



# Analysis of the Impact of the FIFA World Cup Brazil 2014 Games on Overall Consumer Behaviors

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Magdeburg, 29/10/ 2014

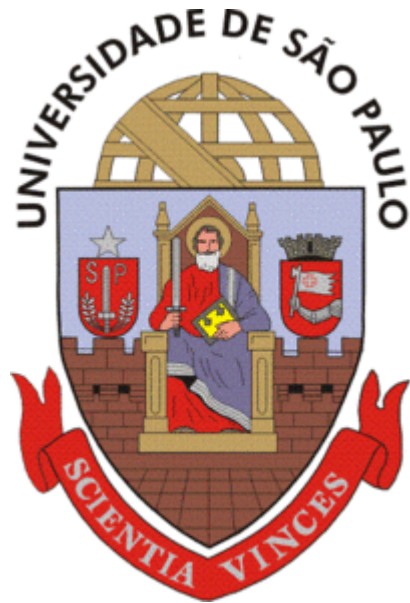


# 1. University of Sao Paulo

- Introduction
- Laboratories: ENERQ-CT

## 2. Paper: Analysis of the Impact of the FIFA World Cup 2014 on Overall Consumer Behaviors

- Introduction
- Transmission System Operators -TSOs
- Analysis
- Conclusions



Public University

Lectures: 5.860 (99,13% PhD)

Students: 92.064

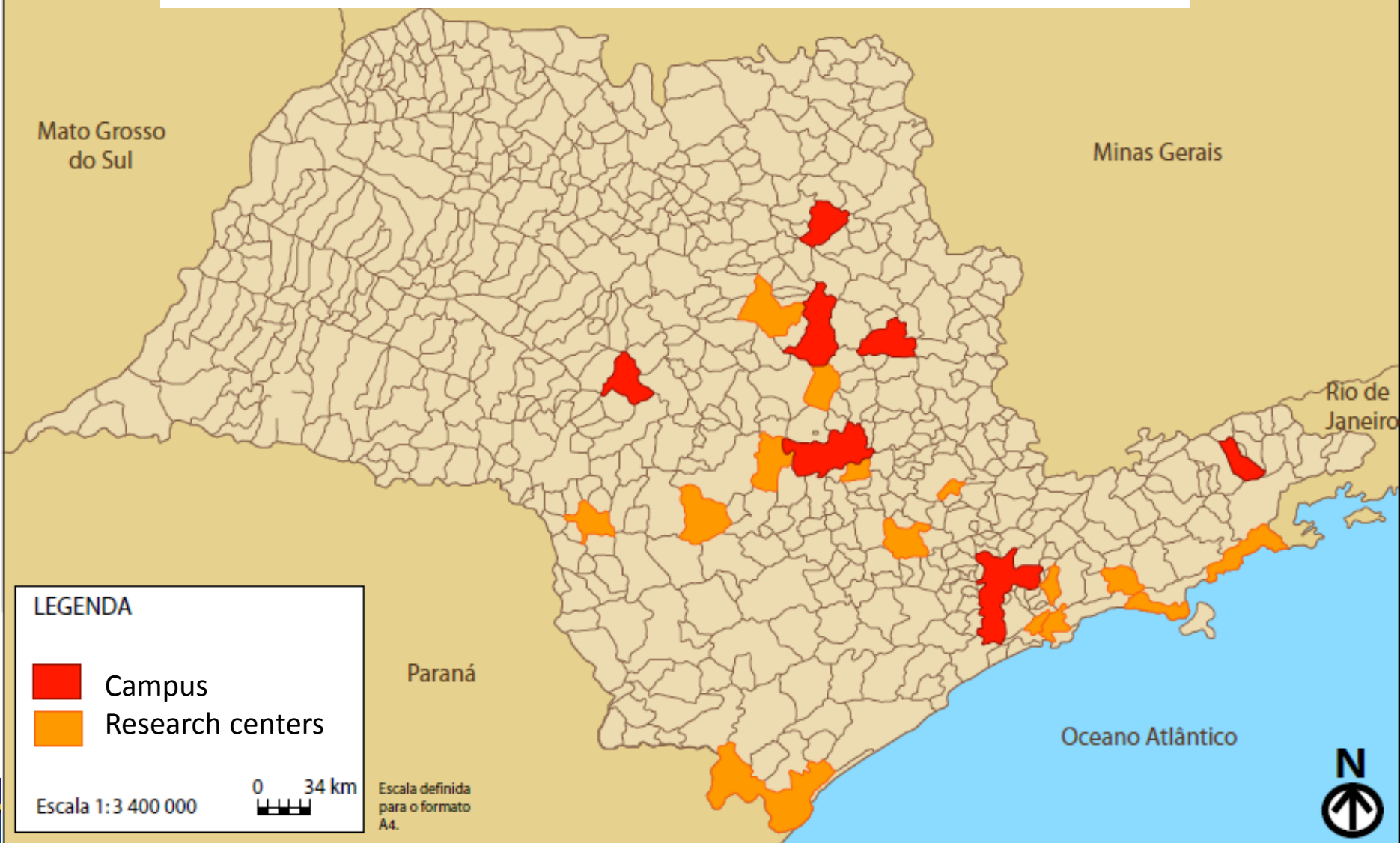
Staff: 16.837

Campus at São Paulo city with 7.5 km<sup>2</sup>  
7 campus inside State of São Paulo



Budget approx. € 1.5 billion

## Geographic distribution of USP In Sao Paulo State



- SCImago Institutions Rankings, **11º** amongst 3,290 international schools
- University Ranking by Academic Performance (URAP) **28º** in the world, and **1º** in Latin America
- *World University Rankings*, ( TimesHigherEducation) **158º** in the world and **1º** in Latin America amongst 70 universities with good reputation in the world







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43. Instituto de Física de São Carlos



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SITE MAP

## Electrical Engineering of the Polytechnic School of the University of São Paulo

Electric Energy and Automation Engineering Department



CULTURE AND EXTENSION

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Defences**

EXTERNAL EVENTS

LOCATION

How to reach the PEA



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portal?

☐ Great

☐ Good



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Página de Apresentação do  
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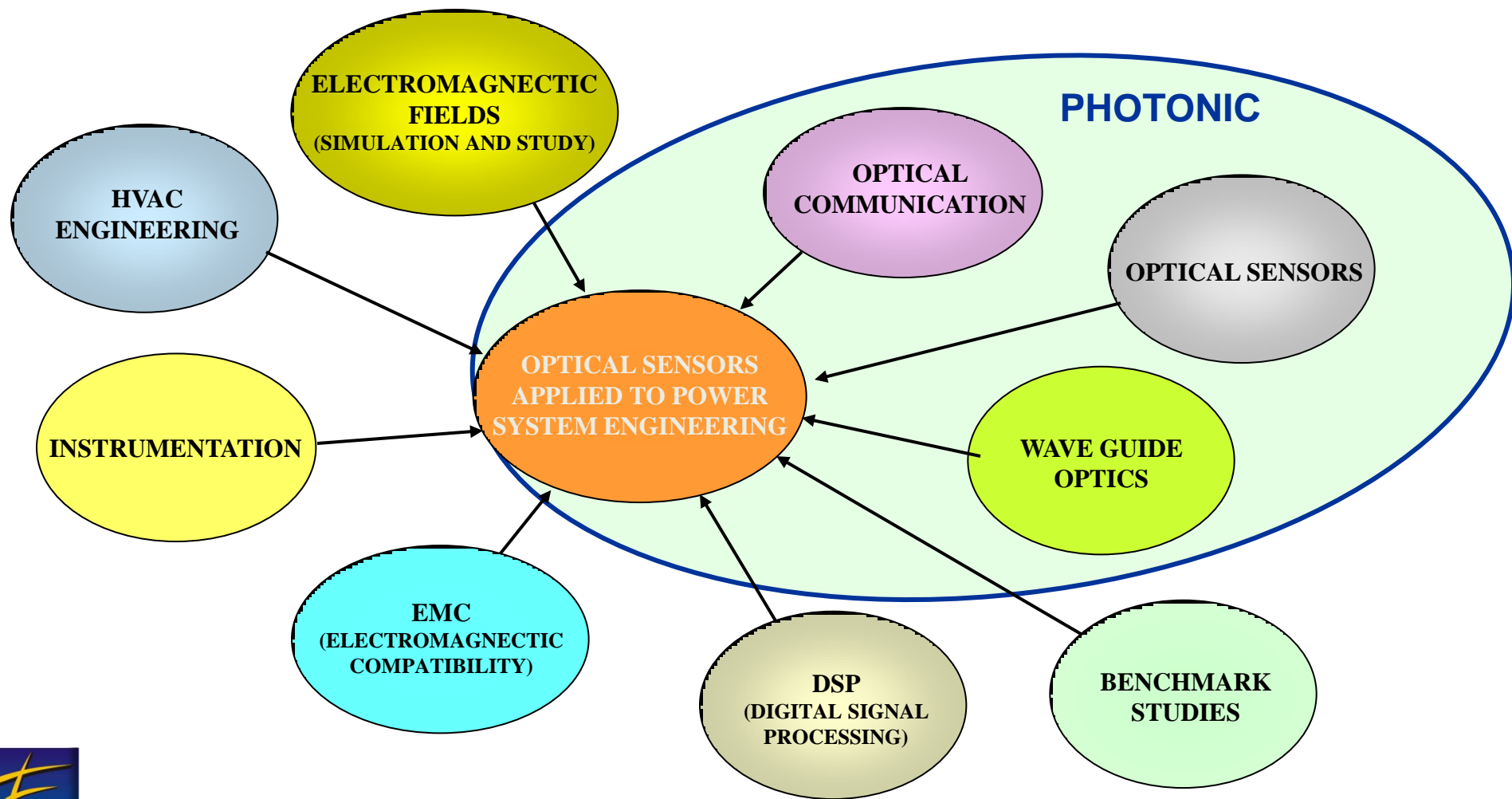




## Laboratory infrastructure

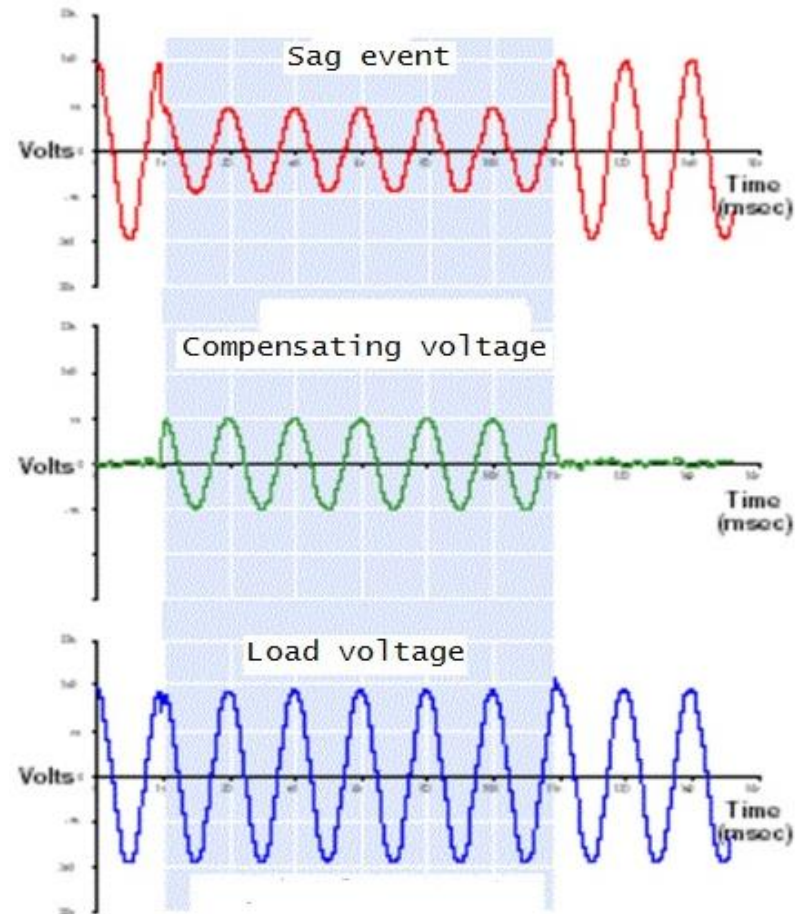
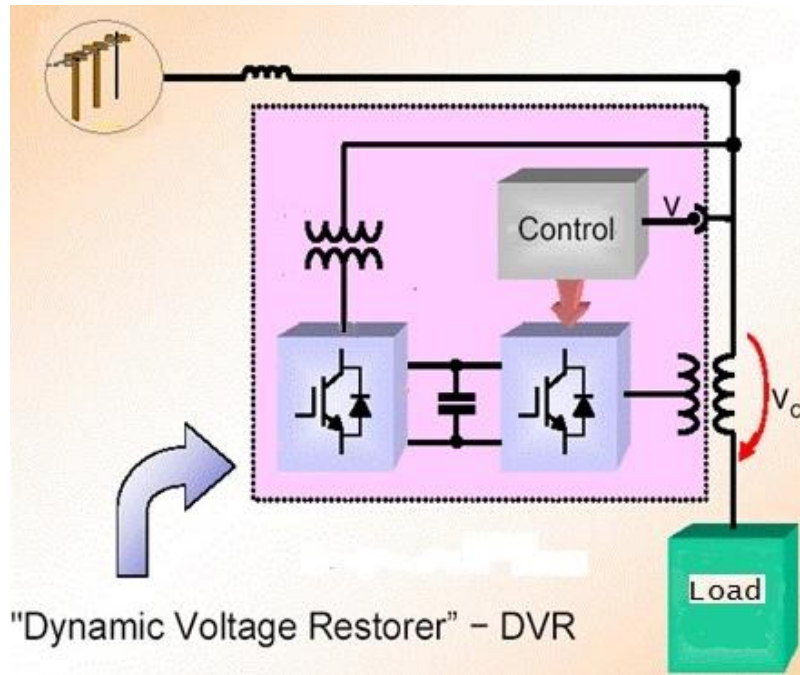
*Hardware infrastructure*





