COLLABORATION AND INVESTMENT OPPORTUNITIES FOR DANISH ORGANIZATIONS IN COLOMBIA'S GREEN TRANSITION

PROJECT COMMISSIONED BY THE EMBASSY OF DENMARK

EMBASSY OF DENMARK
Bogotá

INVESTMENT ATTRACTION IN OFF-SHORE WIND ENERGY

11 October 2021

Image: Jepirachi Wind Park in La Guajira [2019]. Supplied by INDEPAZ, reproduction granted.

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- NIRAS
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- ROSS DK,
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- IFU (The Investment Fund for Developing Countries)
- Ringkøbing-Skjern Municipality

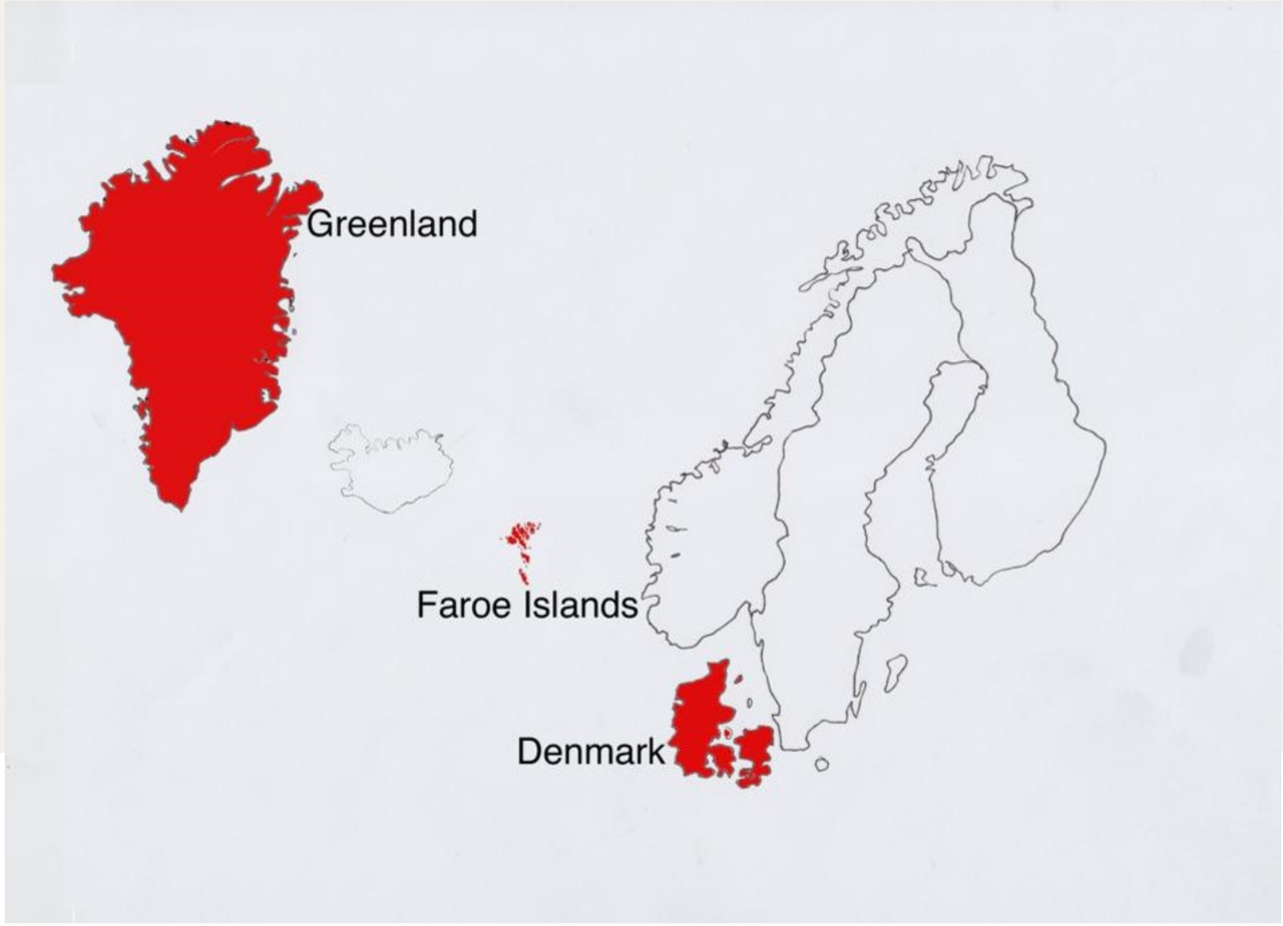
AGENDA

- A brief Introduction to **Denmark**
- **Reflections** on the main findings of the project Green Transition
- **Key drivers** for investment attraction in off-shore wind energy Lessons from Denmark and beyond
- Potential **next steps & conclusions**

DENMARK

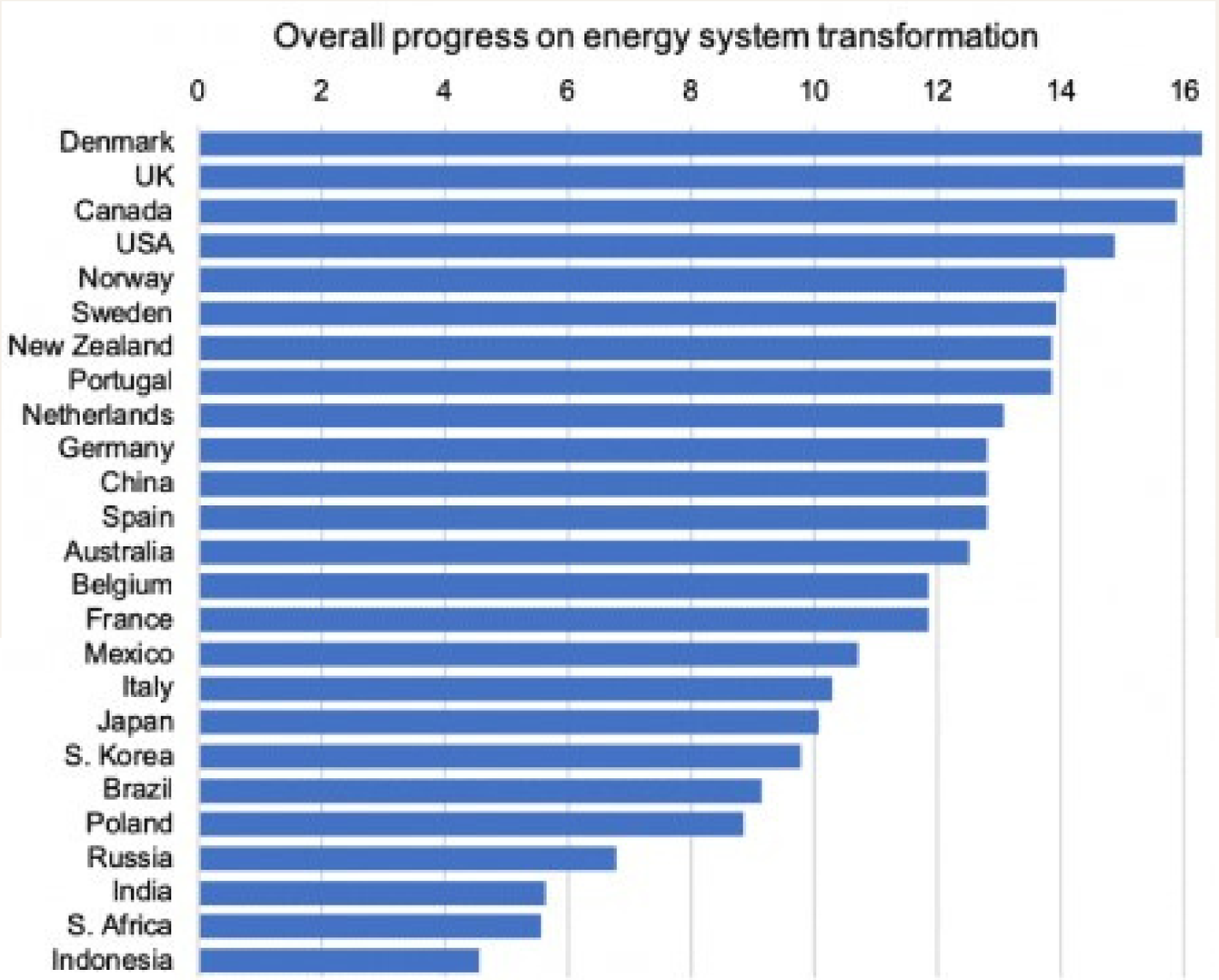
42,933 square kilometers (excluding Greenland and the Faroe Islands) 66% is used for agriculture, 11% for forests.

