



Ministry of Foreign Affairs

Renewable Energies in Colombia

Business Opportunities for Dutch Companies

Commissioned by the Netherlands Enterprise Agency

>> *Sustainable. Agricultural. Innovative.
International.*

Renewable Energies in Colombia

Business Opportunities for Dutch Companies

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Government of the Netherlands

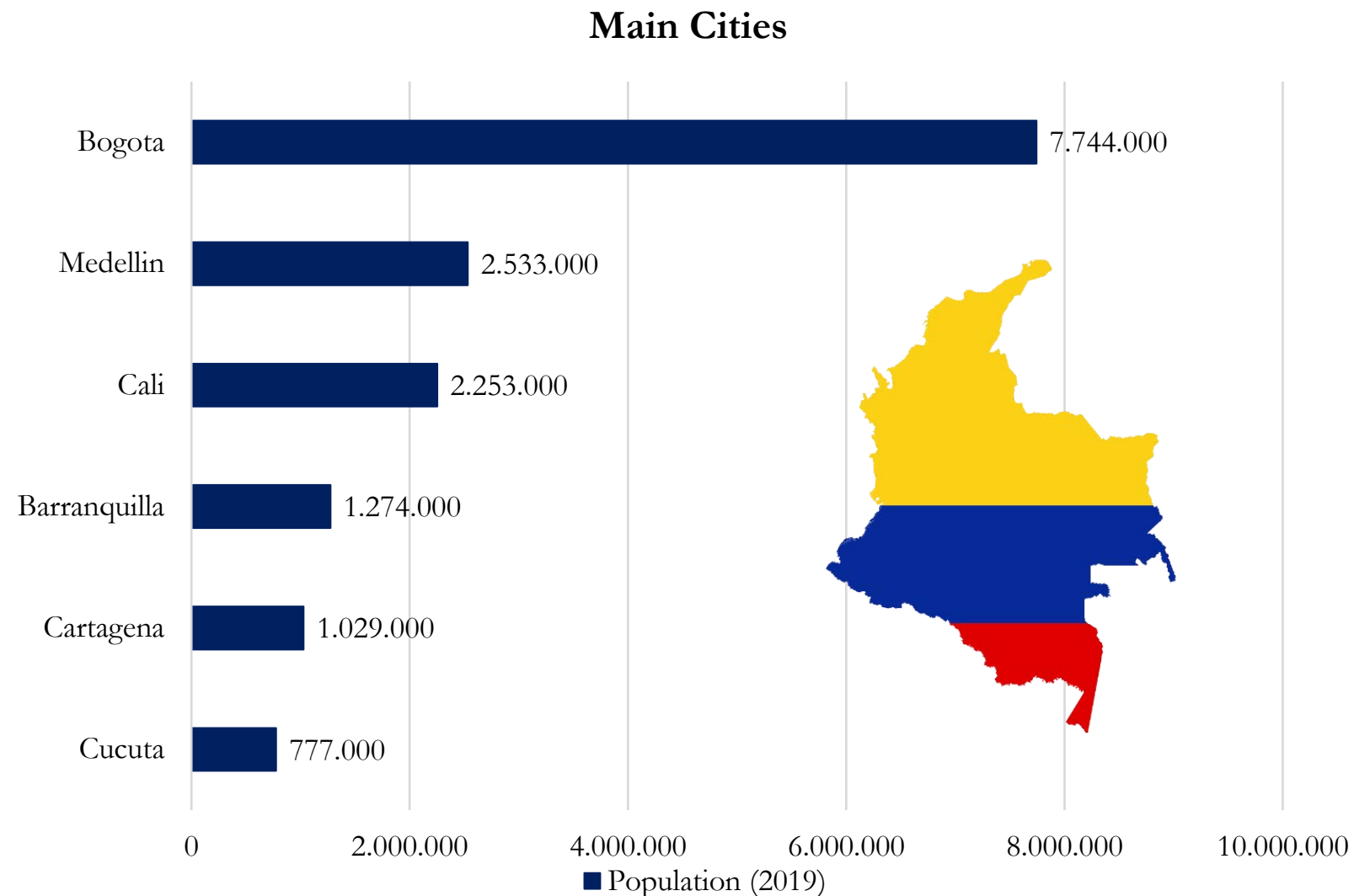
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Chapter 1: Colombia in a Nutshell

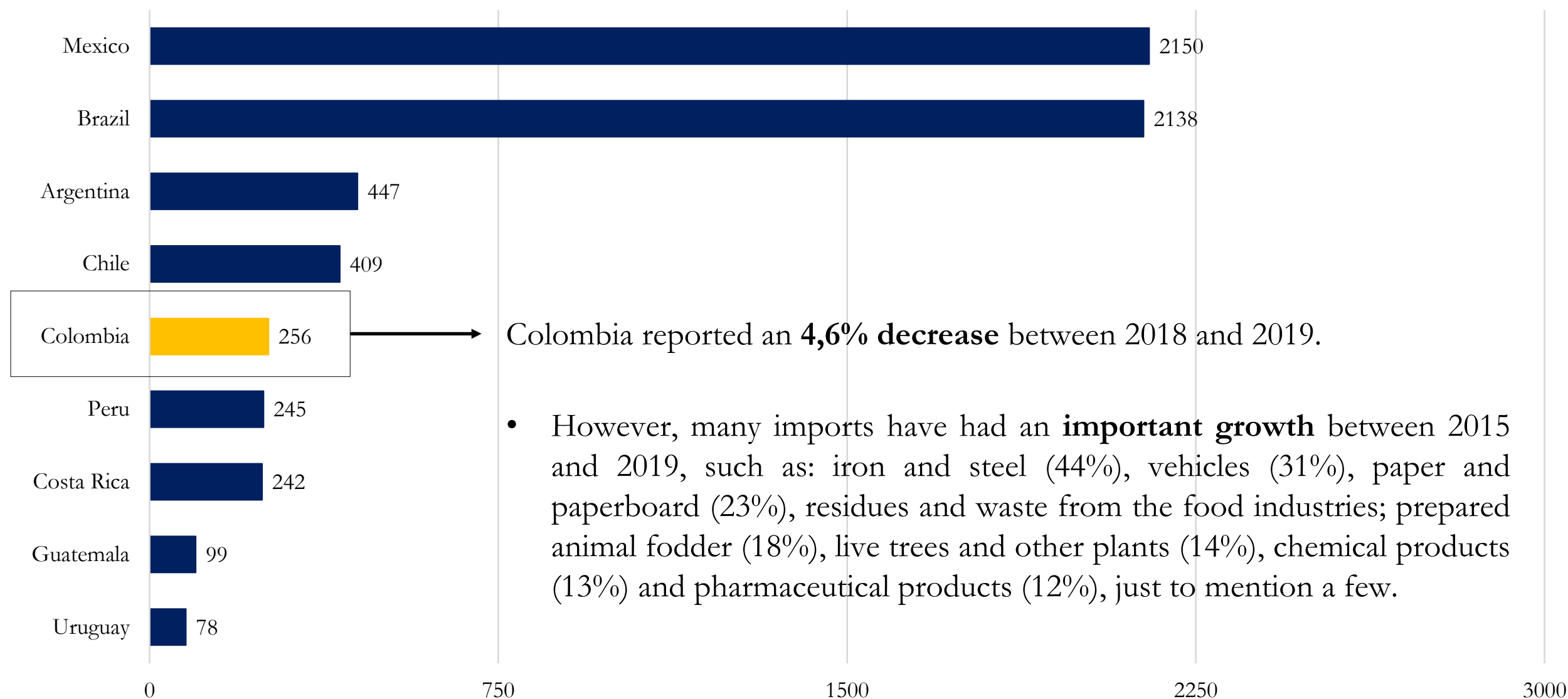
Key Facts - Colombia

- **Total Area:** 1.141.748 km²
- **Population:** 50.000.000 (2019).
- **Labor Force:** 22.200.000 (2019).
- **GDP:** USD \$340,7 billions (2019).
3,3% growth from 2018.
- **GDP Per Capita:** USD \$6.836 (2019).
3,2% growth from 2018.
- **Inflation:** 3,8% (2019).
- **Unemployment:** 10,5% (2019).
- **Total Exports:** USD \$39,5 billions (2019).
- **Total FDI:** USD \$14,58 billions (2019).
- **Doing Business Ranking:** 67/190 (2020).



Colombian Imports from The Netherlands

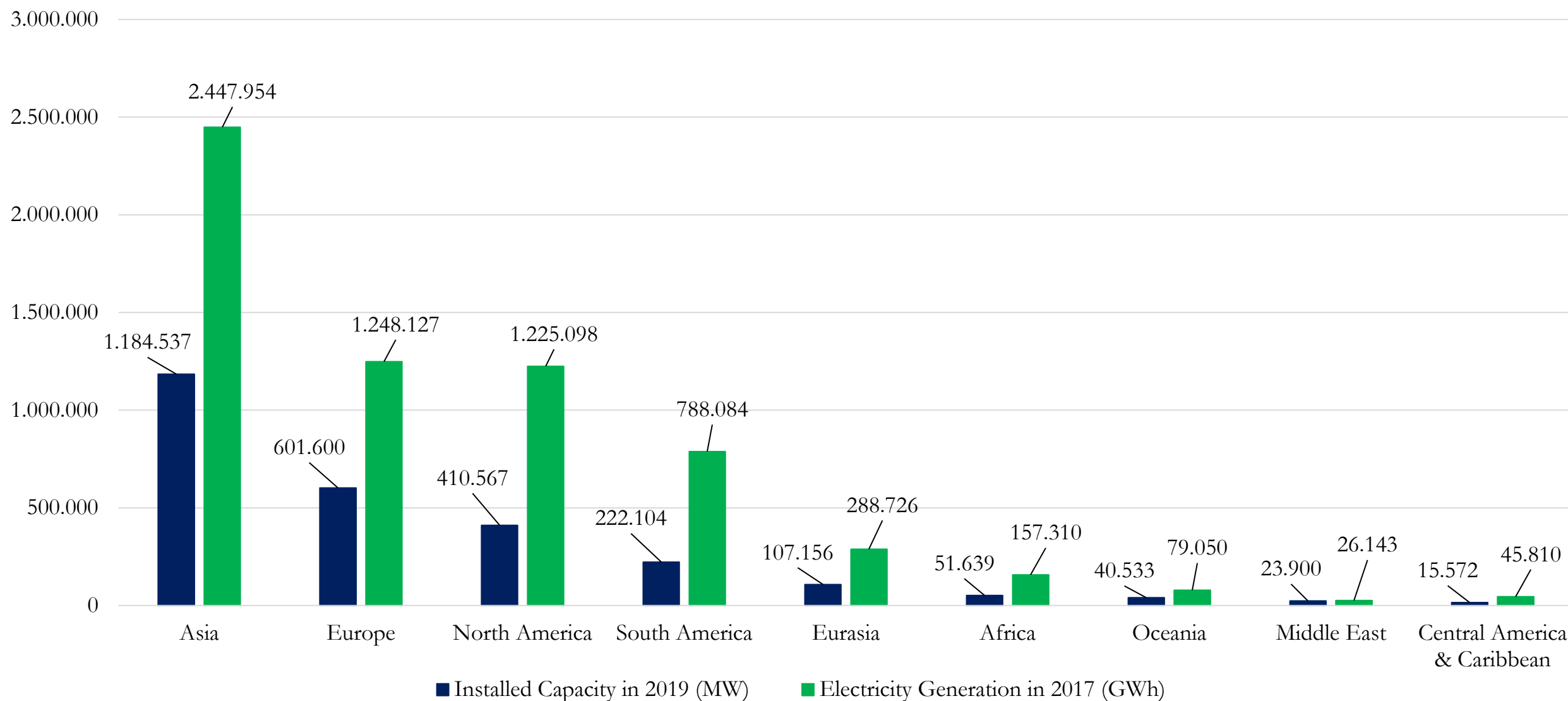
Latin American Imports From the Netherlands 2019 (USD Millions)



