# What can we learn from the Covid-19 pandemic for the renewable energy transition?

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# What can we learn from the Covid-19 pandemic for the renewable energy transition?

- The Covid-19 pandemic resulted in a low demand and high renewable generation period caused by the deceleration of economic activity, especially in the months April and May of 2020
- In this work, we have compared generation, demand and price profiles in Belgium and neighboring countries to a number of previous years [1]
- Analysing the data we draw some general conclusions towards the renewable energy transition

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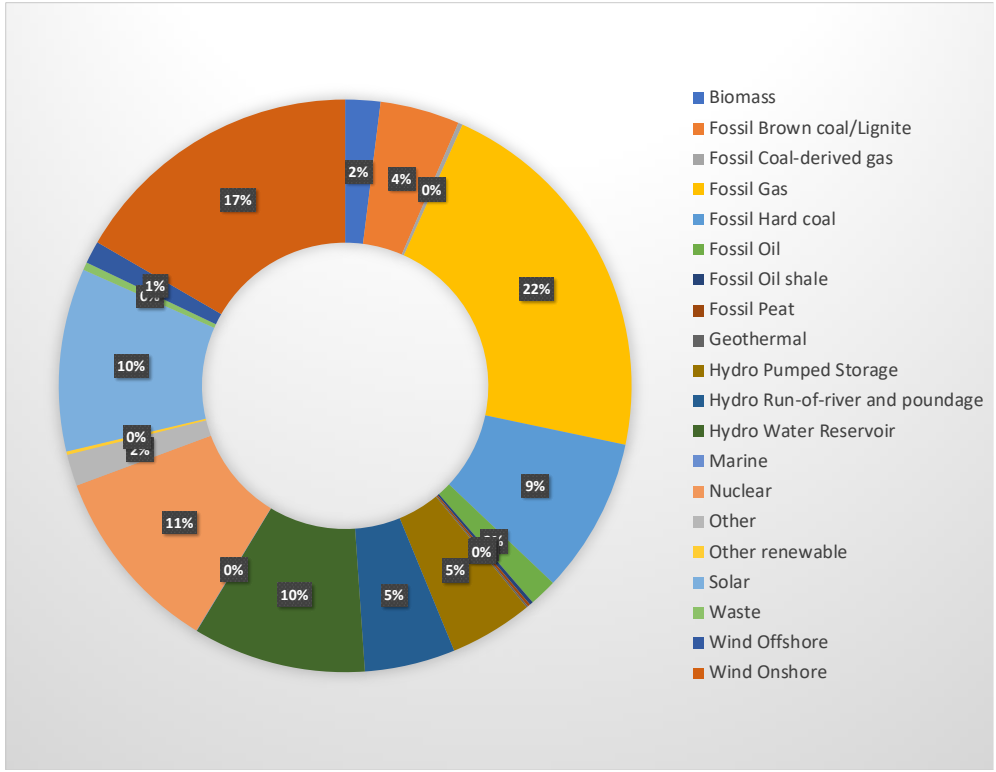
[1] All data is obtained from the Entso-e transparency platform: http://transparency.entsoe.eu/

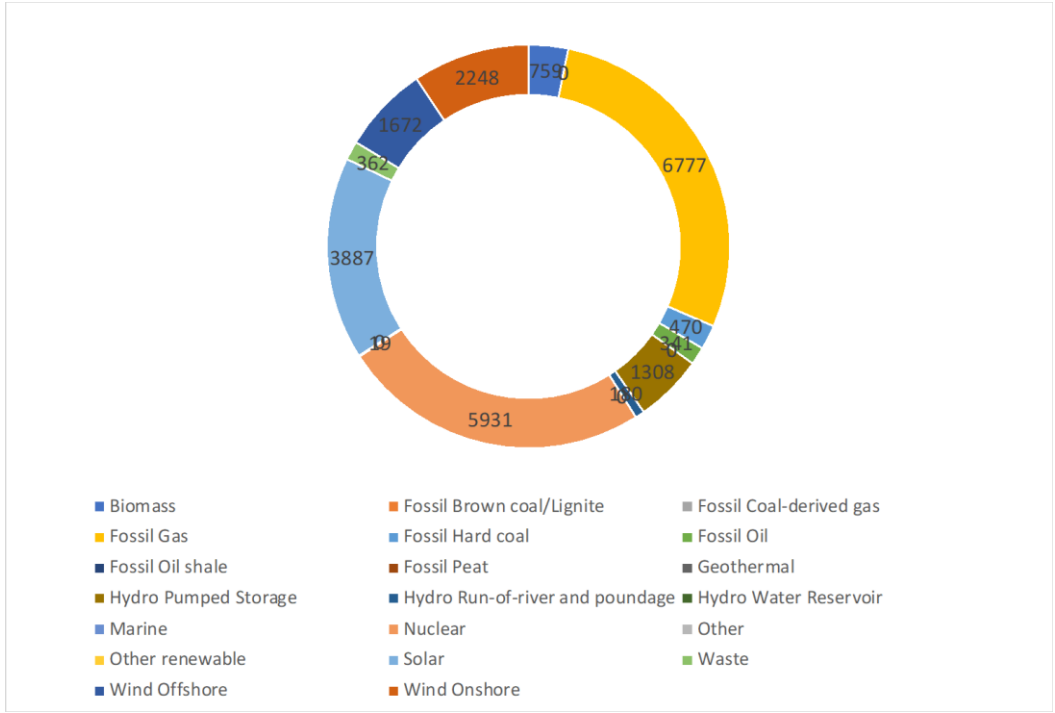
# Overview

- Total installed generation capacity in the Entso-e region approximately 1000 GW
  - Solar PV, onshore & offshore wind make up 28% of the installed capacity



