenters Inventory

Existing datacenters map

- lenuageétaitsousnospieds : carte collaborative (open data : downloadable GPS dataset)
- datacentermap (proprietary data: map visible, raw data restricted)
- Datacenter Magazine (proprietary data: map visible, raw data restricted)

Missing informations

- Distinct electric consumption for each datacenter
- Evolution of the electric consumption over time
- Missing datacenters properties (area, installed capacity, commisioning date ...)

ADEME 2026 report on datacenters

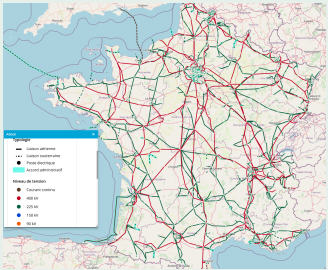
- Estimation based on colocation area.
- Colocation area is not always reported by datacenters owners
  - Based on geo imaging satellite
- Prospective of the evolution from now to 2060
  - No retrospective on the evolution in the recent years

ADEME area estimation

Getting primary data

RTE (Backbone)

- Network Transport of Electricity in France (100% coverage)
- Transport from producer to distributors.
- Can directly provide industrial clients.



Enedis (Last mile)

- Electricity distribution network in France (95% coverage)
- Distribute electrity from transport network (RTE) to companies and residential area.

Enedis open dataset

- Distinct consumption of companies by their address
  - Annual electric consumption from 2018 to 2024
  - Broken down by sector of activity (NAF2[3] code since 2021).
- Code 63 : IT services (equinix, digital realty . . .)

Section J : Information et communication	626
58 Édition	626
59 Production de films cinématographiques, de vidéo et de programmes de télévision ; enregistrement sonore et édition musicale	638
60 Programmation et diffusion	646
61 Télécommunications	650
62 Programmation, conseil et autres activités informatiques	660
63 Services d'information	664

Preview of NAF2 specification[3]

[3] Nomenclatures d'activités et de produits françaises rév. 2 - CPF rév. 2.1, réédition 2020

Enedis open dataset

- Distinct consumption of companies by their address
  - Annual electric consumption from 2018 to 2024
  - Broken down by sector of activity (NAF2[3] code since 2021).
- Code 63 : IT services (equinix, digital realty . . .)

Section J : Information et communication **626**

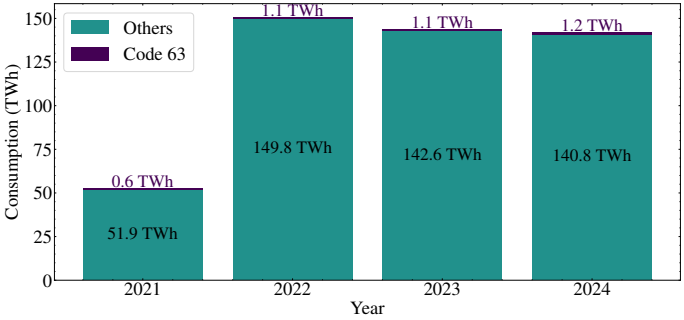
58 Édition 626
59 Production de films cinématographiques, de vidéo et de programmes de télévision ; enregistrement sonore et édition musicale 638
60 Programmation et diffusion 646
61 Télécommunications 650
62 Programmation, conseil et autres activités informatiques 660
63 Services d'information 664

Preview of NAF2 specification[3]

[3] Nomenclatures d'activités et de produits françaises rév. 2 - CPF rév. 2.1, réédition 2020