# LEP – Power Electronics Laboratory

## Dynamic Voltage Restorer Operation





## Infrastructure

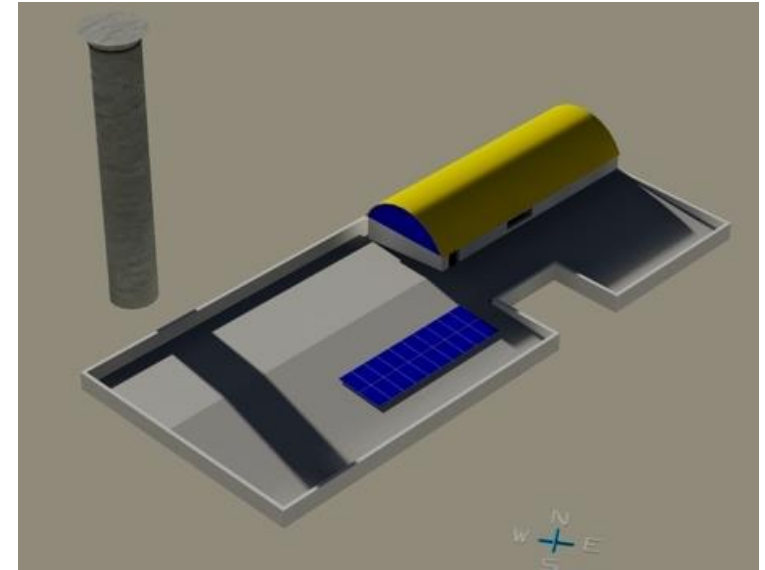
INFRA-ESTRUTURA



Laboratory able for testing and to develop researches in Power Quality and Smart Grid topics such as: metering, distributed generation, micro-generation, telecommunications, IT, etc.



# Solar Power Plant : 5,1 kWp



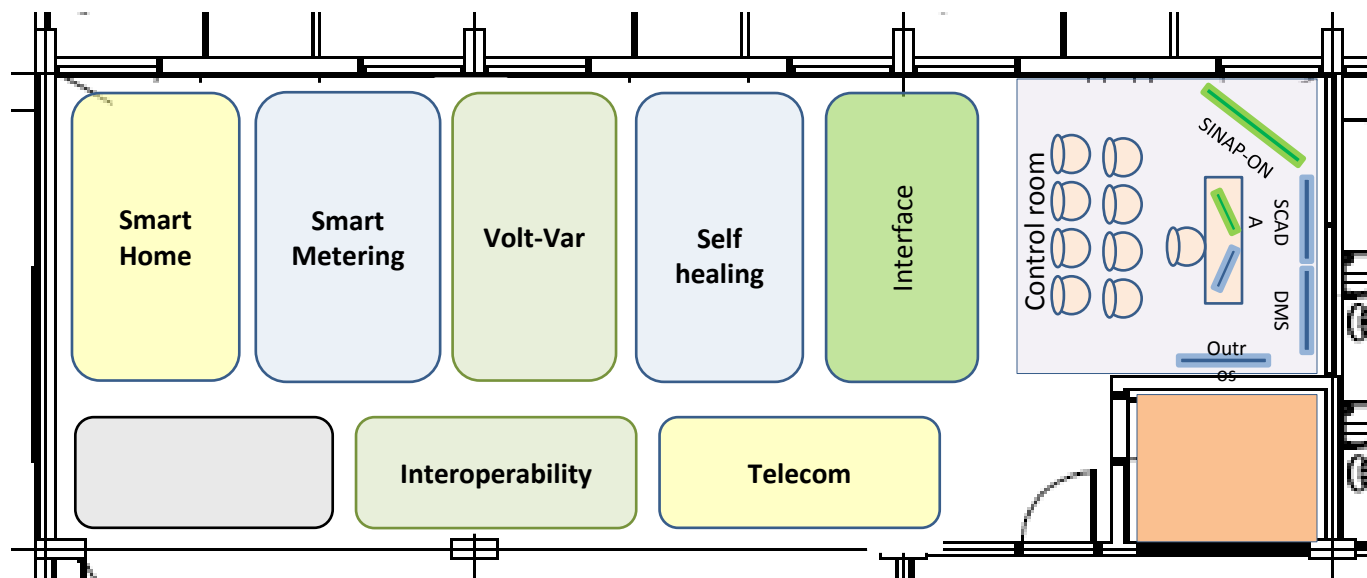
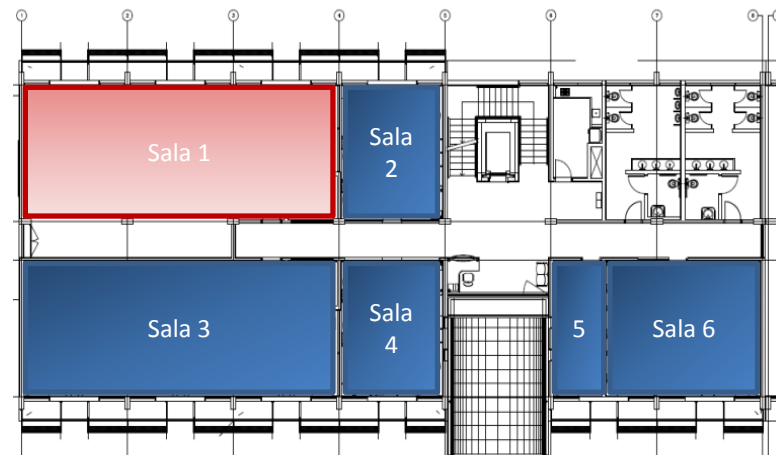


# PQ Power Sources

Distributed generation, energy storage, PQ sources (waveforms, sags)







A vertical flowchart on the left side of the slide, consisting of four white circles connected by a thin green line. Each circle is positioned to the left of a green rectangular box containing text.

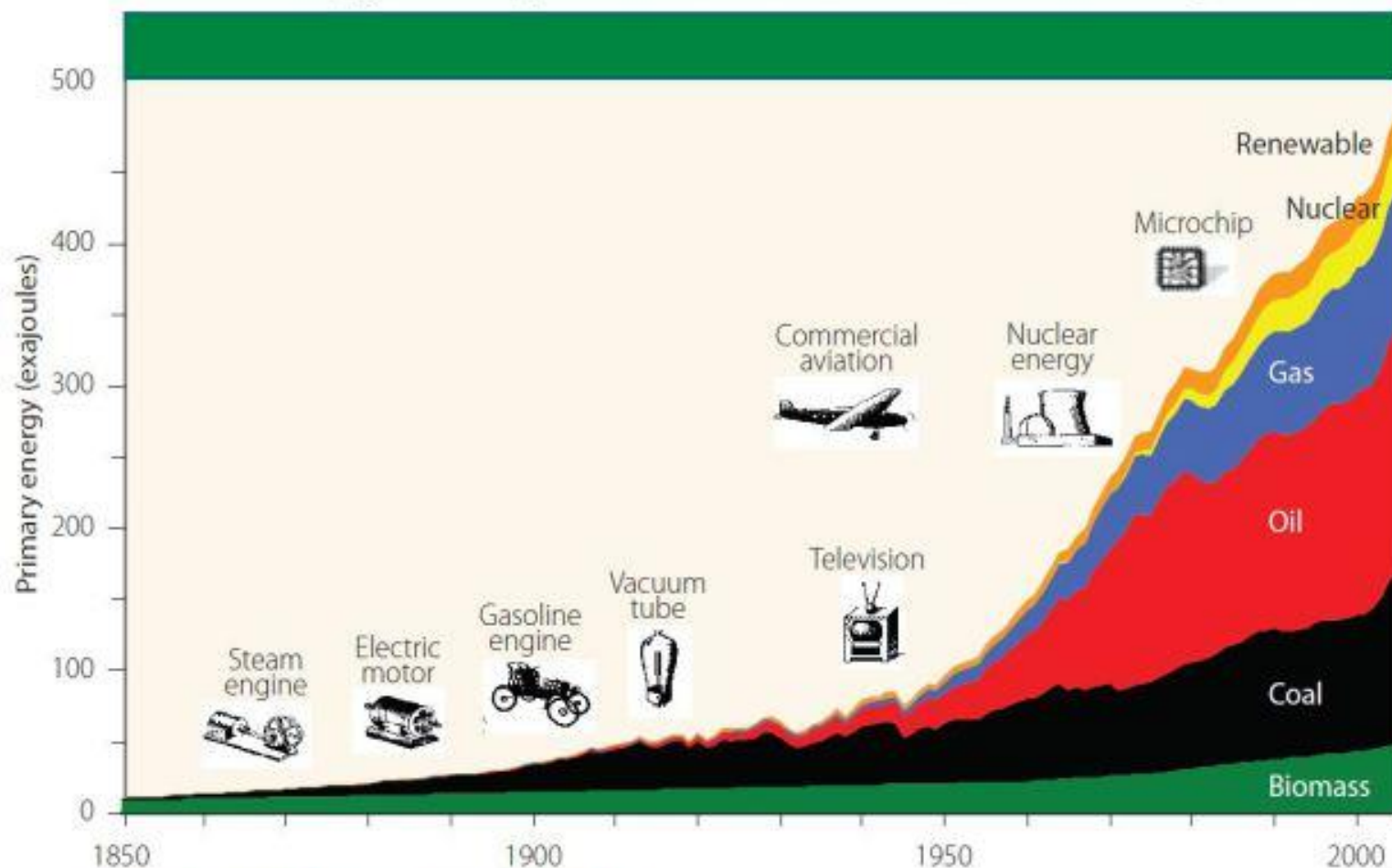
Introduction

The Transmission System Operators -TSO

Analysis of the impact of FIFA 2014

Conclusions

Rise in energy consumption since the first industrial revolution, 1850-2000



Source: United Nations (2009), figure II.4.



Worldwide demand:

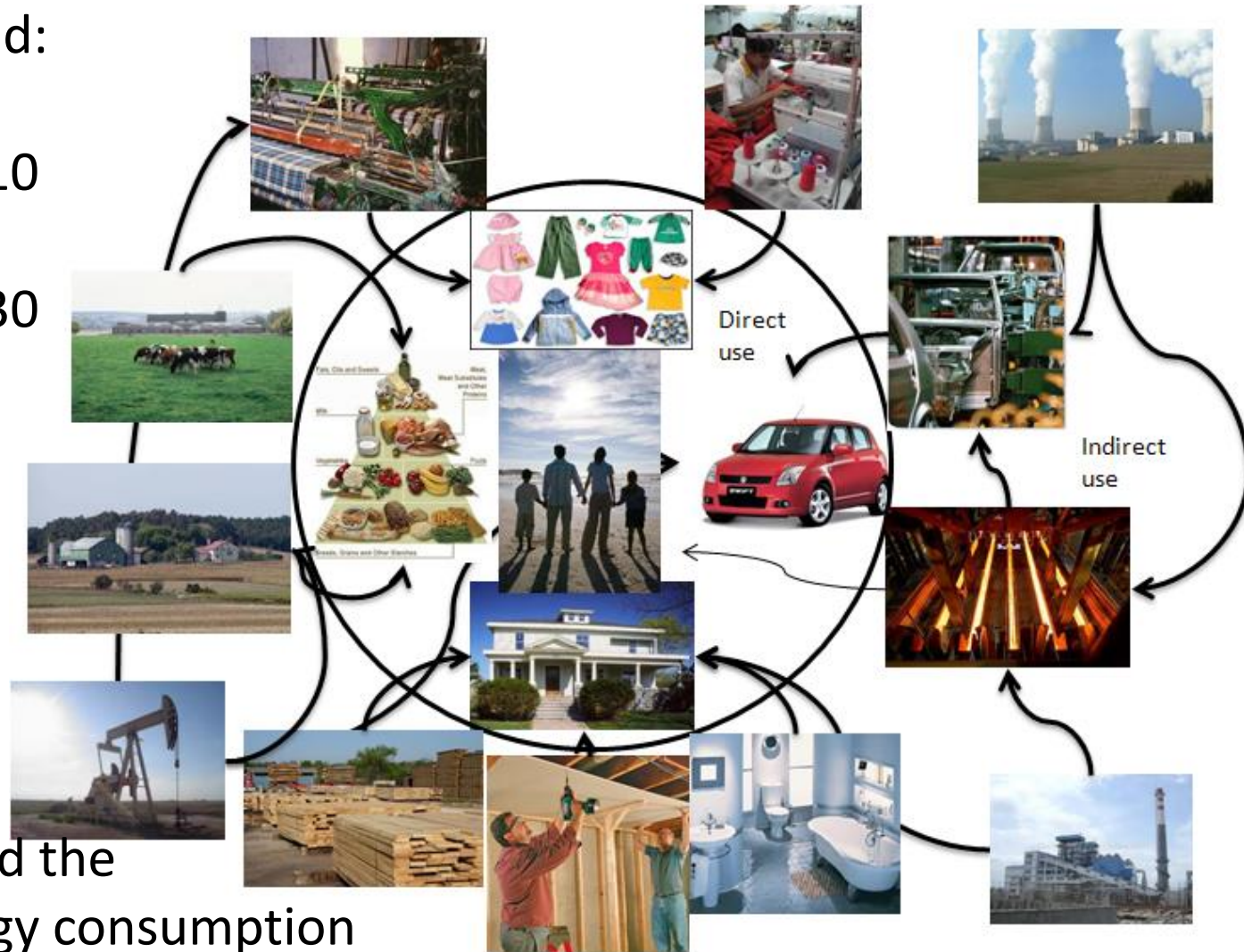
21,000 TWh in 2010

33,300 TWh in 2030

60%



Better understand the  
behavior of energy consumption





Brazil, France , Germany  
and Portugal



A vertical sequence of four green rectangular bars, each containing a white circle on its left side. The circles are connected by a thin green line, creating a staircase-like effect. The text for each bar is as follows:

Introduction

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- ONS (Brazil)
- 50Hertz (Germany)
- RTE (France)
- REN (Portugal).

