EDA

Allan

2023-06-14

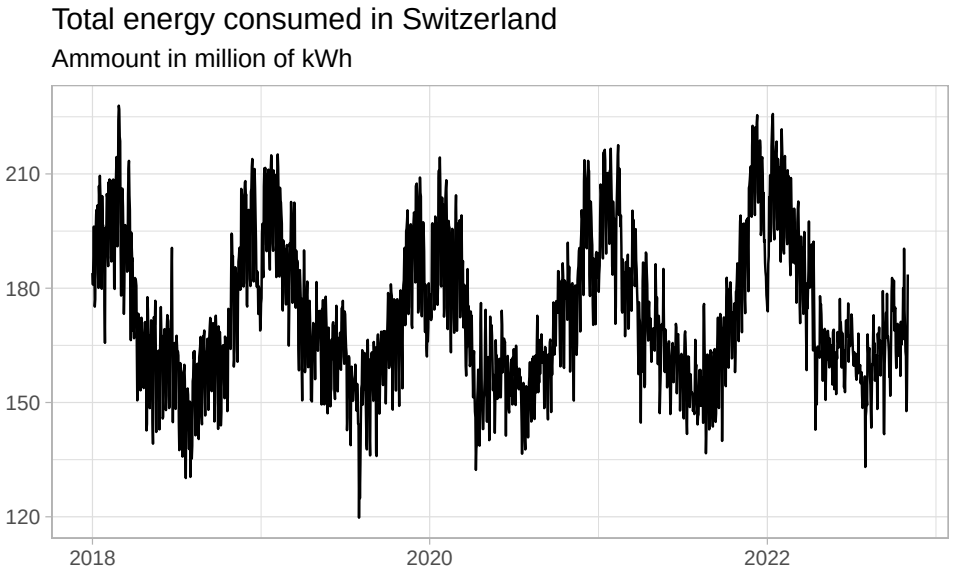
Contents

The Data we have :

time	end_users_cons	energy_prod	energy_cons	pos_second	neg_second	pos_tertiary	neg_tertiary
2015-01-01 00:15:00	1790683	1697772	1922526	37500	0	0	0
2015-01-01 00:30:00	1777126	1686388	1907138	22200	0	0	0
2015-01-01 00:45:00	1807976	1724777	1940146	36100	0	0	0
2015-01-01 01:00:00	1784944	1690007	1918599	16400	0	0	0
2015-01-01 01:15:00	1813997	1681642	1954830	52700	0	0	0

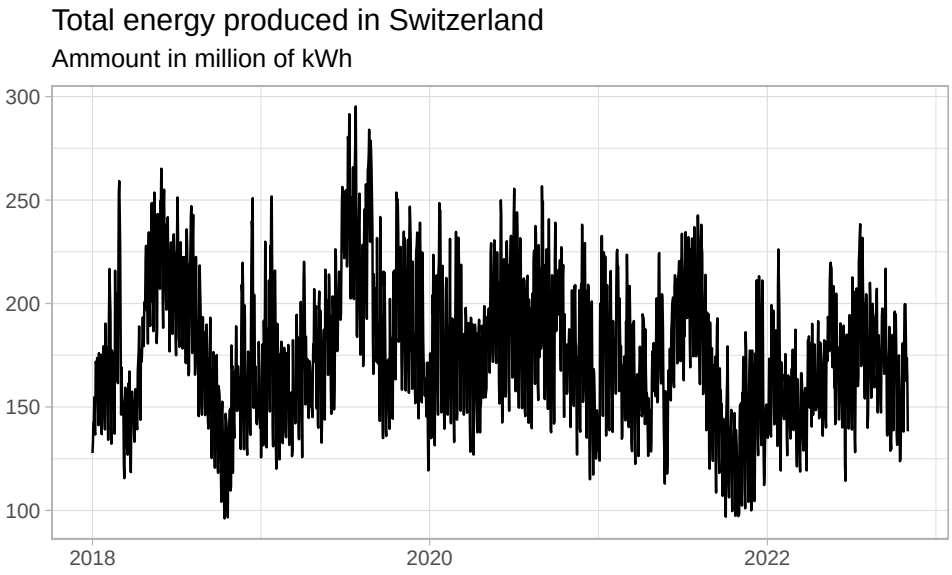
Quick overlook :

Dayly Consumption in Million



-> Strong seasonlity, no obvious trend -> seems to have diffent level of seasonility but hard to get due to the scope

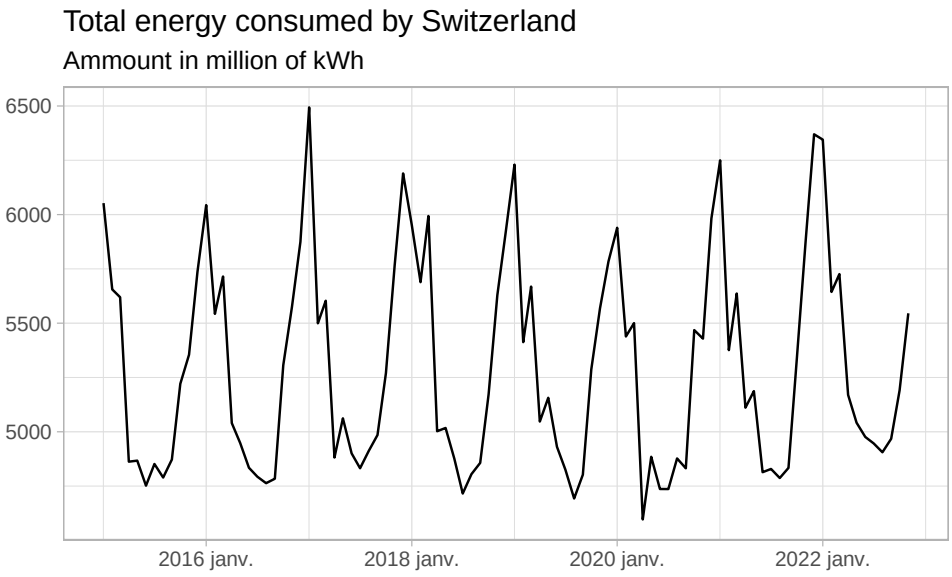
Dayly Production



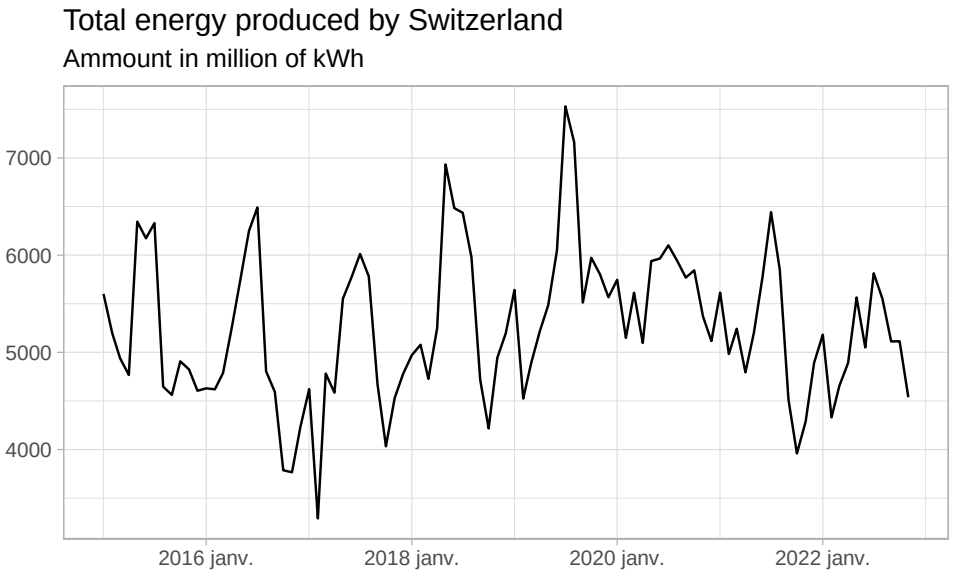
-> also Strong seasonlity, no obvious trend but more messy -> seems to have diffent level of seasonility but hard to get due to the scope