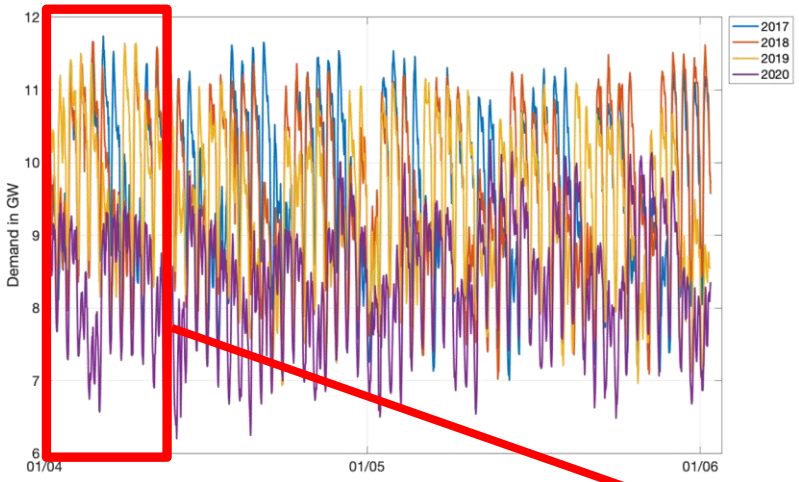

# Overview

- Total installed generation capacity in Belgium equals to 23,9 GW
  - 3,9 GW solar PV
  - 1,67 GW offshore wind
  - 2,24 GW onshore wind



