Colombian Electricity Market - NTNU

03-09-2019

AGENDA

CONTEXT ON THE ELECTRICITY MARKET

ASSESMENT OF THE ELECTRICITY SECTOR

FUTURE CHALLENGES

COLOMBIA

Country´s context

209 Years
As an independent country

50 Million
Population

98%
Electricity coverage

≈ *1 million people without electricity*

30th largest economy
Gross domestic product (GDP)

3,2%
Inflation rate

65 Languages
Spanish - official

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Electricity Market Context

"Wake up Call"

1992

Power Shortage that lasted for one year

Problems

- *Centralized planning*
- *Not enough money to make the necessary investments for the system*

Consequences

- *Total economic loss (5% GDP)*
- *Effects on all productive sectors*
- *Increase our external debt in USD 2B*

"Law 142/94 and 143/94"

1994

Reestructure of the sector

Main aspects

I. *Formalized institutions (planning, regulatory, operative agencies)*
II. *Separated activities (G + T + D), no vertical integration*
III. *Liberalized the market (Private sector participation/investments)*
IV. *Redesing the Wholesale electricity market*

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I. ACOLGEN and government institutions

Institutions	Function
El futuro es de todos · Minenergía	Public policy design
upme — Unidad de Planeación Minero Energética	Energy planning agency
CREG — Comisión de Regulación de Energía y Gas	Regulatory agency
Superservicios — Superintendencia de Servicios Públicos Domiciliarios · Industria y Comercio — Superintendencia	Monitoring agencies
xm	System operator

¿Where we get involve?

*The Colombian Electric Power Generators Association - ACOLGEN, is a private, non-profit, non-political advocacy Association that represents **85%** of the total installed capacity in Colombia.*

- ***Mission:** promote **free and fair competition** and the **sustainable and efficient development** of the Colombian electricity market, through active participation in the design of regulatory frameworks and public policies.*

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II. Separate activities

Activity	Level of regulation	Number of companies	Share in the total end user tariff
Generation	▪ Free market ▪ Non regulated rates ▪ Maximum Price: scarcity price	74	36%
Transmission	Regulated rates	16	6%
Distribution	Regulated rates	32	32%
Commercialization	▪ Free market ▪ Non regulated rates* ▪ Maximum level for pass-through contracts	109	12%

the remaining **14%** is associated with the costs of electrical losses and transmission restrictions

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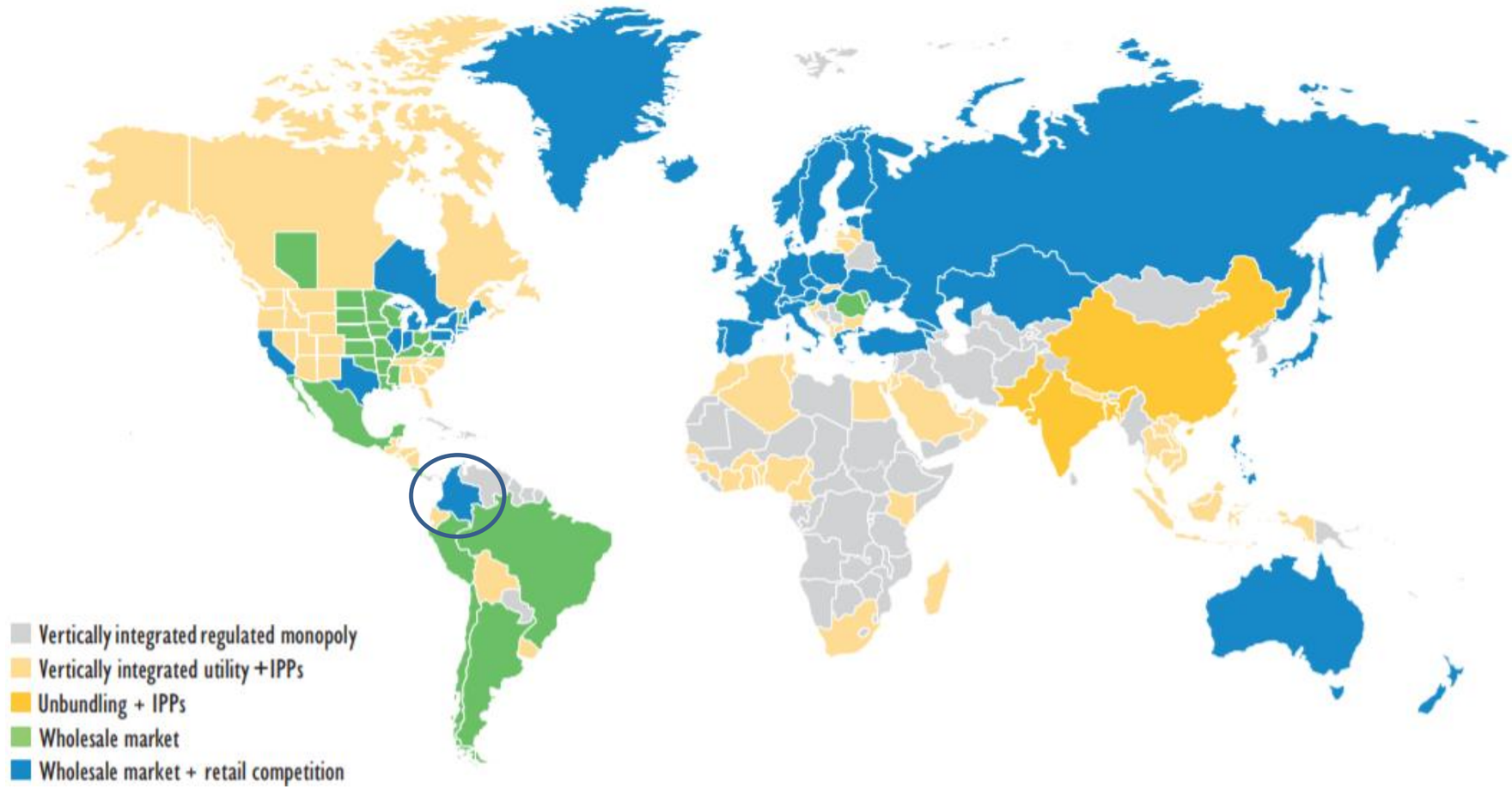
III. Liberalized the market



