



Role of the Regulator to Foster Renewable Energy

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INTRODUCTION



Who are we?



Hydrocarbons



Electricity



Mining



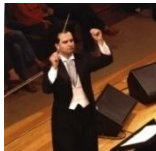
Natural gas



Electrical Power Institutional Structure



- Supervisor & surveillance agent
- Sets rates
- Settles disputes among operators
- Settles users' complaints



- Clusters generators, transmitters and users
- Responsible for system operation at a minimum cost



- Agency in charge of issuing policies and standards for this sector

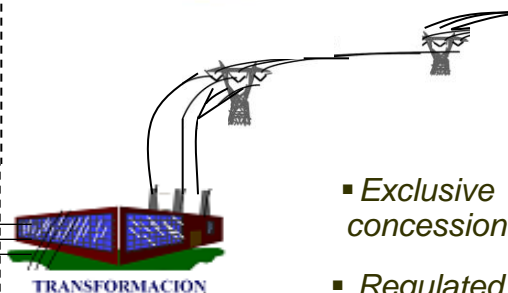
With GENERATION



Markets

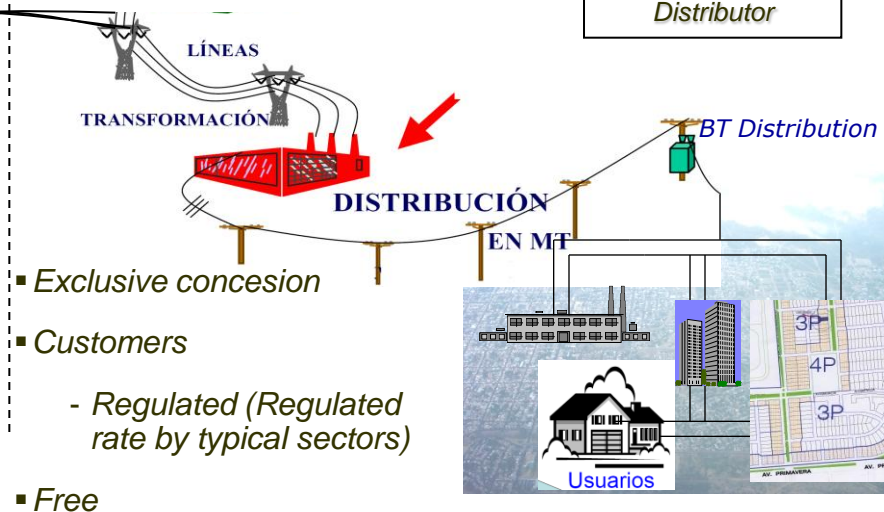
- Distributors
- Free

TRANSMISSION



Free Customer Generator

DISTRIBUTION





Activities in the electric power sector



Peruvian electric power system

- **Generation level prices**
- **Firm prices**
- **Power price**
- **Guaranteed price**
- **Complementary system**
- **Main system**
- **Secondary system**
- **VAD**
- **Model & efficient company and Yardstick Competition**
- **Includes marketing**



POWER GENERATION



Power Generation

- ✓ Bids are filed for long term contracts to supply power on behalf of distributors (Law N° 28832).
- ✓ The resulting price of auctions is called **Firm Price**.
- ✓ **OSINERGMIN sets a base or maximum price** to avoid collusion, so it is kept in a sealed enveloped, it is only disclosed if bids exceed such amount without covering the auctioned energy.
- ✓ During auctions, **hydroelectric plants have a premium**, and its purpose is promotion.
- ✓ **Free Customers, just like other distributors can become part of the bid** summoned by the Distributing Company. However, **the regulated market will have the priority**.
- ✓ In long term bids only energy is auctioned, the **power price is set by OSINERGMIN**.



Long Term Bids

Year	Bid	Required Power (MW)			Awarded Power (MW)			Covered by Bid (%)
		Fix	Variable	Total	Fix	Variable	Total	
2009	ED-01-2009-LP : 2014-2021	1.010,7	202,1	1.212,9	1.010,7	202,1	1.212,9	100%
2009	ED-02-2009-LP : 2014-2023	551,9	110,4	662,3	551,9	110,4	662,3	100%
2009	ED-03-2009-LP : 2014-2025	541,6	108,3	649,9	541,6	108,3	649,9	100%
2009	DISTRILUZ: 2013-2022	465,1	93	558,1	387,6	77,5	465,1	100%
2010	LDS -01-2010-LP: 2014 -2023	558	111,6	669,6	558	111,6	669,6	100%
2010	ELD-01-2010: 2014 - 2018	24,9	5	29,9	24,9	5	29,9	100%
Totals		3.152,2	630,4	3.782,6	3.074,7	614,9	3.689,6	100%



