

# Gas in Power Generation Sector, the story as told by Jodi-Gas database.

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14th Regional JODI Training Workshop  
9-11 November 2016, Moscow, Russia



# Agenda

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- Why Power Sector?
- Drivers of gas consumption in power sector?
- USA : Shale gas and Coal-to-Gas switching.
- Brazil : Gas & Hydro in power generation.
- Data Integration : gas & Renewables
- Asia : Top consuming countries
- Africa : Egypt power sector
- Europe: Solar power in Italy

# Why Power Sector?

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- Power generation was the main area of growth in natural gas consumption and expected to continue to lead the growth in the future.

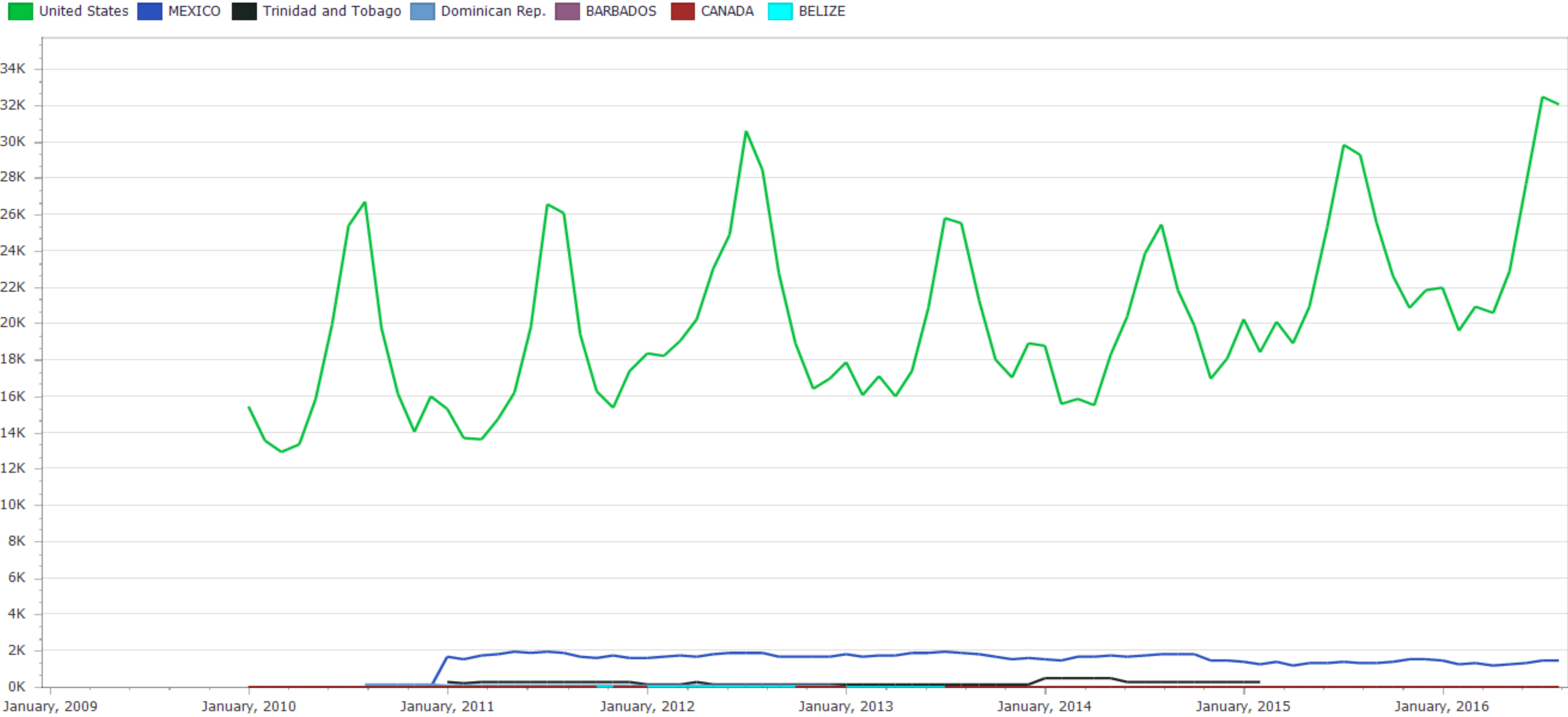
# Drivers of gas consumption in power sector?

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- Economic growth
- Competition from Coal, Renewables, ...
- Environmental policies and market regulations
- Energy Prices
- Supply Availability
- Efficiency Gains
- Others

# United States

Gas Consumption in Power Generation - North America Top 10 Countries ( As per 2015 Annual )



- In United States, gas-fired generation shot up by almost 20% in 2015 (IEA MTGMR 2016)

