



# COUNTRY REPORT OF PERU



Edwin Ramirez Soto  
Supervisory Agency of Investment on Energy and Mining (Osinergmin-Peru)  
June, 2016



# CONTENT

## INTRODUCTION

### 1.GENERAL INFORMATION

### 2.CURRENT ENERGY POLICY AND MEASURES

### 3.PAST ENERGY DEMAND AND SUPPLY (STATISTICS)

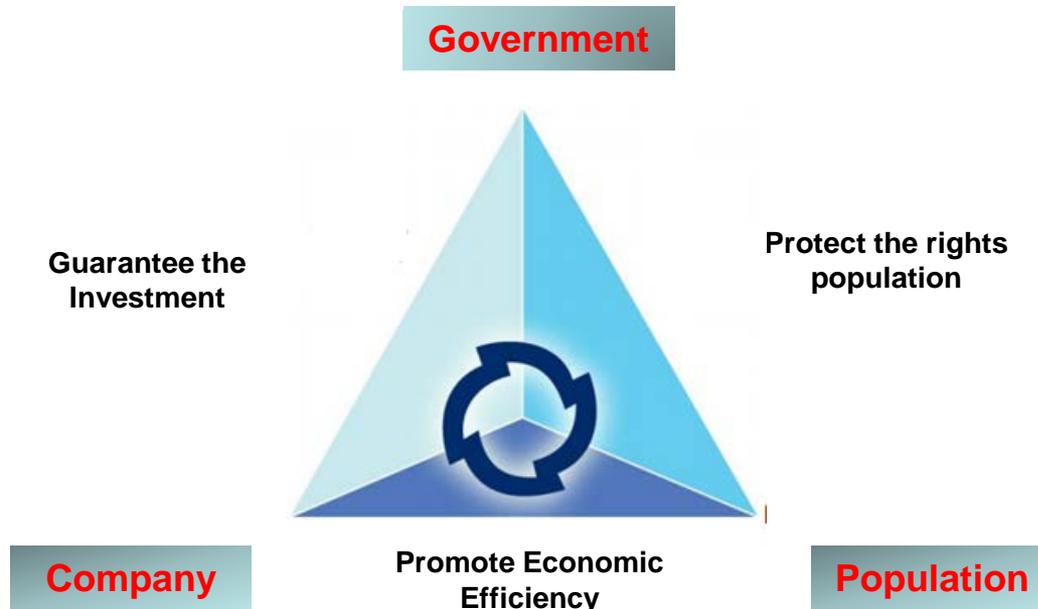
### 4.OUTLOOK OF ENERGY DEMAND AND SUPPLY

### 5.MAJOR DIFFICULTIES AND BOTTLENECKS CURRENTLY FACED IN FORMULATING ENERGY POLICIES

### 6.SUBJECTS TO STUDY



**Osinergmin is a public institution of Peru, whose functions are to regulate, supervise and oversee the energy and mining sectors with autonomy, technical capacity, clear and predictable rules so that activities in these sectors are held in conditions of safety and available with a reliable and sustainable supply of energy**



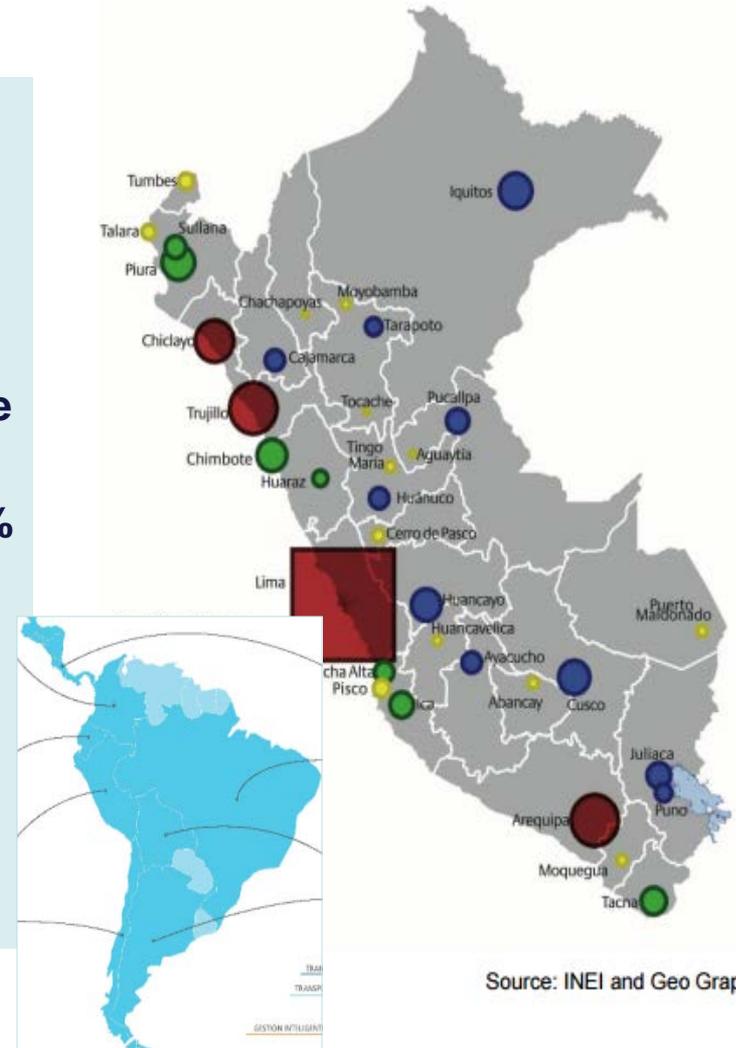


# 1. GENERAL INFORMATION



## BASIC INFORMATION

- ❑ Capital and largest city: Lima
- ❑ High degree of economic concentration: Lima
- Large economic difference between Lima and the provinces
- ❑ Official languages: Spanish 84.1%, Quechua 13.0% and Aymara 1.7%
- ❑ Geographic area: 1.29 Millon km<sup>2</sup>
- ❑ Population: 31.1 Millon- Annual Growth: 1.1%
- ✓ Urban population: 75%
- ✓ Coastal area: 52%
- ❑ Population with acces to electricity (2015): 93%

