Renewable Energy Solutions for Healthcare Facilities

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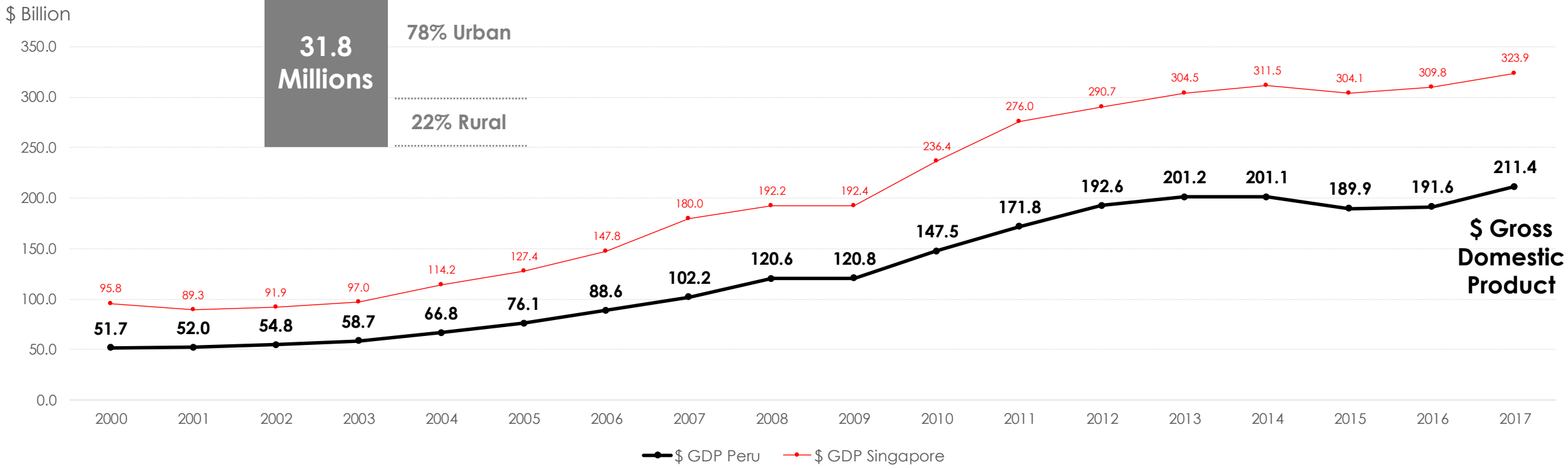
Peru – Key Indicators

Population

31.8 Millions

78% Urban

22% Rural



GDP per capita $	$ 6,642	Unemployment rate %	3.6%
10-year average anual GDP growth %	4.8%	Human Development Index (HDI)	0.750

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Human Development Indices and Indicators

2018 Statistical Update

HDI rank		Human Development Index (HDI) Value 2017	SDG 3 Life expectancy at birth (years) 2017	SDG 4.3 Expected years of schooling (years) 2017[a]	SDG 4.6 Mean years of schooling (years) 2017[a]	SDG 8.5 Gross national income (GNI) per capita (2011 PPP $) 2017	GNI per capita rank minus HDI rank 2017	HDI rank 2016
VERY HIGH HUMAN DEVELOPMENT								
1	Norway	0.953	82.3	17.9	12.6	68,012	5	1
2	Switzerland	0.944	83.5	16.2	13.4	57,625	8	2
3	Australia	0.939	83.1	22.9 [b]	12.9	43,560	18	3
4	Ireland	0.938	81.6	19.6 [b]	12.5 [c]	53,754	8	4
5	Germany	0.936	81.2	17.0	14.1	46,136	13	4
6	Iceland	0.935	82.9	19.3 [b]	12.4 [c]	45,810	13	6
7	Hong Kong, China (SAR)	0.933	84.1	16.3	12.0	58,420	2	8
7	Sweden	0.933	82.6	17.6	12.4	47,766	9	7
9	Singapore	0.932	83.2	16.2 [d]	11.5	82,503 [e]	–6	8
10	Netherlands	0.931	82.0	18.0	12.2	47,900	5	10
HIGH HUMAN DEVELOPMENT								
89	Peru	0.750	75.2	13.8	9.2	11,789	3	86

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2018 Statistical Update

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Health outcomes

HDI rank	Infants exclusively breastfed (% ages 0–5 months) 2011–2016[a]	SDG 3.b Infants lacking immunization: DPT (% of one-year-olds) 2017	SDG 3.b Infants lacking immunization: Measles (% of one-year-olds) 2017	SDG 2.2 Child malnutrition: Stunting (moderate or severe) (% under age 5) 2010–2016[a]	SDG 3.2 Mortality rate: Infant (per 1,000 live births) 2016	SDG 3.2 Mortality rate: Under-five (per 1,000 live births) 2016	SDG 3 Mortality rate: Adult Female (per 1,000 people) 2016	SDG 3 Mortality rate: Adult Male (per 1,000 people) 2016	SDG 3.3 Incidence: Malaria (per 1,000 people at risk) 2016	SDG 3.3 Incidence: Tuberculosis (per 100,000 people) 2016	SDG 3.3 HIV prevalence, adult (% ages 15–49) 2016	Healthy life expectancy at birth (years) 2016	SDG 3.c Current health expenditure (% of GDP) 2015
VERY HIGH HUMAN DEVELOPMENT													
1 Norway	..	1	4	..	2.1	2.6	44 [b]	69 [b]	..	6.1	..	73.0	10.0
2 Switzerland	..	2	5	..	3.6	4.1	37 [b]	63 [b]	..	7.8	..	73.5	12.1
3 Australia	..	2	5	2.0 [c]	3.1	3.7	45 [b]	76 [b]	..	6.1	0.1 [d]	73.0	9.4
4 Ireland	..	2	8	..	3.0	3.6	47 [b]	81 [b]	..	7.1	0.2	72.1	7.8
5 Germany	..	1	3	..	3.2	3.8	50 [e]	92 [e]	..	8.1	..	71.6	11.2
6 Iceland	..	3	8	..	1.6	2.1	..	..	..	2.1	..	73.0	8.6
7 Hong Kong, China (SAR)	..	..	..	..	..	..	36	67	..	69.0	..	..	..
7 Sweden	..	1	3	..	2.4	2.9	40	64	..	8.2	0.2	72.4	11.0
9 Singapore	..	2	5	..	2.2	2.8	39	63	..	51.0	..	76.2	4.3
10 Netherlands	..	2	7	..	3.2	3.8	50 [b]	67 [b]	..	5.9	0.2	72.1	10.7
HIGH HUMAN DEVELOPMENT													
89 Peru	68.4	10	17	13.1	11.9	15.3	93	152	17.8	117.0	0.3	67.5	5.3