Chapter 2: Global Context

Renewable Energy - Global

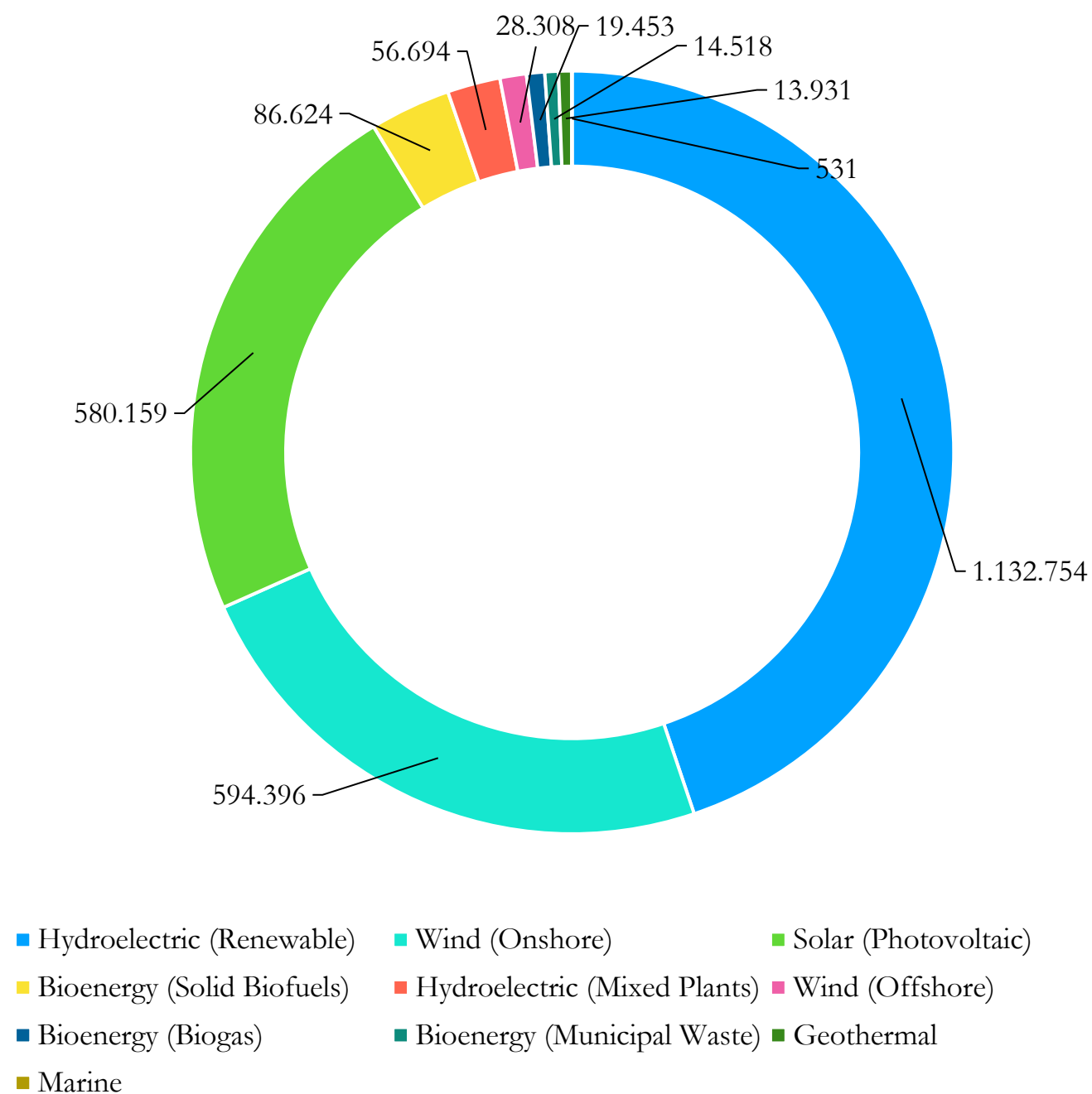
Renewable Energy in the World



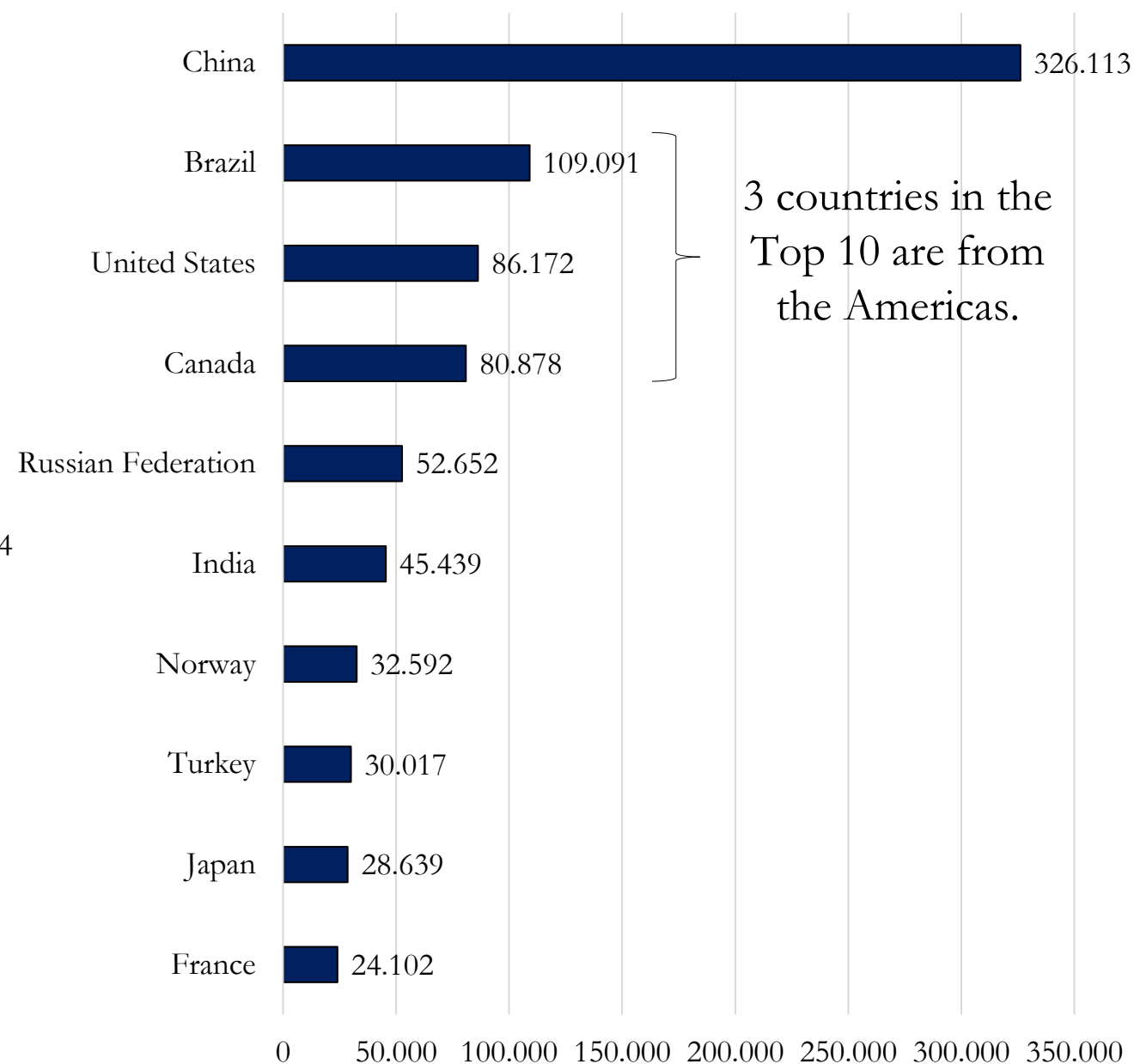
- Asia led Renewable Energy Installed Capacity in 2019 with 44,57% of the world's total, followed by Europe (22,64%), North America (15,45%), South America (8,36%), Eurasia (4,03%), Africa (1,94%), Oceania (1,53%), Middle East (0,90%) and Central America & The Caribbean (0,59%).

Renewable Energy - Global

Technologies - Installed Capacity in 2019 (MW)



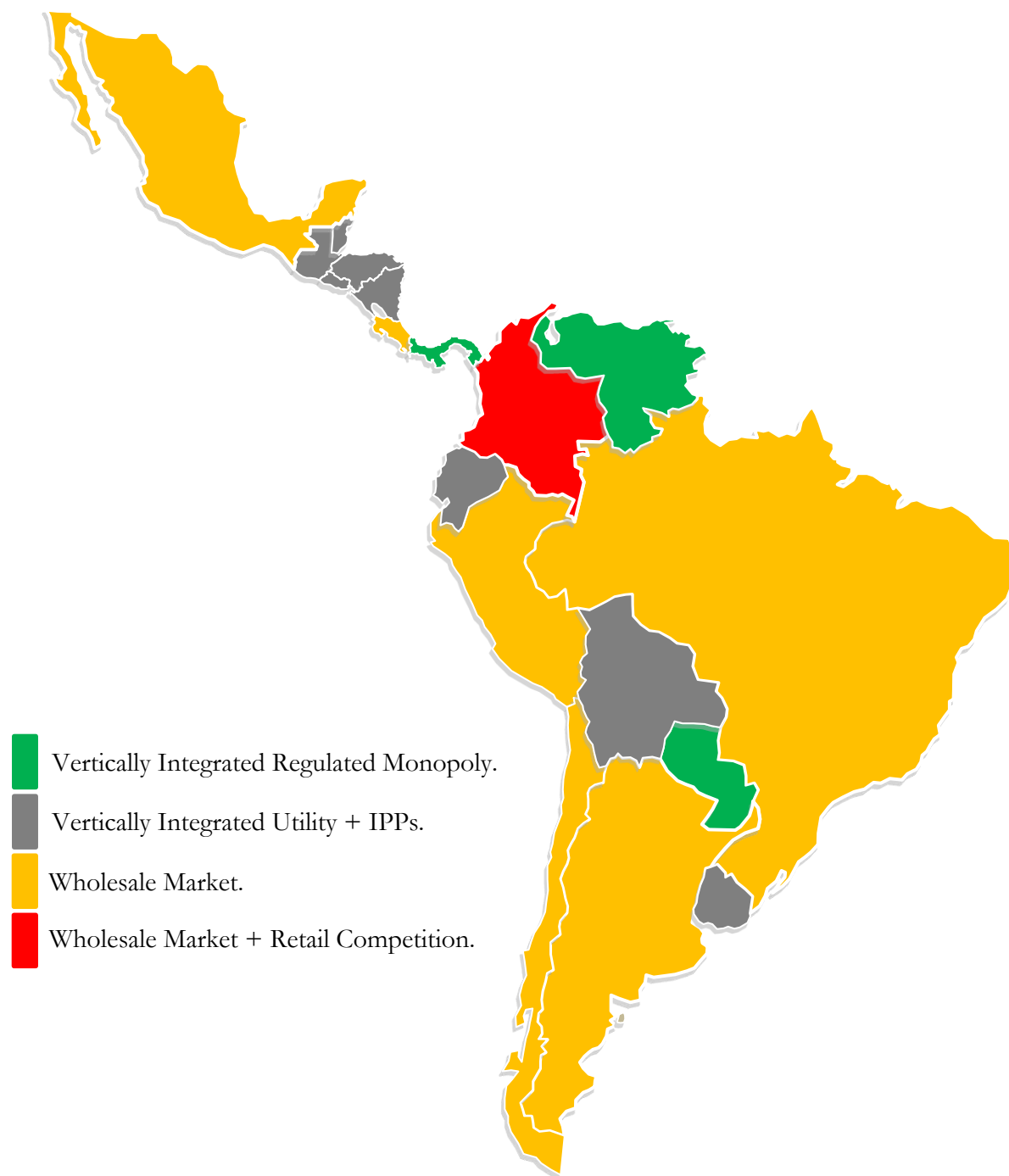
**World Ranking - Installed Capacity in 2019
(MW - All Technologies)**



Chapter 3: Regional Context

Renewable Energy - Latin America

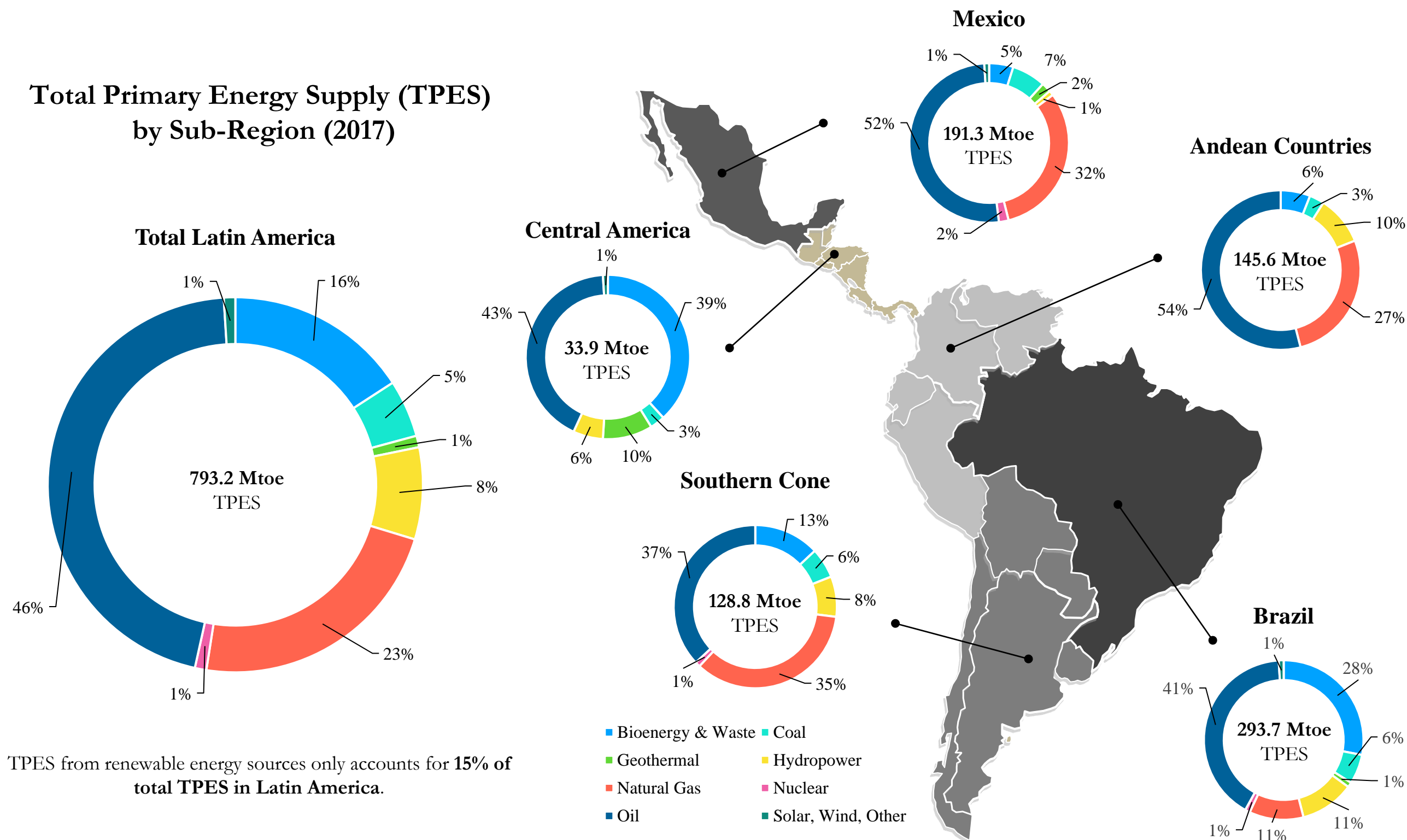
Electricity Market Structures in Latin America (2016)



- Latin America hosts some of the **most dynamic renewable energy markets in the world**, with a quarter of primary energy coming from renewables, twice the global average. Power sectors in the region are characterized by a **high dependence on hydropower**, and exploiting the complementarity between hydropower and variable renewable energy sources is a key leveraging factor for all renewables in Latin America.
- **Countries are beginning to address diversification efforts in electricity systems**, and are working to create more enabling policy and regulatory environments. In this context, recent auctions in Argentina, Mexico, Chile, and Peru have helped to **accelerate the deployment of thousands of megawatts of wind and solar energy in the region**. Due to recent political standpoints, countries like Brazil have shown a slower deployment.
- Total investment in power generation reached almost **USD \$120 billion between 2010 and 2015**, including **USD \$38 billion for large-scale hydropower**. Costs for renewable energy technologies have fallen to the extent that **solar and onshore wind power no longer need financial support to compete with conventional power generation in a growing number of Latin American countries**.

