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# Use of Tableau for renewable energy data visualization

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**Ispra, 10.11.2016**

# Data collection

**28 EU Countries**

**Extended to non EU Countries  
(8 CP of Energy Community, Norway and Iceland)**

**3 Sectors**

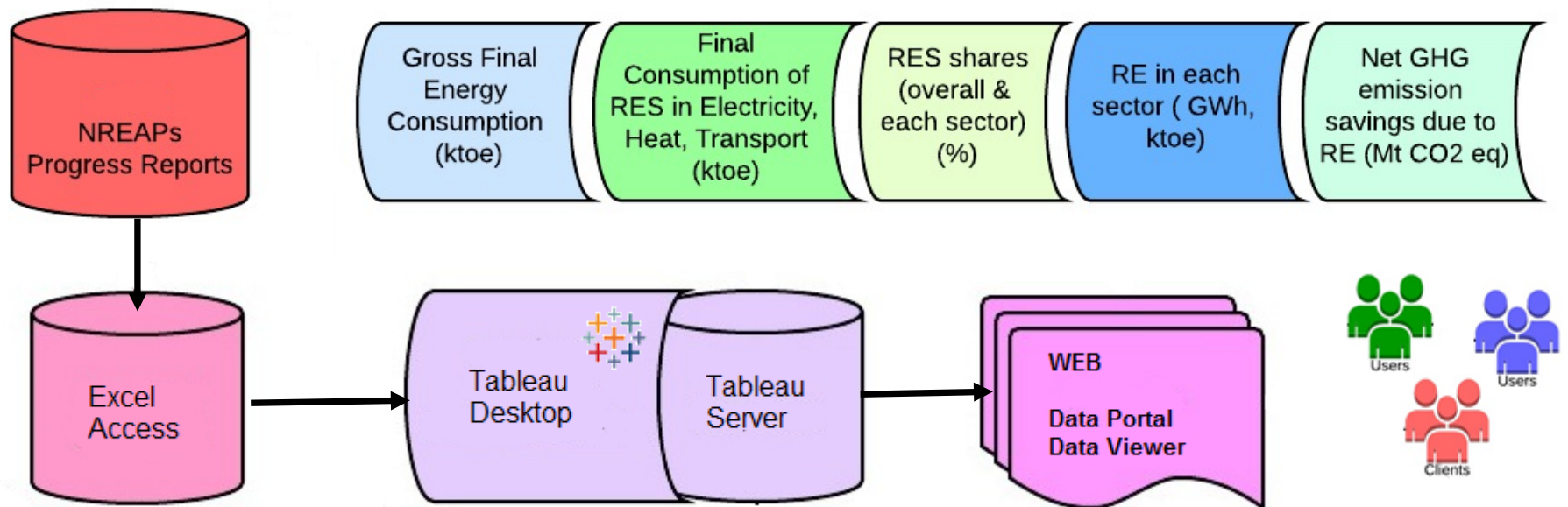
**Electricity   Heating/Cooling   Transport**

**Capacity + Consumption/Use + GHG emission savings**

**~ 40 000 raw data**

**60 indicators /yr/MS**

# Renewable energy database



**Tableau Desktop v.9.2 & 9.3**

**Tableau Server v. 9.2 - going to be upgrade to v.10**

# Analysis

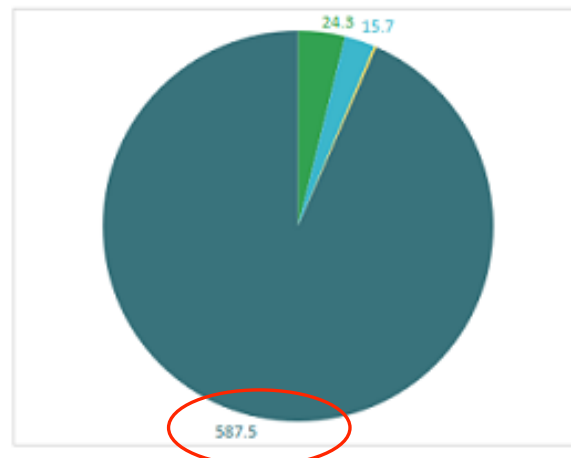
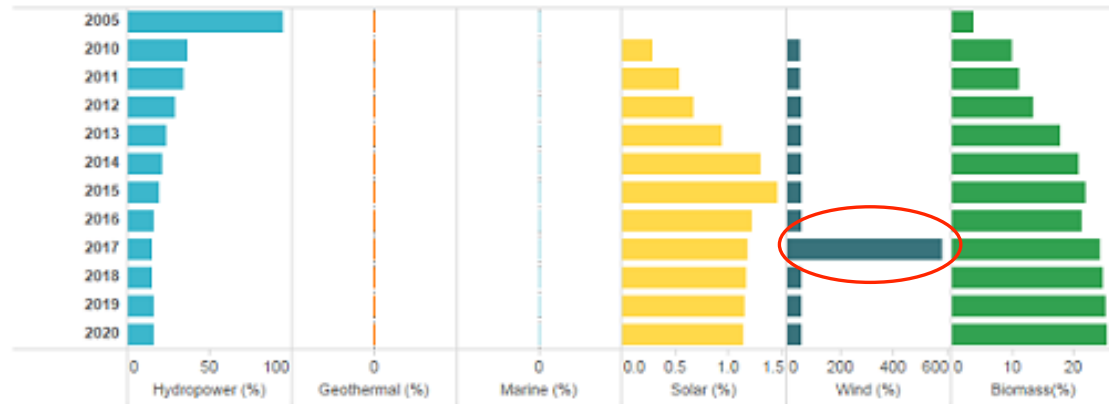
- Gross Final Energy Consumption (GFEC)
  - Final renewable energy consumption
  - Renewable energy shares in each sector and in final GFEC
  - Shares of each technology in final RES
  - Contribution of each EU Member State in final RES and each technology
- 
- EU Member States plans/targets up to 2020
  - Current trend of RES development
  - Deviation from plans/targets
  - Gaps to plans/targets