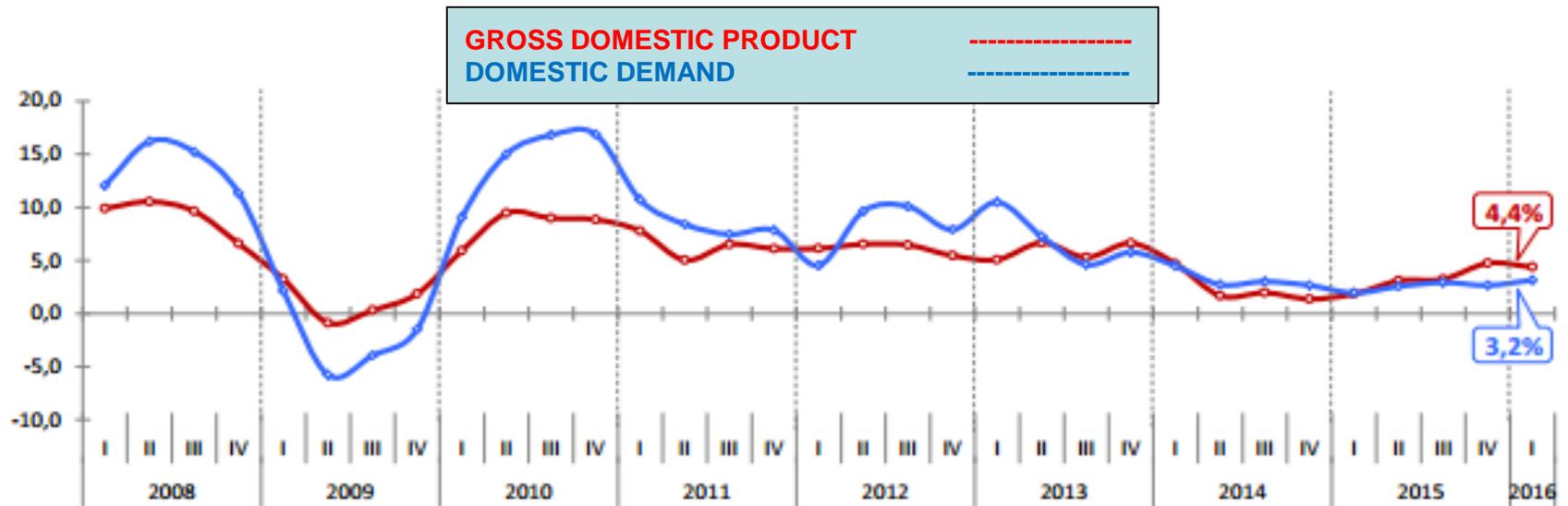


Source: INEI and Geo Graphos.



## GROSS DOMESTIC PRODUCT AND DOMESTIC DEMAND

Base 2007=100



Source: Instituto Nacional de Estadística e Informática

The GDP has decreased between 2010 and 2016, because the country's economy has contracted



## 2. CURRENT ENERGY POLICY AND MEASURES



## **SUPREME DECREE N° 064-2010-EM APPROVES ENERGY POLICY OF PERU 2010-2040**

### **VISION**

Have an energy system that satisfies the national demand in a **reliable, regular, continuous and efficient way**, which promotes sustainable development; based on **planning, research and continuous technological innovation**



## OBJECTIVES OF ENERGY POLICY

- **Have a diversified** energy matrix with emphasis on renewable sources.
- **Have a competitive** energy supply.
- **Universal access** to energy supply.
- **Have a greater efficiency** in energy use and on the production chain.
- **Achieve auto sufficiency** in energy production.
- **Develop an energy sector with minimal environmental impact** and sustainable development.
- **Develop the natural gas industry** and its use in home activities, transportation, trade and industry as well as efficient power generation.
- **Strengthening of the institutions and transparency** of the energy sector.
- **Integration with regional energy markets**, allowing the achievement of long-term vision.



## ENERGY POLICY-MEASURES

### 1. Planning of the Electrical Transmission (Transmission Regulation)

- Expansion - Bids for Electrical Transmission (Law N° 28832-Efficient Generation) Convened by PROINVERSION

Pay: **Guaranteed Annual Remuneration (RAG US\$/year)+COyM**

### 2. Development of the Electrical Generation

- Bids for Electrical Generation (Law N° 28832, Convened by PROINVERSIÓN)

✓ Investment commitment Contract of Hydraulic Power Plants Generation

Pay: **US\$/kW month and US\$/MWh**

✓ Concession Contracts of Power Plants of Cold Reserve

Pay: **US\$/MW month and oil cost**

✓ Investment Contracts of Power Plants of Electric Node in the South of Peru

Pay: **US\$/MW month and oil cost**

- Auctions for Electrical Generation with Renewable Energy Resources (D.L. N° 1002, Convened by MINEM-OSINERGMIN)

✓ Concession contracts for the supply of electrical energy with Renewable Energy Resources

Pay: **US\$/MWh**

3. Long-term contracts up to 20 years (generation) and 30 years (transmission).

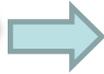
4. Energy policy heavily influenced by the economic conditions of the country.



## REGULATION BY AGENCY-REGULATION BY CONTRACT

Regulation  
by contract

80%



### GENERATION:

- Long-term tenders for the supply of the distributors demand.

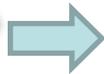
### TRANSMISSION:

- Tenders for the trunk system (guaranteed, principal).
- ✓ Concession Contracts of Transmission Lines and Substations, convened by PROINVERSIÓN. (BOOT-Build, Owner, Operate and Transfer).
- ✓ Additional charges: Cold Reserve, RER, Energy Node South, Gas pipeline in southern Peru, etc.

Proinversión,  
Osinerghmin/Minem

Regulation  
by agency

20%



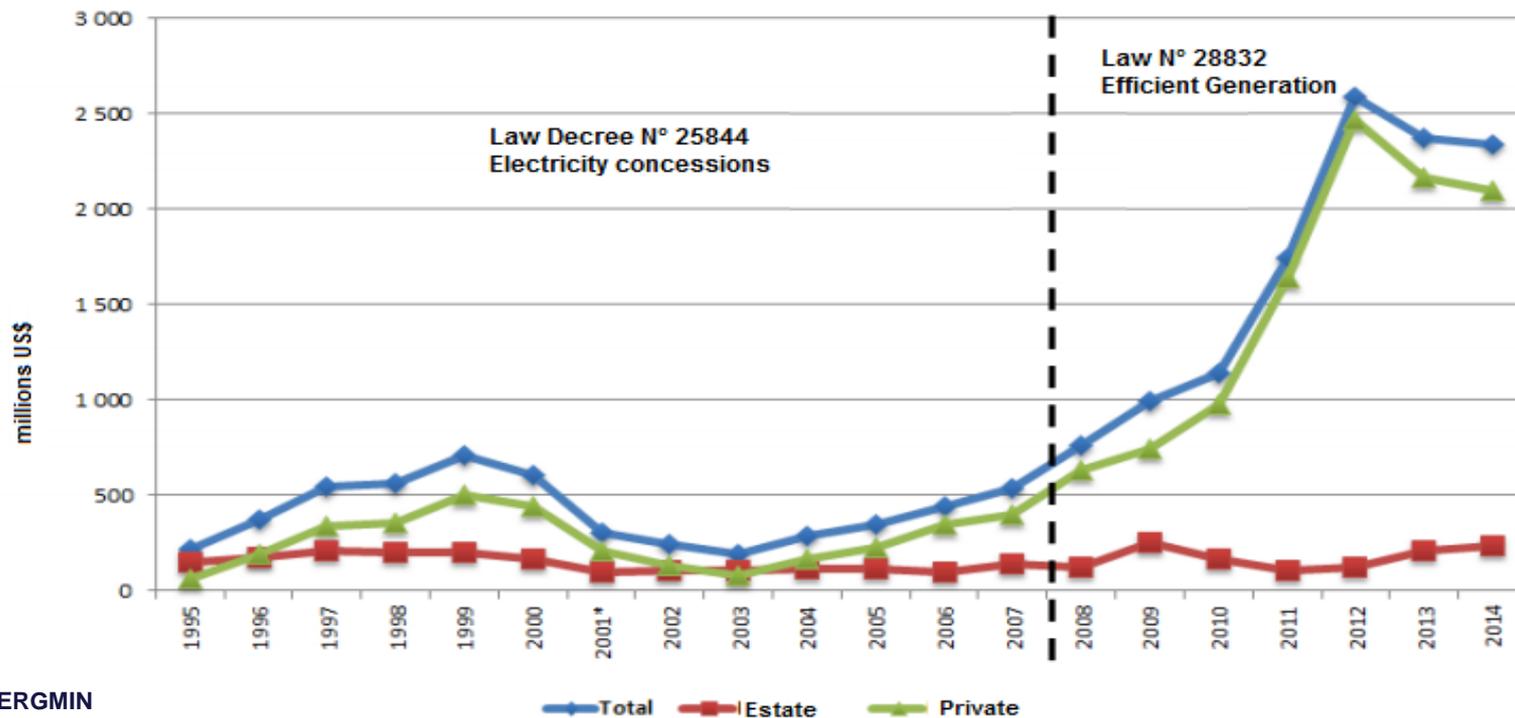
- Distribution rates VAD (value added distribution)
- Secondary/Supplementary