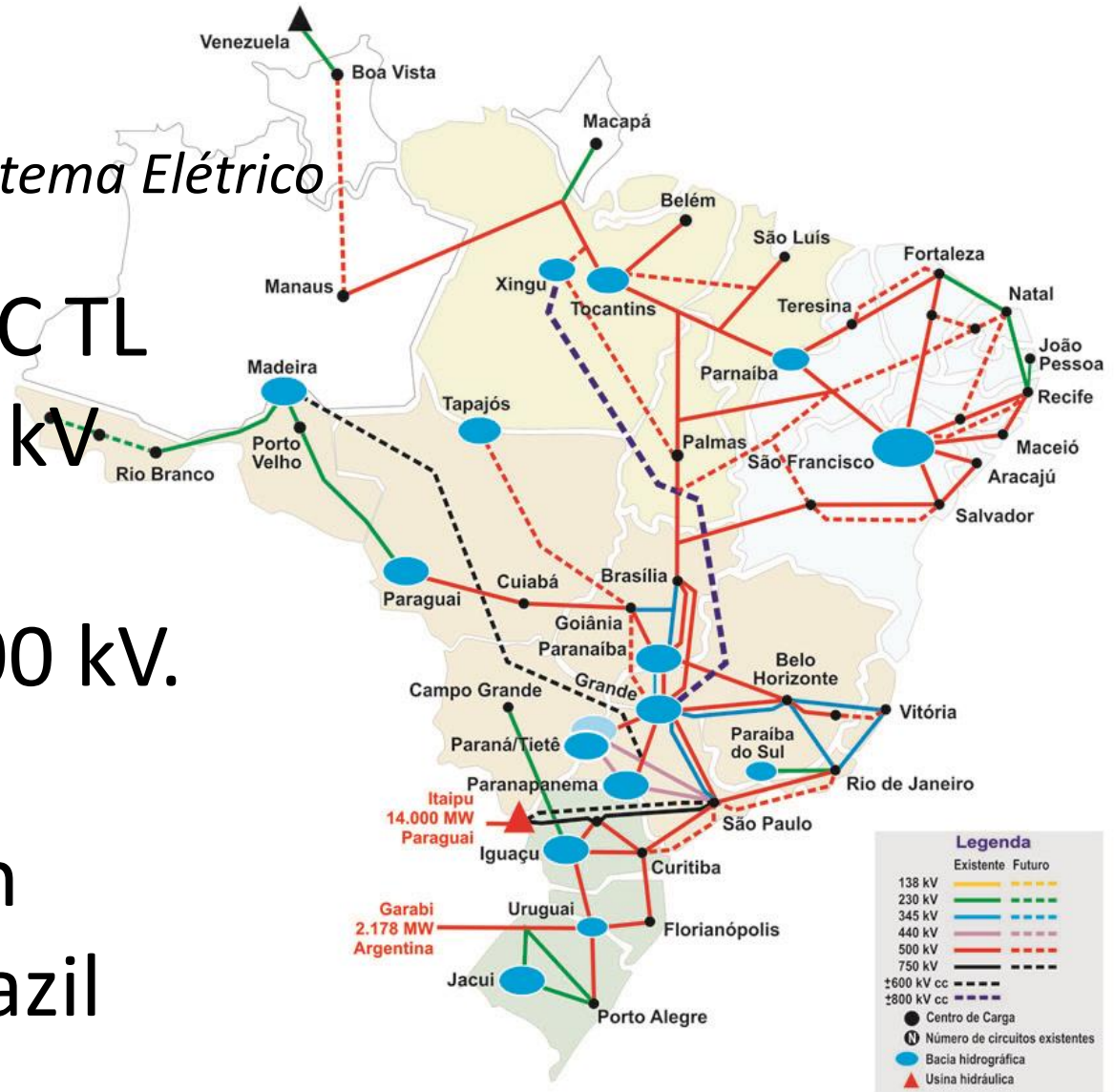
## ONS

*Operador Nacional do Sistema Elétrico*

100,000 km of AC TL  
from 230 to 750 kV

DC TL in 600 - 800 kV.

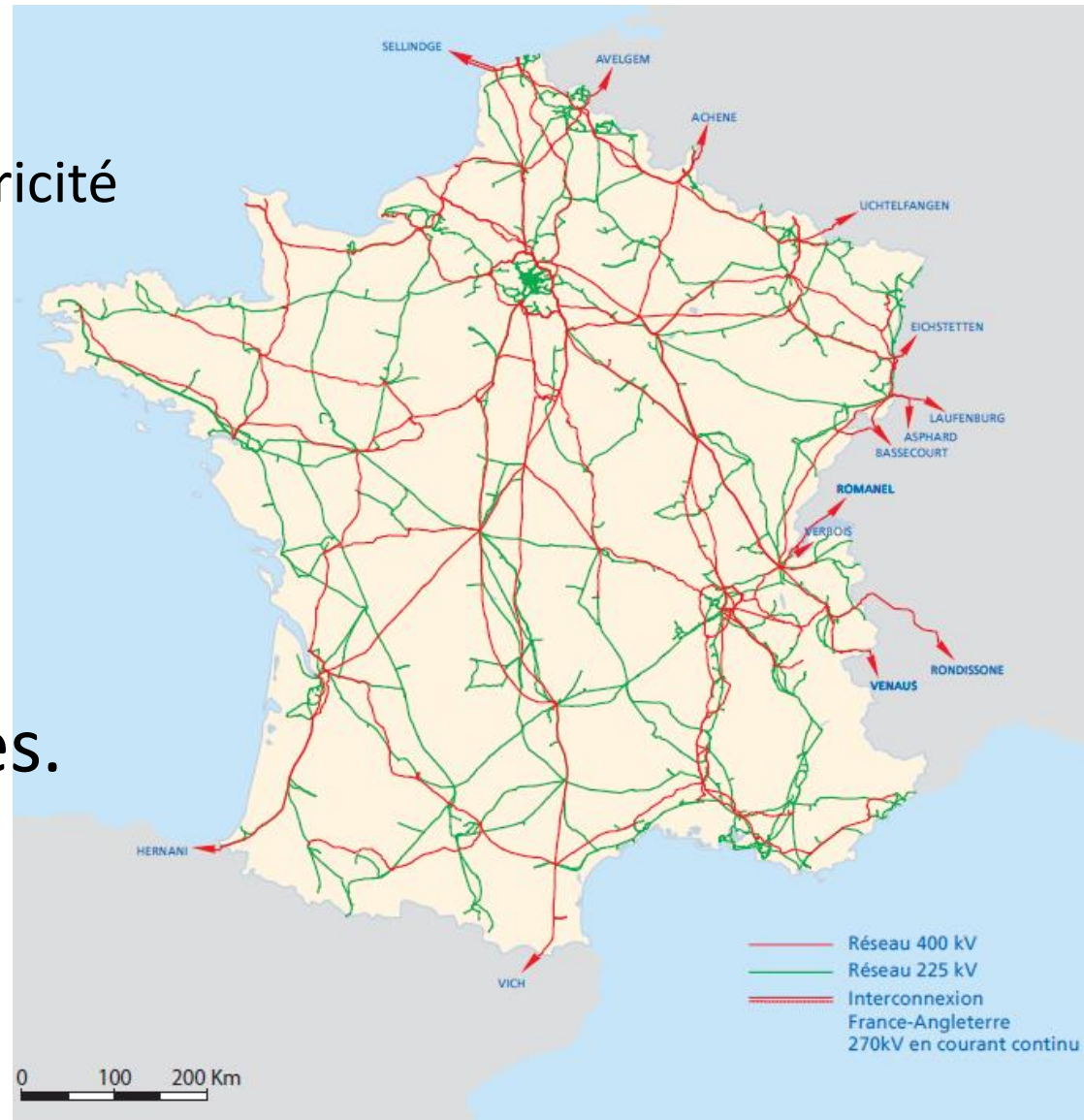
108 transmission  
companies in Brazil



## RTE

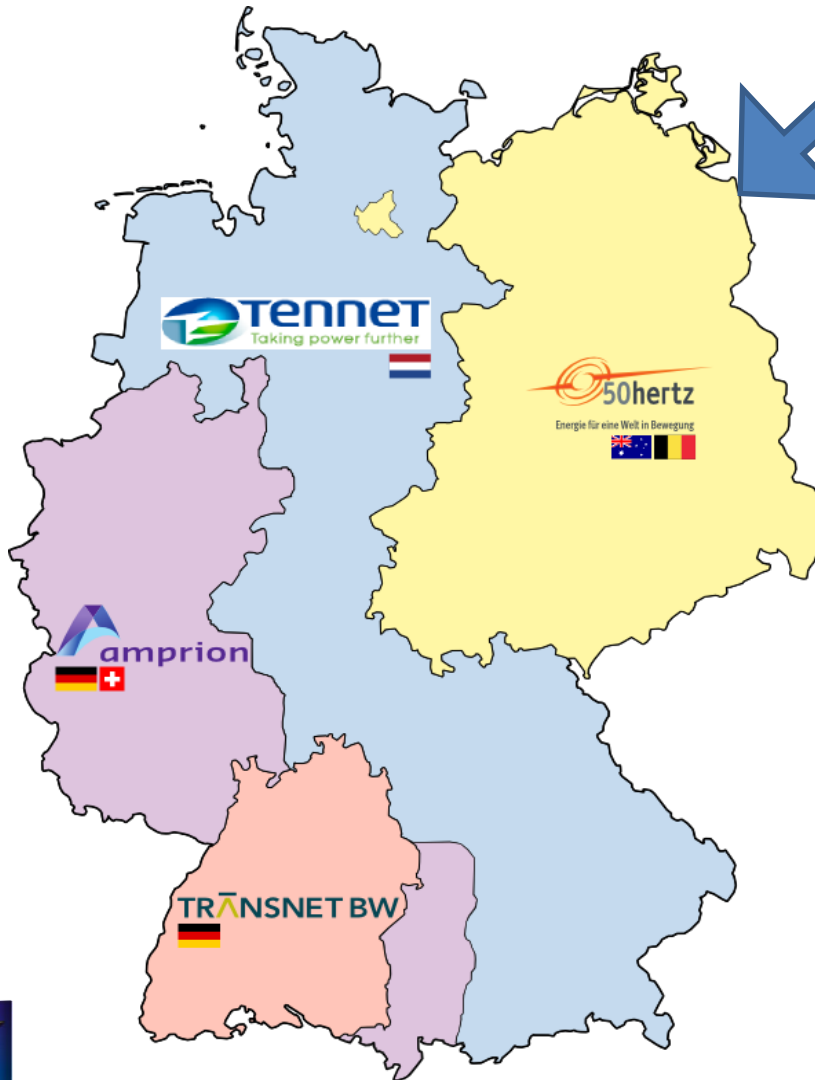
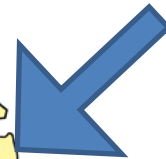
Réseau de Transport d'Electricité

- Lines: 100,000 km
- 63 to 400 kV
- 45 cross-border lines.





**50 Hz**



Lines: 10,000 km -> 380/220 kV  
Distance Berlin → Rio de Janeiro.

Supplies 18 million customers

40% wind power installed in Germany.

The total energy production in 2013 was 629 TWh

Redes Energéticas Nacionais  
Natural gas  
Generation – sea waves  
telecommunication

- Lines: 8,733 km
- 150 to 400 kV



A vertical diagram on the left side of the slide shows four white circles connected by a green line, representing the structure of the content paper. Each circle is positioned to the left of a corresponding green rectangular box containing text.