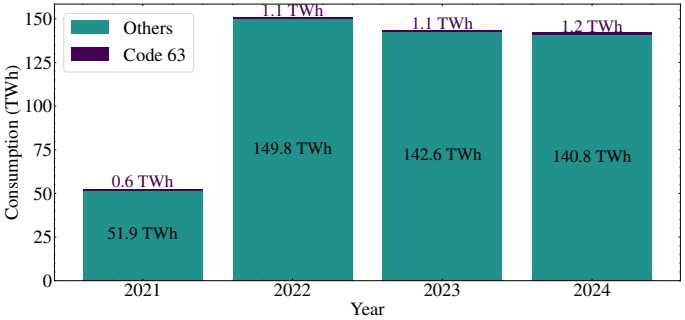
NAF2 code analysis

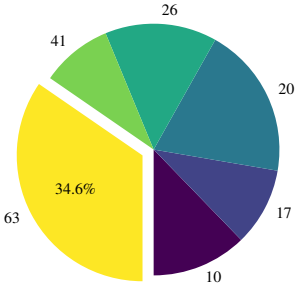
- Code 63 accounts for about 1% of total companies consumption.
- But, DCs rank as the highest energy consumers
  - 4 out of the 10 highest consumers, among all sectors, are datacenters
- Code 63 consumption = 1 TWh
  - Far lower than ADEME estimation of 8.26 TWh



NAF2 code analysis

- Code 63 accounts for about 1% of total companies consumption.
- But, DCs rank as the highest energy consumers
  - 4 out of the 10 highest consumers, among all sectors, are datacenters
- Code 63 consumption = 1 TWh
  - Far lower than ADEME estimation of 8.26 TWh

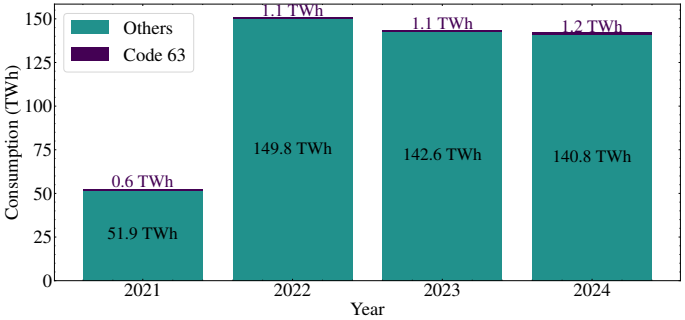


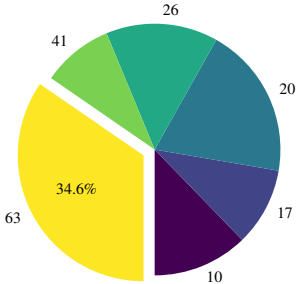


2024 TOP 10 consumption share

NAF2 code analysis

- Code 63 accounts for about 1% of total companies consumption.
- But, DCs rank as the highest energy consumers
  - 4 out of the 10 highest consumers, among all sectors, are datacenters
- Code 63 consumption = 1 TWh
  - Far lower than ADEME estimation of 8.26 TWh





2024 TOP 10 consumption share

Datacenters classification issue

Datacenter classification is not straightforward

- Other IT classification :
  - 61 : Telecommunications (orange, SFR)
  - 62 : Programming, consulting, and other computer-related activities (Google by Cyrus One)
- Historic reasons
  - OVHCloud : code 33 (Repair and installation of machinery and equipment)
- Private datacenters classified by the parent company code
  - Banking (BNP Paribas) : code 64
  - Televisions (M6, TF1) : code 60
  - Scientific research (Jean Zay) : code 72
  - Public/defense (France Travail, CEA) : code 84

Datacenters classification issue

Datacenter classification is not straightforward

- Other IT classification :
  - 61 : Telecommunications (orange, SFR)
  - 62 : Programming, consulting, and other computer-related activities (Google by Cyrus One)
- Historic reasons
  - OVHCloud : code 33 (Repair and installation of machinery and equipment)
- Private datacenters classified by the parent company code
  - Banking (BNP Paribas) : code 64
  - Televisions (M6, TF1) : code 60
  - Scientific research (Jean Zay) : code 72
  - Public/defense (France Travail, CEA) : code 84

Datacenters classification issue

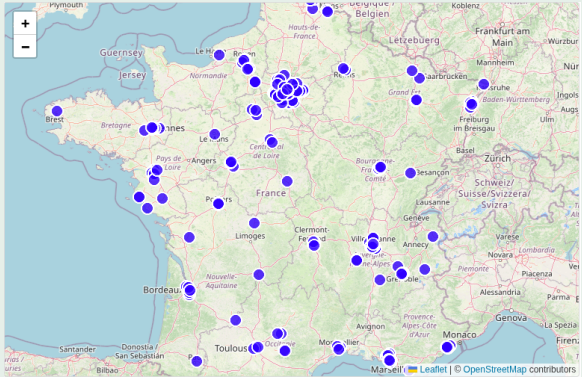
Datacenter classification is not straightforward