Human Development Indices and Indicators

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Quality of human development

HDI rank	Quality of health: Lost health expectancy (%) 2016	Quality of health: Physicians (per 10,000 people) 2007–2017[d]	Quality of health: Hospital beds (per 10,000 people) 2007–2014[d]	SDG 4.c Quality of education: Pupil–teacher ratio, primary school (pupils per teacher) 2012–2017[d]	SDG 4.a Quality of education: Primary school teachers trained to teach (%) 2009–2017[d]	SDG 4.a Quality of education: Proportion of schools with access to the Internet (%) 2008–2013[d]	SDG 4.1 Quality of education: Programme for International Student Assessment (PISA) score: Mathematics[b] 2015	Reading[c] 2015	Science[c] 2015	SDG 7.1 Quality of standard of living: Vulnerable employment[a] (% of total employment) 2017	Rural population with access to electricity (%) 2016	SDG 6.1 Quality of standard of living: Population using improved drinking-water sources (%) 2015	SDG 6.2 Quality of standard of living: Population using improved sanitation facilities (%) 2015
VERY HIGH HUMAN DEVELOPMENT													
1 Norway	11.5	43.9	33	9	..	100	502	513	498	5.2	100.0	100.0	98.1
2 Switzerland	11.8	42.5	50	10	..	..	521	492	506	9.5	100.0	100.0	99.9
3 Australia	11.9	35.0	39	..	..	..	494	503	510	10.8	100.0	100.0	100.0
4 Ireland	11.5	29.6	29	16	..	..	504	521	503	11.9	100.0	98.9	92.2
5 Germany	11.7	41.9	82	12	..	..	506	509	509	6.0	100.0	100.0	99.2
6 Iceland	11.4	37.9	32	10	..	..	488	482	473	7.8	100.0	100.0	98.8
7 Hong Kong, China (SAR)	..	..	..	14	97	100	548	527	523	6.0	..	100.0	96.3
7 Sweden	12.1	41.9	27	12	..	100	494	500	493	6.4	100.0	100.0	99.3
9 Singapore	8.1	22.8	20	..	..	100[e]	564	535	556	8.3	..	100.0	100.0
10 Netherlands	11.7	34.8	47	12	..	..	512	503	509	12.7	100.0	100.0	97.7
HIGH HUMAN DEVELOPMENT													
89 Peru	11.1	11.2	15	18	..	..	387	398	397	50.3	75.6	89.9	76.8

EAPI 2017 results

Figure 2: The energy architecture performance index 2017 ranking and results

Economic growth and development
Environmental sustainability
Energy access and security

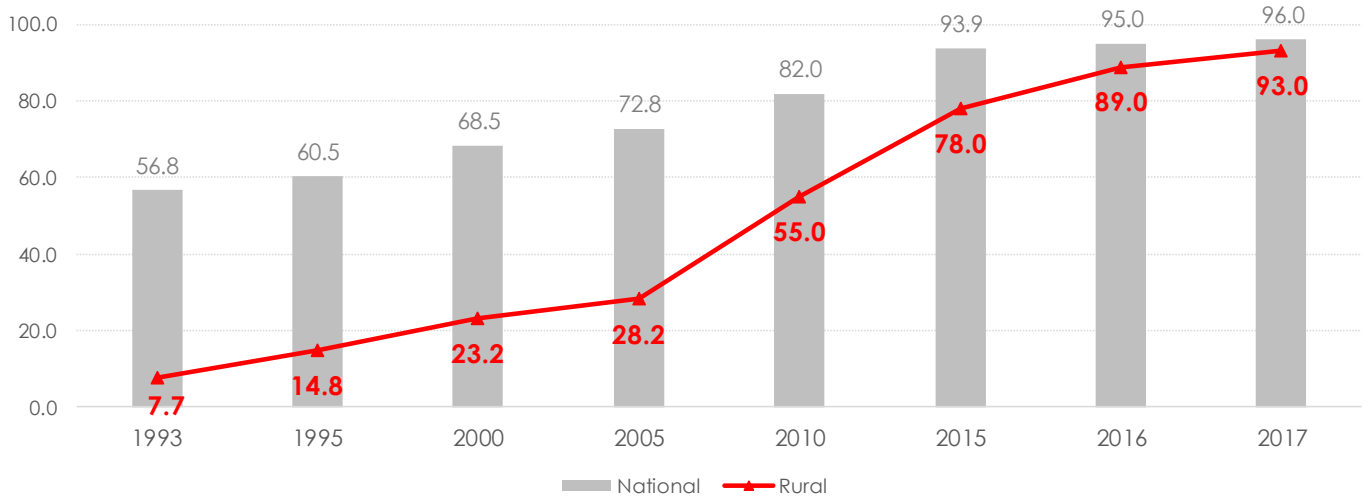
	Country	2017 score[1]				2009-17 trend[2]
1	Switzerland	**0.80**	0.74	0.77	0.88	▲ (+1)
2	Norway	**0.79**	0.67	0.75	0.95	▼ (-1)
3	Sweden	**0.78**	0.63	0.80	0.90	▲ (+1)
4	Denmark	**0.77**	0.69	0.71	0.91	▲ (+1)
5	France	**0.77**	0.62	0.81	0.88	▼ (-2)
6	Austria	**0.76**	0.67	0.74	0.88	▲ (+2)
7	Spain	**0.75**	0.65	0.73	0.87	▲ (+4)
8	Colombia	**0.75**	0.73	0.68	0.83	▲ (+2)
9	New Zealand	**0.75**	0.59	0.75	0.90	▲ (+3)
10	Uruguay	**0.74**	0.69	0.71	0.82	▲ (+15)
11	Portugal	**0.74**	0.63	0.73	0.85	▲ (+2)
12	Finland	**0.73**	0.55	0.79	0.87	▼ (-6)
13	Slovenia	**0.73**	0.58	0.73	0.88	▲ (+6)
14	Costa Rica	**0.73**	0.68	0.76	0.74	▼ (-5)
15	United Kingdom	**0.72**	0.62	0.66	0.89	(=)
16	Ireland	**0.72**	0.69	0.65	0.81	▲ (+6)
17	Latvia	**0.71**	0.62	0.73	0.80	(=)
18	Croatia	**0.71**	0.63	0.68	0.84	▲ (+12)
19	Germany	**0.71**	0.62	0.64	0.88	▼ (-5)
20	Slovak Republic	**0.71**	0.56	0.74	0.84	▲ (+12)
21	Hungary	**0.71**	0.62	0.72	0.79	▲ (+8)
22	Paraguay	**0.70**	0.68	0.81	0.62	▲ (+2)
23	Luxembourg	**0.70**	0.73	0.62	0.76	▲ (+14)
24	Romania	**0.70**	0.66	0.65	0.79	▲ (+15)
25	Albania	**0.70**	0.63	0.78	0.70	▲ (+10)
26	Iceland	**0.70**	0.38	0.90	0.82	▼ (-10)
27	Peru	**0.70**	0.75	0.64	0.70	▼ (-9)