Zoom in to see the monthly seasonality

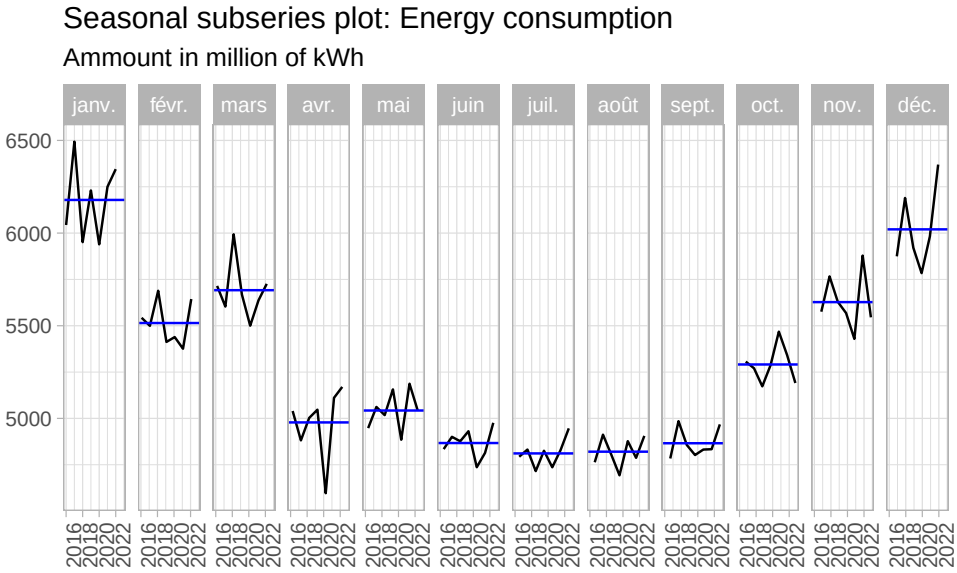
Monthly



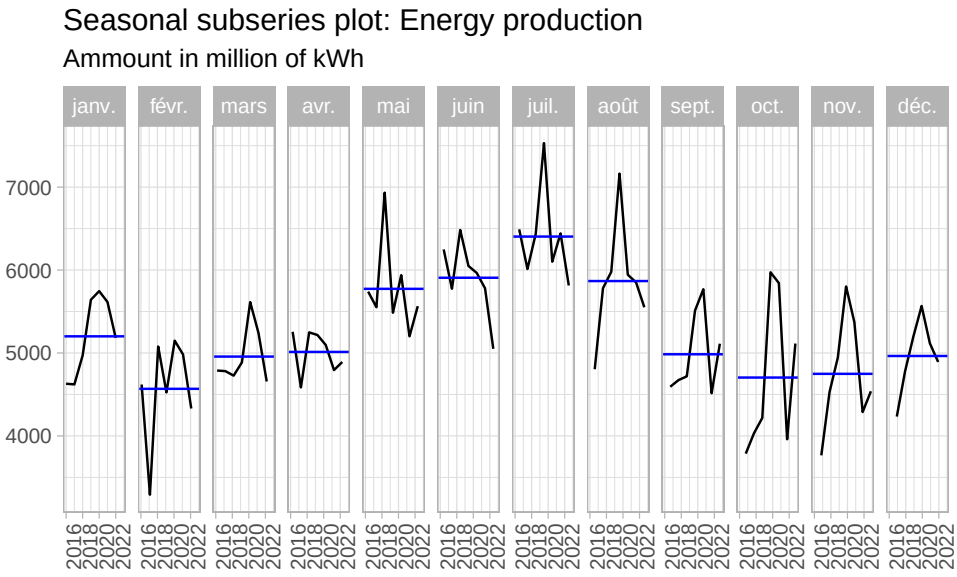
Strong seasonality, no trend, peaks in Winter, lowest in sommer



opposite of consumption, Strong seasonality, no trend, peaks in Summer, lowest in winter

