Comments on plots for *elec\_v2g50*

# Electricity Analysis - Mismatch

## Principal Component 1

1. Monopole of whole of Europe
2. Strong daily frequency and semi-strong half-daily frequency
3. Positive peak at midday with below zero at night
4. Small fluctuations in yearly average with larger fluctuation at the colder months
5. Almost only Solar PV driven with a small negative Solar PV /Load electric
6. Large Transport Coupled as response with covariance with Storage as second most
7. Mostly Solar PV/Transport Couple covariance

## Principal Component 2

1. North-South division between Europe with Germany, UK, Spain, and Italy being the most significance in magnitude
2. Strong daily frequency
3. Not much of a daily pattern. A small peak at noon
4. Les fluctuations over the yearly average with more stability in the summer months
5. Primarily Wind driven with partial Solar PV contribution
6. A high balanced response with the main being the Transport couple
7. Very balanced covariance contribution with mainly Wind as one of the contributer

## Principal Component 3

1. East-West division of Europe with France, UK, and Germany being the most significance in magnitude
2. Strong half-day frequency as well as a daily frequency
3. Half day pattern with peak at 4’oclock as well as 15’oclock while between there is minimums
4. Fluctuation throughout the whole year
5. High wind contribution with some Solar PV aswell
6. Primary response from Transport Couple with the second being Import-Export
7. Main Wind driven covariances with some Solar PV/Transport Couple covariance

## Principal Component 4

1. Tri-pole divided with North and south being negative, while diagonal-central Europe being positive. UK is here the most significance in magnitude
2. High daily frequency
3. Very minor fluctuations in daily average pattern
4. small fluctuations in yearly average with no obvious pattern.
5. Almost entirely Wind driven
6. Larges response from Transport Couple with Backup Generator and Import-Export being of significance as well
7. Mainly Wind driven covariances

### Principal Component 5

1. Primarily Spain, France and Italy dominating
2. High day and half day frequancy
3. Same half day pattern as seen on PC 3
4. Small fluctuations
5. Almost entirely solar driven with some wind
6. Larges response from transport coupling
7. High covariance between Solar PV/Transport Couple with some Solar PV/Storage

### Principal Component 6

1. Poland being most significant in magnitude as well as Sweden
2. No strong frequency. Some peak at the monthly
3. No daily pattern
4. No yearly pattern with minor fluctuations
5. High wind contribution with only a small solar contribution. Some small negative wind/load electric
6. High import-export and transport couple response aswell as a high negative covariance between the two
7. Highest contribution from Wind/Transport Couple with some Wind/Import-Export

# Transport Analysis - Mismatch

## Principal Component 1

1. Positive monopole across whole of Europe
2. Strong daily frequency
3. Clear daily pattern. Positive at night with peak at 1-2 am. Smallest at 3-4 pm.
4. Seasonal showcases a clear fluctuation pattern

## Principal Component 2

1. Strong positive magnitude for UK and small from Portugal rest of Europa is negative
2. High daily frequency
3. Daily pattern with positive peak at 5 am and negative peak at 7 pm
4. No yearly pattern

# Electricity Analysis - Nodal Prices

## Principal Component 1

1. Negative monopole across whole of Europe
2. A semi frequency at the daily marker
3. A daily patter with positive from 4 am to 2 pm the rest is negative
4. Large fluctuations over the yearly average with the highest peaks at summer but with large negative at winter

## Principal Component 2

1. North-South division of Europe
2. Daily frequency
3. Same daily pattern as PC1 with 4 am to 2 pm being positive
4. Yearly fluctuations with highest peak at the beginning of the year

## Principal Component 3

1. East-West division of Europe
2. No daily or half day frequency but large spike at he month marker
3. No daily pattern
4. Large fluctuations over yearly average

## Principal Component 4

1. Central east Europe being negative while rest of Europe is positive
2. High daily frequency
3. Small pattern that is opposite of PC 1 and PC 2
4. Small fluctuations over yearly average

## Principal Component 5

1. A tri-pole Eroupa with France being of highest magnitude (negative)
2. High peak between at biweekly
3. No clear daily pattern
4. Small fluctuations over yearly average with highest fluctuation at winter

## Principal Component 6

1. No obvious division across Europe. Portugal begin of largest magnitude
2. Semi daily frequency
3. No obvious average daily pattern
4. No obvious yearly average pattern and with small fluctuations

# Transport Analysis - Nodal Prices

## Principal Component 1

1. Negative monopole across Europe
2. Semi daily frequency
3. A daily pattern with positive value from 5 am to 3 pm. Very lineal overwise
4. Large fluctuation but with a clear seasonal difference in peaks

## Principal Component 2

1. North-South division between Europe
2. Semi daily frequency
3. Same pattern as seen in PC 1
4. Small fluctuation but with a large peak at the beginning of the year and negative at the end

## Principal Component 3

1. East-West division between Europe
2. No daily or half day frequency but spikes up around the month mark. Could be because of noise or outliers
3. No obvious pattern for daily average plot
4. Fluctuation across the whole year. No clear patterns

## Principal Component 4

1. Tri-pole European division
2. Daily frequency
3. Small daily pattern opposite of PC 1 and PC 2
4. Small fluctuations during the year with slightly larger at winter

## Principal Component 5

1. No clear European split. France being of largest magnitude (positive)
2. No daily or half day frequency but a peak at biweekly
3. No obvious pattern for daily average plot
4. Small fluctuation with largest peaks at the beginning and end of the year

## Principal Component 6

1. No clear European split. Large magnitude from Finland (negative)
2. No clear frequency
3. No clear daily pattern
4. Small fluctuation through the year

# Coherence

## Elec Mismatch (EM) vs Elec NP (ENP)

1. 5 PC with a covariance of more than 0.4, with the maximum covariance of 0.62 between PC1/PC1
2. Only PC1/PC1 coherence significant for coherence method 2
3. High positive coherence between PC1/PC1 PC2/PC2. While EM PC6/ENP PC2 and EM PC3/ENP PC4 is large negative

## Transport Mismatch (TM) vs Transport NP (TNP)

1. 3 PC with a covariance of 0.4 or more, with PC1/PC1 being the largest of 0.594
2. Only PC1/PC1 coherence being significant for coherence method 2
3. Not much coherence. Only TM PC3/TNP PC1 being of significance

## Elec NP (ENP) vs Transport NP (TNP)

1. Strong pattern across diagonal terms
2. Only PC1/PC1 coherence being significant for coherence method 2
3. Strong pattern across diagonal terms with both positive and negative terms, with PC1/PC1 to PC4/PC4 being positive and PC5/PC5 and PC6/PC6 being negative