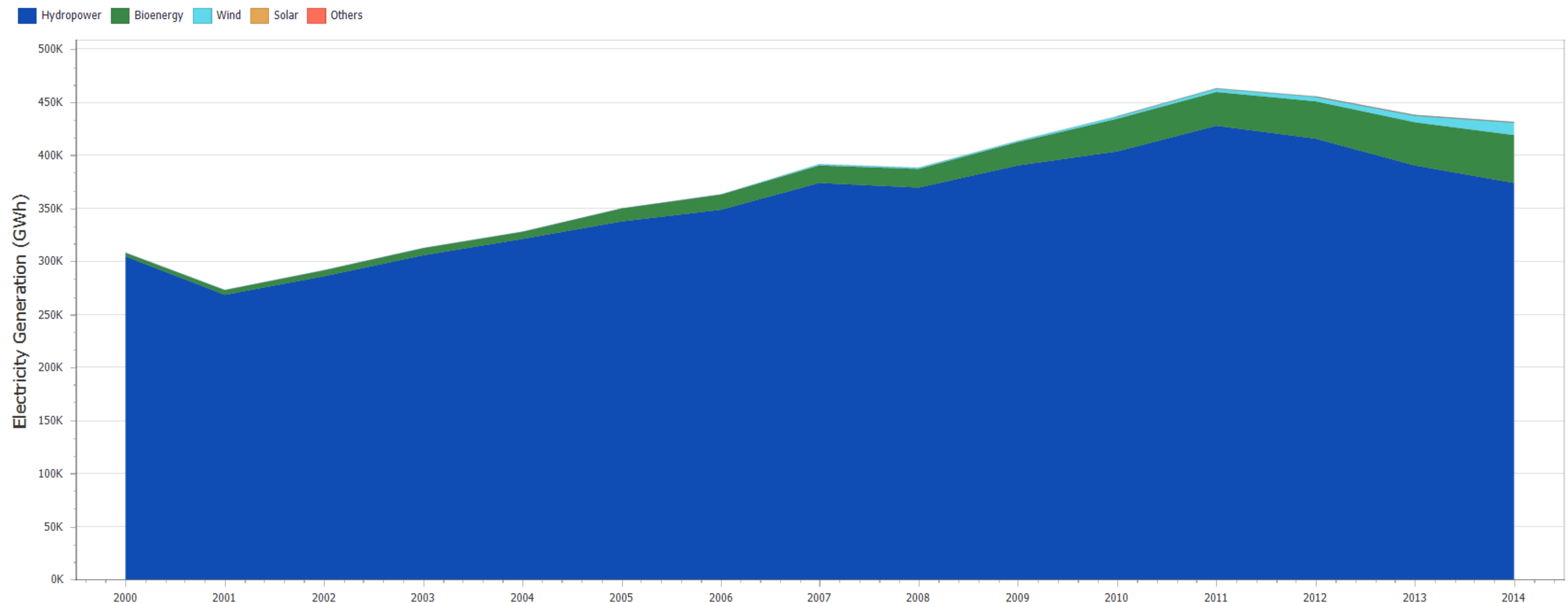
# United States

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- Shale gas revolution, cheap gas , switching from coal to gas in power sector.
- Planned Retirement of coal-fired power plants, increase the share of gas.
- Deployment of renewables : solar and wind. Gas consumption will stagnate in the future.
  
- Coal is very important in power generation in many countries, including China, India , Indonesia.
- Jodi potential expansion to coal, Jodi-Coal.

# Brazil: Electricity from Hydro - IRENA

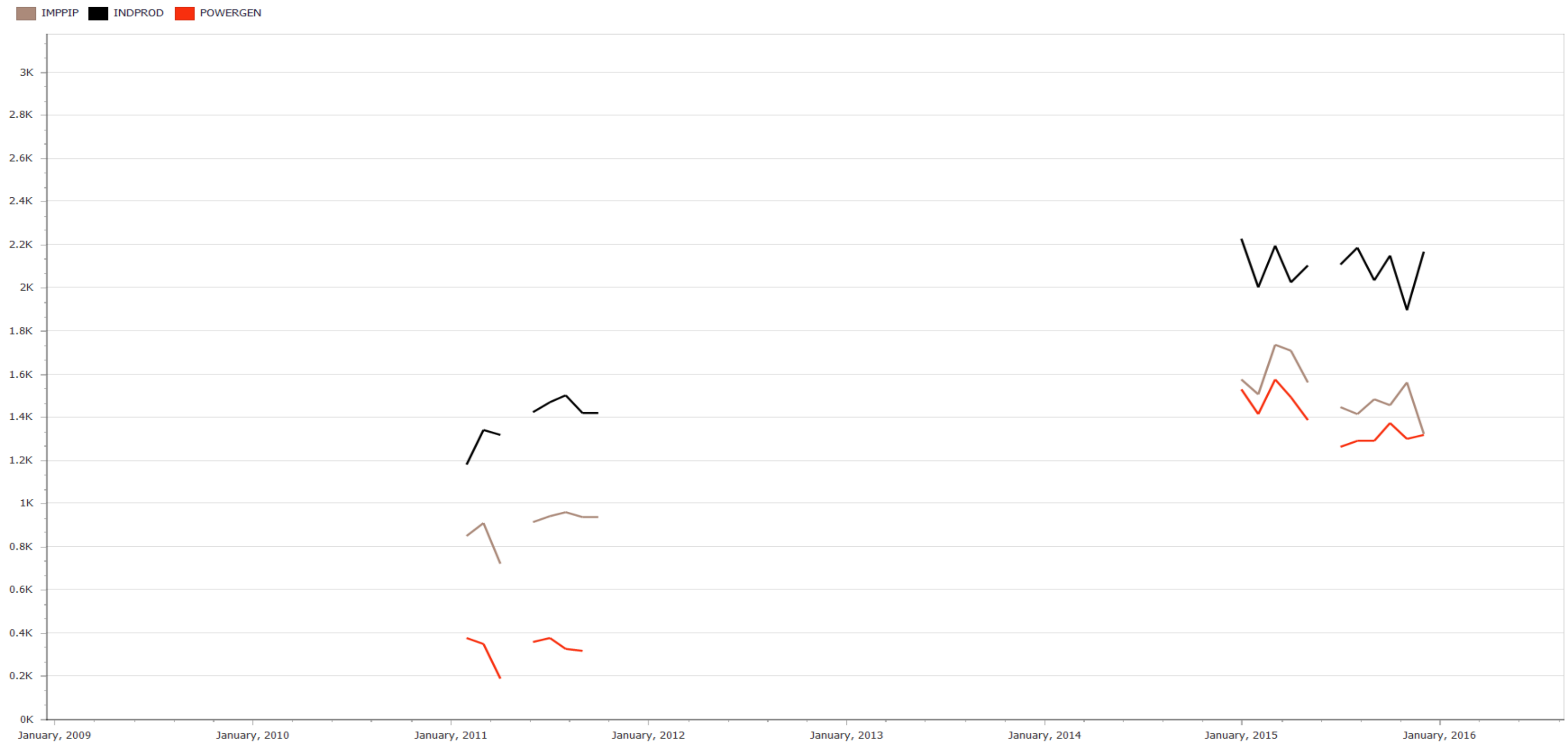
Electricity Generation (GWh) Per Renewable Technology - Brazil - IRENA



- The chart shows Electricity Generation (GWh), not the Installed Capacity (Mw).
- In 2011, 428 TWh of electricity from hydro compared to 373 TWh in 2014 (decline)
- A multi-year drought, lowered the electricity generated from hydro and increased gas-fired generation.