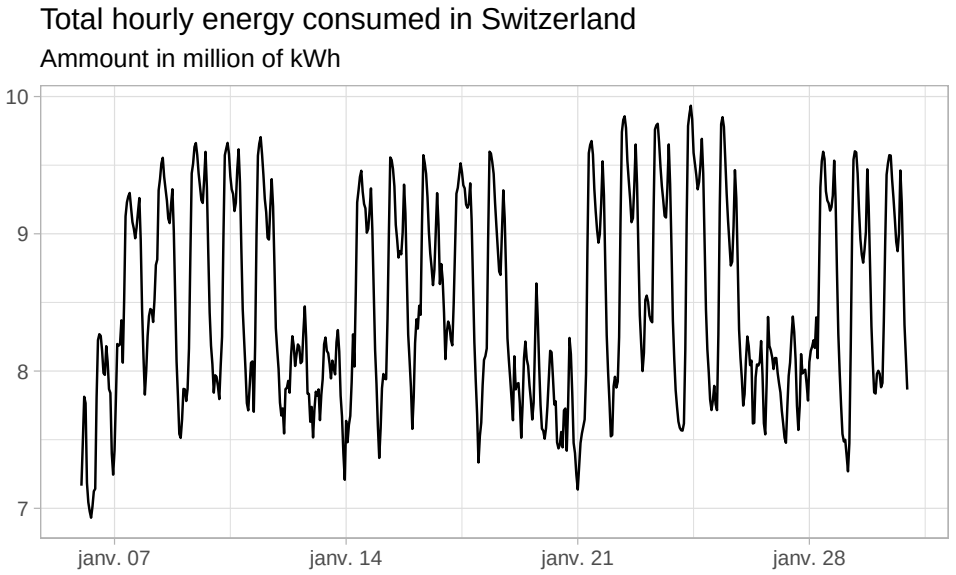


Better view that confirmed what we previous said for consumption

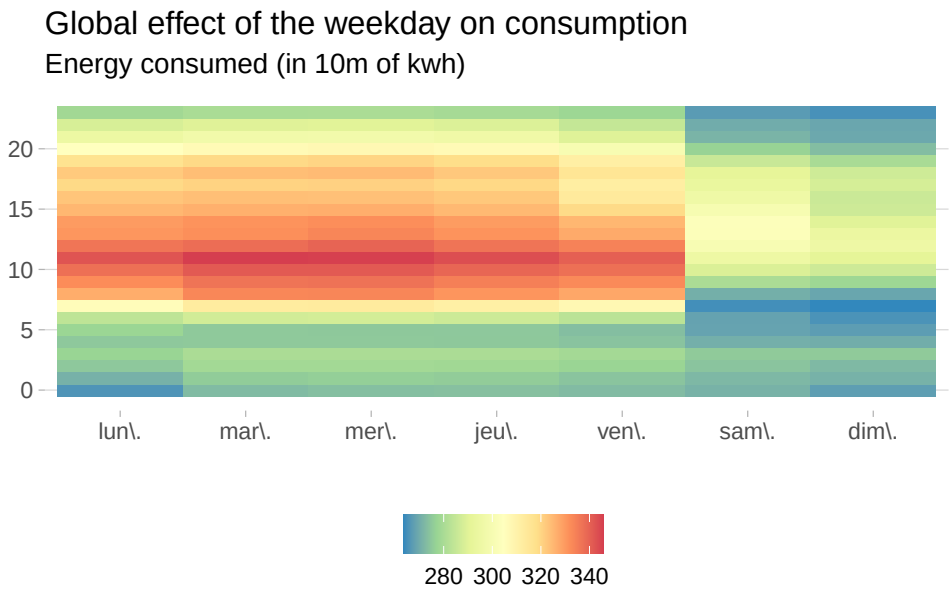


Better view that confirmed what we previous said for prodcution

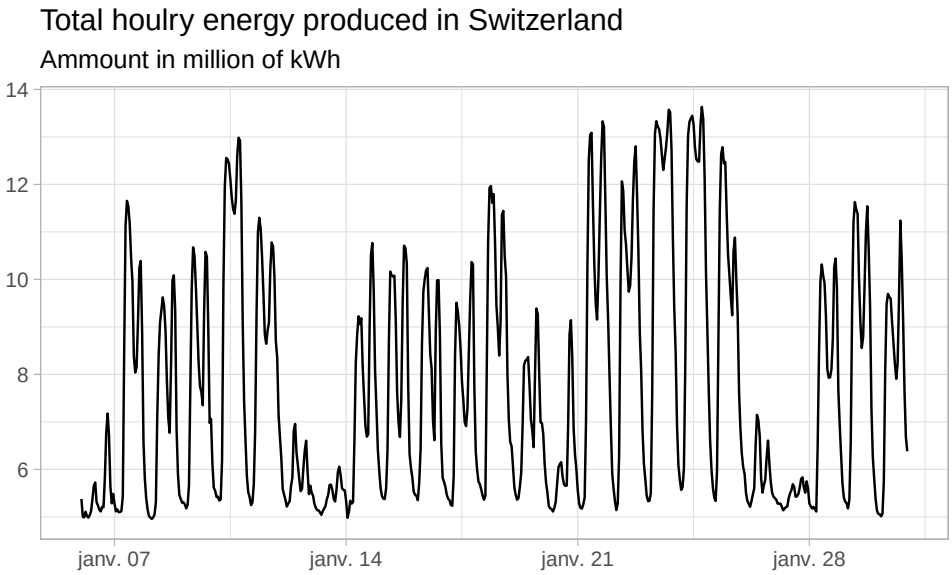
Zoom in to see the weekly seasonality



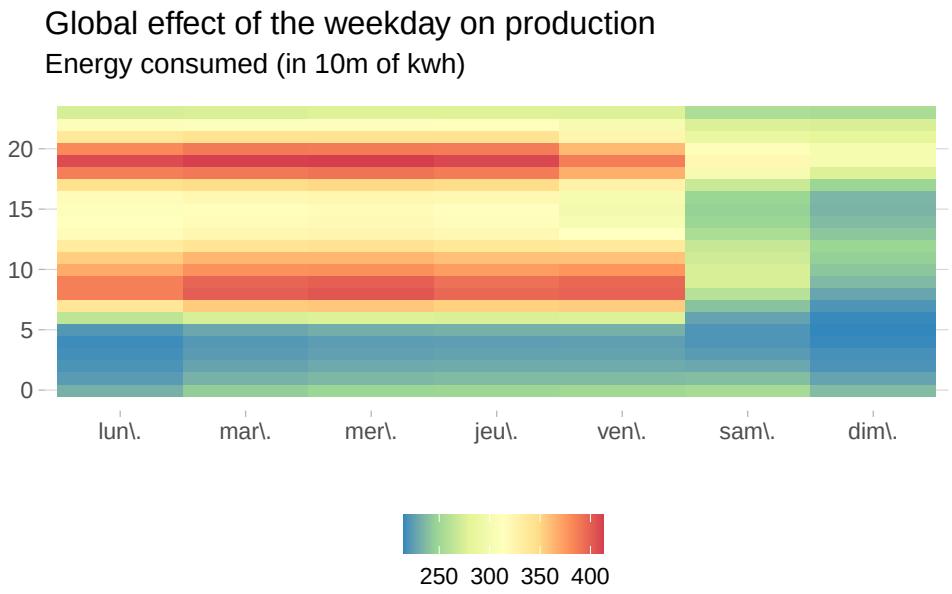
We can see here both weelky and daily seasonlaty : With peaks during days (morning and end of afternoon) and during week with higher volume on weekday (no significant difference among days themselves)



Trend is generalized through the whole period, peaks around noon



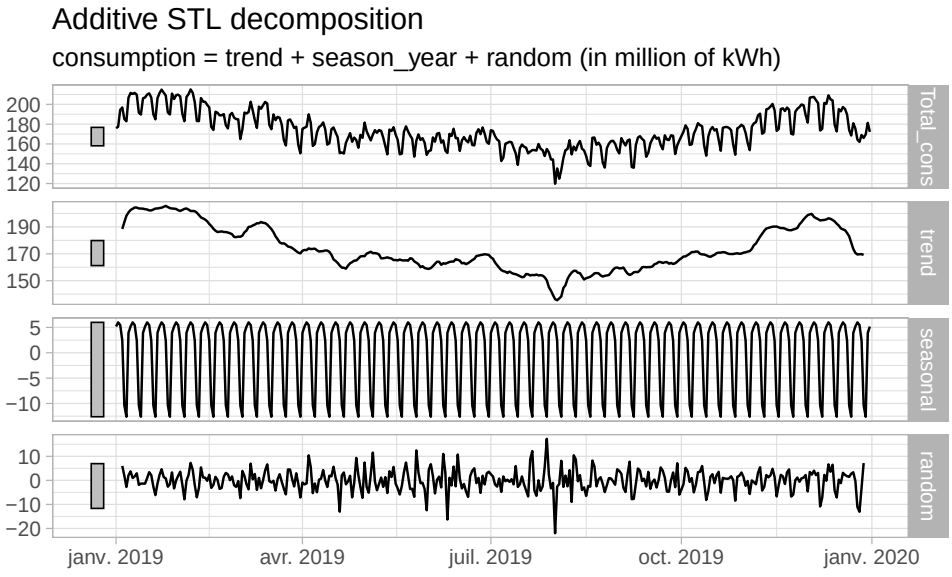
same conclusion as consumption

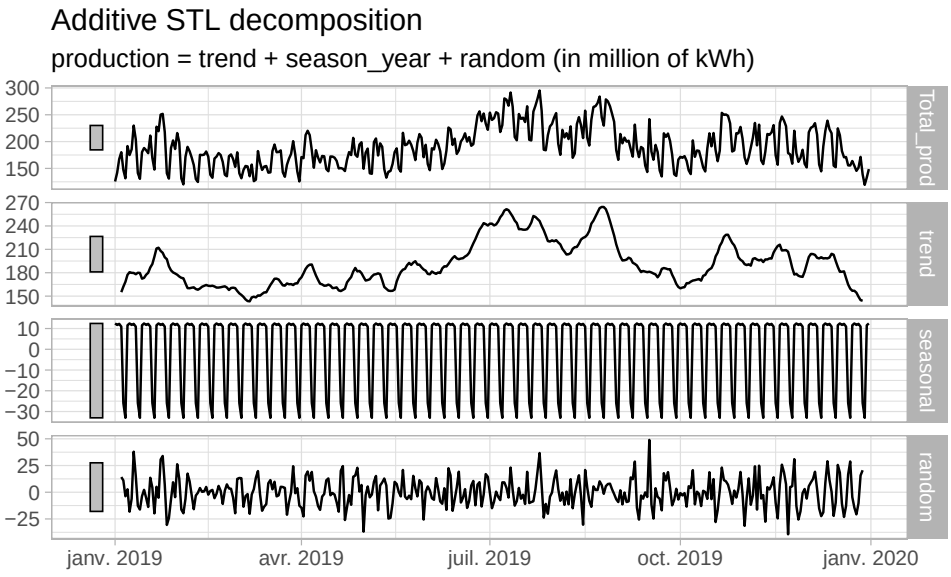


Trend is generalized through the whole period, peaks around 9am and 7pm, almost 0 prod btw 0 and 5 am -> noise and poeple aint working

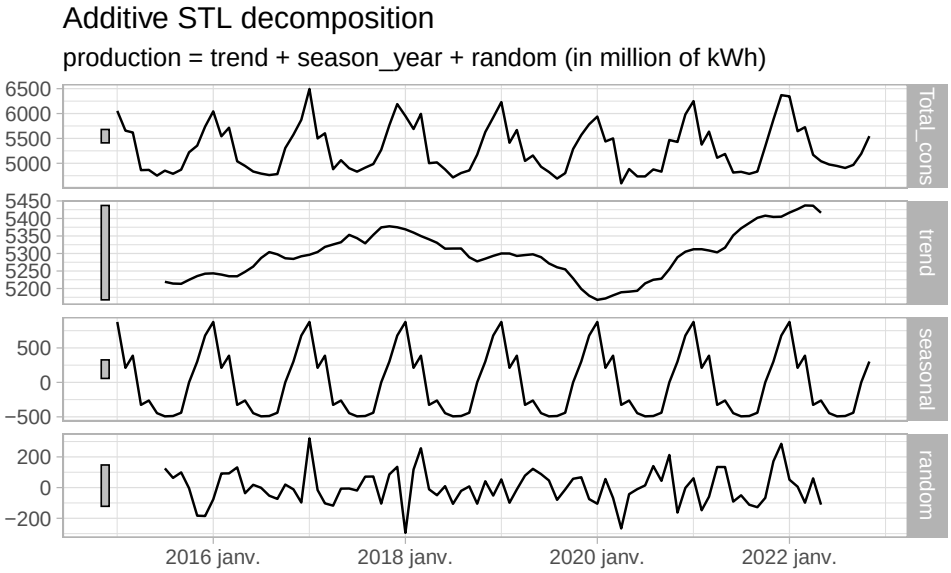
We can now build the stl decomp with additive paramater due to no change over time in the seasonlity :

We reduce the scope to a year the have a better a view of the data, we have shown that seasonality was constant over the year. also show us the weekly seasonality