Source: International Energy Agency

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nowadays it is one of the few electricity markets with a focus on free competition

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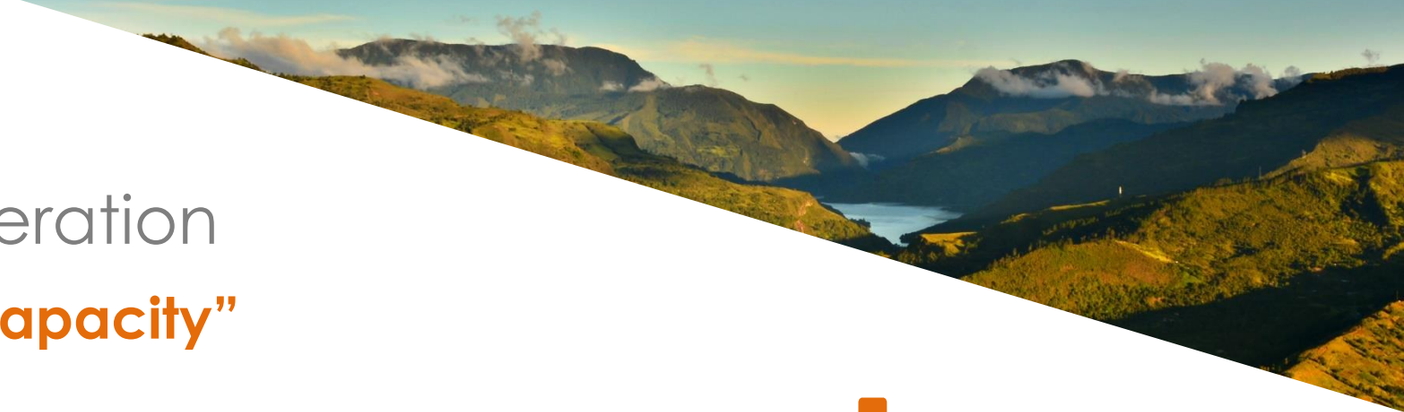
III. Power system expansion in generation

“A power system limited in energy not capacity”



“Reliability Charge”

Activates when
P > Scarcity price

Values and remunerates the firm energy of the generation plants

Expansion mechanism to guarantee energy supply security, and protect users from high prices derived from dry seasonal events like “El Niño”

Results

- 35 new power plants
- USD 45 B in private investments
- USD 8.3 B in savings for users

Benefits

- ✓ **Free competition scheme:** by allowing the participation of all technologies (new and existent projects)
- ✓ **Reliability:** plants are always ready to generate when needed
- ✓ **Expansion:** incentives the development of new power plants to meet domestic demand
- ✓ **Coverage:** cover the price of the end user

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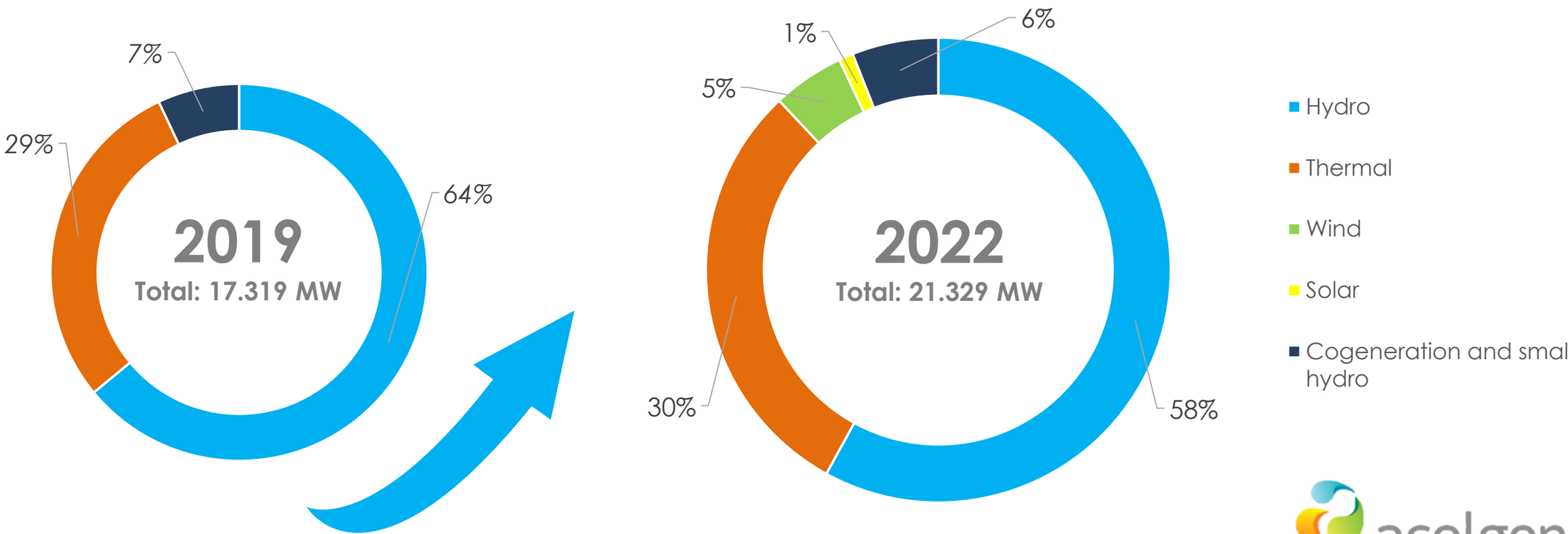
Generation Expansion