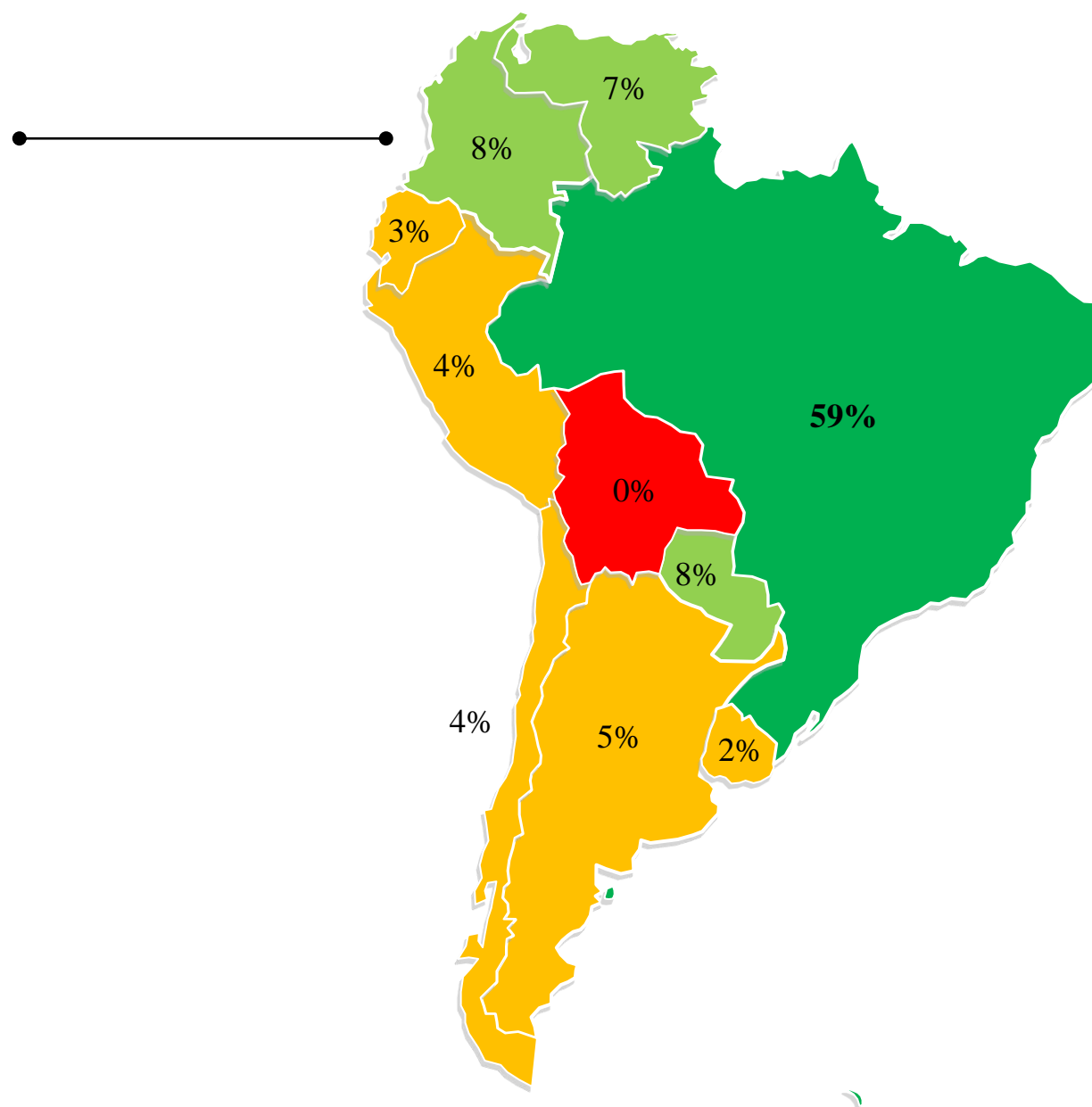
Renewable Energy - Latin America

Total Primary Energy Supply (TPES) by Sub-Region (2017)



Renewable Energy - South America

- Brazil leads the continent in the generation of renewable energy with **59% of the total generated**.
- Colombia surpassed the goal of incorporating unconventional sources of renewable energy, going from less than 50 MW in 2018 to more than 2,200 MW of installed capacity by 2022.
- The percentages reflected on the map only account for solar, wind and biomass sources of energy (no hydropower).



Chapter 4: A Green Colombia

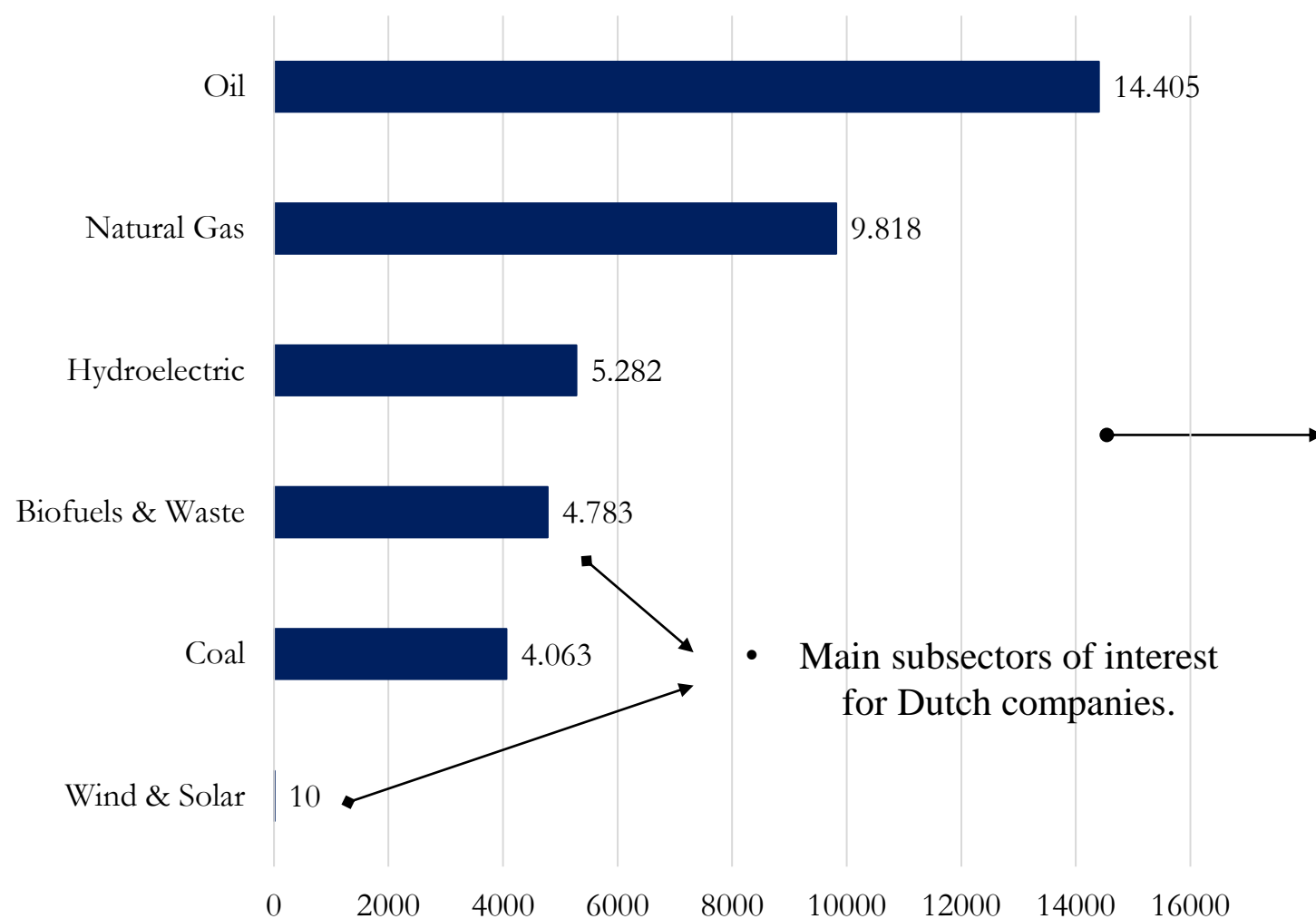
Leading the Way

- Colombia is the **2nd most biodiverse country in the world.**
- Located between the Tropic of Cancer and the Tropic of Capricorn, Colombia boasts **high solar potential.**
- Colombia is the **only country in South America with access to two oceans** and receives constant wind currents from both the North Atlantic and South Pacific Gyres.
- Colombia was the **first country in Latin America** to adopt an official strategy regarding Circular Economy.
- Currently, according to the [2019 Energy Transition Index \(ETI\)](#) of the World Economic Forum Fostering Effective Energy Transition initiative, Colombia ranks **4th in Latin America and 34th worldwide.** The ETI builds on the previous Energy Architecture Performance Index series (2013-2017).
- In a **historic step** towards the renewable energy revolution in Colombia, the **first auction of non-conventional sources of renewable energy** was carried out in 2020 by the National Government through the Mining-Energy Planning Unit (UPME), an entity attached to the Ministry of Mines and Energy.
- Colombia will increase its installed capacity for the generation of solar and wind energy **50 times by 2022.**

Renewable Energy - Colombia

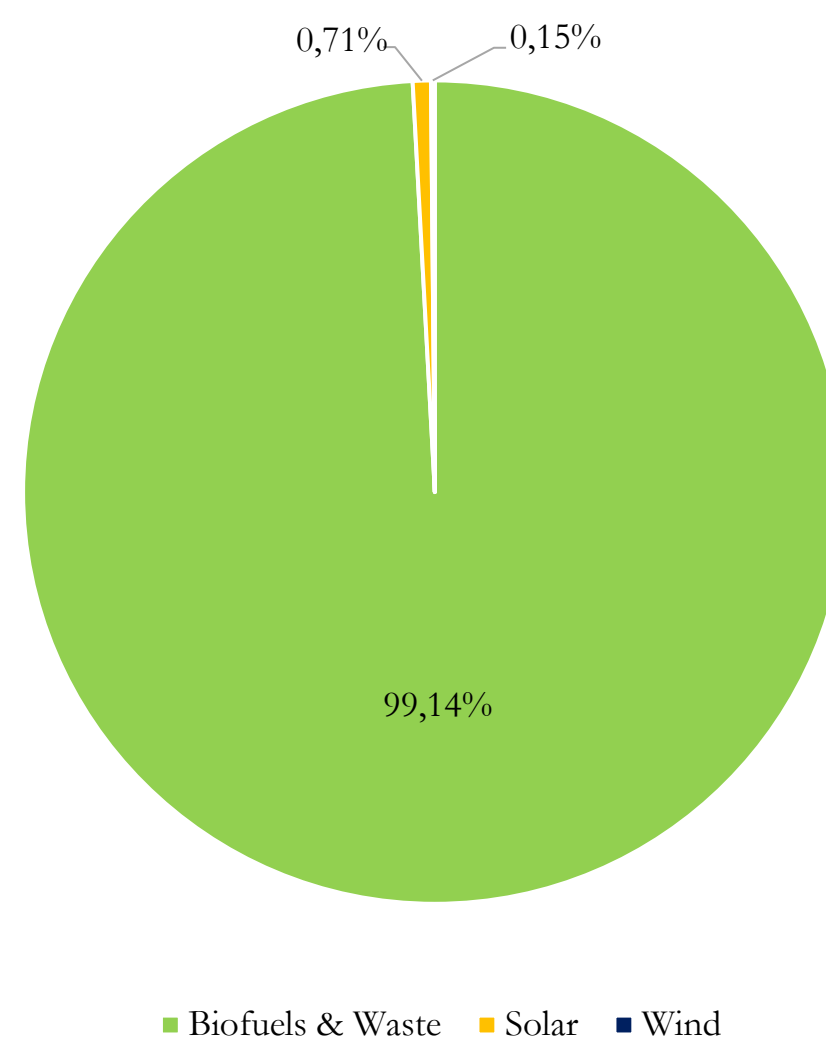
- In Colombia, 52,4% of renewable energy is generated by hydroelectric power. This figure only includes large hydroelectric projects.

Total Primary Energy Supply (TPES) by Source in 2017 (Ktoe)



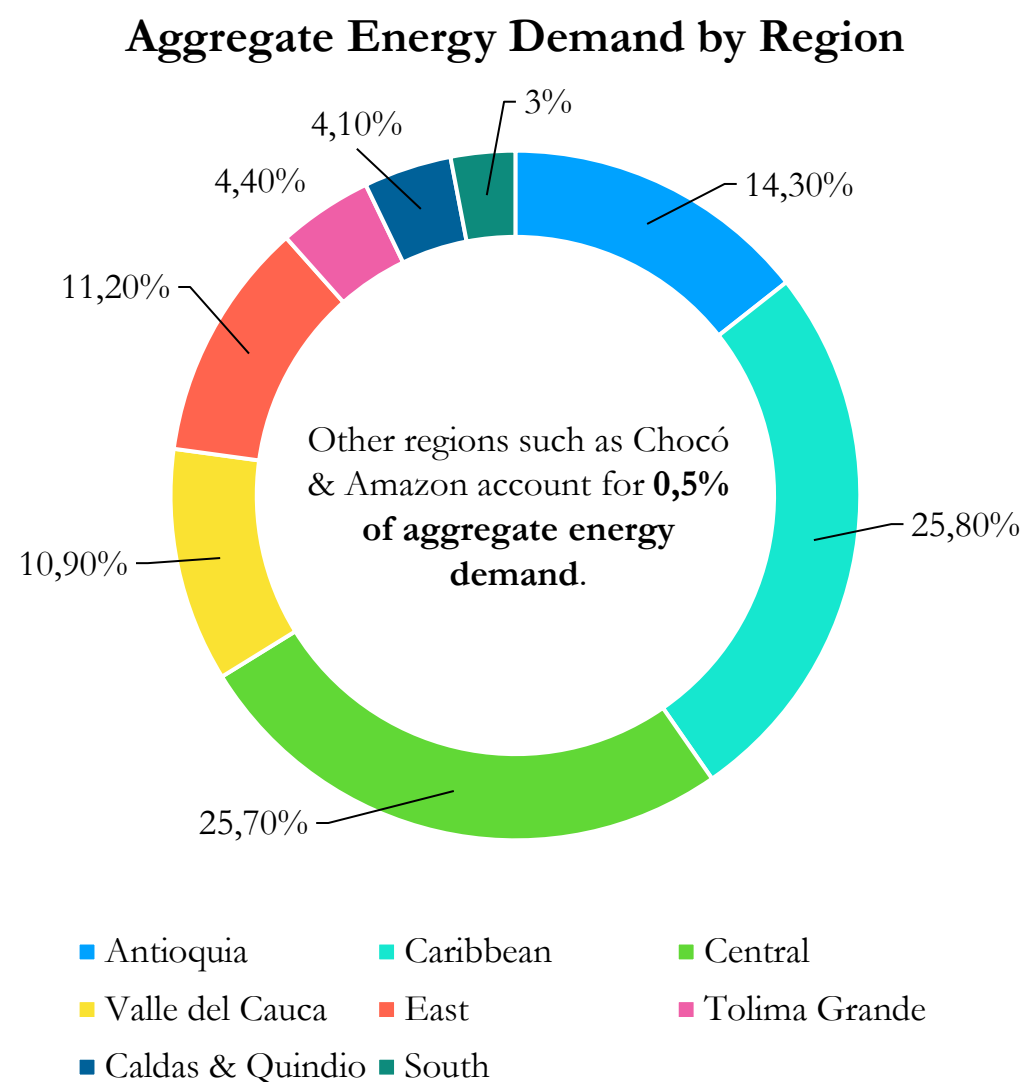
- Main subsectors of interest for Dutch companies.