5,850.189 inhabitants (Statistics for Denmark, 2021), excluding Greenland and the Faroe Islands

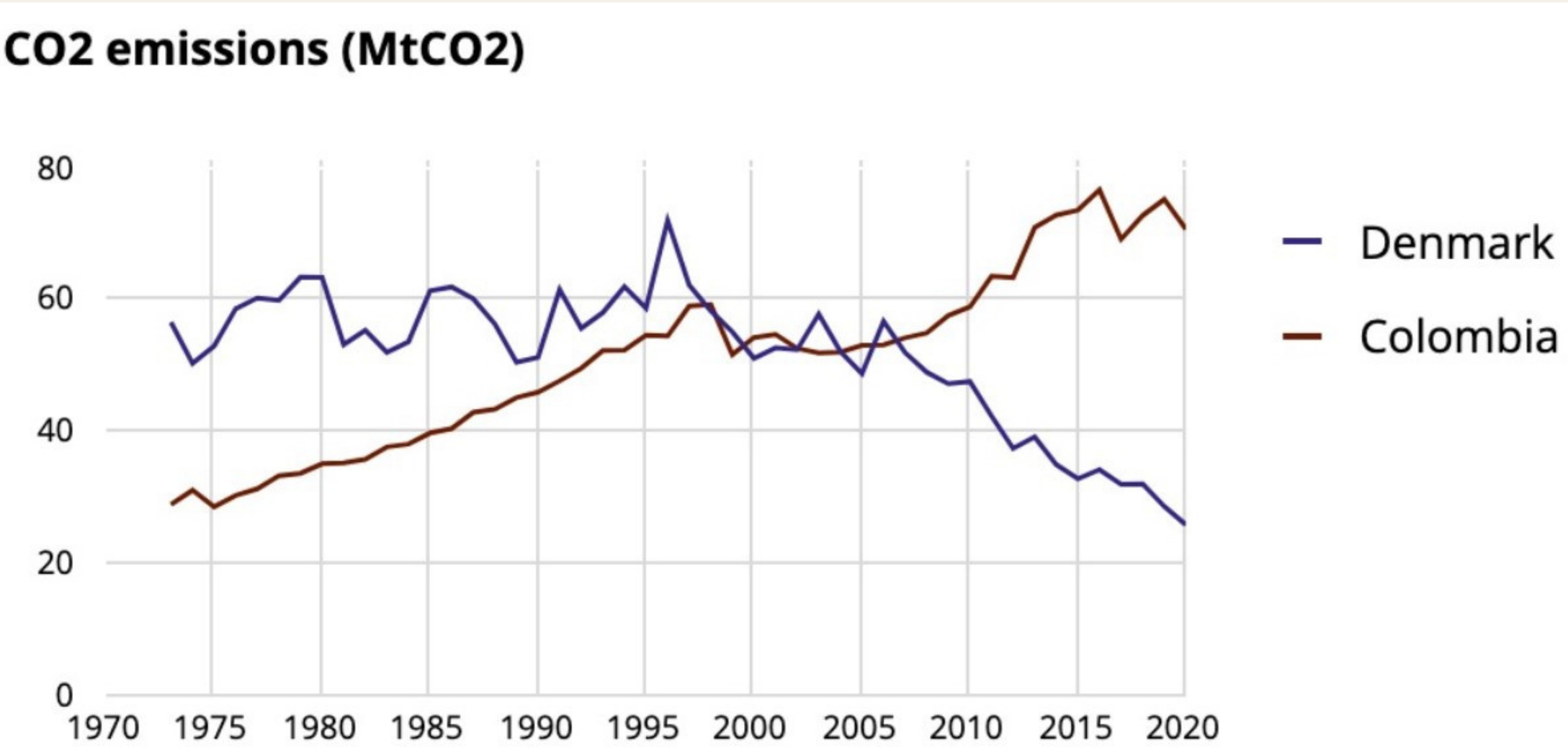


DENMARK

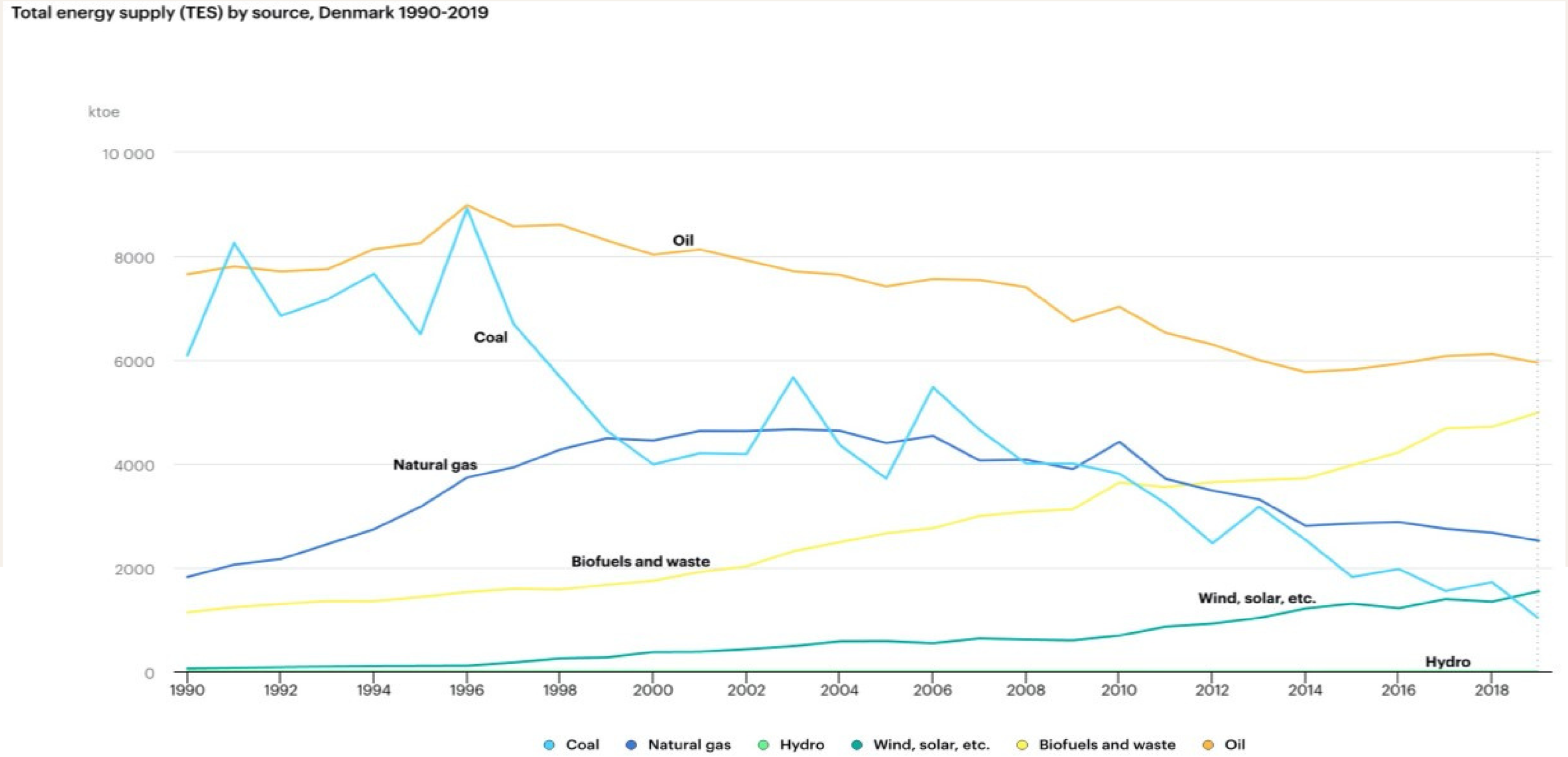
SCIENCE, TECHNOLOGY AND INTERNATIONAL COOPERATION



Reference: : https://stateofgreen.com/en/partners/state-of-green/news/new-research-report-identifies-denmark-as-global-leader-in-the-green-energy-transition/