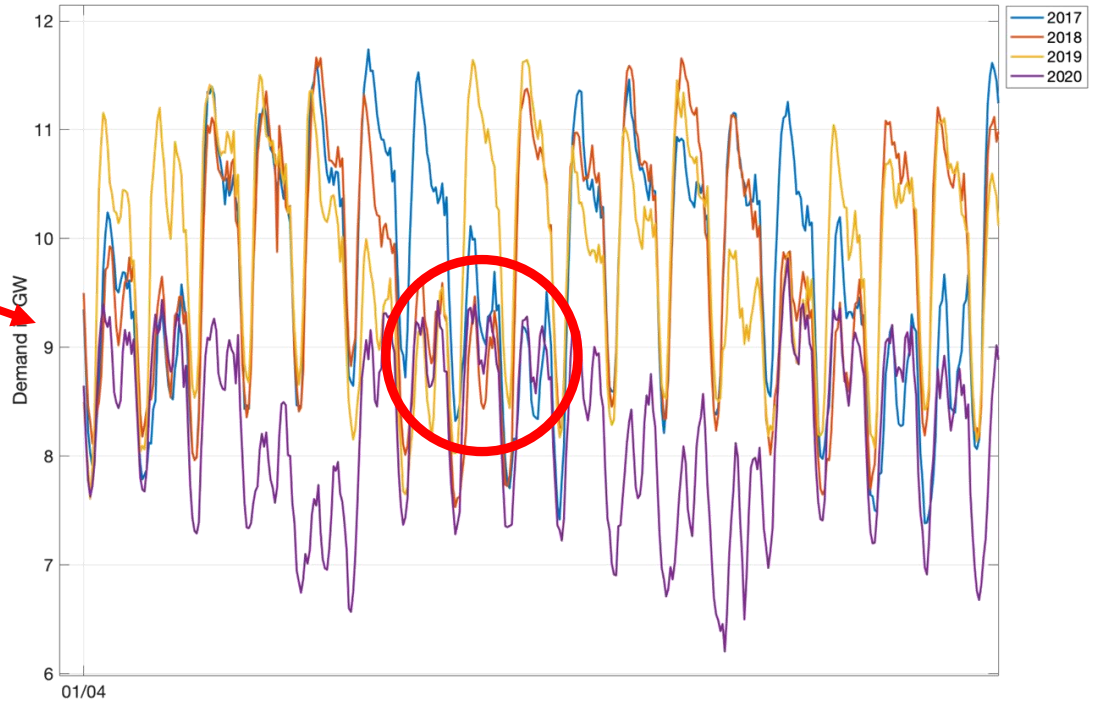

# Electricity demand in Belgium

- Period April 1st – June 1st




(1) Total average demand decreased with 18% in April and with 14% in May

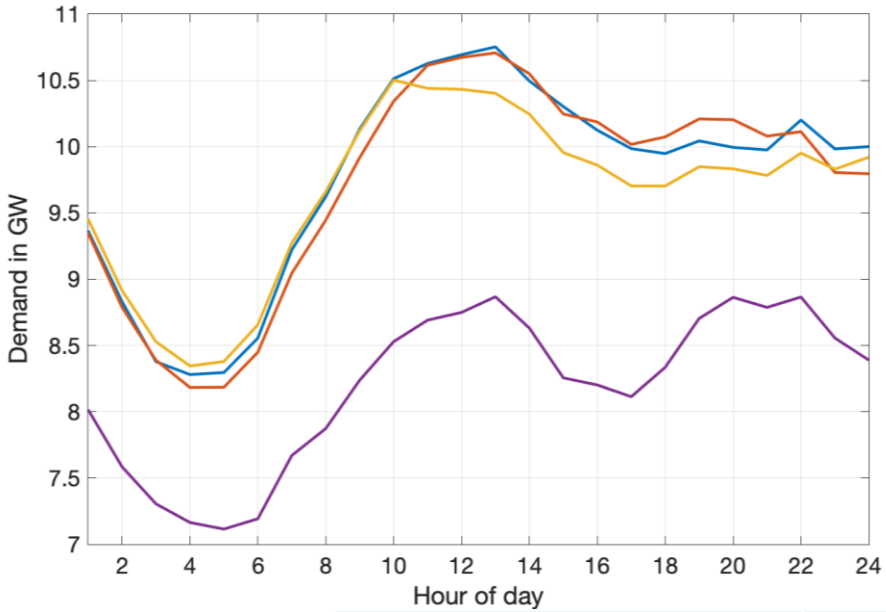
(2) In April 2020 week days did not reach weekend demand of previous years



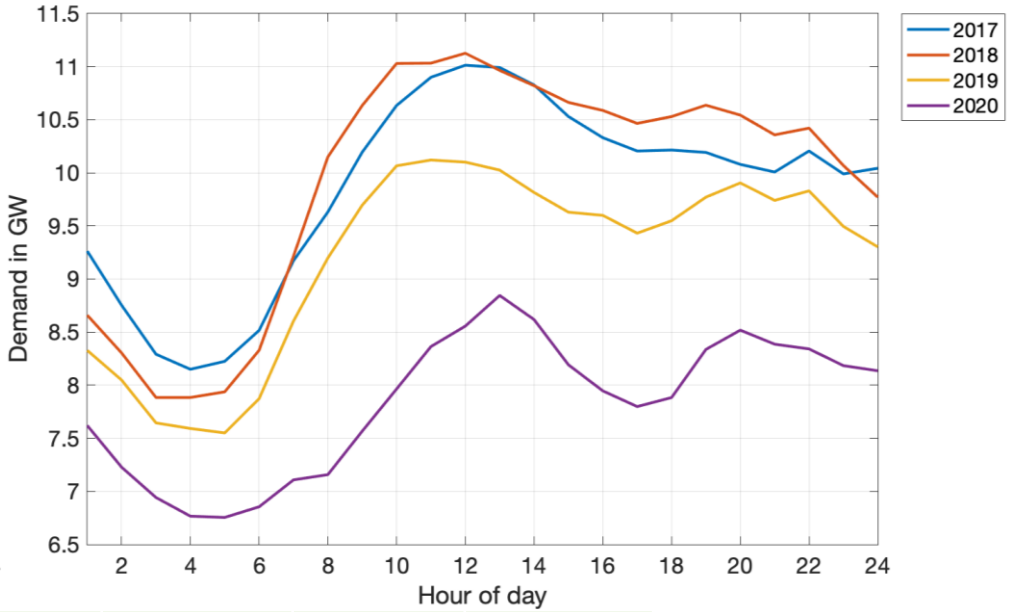
# Electricity demand in Belgium

(1) Afternoon valley more pronounced
(2) Slower demand increase observed in the morning hours
(3) Min/max ratio almost unchanged