Power Transmission

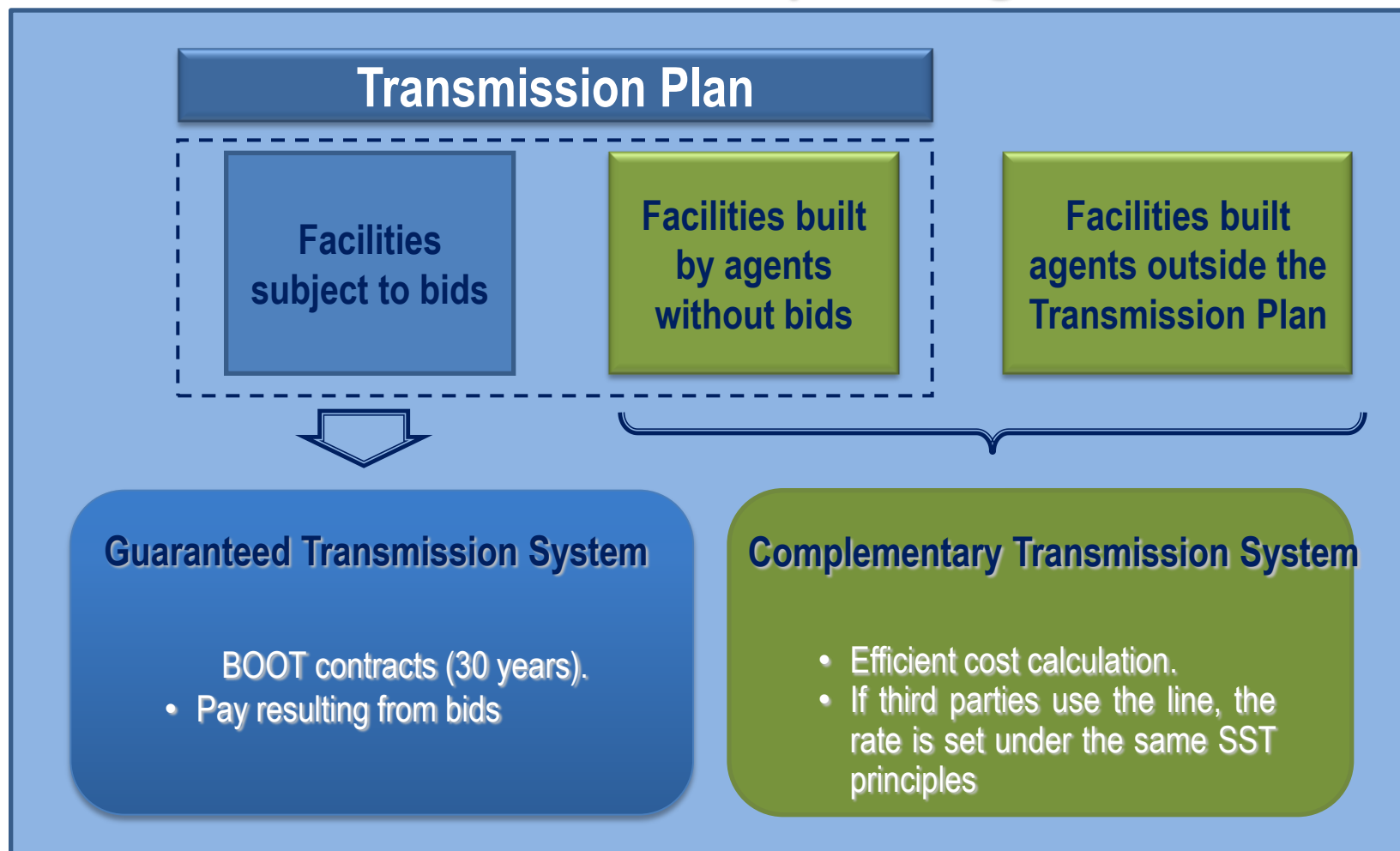


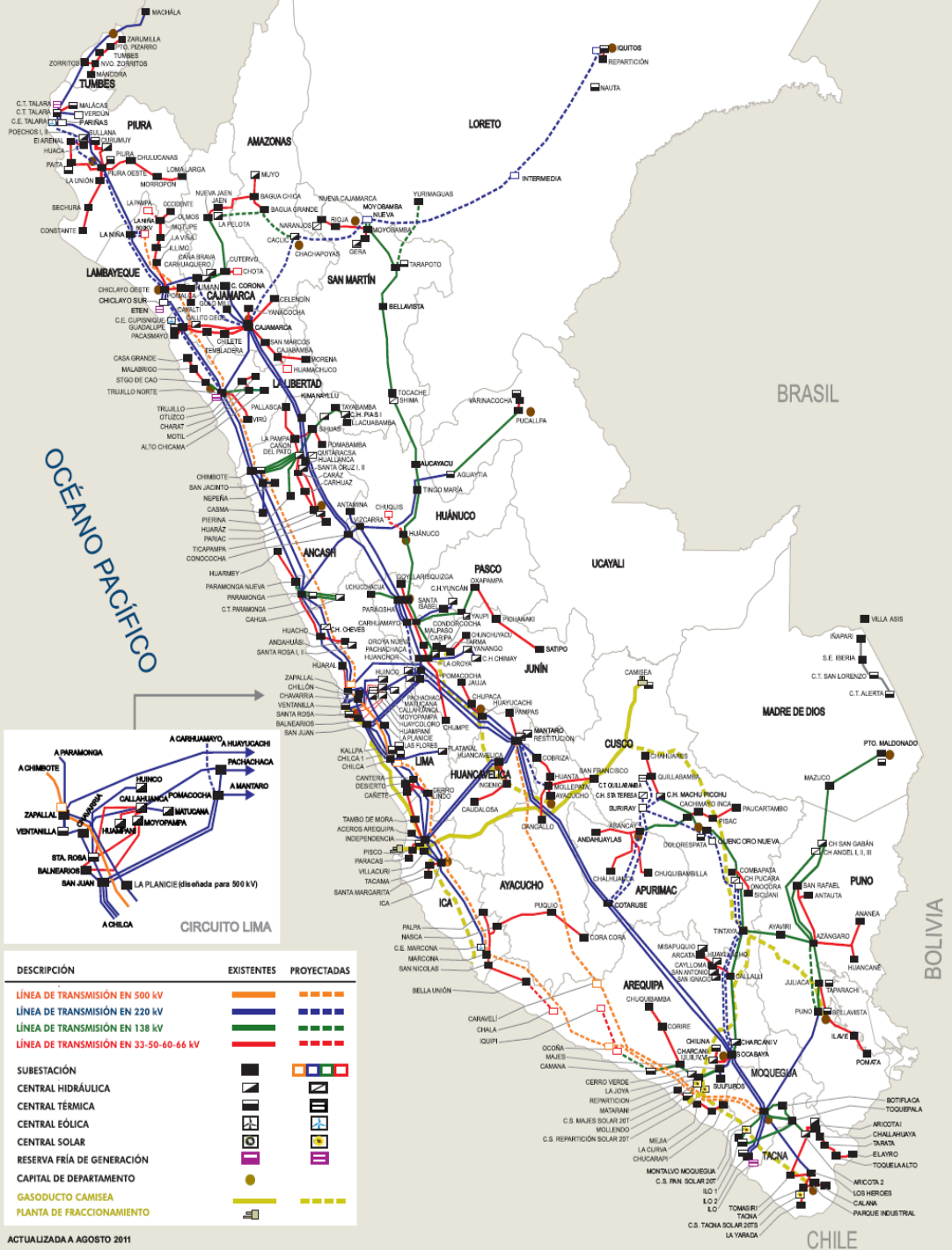
Power transmission

- ✓ Power Concessions Law - LCE (1992) sets two Transmission systems: **Main & Secondary Systems**.
- ✓ To ensure an efficient development of power generation, the law adds two transmission systems (2006): **Guaranteed and Complementary Systems**.
- ✓ According to the regulation framework, **Transmission planning is presented in 3 stages**: a) COES plans b) MINEM approves with remarks of OSINERGMIN c) MINEM bids extensions and new lines of the guaranteed system for 30-year BOOT contracts
- ✓ MINEM can delegate such task to ProInversión.