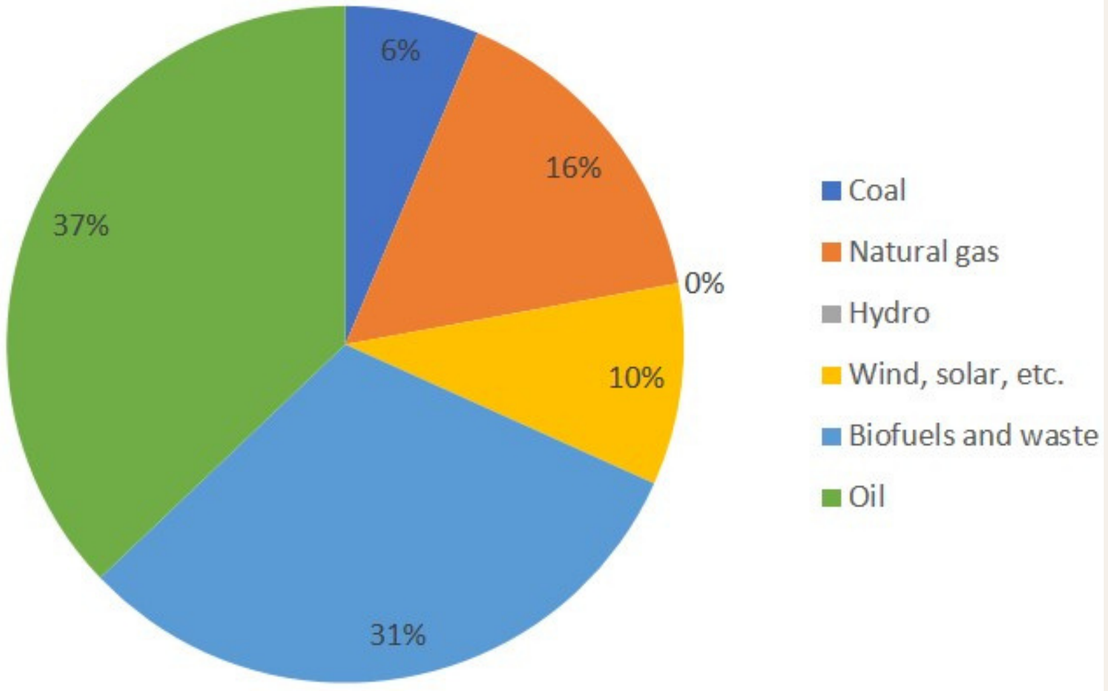


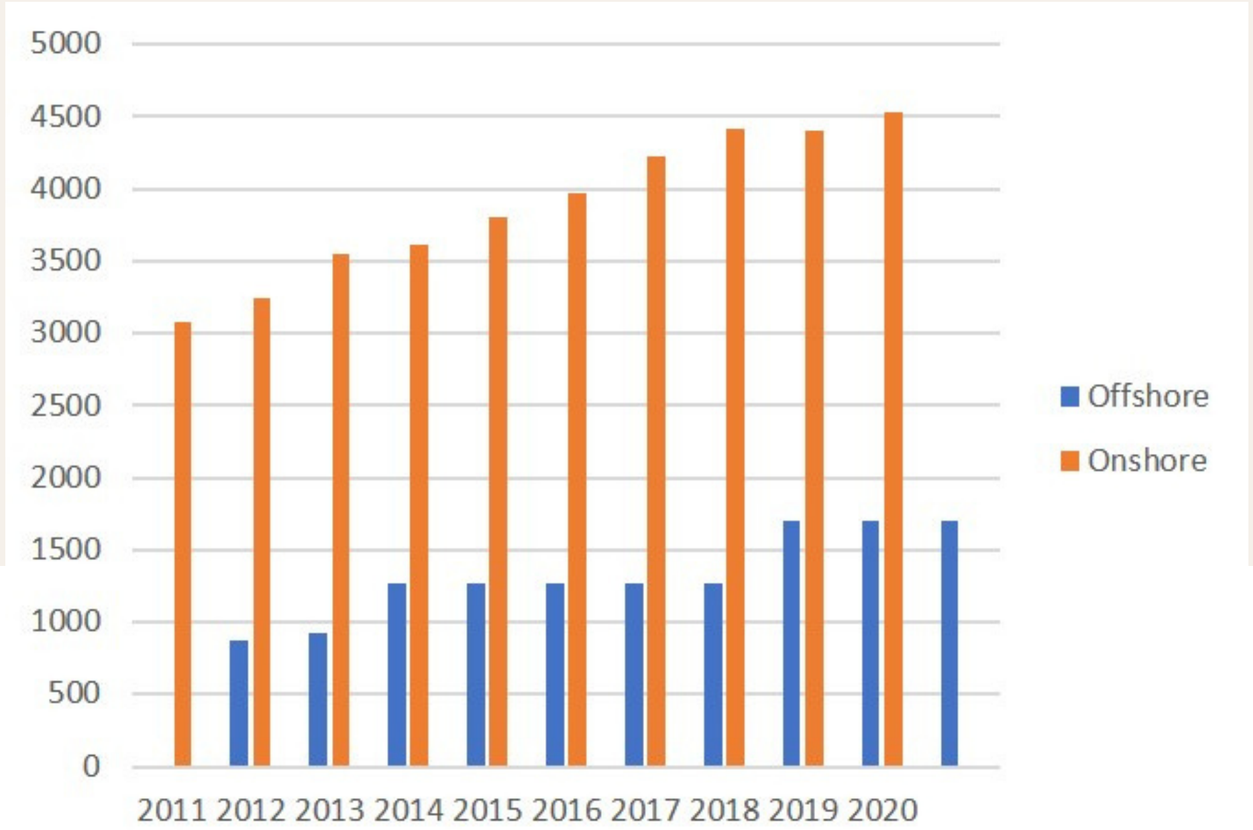
Reference: IEA Atlas of Energy (2020) http://energyatlas.iea.org/#!/tellmap/1378539487



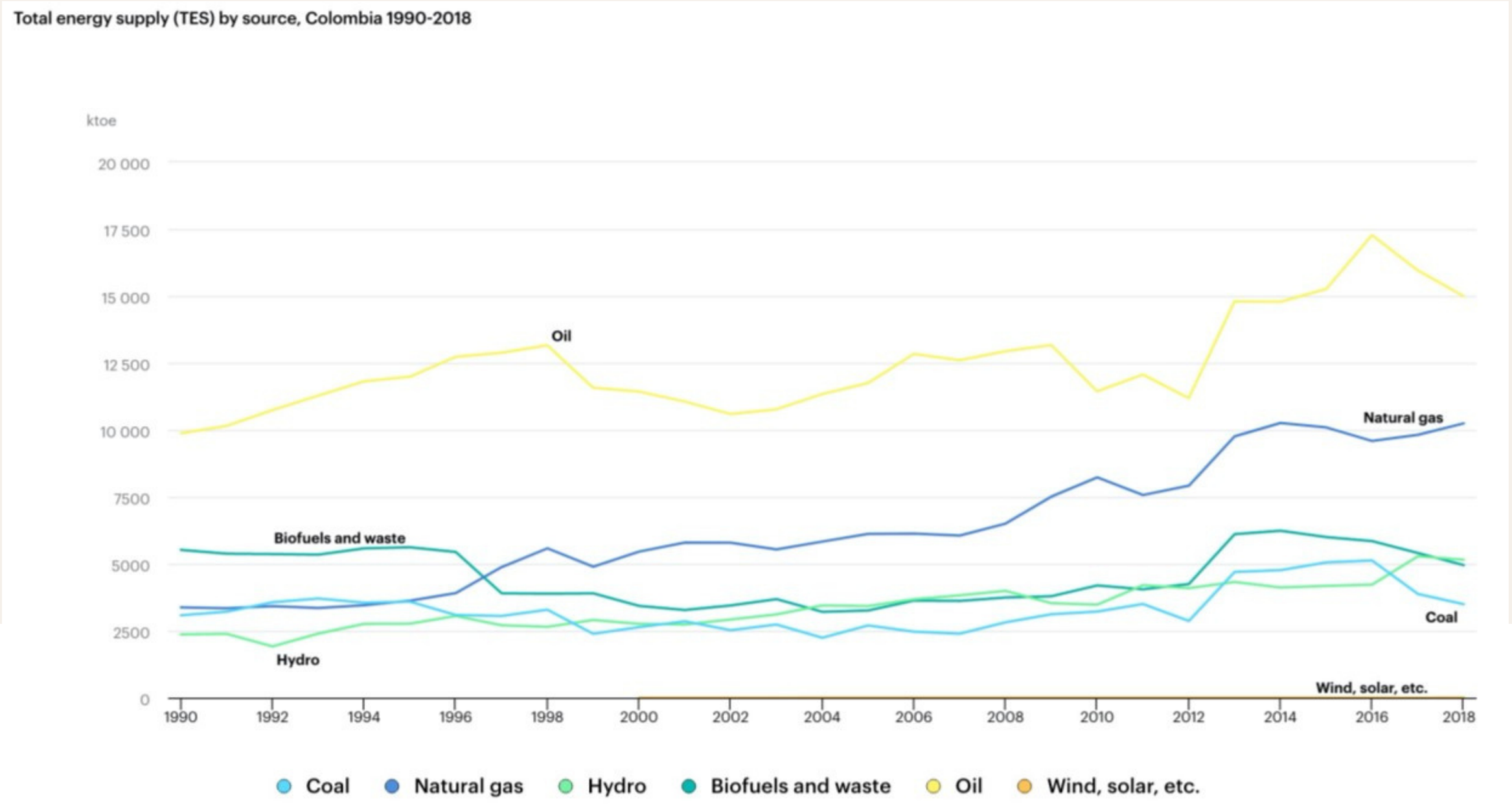
Reference: IEA World Energy Balances (2020) https://www.iea.org/subscribe-to-data-services/world-energy-balances-and-statistics

ENERGY SUPPLY-DENMARK



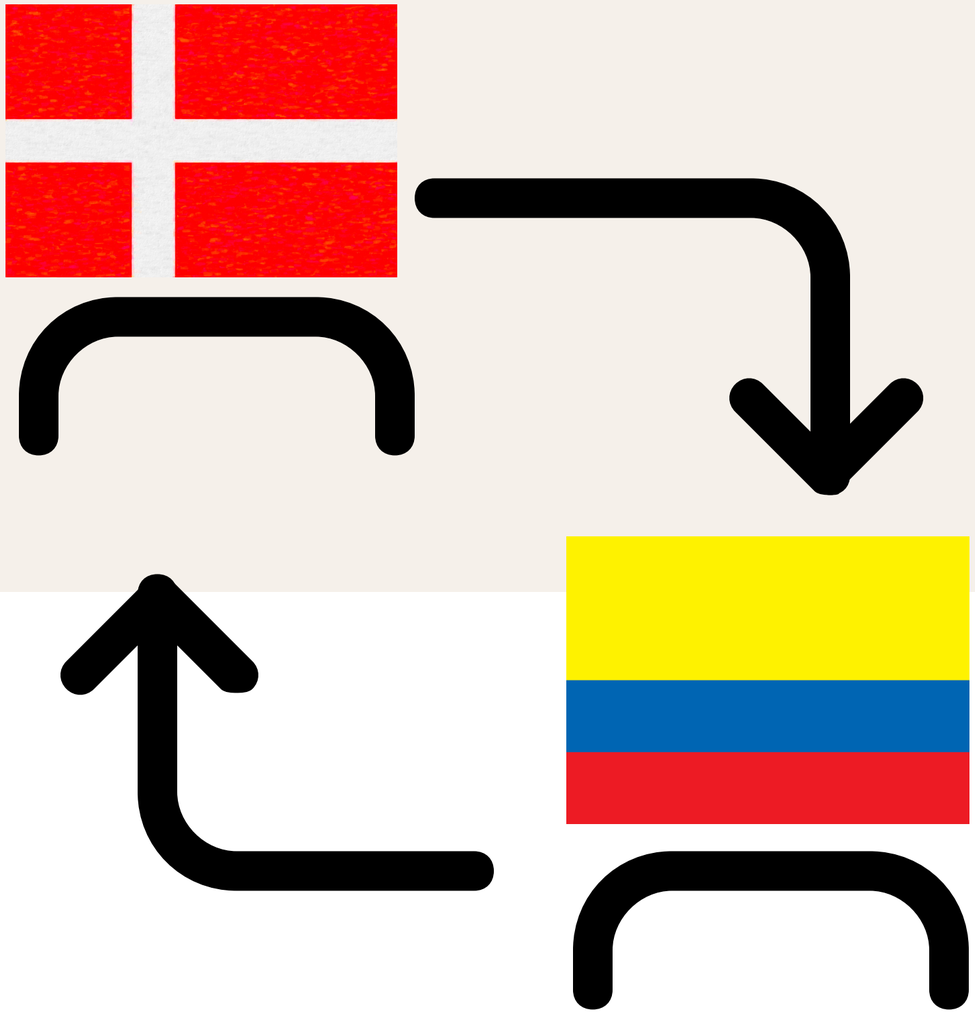


Source: IEA World Energy Balances 2020 https://www.iea.org/subscribe-to-data-services/world-energy-balances-and-statistics