Average weekday demand




Average weekend demand

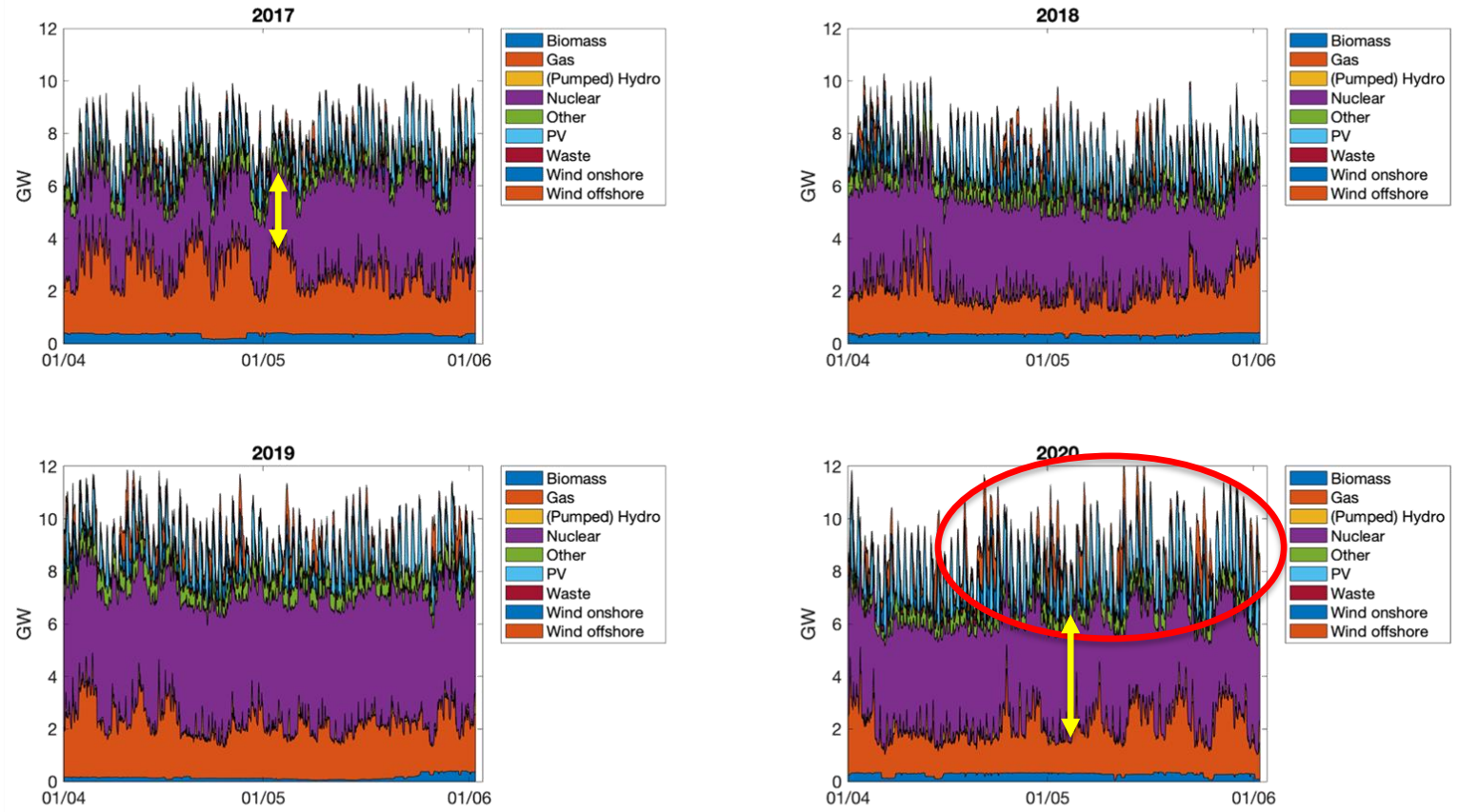



| | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|
| **Mean (Pd)** | 9559 MW | 9545 MW | 9346 MW | 8310 MW |
| **max(Pd)/min(Pd)** | 1,68 | 1,68 | 1,68 | 1,66 |

# Power generation in Belgium

(1) On average higher nuclear generation than in 2017 & 2018

(2) Higher generation from PV and wind especially after second half of April 2020

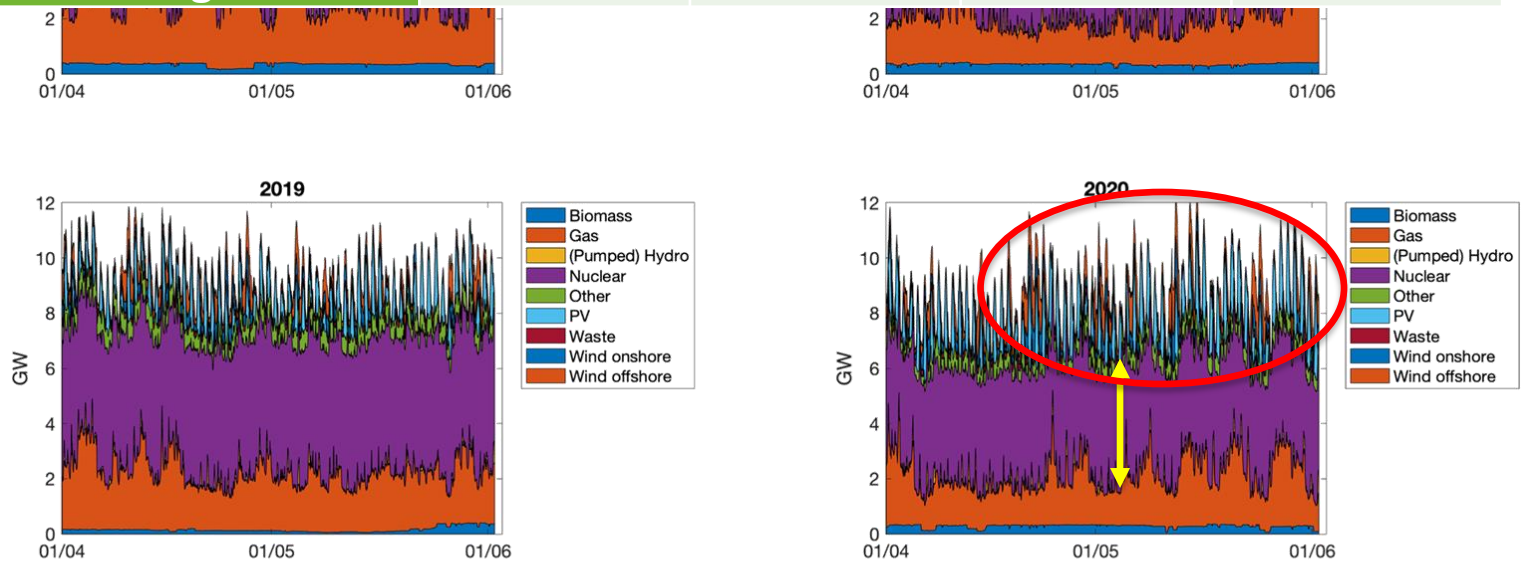


# Power generation in Belgium

(1) Although the demand is much lower, the generation in 2020 has been higher than 2017 & 2018 with limited nuclear generation availability