III. Installed Capacity

We will add new renewable capacity in three years +2770 MW



DOMESTIC DEMAND: 10.000 MW, enough capacity to cover an 70% increase in power demand

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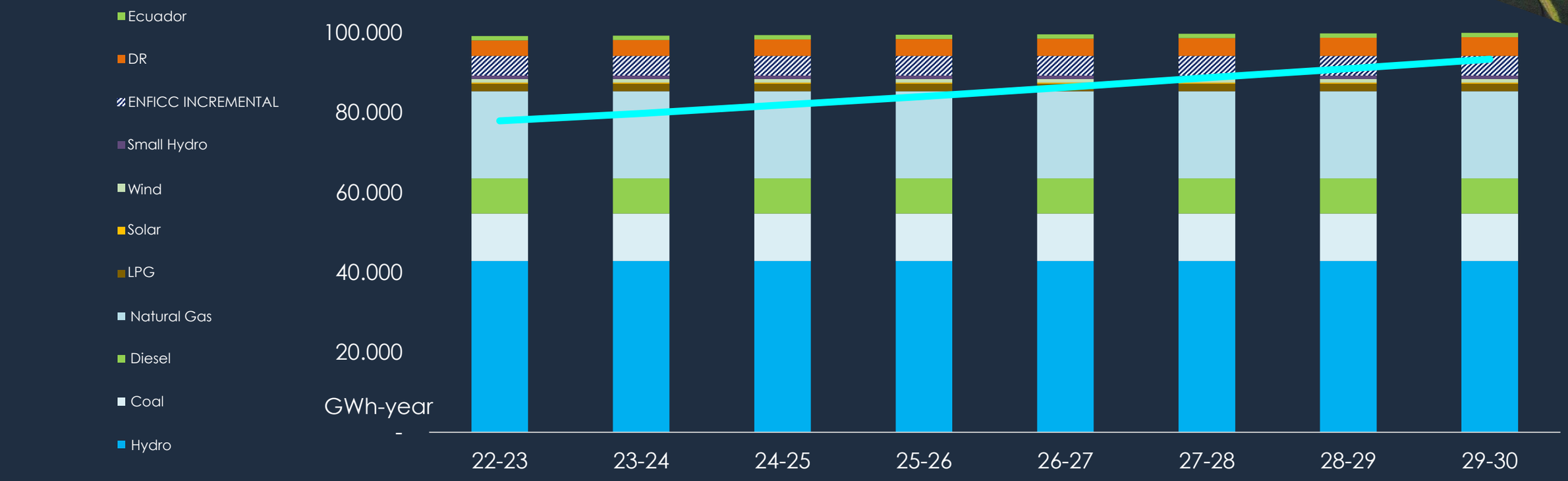
Power system security

III. System Resources



Source: XM, UPME

27% reserve margin

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Market architecture

V. Complete our market sequence

20 – 10 years

10 – 6 years

5 – 0 years

Spot Market

Expansion support mechanism for renewable energy

Standardized bilateral contracts

OTC´s

Standardized anonymous markets

New mechanisms for market promotion and competition

Expansion mechanism, reliability charge

Day ahead Market

Intraday Markets

Complementary services

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GHG emissions from electricity consumption

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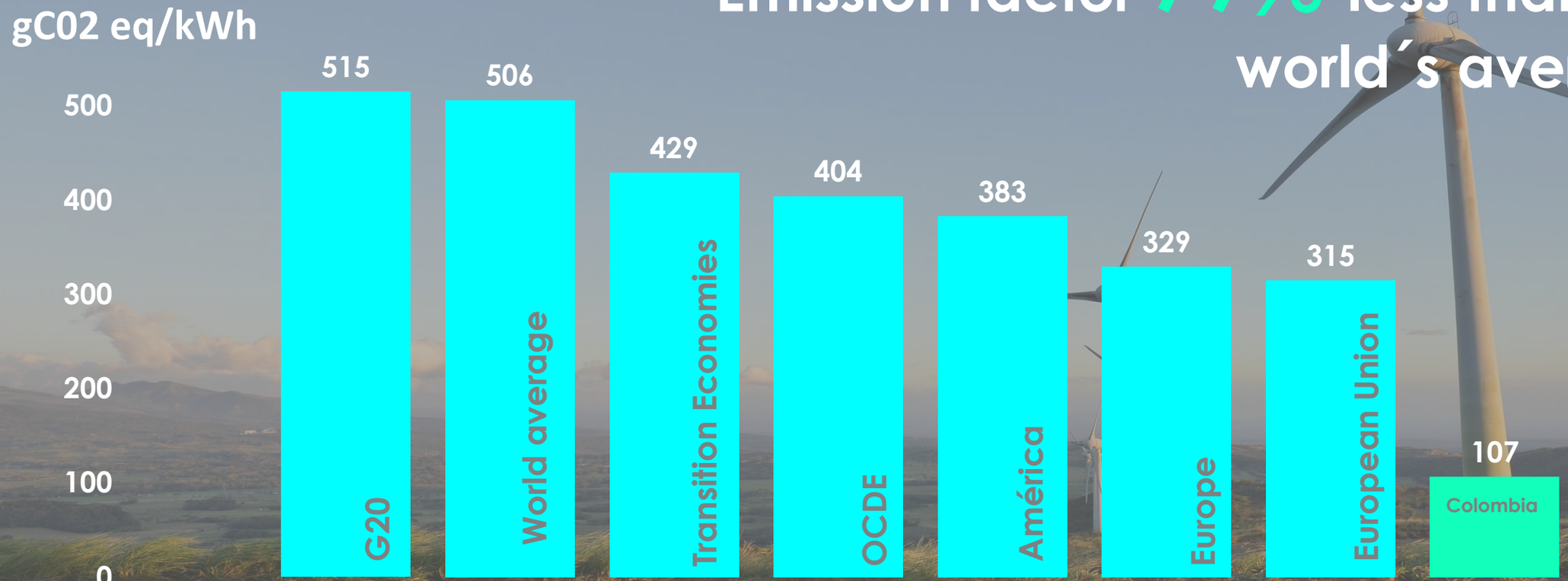
Emission factor 79% less than the world´s average