Osinerghmin

Rate to  
end  
customers



## INVESTMENTS IN THE ELECTRICITY SECTOR

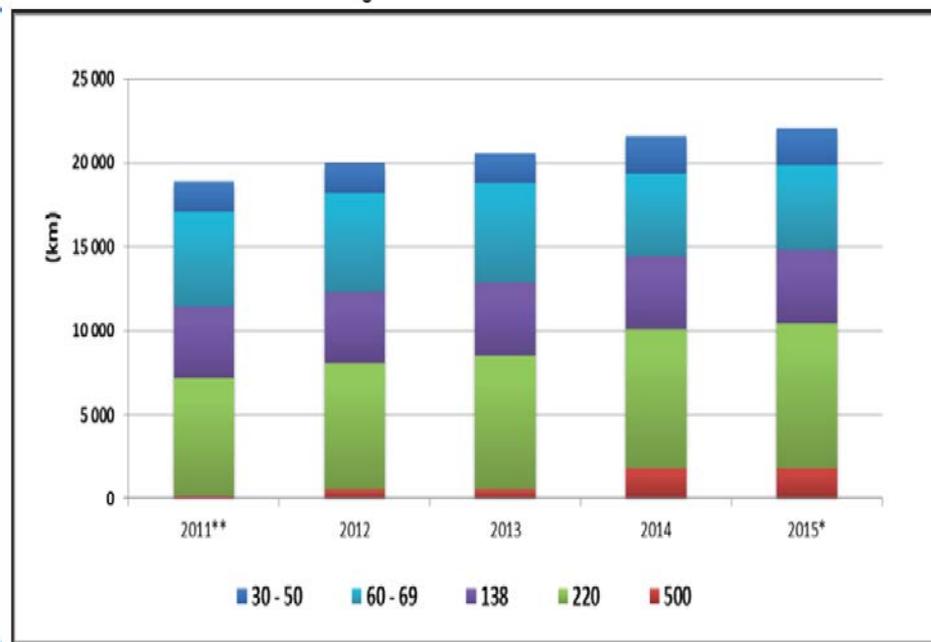
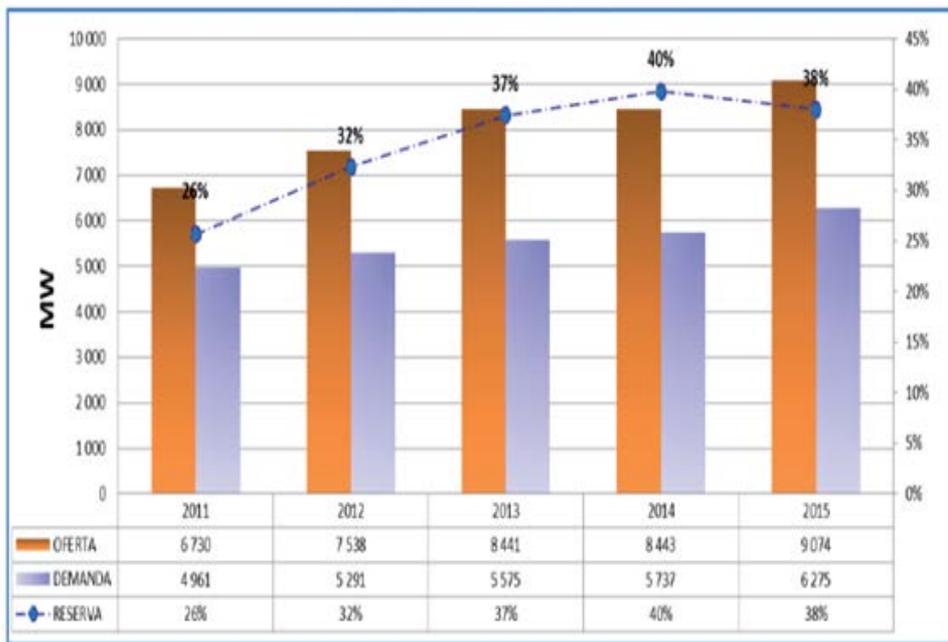


Source: OSINERGMIN

- Investments in the electricity sector in 2014 totaled 2 413 million US\$, of which 88% were private and 12% public (in 2015 the investments were 2 300 million US\$).
- The investment is the result of bidding on contracts awarded that guarantee the prices for energy or services offered.



## MARGIN OF RESERVE ELECTRIC POWER AND TRANSMISIÓN LINE

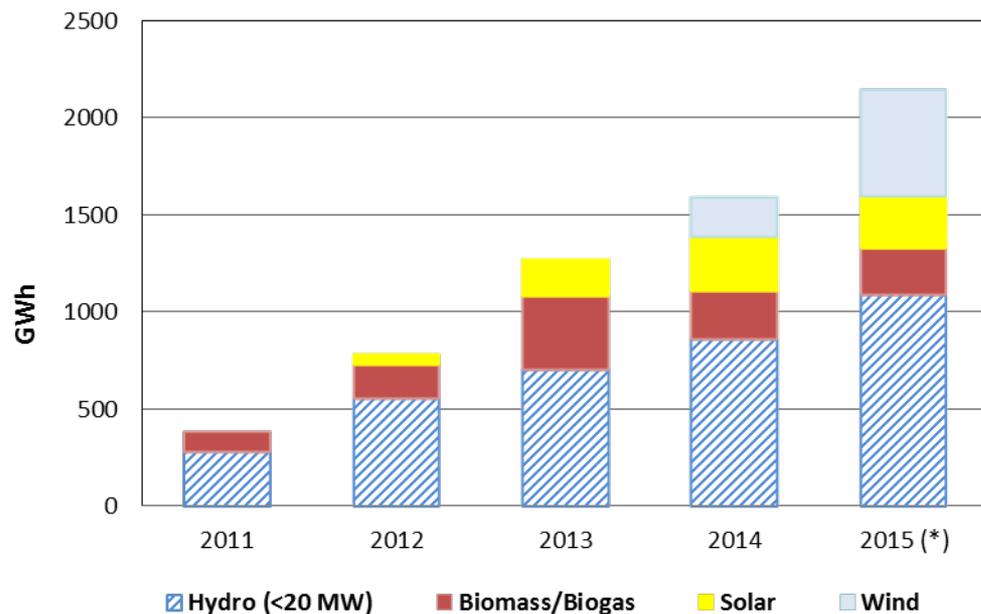


Source: MINEM

- ❑ From 2011 to 2015 the power generated has increased by 2344 MW. This level of generation supply in the country has allowed ensure timely and reliable supply of demand for electricity in the country, while maintaining a reserve margin that ensures safety This provision against possible emergencies that occur in the SEIN.
- ❑ Supply has always been greater than the demand for electricity and the reserve margin has risen from 26% in 2011 to 38% in 2015.
- ❑ From 2011 to 2015 the length of transmission lines has increased by 2,518 km