(2) Share of generation from wind and PV higher almost 20% of total on average

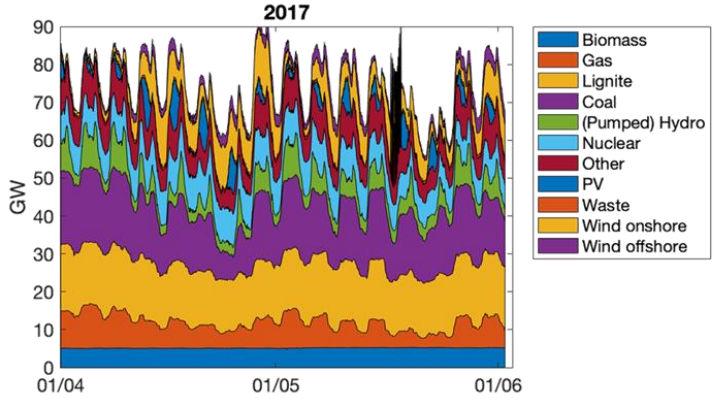
| (April 1st – June 1st ) | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|
| Average power generation in Belgium | 7602 MW | 7331 MW | 9213 MW | 8647 MW |
| Share of PV and wind generation in Belgium | 12,0% | 15% | 13.3% | 19,7% |

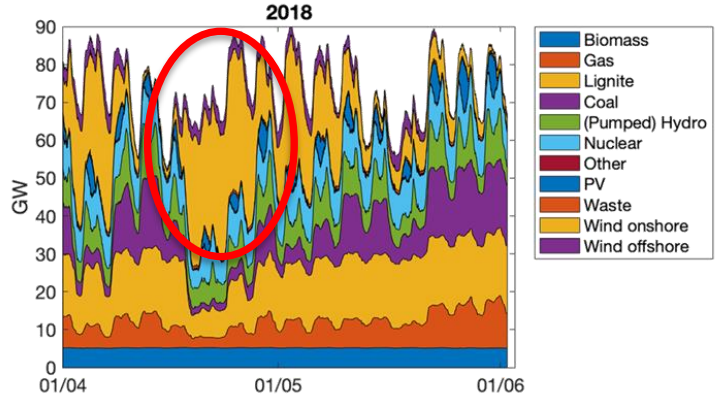


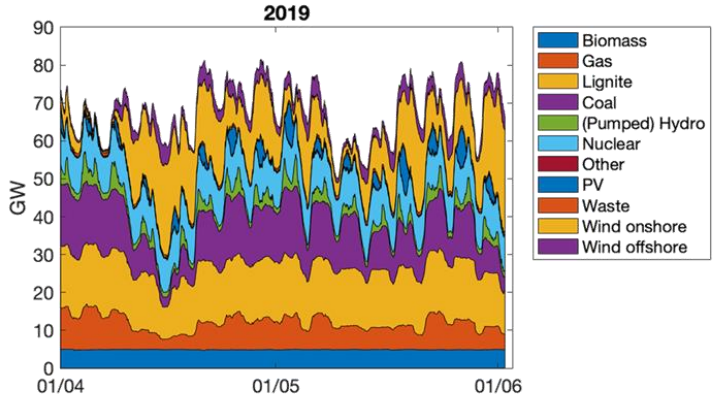
# Power generation in Germany

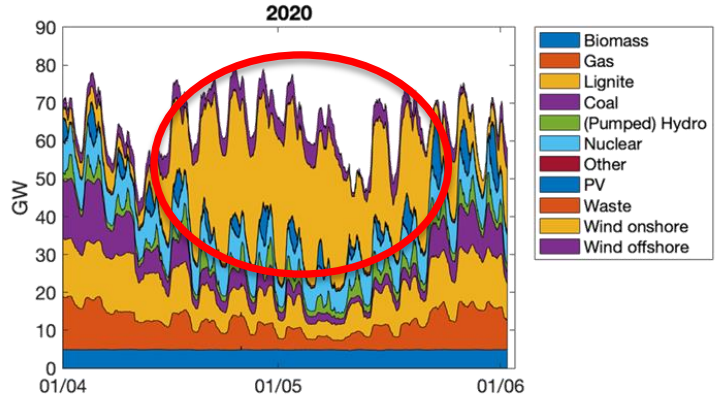
## Usually high impact on prices due to renewables

(1) High renewable generation between mid-April and mid-May 2020
(2) RES generation in April 2020 is lower than in 2018
(3) RES generation in May 2020 much higher than May 2018