Transmission planning





2011 Power Transmission Lines



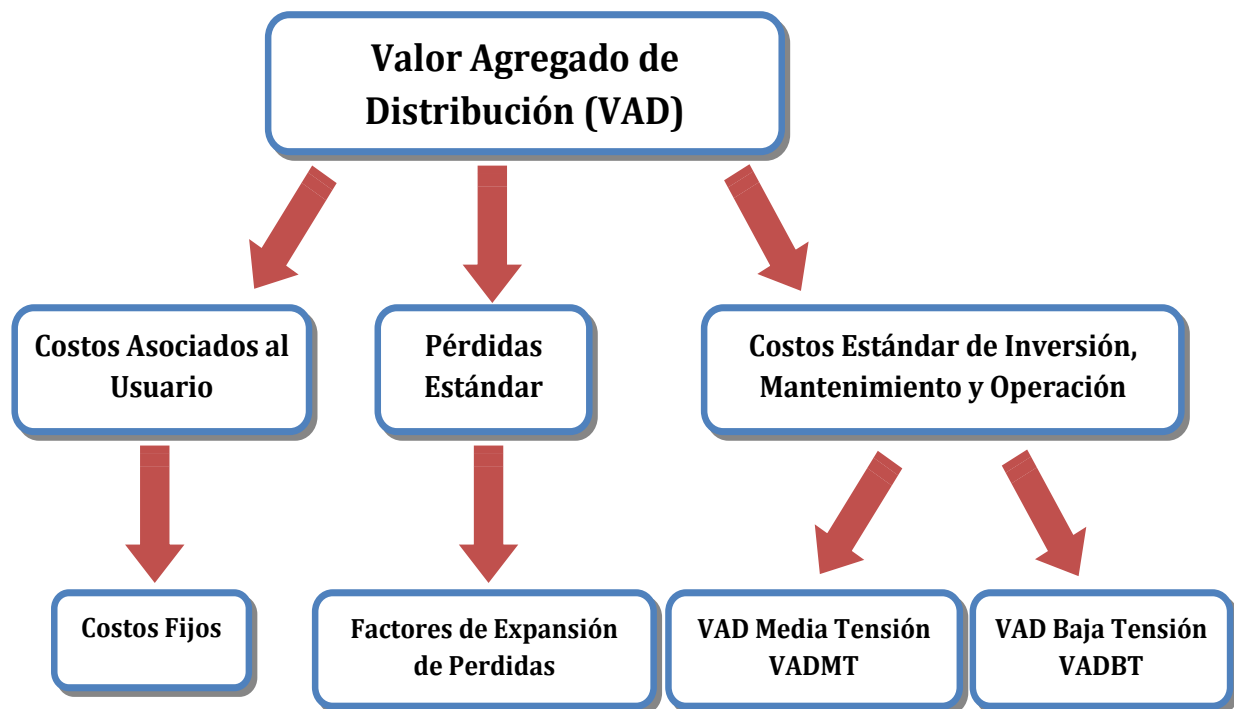
Power Distribution



Distribution Added Value (DAV)

Power distribution rates are represented by the Distribution Added Value (DAV). According to Artículo 64° of LCE, DAV includes the following components:

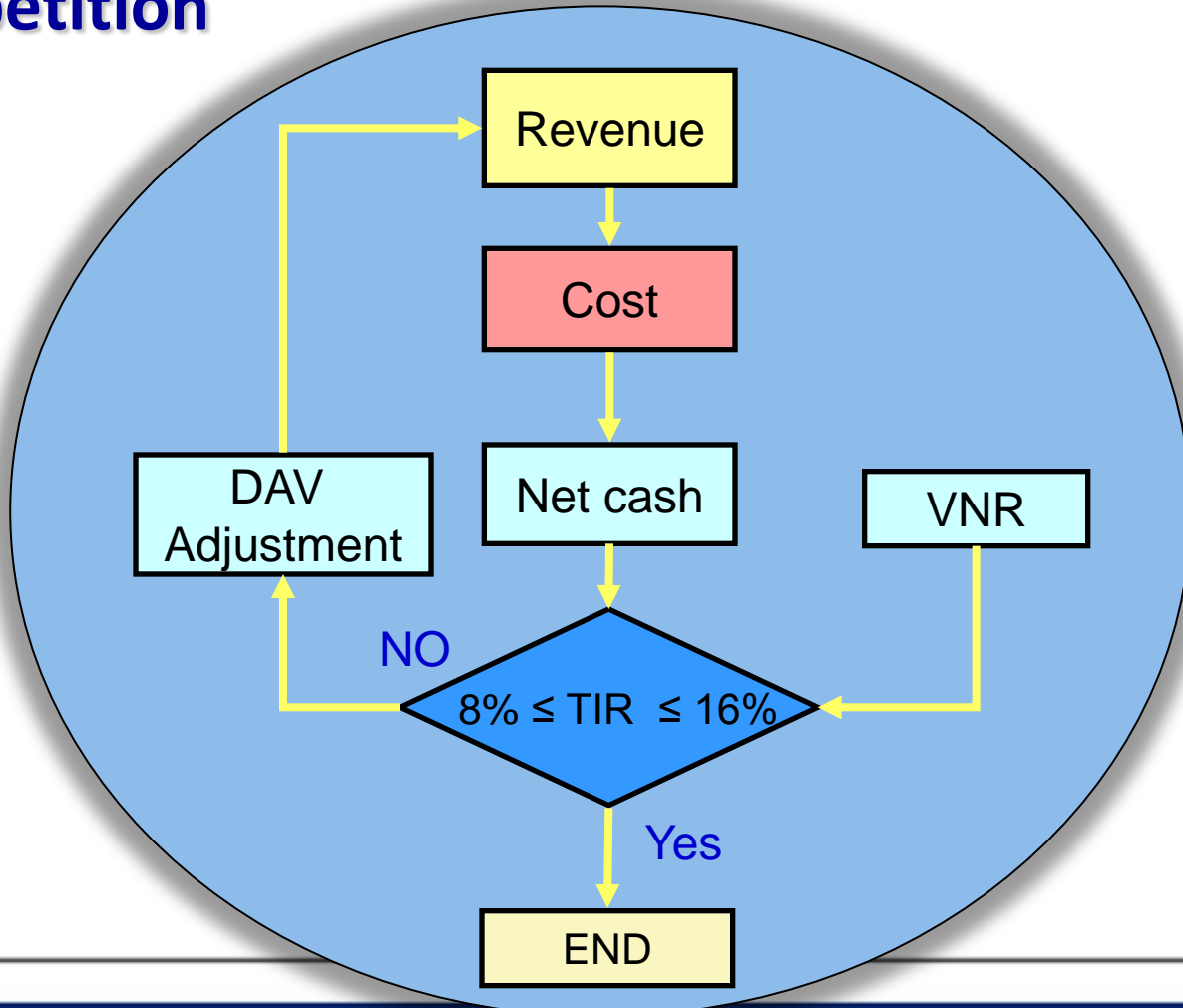
- ✓ **User related costs**, regardless of their power demand and energy.
- ✓ **Standard losses** of distribution in power and energy.
- ✓ **Maintenance & Operations Investment standard cost** related to distribution, per unit of supplied power





Efficient Model Company & Yardstick Competition

Due to the characteristics of other systems of the sector there might be differences with respect to the company chosen to be the model, a profitability check is performed by a group of concessionaries (must be between 8% and 16%)