- Other IT classification :
  - 61 : Telecommunications (orange, SFR)
  - 62 : Programming, consulting, and other computer-related activities (Google by Cyrus One)
- Historic reasons
  - OVHCloud : code 33 (Repair and installation of machinery and equipment)
- Private datacenters classified by the parent company code
  - Banking (BNP Paribas) : code 64
  - Televisions (M6, TF1) : code 60
  - Scientific research (Jean Zay) : code 72
  - Public/defense (France Travail, CEA) : code 84

Mapping tool

Identifying datacenters methodology

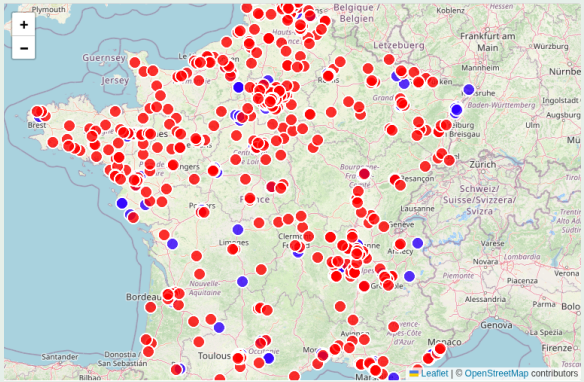
1. Display datacenters from lenuageétaitsousnospieds on the map
2. Display enedis point of delivery (starting with big and known entities)
3. Find matches using distance threshold (50m, 100m, 150m, ...)
4. Validate if the match is a datacenter
5. Remove matches from dataset
6. Start over with smaller consuming entities or difference distance threshold



Mapping tool

Identifying datacenters methodology

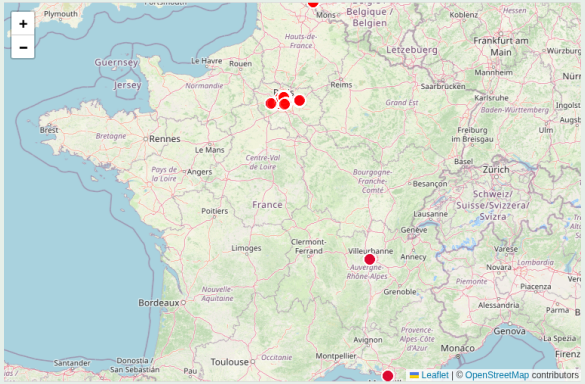
1. Display datacenters from lenuageétaitsousnospieds on the map
2. Display enedis point of delivery (starting with big and known entities)
3. Find matches using distance threshold (50m, 100m, 150m, ...)
4. Validate if the match is a datacenter
5. Remove matches from dataset
6. Start over with smaller consuming entities or difference distance threshold



Mapping tool

Identifying datacenters methodology

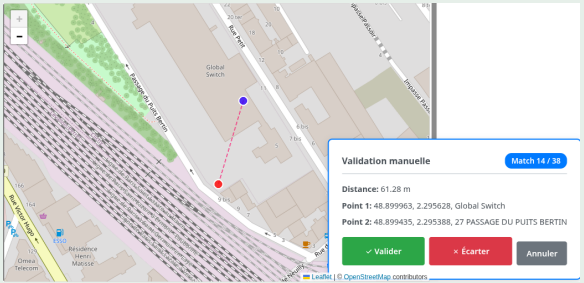
1. Display datacenters from lenuageétaitsousnospieds on the map
2. Display enedis point of delivery (starting with big and known entities)
3. Find matches using distance threshold (50m, 100m, 150m, ...)
4. Validate if the match is a datacenter
5. Remove matches from dataset
6. Start over with smaller consuming entities or difference distance threshold