Source: IEA

SECTOR RELIABILITY

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RADIO TELEVISIÓN MARTÍ

CUBA EEUU AMÉRICA LATINA DEPORTES ARTE Y ENTRETENIMIENTO MULTIMEDIA ESPECIALES MUNDO MÁS

EN VIVO Noticiero Televisión Martí

Venezuela

marzo 07, 2019

Apagón afecta a Caracas y a 23 estados de Venezuela

Personas se aglomeran en la oscuridad, en un centro comercial, en medio del apagón que afectó este jueves a gran parte de Venezuela.

En la mayor parte de los estados de Venezuela se registró la tarde del jueves un apagón que las autoridades atribuyeron a una **falla en el sistema hidroeléctrico del Guri**, que es el mayor generador de energía eléctrica del país.

Súper apagón en Brasil: casi 50 millones de personas quedaron sin luz

28/08/2013 20:00 hs

El corte de energía duró cerca de dos horas y media y afectó a nueve estados del Noroeste del vecino país.

Un apagón dejó hoy sin energía durante dos horas y media a los nueve estados del noreste de **Brasil**, donde viven unos 47.5 millones de personas, informó **el Operador Nacional del Sistema Eléctrico (ONS).**

El apagón fue causado por incendios forestales en áreas vecinas a dos líneas de transmisión en el estado de **Piauí**, que son responsables de la conexión entre los sistemas de electricidad de las regiones **Norte y Noreste**, según un informe **del ONS** citado por la agencia alemana de noticias **DPA.**

El ministro brasileño **de Minas y Energía, Edison Lobao**, afirmó que el gobierno investigará si los incendios fueron intencionales o accidentales.

Según el **ONS**, el problema generó una pérdida de energía de 10.900 megavatios y causó la suspensión del suministro que afectó a los estados de **Alagoas, Bahía, Ceará, Pernambuco, Río Grande do Norte, Sergipe, Piauí, Paraíba y Maranhao.**

La región quedó sin luz pocos minutos después de las 15 (hora local) y el suministro recién empezó a restablecerse en las principales ciudades a partir de las 17:30.

La falta de energía ha causado graves transtornos en toda la región, que sufrió otros dos episodios de colapso en el suministro de electricidad en septiembre y en octubre del año pasado.

Colombia 27 years without a Power Shortage

CLEAN ENERGY GENERATION MATRIX

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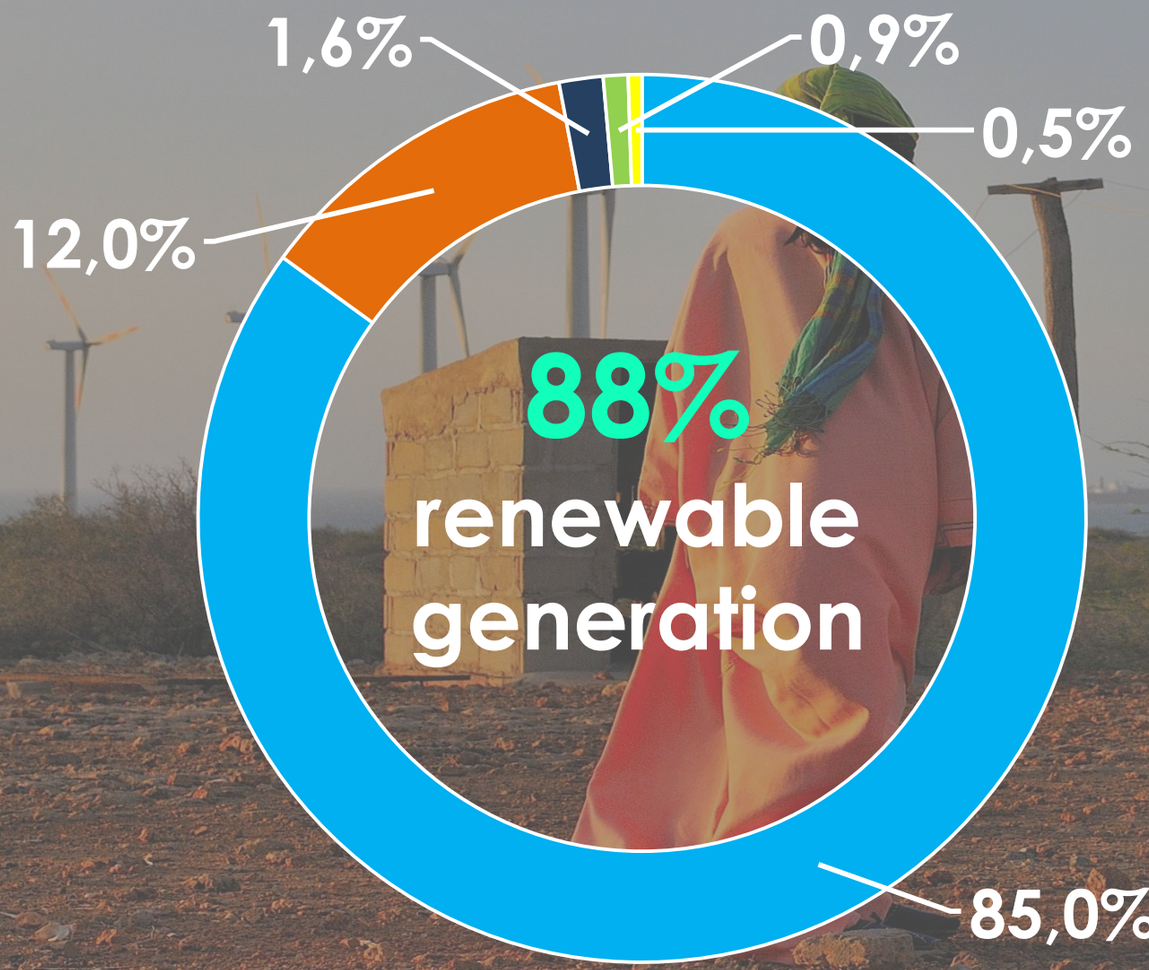