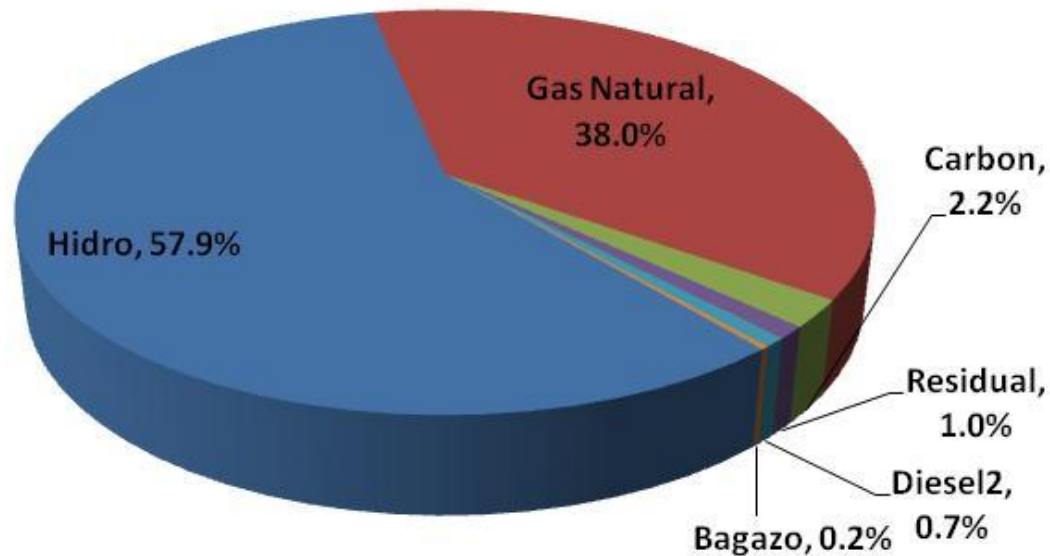


Generation & Electrical Potential with RE in Peru



Power generation in Peru

Accumulated power production up to Oct. 2011



Peru is Hydrothermal

- 2010: Hyd: 59% ; Therm: 41%
- 2009: Hyd: 63% ; Therm: 37%
- 2008: Hyd: 61% ; Therm: 39%
- 2007: Hyd: 68% ; Therm: 32%
- 2006: Hyd: 75% ; Therm: 25%
- : : :
- 2002: Hyd: 85% ; Therm: 15%

RE is typically used in Peru for production, historically more than half of the power production in Peru comes from renewable sources.

Hydro Potential

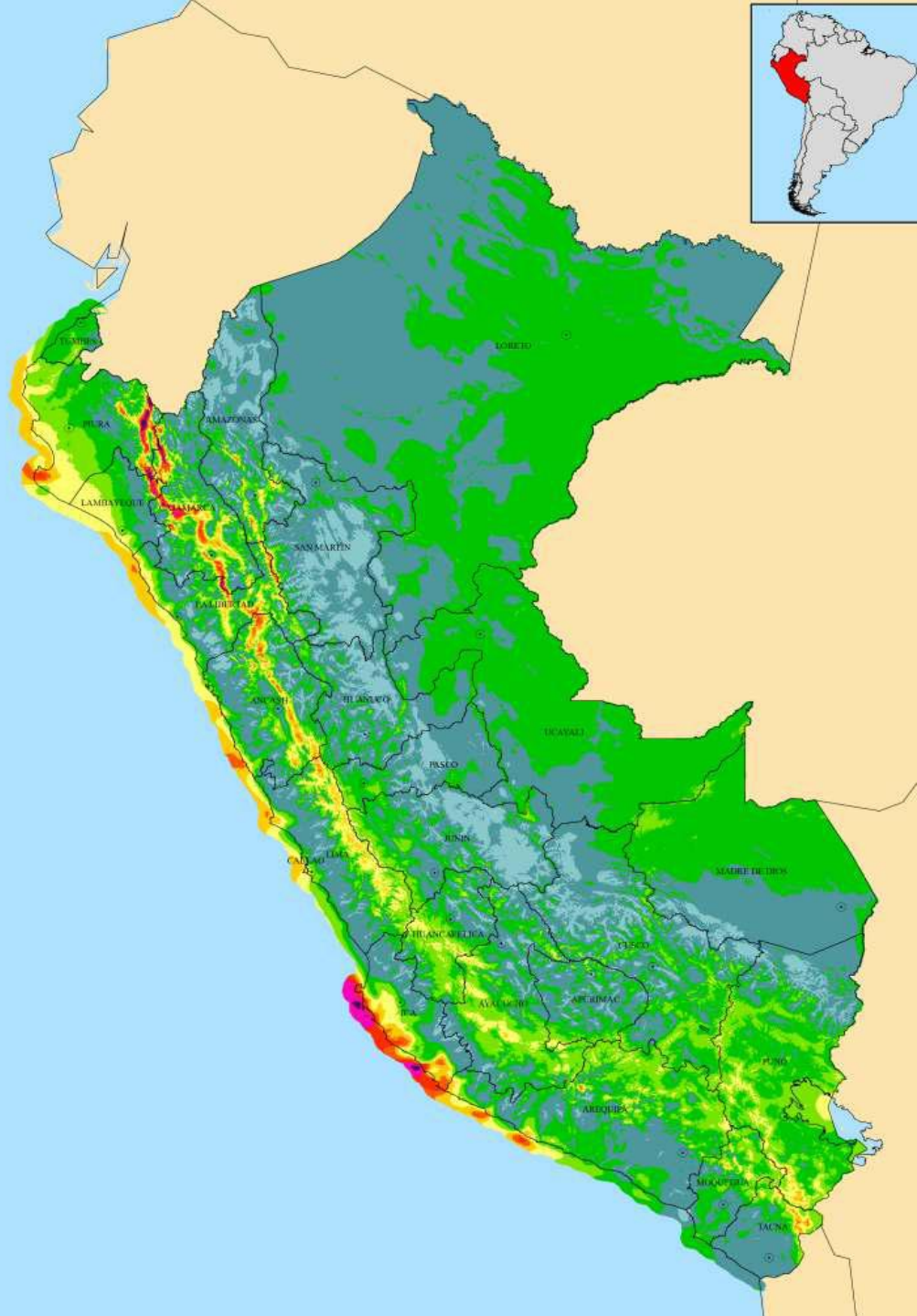
Recently, MINEM performed a preliminary study on hydro potential used by hydroelectric plants up to 100 MW, estimating an aprox. potential of 70 000 MW

The previous hydroelectrical potential study dates back to the 70's. The potential that can be technically used amounts to 60 000 MW, out of which 86% comes from the Atlantic Basin resources, 14% from the Pacific Rim and 0,3% from the Titicaca River Basin.



Wind Potential

The largest wind potential is located on the coastline of Peru, due to the anticyclone influence of the Pacific and the Andes that generate winds coming from the southeast throughout the coastline. The Wind Atlas estimates a potential over 77 000 MW, out of which more than 22 000 MW can be used. However, specific studies are needed to determine the real wind potential of Peru.



Dptos.	%	Velocidades (m/s)		Prom. (m/s)
Ica y Piura	15%	8	9	8,5
	30%	7	8	7,5
	55%	6	7	6,5
	Velocidad Promedio (m/s)			7,2

Solar Potential

Solar projects capacity for power generation has not been estimated.

The Solar Atlas Solar only has records of average solar radiation for each month of the year.



Geothermal Potential

There is the possibility to install several geothermal farms in 6 regions:

Region I: Cajamarca, La Libertad

Region II: Callejón de Huaylas

Region III: Churín

Region IV: Central Area

Region V : South Volcanic Chain

Region VI : Puno, Cusco

The largest potential is located in the south part of the country, specially in the areas of Puno and Cusco.





RER regulations framework in Peru



Legal Framework

- **Law to foster investment for power generation based on RE usage – Legislative Decree 1002 (May 2008).**
- **RE based power generation Regulation Supreme Decree 012-2011-EM (March 2011).** Replaces the original Regulation (Supreme Decree 050-2008-EM).
- Consolidated Rules for the **First RE Auction (RER)**, approved through the **Vice ministerial Resolution N° 113-2009-MEM/VME** of the Ministry of Energy and Mines.
- Consolidated Rules of the **second RE Auction (RER)**, approved through the **Vice ministerial Resolution N° 036-2011-MEM/VME** of the Ministry of Energy and Mines.