Total Renewable Energy Supply (TPES) Other Than Hydroelectric in 2017



Renewable Energy Map - Colombia

Power Generation Capacity by Renewable Resources



Coffee Region + Antioquia:

Hydroelectric: 14.762 MW
Solar: 492 MW

Caribbean Region:

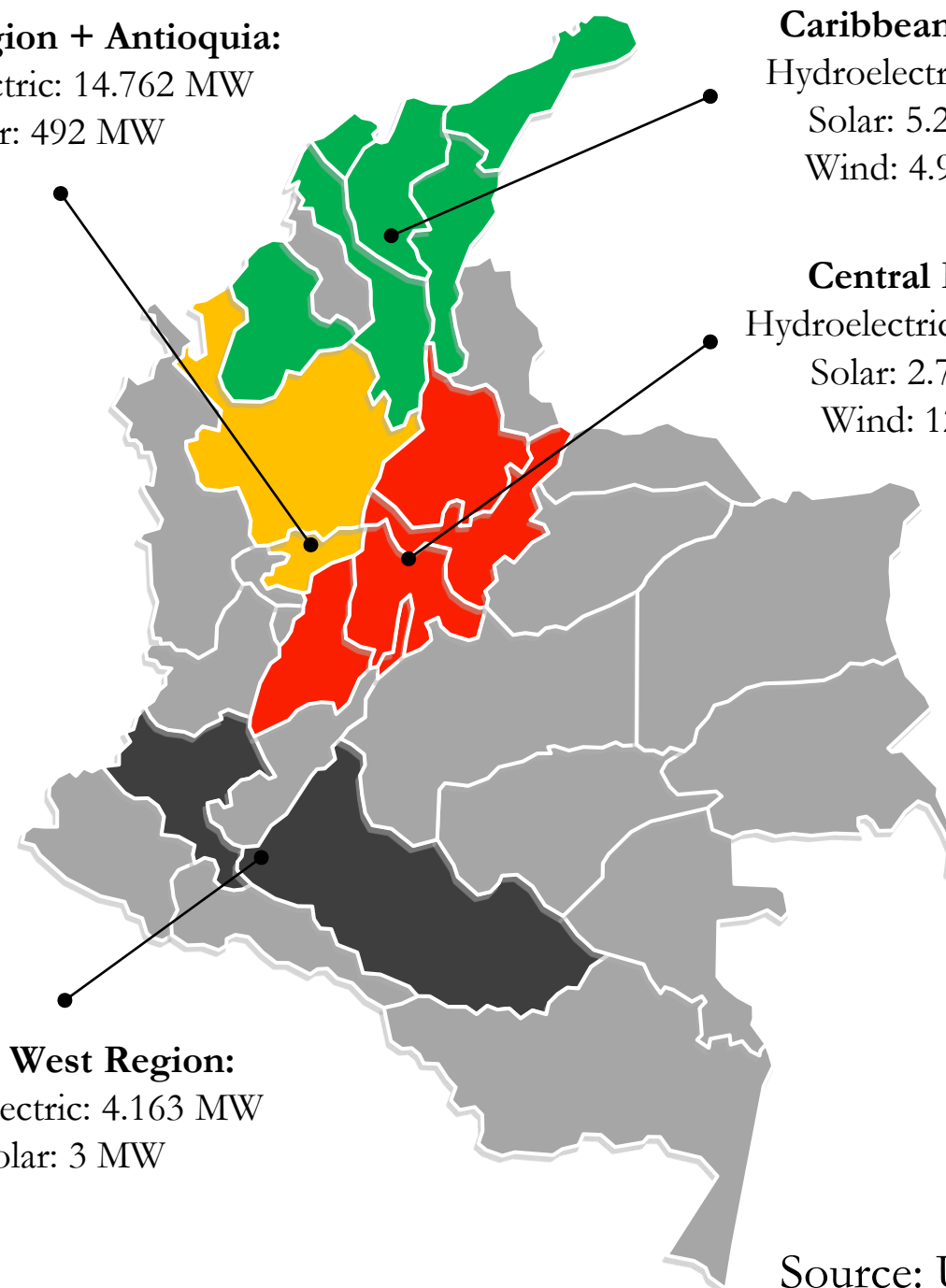
Hydroelectric: 55 MW
Solar: 5.231 MW
Wind: 4.931 MW

Central Region:

Hydroelectric: 5.928 MW
Solar: 2.741 MW
Wind: 125 MW

South West Region:

Hydroelectric: 4.163 MW
Solar: 3 MW



Photovoltaic Power Map - Colombia

• Coffee Region + Antioquia:

- Antioquia
- Caldas
- Risaralda
- Quindío

• Central Region:

- Santander
- Boyacá
- Cundinamarca + Bogotá
- Tolima

• Caribbean Region:

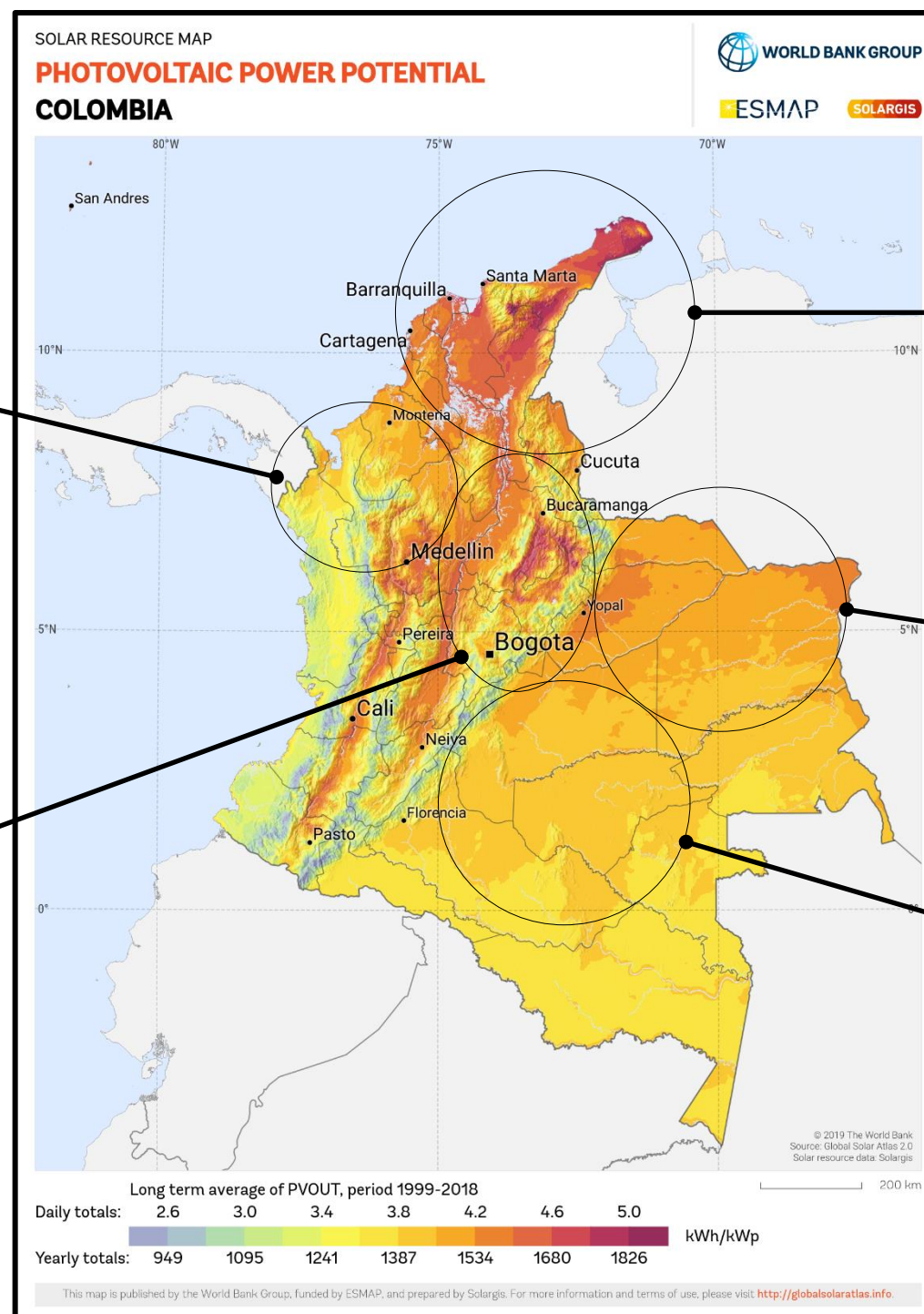
- La Guajira
- Atlántico
- Magdalena
- Bolívar

• East Region:

- Meta
- Arauca
- Casanare
- Vichada

• Amazon Region:

- Guaviare
- Caquetá
- Vaupés



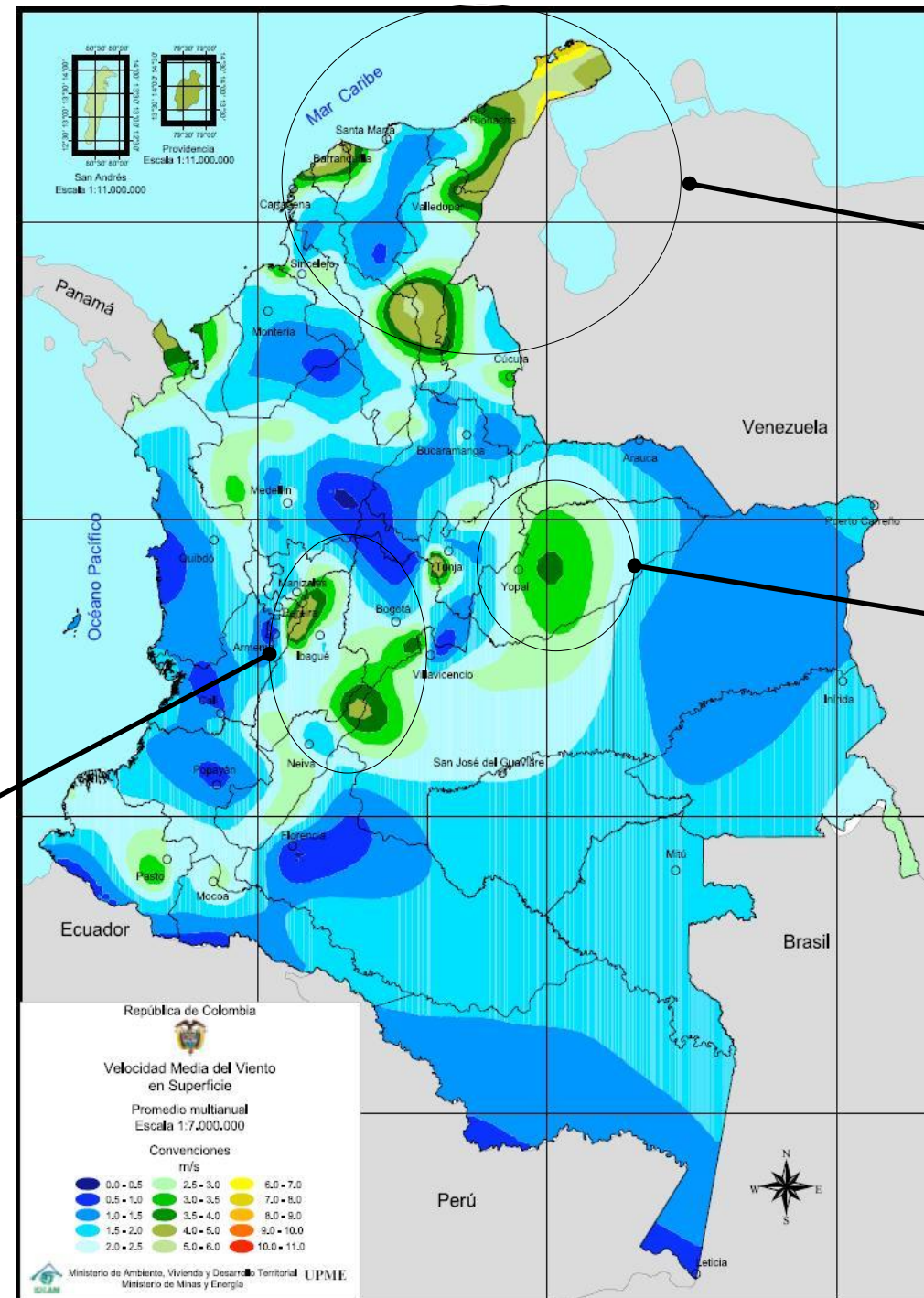
Wind Power Map - Colombia

- Although most parts of Colombia are not suited for wind power, the Colombian Caribbean coast/region has **6.0 - 8.0 m/s speeds**, similar to what is seen in other coasts with high wind potential in South America (Brazil, Peru, Argentina, Chile and Uruguay).

- Central Region:**
- Cundinamarca + Bogotá
- Tolima
- Huila

- Caribbean Region:**
- La Guajira
- Atlántico
- Magdalena
- Bolívar

- East Region:**
- Casanare



Key Stakeholders - Colombia



Instituto de planificación y promoción
de Soluciones Energéticas para las
zonas No Interconectadas



Comisión de Regulación
de Energía y Gas



Unidad de Planeación Minero Energética

 **Superservicios**
Superintendencia de Servicios
Públicos Domiciliarios **MINMINAS**

IPSE: meets the energy needs of inhabitants who do not have this service by identifying, implementing and monitoring sustainable energy solutions through efficacy, efficiency and effectiveness in Non-Interconnected Zones (ZNI).

CREG: regulates the provision of domiciliary public services of electric energy, fuel gas and liquid fuel public services, in a technical, independent and transparent manner and promotes the sustained development of these sectors.

UPME: is the special technical and administrative unit in charge of the sustainable development of the country's mining and energy sectors, including hydrocarbons. Its main objectives are to plan, support and evaluate the development of both industries comprehensively, as well as to support the Ministry in the formulation of national policies and regulations.

Superservicios: performs specific control and surveillance functions independently of the Service Commissions and with the immediate collaboration of the delegated superintendents.

Ministry of Mines & Energy: public entity of national character, in charge of managing resources non-renewable natural resources of the country ensuring their best and greater use orientation in the use and regulation of the same, guaranteeing their supply. FAZNI is a special Ministry fund specialized in financial support for the energization of non-interconnected areas.

Key Stakeholders - Colombia



Acolgen: non-profit organization of the trade union, created with the aim of promoting free and healthy competition and the development of the Colombian electricity sector market, in particular, of the generation activity, contributing to the development of the sector through active participation in the formulation of sector policies and regulations.



SER: private non-profit entity that brings together more than 67 companies, locally and globally, that have made their commitment to renewable energy, bringing all their experience and knowledge from the point of view of generators, developers, suppliers and consultants.