## ELECTRIC GENERATION WITH RENEWABLE ENERGY RESOURCES



PLANT	POWER CONTRACT (MW)	PRICE AUCTION (US\$/MWh)	INVESTMENT (US\$ x 10 <sup>6</sup> )	OPERATION
C.B. Huaycoloro (Lima)	3.4	110	10.5	06.12.2011
C.S. Panamericana (Ilo)	20	215	94.6	31.10.2012
C.S. Majes 20T (Arequipa)	20	222.5	73.6	31.10.2012
C.S. Repartición 20T (Arequipa)	20	223	73,5	31.10.2012
C.S. Tacna 20 TS (Tacna)	20	225	94.6	31.12.2012
C.E. Marcona (Ica)	32	65.5	61.1	25.04.2014
C.E. Talara (Piura)	30	87.0	101.0	30.08.2014
C.E. Cupisnique (La Libertad)	80	85.0	242.0	30.08.2014
C.S. Moquegua FV (Ilo)	16	119.9	43.0	31.12.2014
C.B. La Gringa (Lima)	3	99.9	5.1	09.01.2015
C.E. Tres Hermanas (Marcona)	90	69.0	185.7	11.03.2016

Source: MINEM

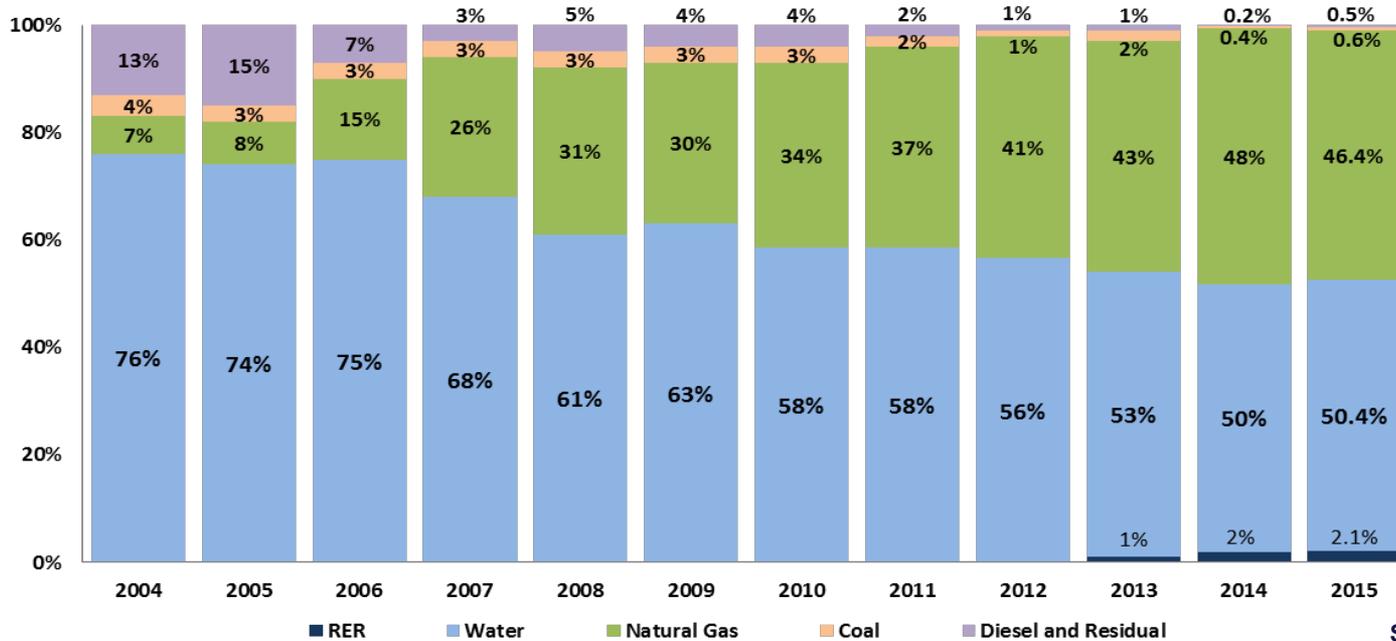
Currently we have 5 solar plants and 4 wind farms in service. The biggest is the Tres Hermanas Wind Power Plant which began operations in March 2016, with 97 MW of installed capacity.