Introduction

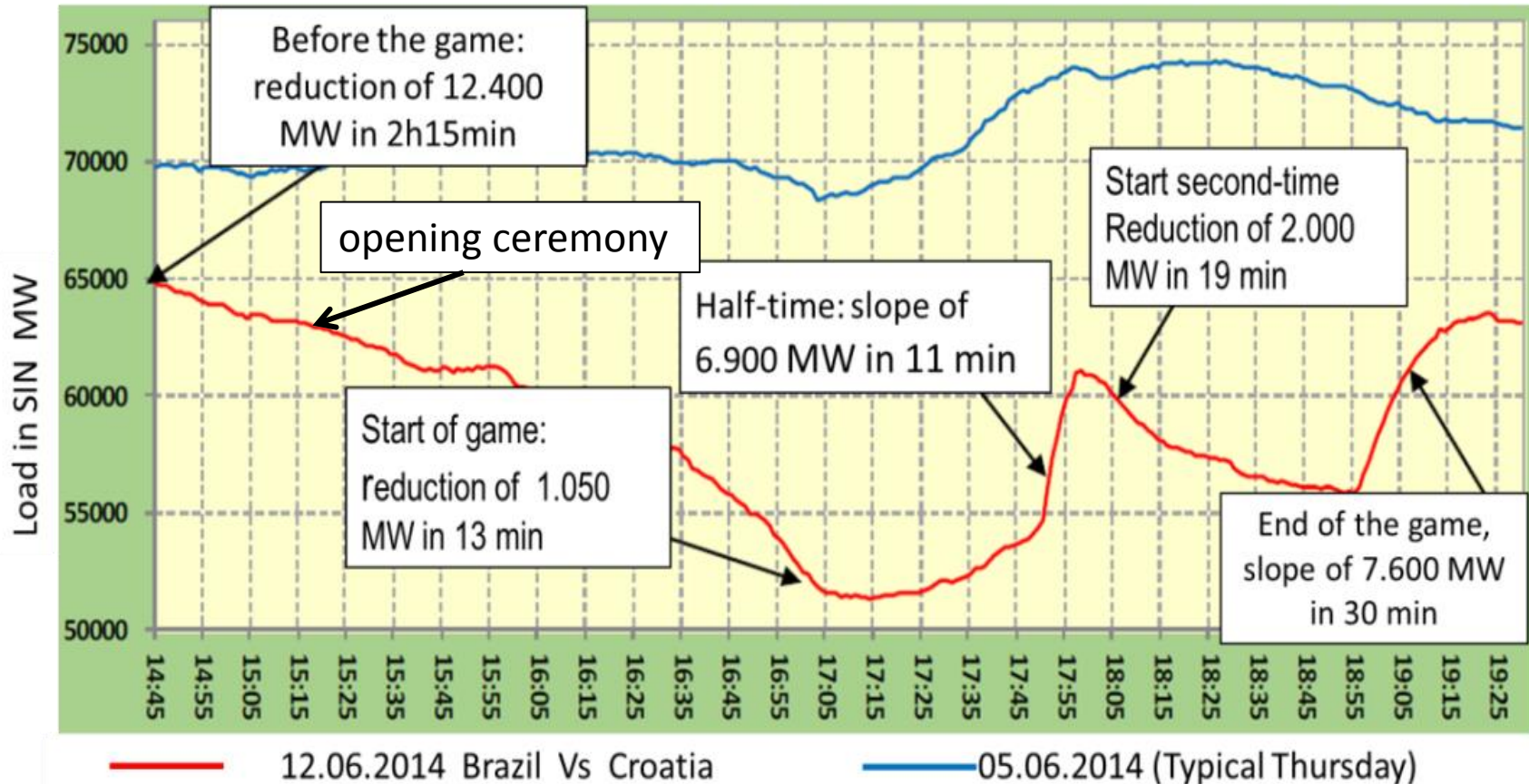
The Transmission System Operators -TSO

Analysis of the impact of FIFA 2014

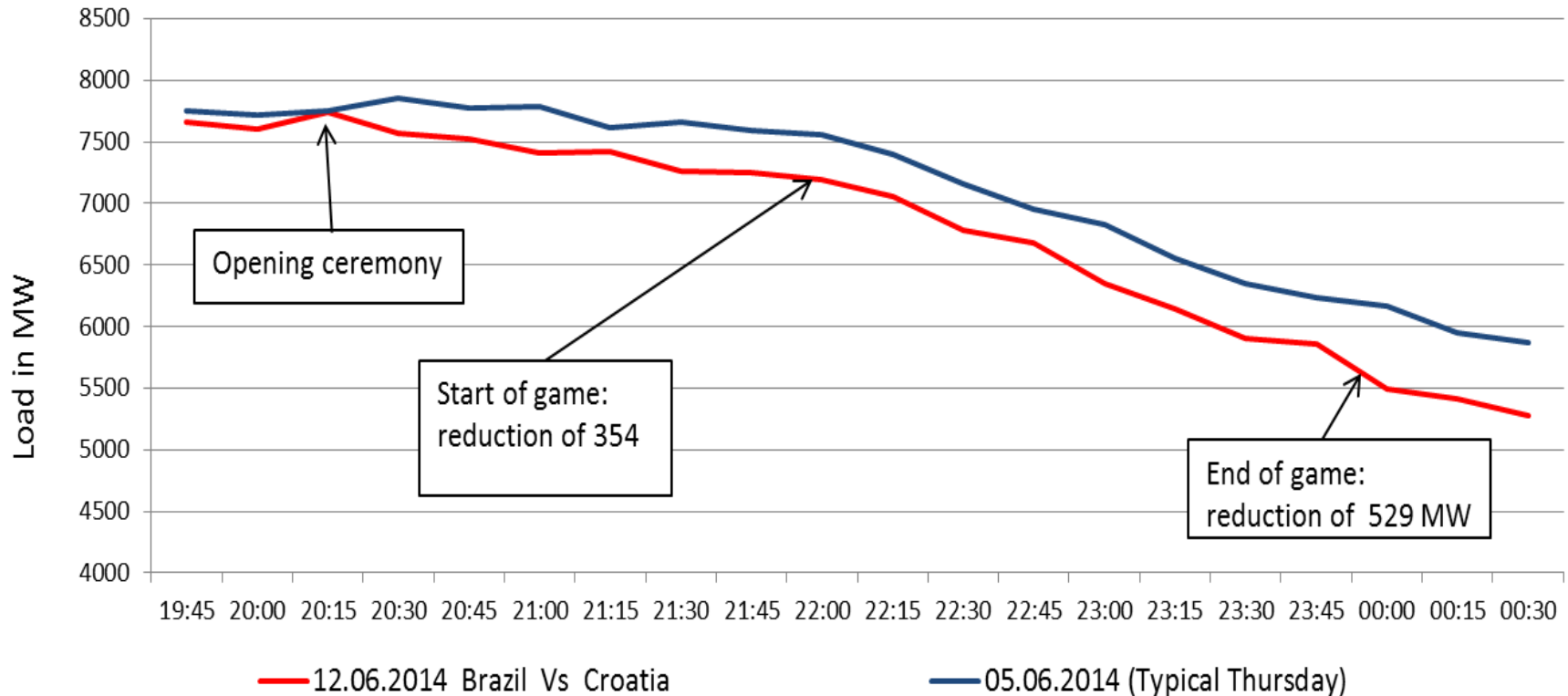
Conclusions



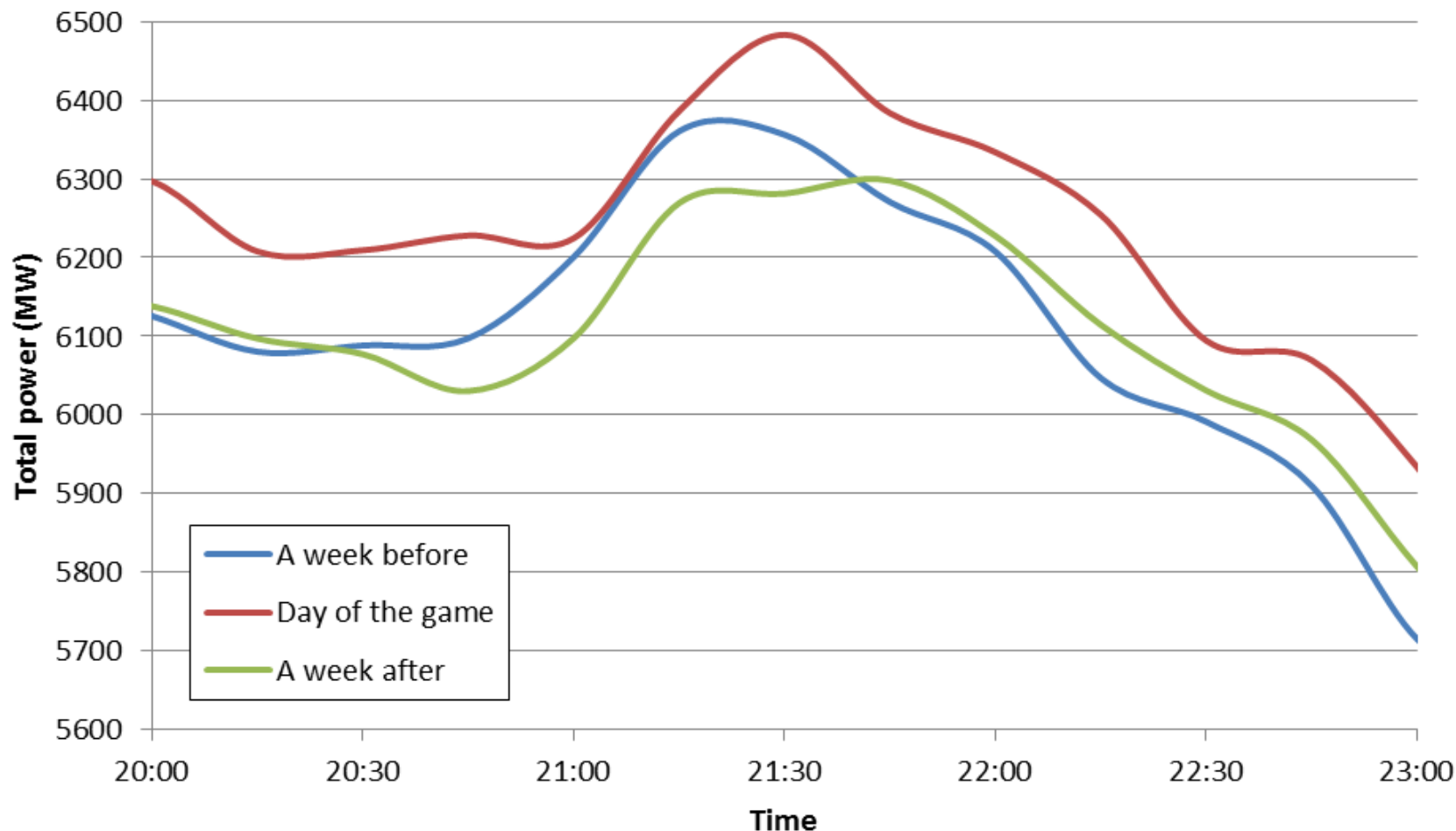
## In Brazil



## In Germany

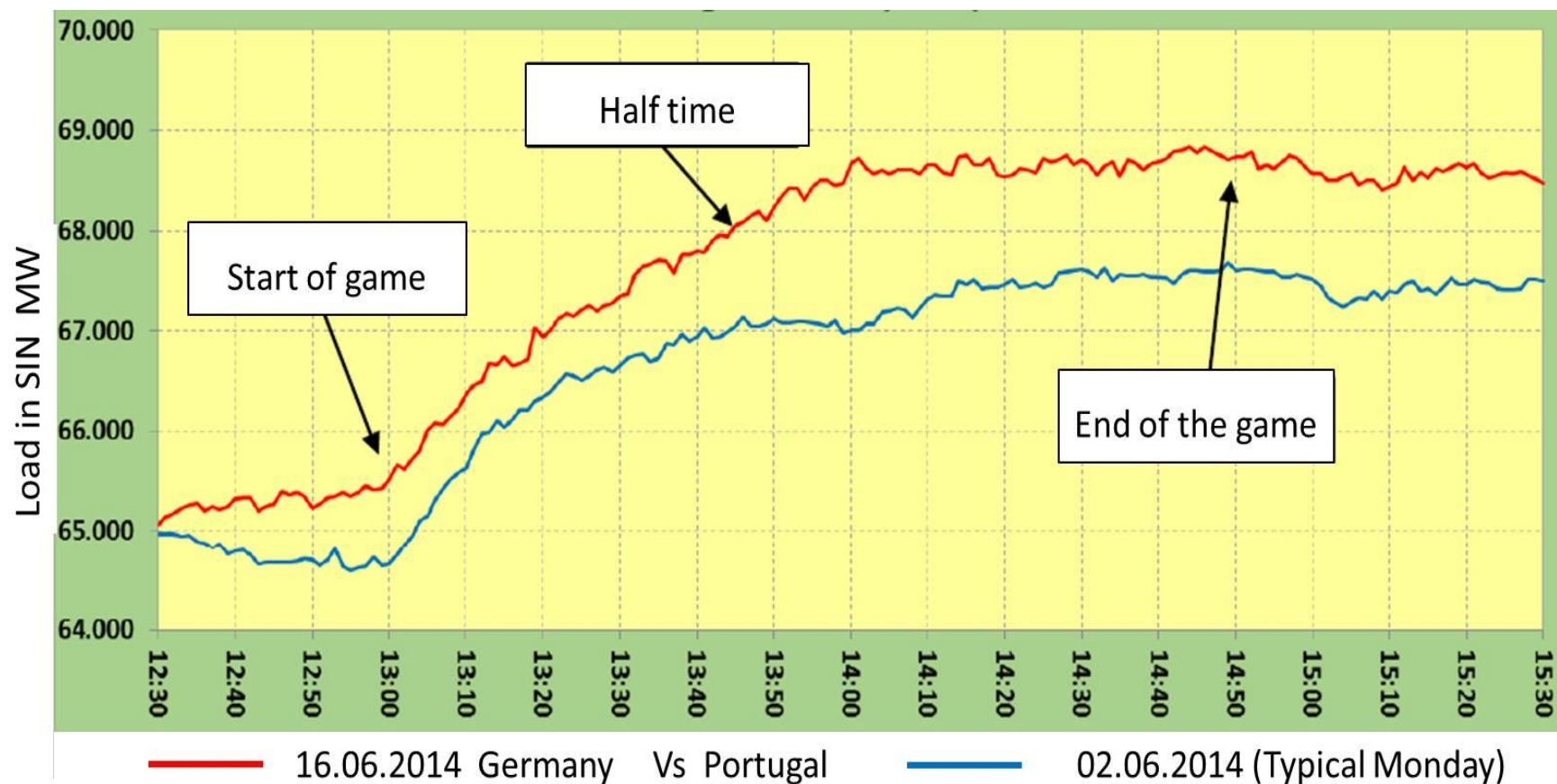


## In Portugal

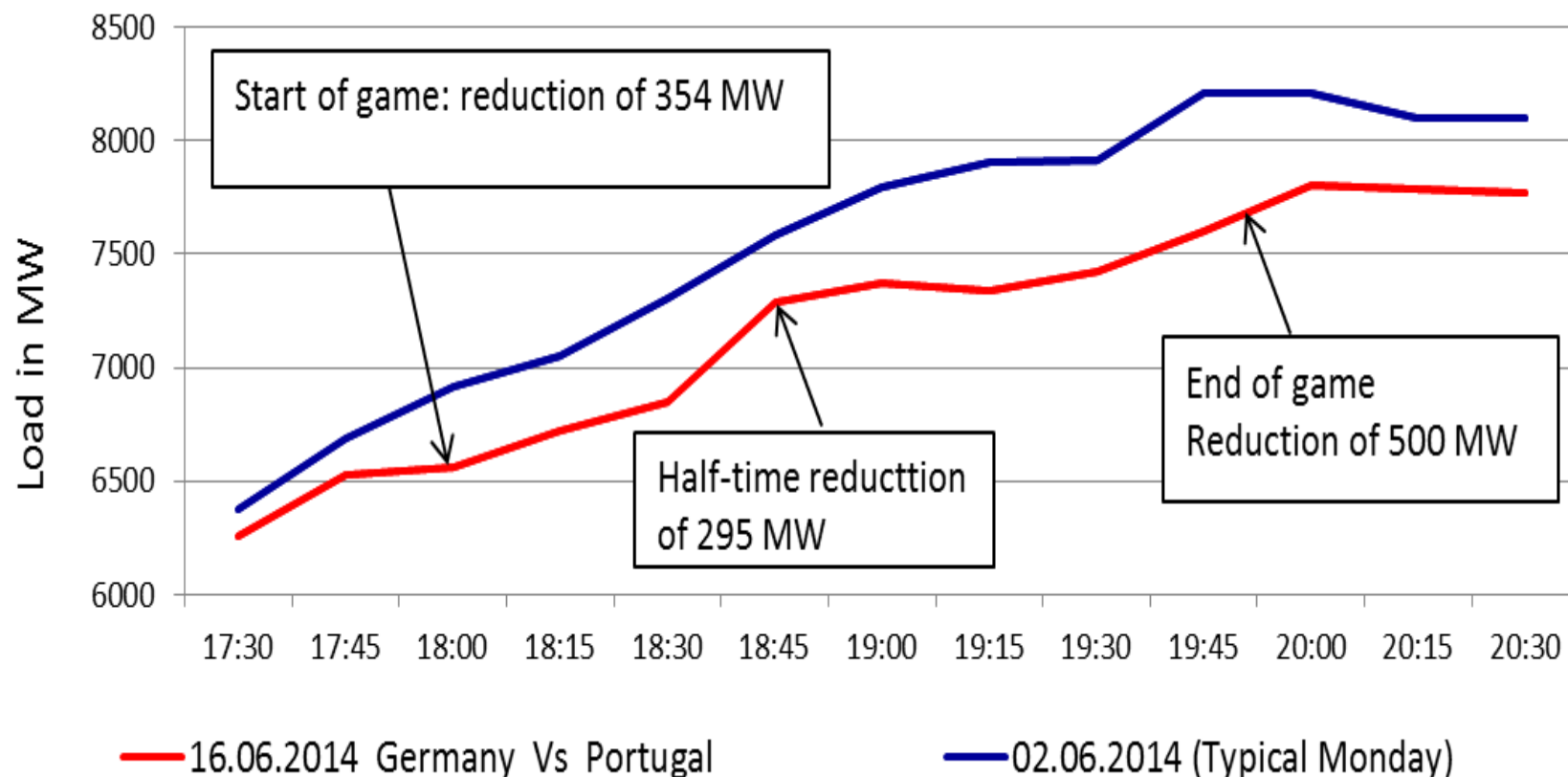