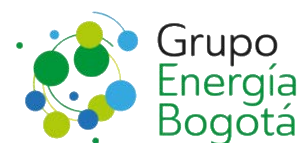


ACER: encourages the development and use of renewable energies, it will work indefinitely and will not pursue profit, but rather technical, academic, scientific, cultural and social, participating in projects of public interest.



CNO: private body whose main function is to agree on technical aspects to guarantee that the operation of the National Interconnected System is safe, reliable and economical and to be the executor of the Operation Regulations.

Key Companies - Colombia



Income statement and Balance Sheet as of December 2018					
<i>Figures Expressed in millions of EUR – based on the official exchange rate for 2018 (\$3.399 COP per 1 EUR)</i>					
No.	Company Name	Company Type	Total Assets (EUR)	Total Liabilities (EUR)	Total Equity (EUR)
1	Empresas Públicas de Medellín ESP	Public	13.414	6.763	6.650
2	Interconexión Eléctrica SA ESP	Mixed (Predominantly Public)	13.228	7.655	5.572
*3	Codensa SA ESP	Private	2.007	1.193	814
4	Grupo Energía Bogotá SA ESP	Mixed (Predominantly Public)	7.437	3.615	3.822
*5	Emgesa SA ESP	Mixed (Predominantly Public)	2.721	1.474	1.247
6	Celsia SA ESP	Private	3.145	1.555	1.589
7	Isagen SA ESP	Private	5.586	3.847	1.739
8	AES Chivor & CIA SCA ESP	Private	476	208	268
9	Electrificadora del Huila SA ESP	Public	245	132	112
10	Electrificadora del Meta SA ESP	Public	187	103	83

*As of 2019, Codensa & Emgesa are branded under the Italian Enel Brand as: Enel-Condensa and Enel-Emgesa.

- With a **25% share in the country**, Enel-Codensa is the leader in the Colombian market with 3.4 million clients.

Pricing KWh - Colombia

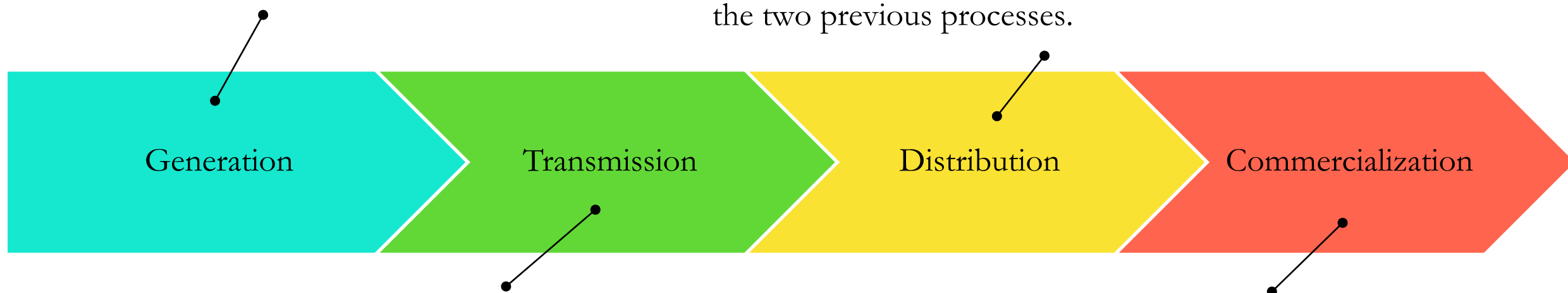
Cost (EUR) per KWh of Grid Power (2019) <i>Based on the official exchange rate for 2019 (\$4.138 COP per 1 EUR)</i>												
Company	Price Per Month (Average for Industrial & Commercial)											
	January	February	March	April	May	June	July	August	September	October	November	December
Empresas Públicas de Medellín ESP	0.14	0.143	0.149	0.146	0.141	0.143	0.143	0.147	0.145	0.147	0.15	0.145
Codensa SA ESP	0.142	0.145	0.148	0.147	0.141	0.14	0.139	0.144	0.145	0.146	0.147	0.142
Celsia SA ESP	0.13	0.13	0.129	0.129	0.13	0.132	0.133	0.136	0.136	0.133	0.132	0.137
Electrificadora del Huila SA ESP	0.158	0.159	0.160	0.158	0.156	0.158	0.158	0.162	0.164	0.158	0.158	0.156
Electrificadora del Meta SA ESP	0.129	0.13	0.134	0.131	0.126	0.126	0.127	0.13	0.132	0.131	0.130	0.126

*All prices are based on an average price (operator & client) for industry & commerce (non-residential).

Operating Process - Colombia

Generation: takes place by means of power plants, according to the type of energy that is going to be produced; whether solar, wind, bioenergy, etc., in which generating agents, self-generators or cogenerators intervene.

Distribution: performs activity of transporting electrical energy through a set of power lines and substations, with the associated equipment, which operates at voltages less than 220 kV (medium voltage networks). In terms of transparency and neutrality, **CREG** regulates the market by placing restrictions on contracting with companies from the same business group, eliminating conflicts of interest between the agents involved in the two previous processes.



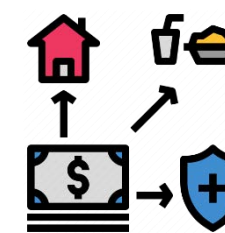
Transmission: consists of the transport of electrical energy through a set of power lines, with their corresponding connection modules. It is the part of the system in charge of bringing electrical energy from power plants to large consumption points, traveling enormous distances through high-voltage networks.

Commercialization: performs purchase of electrical energy in the wholesale market and its sale to end users, regulated or unregulated, whether that activity is carried out exclusively or combined with other activities in the electricity sector, and is for domestic or industrial consumption.

Cash Flow - Colombia



Income



Expenditure

- Hourly transactions on the energy exchange.
- Energy financing contracts.
- Auctions for the allocation of energy obligations.
- Energy exports.
- The Energy Exchange is a commercial figure to receive offers and demands from the electricity market and that allows the purchase and sale of energy at different prices given by a competitive environment.

Direct

Benefits

- Tax.
- Reduction of greenhouse effect emissions.
- Subsidies.
- Incentives.



Administrative Expenses

Economic Cost of Operation

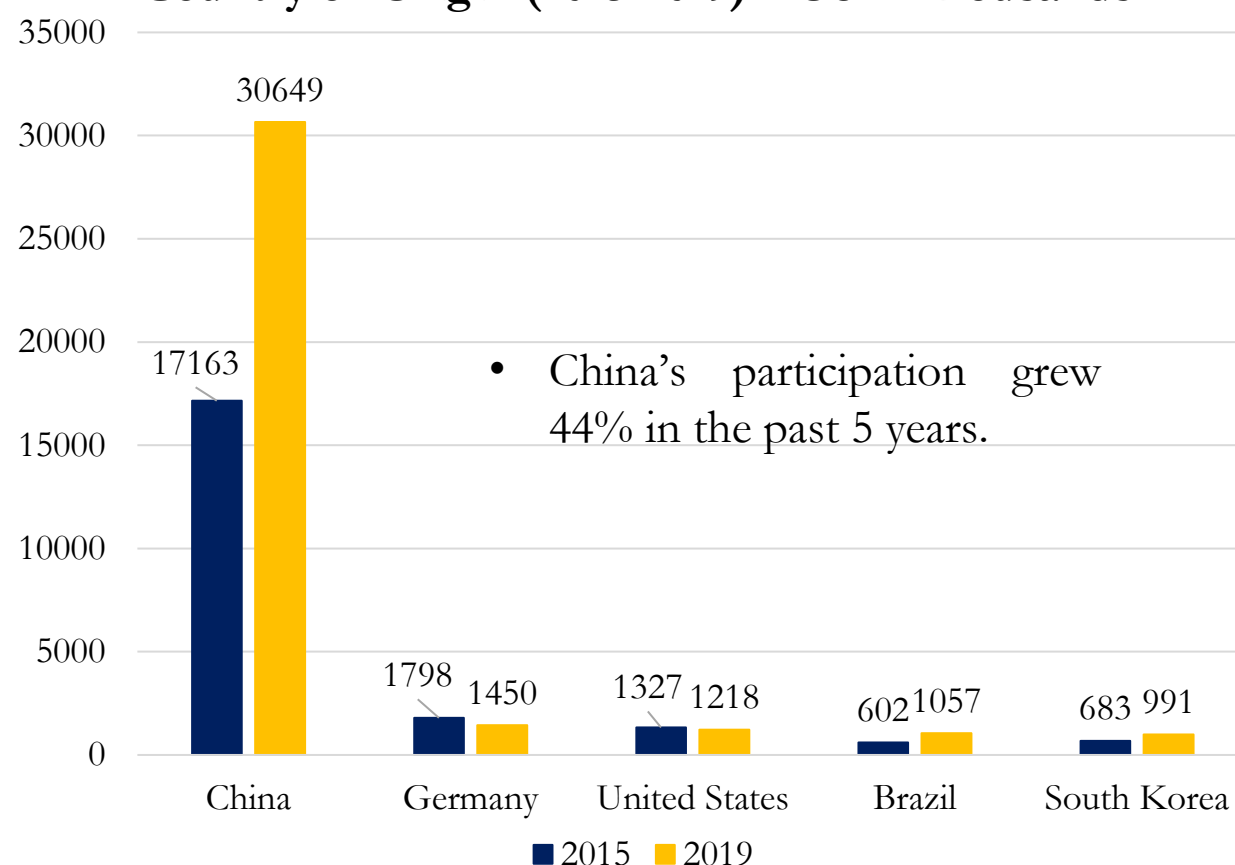
Project Cost

Professional & Technical Staff

- Insurance.
- Computer equipment.
- Non-compliance penalties.
- Generation and connection costs.
- Maintenance and reinforcement costs of the networks.
- Maintenance staff labor.
- Transportation of personnel and supplies.
- Costs in generators, transformers and batteries.
- Stock fees.
- Project development staff.
- Licenses.
- Land acquisition.
- Machinery and technology.
- Electrical engineers.
- Technicians and technologists.
- Administrative staff.

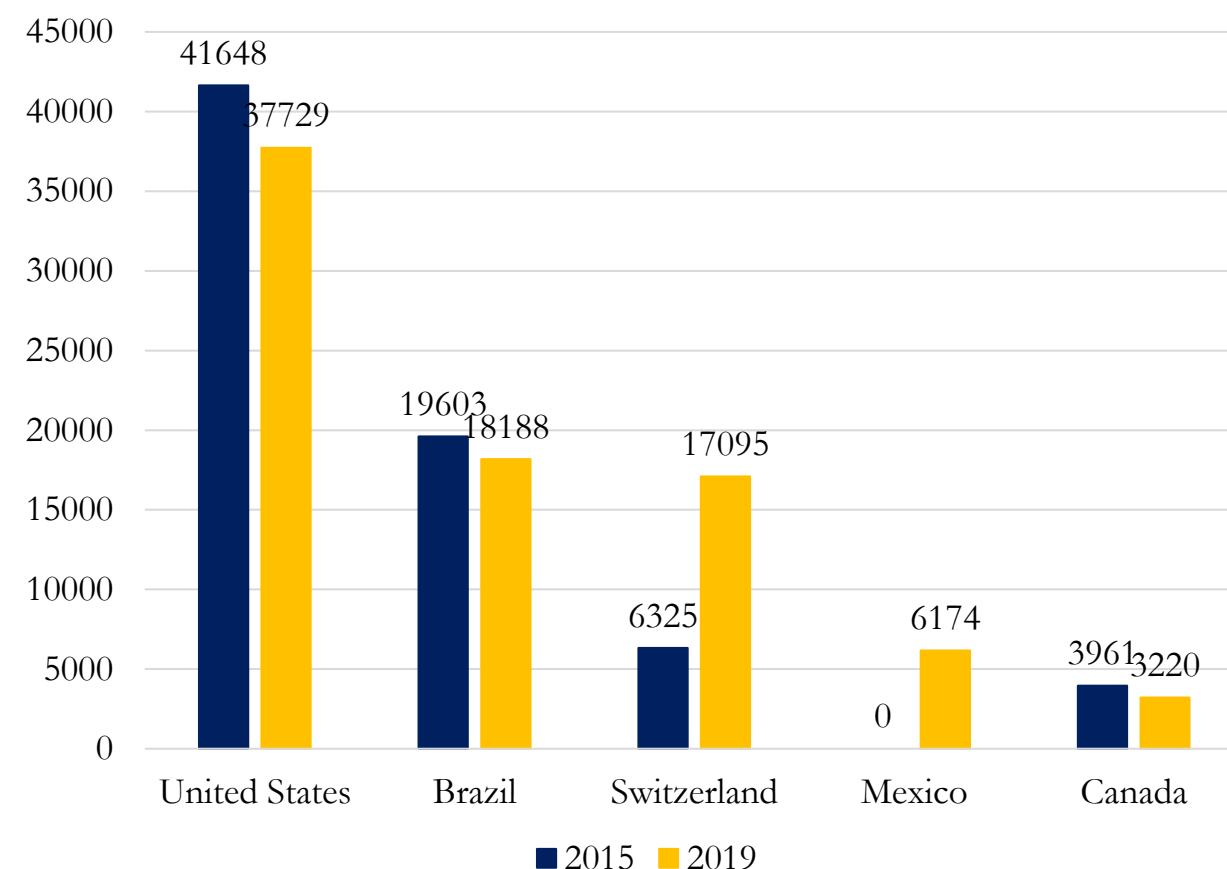
Colombian Renewable Technology Imports

Photovoltaic Panels & Similar Products
Country of Origin (2015-2019) – USD Thousands



- Total imports in 2019: **USD \$40.314.000.**
- **27% increase** since 2015.