### **3. PAST ENERGY DEMAND AND SUPPLY (STATISTICS)**



## ELECTRIC GENERATION MATRIX OVER THE LAST 11 YEARS

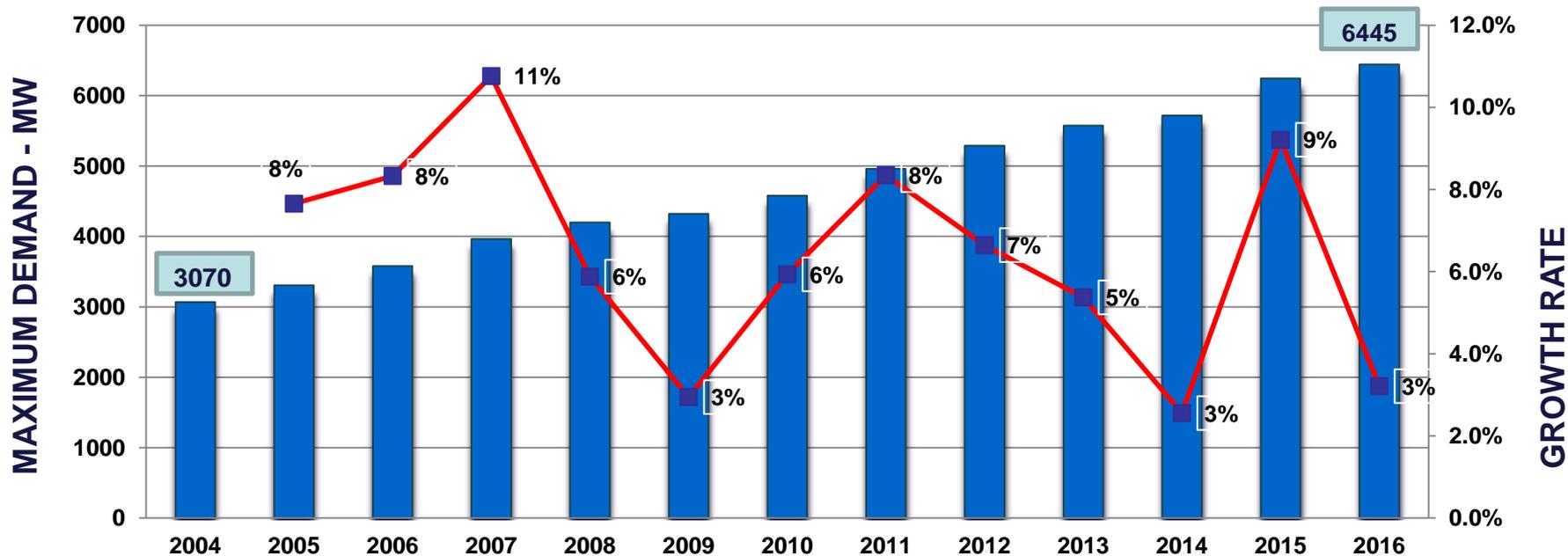


Source:  
OSINERGHMIN

- ❑ Over the last 11 years, energy production technologies with diesel has reduced from 13% to less than 1%. The electrical energy with natural gas has grown (7% to 46%) while hydropower has decreased (76% to 50%)
- ❑ The 2015 energy matrix, comes mostly from Renewable Energy (about 50.4% of energy production was hydroelectric, 46.4% is based on natural gas and 2.1% with other Renewable Sources-No Conventionals).
- ❑ In the period 2011-2015, electricity production had a cumulative growth of 23.9%, from 38 805 GWh in 2011 to 48 295 GW.h in 2015. This represent an average annual growth of 5.6%.
- ❑ The wide availability of water resources and natural gas allowed to meet the growing electricity demand of the country.



## EVOLUTION OF THE PEAK OF ELECTRIC DEMAND



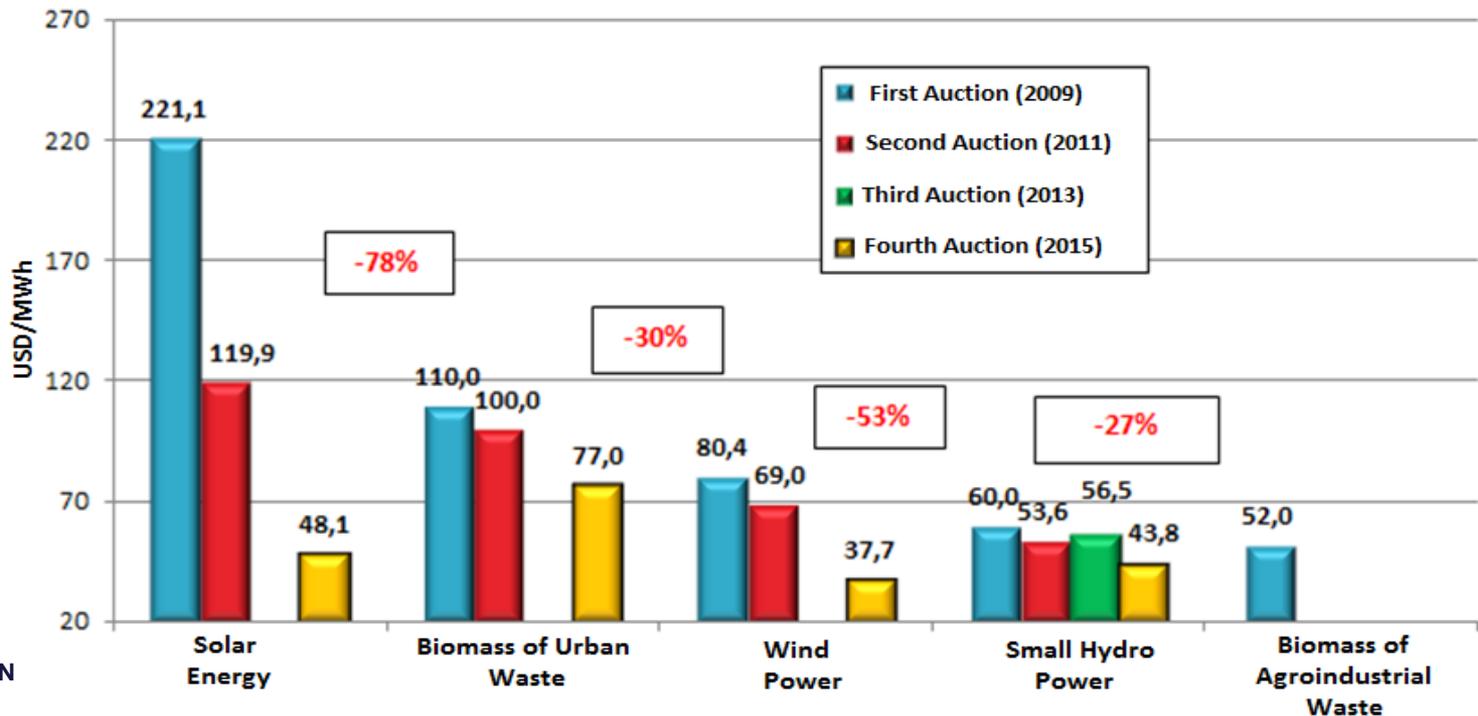
Source: OSINERGHMIN

- ❑ Over the last 10 years the maximum demand has grown on average by 6.2% and the total growth is 50.2%.
- ❑ In the last 5 years the maximum demand has risen 30.2%.



# AUCTION RESULTS RENEWABLE ENERGY RESOURCES

## AVERAGE PRICE OF THE PROJECTS AWARDED



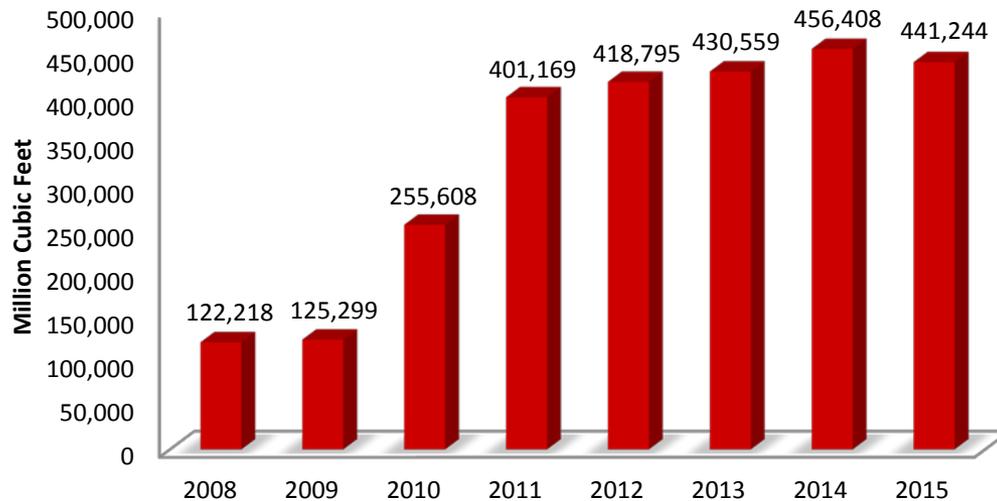
Source: OSINERGHMIN

- ❑ The prices of solar, wind and biomass projects, in the fourth auction have been greatly reduced, compared to the first auction.
- ❑ Idem, the prices of hydraulic projects, in the fourth auction have been reduced, compared to the first auction.