Peru 27th / 127

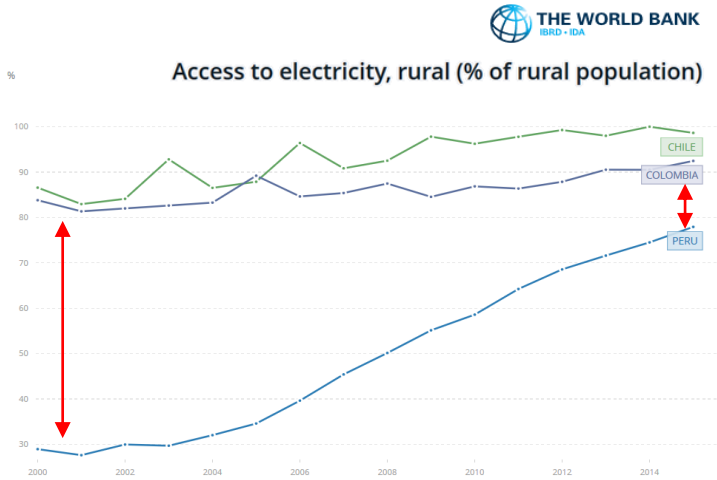
Performance Overview	Rank / 127	Score (1-7)	Trend	Distance from best
Energy Architecture Performance Index	27	0.70		
Economic Growth and Development	2	0.75		
GDP per unit of energy use	10	16.0		
Fuel Imports	36	2.05		
Super Gasoline - Level of Price Distortion through subsidy or tax	1	1.00		
Diesel - Level of Price Distortion through subsidy or tax	44	0.81		
Electricity Prices for Industry	17	0.08		
Fuel Exports	71	1.26		
Environmental Sustainability	59	0.64		
Alternative and nuclear energy	69	20.45		
Nitrous oxide emissions in energy sector	6	10.40		
CO2 emissions from electricity production	41	287		
Methane Emissions from energy sector	37	133.25		
Particulate matter (2.5) concentration	40	12.9		
Average Fuel Economy for passenger cars	84	11.71		
Energy Access and Security	74	0.70		
Electrification rate	93	91.20		
Quality of electricity supply	60	4.9		
Percentage of population using solid fuels for cooking	90	34.91		
Energy imports, net	40	-0.20		
Diversity of TPES (Herfindahl index)	41	0.22		
Diversification of Import Counterparts (Herfindahl Index)	89	0.32		

Peru – Energy Acces / Rural Sector

Evolution of Access Index



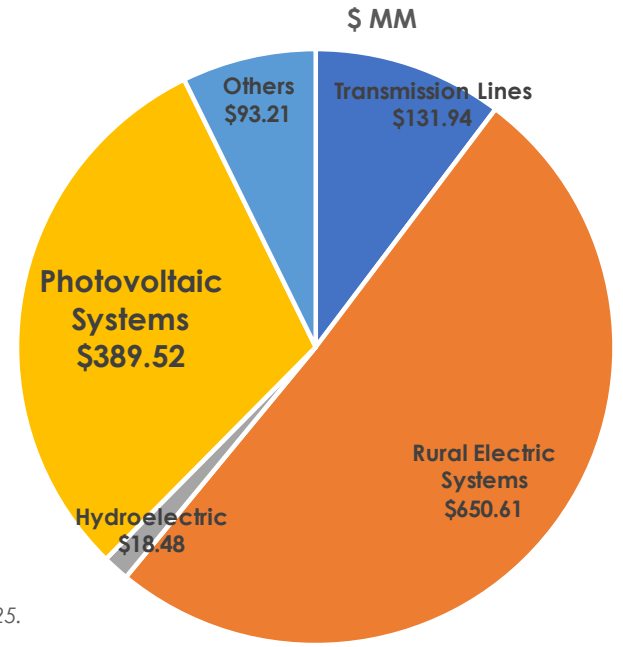
Source: OSINERGMIN; MEM.