# Tableau - Interactive Exploratory

- ➔ Present data in context
  - ➔ Discover significant, meaningful patterns in data
  - ➔ Reveals data at several levels of details
  - ➔ More dimensions of information
  - ➔ Multi perspectives
  - ➔ Comparison
  - ➔ Multivariate analysis
  - ➔ Quantitative information
  - ➔ Categorical information
  - ➔ Calculations
- 
- ➔ Data consistency checks
  - ➔ Forecast

# Tableau – Data entry checking

Performing internal consistency checks of the data



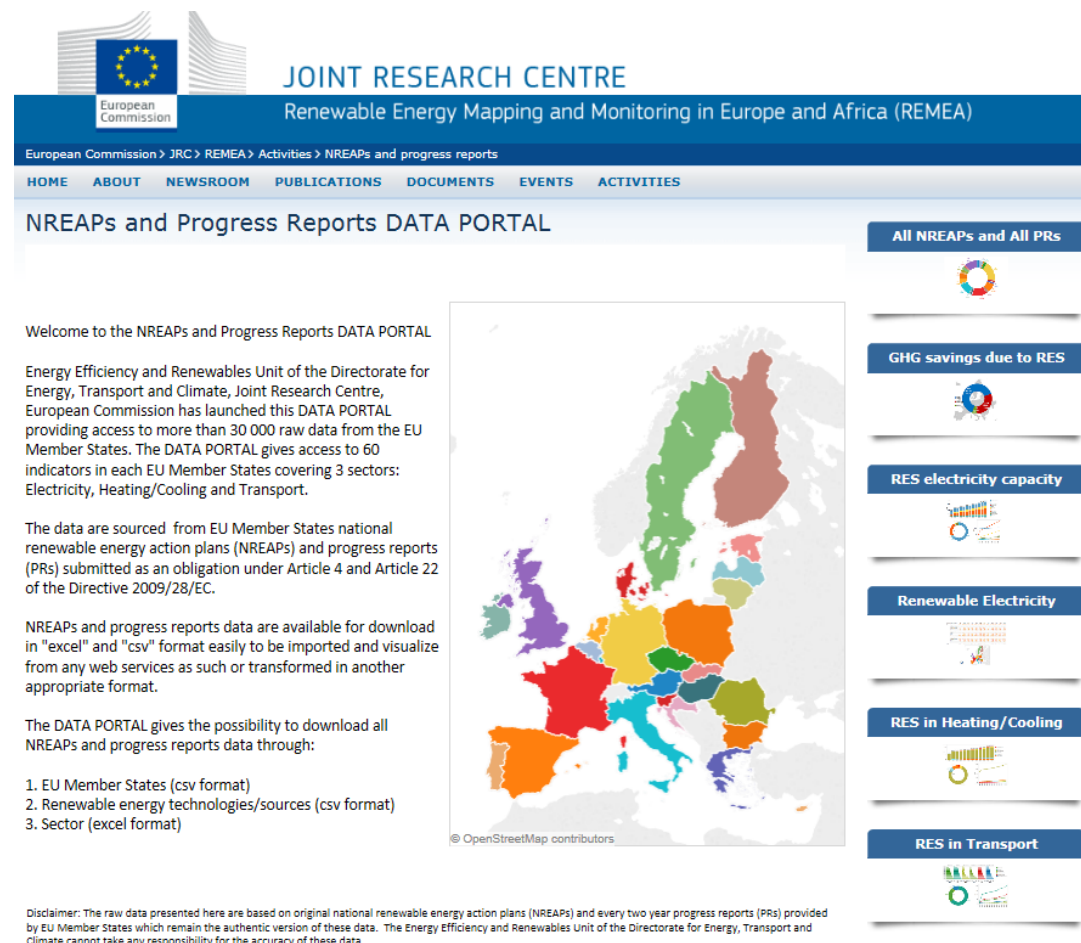
- Biomass capacity (%)
- Geothermal capacity (%)
- Hydropower capacity (%)
- Marine capacity (%)
- Solar capacity (%)
- Wind capacity (%)