## NATURAL GAS INFORMATION

### NATURAL GAS PRODUCTION FISCALIZED 2008-2015



Source: Petroperu

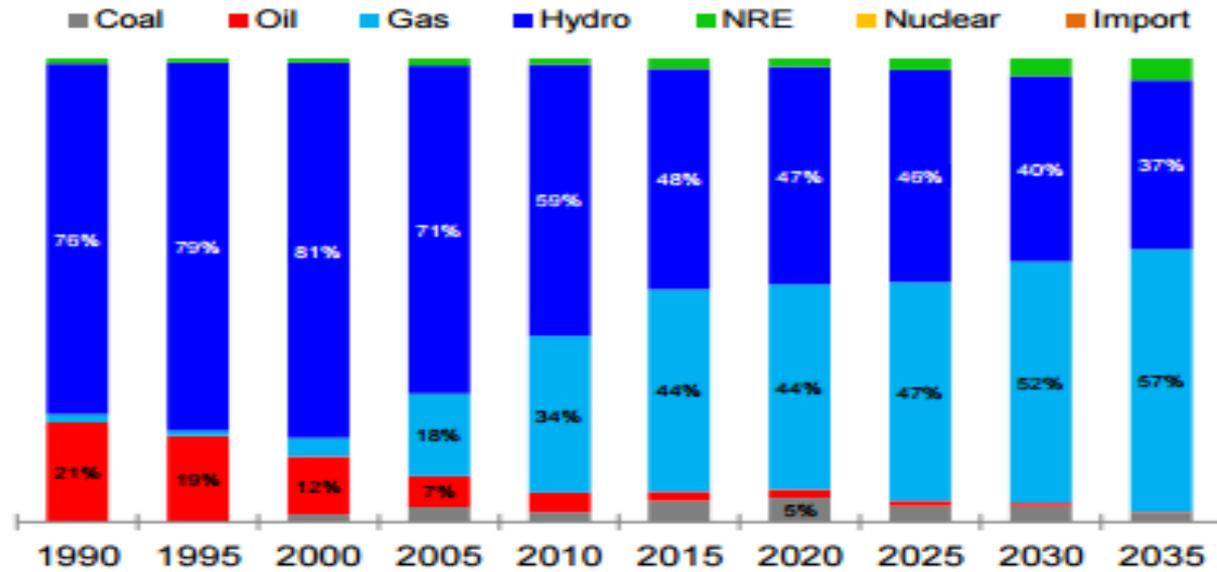
- ❑ In 2015, natural gas production totaled 441 244 million cubic feet, driven by growing demand from power plants, increased consumption of vehicular (VNG), domestic and commercial natural gas.
- ❑ Peru is the only sustainable source of natural gas in the South American Pacific area.
- ❑ Peru has oil fields that have not been explored (29.97 million ha), making it a potential petrochemical hub.
- ❑ The petrochemical industry integrates the production of natural gas and other liquid hydrocarbons, giving it a significant added value.



## 4. OUTLOOK OF ENERGY DEMAND AND SUPPLY



# ELECTRICITY GENERATION MATRIX OF THE PAST AND OF THE FUTURE



Source: APERC Analysis (2012)  
Historical Data: *World Energy Statistics 2011* © OECD/IEA 2011

- ❑ The Government’s efforts to raise the Renewable Energy Resources (NRE) contribution to the electricity generation matrix will pay off in the long term.
- ❑ The Renewable Energy Resources share on total generation is expected to increase from 1% in 2010 to 5% by 2020. The mostly likely Renewable Energy Resources developments will be wind, solar and biomass power plants.



## HYDRO POTENTIAL

According to a recent study, usable potential for hydropower is about **70 000 MW (MINEM)**.

- 86% comes from the resources of the Atlantic Ocean,
- 14% is from the Pacific Rim
- 0.3% is from Titicaca Lagoon Basin.





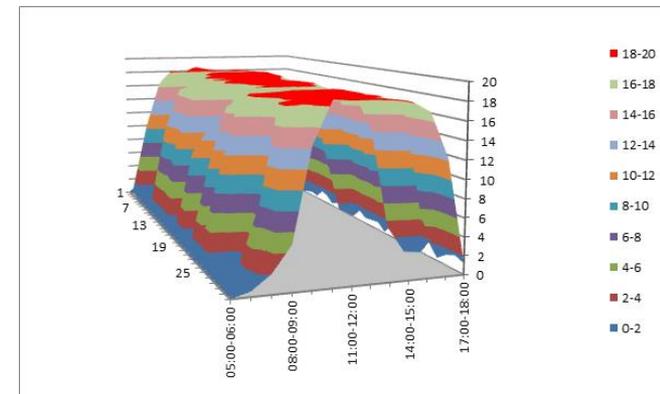
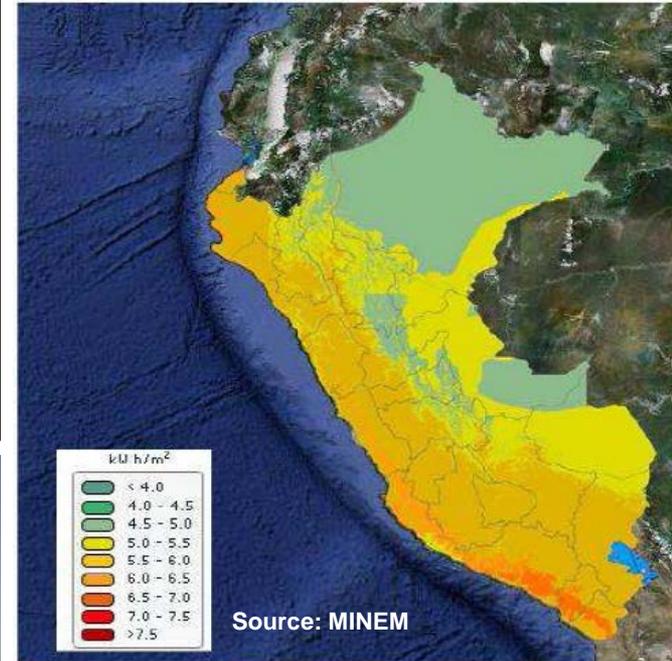
## SOLAR POTENTIAL

Capacity not estimated in terms of solar power for generation projects.

The Solar Atlas ranges contain records of average solar radiation for each month of the year.