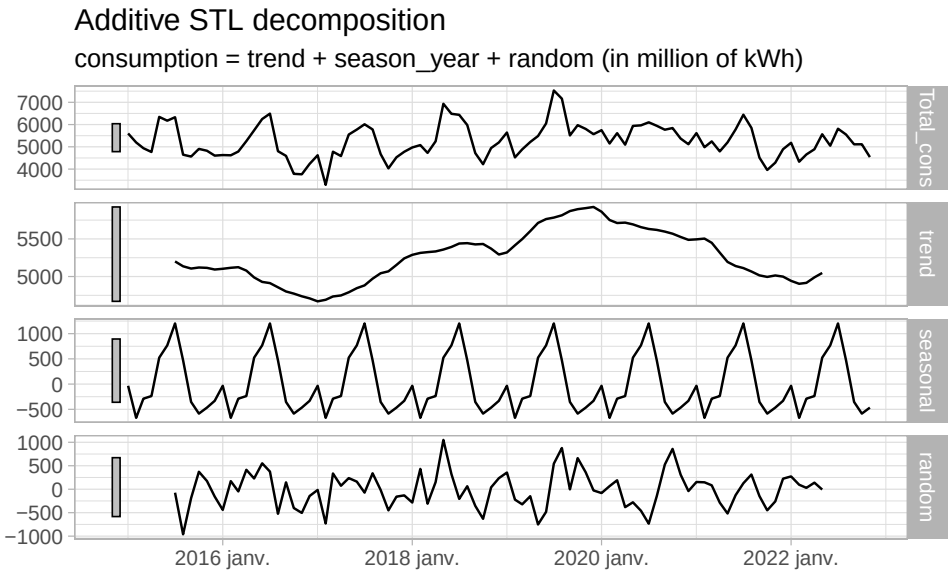




Same for production



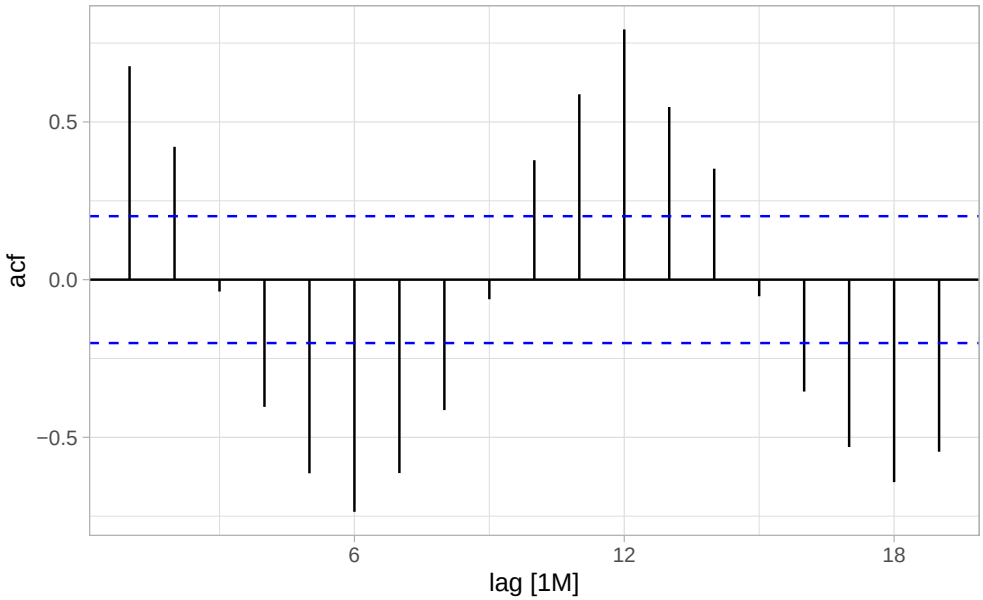
Monthly seasonality for cons



Monthly seasonality for prod

Let's have a look at the residuals :

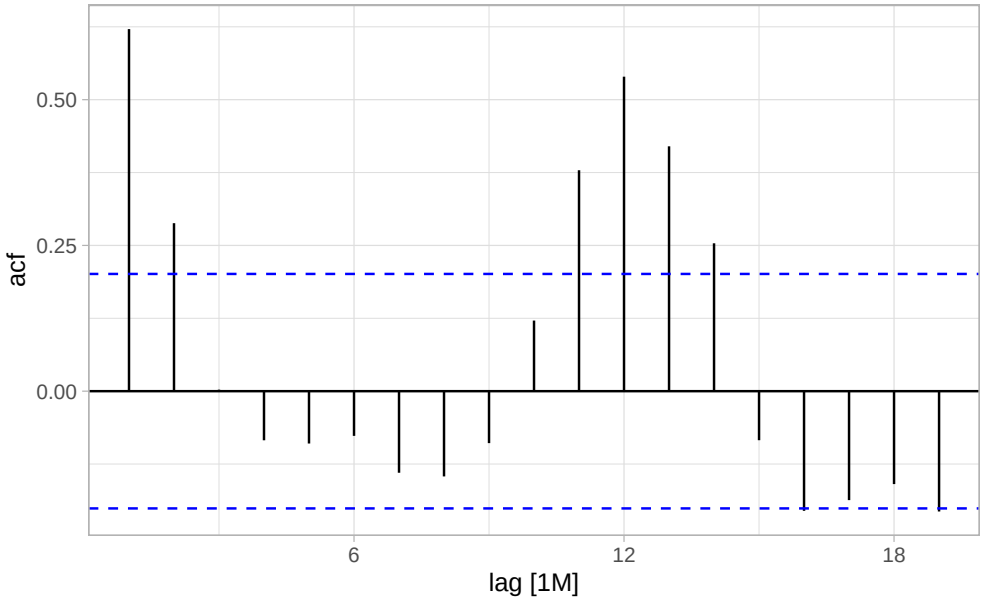
```
#> $title
#> [1] "Consumption's residuals"
#>
#> attr(,"class")
#> [1] "labels"
```



for cons

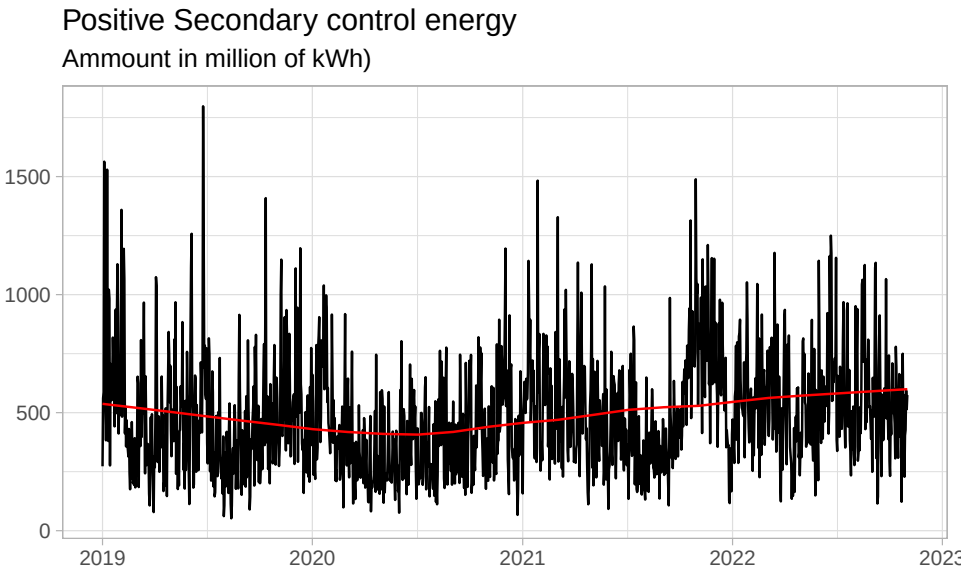
```
#> $title
```

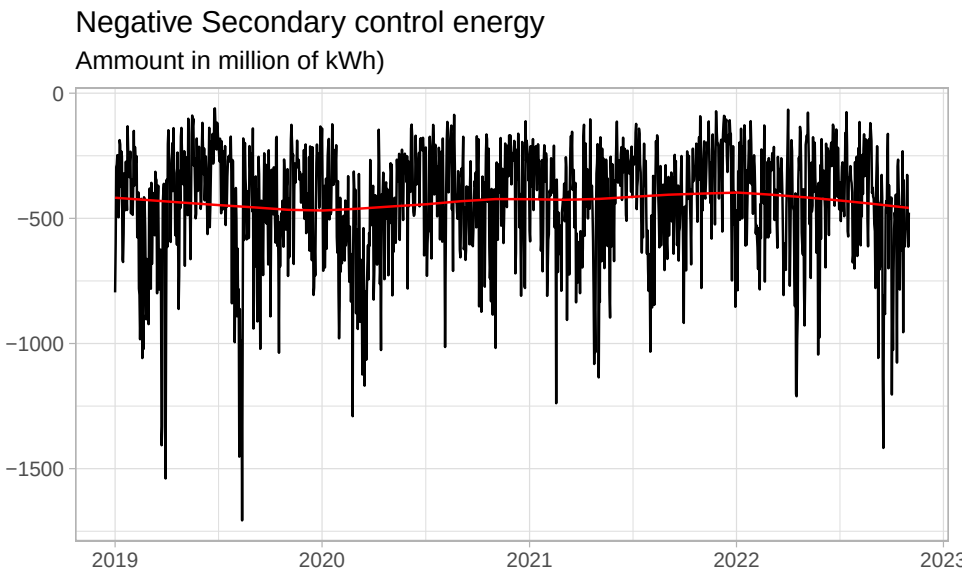
```
#> [1] "Production's residuals"
#>
#> attr(,"class")
#> [1] "labels"
```