# Brazil : Gas Consumption in Power Generation – Jodi-Gas

Brazil Gas Production, Imports, Consumption in Power Gen. - Jodi-Gas



- In March 2011, 347 MMcm of Gas Consumed in Power Generation compared to 1580 MMcm in March 2015
- Brazil imports gas from Bolivia, a GECF member country.
- More complete data will help to better understand the behaviour of gas imports and consumption in Brazil.



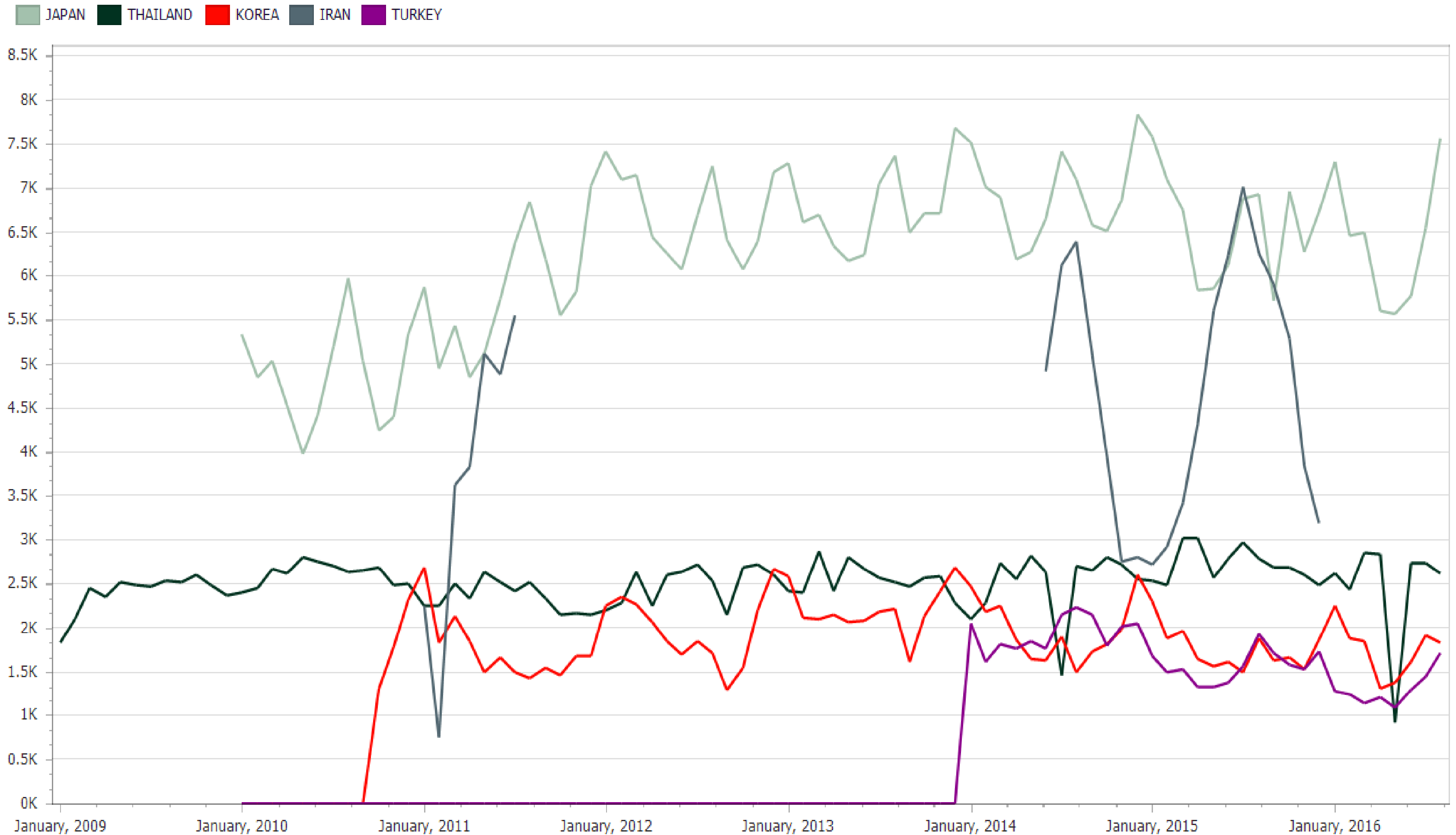
# Data Integration

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- Integrate data from different sources is a must to see the full picture.
- On monthly basis, Jodi-Gas data is being **processed** and loaded to GECF Data Exchange Center (DEC). So DEC users can benefit from the built in **data analysis and dashboards**.
- **Integrate** Jodi-Gas data with other data available in DEC, (IRENA power data)
- Macroeconomic Indicators & forecast from IMF
- others

# Asia : Gas in Power Sector

Gas Consumption in Power Generation - Asia Top 5 Countries ( As per 2015 Annual )



# Japan

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- Before Fukushima, 26% of the electricity came from Nuclear power.
- After nuclear power plants shutdown, the LNG imports increased by 20% for consumption in gas-fired power plants.
- The largest LNG importer in the world, with share 35% of the global trade.
- Japan returning nuclear power? How fast ? New safety regulations? Public opposition ? = Uncertainty.
- Increased deployment in renewables
- Will lead to lower gas consumption in power sector and lower LNG imports.