Referencia: IEA World Energy Balances 2020 https://www.iea.org/subscribe-to-data-services/world-energy-balances-and-statistics

FIVE AREAS THAT CAN BE THE BASIS FOR A BROAD COLLABORATION BETWEEN DENMARK AND COLOMBIA



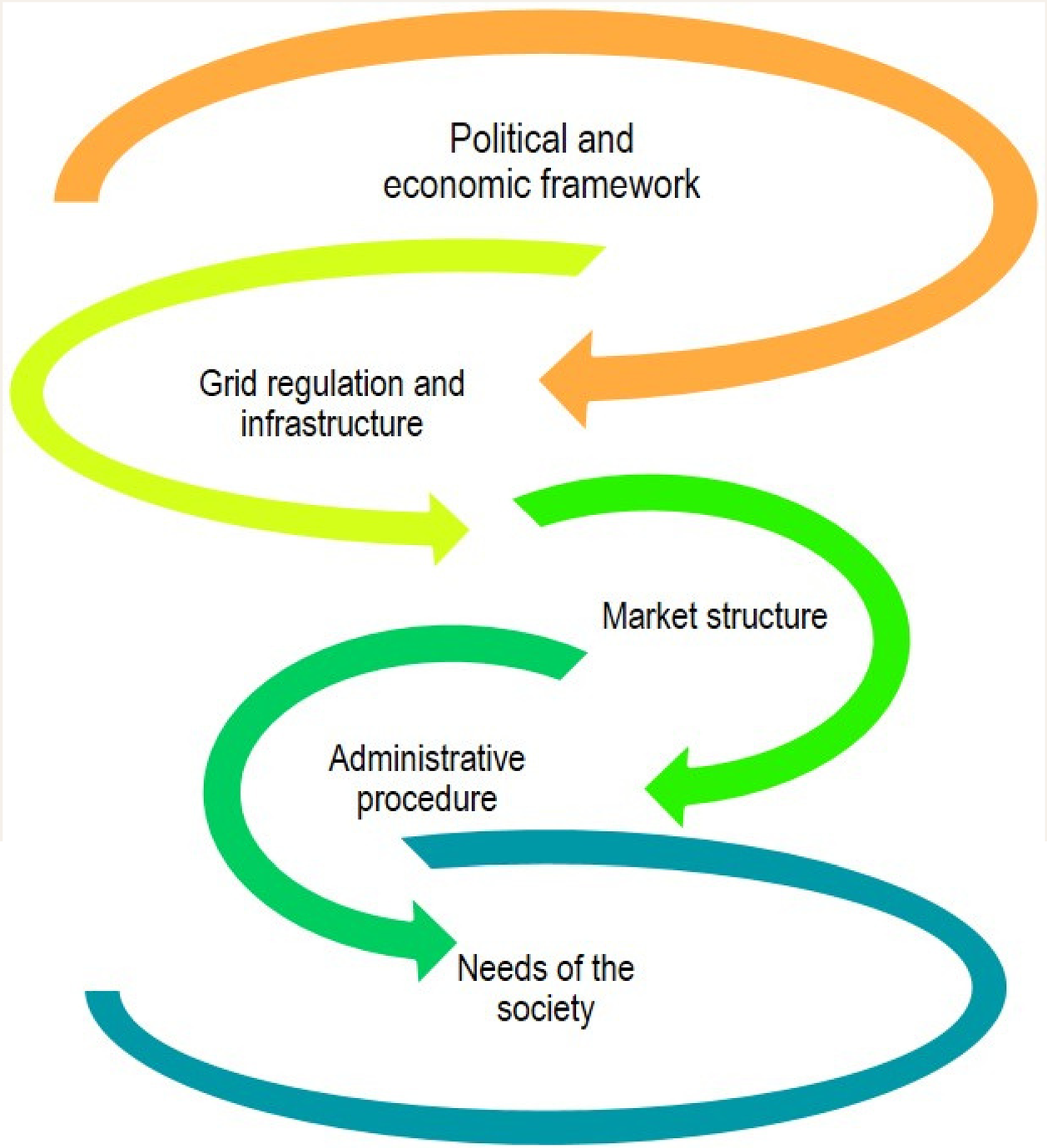
BIODIVERSITY AND NATURAL ECOSYSTEMS

GOVERNANCE IN ENERGY DEMOCRACY

ENERGY EFFICIENCY

ENERGY CULTURE

SUPPORTING INFRASTRUCTURE



LESSONS FROM DENMARK ON THE KEY DRIVERS OF OFFSHORE WIND ENERGY INVESTMENTS

SNAPSHOT OF COLOMBIAN ENERGY TRANSITION

Drivers	
Climate change and sustainable development	National commitment with the Paris Agreement and the 2030 Agenda for Sustainable Development
Energy security	Diversification of energy matrix.
Green growth and development	Energy Charter Treaty Green Growth Policy- Colombian Energy Plan Toward 2050 (E2050)
Legal framework and governance	**Law 1715** (13 May 2014) Regulates the integration of nonconventional renewable energy to the national energetic system **Law 2099** (July 10, 2021). Dispositions for the energy transition, market dynamization, economic recovery and others.

POLITICAL AND ECONOMIC FRAMEWORK IN OFF-SHORE WIND ENERGY –A COMPARISON EU & COLOMBIA

	EU -Denmark	Colombia
Economic incentives	Feed-in Tariff (FIT) in Power Purchase Agreement–(PPA)	
	Renewable (RO) obligation	8-10 % (Law 1955 of 2019)
	Tax incentives	TAX, VAT, Depreciation (Law 1415)
	Tendering Scheme	
	Low interest loans	
	Supplementary funds	FENOGE

In Colombia, it is extremely difficult for an energy producer to sign long-term power purchase agreements (PPAs) *[a]. There are over 100 generation projects with approved connections that have struggled to purchase long-term energy agreements [a].*

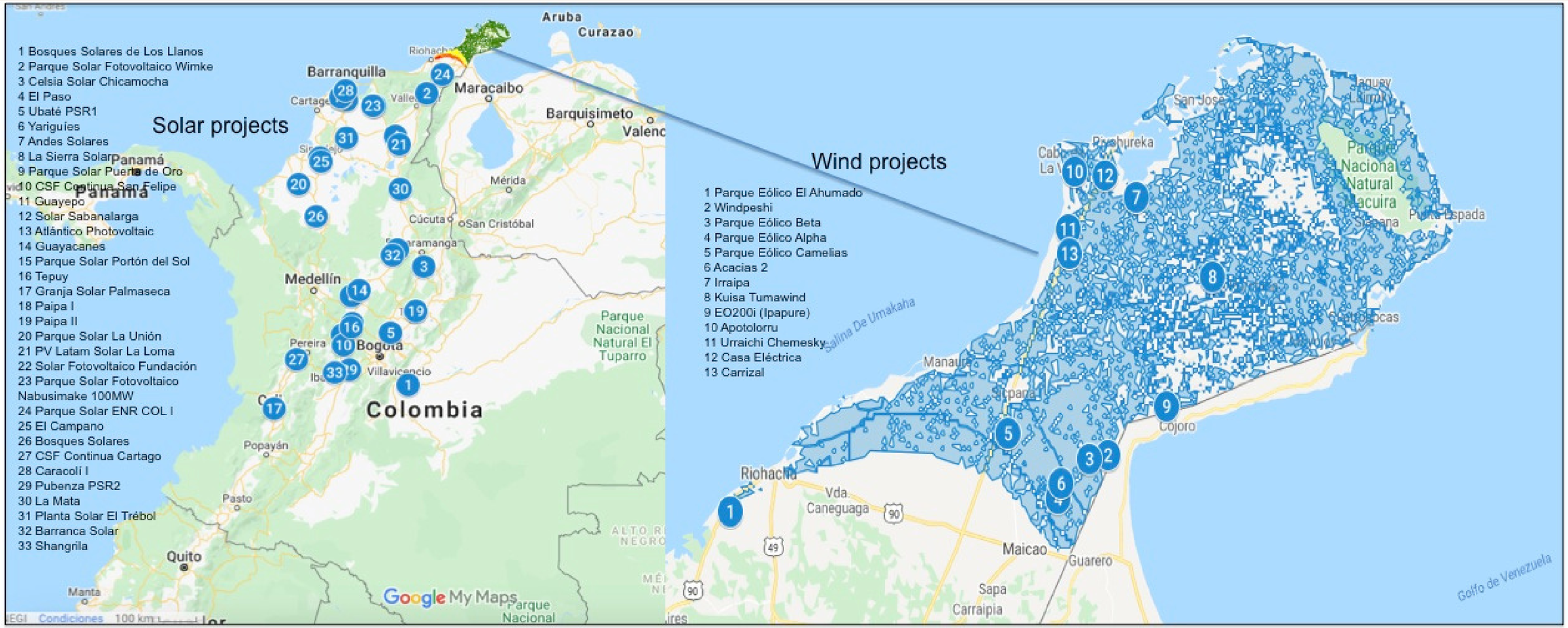
References: Danish Energy Egency (2015) Danish Experiences from Offshore Wind Develoment, https://ens.dk/sites/ens.dk/files/Globalcooperation/offshore_wind_development.pdf; Serrano González & Lacal-Arántegui (2016) A review of regulatory framework for wind energy in European Union countries: Current state and expected developments, Renewable and Sustainable Energy Reviews, https://doi.org/10.1016/j.rser.2015.11.091

KEY FINDINGS –PPAS & TENDERS

- Long-term Power Purchase Agreements (PPAs)- Introduced in 2019 (15–25 year) **minimize market price uncertainty**, which is beneficial for large electricity consumers to reduce investment costs associated with planning or operating nonconventional renewable energy projects [a].