Select MS  
LT

Select year  
2017

# NREAPs and progress reports DATA PORTAL

- ➔ Current trend and expected development
- ➔ Data download (by MS, Technology, Sector)



The screenshot shows the website interface for the NREAPs and Progress Reports DATA PORTAL. At the top, it features the European Commission logo and the text 'JOINT RESEARCH CENTRE Renewable Energy Mapping and Monitoring in Europe and Africa (REMEA)'. Below this is a navigation menu with options: HOME, ABOUT, NEWSROOM, PUBLICATIONS, DOCUMENTS, EVENTS, and ACTIVITIES. The main heading is 'NREAPs and Progress Reports DATA PORTAL'. The content area includes a welcome message, a description of the portal's purpose (providing access to more than 30,000 raw data points from 60 indicators across 3 sectors: Electricity, Heating/Cooling, and Transport), and information about data sourcing and availability for download in various formats. A map of Europe is displayed on the right side of the main content area. On the far right, there is a vertical sidebar with several interactive buttons: 'All NREAPs and All PRs', 'GHG savings due to RES', 'RES electricity capacity', 'Renewable Electricity', 'RES in Heating/Cooling', and 'RES in Transport'. Each button is accompanied by a small icon representing the data it provides.

Welcome to the NREAPs and Progress Reports DATA PORTAL

Energy Efficiency and Renewables Unit of the Directorate for Energy, Transport and Climate, Joint Research Centre, European Commission has launched this DATA PORTAL providing access to more than 30 000 raw data from the EU Member States. The DATA PORTAL gives access to 60 indicators in each EU Member States covering 3 sectors: Electricity, Heating/Cooling and Transport.

The data are sourced from EU Member States national renewable energy action plans (NREAPs) and progress reports (PRs) submitted as an obligation under Article 4 and Article 22 of the Directive 2009/28/EC.

NREAPs and progress reports data are available for download in "excel" and "csv" format easily to be imported and visualize from any web services as such or transformed in another appropriate format.

The DATA PORTAL gives the possibility to download all NREAPs and progress reports data through:

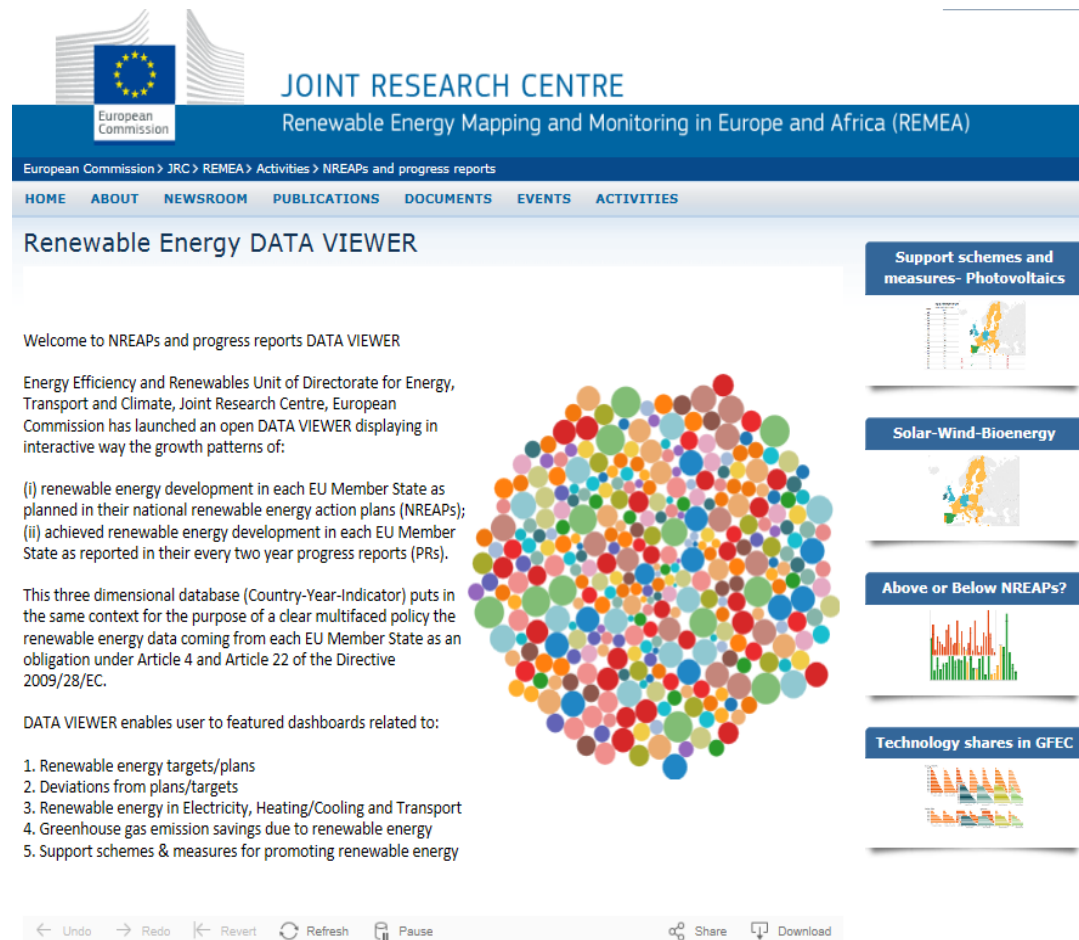
1. EU Member States (csv format)
2. Renewable energy technologies/sources (csv format)
3. Sector (excel format)