Investment Plan 2016-2025

- Conducted by Ministry of Energy & Mining / General Direction of Rural Electrification.
- Target 3,380K people / 935K houses.
- Expected Access Index 99% at 2025.

Source: MEM/DGER – Plan Nacional de Electrificacion Rural 2016-2025.



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Tozzi Green – Business Areas

ENERGY PRODUCTION FROM RENEWABLE SOURCES

RURAL ELECTRIFICATION

O&M - ASSET MANAGEMENT

AGRICULTURE

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Ergon Peru Off-Grid Project – Summary

- In April 2015, Ergon Peru entered into three **Investment Agreements** with the Peruvian Ministry of Energy and Mines (**MEM**) to install and operate at least 172,890 small-scale photovoltaic systems (**RER Systems**) supplying electricity to off-grid rural areas in Peru (the **Off-Grid Project**).
  - RER Systems are designed for residential users ("**RER 1**", 98% of total), healthcare centers ("**RER 2**") and schools ("**RER 3**").

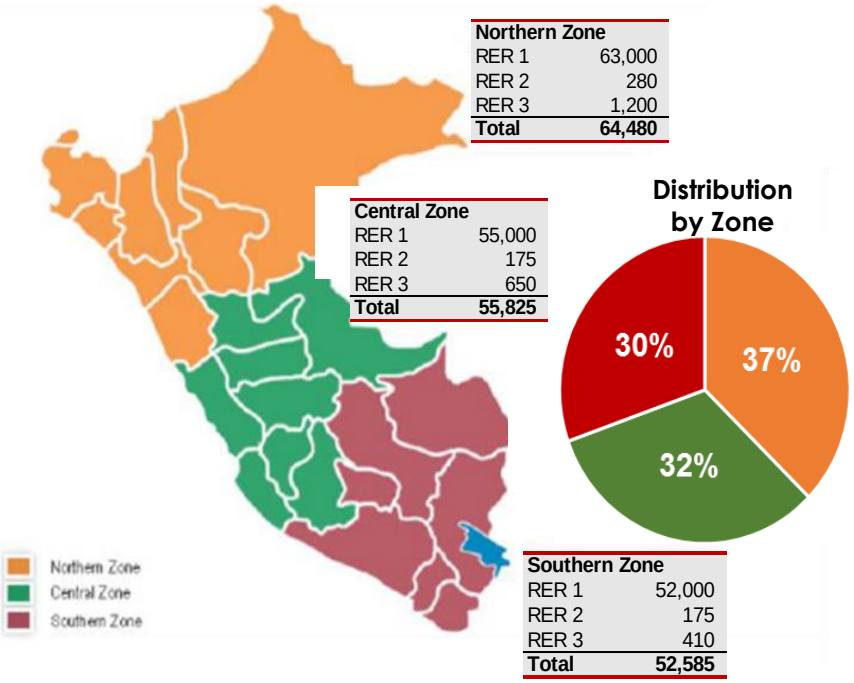
- Off-Grid Project is the most ambitious program of its kind in Peru, with an estimated cost of $180 MM, and is highly strategic to Peruvian Government as it seeks to provide electricity to all peruvians not currently connected to the national grid and promote the use of renewable sources.

- Pursuant to Investment Agreements, Ergon Peru is responsible for the design and installation of the RER Systems, as well as operation and maintenance **for 15 years from Commercial Operation (COD).**
  - ~87,000 RER Systems are in operation as of October 2018, with COD targeted in October 2019.

- Ergon Peru will receive a fixed annual compensation per unit ("**Annual Remuneration**").
  - Annual Remuneration is denominated in US$, adjusted for both local and US inflation, payable monthly and subject to defined operational and service factors.

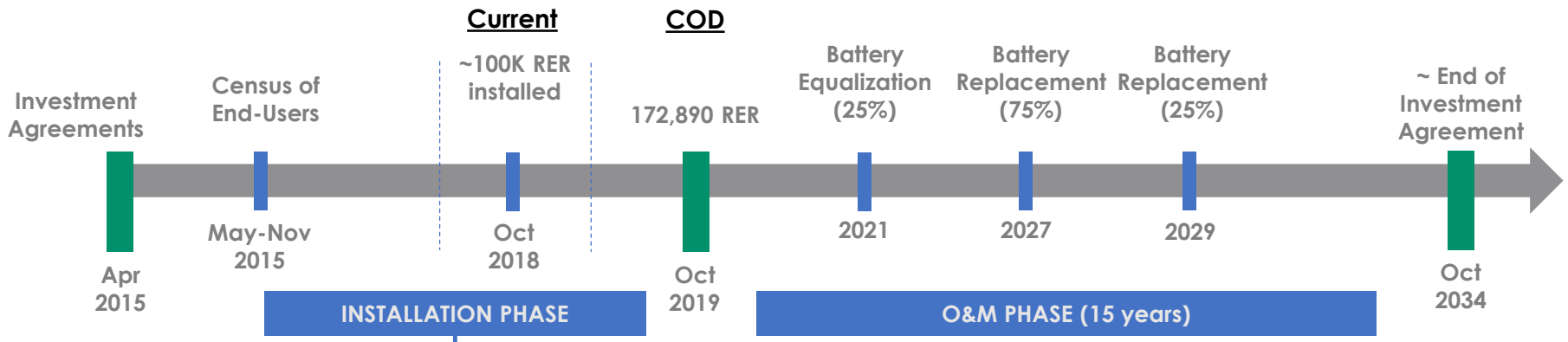
- Off-Grid Project's investment is covered through a monthly tariff charged to the Project's end-users ("**Cargo RER Autónomo**") and is up to 80% subsidized by two funds managed by MEM / OSINERGMIN[1] ("**FOSE**" and "**FISE**").
  - Funds are deposited on a monthly basis into a Project Trust and used to cover the Annual Remuneration to Ergon Peru and relative project expenses.