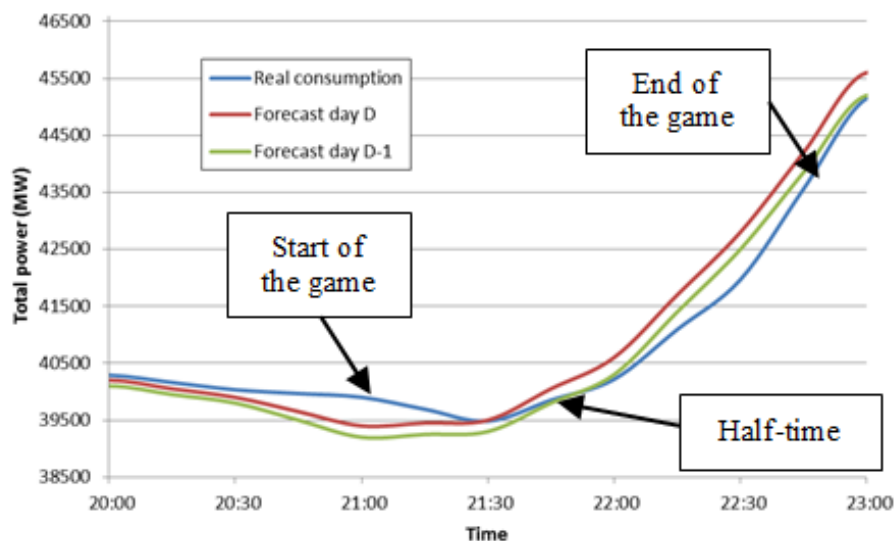
## In Brazil



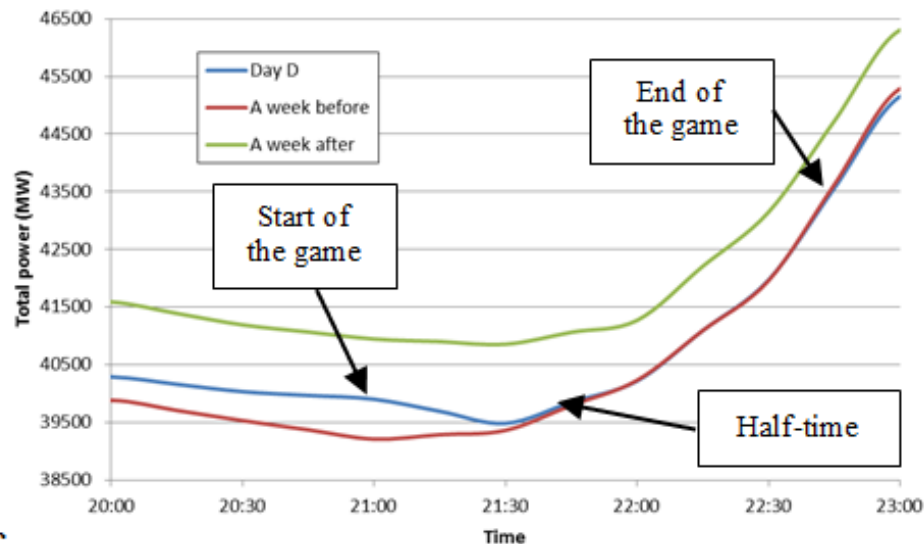
## In Germany



## In France

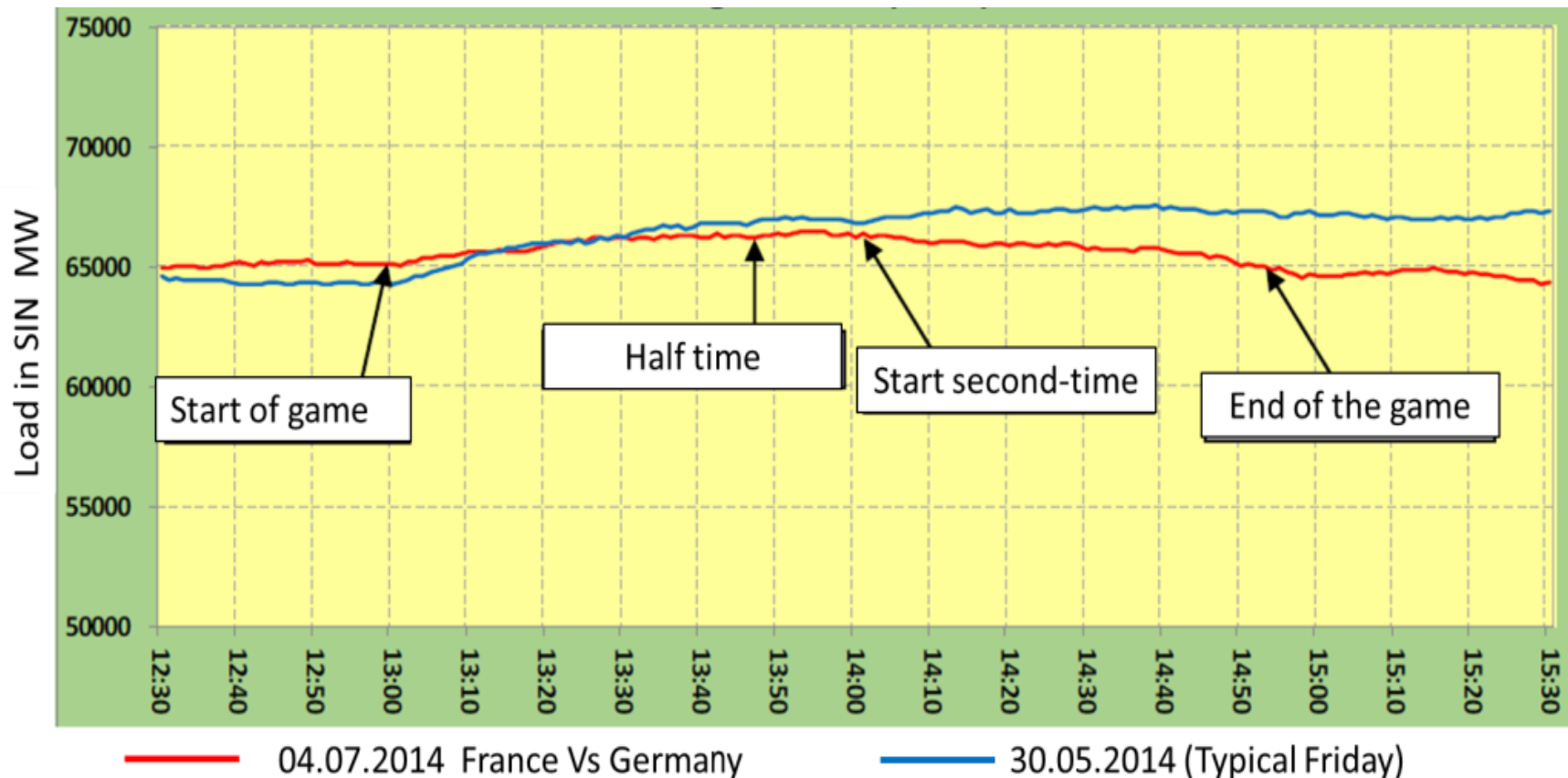


C

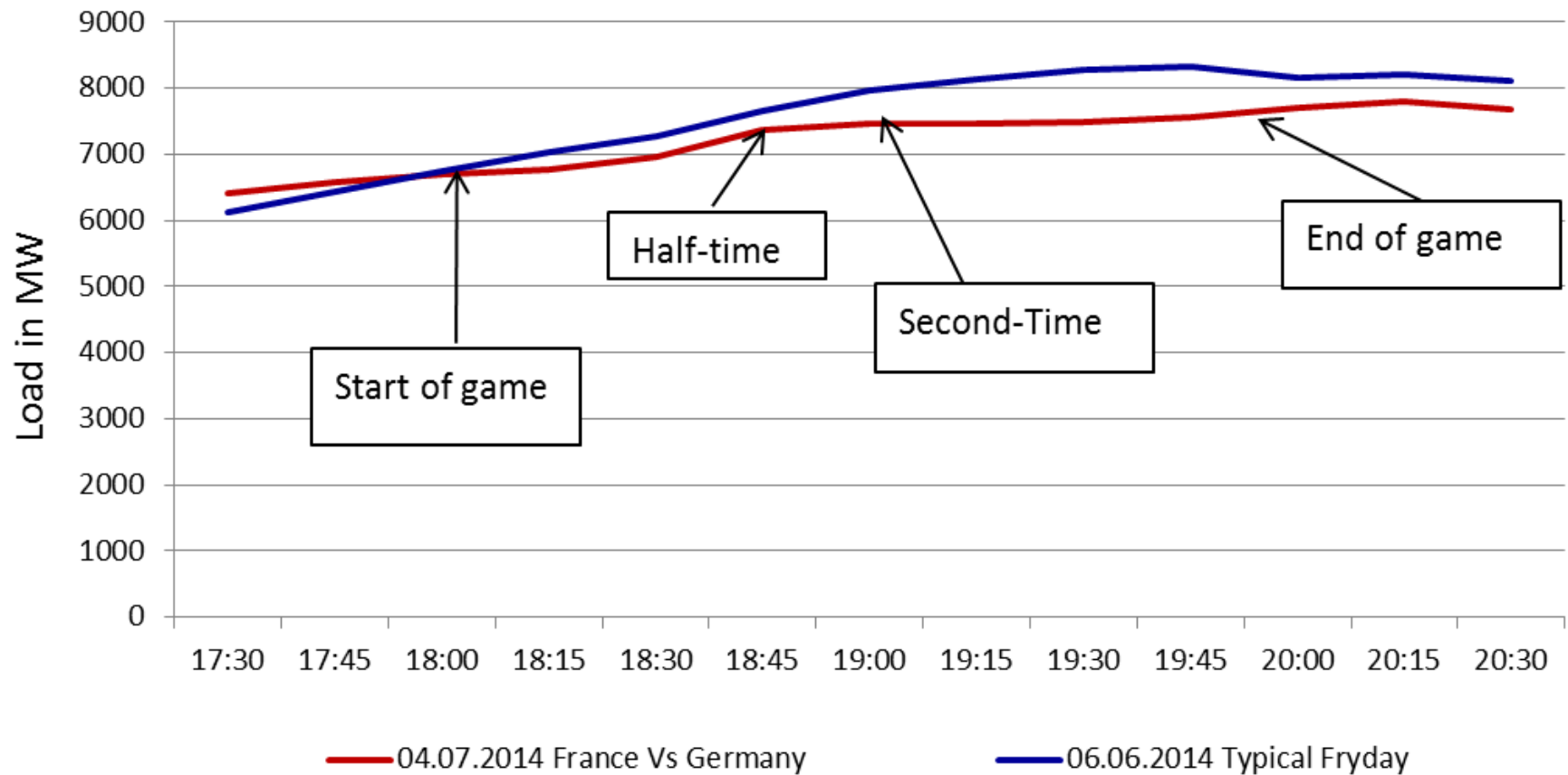




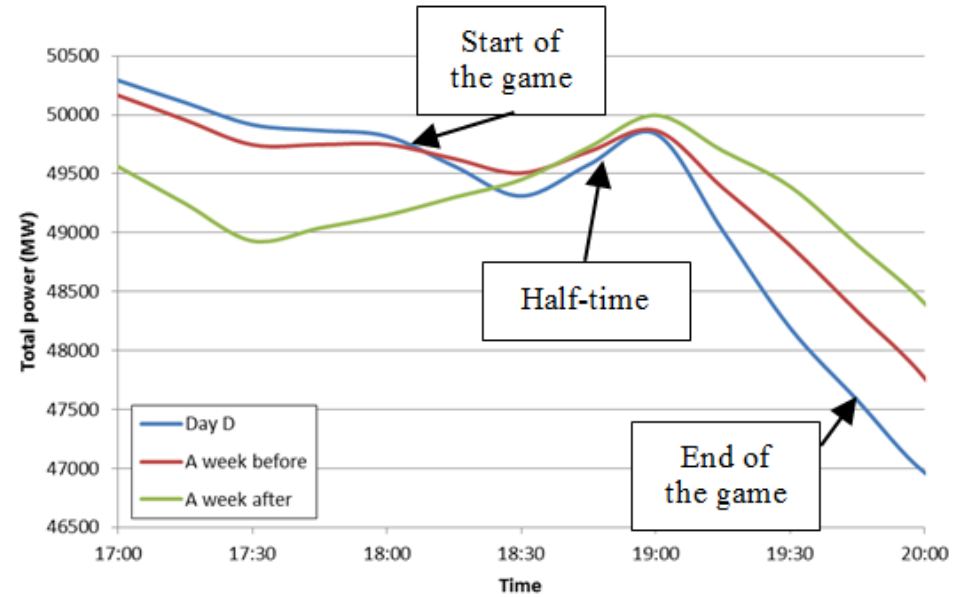
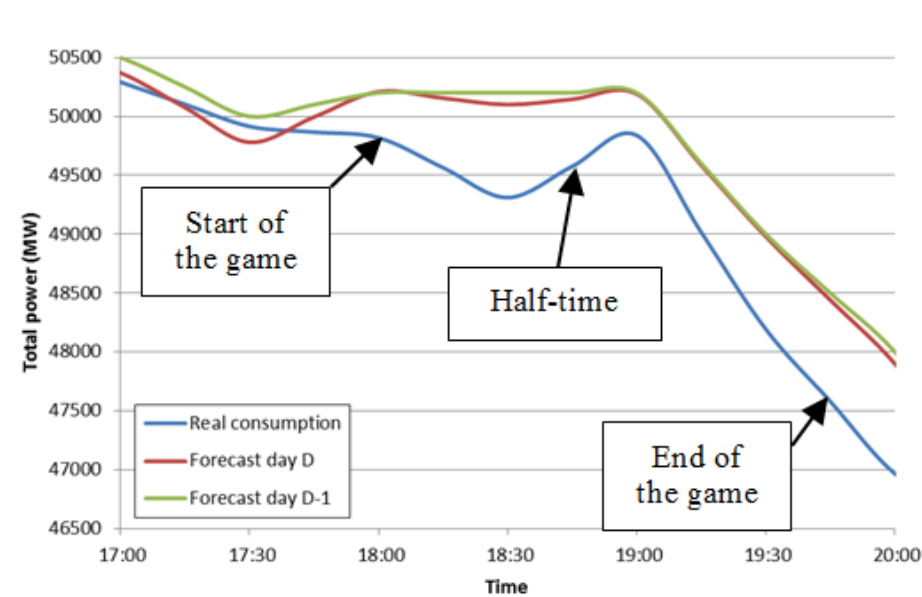
## In Brazil