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Disclaimer: The raw data presented here are based on original national renewable energy action plans (NREAPs) and every two year progress reports (PRs) provided by EU Member States which remain the authentic version of these data. The Energy Efficiency and Renewables Unit of the Directorate for Energy, Transport and Climate cannot take any responsibility for the accuracy of these data.

# Renewable energy DATA VIEWER under development

- ➔ Featured analysis
- ➔ Deviation from NREAPs
- ➔ Gap to 2020 plans/targets
- ➔ Country profiles
- ➔ Country RES policy



The screenshot shows the website for the Renewable Energy Mapping and Monitoring in Europe and Africa (REMEA) project, managed by the Joint Research Centre of the European Commission. The page title is "Renewable Energy DATA VIEWER".

**JOINT RESEARCH CENTRE**  
Renewable Energy Mapping and Monitoring in Europe and Africa (REMEA)

European Commission > JRC > REMEA > Activities > NREAPs and progress reports

HOME ABOUT NEWSROOM PUBLICATIONS DOCUMENTS EVENTS ACTIVITIES

## Renewable Energy DATA VIEWER

Welcome to NREAPs and progress reports DATA VIEWER

Energy Efficiency and Renewables Unit of Directorate for Energy, Transport and Climate, Joint Research Centre, European Commission has launched an open DATA VIEWER displaying in interactive way the growth patterns of:

- (i) renewable energy development in each EU Member State as planned in their national renewable energy action plans (NREAPs);
- (ii) achieved renewable energy development in each EU Member State as reported in their every two year progress reports (PRs).

This three dimensional database (Country-Year-Indicator) puts in the same context for the purpose of a clear multifaced policy the renewable energy data coming from each EU Member State as an obligation under Article 4 and Article 22 of the Directive 2009/28/EC.

DATA VIEWER enables user to featured dashboards related to:

1. Renewable energy targets/plans
2. Deviations from plans/targets
3. Renewable energy in Electricity, Heating/Cooling and Transport
4. Greenhouse gas emission savings due to renewable energy
5. Support schemes & measures for promoting renewable energy

The interface includes a sidebar with several interactive dashboards:

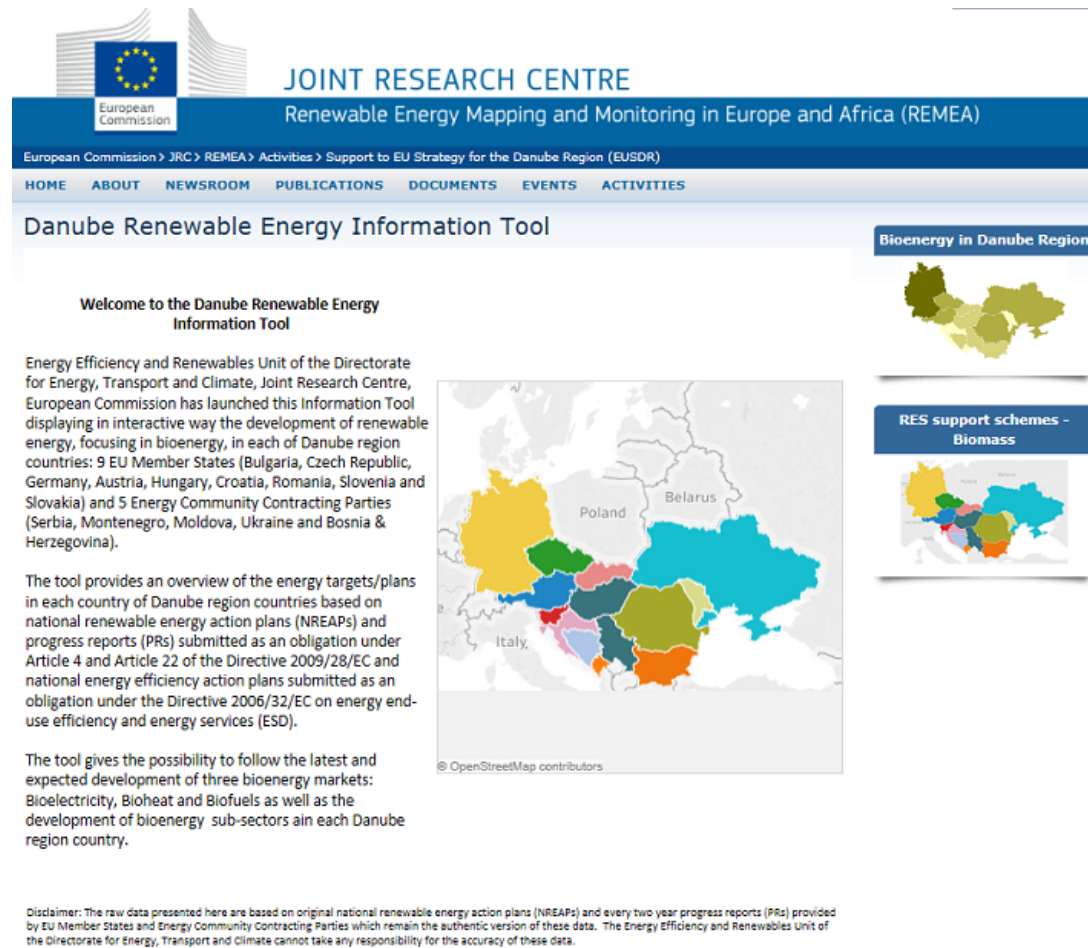
- Support schemes and measures- Photovoltaics
- Solar-Wind-Bioenergy
- Above or Below NREAPs?
- Technology shares in GFEC

At the bottom of the page, there is a navigation bar with the following options: Undo, Redo, Revert, Refresh, Pause, Share, and Download.



# Danube Renewable Energy Information Tool under development

- ➔ Regional analysis
- ➔ Country profiles
- ➔ Country RES policy



The screenshot shows the website for the Danube Renewable Energy Information Tool. At the top, it features the European Commission logo and the text "JOINT RESEARCH CENTRE Renewable Energy Mapping and Monitoring in Europe and Africa (REMEA)". Below this is a navigation menu with links for "HOME", "ABOUT", "NEWSROOM", "PUBLICATIONS", "DOCUMENTS", "EVENTS", and "ACTIVITIES". The main heading is "Danube Renewable Energy Information Tool".

**Welcome to the Danube Renewable Energy Information Tool**

Energy Efficiency and Renewables Unit of the Directorate for Energy, Transport and Climate, Joint Research Centre, European Commission has launched this Information Tool displaying in interactive way the development of renewable energy, focusing in bioenergy, in each of Danube region countries: 9 EU Member States (Bulgaria, Czech Republic, Germany, Austria, Hungary, Croatia, Romania, Slovenia and Slovakia) and 5 Energy Community Contracting Parties (Serbia, Montenegro, Moldova, Ukraine and Bosnia & Herzegovina).

The tool provides an overview of the energy targets/plans in each country of Danube region countries based on national renewable energy action plans (NREAPs) and progress reports (PRs) submitted as an obligation under Article 4 and Article 22 of the Directive 2009/28/EC and national energy efficiency action plans submitted as an obligation under the Directive 2006/32/EC on energy end-use efficiency and energy services (ESD).

The tool gives the possibility to follow the latest and expected development of three bioenergy markets: Bioelectricity, Bioheat and Biofuels as well as the development of bioenergy sub-sectors in each Danube region country.