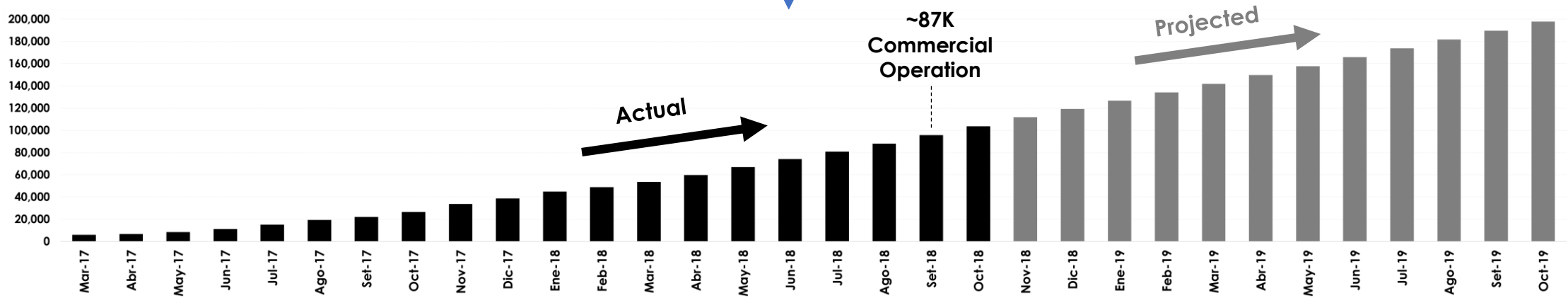
RER Systems Location & Breakdown



(1) OSINERGMIN is the public institution that supervises and oversees national compliance of activities in the power, energy and mining sectors in Peru.

Ergon Peru Off-Grid Project – Timeline & Status





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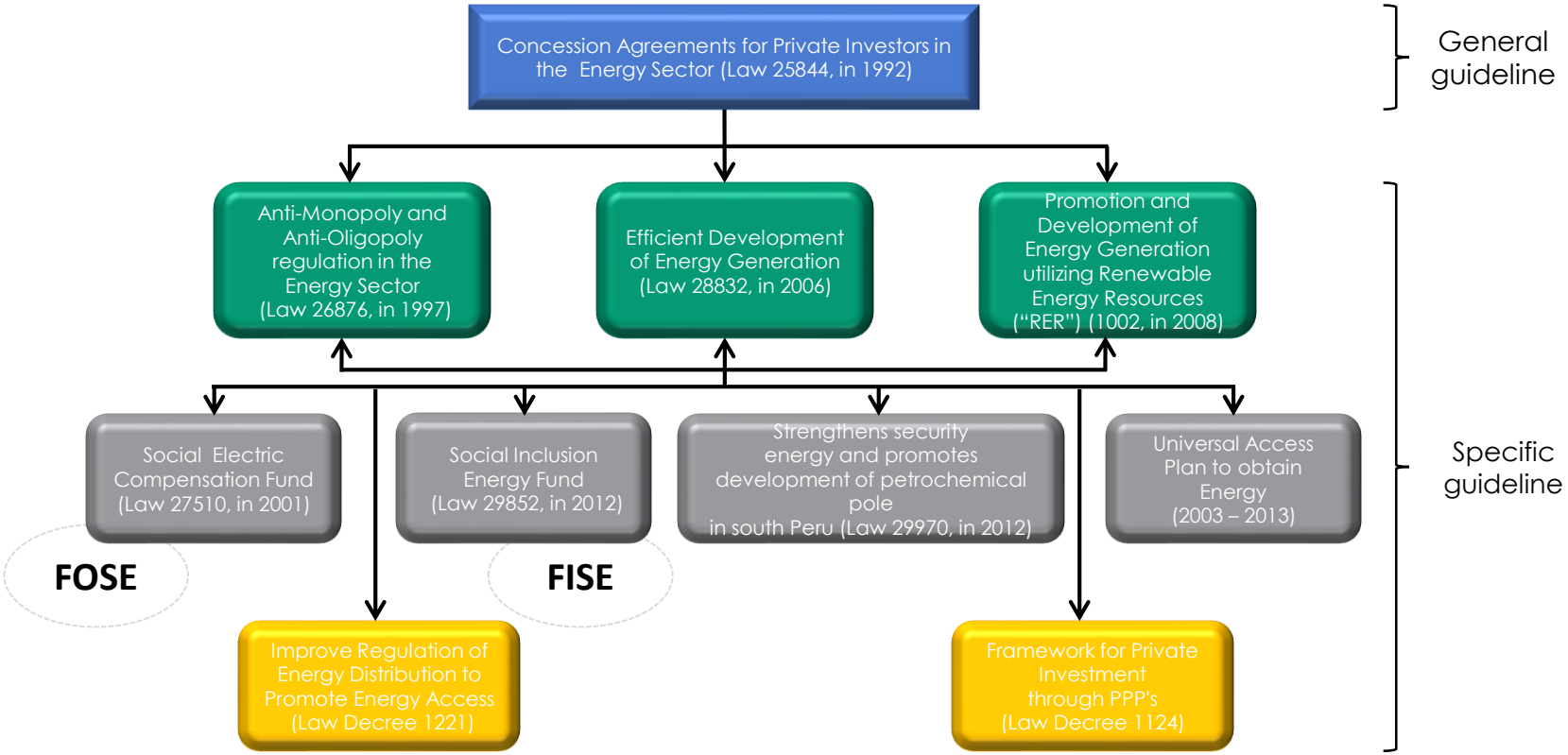
Peruvian Energy Sector – Legal Framework