- **Mountain:** 5.5 – 6.5 kWh/m<sup>2</sup>
- **Coast:** 5.0 – 6.0 kWh/m<sup>2</sup>
- **Jungle:** 4.5 – 5.0 kWh/m<sup>2</sup>

C.S. Repartición (20 MW)  
Arequipa

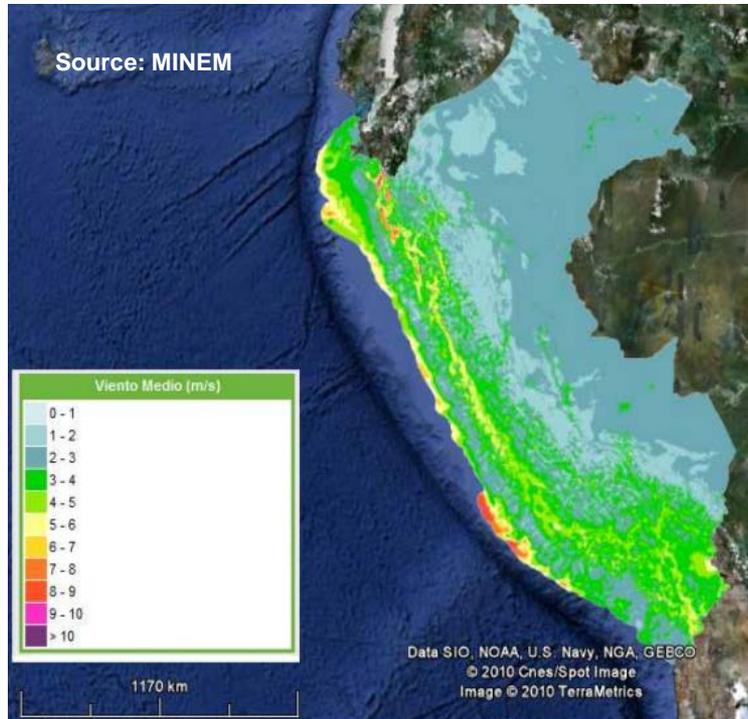




## WIND POTENTIAL

The highest wind potential is located on the coast of Peru, due to the strong influence of the anticyclone of the Pacific and the Andes, generating winds from the southwest across the coastal region.

The Wind Atlas estimates a potential to be exploited of about **22 000 MW.**

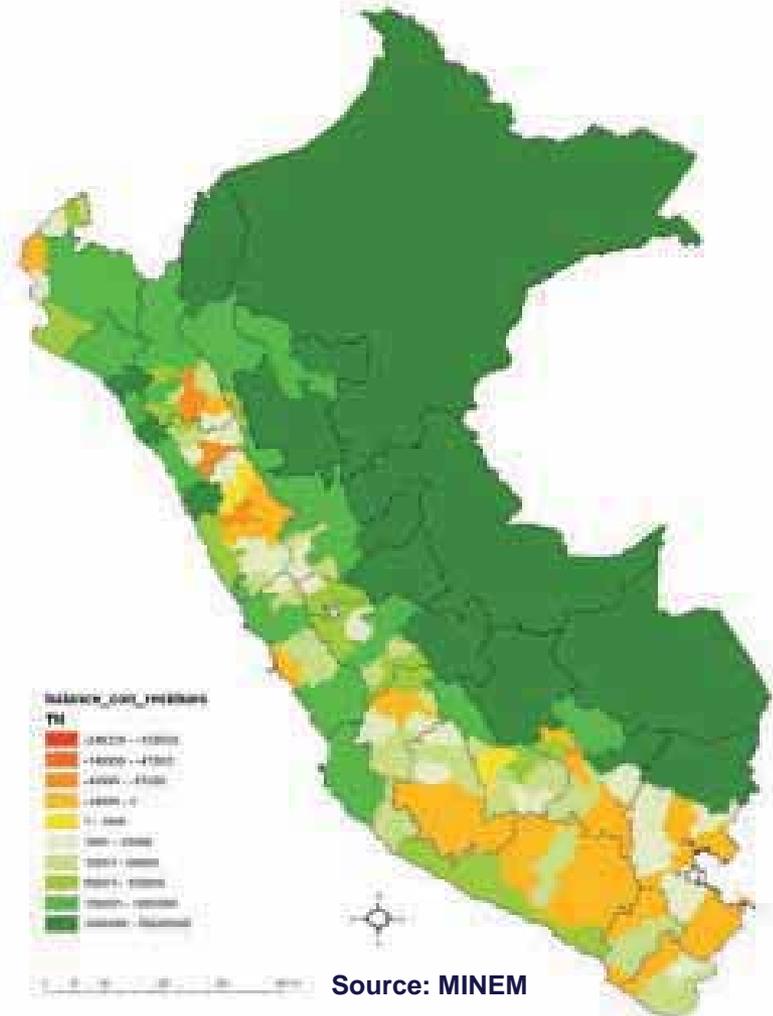




## BIOMASS POTENTIAL

**It is estimated that 177 MW of conventional biomass and 51 MW using biogas will be exploited.**

This is obtained from data records, taking into account agro-industrial waste coming from processing plants of sugar cane, rice husk, cotton, wheat, asparagus and sawmills forest residues.





## GEOHERMAL POTENTIAL

It is possible to install geothermal plants in regions:

Region I: Cajamarca, La Libertad

Region II: Huaylas

Region III: Churín

Region IV: Central

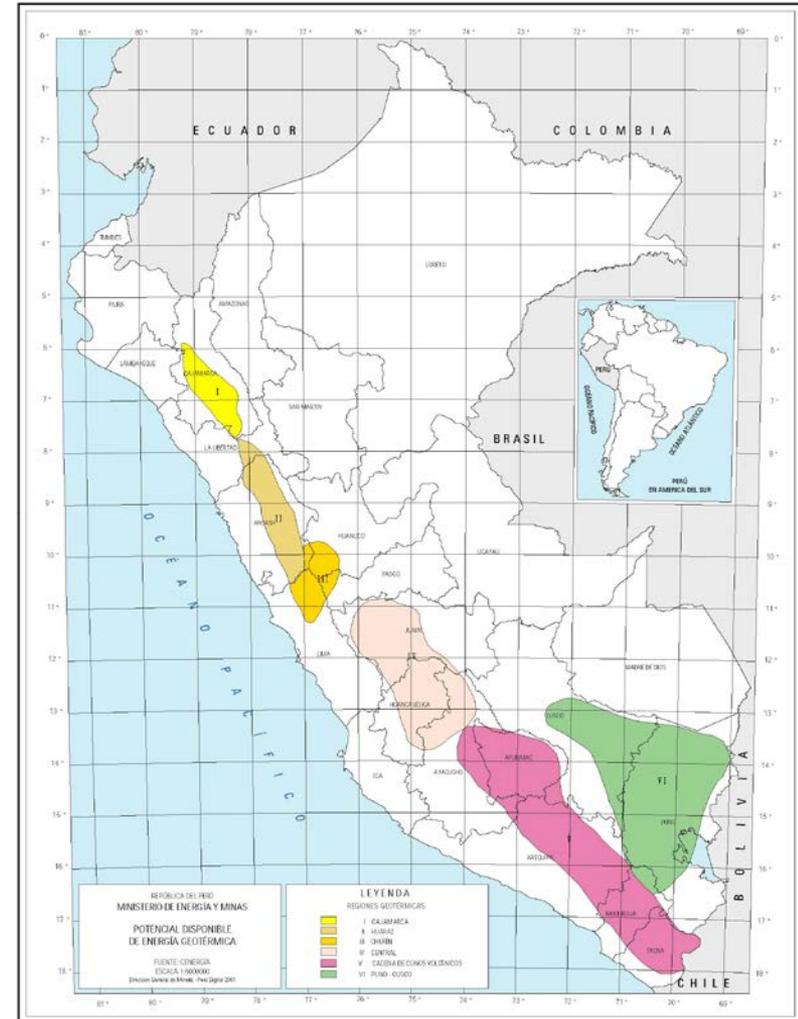
Region V: Southern Volcanic Chain

Region VI: Puno, Cusco

The estimated potential is **3 000 MW**

The greatest potential is in the south of the country, especially in the departments of Puno and Cusco.