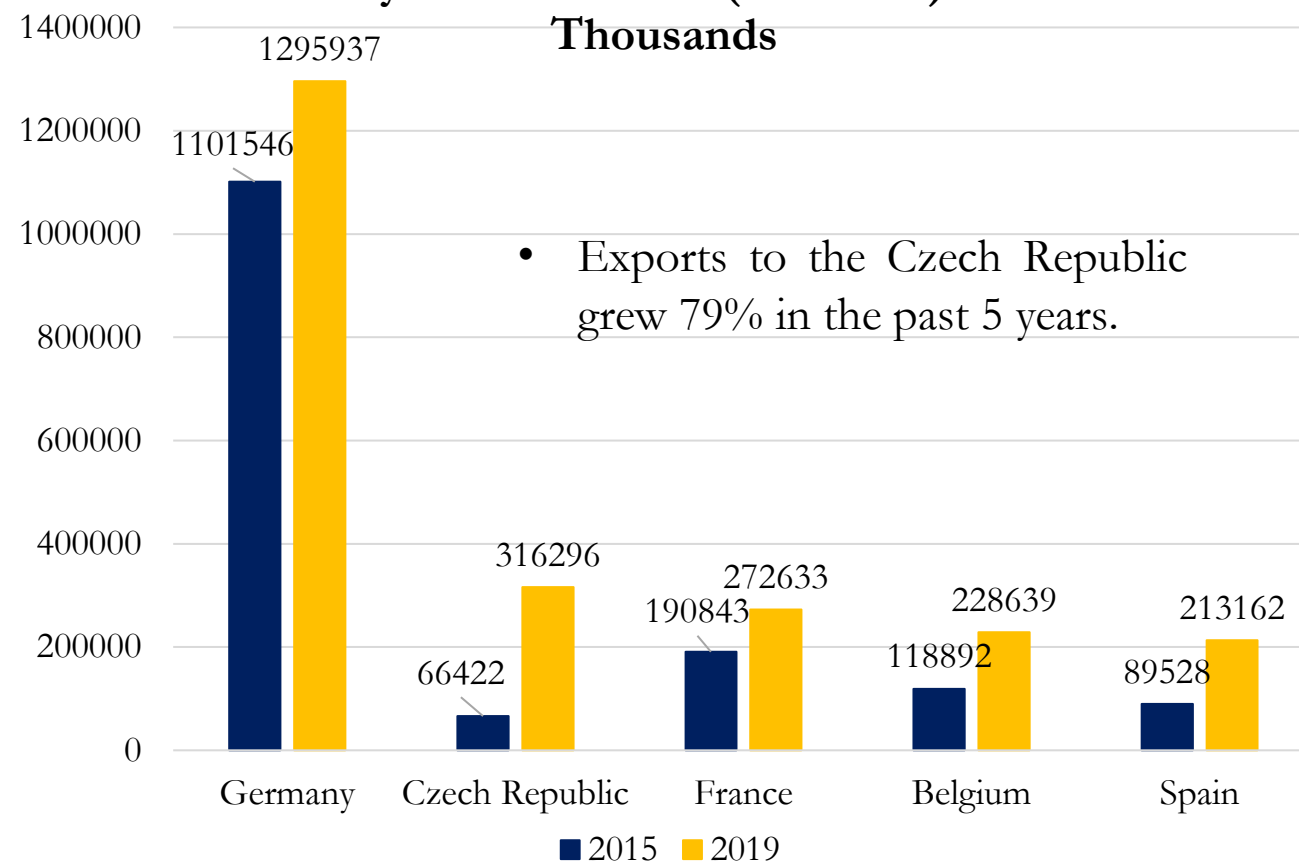
Hydraulic, Gas & Steam Turbines & Parts
Thereof
Country of Origin (2015-2019) – USD Thousands



- Total imports in 2019: **USD \$96.582.000.**
- **-12% decrease** since 2015.
- As wind installed capacity continues to further develop, turbine, spare parts and service imports from sector-leaders such as China and Denmark are also expected to rise.

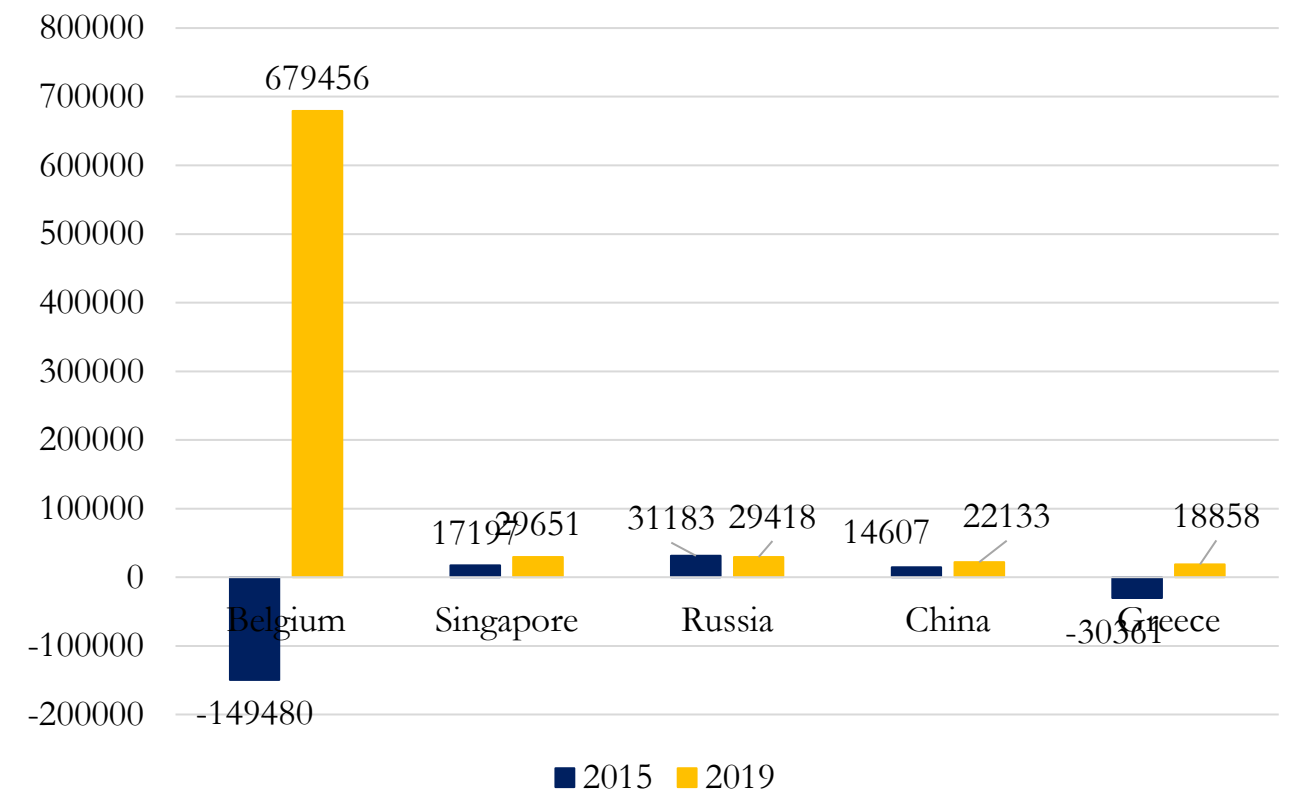
Dutch Renewable Technology Exports

Photovoltaic Panels & Similar Products
Country of Destination (2015-2019) – USD
Thousands



- Total exports in 2019: **USD \$3.762.989.000.**
- **14% increase** since 2015.
- Exports to Colombia in 2019: **USD \$43.000.**
- **27% increase** since 2015.

Wind Turbines & Similar Products
Country of Destination (2015-2019) – USD
Thousands



- Total exports in 2019: **USD \$1.188.699.000.**
- **56% increase** since 2015.
- Exports to Colombia in 2019: **USD \$959.000.**
- **-7% decrease** since 2015.

Renewable Certifications - Colombia



- A renewable energy certificate, also known as Renewable Energy Certificates (RECs) for its acronym in English, is a marketable product or value title that is created **when a renewable energy source produces 1 MWh**. This certificate represents the property of the attributes related to the generation of renewable energy, including the source that produced the energy associated with the REC, its location and the date on which the electricity was produced.

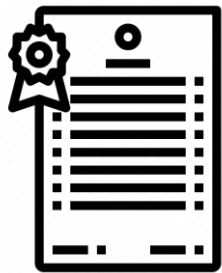


- As the first generator and marketer in the country, in 2017 Empresas Públicas de Medellín ESP (EPM) passed the tests to be able to issue RECs each month to industries and businesses with high electricity consumption. This was possible after a year of paperwork to prove to the organization **The International I-REC Standar**, based in The Netherlands, the good practices applied in generation plants with less than 14 years of operation and that use renewable sources such as water, sun or wind.

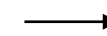


- This clean energy seal is already held by companies such as OI-Peldar, Cartón de Colombia, Bimbo and Dutch **Makro**, which are part of the unregulated market. In this, the price and delivery conditions are agreed bilaterally, since they have intensive consumption of more than 55.000 kilowatt hours-month.

Renewable Legislation - Colombia

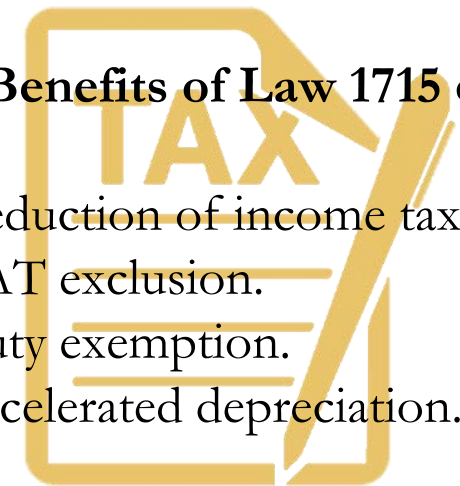


- [Law 142 & 143 of 1994](#): is regulation applicable to power generation and its commercialization.
- [Law 1715 of 2014](#): Integration of non-conventional renewable energy into the National Energy System.
- [Decree 2143 of 2015](#): definition of the guidelines for the application of the incentives established in Chapter III of Law 1715 of 2014.



Tax Benefits of Law 1715 of 2014:

- Deduction of income taxes.
- VAT exclusion.
- Duty exemption.
- Accelerated depreciation.



- [Decree 829 of 2020](#): offers tax benefits for investors in research, development and energy production (wind, solar, maritime/small hydroelectric exploits, biomass, geothermal and nuclear). These include:
 - **Investment (includes contributions and acquisition with leasing)**: a) deduction of 150% of the value invested in 15 years (includes investments in non-electric uses of renewable energies); and b) accelerated depreciation (5 years). Fulfilling certain requirements it is possible to keep these benefits in the event of contributions, mergers and divisions.
 - **Machinery, Equipment & Services**: not taxed with VAT. There is a list of excluded goods and services; however, it is possible to request extensions.
 - **Import**: exemption from import duties on machinery, equipment, materials and supplies not produced in Colombia.

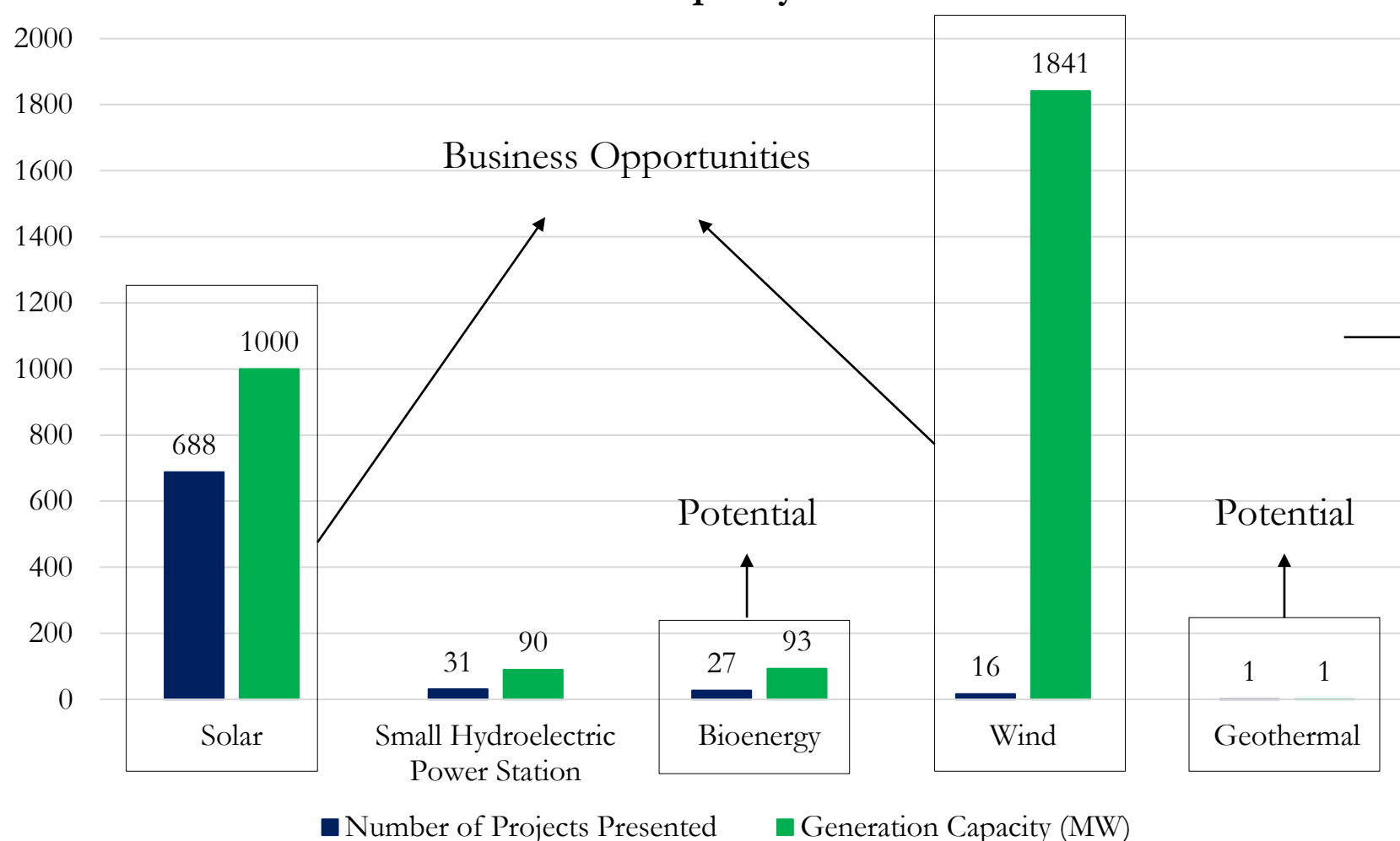
Renewable Auction - Colombia

- The Government announced that the renewable energy auction carried out in 2019 was a complete success, since the allocation reached **2,250 MW in renewables**, almost 10% of the total capacity of the system. **Seven companies will be tasked with carrying out the projects by 2022.**
- This means that the auction far exceeded the estimates of the Government that calculated to achieve the generation of **1,500 MW of renewable energy** throughout its four-year period.
- According to the Ministry of Mines and Energy, the process resulted in the allocation of generation responsibilities to **eight awarded projects**, of which 5 are wind and 3 solar. The 8 contracts have a total value of **USD \$2.2 billion.**
- In addition to this, according to the Ministry, during the process 7 generating companies and 22 commercializing companies were assigned. **53 companies participated in the auction**, including Celsia Tolima, Ecopetrol Energía S.A., EPM, Codensa, Emcali.
- The auction closed with an average allocation price of COP \$95 per kilowatt hour, about **COP \$50 below the current average cost of generating bilateral contracts.** The CREG also established the price of COP \$200 per kilowatt as an individual maximum limit, as well as the maximum limit of \$160 per kilowatt.
- The Government was targeting a demand of 12,050 MWh-day and the **total energy assigned was 10,186 MWh-day.**

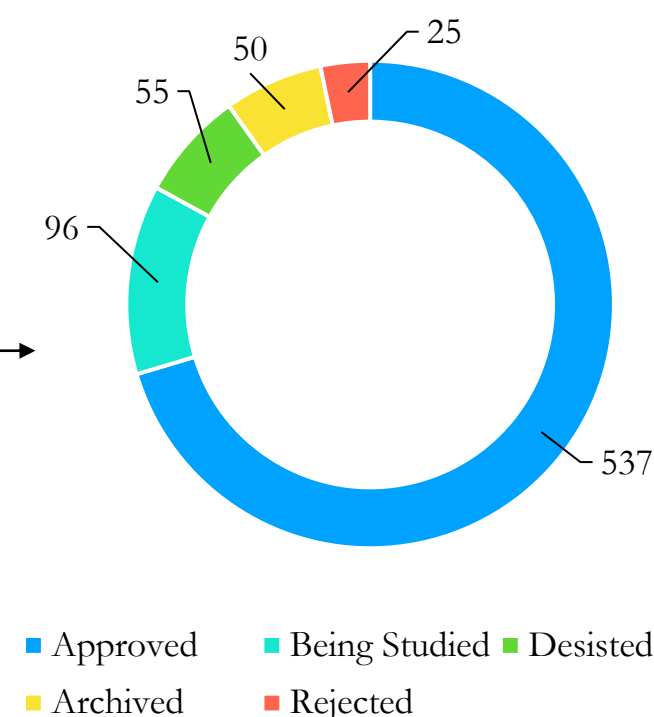
Current Renewable Projects - Colombia

- Between 2016 and 2019, UPME received 763 renewable energy generation projects, of which **537 were approved**, and where wind energy projects have the highest generation capacity with **1,841 MW**.
- Additionally, Colombia aims to invest **USD \$4.2 billion in 27 strategic, renewable energy projects**, which would also generate **55.000 jobs**.