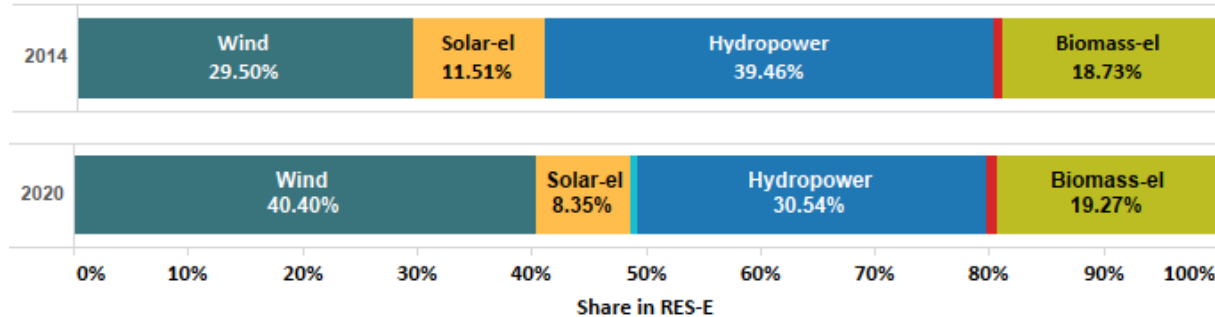
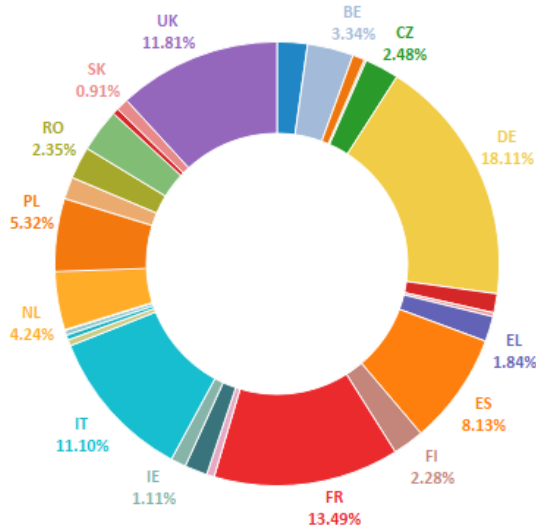
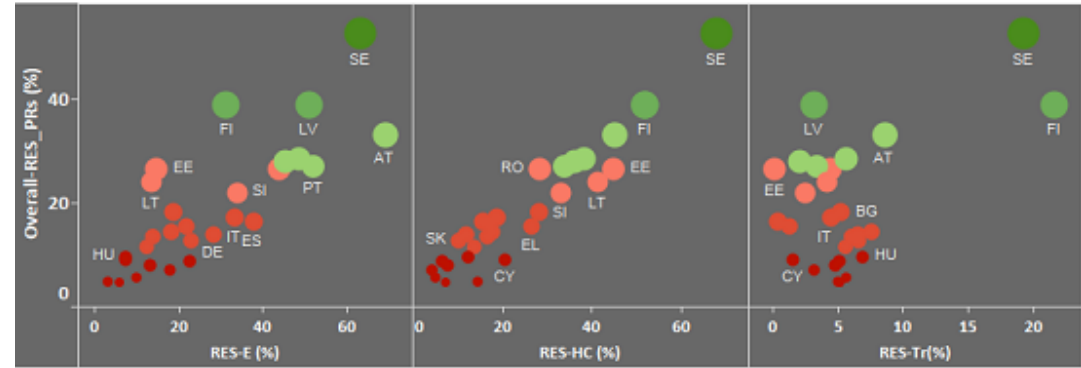
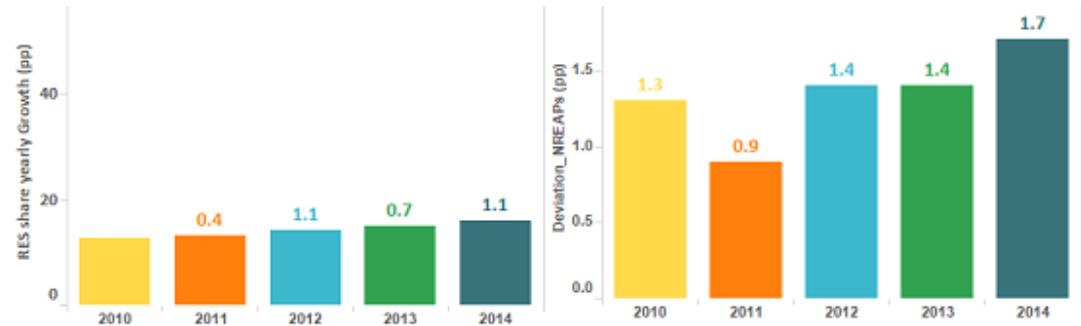
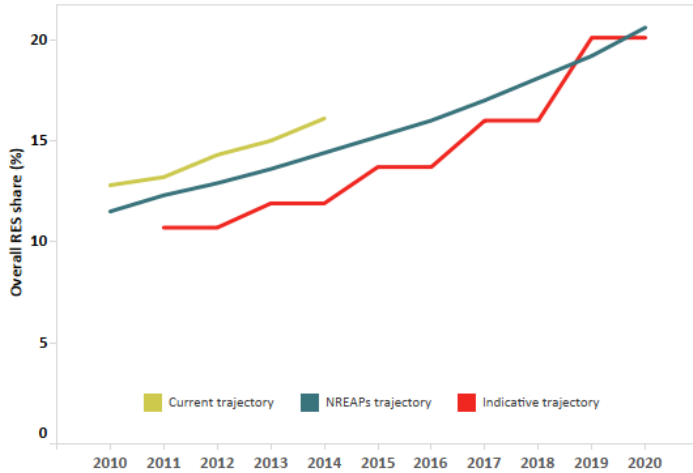
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**Bioenergy in Danube Region**