Mapping tool

Identifying datacenters methodology

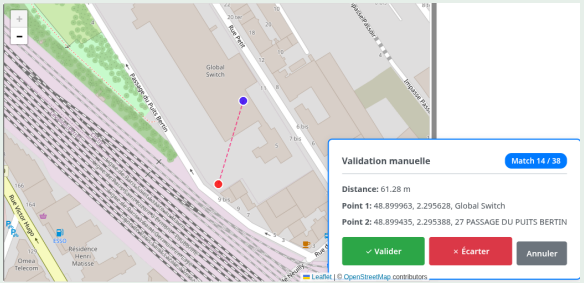
1. Display datacenters from lenuageétaitsousnospieds on the map
2. Display enedis point of delivery (starting with big and known entities)
3. Find matches using distance threshold (50m, 100m, 150m, . . .)
4. Validate if the match is a datacenter
5. Remove matches from dataset
6. Start over with smaller consuming entities or difference distance threshold



Mapping tool

Identifying datacenters methodology

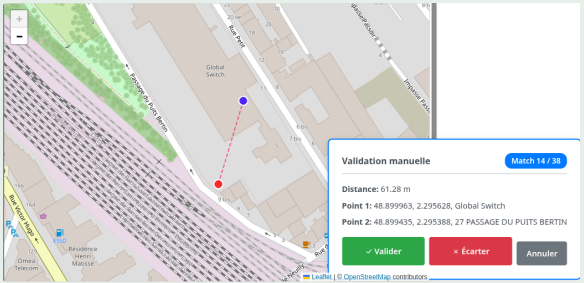
1. Display datacenters from lenuageétaitsousnospieds on the map
2. Display enedis point of delivery (starting with big and known entities)
3. Find matches using distance threshold (50m, 100m, 150m, ...)
4. Validate if the match is a datacenter
5. Remove matches from dataset
6. Start over with smaller consuming entities or difference distance threshold



Mapping tool

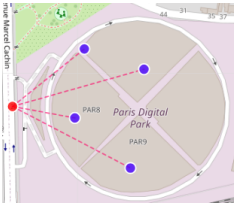
Identifying datacenters methodology

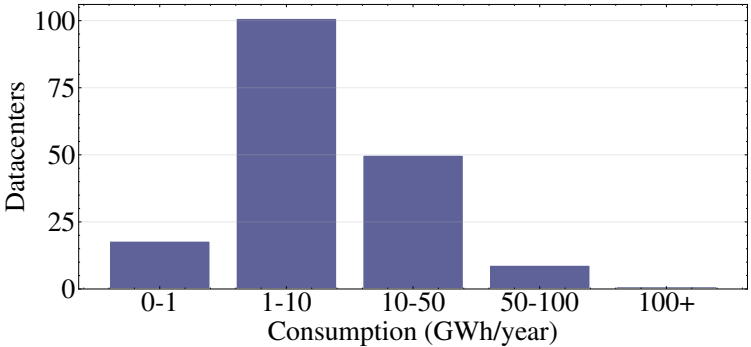
1. Display datacenters from lenuageétaitsousnospieds on the map
2. Display enedis point of delivery (starting with big and known entities)
3. Find matches using distance threshold (50m, 100m, 150m, ...)
4. Validate if the match is a datacenter
5. Remove matches from dataset
6. Start over with smaller consuming entities or difference distance threshold



Identification results

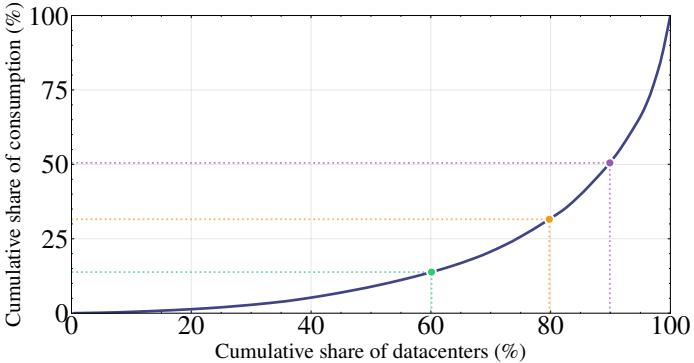
- 210 datacenters matching 178 Enedis point of delivery
  - Wide variety of NAF2 codes
- 10% of datacenters account for 50% of total consumptions
- Most power consuming datacenters found in code 61, 62, and 63