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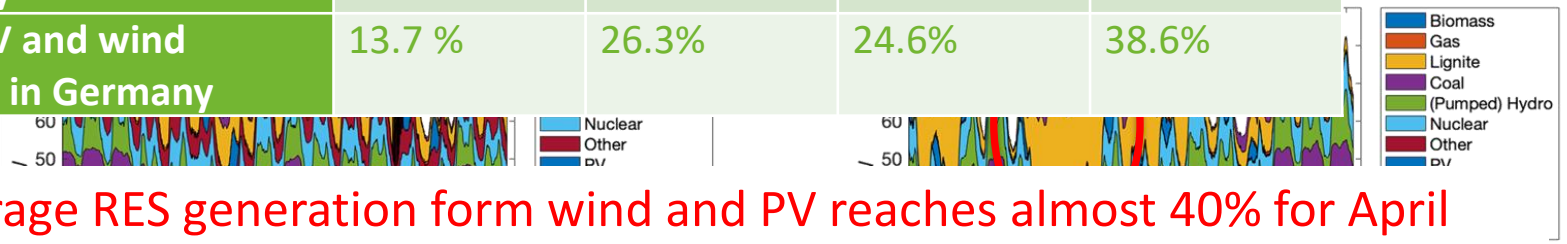
# Power generation in Germany

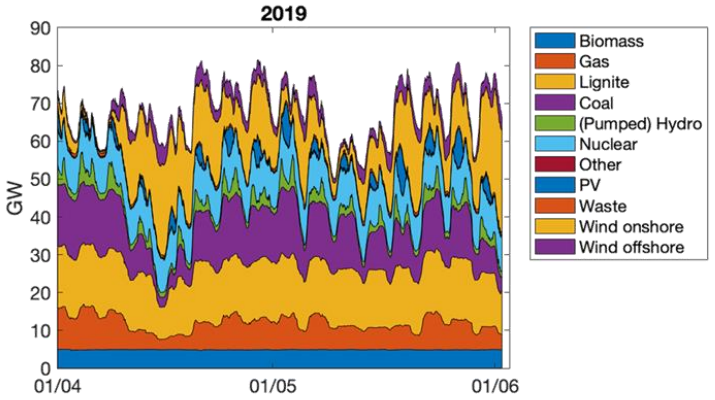
## Usually high impact on prices due to renewables

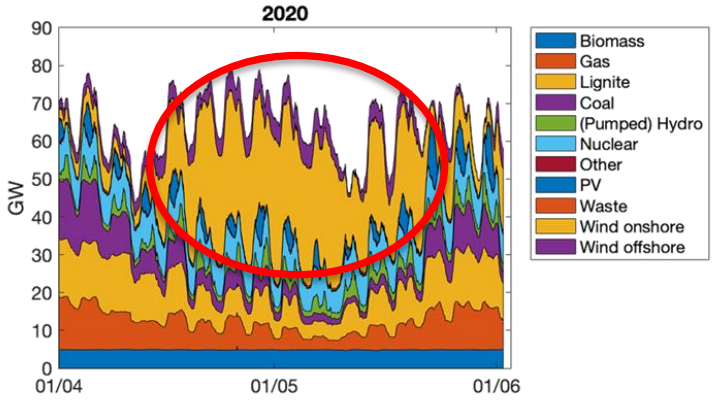
| (April 1st – June 1st) | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|
| Average power generation in Germany | 73.1 GW | 72.7 GW | 66.6 GW | 62.8 GW |
| Share of PV and wind generation in Germany | 13.7 % | 26.3% | 24.6% | 38.6% |