**RES support schemes - Biomass**

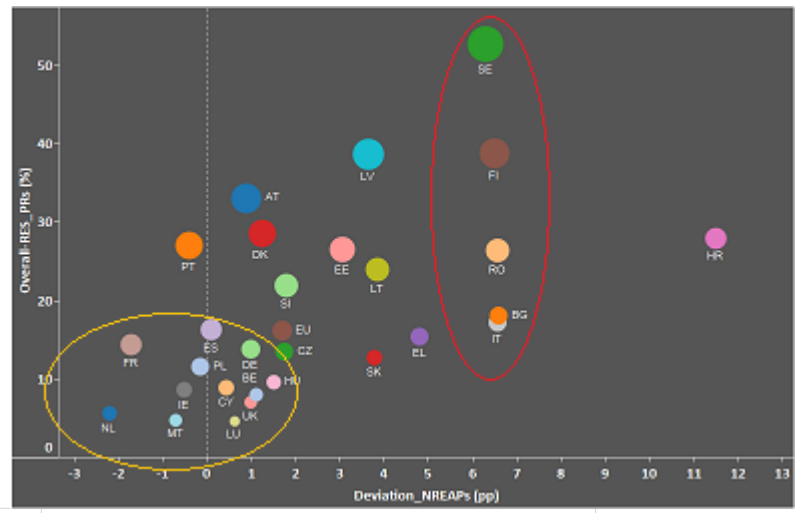
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# Tableau - Analysis and Visualization

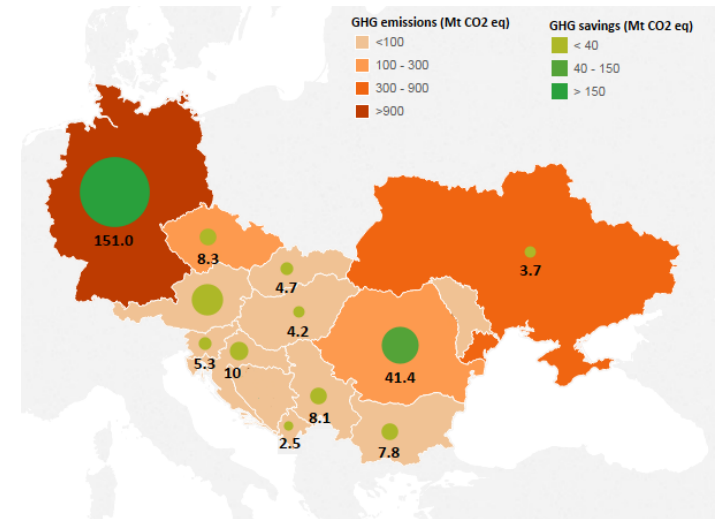
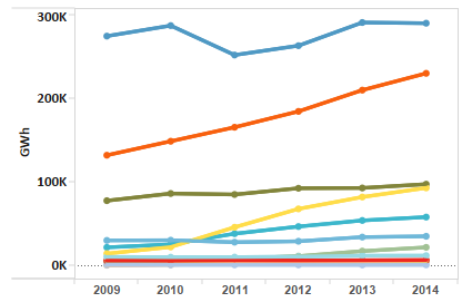
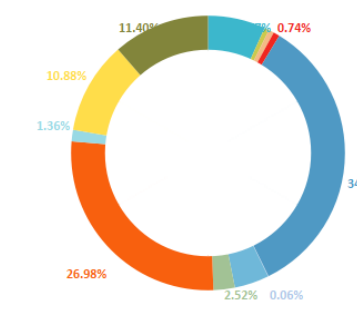
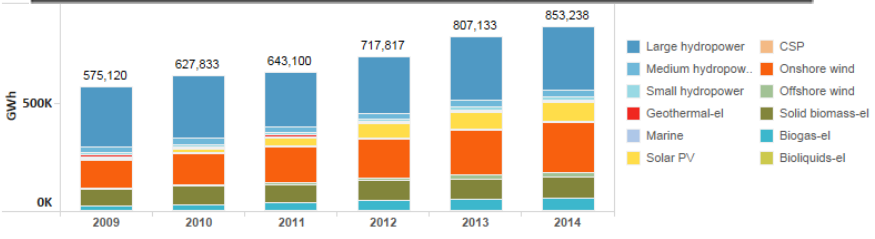
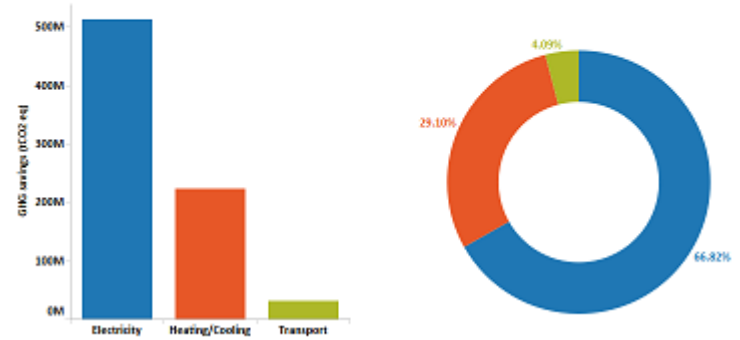