Updated and compiled documents are available in:
www.osinergmin.gob.pe



Legislative Decree No. 1002

Legislative decree to promote investment for power generation using renewable energy

The Renewable technologies are not conventional and include:

- + Photovoltaic Solar
- + Thermal Solar
- + Wind
- + Geothermal
- + Biomass
- + Hydroelectric **only up to 20 MW**



Regulatory Framework Scope

- **RE in the Power Generation Matrix**

States that every 5 years MINEM will set a target percentage where it must participate in the domestic power consumption, power generated based on RER, such target percentage will be up to an annual 5% during the first 5 years. Mini Hydros are excluded from this target percentage. MINEM will determine the amount to be auctioned.

- **Power commercialization and power generated based on RER** It has dispatch priority (it is considered to have a variable production cost equal to zero), preferential premium in auctions (charged in transmission loads), grid connection priority, besides R&D funding.



Regulatory Framework Scope

- OSINERGMIN sets **basic rates (maximums) and and premiums**, by RE category and technology and through auction mechanisms.
- **Premiums** are paid by users as an annual markup in the **Transmission Toll**.
- OSINERGMIN will summon an auction in domestic newspapers and on a specialized international mean.



General auction aspects

Frequent questions	Respuestas
Who performs the auction?	OSINERGMIN
How frequently do they take place	Auctions are summoned with a frequency no less than 2 years .
What will be auctioned?	The Required Energy in MWh/year plus some small hydroelectric facilities.
How much energy will be auctioned?	<ul style="list-style-type: none"> • MINEM will set a target % every 5 years • During the first 5 years it is 5% of domestic consumption. • This Required Energy is for all RER technologies
What defines the Required Energy allocation by technology?	<ul style="list-style-type: none"> • MINEM is the authority that defines it according to the energy development policies of the country. • The allocation of the Required Energy per technology represents the penetration limit of such technology • MINEM approved the RE National Plan.



ASPECTOS GENERALES DE LAS SUBASTAS

Preguntas frecuentes	Respuestas
How long will the RER rates be valid?	<ul style="list-style-type: none"> • Awarded rates in auctions will be in effect between 20 and 30 years. • Effective term is determined based on auction rules..
What is an Awarded Rate?	<ul style="list-style-type: none"> • It is the rate guaranteed to each awardee, for the sale of energy production, expressed in ctvs. US\$/kWh ó US\$/MWh. • The resulting rate from the auction of RER projects and it is firm during the effective term.
How are RER generators paid?	<p>In two ways:</p> <ul style="list-style-type: none"> • By energy sale at a marginal cost (Income 1) • With a premium (Income 2) if the first one does not cover the awarded rate • Premium is paid ex-post (after 1 rate year, after the yearly settlement).



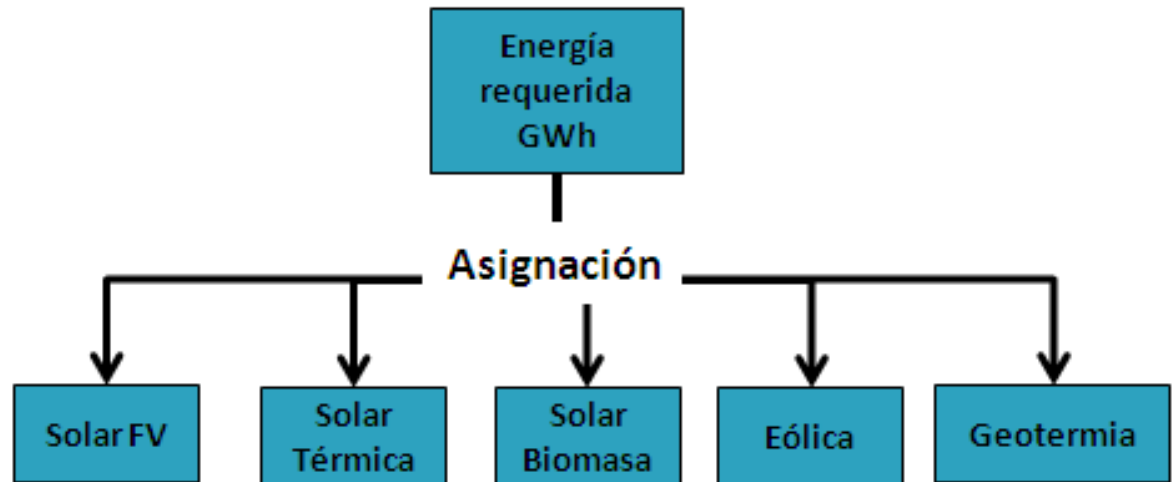
RE Auctions

1° Total request power is defined

2° It is assigned to each power technology required

3° There is an auction for each assigned energy type

Auction per technology





RE Auction

Auction stages

1. Prior announcement (MINEM)
2. Rule approved (MINEM)
3. Summons (OSINERGMIN)
4. Registration of participants and Sales of Rules (OSINERGMIN)
5. Rules consultations and remarks (Participants)
6. Publication of consolidated rules (MINEM)
7. Bids delivery (Participants)
8. Evaluation of technical bids (Committee)
9. Publication of Bidders' List (Committee)
10. Awarding and Buena Pro (Committee)
11. Contract signature (MINEM + Awardees)



RE price regulation

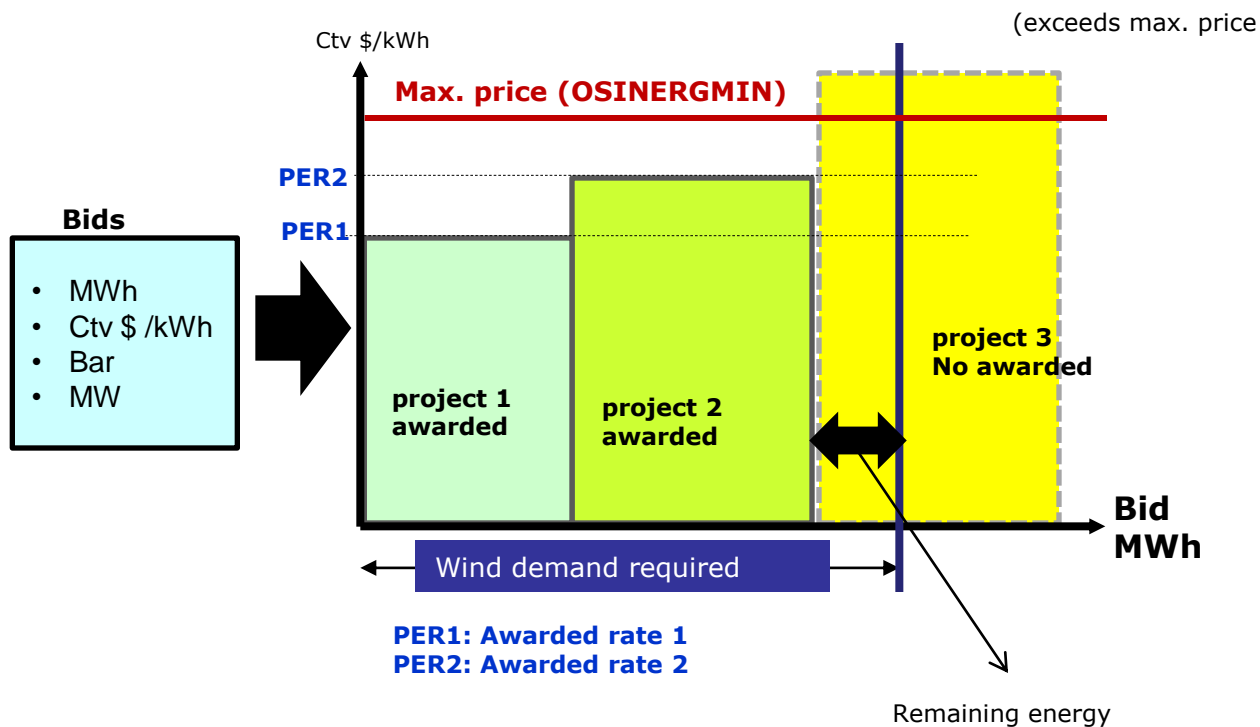


Awarded energy and Awarding Rates

Steps:

- 1° Highest price is disclosed
- 2° Bids are opened and projects are ordered from the lowest to the highest price. The ones that exceed the price are discarded.
- 3° Ensure MW do not exceed power limits in the Bid Bar
- 4° If the MWh in the bid is under the Required Energy, it is awarded
- 5° If the MWh in the bid exceeds the Required Energy, it is checked to decide if a partial award is approved and if it is under the maximum price

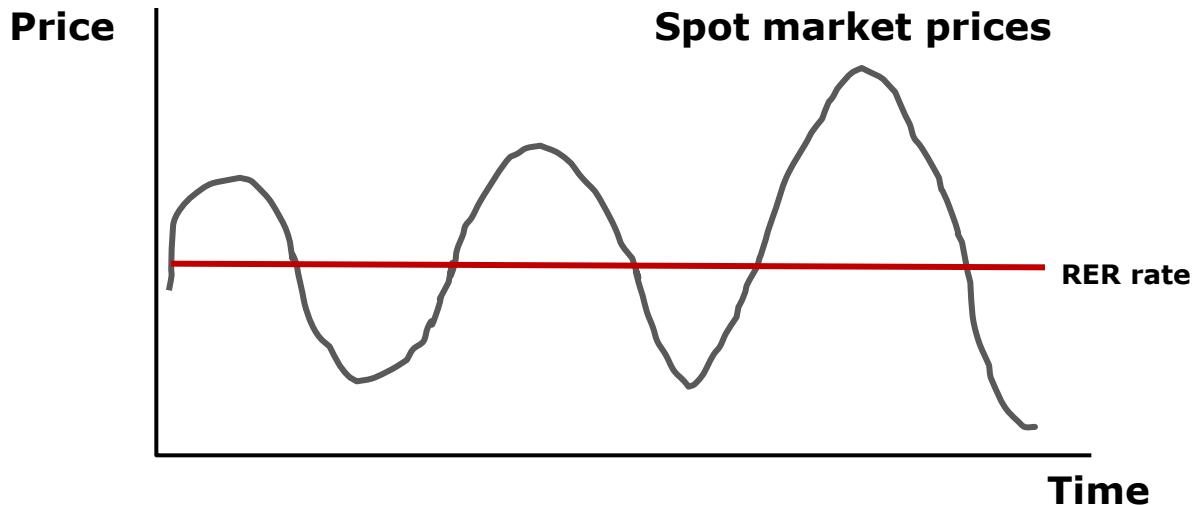
Example: Awarding wind projects





Premiums

- Rates are set by categories and through auctions.
- RER awardees receive an awarding rate for the net produced energy and sold to the market.
- They will be paid for the energy (awarded) produced at a spot price.
- By year end, if their revenue considered in the awarded rate was not achieved with the paid spot price, then there will be an offset Premium





First RER Auction



First auction design: First summon

- 20-year term.
- The energy required for different technologies was assigned as follows:

	Tecnología Biomasa	Tecnología Eólica	Tecnología Solar	Total
Energía GWh/año	813	320	181	1314

- Additionally, it also participated un hydroelectric RER, up to a maximum of 500 MW.



Result of the first RE Auction: First Summon

I. Required energy

	Biomass	Wind	Solar	Total
Required energy (GWh/year)	813	320	181	1314
Awarded energy (GWh/year)	143.3	571	172.94	887.24
% awarded	18%	178%	96%	68%