(1) Average RES generation form wind and PV reaches almost 40% for April and May

(2) Total average power generation lower than in the previous years

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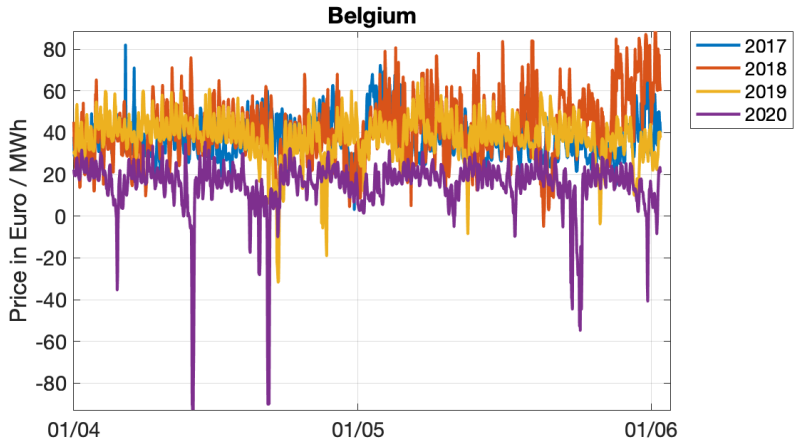
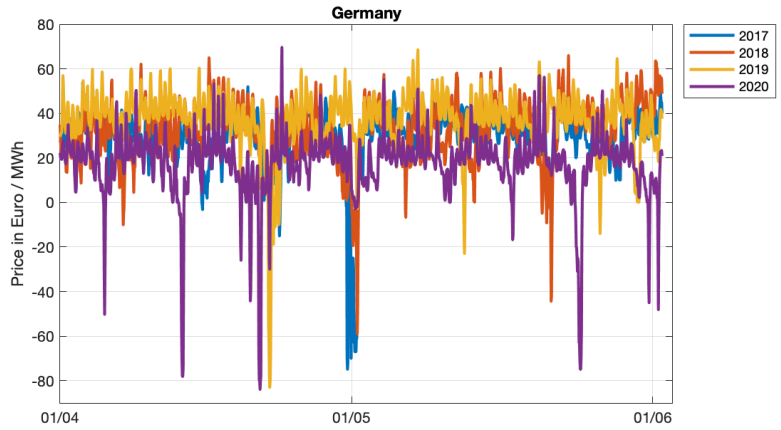
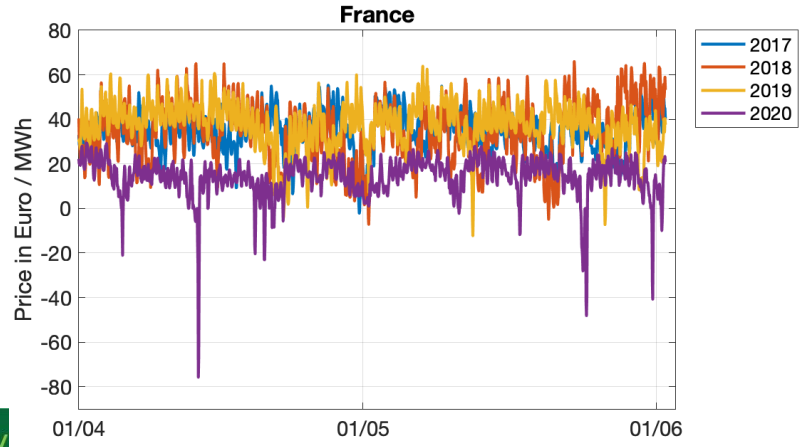
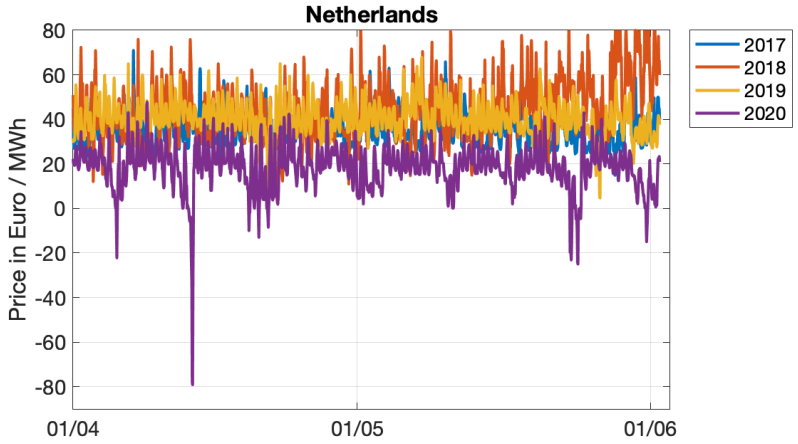
# Day-ahead electricity prices

(1) Higher number of negative price events and more pronounced negative peaks

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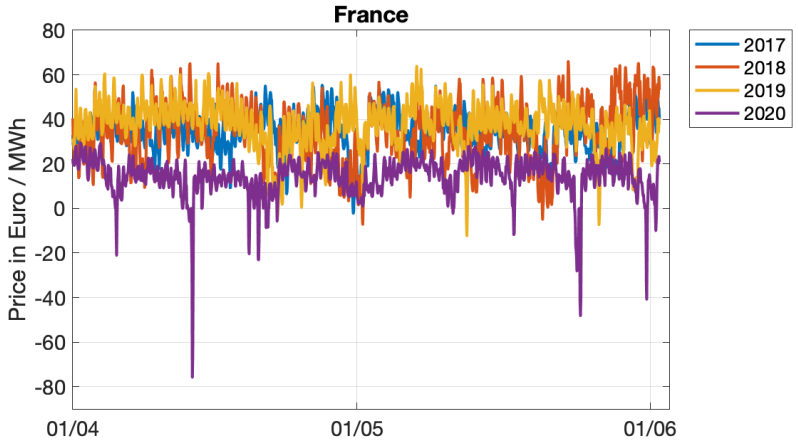
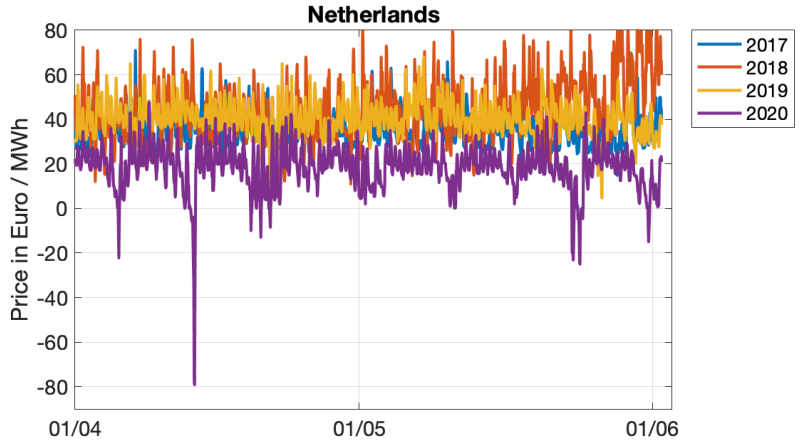
# Day-ahead electricity prices