EU MS contribution in GFEC, 2014 (%)

# Tableau - Analysis and Visualization

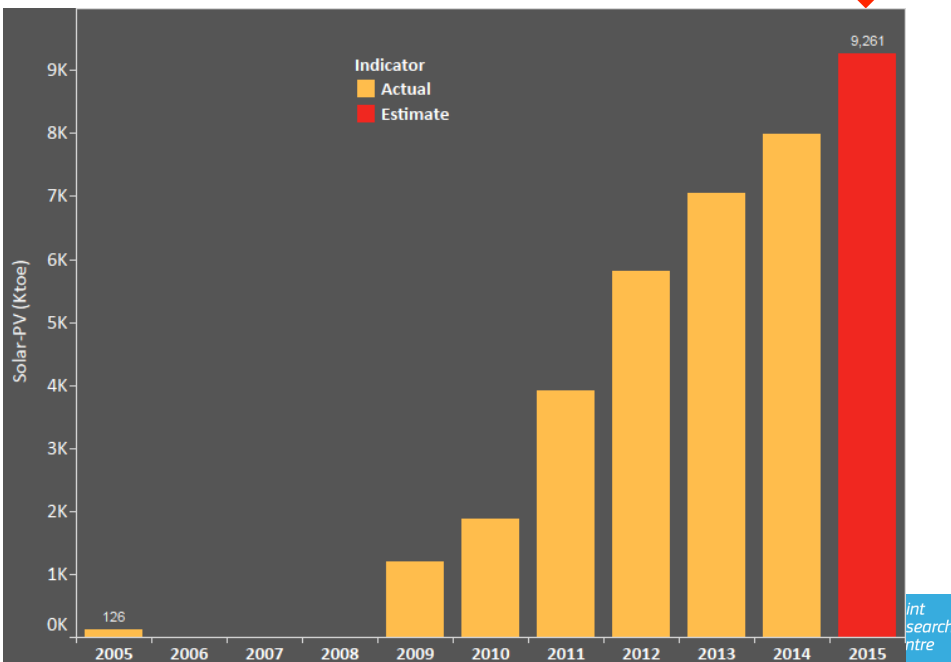


| Country | Sector          | 2009        | 2010        | 2011        | 2012        | 2013        | 2014        |
|---------|-----------------|-------------|-------------|-------------|-------------|-------------|-------------|
| EU      | Electricity     | 295,454,581 | 315,841,973 | 405,347,395 | 463,395,226 | 472,162,502 | 512,461,524 |
|         | Heating/Cooling | 208,288,361 | 229,061,636 | 209,461,571 | 225,151,952 | 228,010,535 | 225,157,739 |
|         | Transport       | 24,368,929  | 28,358,788  | 31,459,519  | 33,705,539  | 29,189,029  | 31,356,504  |
|         | Total           | 528,292,870 | 573,362,395 | 646,731,610 | 722,846,107 | 729,891,731 | 769,985,768 |



# Tableau – Forecast and Visualization

Forecast quantitative time-series data using **exponential smoothing models** capturing the evolving trend or seasonality of the data and extrapolate them into the future.



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