Peru Long Term Vision

Peruvian National Energy Politics 2012 – 2040
(Supreme Decree 064 – 2010 –EM)
Achieved a diversified energy matrix with emphasis on RER and energy efficiency, have competitive supply energy; universal access to energy supply and self– sufficiency of energy production

National Energy Plan 2014 – 2025
Prepared by the Ministry of Energy and Mining
Ensure security and access to universal energy; and develop energy resources in a sustainable way

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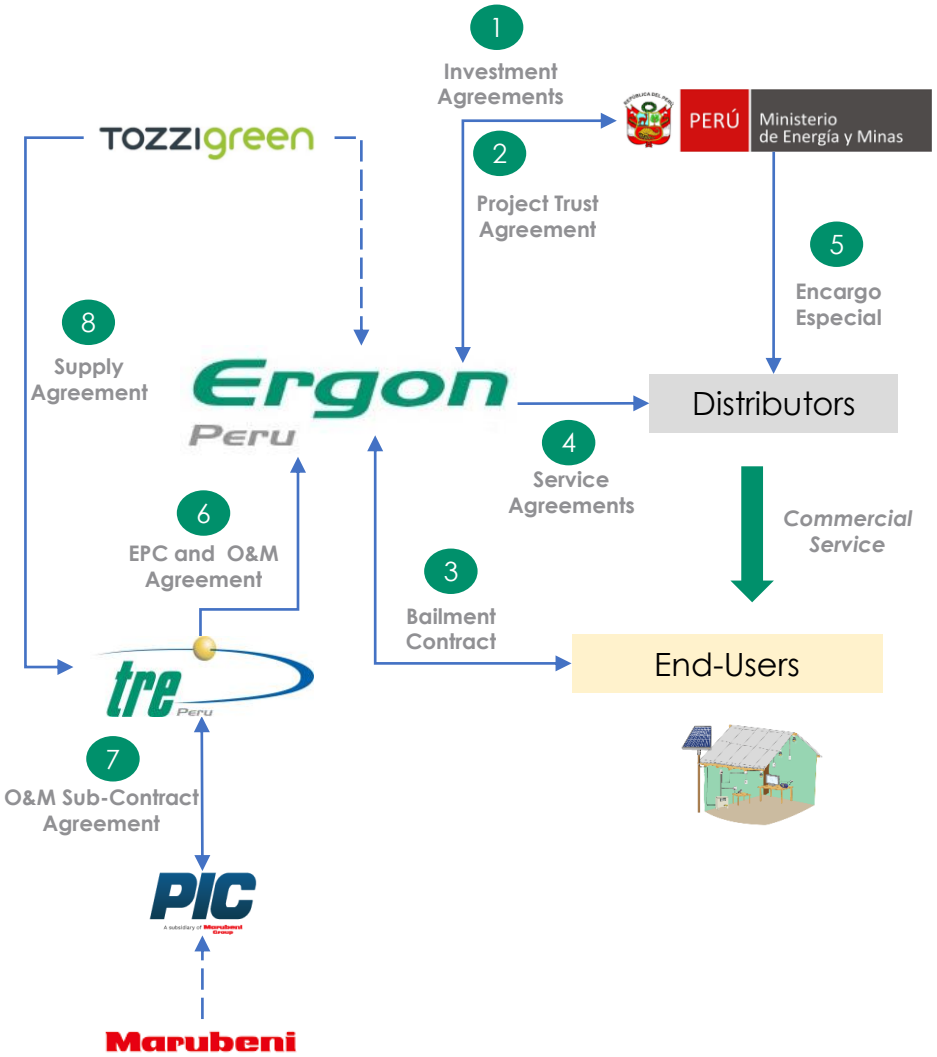
Ergon Peru Off-Grid Project - Legal Structure

1. Pursuant to Investment Agreements, Ergon Peru is responsible for design, installation, operation and maintenance of RER Systems for a 15 years-period from COD.

2. A Project Trust Agreement governs the application of cash flows deriving from end-user collections, FOSE and FISE funds to satisfy the payment of the Annual Remuneration and Project expenses.

3. Upon installation of each RER System, end-users enter into a Bailment Contract ("Contrato de Comodato") for the use of the equipment.

4. Ergon Peru has entered into service Agreements with 11 Distributors (Electrical Distribution Public Companies) whereby Distributors set up a network to receive end-users' requirements and channel them to Ergon Peru.



5. Distributors have entered into a special agreement ("Encargo Especial") with MEM in order to undertake the commercial service to end-users, including billing and money collection.

6. Ergon Peru has entered into EPC and O&M Agreements with TRE PERU, a subsidiary of TozziGreen, covering the design, procurement and installation of RER Systems.

7. PIC Group Inc., a fully-owned subsidiary of Marubeni, provides O&M services on RER Systems pursuant to an O&M Sub-Contract Agreement with TRE PERU.

8. TRE PERU has entered into a Supply Agreement with TozziGreen for the provision of all equipment/components and spare parts.

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Ergon Peru Off-Grid Project – Photovoltaic Systems

	RER1	RER2	RER3
Panel Power (Wp)	120	600	1,200
Output (V)	12 Vdc	220 Vac	220 Vac
Energy (Wh/day)	180	900	1,800