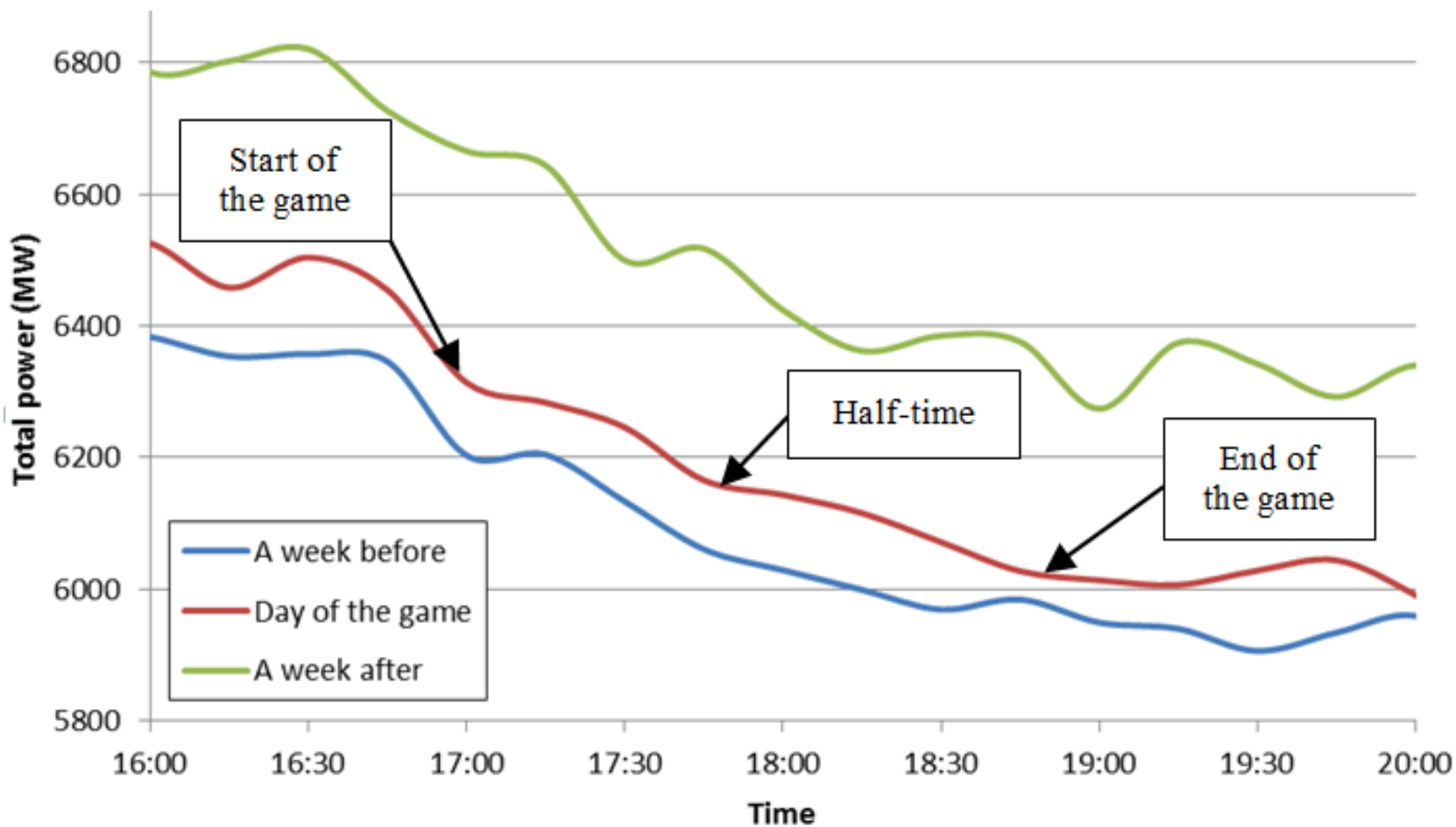
## In Germany



## In France

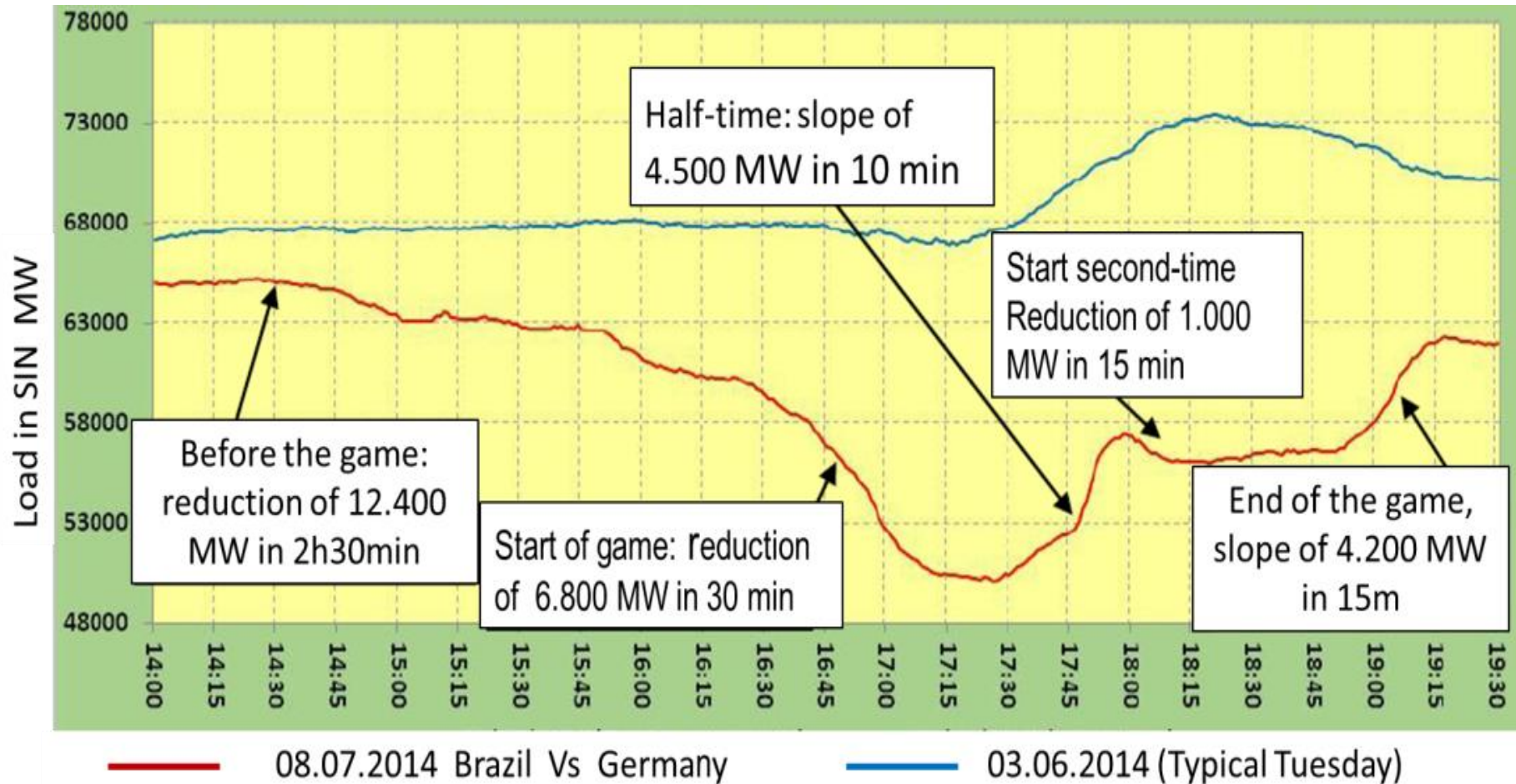


## In Portugal

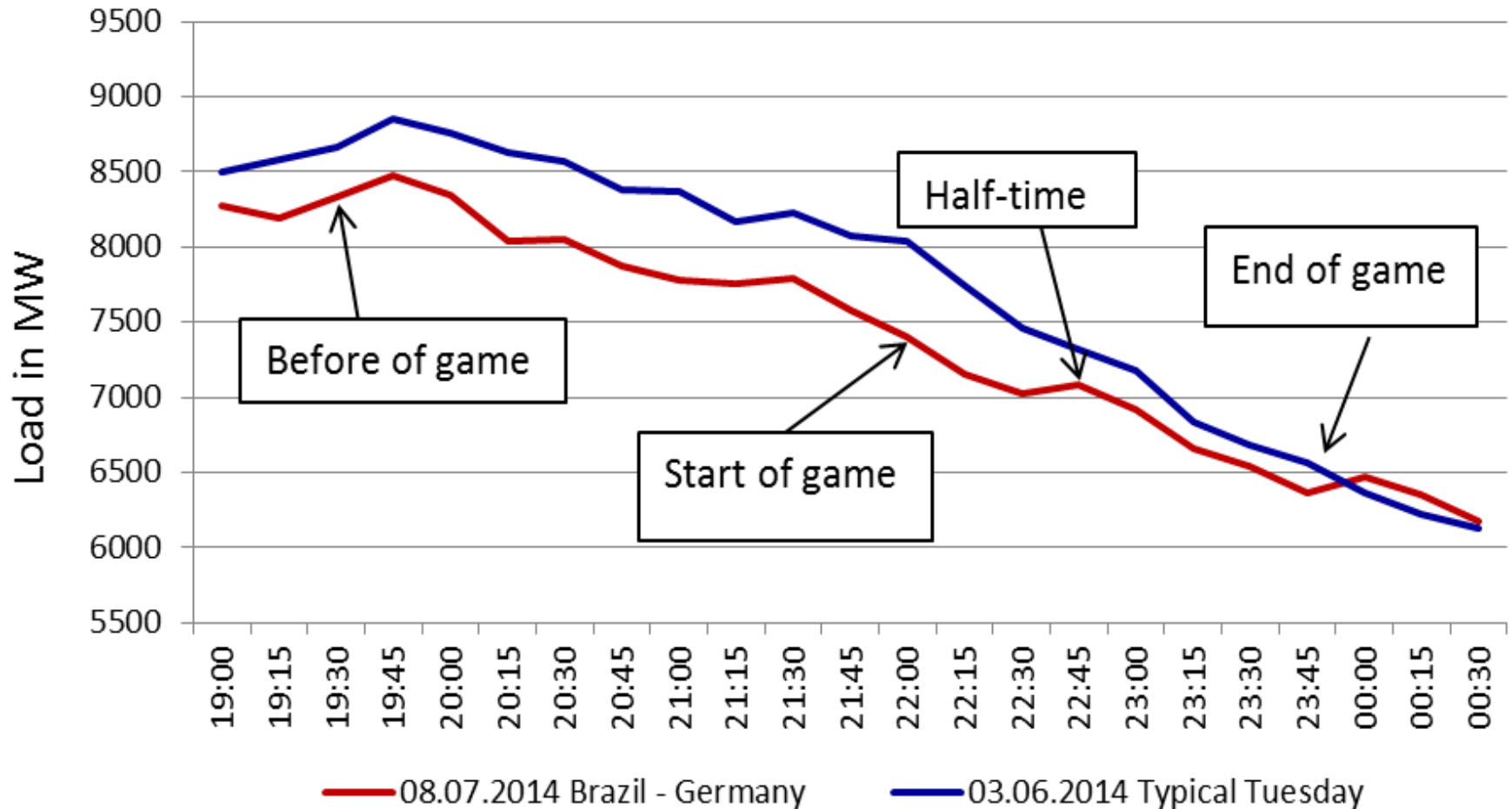




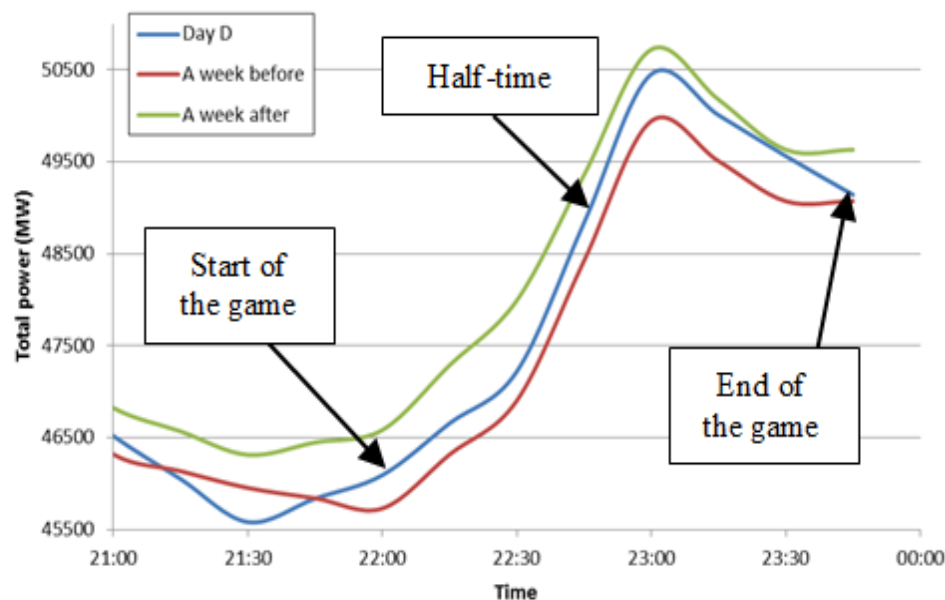
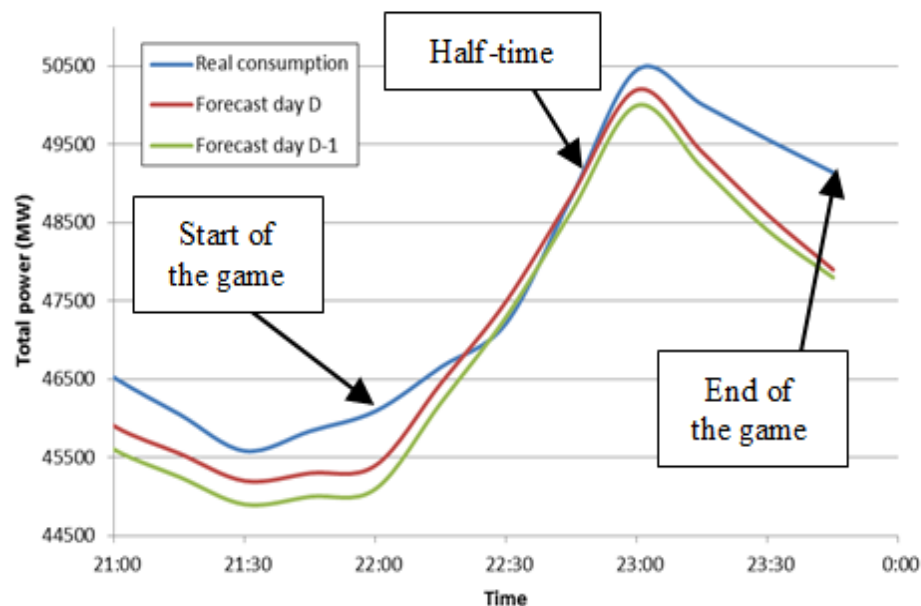
## In Brazil