- The tenders mechanism was designed to **provide flexibility**, with simpler requirements for participation, less rigid competition criteria, and, in general, balanced rules to guarantee the **financial viability of the projects** and adequate contracting conditions for the demand.

LOCATION OF WIND FARMS AND SOLAR FARMS IN COLOMBIA



Reference: Own elaboration based on data from García Orrego, S. (2021). Análisis espacial multicriterio para la ubicación de parques eólicos y granjas solares en Colombia. Universidad Nacional de Colombia and Primer mapa de zonas aptas para generar energía solar y eólica Retrieved from: https://bit.ly/3Bq2fDq [accessed 20 April 2021].

CONCLUSIONS ON-SHORE VS. OFF-SHORE WIND ENERGY

Positive conditions

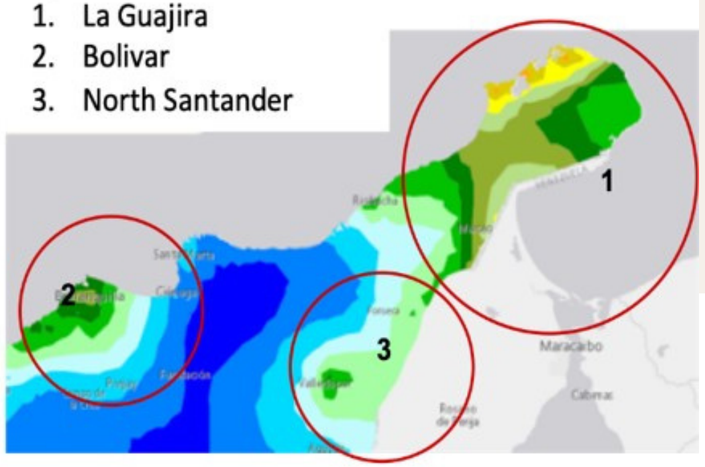
- Legal framework
- Public tender
- Private sector organization –*Ser Colombia*

Challenges

- Need for infrastructure construction
- Lacking or inadequate transmission lines
- Human capital limitations
- Need for community engagement expertise

Regions

1. La Guajira
2. Bolivar
3. North Santander

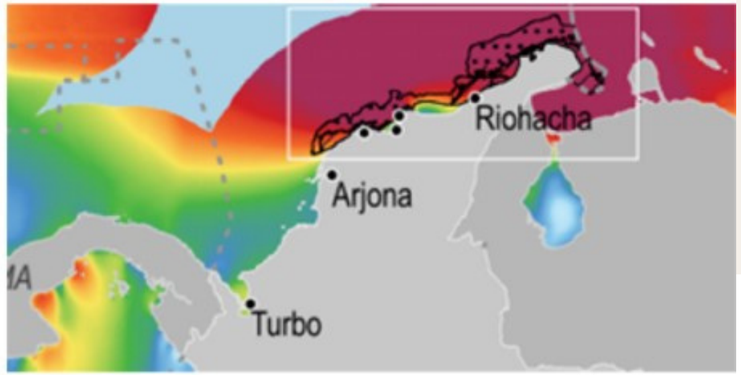


Positive conditions

- Alternative to avoid community conflict
- Abundant resource

Challenges

- Need to invest in infrastructure
- No big cities close to potential construction zones

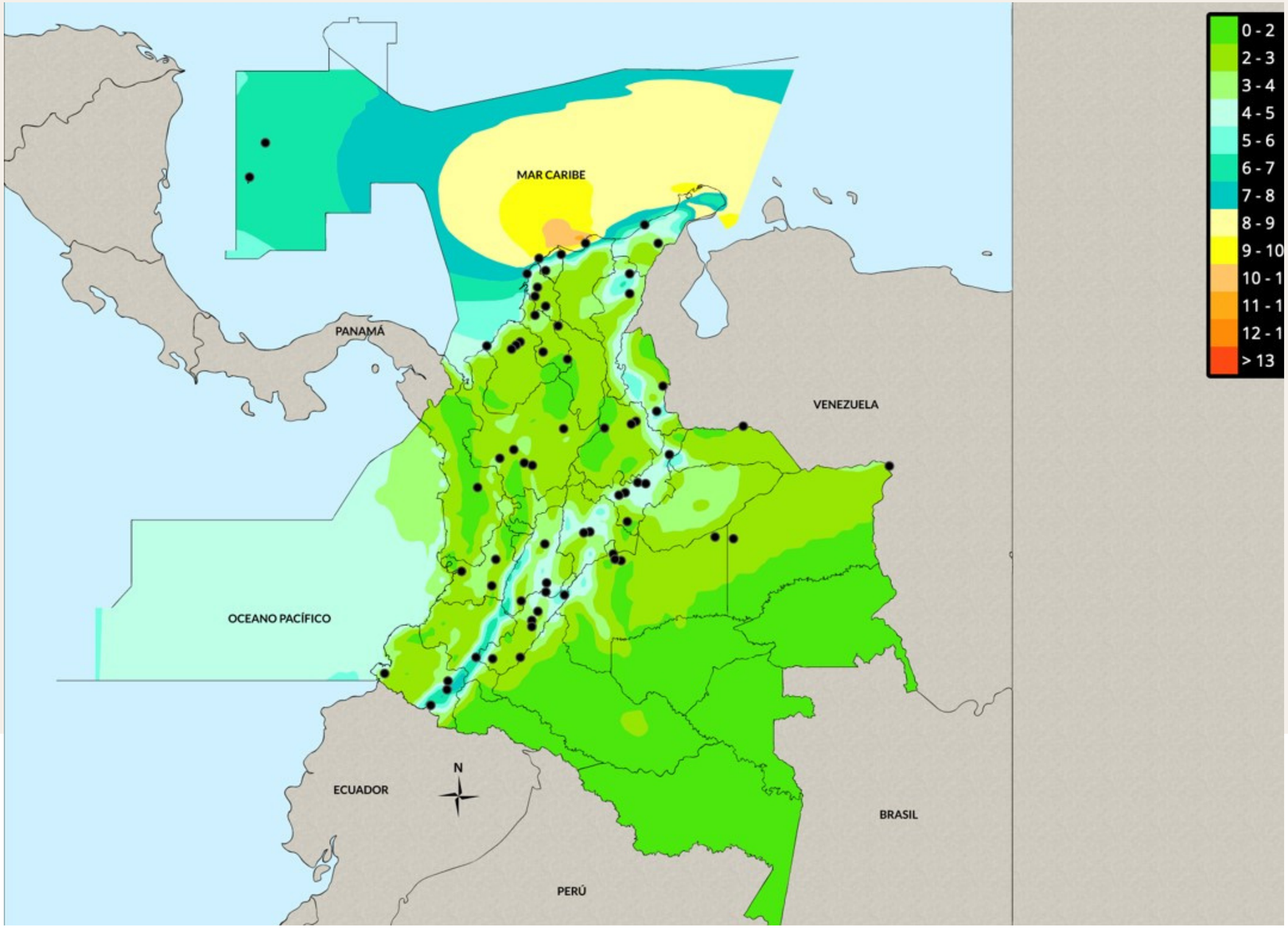


KEY AREAS OF CAUTION FOR OFFSHORE WIND INVESTMENTS

- Infrastructure building
- Transmission lines guaranteed access to the grid
- Curtailment
- Human capital
- Partnerships
- Community engagement through balancing between Territory/Community/Land
- Stable,long-term purchase agreements & Payment levels based on cost of power generation

A cultural change in Colombia is needed in terms not only of incorporating nonconventional renewable energy sources for energy production at large and small scales but also of other uses of nonconventional renewable energy [Law 1715].