RER1 **Houses**

RER2 **Health centers**

RER3 **Rural schools**

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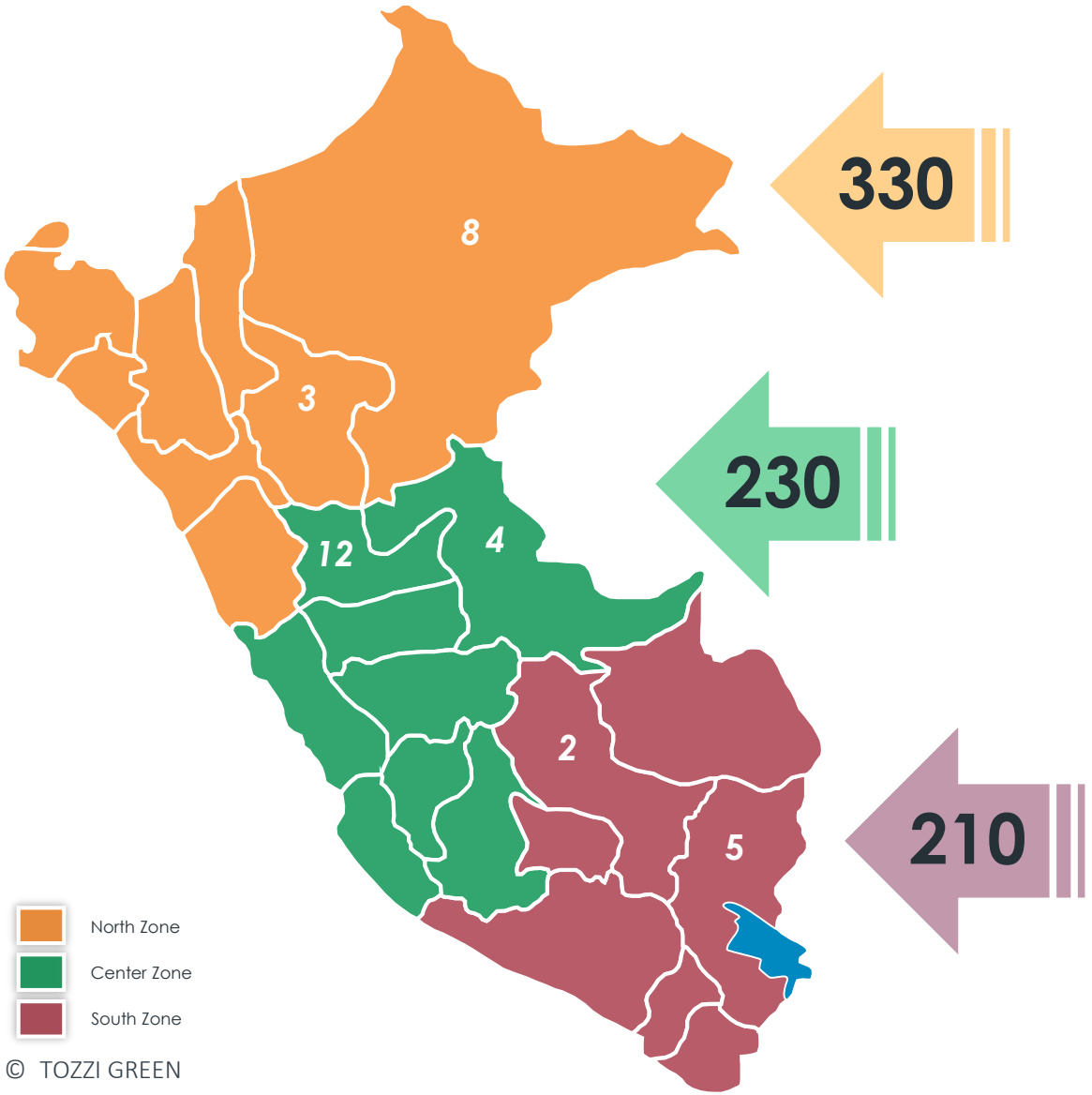
RER2 Systems – Installation Target



Ergon Peru is currently installing RER2 systems among the three Project zones. A minimum quantity of 630 RER2 Systems are required by Peruvian Government. It's also expected to attend 150,000 people based on a monthly basis installation plan.

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RER2 Systems – Components

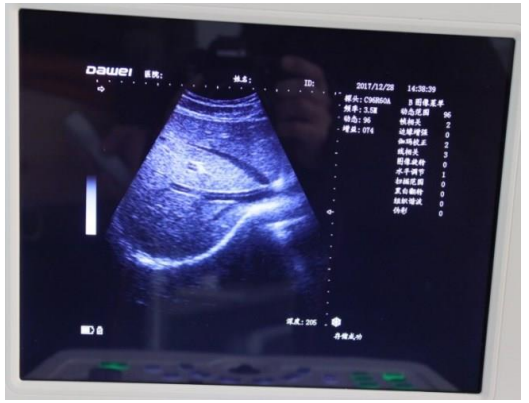
RER2 Systems supply energy in alternate current (220 V), to be installed in off-grid rural localities.

Main components of RER2 System:

- Kit of 500 Wp Solar Panels (2 x 300 Wp)
- AC Energy Station:
  - Battery Bank(12 batteries x 180 Ah)
  - Charge Controller
  - Inverter 2,000 W
- Lightning System
- Grounding System
- Distribution Board (thermomagnetic breakers and differential)

RER2 Systems – Appliances (1/3)

Name	Portable ultrasound machine
Brand	Dawei
Monitor	12" LED high resolution LED
Element	96
MOQ	1 set
Application	Gynecology, Urology, Abdomen, small parts,
Probes	convex probe, trans-vaginal probe, trans-rectal probe, high frequency linear probe
Display mode	B, B+B, 4B, B+M, M mode
Scanning mode	convex / linear
Detecting depth	0-240mm
Dynamic scope	0-120db
Gray scale	256
Pseudo color	7
Cine loop	256 frames
Gain control	The total gain, 8-segment TGC
Measurement	distance, perimeter, area, volume, HR, BPD, CRL, GS, FL, HC, AC, etc.
Standard Configuration	Main Unit 12.1 inch LED color display Battery (4 hours working time,8 hours standby time) Full digital system 3.5MHz Multi-frequency convex probe Aluminum plastic multi-layer package



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RER2 Systems – Appliances (2/3)

Electronic thermostat, airflow system and the specially designed icelining ensure stable temperature control in range from +2°C to +8°C. The actual temperature is readily checked on the external digital thermometer. Effective 80mm insulation and the icelining ensure long hold over time in case of power cut. The galvanised steel cabinet protects against corrosion. Baskets included for organized storage.