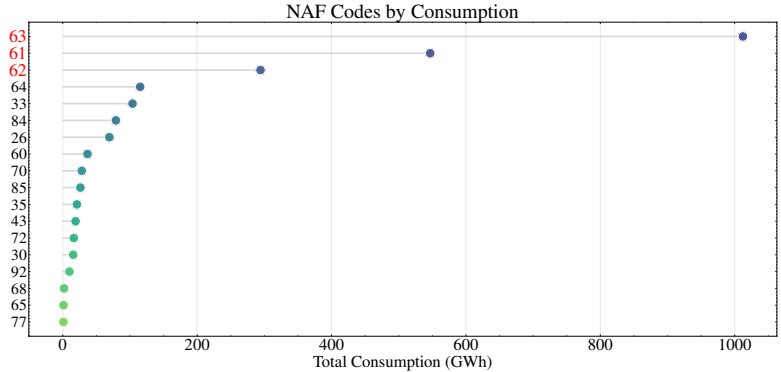
Identification results

- 210 datacenters matching 178 Enedis point of delivery
  - Wide variety of NAF2 codes
- 10% of datacenters account for 50% of total consumptions
- Most power consuming datacenters found in code 61, 62, and 63



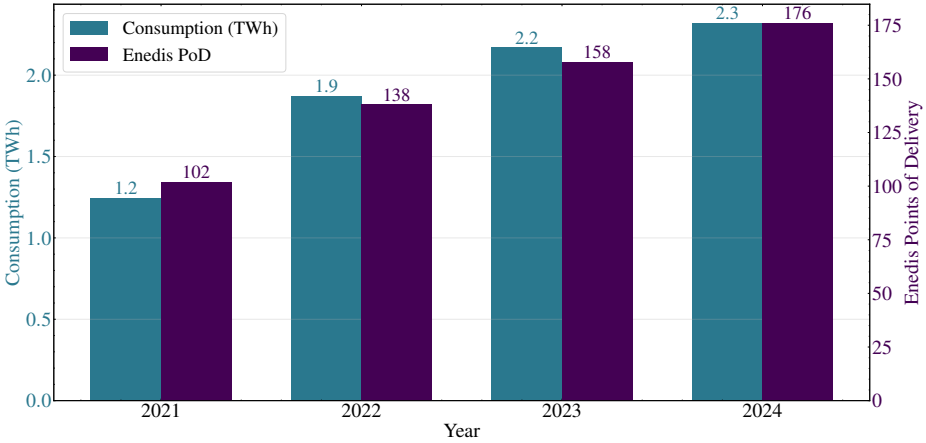
Identification results

- 210 datacenters matching 178 Enedis point of delivery
  - Wide variety of NAF2 codes
- 10% of datacenters account for 50% of total consumptions
- Most power consuming datacenters found in code 61, 62, and 63



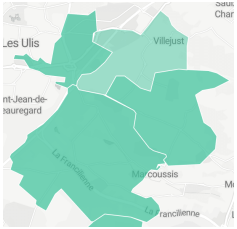
Consumption evolution from 2021 to 2024

- Energy consumption has doubled from 2021 to 2024.
  - Enedis statitics with NAF2 codes start in 2021



RTE dataset

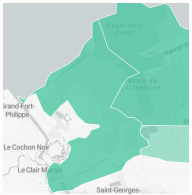
- Industrial sites consumption (metal work, trains . . .)
- Modern datacenters are directly plugged to the transport network
- Break down by IRIS (Îlots Regroupés pour l'Information Statistique) code[4]



Data4 campus, Marcoussis

Problems

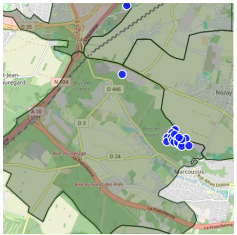
- Hard to isolate a datacenter in some area
- Example : Gravelines area has several industries (OVHCloud, aluminium, nuclear, plastic . . .)