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In the Top 10 of countries with the highest percentage of renewable energy generation

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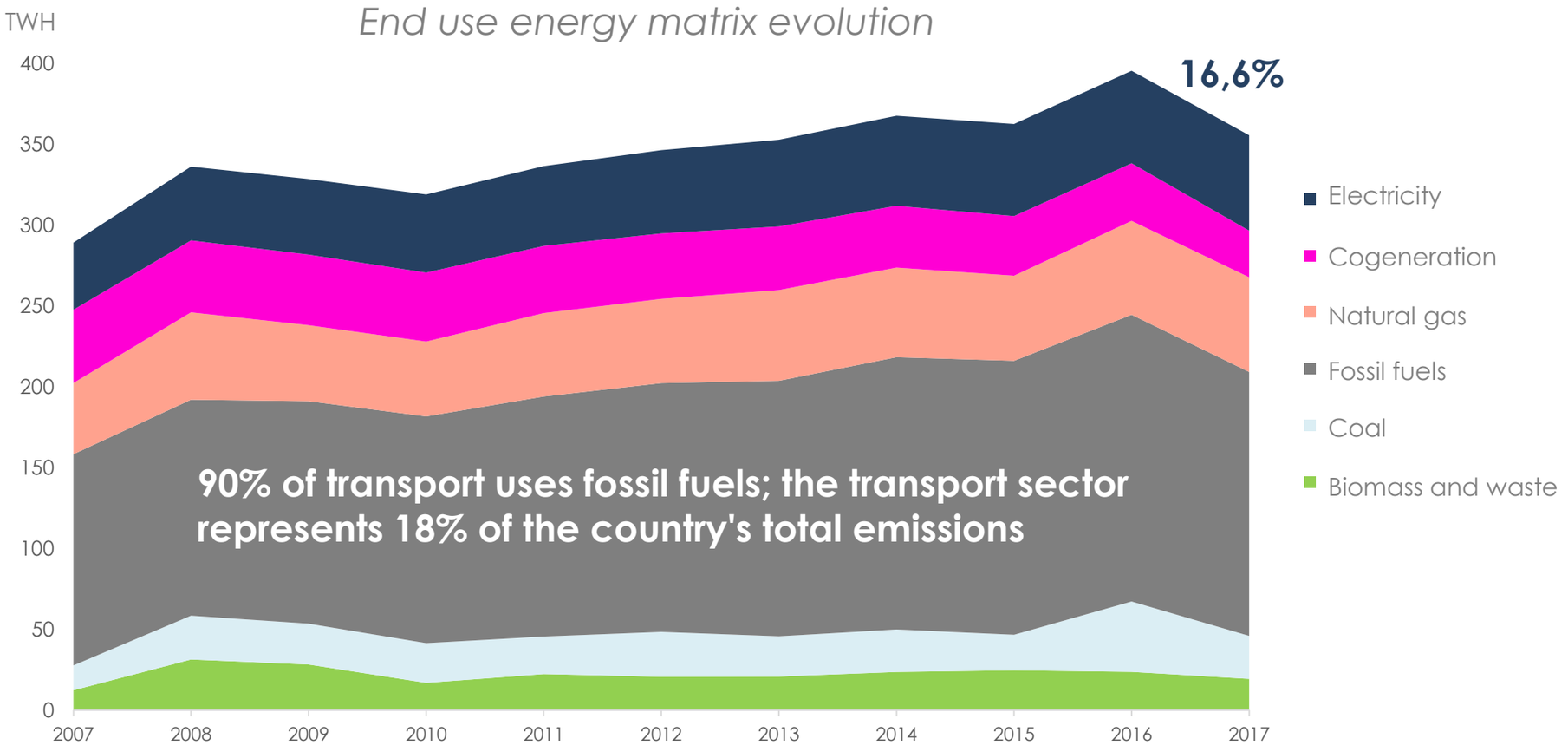
I. Future Challenge: energy transition

End use energy matrix evolution



Source:Upme

GOAL

Promote the substitution of fossil fuels through the **electrification of the economy**