CITIES CLOSE TO THE PACIFIC AND CARIBBEAN



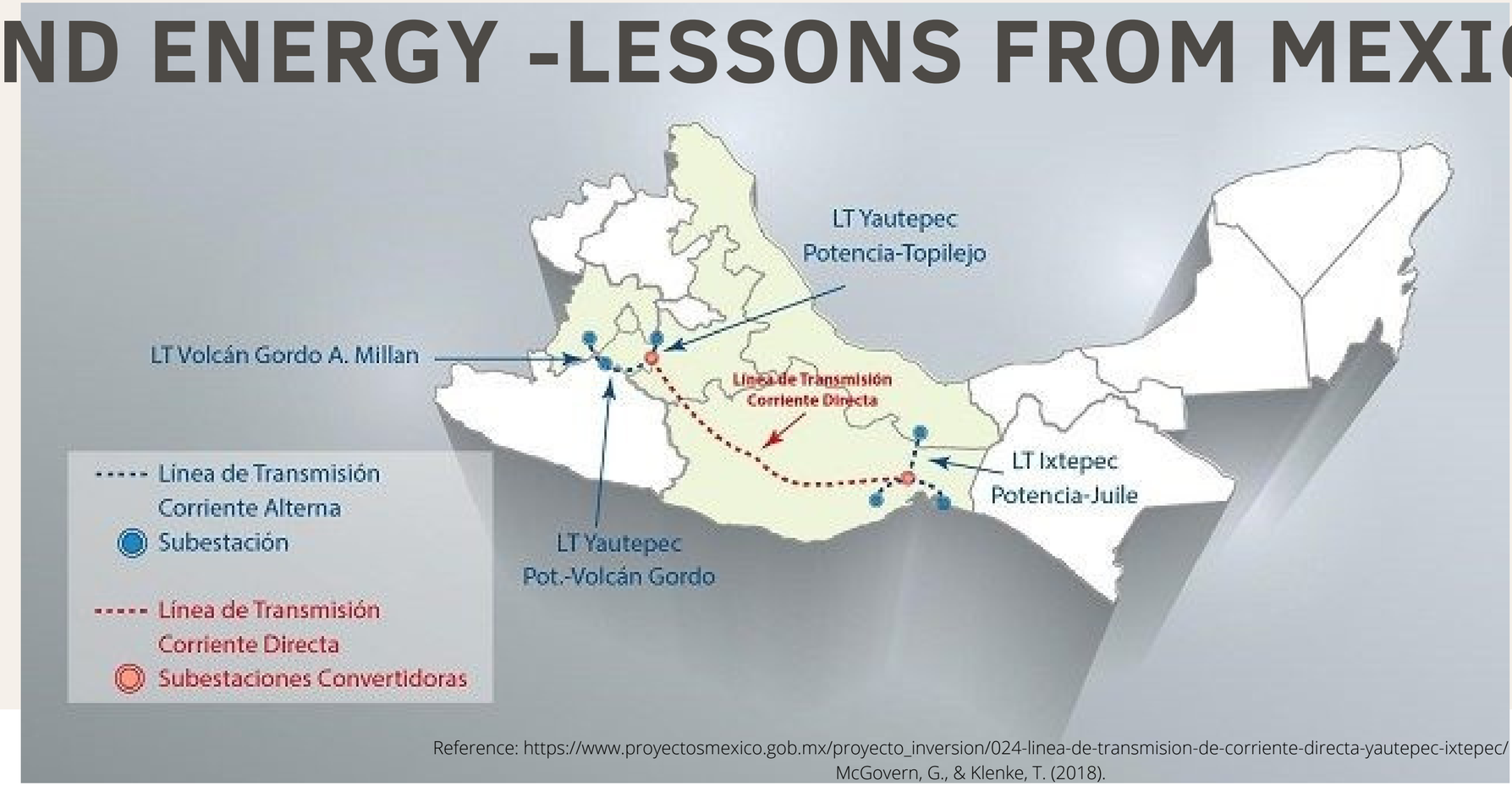
Reference: IDEAM, Atlas de Viento de Colombia – Interactivo – año 2015. Bogotá, D. C., 2015, https://www1.upme.gov.co/DemandayEficiencia/Documents/UPME_Proyeccion_Demanda_Energia_Junio_2021.pdf

INVESTMENT ATTRACTION IN OFF-SHORE WIND ENERGY -LESSONS FROM DENMARK-

Grid Connection	
Grid connection cost sharing schemes (e.g., super-shallow connections)*	• EU-members countries liberalised their electricity market. –**Nordpool** –Nordic electriticy market

Depends on loans. Grid cost could account for 25% of the entire project cost of offshore
References: Danish Energy Egency (2015) Danish Experiences from Offshore Wind Develoment, https://ens.dk/sites/ens.dk/files/Globalcooperation/offshore_wind_development.pdf

INVESTMENT ATTRACTION IN ON-SHORE WIND ENERGY -LESSONS FROM MEXICO-



Reference: https://www.proyectosmexico.gob.mx/proyecto_inversion/024-linea-de-transmision-de-corriente-directa-yautepec-ixtepec/
McGovern, G., & Klenke, T. (2018).

Curtailment takes place when there is **too much production** of a certain energy and too little local demand, **grid expansion**, or **capability to absorb** and supply variable energy to where the demand is located.

ADMINISTRATIVE ISSUES IN OFF-SHORE WIND ENERGY - LESSONS FROM DENMARK -

Procedure	
Who licenses what? –One Stop Shop	• License to carry out prelimiary investigation • License to establish offshore wind turbines. Before this license can be granted, an Environmental Impact Assessment (EIA) must be carried out. • **License to exploit wind power for 25 years**. • This license may be prolonged. • Approval for electricity production in compliance with the electricity legislation.

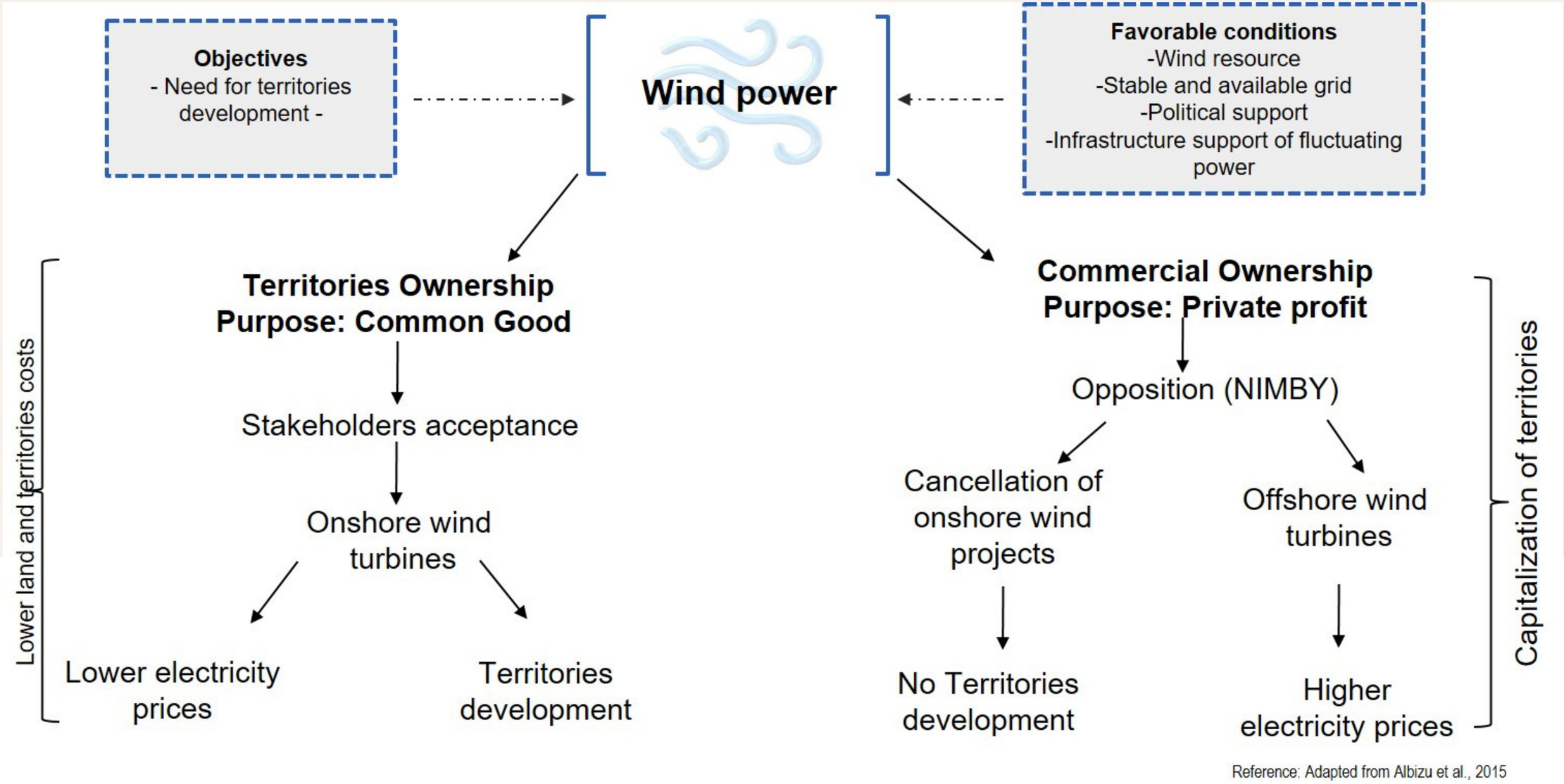
References: Danish Energy Egency (2015) Danish Experiences from Offshore Wind Develoment, https://ens.dk/sites/ens.dk/files/Globalcooperation/offshore_wind_development.pdf

MUNICIPALITY OF RINGKØBING-SKJERN

NEEDS OF THE SOCIETY –ENERGY DEMOCRACY-

Development of energy vision and priorities in 2008	• Conducted in collaboration with representatives of society. • Goal: Electricity self-sufficiency dependent on clean fuels by 2020, and by 2040, it would be free of fossil fuels. • An Energy Council was set up as part of the region's transition.
Energy Council	• Eighteen members, including city council members, officials from public sector agencies, businesses, and individuals. • The council held working committees on a regular basis to address tasks related to the achievement of the energy vision. • Members serve as ambassadors for the energy change. One of their responsibilities is to engage with community stakeholders to identify shared options for the region's energy change.