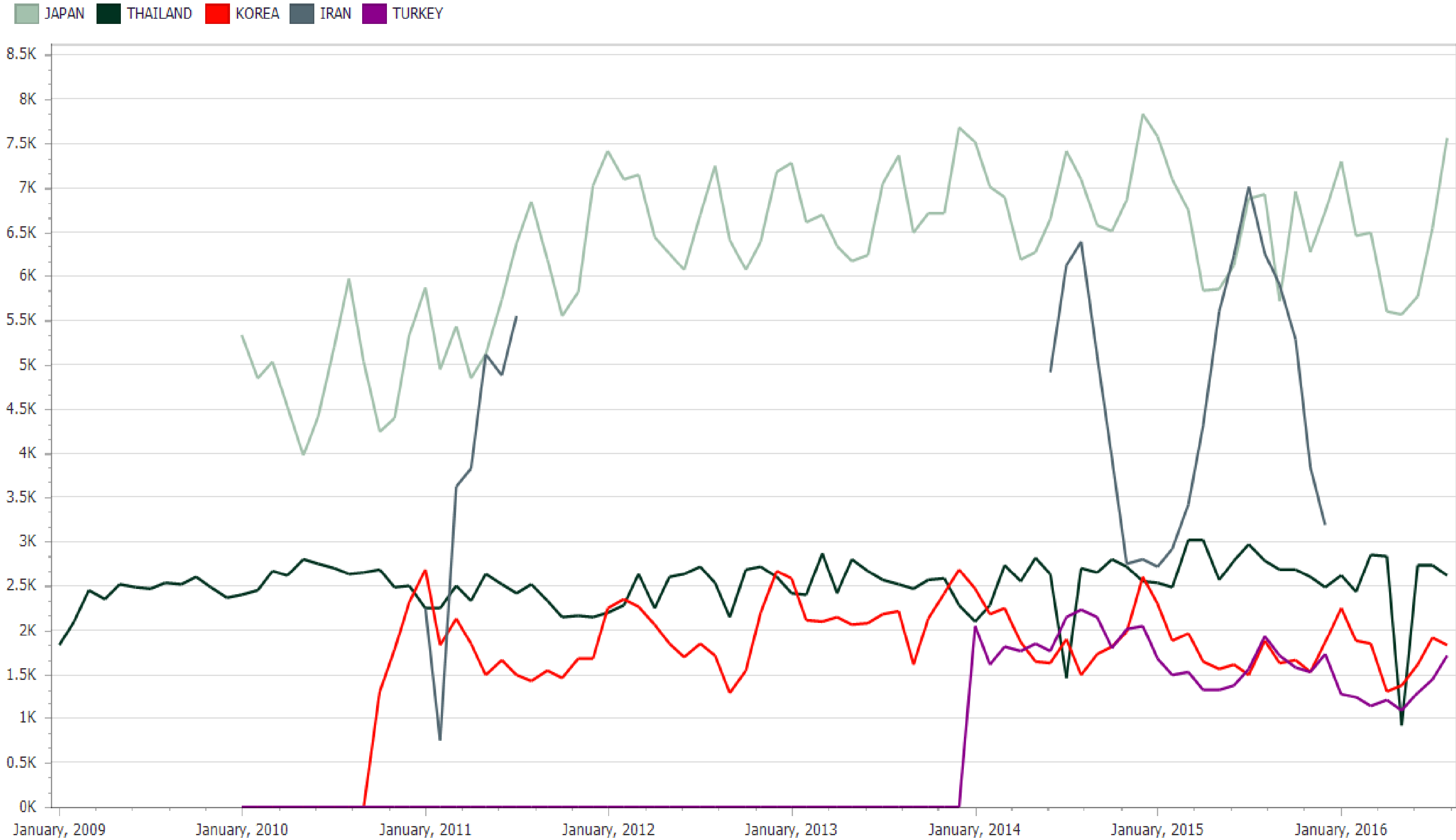
# Asia : Gas in Power Sector

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- **China :**
  - Gas consumption data in power sector is not available in Jodi-Gas database yet.
  - 60% of electricity comes from coal-fired plants.
  - For air pollution reasons china will accelerate switching from coal-fired to gas-fired power generation. As per IEA MTGMR, Beijing aims to close down all coal-fired power plants by 2017, and to build four major gas-fired co-generation units.
- **Iran:** data gaps, for example no data available for the period from Aug 2011 to May 2014.

# India

Gas Consumption in Power Generation - Asia Top 5 Countries ( As per 2015 Annual )