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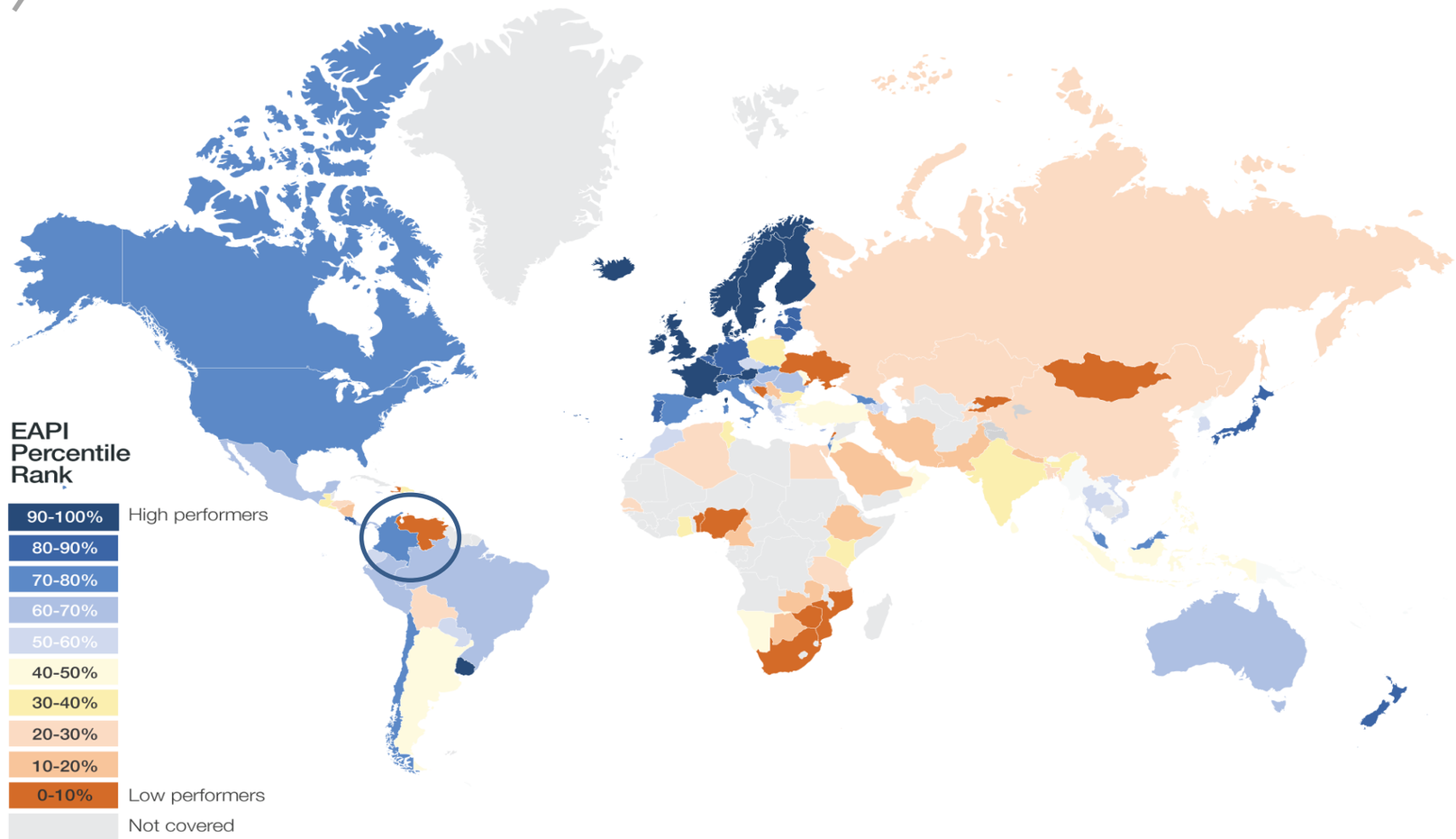
"Electricity is the backstone of the energy transition"
IEA,2019

ENERGY TRANSITION INDEX

2019



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One of the most prepare countries for the energy transition, because of our clean energy generation matrix

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Source: World Economic Forum

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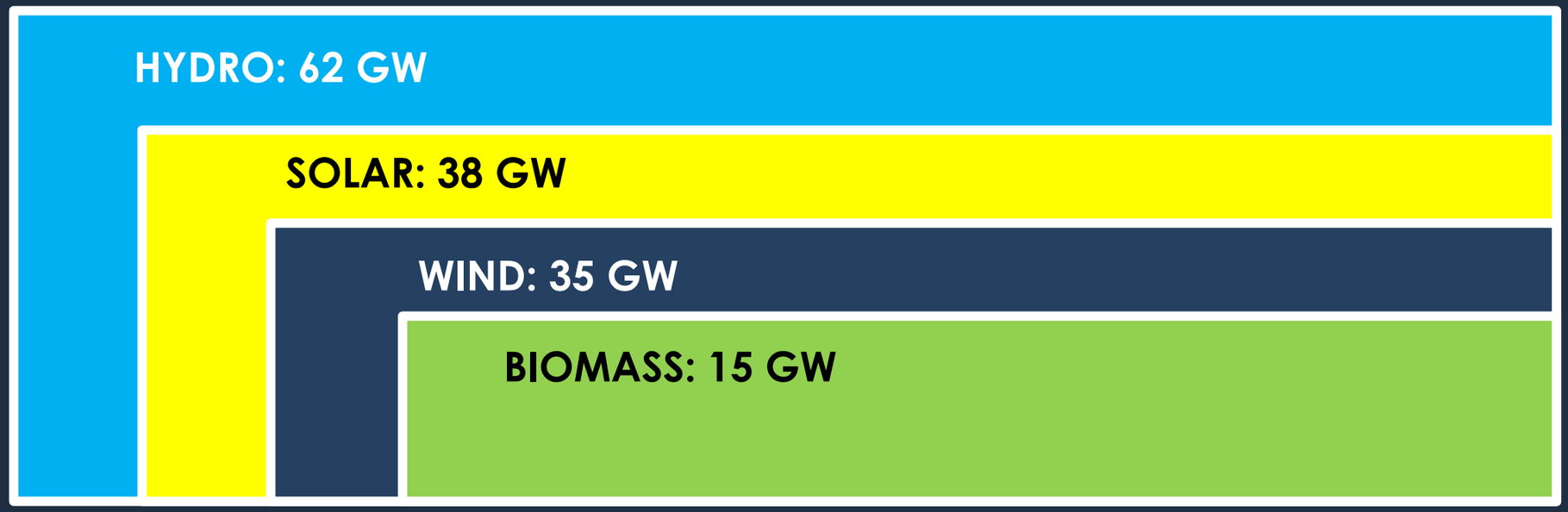
II. Future Challenge: harness our potential