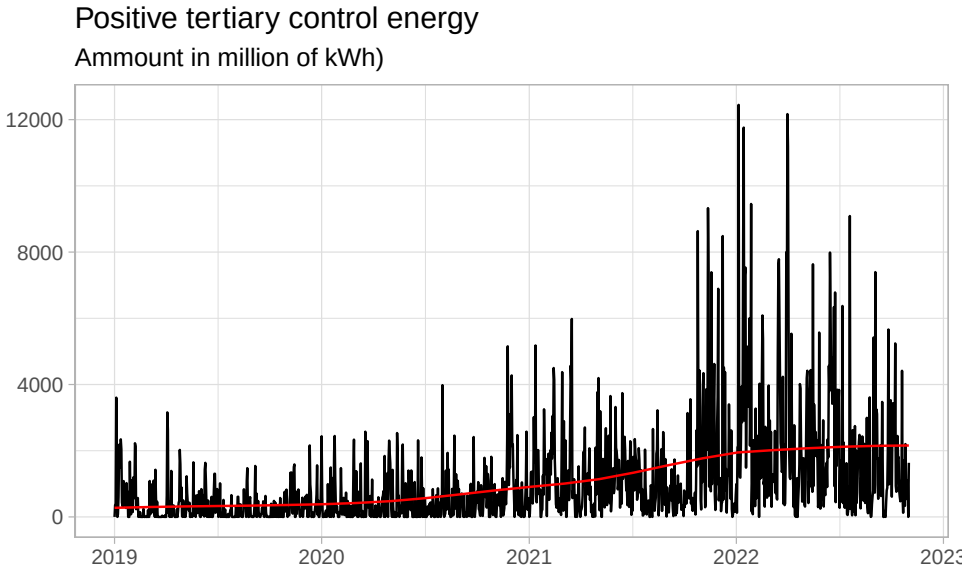
for prod

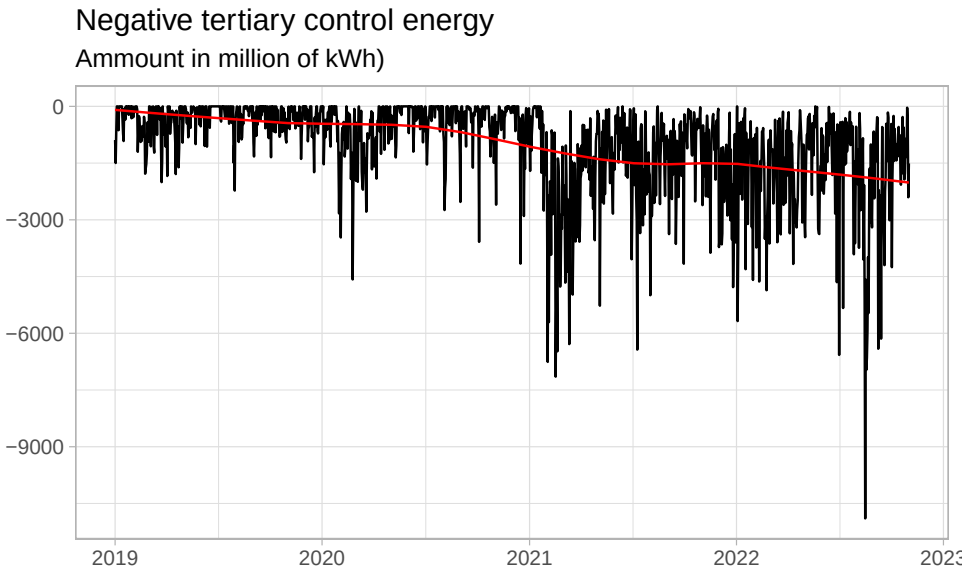
Positive and Negative Secondary control with trend





Positive and Negative Tertiary control with trend





Let's do the same for Cantons : -> Where is the electricity consumed and where does it come from ? -> what drives it ? density, mapping, policy, mapp of barrage/hydrolyique central, plant and so on

What data do we have :

All the different cantons where set as variable (horizontal), in order to perform the anaylsis we needed to transform our Data-set in a vertical shape.

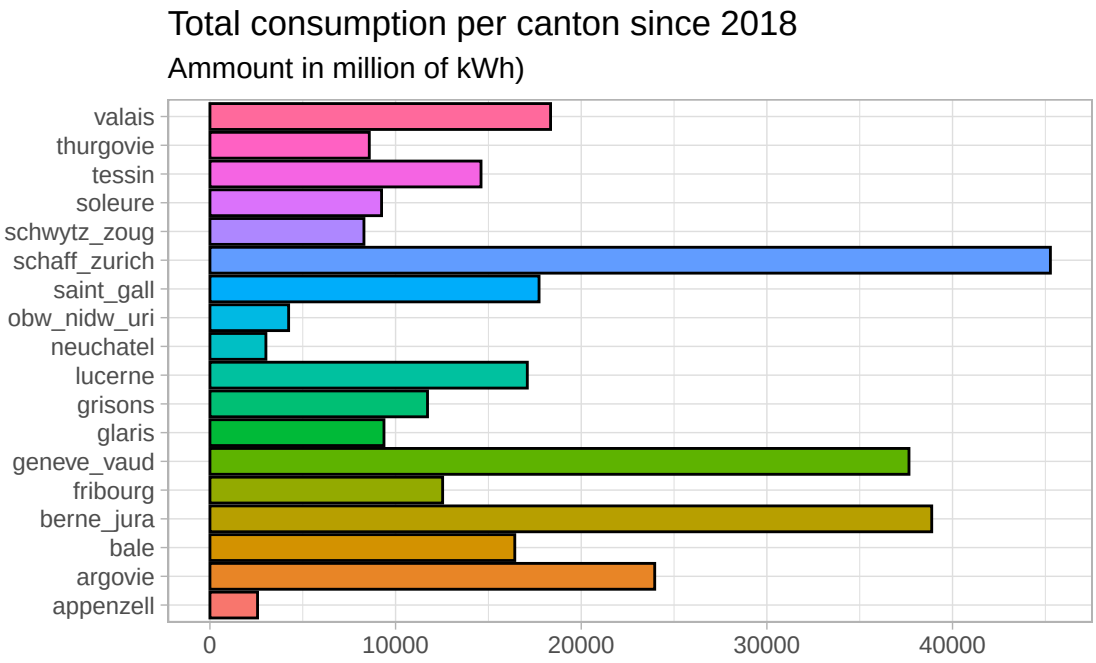
Here is what the final version look like (we only show 1 variable for the Time)

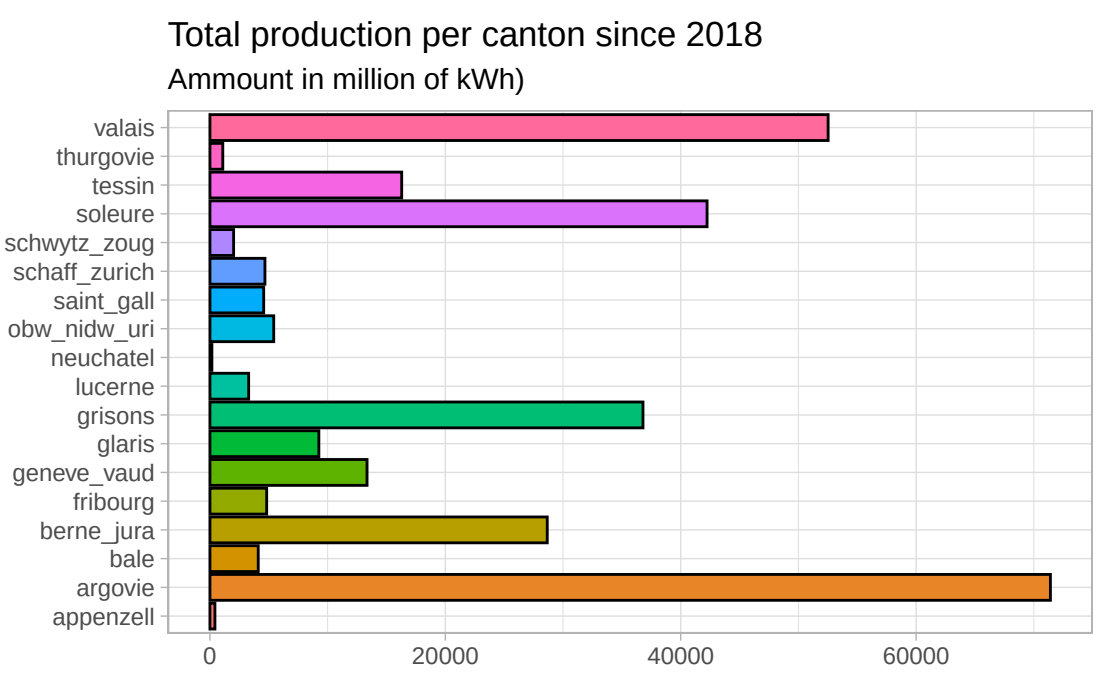
time	Cantons	production	consumption
2015-01-01 00:15:00	argovie	511742	151008
2015-01-01 00:15:00	fribourg	6657	82368
2015-01-01 00:15:00	glaris	56449	12761
2015-01-01 00:15:00	grisons	196507	89631
2015-01-01 00:15:00	lucerne	4576	104484