Renewable Projects Presented to UPME (2016-2019) & Generation Capacity



Status of Projects



Chapter 5: SWOT

Market Insights - SWOT

Strengths:

The subsectors with the greatest potential in Colombia are highly dependent on their location, but in general terms, **photovoltaic and wind solutions are the most viable in the country.**

The auction results mark an energy milestone for the country. This is the beginning of a revolution because it allows Colombia to **diversify its electrical matrix.**

Weaknesses:

Colombia still has room to improve in relation to renewable energy contracts.

Contracts should be **dollarized** in order to increase International participation.

contracts should be long-term (instead of 2-3 year contracts); this would allow project financing from **international players** to be much easier.

Opportunities:

Biomass solutions also represents a great potential for the country. Pig farmers, for example, have worked hand-in-hand with the Ministry to develop a guide for the development of biogas projects for small and medium-sized producers.

Many options related to **tidal and geothermal energy** are currently being analyzed by the Ministry as future possibilities in the country.

Threats:

No interest from Dutch energy generation companies, as pricing war is regularly won by China and other countries.

Dutch expertise in **electric mobility solutions** (buses, individual transport and cargo), **smart charging, microgrids and smart grids**, as well as in **energy storage**, still hasn't received much interest from the Colombian public and private sectors.

Chapter 6: Opportunities

General Business Opportunities

Understanding the Opportunity:

- Due to the recent oil crisis, foreign investment towards related services has been diminished and opportunities have appeared in other segments in the energy value chain.
- Renewables are, without a doubt, an alternative to the energy difficulties that are currently occurring in Colombia, which would ultimately benefit any sector of the economy (costs, supply, stability, etc.).
- Renewables are an opportunity for economic growth and development for the country (investment, employment, new technologies, research, etc.).

Current Opportunities:

- **Solar:** photovoltaic panels, smart grids, energy storage - EPC, EPCM, MRO.
- **Wind:** wind turbines - EPC, EPCM, MRO.
- **Biomass:** industrial biogas solutions - EPC, EPCM, MRO.

Additional/Future Opportunities:

- **Geothermal:** EPC, EPCM, MRO.
- **Tidal:** EPC, EPCM, MRO.



Solar Opportunities

Where to Sell & Why (Solar)

Why Should Dutch Companies Focus in Colombian Solar Projects?

- Dutch manufacturers have extensive experience in **designing and implementing photovoltaic systems for special solar projects**, both in the Netherlands and – especially – other countries.
- Over the past 25 years, Dutch suppliers of **solar collector systems** have made major advances in terms of the efficiency, visual integration and modularity of their products, establishing extremely high standards of quality.
- Dutch solar collector systems can be supplied with a **‘runback’ option** which automatically shuts down the collector in extremely hot or cold weather. The fluid in the system (used to transfer heat) drains into a buffer container inside the building where it is protected against the elements. This Dutch invention renders the entire system extremely reliable and virtually maintenance-free.
- The Netherlands has also conducted promising research into **ultra-thin photovoltaic films**, which enable solar energy systems to be integrated into glass and other components of a building’s exterior without detracting from its aesthetic qualities.

Non-Interconnected Zones:

- The Eastern Colombian States of Casanare, Vichada, Meta, Guainía, Guaviare, Caquetá and Vaupés are well known for their lack of energy interconnectivity. Given their remote geolocation, smart grids are a great option for Dutch companies.
- **Smart Grids** not only provide a two-way flow of electricity, but also a two-way flow of information between provider and consumer.
- Isolated communities would greatly benefit from smart grids and micro grids.

Solar Opportunities (2021-2024)



La Guajira:

Sowitec Operation Colombia: Cuestecitas Solar Park (600 MW)
Parque Solar Colombia VIII: Santa Teresa Photovoltaic Park (200 MW)

Bolívar:

La Orquídea Solar: La Orquídea Project (200 MW)

Córdoba:

Due Capital & Services: Valle Negro Project (200 MW)

Cesar:

SC Solar: SC Solar San Martín Project (240 MW)

Antioquia, Santander, Norte de Santander:

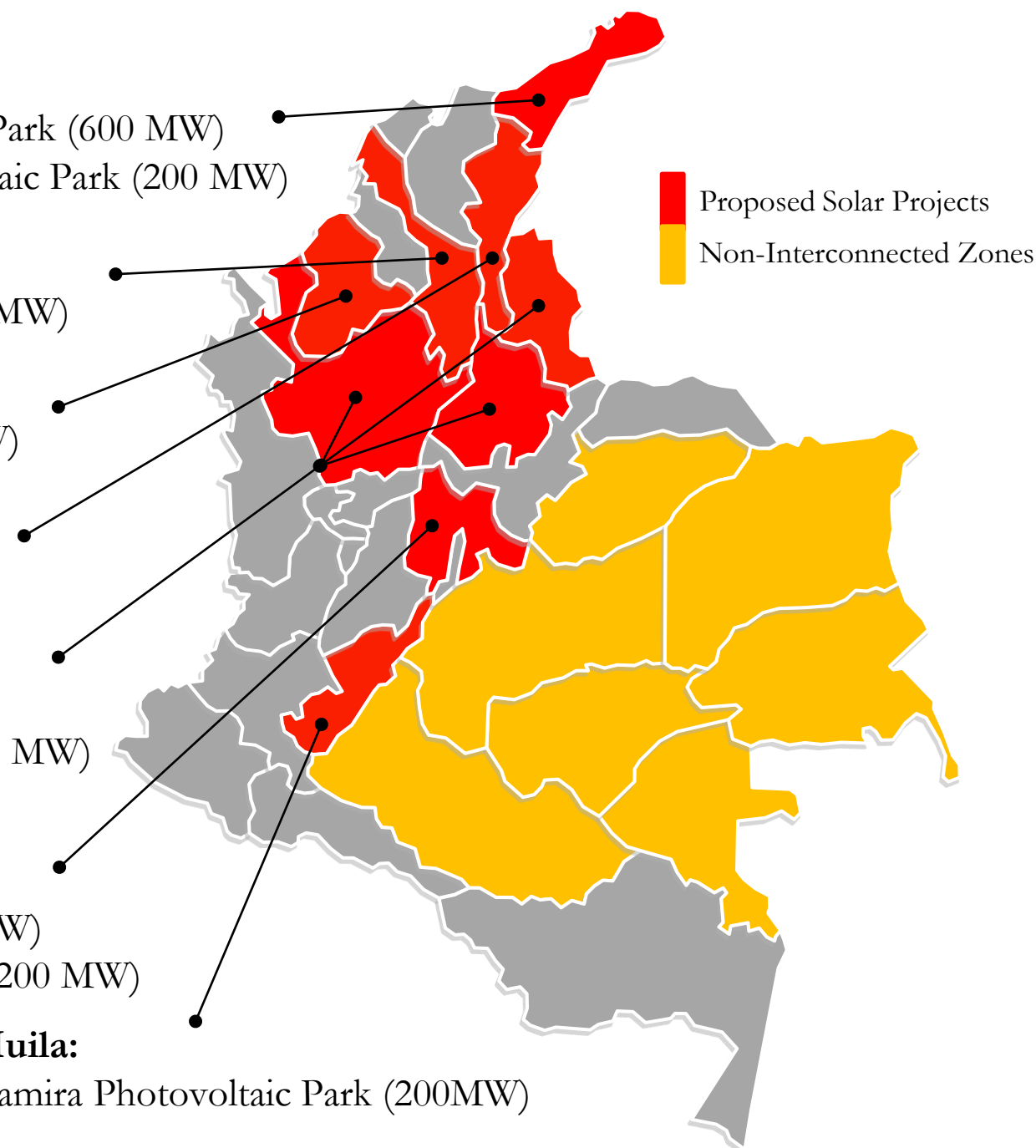
Sebastosol: Sebastosol Photovoltaic Project (700 MW)
Abo Wind Renovables Proyecto Uno: Carare Photovoltaic Park (200 MW)
Perales Photovoltaic: Perales Solar Park (200 MW)

Cundinamarca:

Puerta de Oro: Puerta de Oro Project (300 MW)
Due Capital & Services: Canoas Photovoltaic Park (200 MW)

Huila:

Parque Solar Colombia III: Altamira Photovoltaic Park (200MW)



Who Should Sell? (Solar)

Solar Power:

1. Solar Panels.
2. Solar Panels (Businesses/Homes).
3. Grid-Connected Systems.
4. Smart Grids & Storage Systems.
5. Floating Systems.
6. Inverters & Monitoring Systems.
7. Engineering, Procurement & Construction (EPC).

Solar Heating:

1. Solar Thermal Systems.
2. Heat Pumps.
3. Heat Recovery From Waste.
4. Heating Ventilation.

OPPORTUNITIES

POTENTIAL COMPANIES



Wind Opportunities

Where to Sell & Why (Wind)

Why Should Dutch Companies Focus in Colombian Wind Projects?

Onshore & Offshore:

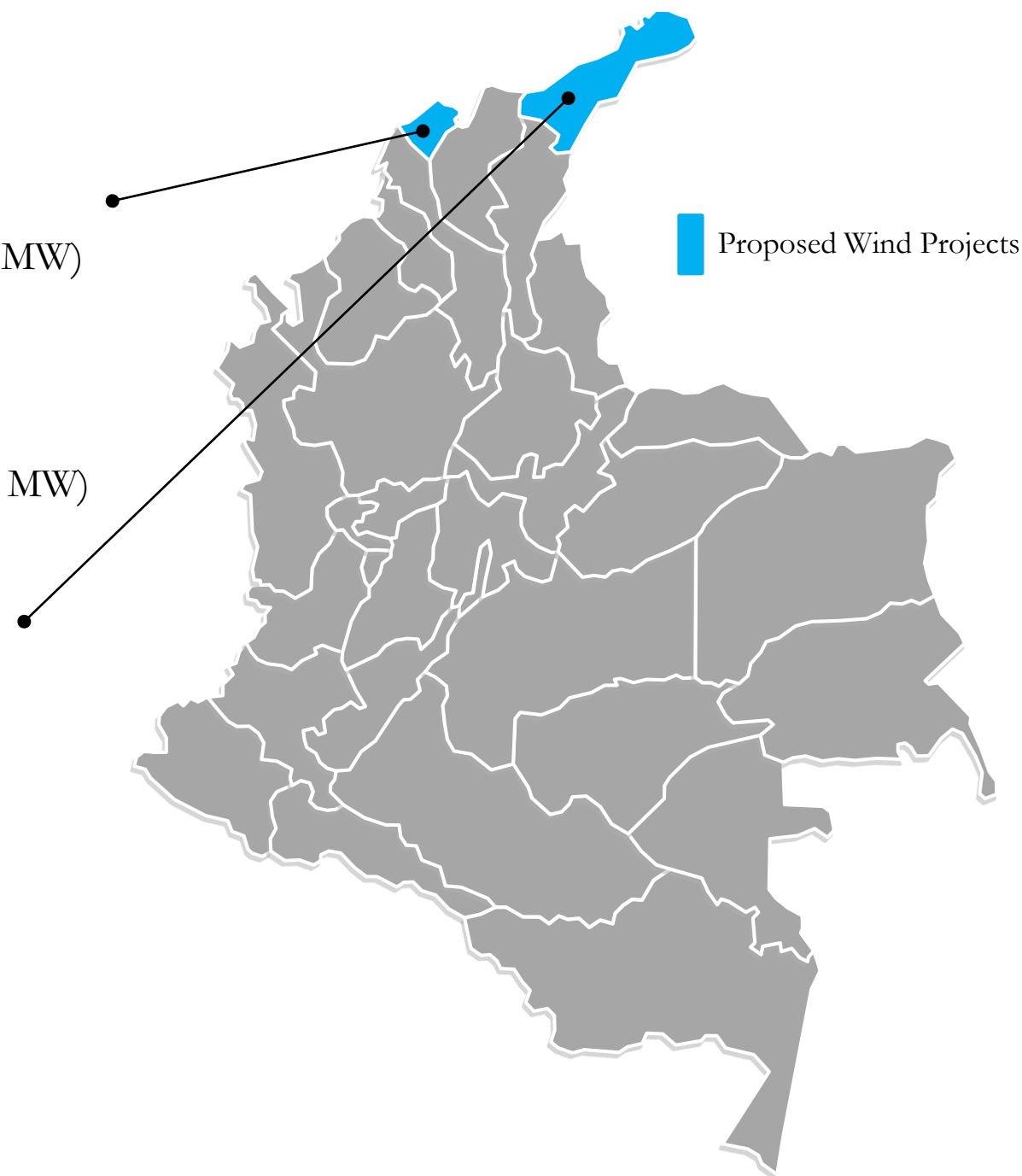
- In addition to knowledge and experience in the **construction of complete wind turbines**, the Netherlands has a number of (onshore & offshore) specialists in areas such as **blade design, installation technology, on-site maintenance, and foundation design**. The Dutch companies **Heerema, Mammoet van Oord, Ballast Nedam and Grontmij** are noted for their expertise in foundation technology for offshore wind farms. Almost all vessels (the so-called ‘jack-ups’) used to install offshore wind turbines were designed by the Dutch company **IHC-Gusto**.
- The Netherlands has a number of excellent test facilities, including ECN’s test field, WMC’s blade and materials test lab, and the wind tunnels of the Netherlands Organization for Applied Scientific Research (TNO), TU Delft, and the German Dutch Wind Tunnels company.
- Given the space available and the high wind speeds at sea, offshore wind energy has far greater potential than onshore wind energy. The turbines can be clustered in huge wind farms, well out of sight from the coast. They can then be much larger than their onshore counterparts, which are generally subject to height restrictions to reduce adverse visual impact. Moreover, the noise of the blades and rotation mechanisms will raise no objections when the turbines are sited offshore.
- Dutch **engineering and consultancy** companies have gained much experience in producing Environmental Impact Assessments, based on the Egmond aan Zee project and various ongoing offshore projects in the North Sea.