COMMUNITARY PROJECT DEVELOPMENT



Reference: Adapted from Albizu et al., 2015

ON-SHORE WINDPARK AT RINGKØBING-SKJERN

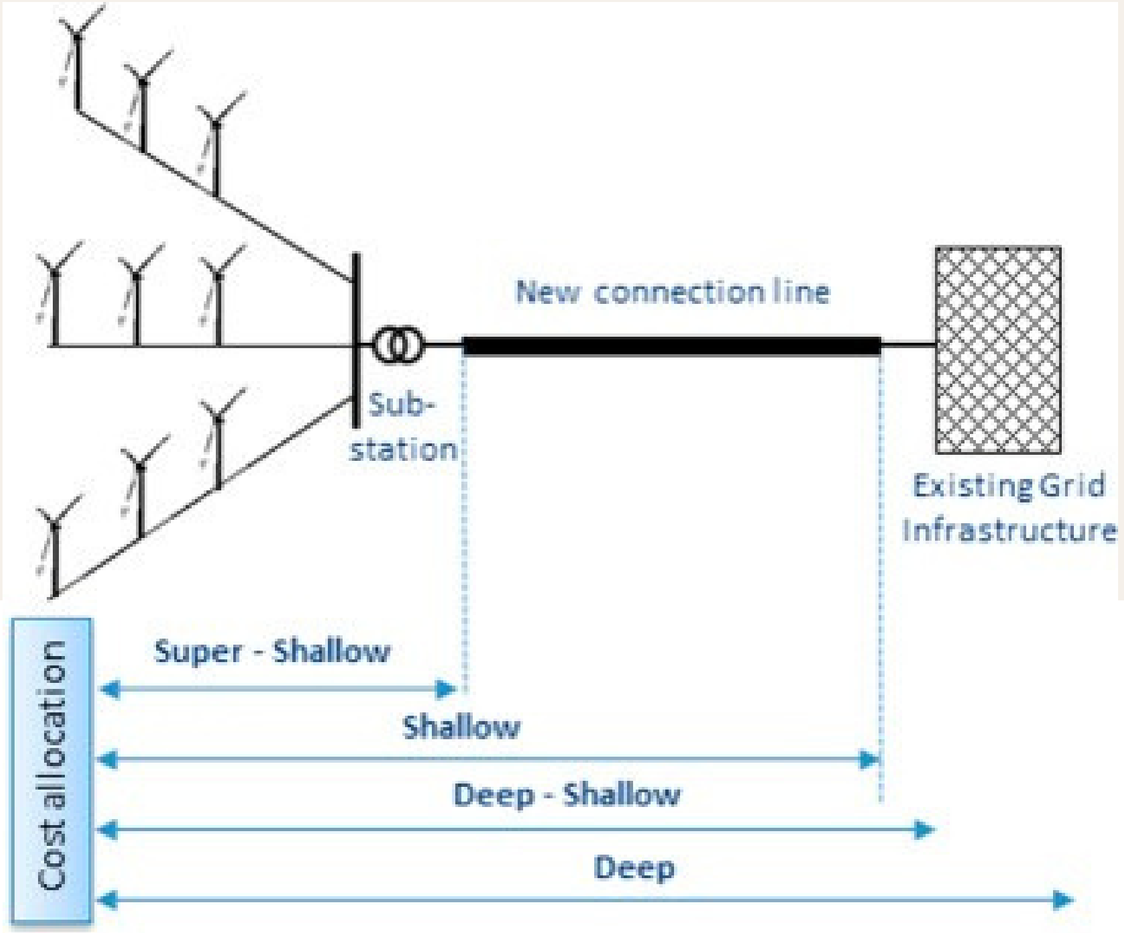
INVESTMENT ATTRACTION IN OFF-SHORE WIND ENERGY
-LESSONS FROM DENMARK-

Denmark

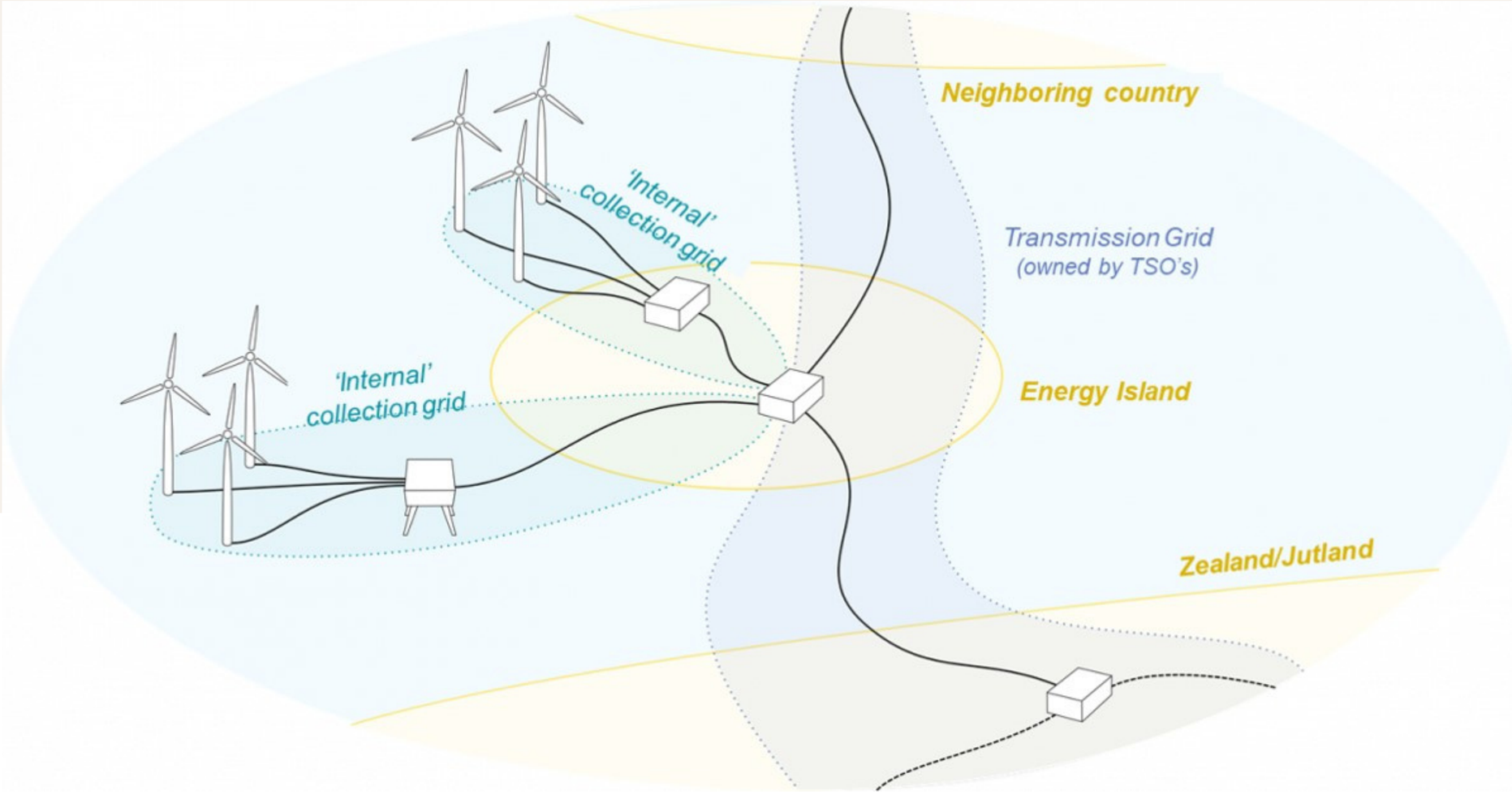
The transmission system operator pays for the offshore substation grid connection (ultra-shallow approach). However, near-shore plant developers must pay for their own offshore substation and land connection, whether via tenders or open-door procedures (shallow approach).

Approaches

Shallow cost approach
Super-shallow approach
Deep cost approach
Mixed shallow–deep approach



WIND-POWER ENERGY RESPONSIBILITIES - ISLANDS/DENMARKS



Reference: https://ens.dk/en/our-responsibilities/wind-power/energy-islands/denmarks-energy-islands

KEY DRIVERS IN ENERGY TRANSITION

Energy democracy

- Political call to **open the energy** sector to private sector participation

Energy Transition

- The institutionalization of **democratic principles** in the renewable energy transition

Stability

- Guarantee the stability of **public policies** in the energy sector.

RELEVANT CHALLENGES FOR THE OFF-SHORE WIND SECTOR

The **costs** related to building and maintaining offshore infrastructure could be a major obstacle (e.g., ports, transmission lines, etc.).

There is a need to **define which environmental permits can be assigned** on Colombian waters, either by a concession granted by the Environmental Authority, which will establish the limits and areas where the projects will be developed, or by an environmental license equivalent to the ones used by projects in the territory, in which the project promoters carry out the necessary environmental impact studies [4].

Medium-term approach (five years) is required to introduce offshore wind as an element of the Colombian energy matrix because of the high cost of these projects compared to onshore investments.

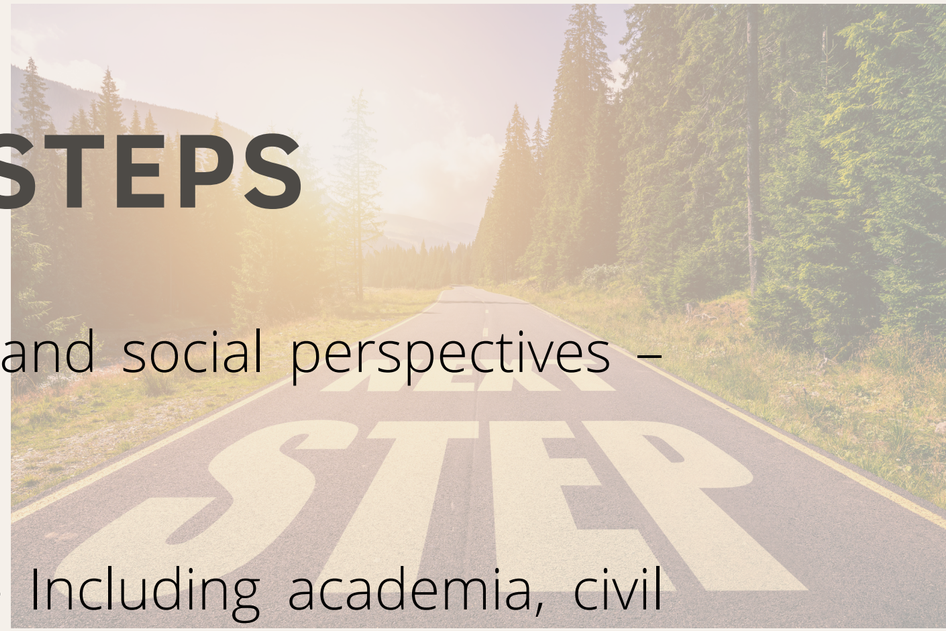
RELEVANT CHALLENGES FOR THE OFF-SHORE WIND SECTOR

Political context- Could be perceived volatile and uncertain after elections 2022.