-> We have, for each 15-minute period, the consumption and production of each Cantons. As said in introduction, some Cantons have been grouped together. You can see the breakdown here:

```
#>  [1] "argovie"       "fribourg"      "glaris"        "grisons"
#>  [5] "lucerne"       "neuchatel"     "soleure"       "saint_gall"
#>  [9] "tessin"        "thurgovie"     "valais"        "appenzell"
#> [13] "bale"          "berne_jura"    "schwytz_zoug"  "obw_nidw_uri"
#> [17] "geneve_vaud"   "schaff_zurich"
```

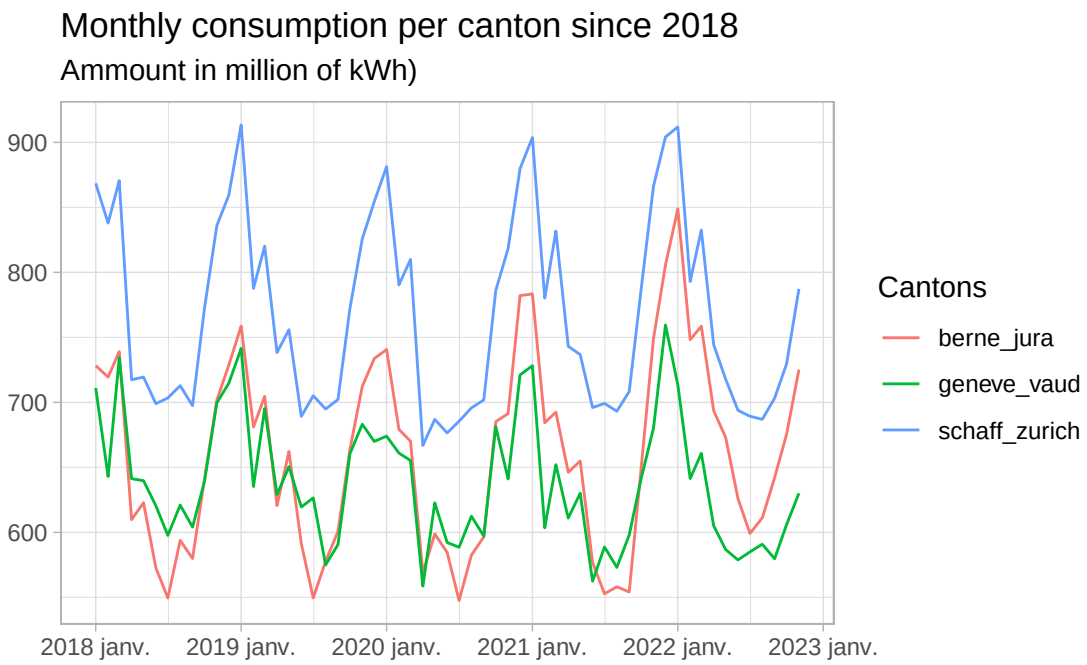
24 Cantons (do not differentiate half-canton) spread over 18 values. -> For further analysis, we will split the value to get the 24 cantons. Method and results will be presented in an other section.

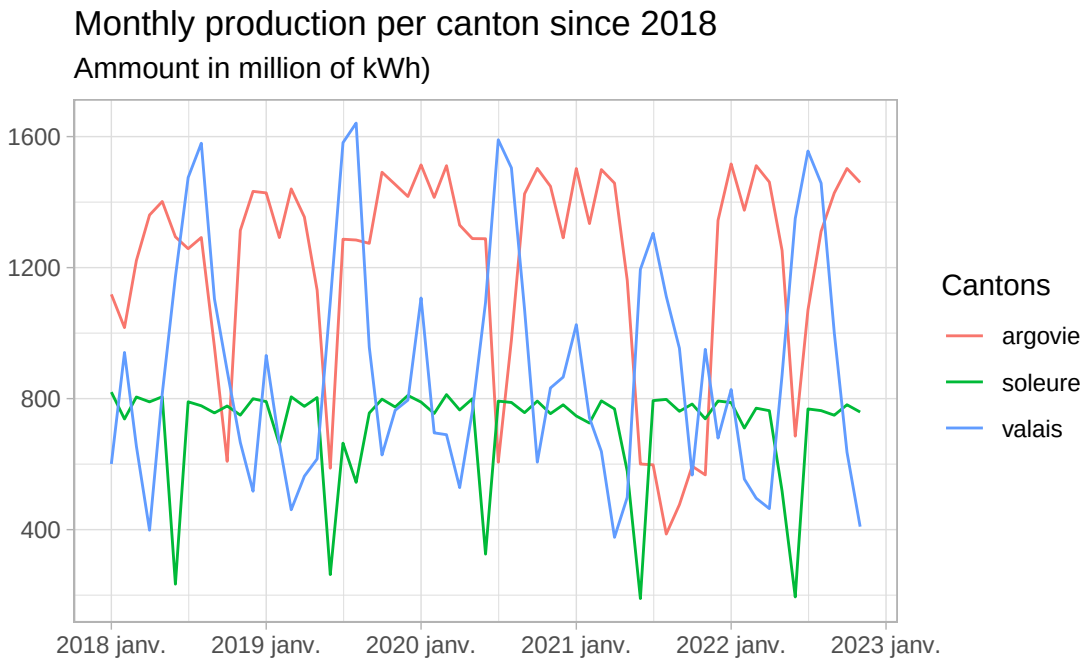




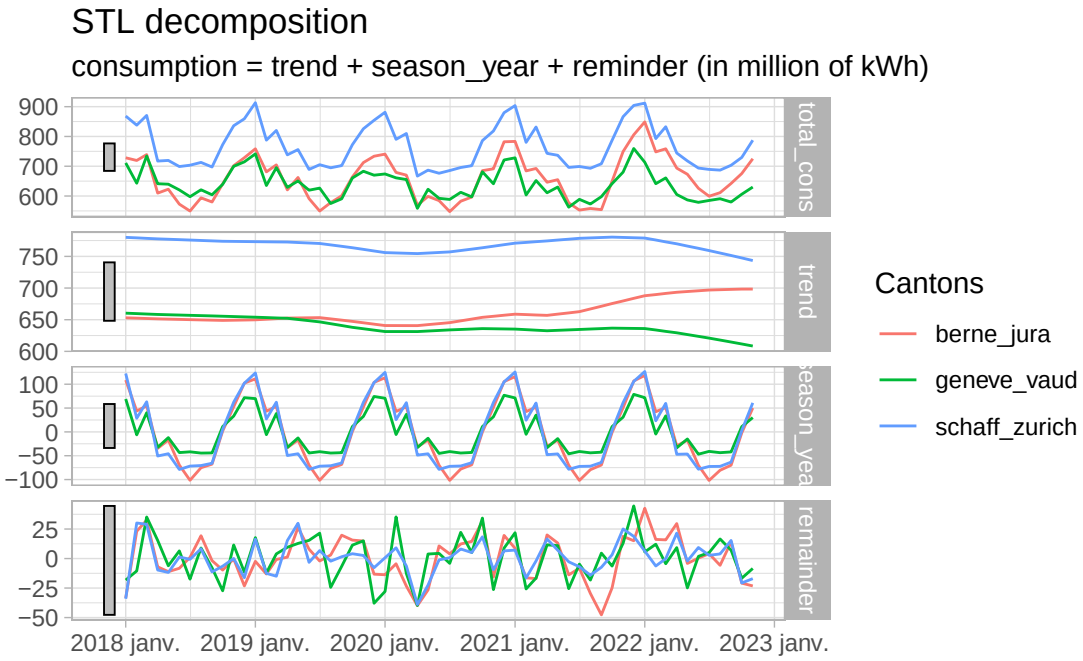
Many difference here : Higher standard deviation for production Consumption and Production seems independent -> not driven by the same variable