Wind Opportunities (2022-2023)



Atlántico:
San Martin Energy Green: San Martin Energy Green (200 MW)

La Guajira:
Desarrollos Eólicos Uribia: Andrea Jusayu – previously: Cerrito (378 MW)
Isagen: Guajira II (325 MW)
Vientos del Norte (Grupo Renovatio): Alpha (212 MW)
EPM: EO200i (201 MW)
Jemeiwaa Kai: Carrizal (195 MW)
Jemeiwaa Kai: Casa Eléctrica (180 MW)



Who Should Sell? (Wind)

Onshore:

1. Turbines.
2. Connections, Transmission, Automation, Network Management.
3. Maintenance, Repair & Operations (MRO).

Offshore:

1. Turbines.
2. Connections, Transmission, Automation, Network Management.
3. Foundations.
4. Transportation and Installation (T&I).
5. Engineering, Procurement & Construction (EPC).
6. Maintenance, Repair & Operations (MRO).

OPPORTUNITIES

POTENTIAL COMPANIES



Biomass - Biogas Opportunities

Where to Sell & Why (Biomass)

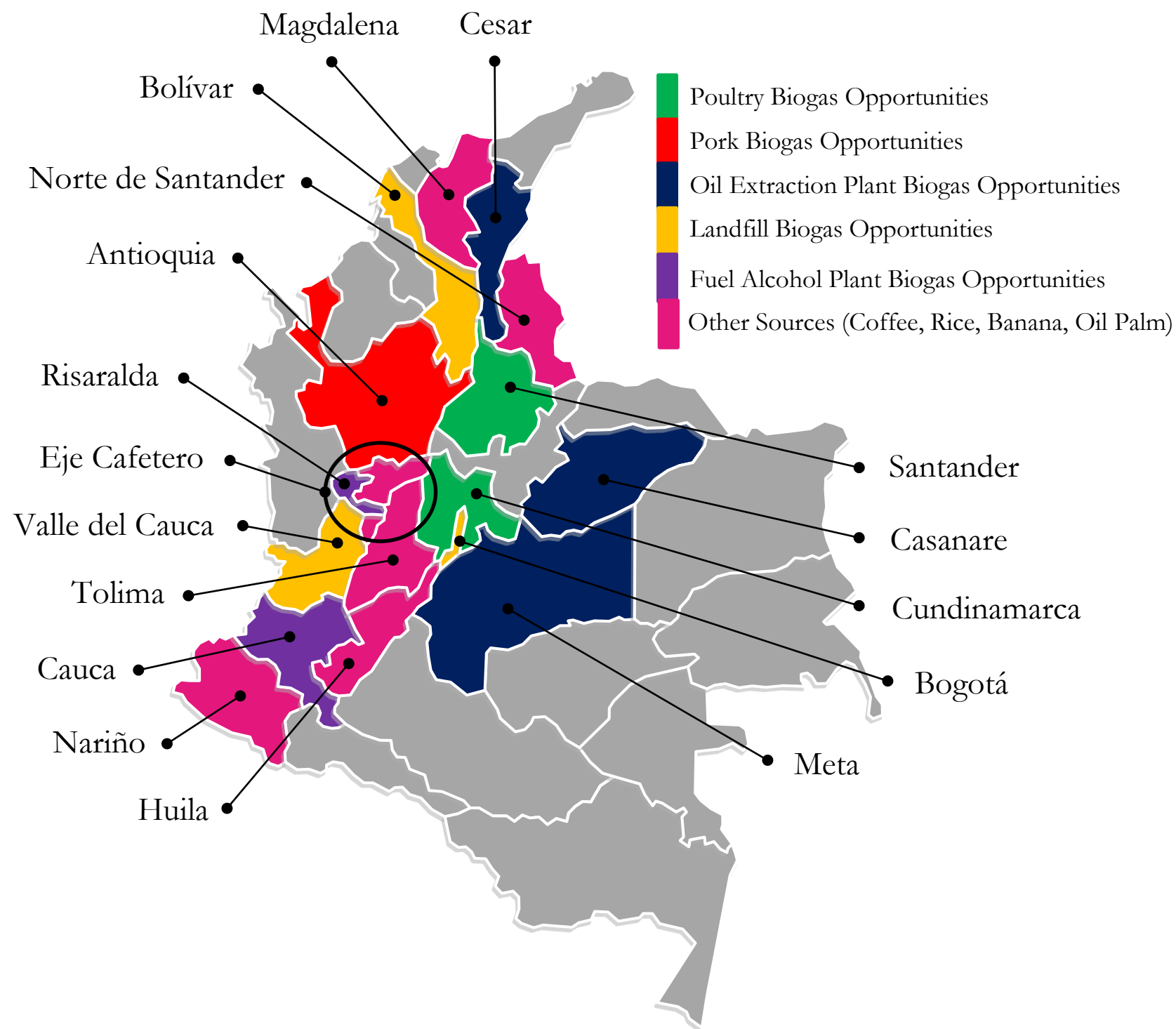
- **Why Should Dutch Companies Focus in Colombian Biomass Projects?**

Biogas:

- **Cirmac International** has developed a new and innovative process which results in the best performance in terms of **biogas upgrading** to date: the LP Cooab system. The process removes CO₂ by means of chemical absorption under atmospheric pressure. The absorption fluid is regenerated by heat within a ‘stripper column’.
- **Natuurgas Overijssel** (a partnership of ROVA and the HVC Group) produces **green gas**. **Enexis** manages the **low-pressure transport connections** and **Gasunie** now **injects the green gas into its high-pressure mains supply system**, which is the first time that green gas has been injected into system. Natuurgas Overijssel has built a **fermentation plant** in which waste vegetable matter is converted into biogas. The biogas is then upgraded to natural gas quality and introduced directly into Gasunie’s high-pressure supply system via a dedicated supply pipeline. The plant will produce over two million cubic metres of gas each year, enough to meet the gas requirements of one thousand households. It is also possible to use **green gas as a fuel for vehicles**.
- Much gas-related knowledge and expertise is available in the Netherlands. Green gas therefore has great potential as an economic motor.
- Dutch companies are often the first to develop **purification and upgrading techniques for biogas**.
- Upgraded biogas (green gas) can be used as a transport fuel.
- Green gas can be injected into the national gas mains supply.
- Green gas can be injected into the regional gas mains supply.

Biomass - Biogas Opportunities

- **Poultry** biogas opportunities are also found in: Antioquia and Valle del Cauca.
- **Pork** biogas opportunities are also found in: Cundinamarca, Valle del Cauca and Meta.
- **Oil extraction plant** biogas opportunities are also found in: Santander.
- **Landfill** biogas opportunities are also found in: Cundinamarca and Antioquia.
- **Fuel alcohol plant** biogas opportunities are also found in: Valle del Cauca and Meta.
- Biogas opportunities are also available from **Coffee** (Nariño, Norte de Santander, Antioquia, Valle del Cauca, Cundinamarca, Huila, Cauca, Tolima and Eje Cafetero), **Rice** (Casanare, Huila, Tolima, Meta y Valle del Cauca), **Banana** (Antioquia, Magdalena, Valle del Cauca) and **Oil Palm** (Meta, Casanare, Magdalena, Santander, Nariño) residues.



Who Should Sell? (Biomass - Biogas)

OPPORTUNITIES

Biogas:

1. Waste Heat & Steam.
2. Project Development.
3. Green Gas.
4. Transport and Storage (T&S).
5. HVAC Installations.
6. Industrial Burner Systems.

POTENTIAL COMPANIES



Proof of Concept Opportunities for Dutch SMEs

Opportunities for Dutch Startups

Colombia has also proved to be an excellent location for obtaining proof of concept. Several Dutch companies with innovative - and sometimes experimental - technologies have chosen the country, because of its enormous biodiversity and openness to realize pilot projects.

Some of the companies that are currently interested in Colombia are:



www.solteq-energy.com



www.maru-systems.com

OCEANS OF ENERGY

www.oceansofenergy.blue



www.blurise.nl

Opportunities for Dutch Startups

OPPORTUNITIES

All Technologies:

1. Solar Hubs: Watly (www.watly.co)
2. Heat-to-Cooling: SoundEnergy (www.soundenergy.nl)
3. Hybrid Solar Panels: Viridi (www.viridiproduction.com)
4. Swappable Batteries: Skoon Energy (www.skoon.world)
5. Smart Battery Solutions: iwell (www.iwell.nl)
6. Smart Energy Savings: Sensorfact (www.sensorfact.nl)
7. Smart Data Monitoring: SunData (www.sundata.nl)

POTENTIAL STARTUPS



SKOON

SENSORFACT

SUN DATA

Chapter 7: COVID 19 Impact

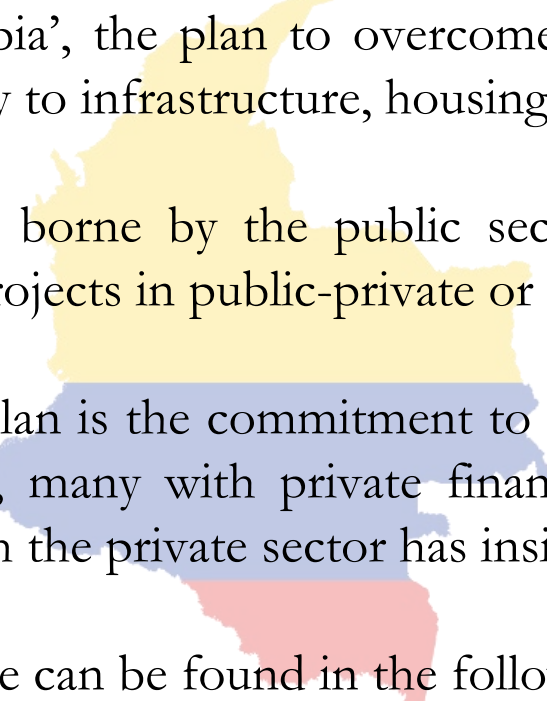
Will There be an Impact?

- Although the COVID-19 pandemic has greatly affected business in countries around the world, Colombia is still **moving forward** with its strategic plans for renewable energy sources throughout the country.

The following are some of the positive headlines during the pandemic:

- According to Camilo Sánchez, President of Andesco, Colombia will exceed the goal of having **at least 12% of the country's generation in 2022 coming from renewable sources**.
- The national government issued **Decree 829 of 2020**, through which it facilitates access to tax incentives for projects related to non-conventional sources of energy. This makes access to the mechanism much faster.
- Approximately **USD \$70 million were approved to finance 33 rural electrification projects**, which would impact 14.472 homes in 12 Departments throughout the country.
- Ecopetrol, the Colombian state-owned hydrocarbons company, awarded a contract for the construction of a new solar megapark in the Meta Department. The project will have a capacity of **59 MW** and will begin construction in October 2020 (construction led by AES Colombia).

The ‘Nuevo Compromiso por Colombia’

- 
- The ‘Nuevo Compromiso por Colombia’, the plan to overcome the disasters of the pandemic, will have **USD \$26.2 billion** and will give priority to infrastructure, housing and **technology**.
 - 60 percent of this investment will be borne by the public sector and the rest will come from private companies, since it includes countless projects in public-private or totally private partnerships.
 - The second axis of the Government's plan is the commitment to clean growth. It contemplates carrying out 27 strategic renewable energy projects, many with private financing - for about **USD \$4.2 billion** - by facilitating regulations, an issue on which the private sector has insisted.
 - For more information, the original article can be found in the following [link](#).

Chapter 8: Financing

Financing for Dutch Companies

Future Auctions/Tendering:

- The date for the next Renewable Energy Auction/Tender in Colombia has not yet been announced. However, more information can be obtained by visiting the Colombian Association of Renewable Energies (SER) at: www.ser-colombia.org.
- The current Director of the Association is Mr. Germán Corredor and can be contacted at: direccion@ser-colombia.org and/or asistenteejecutiva@ser-colombia.org

Financing:

- Although companies are normally capable of participating by themselves in projects throughout Colombia, as well as in the aforementioned auction, there are multiple institutions willing to assist companies through financing. Some of these institutions are the following:



Netherlands Enterprise Agency

english.rvo.nl/subsidies-programmes



www.fmo.nl/funding-programs



p4gpartnerships.org/content/colombia

Chapter 9: Importers & Distributors

Technology Importers & Distributors



www.suncolombia.com



www.proviento.com.co



www.greenenergy-latinamerica.com



www.cler-energía.com



www.improinde.com



www.greencolenergy.com



www.solartex.co



www.syscomcolombia.com



www.colsein.com.co



www.ambientesoluciones.com



www.greenyellow.com

Chapter 10: Helpful Tips

Helpful Tips

- Contact the Embassy of the Kingdom of the Netherlands in Colombia and the Dutch-Colombian Chamber of Commerce – Holland House to clarify any doubt you have on the aforementioned information.
- Contact technology importers and distributors in Colombia, as they are the main point of entry for your products in Colombia. Through them you can also expand your business and sales networks throughout the country and reach new customers.
- Contact UPME to receive information on upcoming auctions on solar, wind and biomass opportunities throughout the country.
- Contact RVO, FMO and P4G to learn more about financing opportunities.
- Contact Dutch renewable energy companies currently deploying their pilot projects in Colombia, to learn more about the current business environment.
- Participate in Colombian and Latin American events on Renewable Energies, specifically on topics related to solar, wind and biomass developments. **Andesco's Congress of Public Services, ICT and TV (October 6-9, 2020) is a recommended event. This event has become the sector's main event and will be carried out virtually in 2020.**

For more information, please contact:

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Netherlands Enterprise Agency is part of the ministry of Economic Affairs and Climate Policy.