[4] 9-digit numerical code used in France to uniquely identify sub-municipal areas

RTE dataset

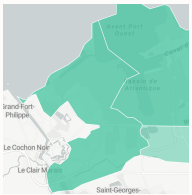
- Industrial sites consumption (metal work, trains . . .)
- Modern datacenters are directly plugged to the transport network
- Break down by IRIS (Îlots Regroupés pour l'Information Statistique) code[4]



Data4 campus, Marcoussis

Problems

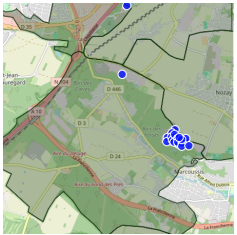
- Hard to isolate a datacenter in some area
- Example : Gravelines area has several industries (OVHCloud, aluminium, nuclear, plastic . . .)



[4] 9-digit numerical code used in France to uniquely identify sub-municipal areas

RTE dataset

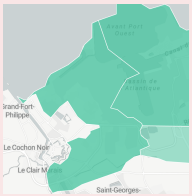
- Industrial sites consumption (metal work, trains . . .)
- Modern datacenters are directly plugged to the transport network
- Break down by IRIS (Îlots Regroupés pour l'Information Statistique) code[4]



Data4 campus, Marcoussis

Problems

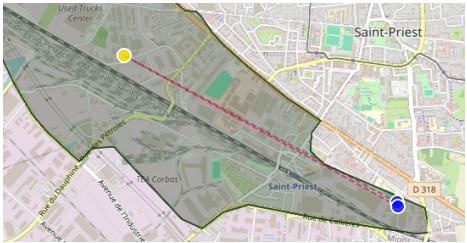
- Hard to isolate a datacenter in some area
- Example : Gravelines area has several industries (OVHCloud, aluminium, nuclear, plastic . . .)



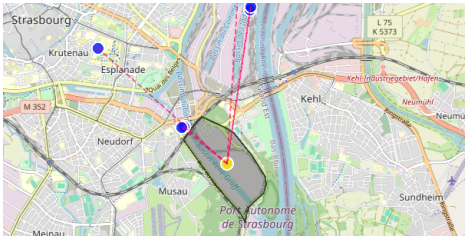
[4] 9-digit numerical code used in France to uniquely identify sub-municipal areas

RTE matching methodology

- Display non matching datacenters from lenuageétaitsousnospieds on the map
- Display IRIS area from RTE dataset on the map
- Display center of the zone for distance calculations
- Matching the points within or near from the IRIS area



2.5km



3.5km

RTE matching results

- 2.5 km distance :
  - 62 new datacenters
  - 34 RTE area consuming 5.88 TWh/y (including all industries)
- 3.5 km distance :
  - 79 new datacenters
  - 44 RTE area consuming 6.38 TWh/y (including all industries)

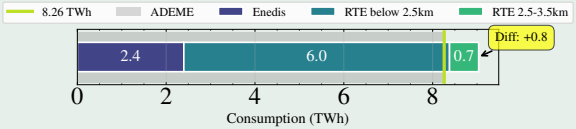
This is an upper boundary

- 5.88 TWh or 6.38 TWh are not the actual datacenters consumption.

Comparing results with ademe estimations

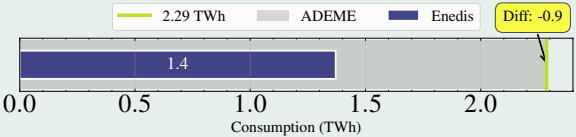
Enedis and over-estimated RTE compared to ADEME estimation

- 272 datacenters
  - Enedis = 2.4 TWh — 210 datacenters
  - RTE < 6 TWh — 62 datacenters
- 80 datacenters not yet identified



Comparing with ADEME methodology with know datacenter area

- Get DCMag source used by ADEME
- Find matches between DC with known area and enedis data
- Calculate estimation using ADEME methodology[5] based on found area



[5] We derived an average of 13MWh/m2 from Hubblo article published in 2020

Conclusion

- Exploiting raw data to estimate datacenter energy consumption
- 272 datacenters identified
- ADEME area based methodology seems over estimated so far
  - We are still missing 80 datacenters
- Datacenter energy consumption already doubled in 4 years
  - This does not yet account for A.I. boom in France

The end

Thank you for your attention