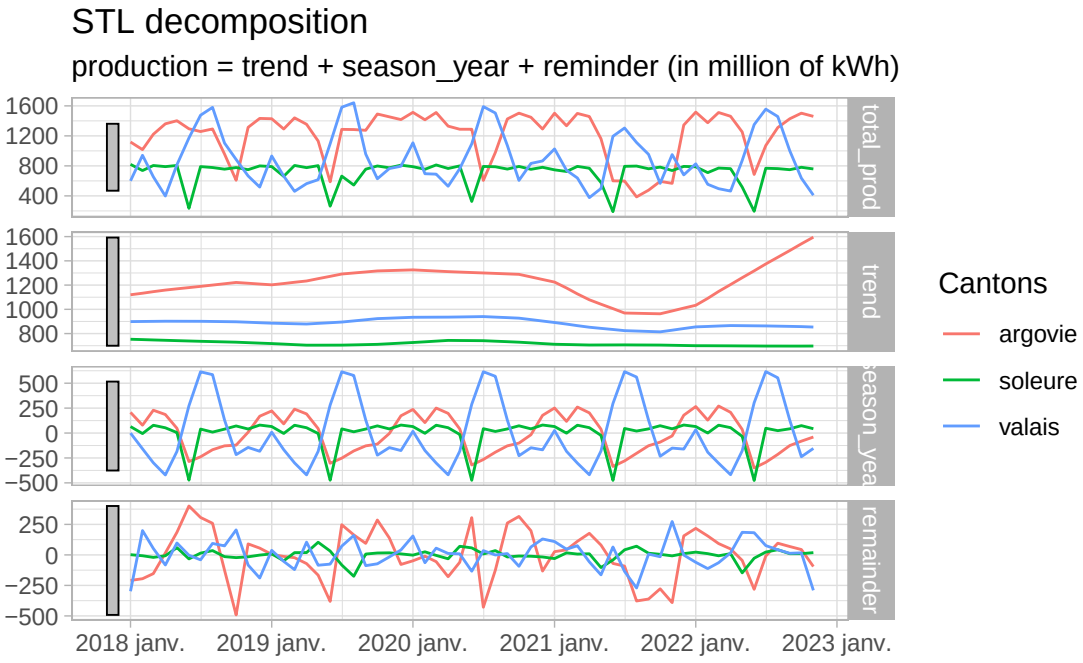
Let's see the monthly seasonality and trends over time for the top 3 of each category :



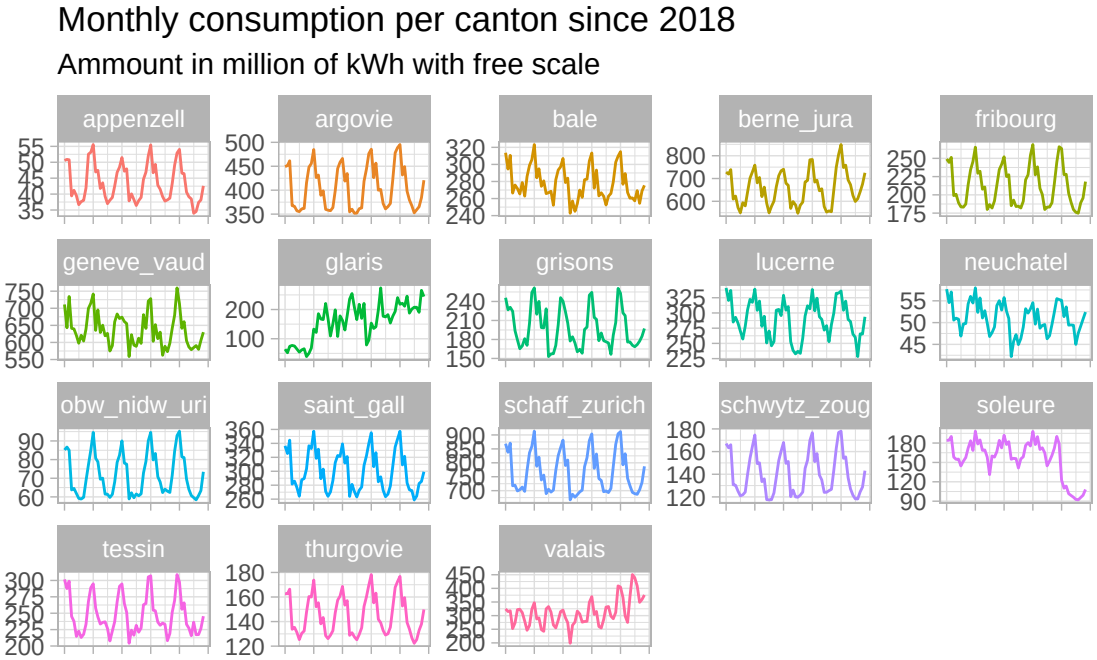


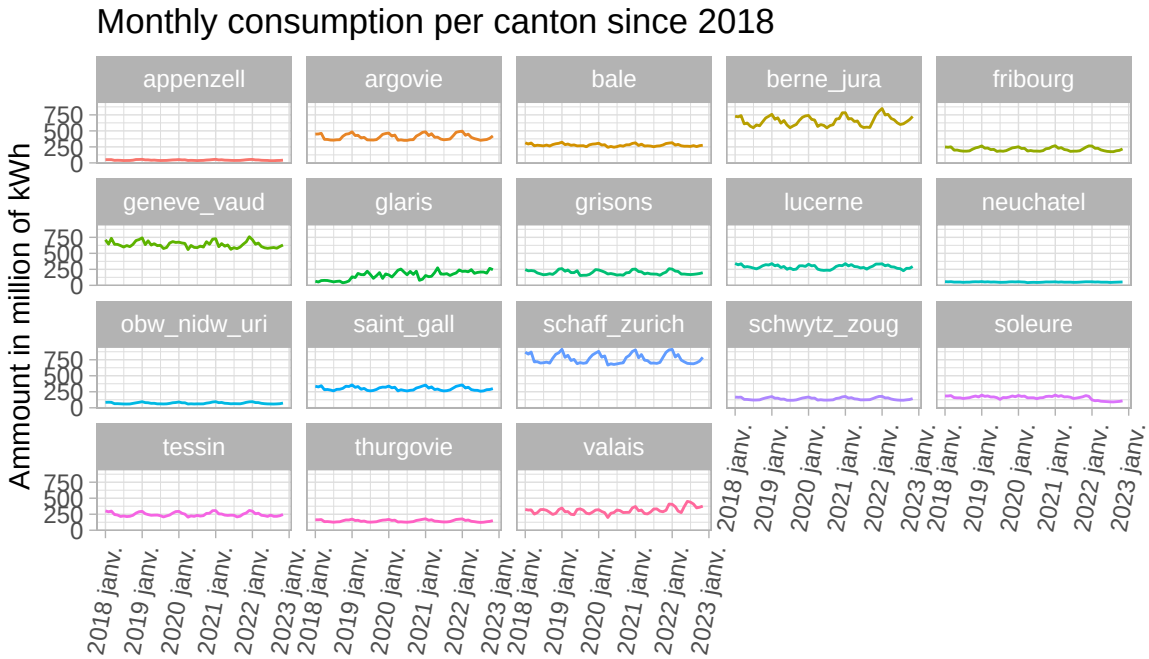
STL decomp for top 3 prod and top 3 cons