¿How to decide which is the optimal matrix with a potential of **150 GW** in different renewable energy resources?

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II. Future Challenge

Design the necessary incentives for the **Integration of new technologies** under free market schemes (symmetric conditions for all)

- ✓ Bring competition to the market = Price efficiency
- ✓ Decentralized alternatives for people without electricity
- ✓ Meet our environmental goals, with a cleaner energy matrix, that could support the energy Transition

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II. Future Challenge – incentives and problems

Tax Incentives for non-conventional RE

- Reduction of 50% of income tax, for investments in NC-RE
- 0% of "value added tax" for solar and wind equipment
- 0% of "tax for imported goods", for equipment, materials and supplies for NC-RE development

Non-conventional Renewable energy auctions

- Were designed to meet the goal of the current government to introduce 1500 MW of NC-RE
- Secure a 15 year contract
- **First auction (January 2019):** auction with no assignments, due to bad auction design
- **Second auction (September 2019):** government forced agents to participate

Current challenges for NC-RE

- Design a mechanism for long-term contracts suitable for non-conventional renewable energy, based on free competition, free participation, and with clear and predictable rules.
- Clearer information about the possible connection points of new projects to the power grid
- Large-scale implementation of "*Advance metering infrastructure*".

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II. Challenges for Hydropower development

- Agreement with the communities, today it is very difficult to find a place where hydroelectric plants are easily accepted
- Environmental management of cumulative impacts
- The consideration of climate change in the operation, with the increasingly unpredictable weather conditions, it is necessary to perform better basin instrumentation and make more flexible constructions that allow handling more intense and lasting climatic events
- Environmental licensing is increasingly complex, more studies are required
- There is no regulation for sediment management

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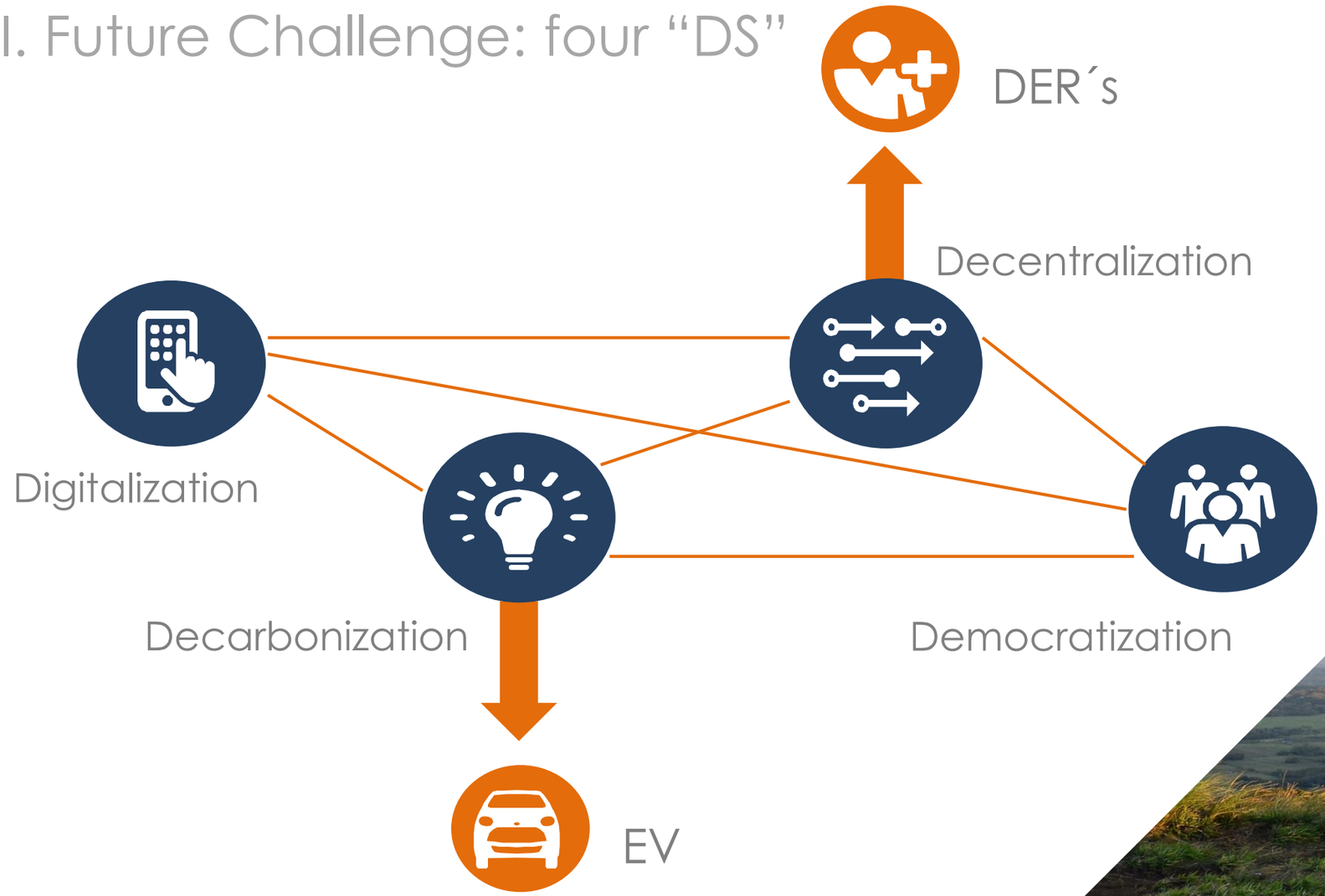
III. Future Challenge: four “DS”