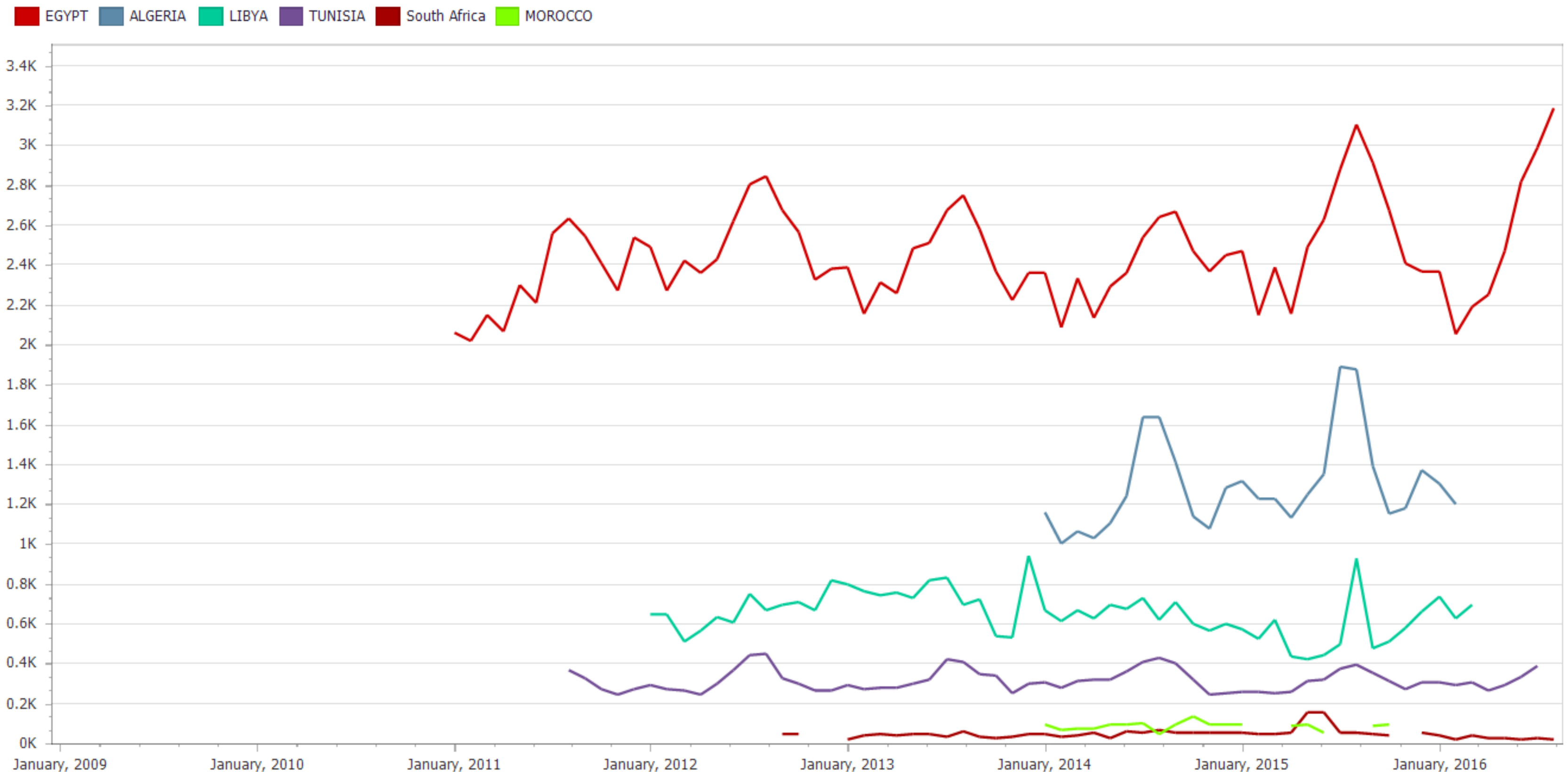
# Asia : Gas in Power Sector

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- **India :**
  - Because of **low utilization rate** of its installed gas-fired power generation capacity (was 20% in 2014), it consumes around 1 bcm per month.
  - Price-driven increase in gas consumption in power sector?
  - IEA : the **fertilizer sector** - which accounts for around one-third of total Indian gas consumption – will drive robust growth in industrial gas usage.
  - Should Jodi-Gas questionnaire **expand to cover consumption in sectors** like industry, petrochemicals, transportation, ... ?
- **Indonesia:** the cheap domestic coal is dominating the power sector, gas consumption is around 0.75 Bcm a month.

# Africa Top Consumers

Gas Consumption in Power Generation - Africa Top Countries ( As per 2015 Annual )



Egypt, Algeria and Nigeria are the three biggest gas producers & consumers in Africa. The three countries are GECF members.