Size of the market- In April 2021, at National level the sectors with the highest growth were industry, agriculture, and construction, presenting growth of 10%, 3.8%, and 3%, respectively [31].

Social issues and potential risks- Right to consultation, even when the offshore seems to be out of the range of these difficulties, the construction of required infrastructure can face some challenges as was documented in La Guajira.

POTENTIAL NEXT STEPS



Off-shore risk analysis – Political, environmental and social perspectives – cultural heritage (e.g., EIA).

Mapping and directory of relevant stakeholders- Including academia, civil society, others.

Strategic thematic planning, for example for partnerships or human capital development.

External demand analysis- Central America and other Caribbean countries.

Incorporate the lessons learned and methodology developed by IFU in other strategic markets (Brazil, Mexico, Chile, Peru).

Thank you

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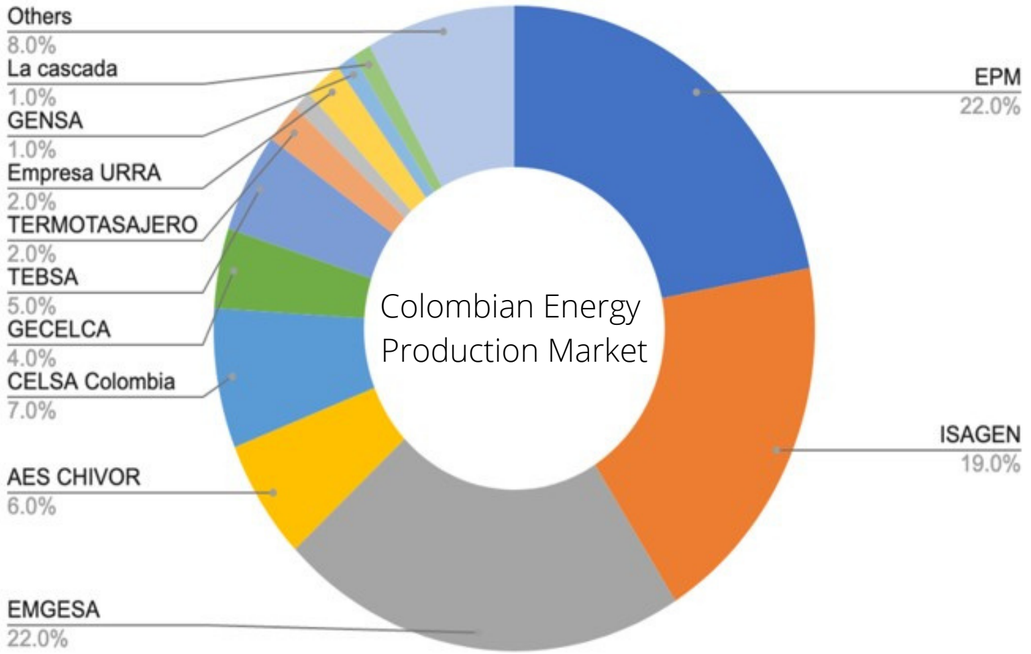
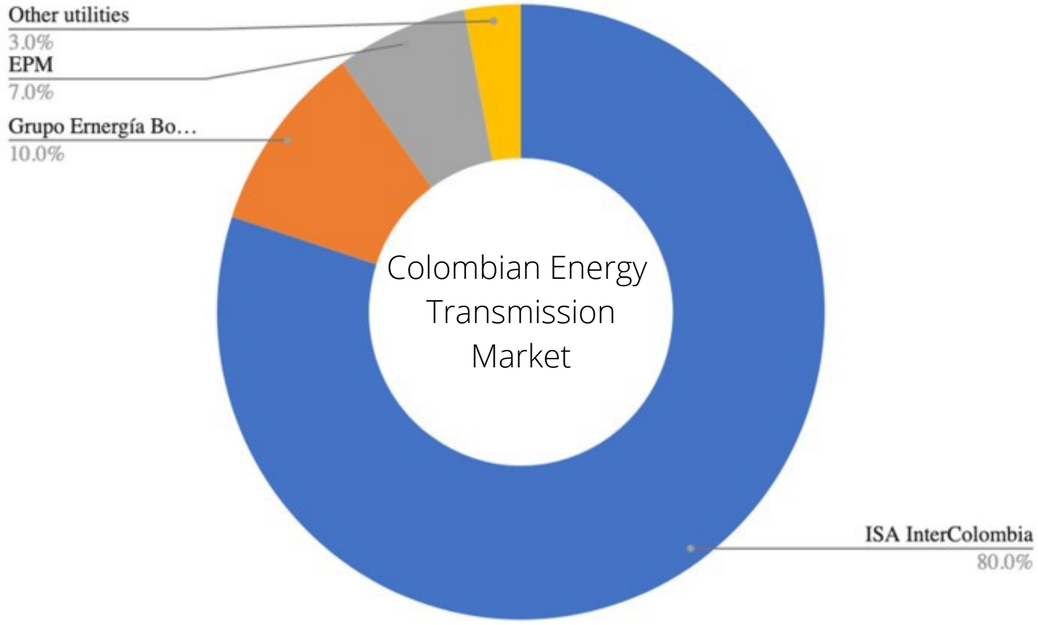
ANNEXES

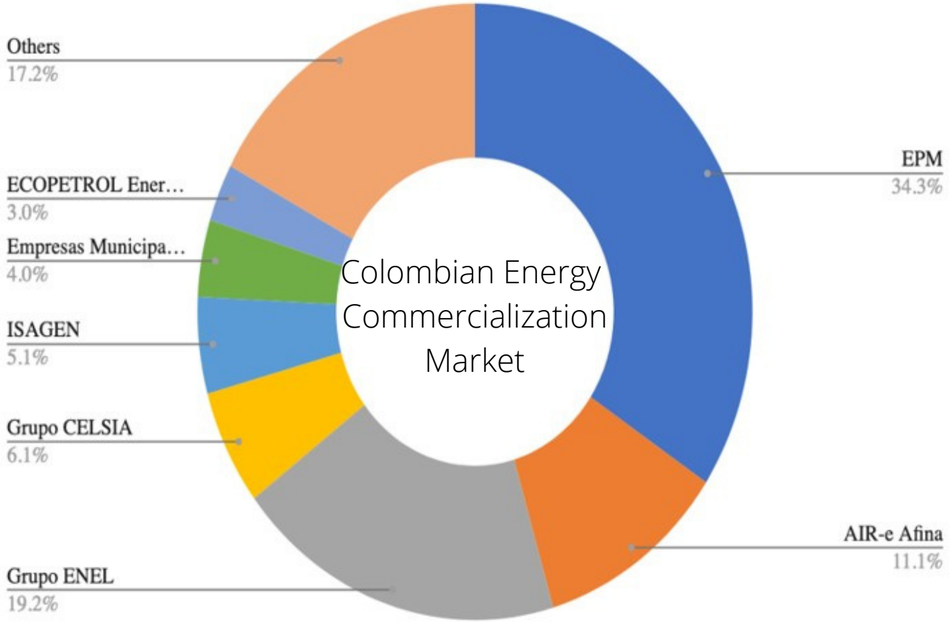
LEGAL FRAMEWORK

Law/Norm/Resolution	Relevance
Law 2099 (July 10, 2021). Dispositions for the energy transition, market dynamization, economic recovery and others.	• Update and change Law 1715 of the 2014 and other norms. Especially relevant are the changes in the tax incentives defined in Law 1715. • Regulation of benefits and incentives for smart meters, geothermal, solar and electric mobility. • Hydrogen is expressly defined both in terms of green and blue hydrogen. • Institutionality, under the new legislation, CREG may appoint legal experts. • Restructure and regulate the function of the FENOGE and creates a new fund the FONENERGIA. • Creation of the label “Clean Production” as an incentive for the private sector to invest in clean energy.

THE COLOMBIAN ENERGY SECTOR IS AN OLIGOPOLISTIC INDUSTRY, CONTROLLED BY UTILITIES WITH A MIX OF OWNERSHIP (GOVERNMENT AND PRIVATE INVESTORS)







COLOMBIA

- Geography and Biodiversity
- Sociodemographics
- Politics and International Agreements

DRIVERS *CURRENT COLOMBIAN FISCAL INCENTIVES*

Colombian Incentives	
Tax	• Deduction of 50% of the investment profits for tax purposes on the project for 15 years. This applies to energy generation projects only.
	• Tax exemption on imports of machinery and other necessary supplies for the project.
VAT	• Waiver of that VAT on the purchase of equipment, elements, and machinery or the acquisition of necessary services for the project.
Depreciation	• Accelerated depreciation of applicable assets, equipment, machinery, and civil projects needed for the project (which provides tax relief over time).

DRIVER COLOMBIAN PUBLIC TENDER ON NONCONVENTIONAL RENEWABLE ENERGY (OCTOBER 2019)

Characteristics of the first public tender on nonconventional renewable energy
• Exclusive auction for nonconventional renewable energy
• Projects with a capacity of ≥5 MW • Energy by hourly blocks • Financial commitment to the contract • Sellers can cover their obligation with other mechanisms
• Price in Colombian pesos updated with Producer Price Index (PPI) • Obligation due from January 1, 2022 • Contract term: 15 years

DRIVER COLOMBIAN PUBLIC AUCTION ON NONCONVENTIONAL RENEWABLE ENERGY

Mechanism	Auction (176 contracts)	Complementary (84 contracts)
Agents	22 suppliers/7 producers	28 suppliers/3 producers
Total effective capacity	1,298.9 MW	75 MW additional
Assigned energy[a]	10,186 MWh-d	1,864.5 MWh-d
Technology	17.39% solar/82.61% wind	1.26% solar/98.74% wind
Average price[b]	95.65 Col$/kWh	106.66 Col$/kWh