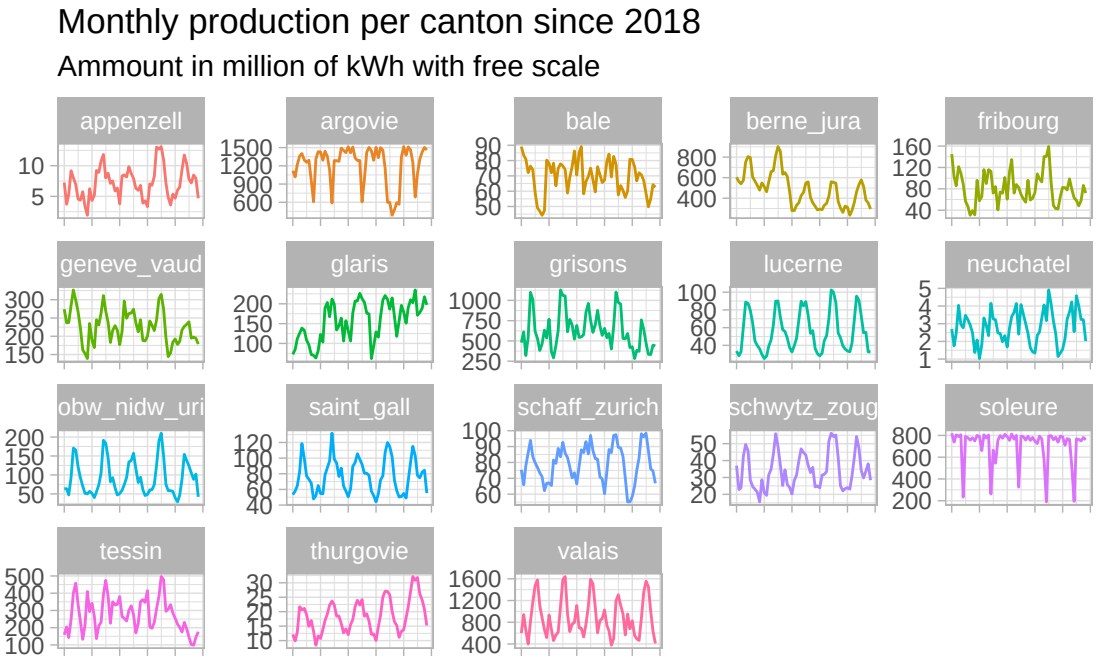


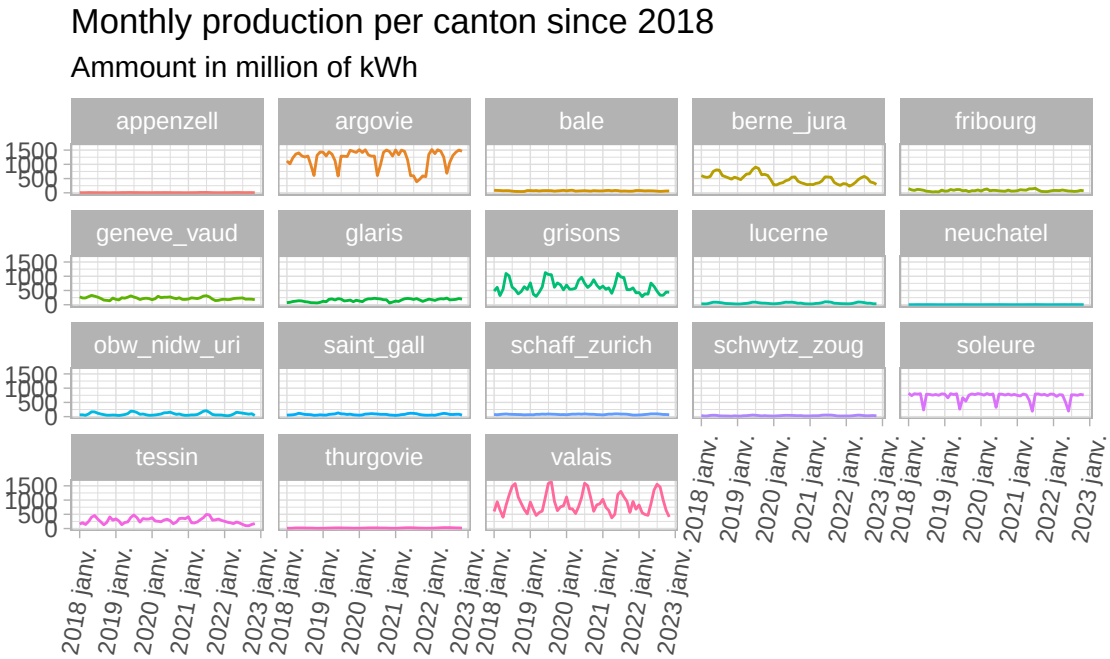


Facet wrap per Cantons with and without free scale :

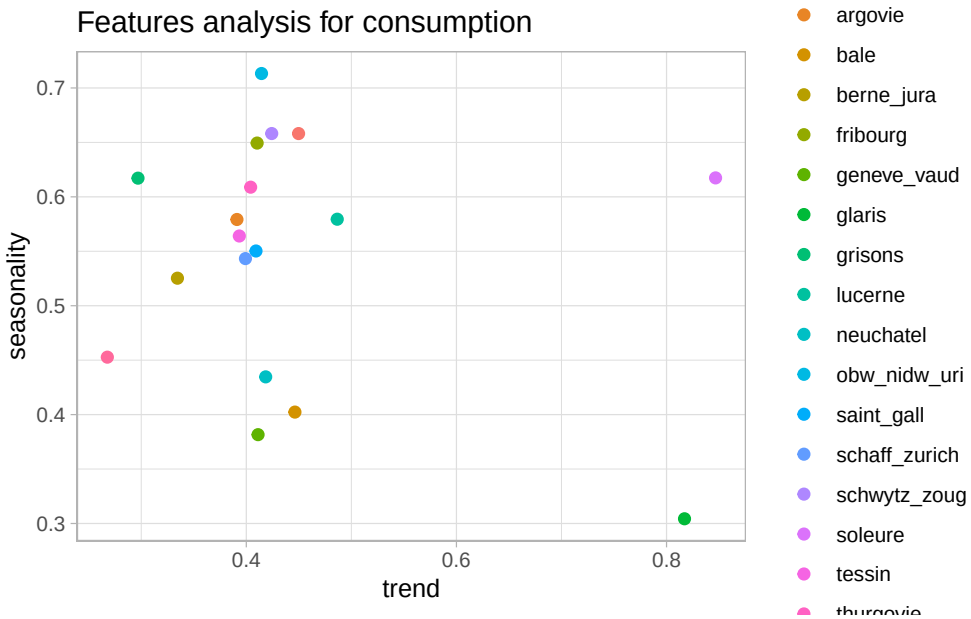

Monthly consumption per canton since 2018
Ammount in million of kWh with free scale
appenzell
argovie
bale
berne_jura
fribourg
geneve_vaud
glaris
grisons
lucerne
neuchatel
obw_nidw_uri
saint_gall
schaff_zurich
schwytz_zoug
soleure
tessin
thurgovie
valais


Monthly consumption per canton since 2018
Ammount in million of kWh
appenzell
argovie
bale
berne_jura
fribourg
geneve_vaud
glaris
grisons
lucerne
neuchatel
obw_nidw_uri
saint_gall
schaff_zurich
schwytz_zoug
soleure
tessin
thurgovie
valais
2018 janv.
2019 janv.
2020 janv.
2021 janv.
2022 janv.
2023 janv.

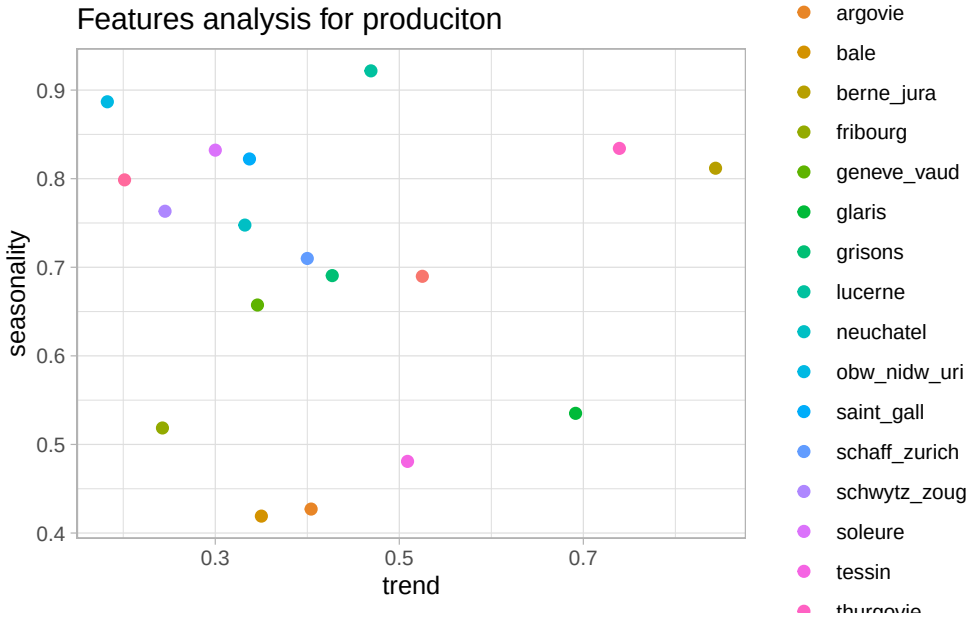




Features analysis to check the strength of the seasonality/trend


Features analysis for consumption
seasonality
trend
0.3
0.4
0.5
0.6
0.7
0.4
0.6
0.8
argovie
bale
berne_jura
fribourg
geneve_vaud
glaris
grisons
lucerne
neuchatel
obw_nidw_uri
saint_gall
schaff_zurich
schwytz_zoug
soleure
tessin
thurgovie

test


Features analysis for produciton
seasonality
trend
0.4
0.5
0.6
0.7
0.8
0.9
0.3
0.5
0.7
argovie
bale
berne_jura
fribourg
geneve_vaud
glaris
grisons
lucerne
neuchatel
obw_nidw_uri
saint_gall
schaff_zurich
schwytz_zoug
soleure
tessin
thurgovie