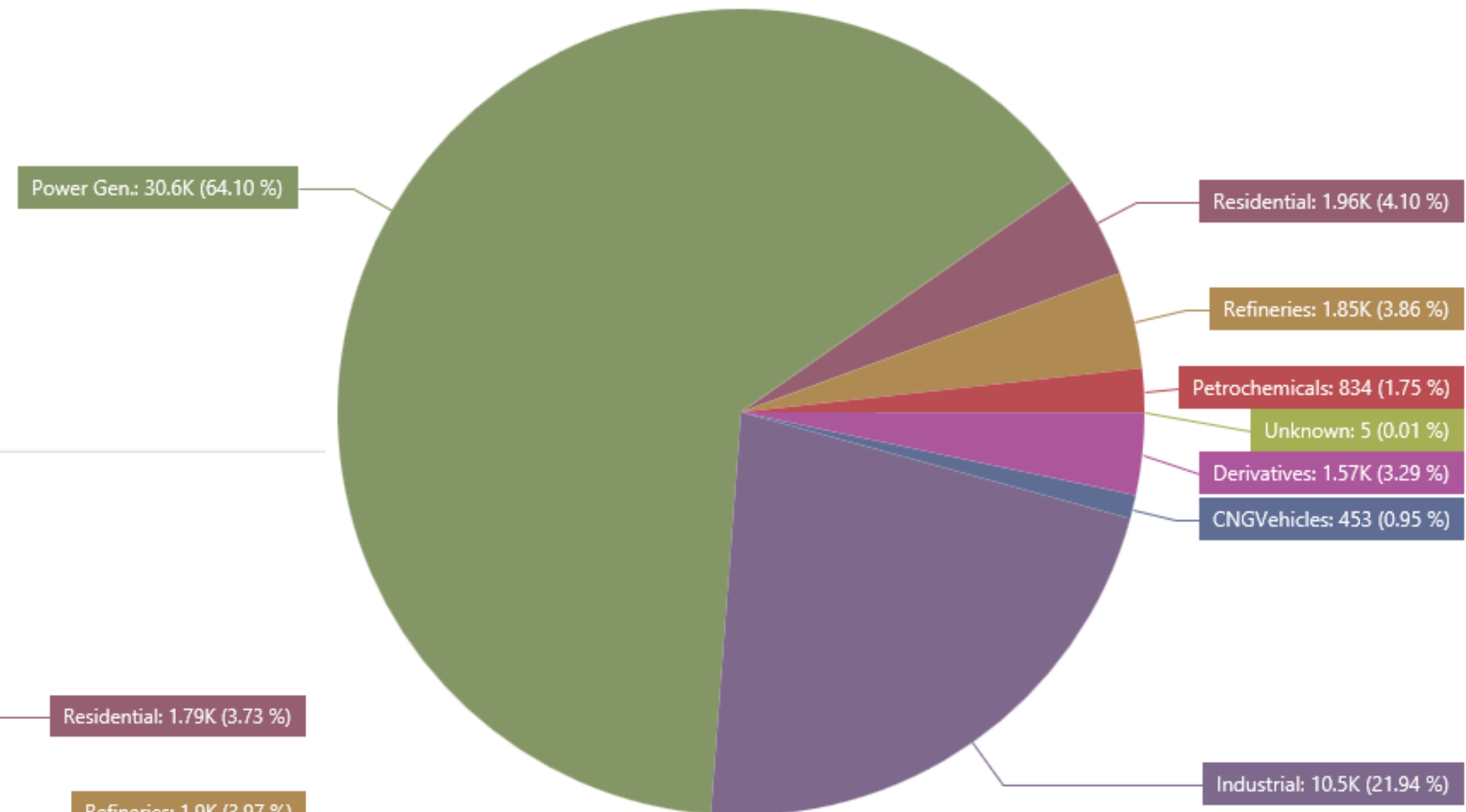


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- 70% of the electricity generated in Egypt and almost all electricity in Algeria is from gas-fired power plants.
  - Egypt : Supply shortages, LNG Imports : 2 FSRU , New discovery : Zohr offshore filed (30 tcf), switch to coal in power generation and industries like cement?
  - MENA : Gas subsidy reforms, raise gas and electricity prices. (gulf states & Egypt for example)