II. Required Power

	Hidroeléctricas
Required Power (MW)	500
Awarded Power (MW)	161.71
% awarded	32%

**Quotas not covered by
one technology can be
covered by others**

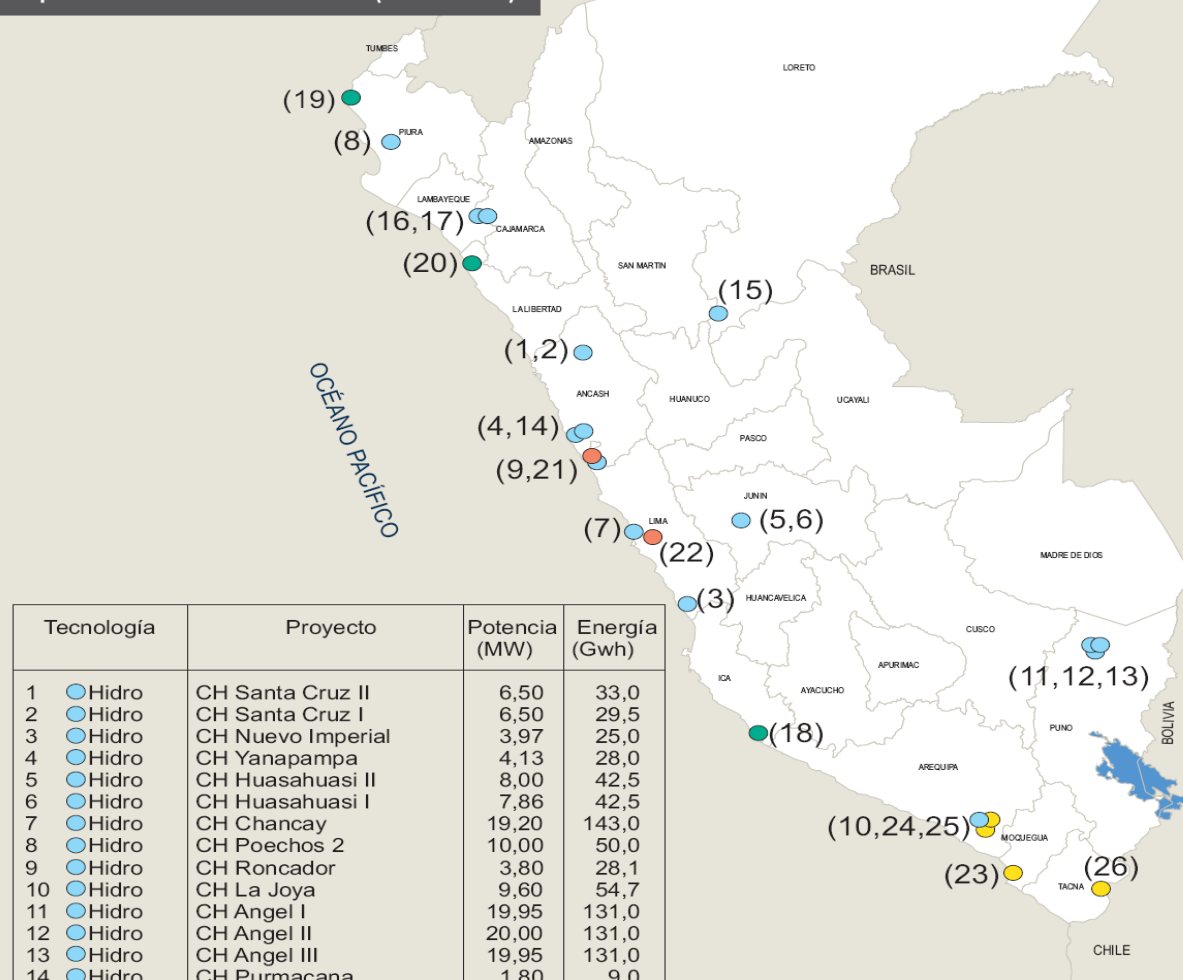
III. Price Results

	Precio Base fijado por OSINERGMIN	Precio Promedio Ofrecido	Nº of proposed projects	Nº de projects awarded
Biomass (Ctv US\$/kWh)	12.00	8.10	2	2
Wind (Ctv US\$/kWh)	11.00	7.92	6	3
Solar (Ctv US\$/kWh)	26.90	22.14	6	4
Hydro (Ctv US\$/kWh)	7.40	5.99	17	17

Power generation projects with Renewable Energy Resources (RER)

These projects were awarded during the First Summon of the First RER Auction performed in Peru (2010).

Ministerio de Energía y Minas PROYECTOS DE GENERACIÓN CON RECURSOS ENERGÉTICOS RENOVABLES (RER) Adjudicados en la 1ª Subasta RER (2010-02-12)



Tecnología	Proyecto	Potencia (MW)	Energía (Gwh)
1 Hidro	CH Santa Cruz II	6,50	33,0
2 Hidro	CH Santa Cruz I	6,50	29,5
3 Hidro	CH Nuevo Imperial	3,97	25,0
4 Hidro	CH Yanapampa	4,13	28,0
5 Hidro	CH Huasahuasi II	8,00	42,5
6 Hidro	CH Huasahuasi I	7,86	42,5
7 Hidro	CH Chancay	19,20	143,0
8 Hidro	CH Poechos 2	10,00	50,0
9 Hidro	CH Roncador	3,80	28,1
10 Hidro	CH La Joya	9,60	54,7
11 Hidro	CH Angel I	19,95	131,0
12 Hidro	CH Angel II	20,00	131,0
13 Hidro	CH Angel III	19,95	131,0
14 Hidro	CH Purmacana	1,80	9,0
15 Hidro	CH Shima	5,00	32,9
16 Hidro	CH Carhuaquero IV	10,00	66,5
17 Hidro	CH Caña Brava	6,00	21,5
18 Eólica	CE Marcona	32,00	148,4
19 Eólica	CE Talara	30,00	119,7
20 Eólica	CE Cupisnique	80,00	303,0
21 Biomasa	CTC Paramonga I	23,00	115,0
22 Biomasa	CTB Huaycoloro	4,40	28,3
23 Solar	Panamericana Solar 20T	20,00	50,7
24 Solar	Majes Solar 20T	20,00	37,6
25 Solar	Repartición Solar 20T	20,00	37,4
26 Solar	Tacna Solar 20TS	20,00	47,2



PERÚ

Ministerio de Energía y Minas



Fist Auction Design: Second summon

- 20-year term
- The energy required was allocated to different technologies, as follows:

	Tecnología Biomasa	Tecnología Solar	Total
Energía GWh/año	419	8	427



Results of the first RE auction: Second summon

I. Required Energy

	Biomass	Solar	Total
Required energy (GWh/year)	419	8	427
Awarded energy (GWh/year)	11.7	0	11.7
% awarded	3%	0%	3%

II. Required Power

	Hidroeléctricas
Required Power (MW)	338.29
Awarded Power (MW)	19
% awarded	6%

III. Price results

	Precio Base fijado por OSINERGMIN	Precio Promedio Ofrecido	Nº de projects Propuestos	Nº de projects awarded
Biomass (Ctv US\$/kWh)	5.50	0.12	5.00	1.00
Solar (Ctv US\$/kWh)	21.10	0.00	3.00	0.00
Hydroelectrical (Ctv US\$/kWh)	6.40	5.92	17.00	2.00



First RE auction

projects awarded (1st and 2nd Summon)

- **Biomass (3 awardees, 155 GWh).**- Paramonga I (23 MW), Huaycoloro (4,4 MW) and Lambayeque (1.5 MW).
- **Wind (3 awardees, 571 GWh).**- Marcona (32 MW), Talara (30 MW) and Cupisnique (80 MW).
- **SOLAR (4 awardees, 172.95 GWh).**- Panamericana Solar 20TS (20 MW), Majes Solar 20T (20 MW), Repartición Solar 20T (20 MW) and Tacna Solar (20 MW).
- **HYDROELECTRICAL (19 awardees, 180.71 MW).**- Santa Cruz I (6 MW), Santa Cruz II (6,5 MW), Huasahuasi I (7,8 MW), Huasahuasi II (8 MW), Nuevo Imperial (3,9 MW), Yanapampa (4,1 MW), Chancay (19,2 MW), Poechos 2 (10 MW), Roncador (3,8 MW), Joya (9,6 MW), Angel I (20 MW), Angel II (20 MW), Angel III (20 MW), Purmacana (1,8 MW), Shima (5 MW), Carhuaquero (10 MW), Caña Brava (6 MW), Las Pizarras (18 MW) and Patapo (1 MW).



Second RER auction



Design of the second RER auction

- Process started: April 28, 2011
- Total annual energy to be auctions: 1981 GWh (the first was 1314 GWh).

	Tecnología Biomasa con:		Tecnología Eólica	Tecnología Solar	Total
	Residuos agro- industriales	Residuos urbanos			
Energía MWh/año	593 000	235 000	429 000	43 000	1 300 000

- Assignment: 681 000 MWh will be for RER hydro projects.