SPECIFICATIONS

Gross volume, litres (cu. ft.)	136 (4.80)
Net volume, litres (cu. ft.)	75 (2.64)
Temperature range (43°C AMB)	+2° to +8°C
Hold-over time, hours	20.10
Energy consumption - stable, kWh/24h	1.89
Energy consumption- cool down, kWh/24h	3.58
Refrigerant	R134a
WHO PQS code	E003/011
Climate class	T
Energy supply needed per 24 hours, hours	8

VESTFROST SOLUTIONS

MK 204

ICELINED REFRIGERATOR

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RER2 Systems – Appliances (3/3)

FS107 LED TV Niwa 15,6”

Niwa,
15/F, Neich Tower, 128 Gloucester Road,
Wan Chai, Hong Kong

Product Description

The Niwa 15.6” TV consist of integrated digital and analogue tuner combined with DVB-T, DVB-T2, HDMI, HDTV MPEG4, PC VGA and Video-In allows a very universal use for entertainment, education and presentation.

Target Group

Households, schools, restaurants, bars

Product Specification

Type of product	TV
Load	8 W
AC or DC coupled	DC, 12 V
Voltage	12 V
Size	375 x 130 x 288 mm
Weight	1.5 kg

FS106 Radio fosera

fosera,
Beim Mühlbach 3,
89171 Illerkirchberg,
Germany

Product Description

The fosera radio includes, additional to FM, AM, SW, MW receiver also an AUX-IN-Outlet that allows connection to any cell phones or mp3 players to play own music. The radio can be powered with the fosera PSHS, LSHS, all fosera lanterns or over USB.

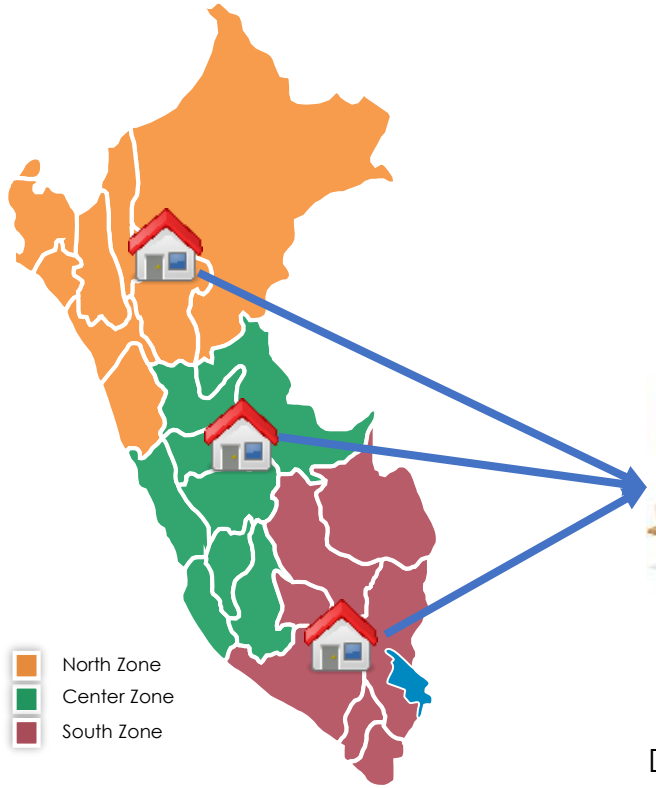
Target Group

Media entertainment for restaurants, bars, multimedia theatres

Product Specification

Type of product	Radio
Load	20 – 100 mA (depending on sound volume)
AC or DC coupled	DC, 12- 14 V
Voltage	3.25 V & 13 V
Capacity of solar panel (kWp) required	0.01 kWp
Size	19.5 x 14.2 x 9 cm
Weight	0.52 kg

Ergon Peru Off-Grid Project – Users Requirements



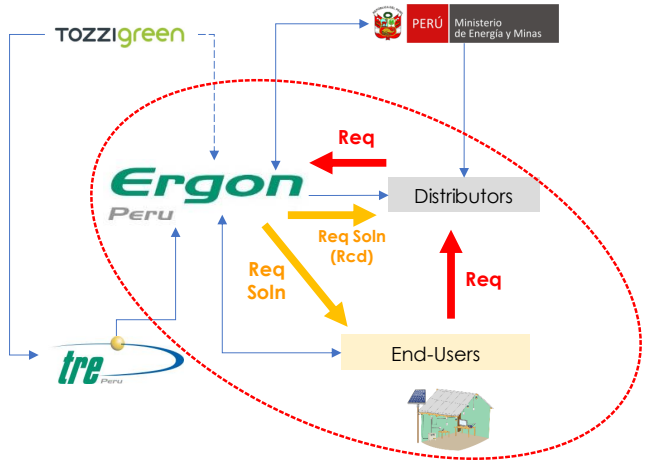
User identifies a non-standard operation condition of pv system

User calls Distributors for service attention

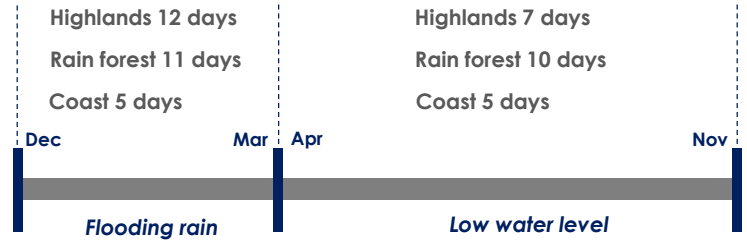
Distributors register user's requirement in an electronic platform and automatically reports it to Ergon

Ergon mobilize site crews, attends requirement and confirm its completion

Ergon sends Distributors a service report



Contractual Attention Terms



TOZZIgreen

Thanks

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