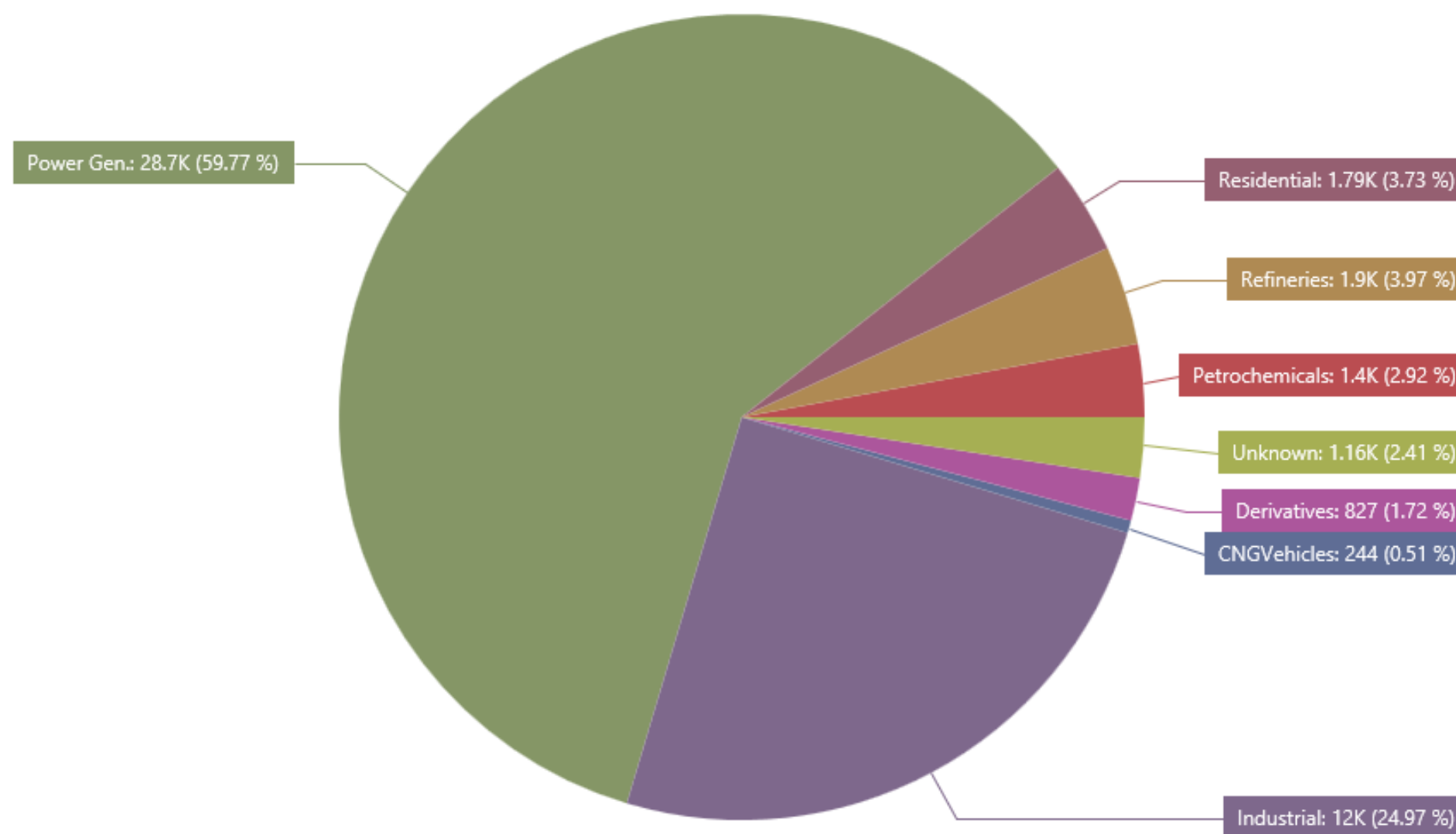


# Egypt : Consumption by Sector

2015 - Egypt



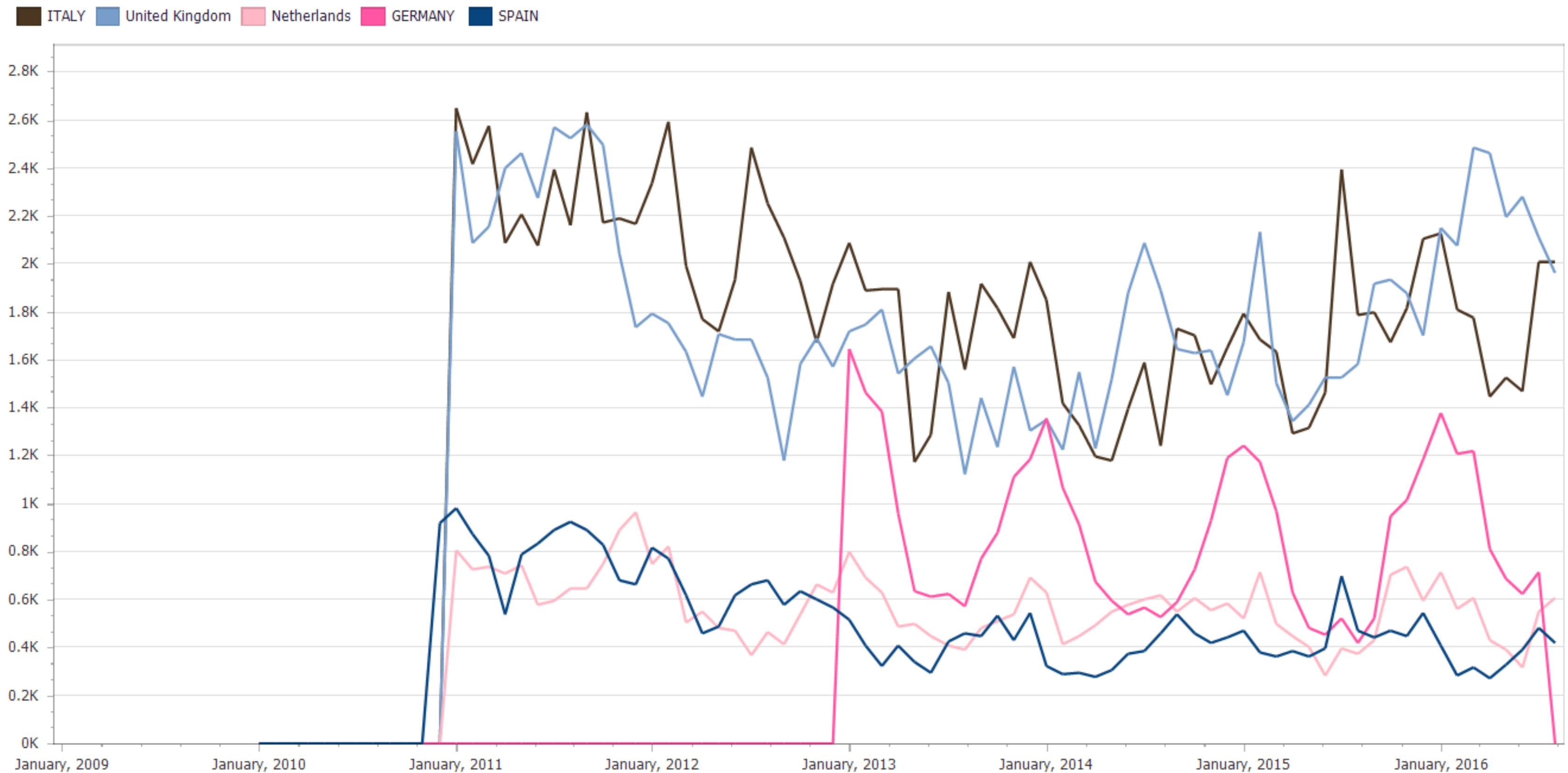
2014 - Egypt



Egypt: the increase in power sector consumption came at the expense of industrial sector.

# Europe: Gas in Power Sector

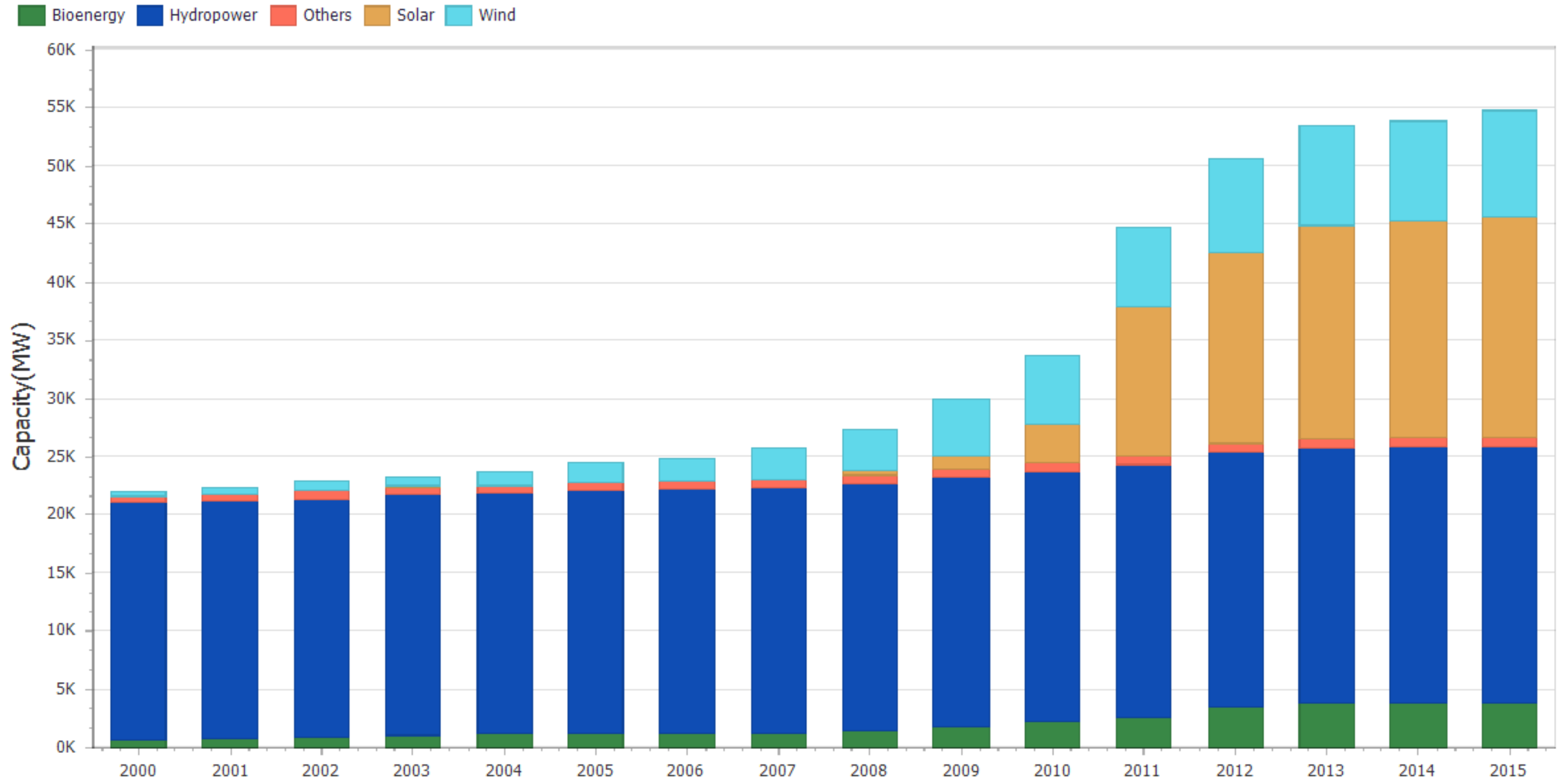
Gas Consumption in Power Generation - Europ Top 5 Countries ( As per 2015 Annual )