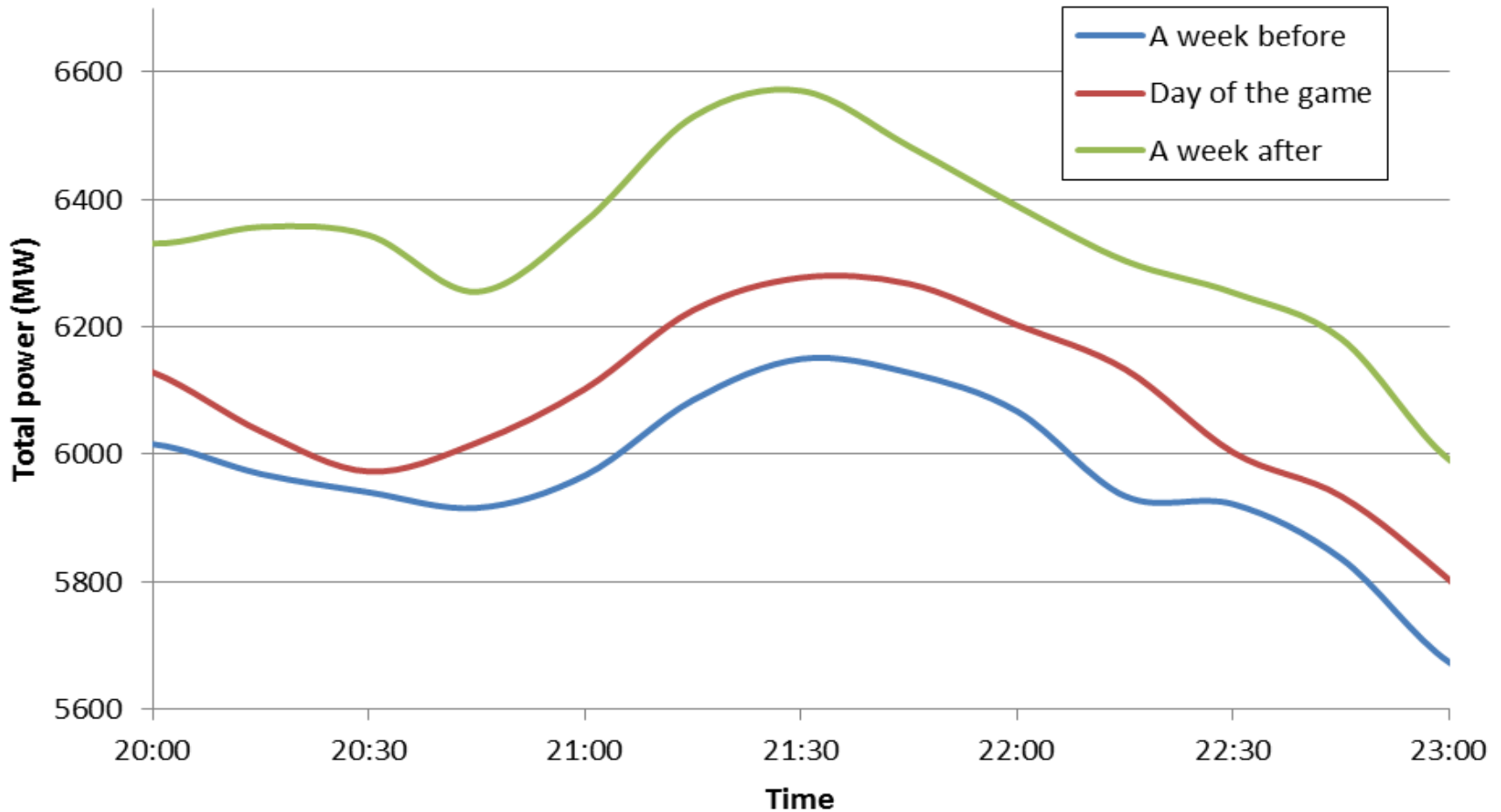
## In Germany



## In France

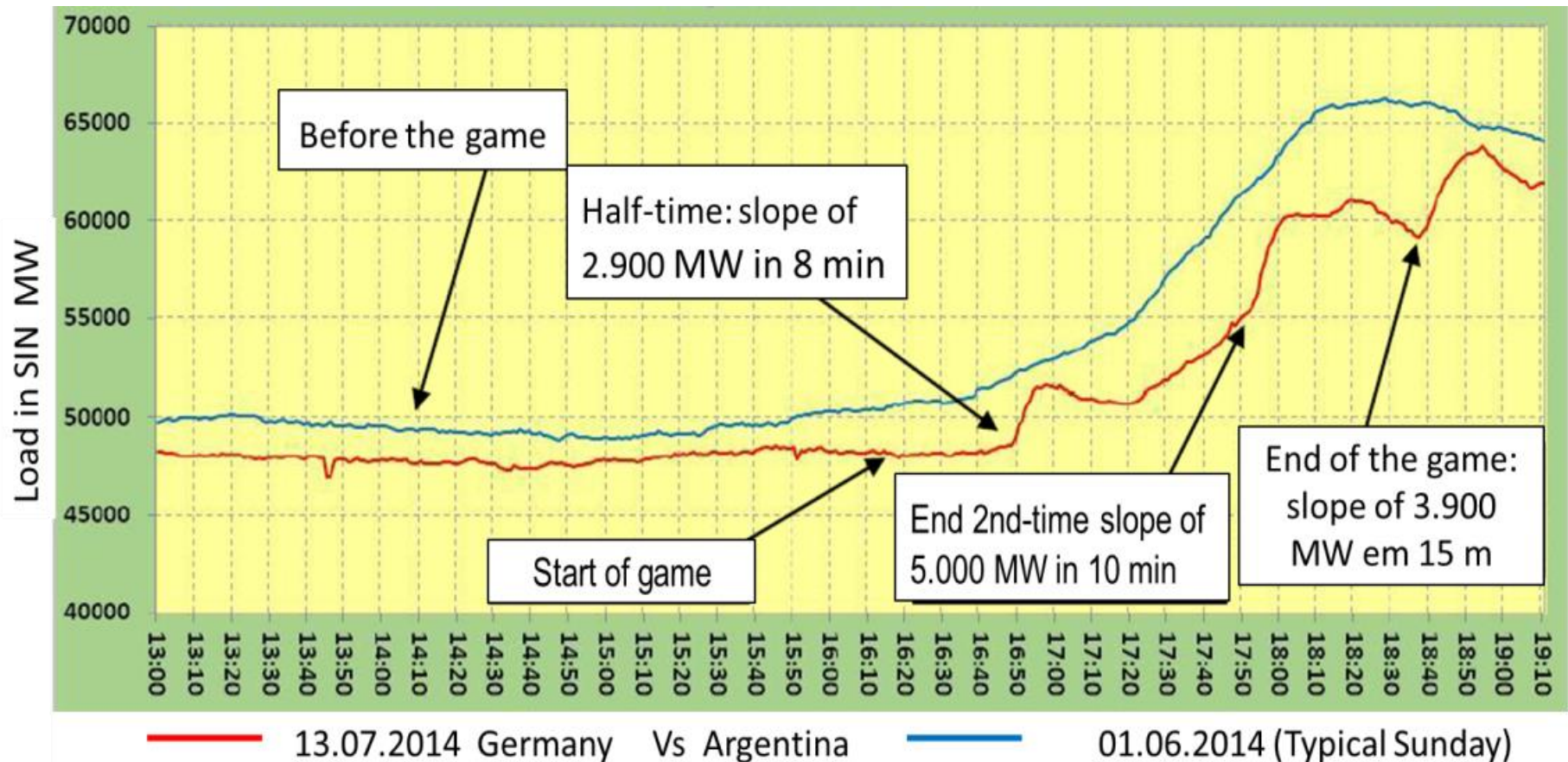


## In Portugal

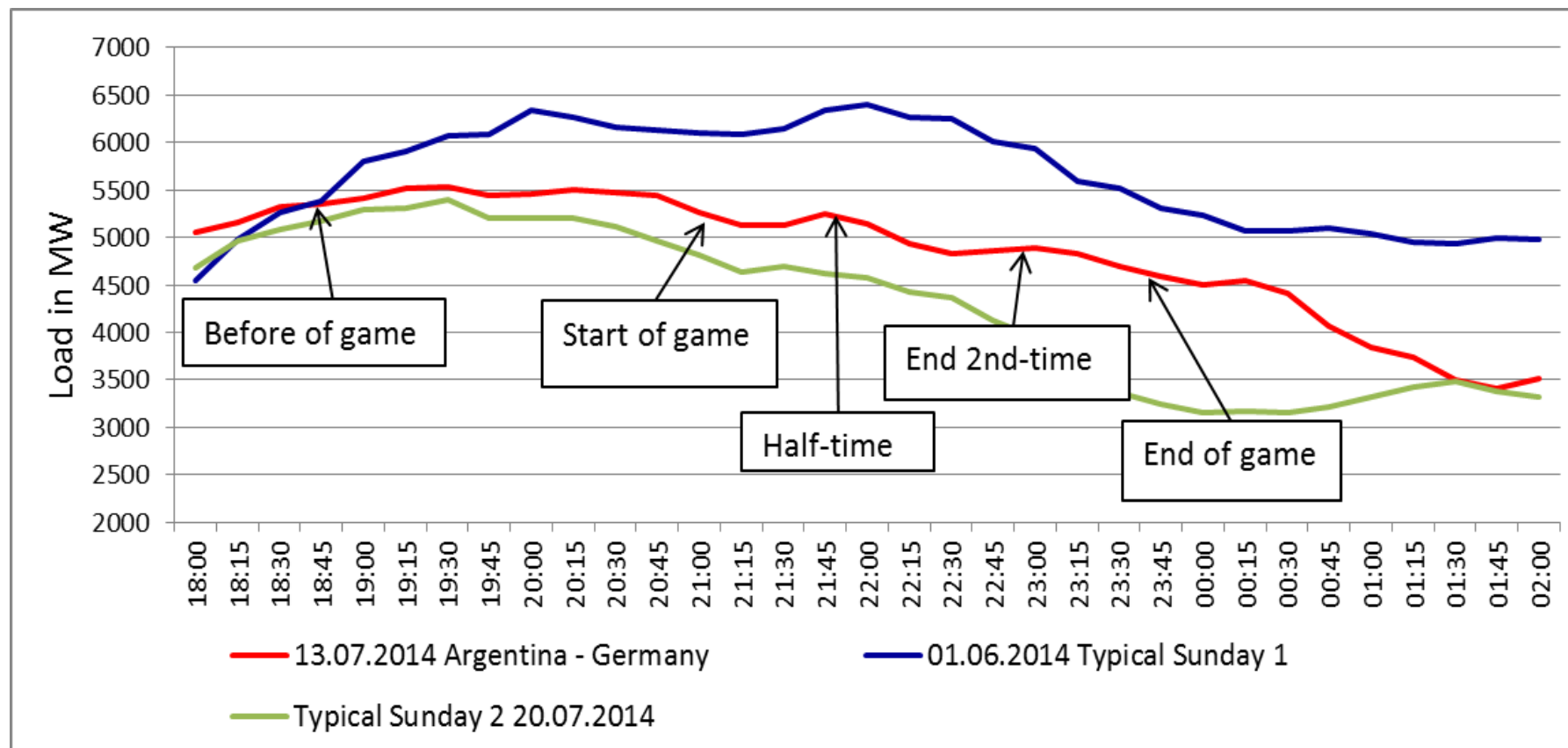




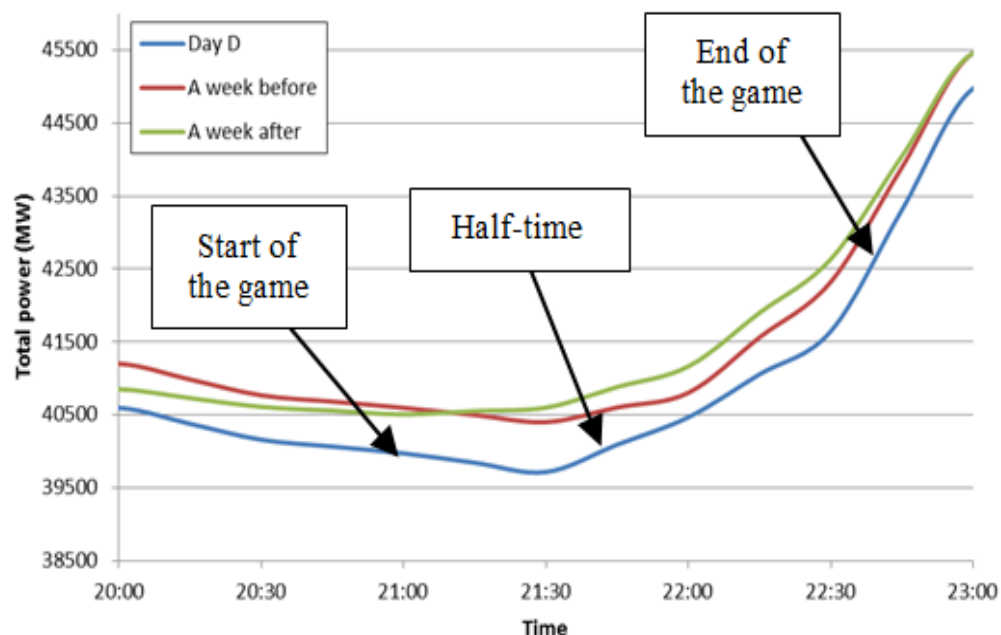
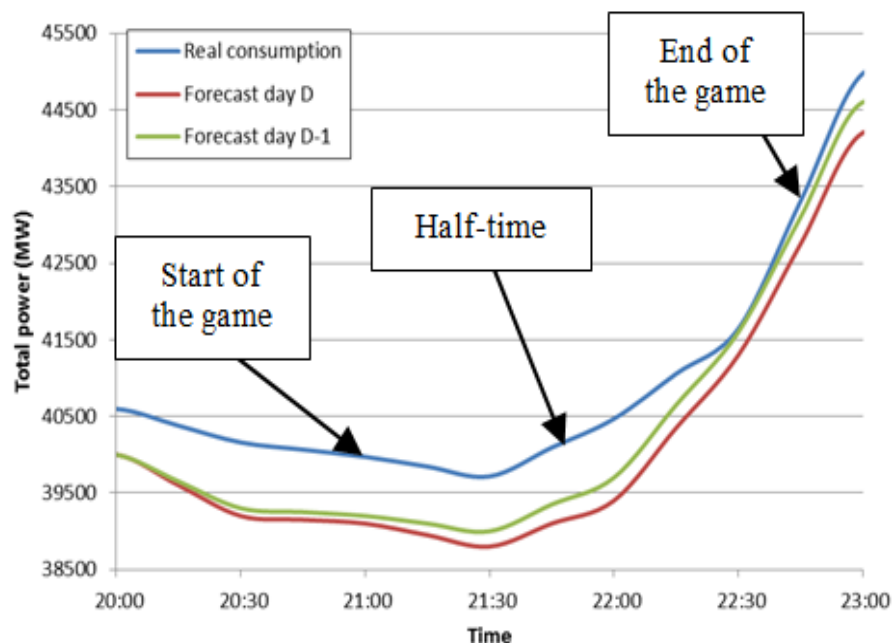
## In Brazil



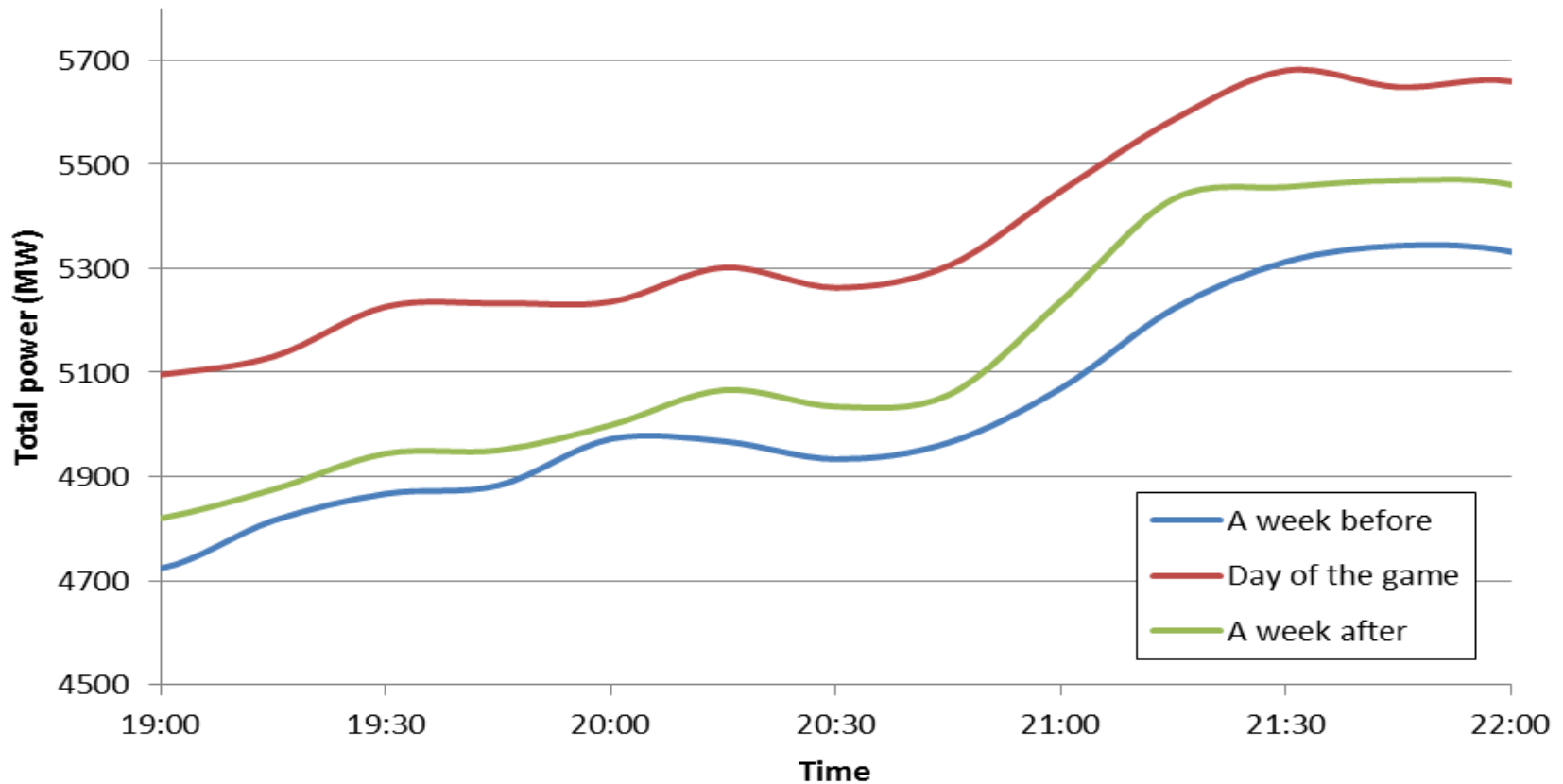
## In Germany



## In France



## In Portugal







Introduction

The Transmission System Operators -TSO

Analysis of the impact of FIFA 2014

Conclusions

- A high impact on the behavior of energy consumption in Brazil, especially first day (12 June 2014) due to the **opening ceremony** and the game **Brazil vs Croatia**. On other countries (Germany, France and Portugal) the impact was very small, due to local times in Portugal (4h ahead) and in France and Germany (5h ahead). Most of the matches occurred in the afternoon in Brazil, which means night time in Europe.

- Other matches involving Brazil showed high impact too in Brazilian territory especially when compared with the impacts in European countries. Another reason for that is that in the city where the game occurred, it was declared “**holyday**” and in the other cities in Brazil there was flexibility in industrial, commercial and education areas. Some days the banks were closed and the holiday period in the schools were moved because of the world cup.

- Matches involving European teams did not show an impact in the energy consumption in Brazil, except for the world cup final that shows some changes in the load profile. For the other countries the final match (Argentina vs Germany) did not show impact, probably because it started at 21h (Germany and France local time) ending at 23h40 approximately. It means that most of the match occurred in resting time in European territory.





**Danke schön !**



## **SMART GRID AND POWER QUALITY LABORATORY**

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