## (1) Average day-ahead electricity prices ***less than half***

| Average day-ahead electricity prices in €/MWh | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|
| BE | 37.29 | 41.61 | 37.83 | **14.97** |
| DE | 29.78 | 33.11 | 37.29 | **17.17** |
| FR | 34.57 | 34.22 | 37.50 | **14.08** |
| NL | 35.24 | 43.77 | 40.38 | **18.18** |

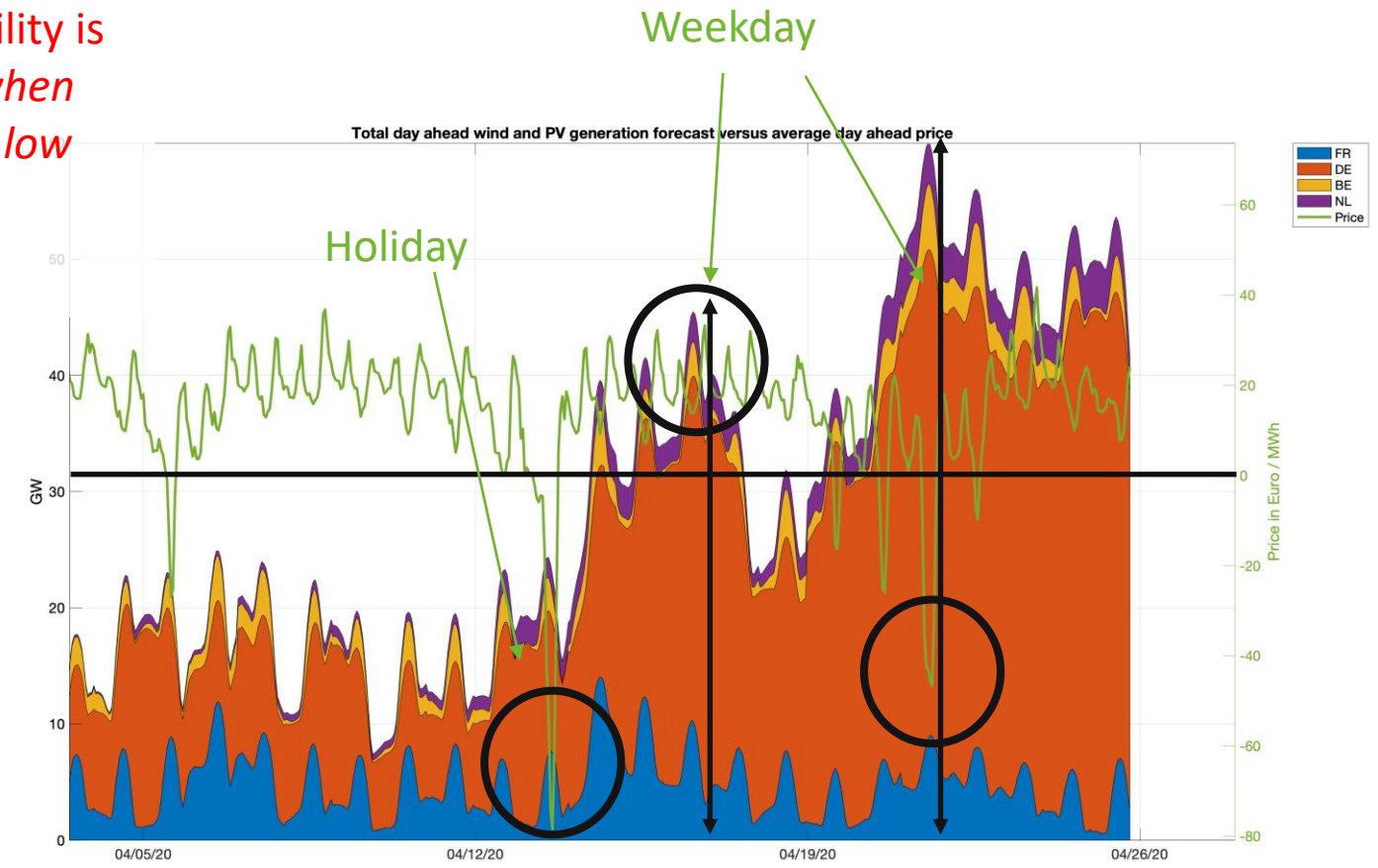


# Renewable generation forecast vs day-ahead prices

(1) Day ahead prices do not capture renewable generation

(2) More demand flexibility is needed, *especially when industrial demand is low*



# Short - term conclusions

- Day-ahead prices and actual renewable generation not always coherent due to ***lack of flexibility***
- Demand flexibility, storage and liquid intraday markets would avoid price peaks
- Keeping enough security margins in operation is of paramount importance to avoid outages and avoid bottlenecks

# Long – term conclusions

- We can see the current simulation as a **scale-down experiment** of a renewable dominated future
- Currently high share of renewables, ***but not even remotely comparable to 2030 - 2050 expectation***
  - The ***MWh based*** market organization must be rethought to avoid frequent price peaks in the future (both positive and negative)
  - Clear need for up and downwards reserves; large scale deployment of storage and ***demand flexibility*** is essential, also to avoid high price peaks
  - Higher transmission capacity and ***flexible transmission*** elements are required to cope with the expected flow increase and volatility and enhance system stability

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