- Italy : imports pipeline gas from Algeria and Libya
- Germany : a major importer of Russian gas.
- Netherlands is a gas producing country.

# Italy : Installed Renewables Capacity (IRENA)

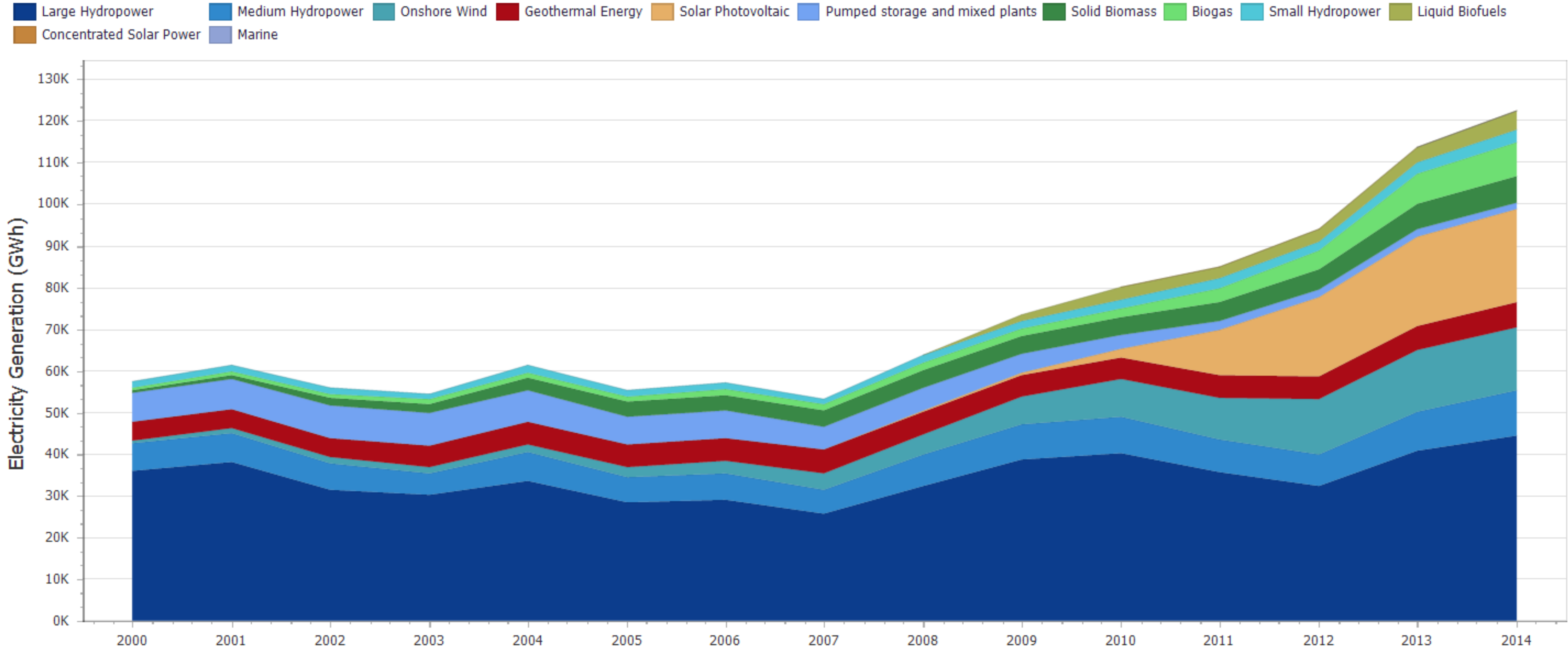
Installed Capacity (Mw) Per Technology - Italy



Germany, Italy and Spain are leaders in renewables.  
In 2011, there was a big increase in installed solar capacity in Italy.

# Italy : Electricity Generated from Renewables (IRENA)

Electricity Generation (GWh) Per Technology / Sub Technology - Italy



Italy electricity generated from **Solar PV** increased dramatically since 2011.



# Mexico

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- Switch from the expensive oil-fired power plants to gas-fired power plants.
- Plans to build pipelines to import gas from US.
- Mexico's energy market reforms:
  - End the monopoly in NG transportation and marketing in Mexico.
  - Attract foreign investment .



Thank You





# Russia

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- Economic contraction, mild weather
- Decline in gas consumption for power generation:
  - More efficient gas units
  - More nuclear capacity