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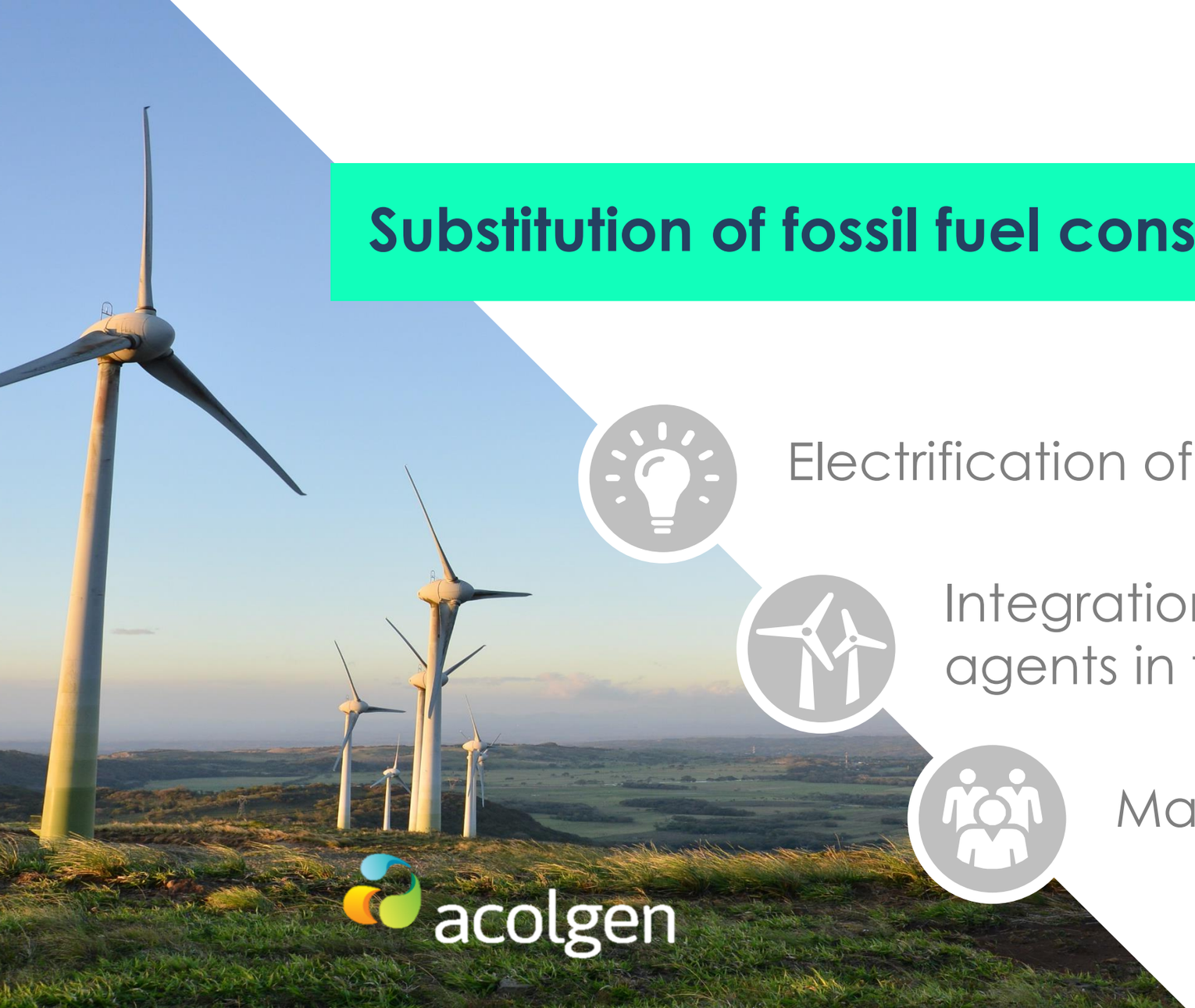
Way forward and future plans

GOVERNMENT ENERGY TRANSITION MISSION

- Roll of natural gas
- Four "DS"
- Market structure, competition
- Electricity Access, subsidies

34 national and international experts are reviewing now the roadmap for the energy sector, and making recommendations for the short term

Final document: December - 2019



CONCLUSIONS

Substitution of fossil fuel consumption with electricity

- Electrification of the economy
- Integration of new technologies and agents in the market
- Market based schemes

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THANK YOU