Results of the second RE auction: First Summon

I. Required energy

	Biomass residuos agroindustriales	Biomass Residuos Urbanos	Wind	Solar	Total
Required energy (GWh/year)	593	235	429	43	1300
Awarded energy (GWh/year)	0	14.02	415.76	43	472.78
% awarded	0%	6%	97%	100%	36%

II. Required Energy

	Hidroeléctricas
Required Energy (GWh/year)	681
Awarded Energy (GWh/year)	679.93
% awarded	99.8%

III. Resultados en Precios

	Precio Base fijado por OSINERGHMIN	Nº de projects Propuestos	Nº de projects awarded
Biom. res. ag. (Ctv.US\$/MWh)	65	1	0
Biom. res. urb. (Ctv.US\$/MWh)	Not disclosed	1	1
Wind (Ctv US\$/kWh)	Not disclose	6	1
Solar (Ctv US\$/kWh)	Not disclosed	13	1
Hydro (Ctv US\$/kWh)	Not disclosed	16	7



Second RE auction

projects awarded (1st. summon

- **Urban waste Biomass (1 awardee; 14.02 GWh).- La Gringa V (2 MW).**
- **Wind (1 awardee; 415.76 GWh).- Tres Hermanas (90 MW).**
- **SOLAR (1 awardee; 43 GWh).- Moquegua FV (16 MW).**
- **Hydroelectrical (7 awardees; 102 MW).- Canchayllo (3.73 MW), Huatziroki I (11,08 MW), Manta (19.78 MW), RenovAndes H1 (19.99 MW), August 8 (19 MW), El Carmen (8.4 MW) and Runatullu III (20 MW).**



Program for off-grid rural areas: photovoltaic rate



Photovoltaic rate

- By year end (2011) the domestic electrification coverage is 84.8%, while in rural areas it amounted to 63%.
- So, OSINERGMIN set, besides a special promotion framework for RE, a rate for the use is solar panels in remote or off grid areas.
- The rate is subsidized thus being affordable for users and the cost difference is charged to the interconnected electric system



Promotional rates: montly cost of rural photovoltaic rate for the final customer with Fose discounts

Inversiones 100% Empresa

Cargo Fijo con Ley del FOSE (S/./mes) - Sin IGV a Usuario Final

Región	Tipo Módulo				
	BT8-050	BT8-080	BT8-160	BT8-240	BT8-320
Costa	9.10	11.15	16.51	23.30	41.30
Sierra	9.27	11.32	16.68	23.53	40.54
Selva	10.21	12.62	18.41	26.12	33.50
Amazonía (1)	11.34	14.12	20.78	29.61	38.09

(1) Aplicable a las Zonas de la Amazonía bajo el ámbito de la Ley N° 27037, Ley de Promoción de la Inversión en la Amazonía.

Exchange rate S/. Per US\$ = 2.68

Inversiones 100% Estado

Cargo Fijo con Ley del FOSE (S/./mes) - Sin IGV a Usuario Final

Región	Tipo Módulo				
	BT8-050	BT8-080	BT8-160	BT8-240	BT8-320
Costa	6.00	7.25	9.76	13.36	23.31
Sierra	6.15	7.40	9.91	13.54	22.95
Selva	7.03	8.63	11.55	15.99	20.24
Amazonía (1)	7.75	9.62	12.97	18.08	22.98

(1) Aplicable a las Zonas de la Amazonía bajo el ámbito de la Ley N° 27037, Ley de Promoción de la Inversión en la Amazonía.



Photovoltaic system costs

- Include installation & usage costs.
 - **Installations costs:** Procurement costs and mounting elements (panel, controller, battery, connections and others). Likewise, it takes into considerations storage and indirect costs (engineering and commissioning, general expenses and interest).
 - **Usage costs:** Preventive & corrective maintenance activities, replacement of elements with a service life under 20 years and removals. It also includes management indirect costs (working capital cost, regulatory contributions and others).



Photovoltaic systems installation costs

Costos de Instalación - US\$

Región	Tipo Módulo				
	BT8-050	BT8-080	BT8-160	BT8-240	BT8-320
Costa	747.47	946.58	1 659.83	2 460.55	3 239.84
Sierra	753.13	953.15	1 667.28	2 473.46	3 254.35
Selva	767.75	969.88	1 687.66	2 509.78	3 293.90
Amazonía	865.53	1 096.57	1 921.70	2 856.41	3 752.79



Rate calculation formula

For 100% investments of the concession agent and other private institutions:

$$\text{Costo Anual} = aVNR_{SFV} + aOMyC_{SFV}$$

The average annual cost is aprox. US\$ 15 / per household per month vs. aprox US\$ 3.5 / per month per household charged.

For 100% State Investments:

$$\text{Costo Anual} = bVNR_{SFV} + aOMyC_{SFV}$$

$$bVNR_{SFV} = aVNR_{SFV} \times FFR$$

The average annual cost is aprox. US\$ 12 / per month per household.



Fondo de Compensación Social Eléctrica (FOSE) - Law N° 28307

FOSE is a Crossed Subsidies System that can offer consumers a discount up to 62.5% of the rate.

Usuarios	Sector	Reducción Tarifaria para consumos menores o iguales a 30 kw.h/mes	Reducción Tarifaria para consumos mayores a 30 kw.h/mes hasta 100 kw.h/mes
Sistema Interconectado	Urbano	25% del cargo de energía	7,5 kw.h/mes por cargo de energía
	Urbano-rural y Rural	50% del cargo de energía	15 kw.h/mes por cargo de energía
Sistemas Aislados	Urbano	50% del cargo de energía	15 kw.h/mes por cargo de energía
	Urbano-rural y Rural	62,5% del cargo de energía	18,75 kw.h/mes por cargo de energía



Summary



Summary

- Regulated users have a maximum demand under 200 KW, free users have a maximum demand over 2500 KW. Users with a maximum demand between 200 KW and 2500 KW can choose to be free or regulated.
- Users with a monthly consumption equal or under 100 KWh have a FOSE subsidy, which is loaded through the interconnection system for users with a monthly consumption over 100 KWh.
- As of the Legislative Decree 1002, RERs are promoted through auction mechanisms, Awarding Rates and Premiums.
- A model was developed for off-grid rural areas, it allows to expand the coverage through the usage of solar panels and a flat subsidized rate is charged through FOSE.



Information system

Renewable
Energy
Information
System

The screenshot displays the Osinergmin website interface. At the top, the logo and name 'Osinergmin' are prominent, along with the tagline 'ORGANISMO SUPERVISOR DE LA INVERSIÓN EN ENERGÍA Y MINERÍA'. A search bar is located in the top right corner. The main content area features a central graphic with a large red arrow pointing towards a cartoon character, surrounded by various service icons and links. These include: 'PREMIO NACIONAL A LA CALIDAD', 'IX curso de Extensión Universitaria', 'Facilito Precios de Combustibles y Gas (GLP)', 'Calcula tu Consumo Eléctrico', 'Portal de Transparencia', 'Control de Calidad y Cantidad Combustibles', 'Tarifas Eléctricas', 'Precios de Referencia y Bandas de Precios de Combustibles', 'Registro de Hidrocarburos', 'Correo corporativo', 'Seminario', 'ITF Simplificado', 'Registro de Empresas Supervisoras', 'Consulta de Expedientes Reclamos, Quejas y Medidas Cautelares', 'Orientación al Usuario', 'Data Room de Subasta de Energías Renovables', and 'Incidente en Ducto de Transporte de Gas Natural de TGP'. A sidebar on the left contains links for 'Información Institucional', 'Normas Legales', 'Resoluciones', 'Oportunidades de Trabajo y formación', 'Publicaciones', 'Enlaces de Interés', 'Registro de Sanciones', and 'Contáctenos'. At the bottom, there is a row of icons for 'Regulación Tarifaria', 'Fiscalización en Hidrocarburos', 'Fiscalización de Gas Natural', 'Fiscalización de Electricidad', 'Fiscalización de Minas', 'Apelaciones de Reclamos de Usuarios', and 'Instancias de Solución de Controversias'.

WWW.OSINERGMIN.GOB.PE



Thank you

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