Source: MINEM





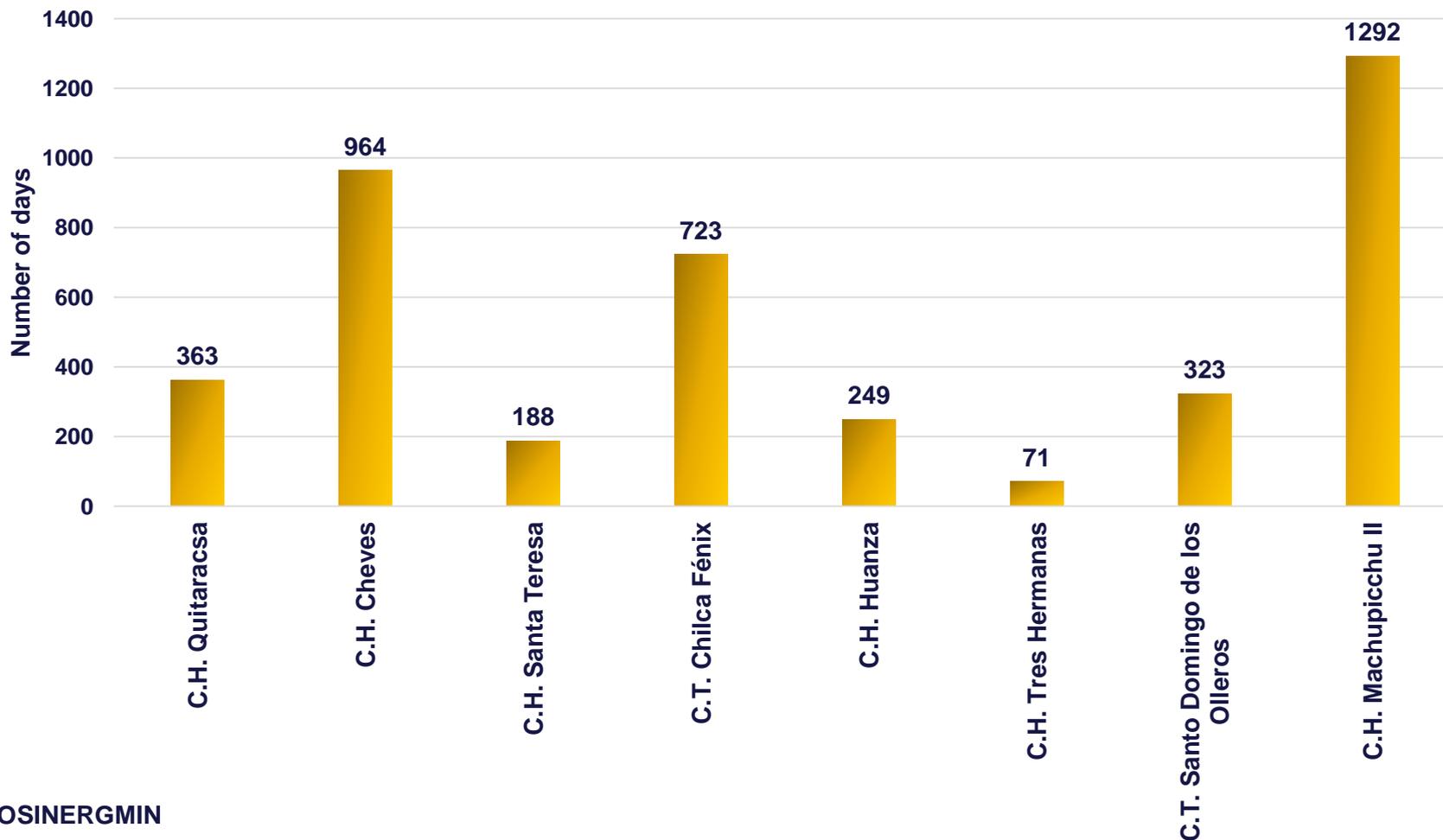
## **5. MAJOR DIFFICULTIES AND BOTTLENECKS CURRENTLY FACED IN FORMULATING ENERGY POLICIES**



- ❑ In Peru for more than three decades there **has not been a long-term energy policy**. At present, we have an energy policy that promotes the participation of clean energy (solar and wind); the problem is the increment of the tariff for the users, because these technologies are expensive and the electricity generation based on these resources do not provide the continuity and reliability of service that is required to strengthen security of supply in the SEIN..
- ❑ **Currently there is no plan for power generation projects**. There is no power generation plan in order to set the projects that enter every year in the national electricity grid. The government seems to not give due importance, **because there is no national energy plan**, nor do citizens show interest. Even though we will be who we will be, favored or prejudiced, given to changes in electricity rates.
- ❑ **Peru doesn't have a plan to invest resources efficiently**. We believe that before delivering energy to rural zones, we have to promote a process of change that exploits the productive use of electricity to generate wealth.
- ❑ **There isn't progress in the development of geothermal energy**. In Peru we are in the stage of exploration; the exploitation of this important energy resource has not been started, despite the significant potential existent.
- ❑ The time spent on the approval of environmental permits for the construction of power plants and power transmission lines are excessive and generate delays in commissioning of projects.



## DELAY TIME OF COMMERCIAL OPERATION -CENTRAL GENERATION



Source: OSINERGMIN



## 6. SUBJECTS TO STUDY



Subject	Priority	Reason
Implementation of geothermal energy in the energy matrix of a country	Very Important	<p>Geothermal energy can bring benefits to Peru, could reduce oil consumption and carbon emissions.</p> <p>It could also help to increase energy security, and leverage the opportunities of the regional electricity market.</p> <p>It is necessary to know the strengths and weaknesses of this technology, as for example, the high investment costs make it risky to start the work on these projects, and it is necessary to know aspects that could be useful in the perfection of the current regulations.</p>
Smart Grids and Energy Saving	Important	<p>The control of energy and its efficient use is very important to secure energy resources and reserves needed in the future.</p> <p>To ensure the efficiency and sustainability of power systems with low losses and high levels of quality, safety and reliability of electric service.</p>
Implementation Nuclear Fusion and Nuclear Fission must to be included in the Energy Matriz	Important	This Potential Source of Energy will to be important when Fossil Fuels Run Out.



**Thanks for your attention**

**Edwin Ramirez Soto**

Specialist of Supervisory Agency of Investment of Energy and Mining of Peru (Osinergmin)

Fixed Phone : (51-1) 2193400 Ext.1425  
Cell Phone : 990 334771  
E-mail : [eramirezs@osinergmin.gob.pe](mailto:eramirezs@osinergmin.gob.pe)  
[ramirezsoedwin@gmail.com](mailto:ramirezsoedwin@gmail.com)  
<http://www.osinergmin.gob.pe>



Contact : [report@tky.iej.or.jp](mailto:report@tky.iej.or.jp)