

Flanders International
**Business
Weeks** /2023



Kansen voor de Cleantechsector in Brazilië, Chili en de VS

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SOME HIGHLIGHTS

- One of the **cleanest electricity matrixes in the world**: > 82% of renewable energy production (**3rd place worldwide**):
 - ✓ 51.8% hydropower
 - ✓ 11% wind energy
 - ✓ 10,6% solar PV
 - ✓ 7,8% biomass + biogas
- **second largest biofuel producer**. Biofuels represent 25% of transport of fuels in Brazil.
- **6th place in the Installed Capacity of Wind Energy (GWEC)**.
- **Offshore wind energy**: potential of approximately 700 GW = **24 times larger than the current global capacity**.
- Brazil has the **potential to become the world's largest producer of green hydrogen**.

The renewable energy sector presents interesting **opportunities for FL companies as suppliers of technology, materials and knowhow**.



* The matrix total capacity does not include imports. In addition, mini and micro distributed generation are considered in the values of installed capacity for each source, according to criteria applied by MME.

- Most of the new energy will come from wind, sun, biomass and are estimated to increase by 150 GW until 2040.
- The ten-year-energy-expansion plan (PDE 2019-2029) by the Ministry of Mines and Energy foresees an investment of 93 billion USD in the generation and transmission of electrical energy from different sources.
- Large hydropower plants potential is already fulfilled but there are some opportunities for small hydropower plants for remote areas (unattended by Brazil National grid) – forest and rural community/business.

“Brazil is the Disneyland of renewable energies”

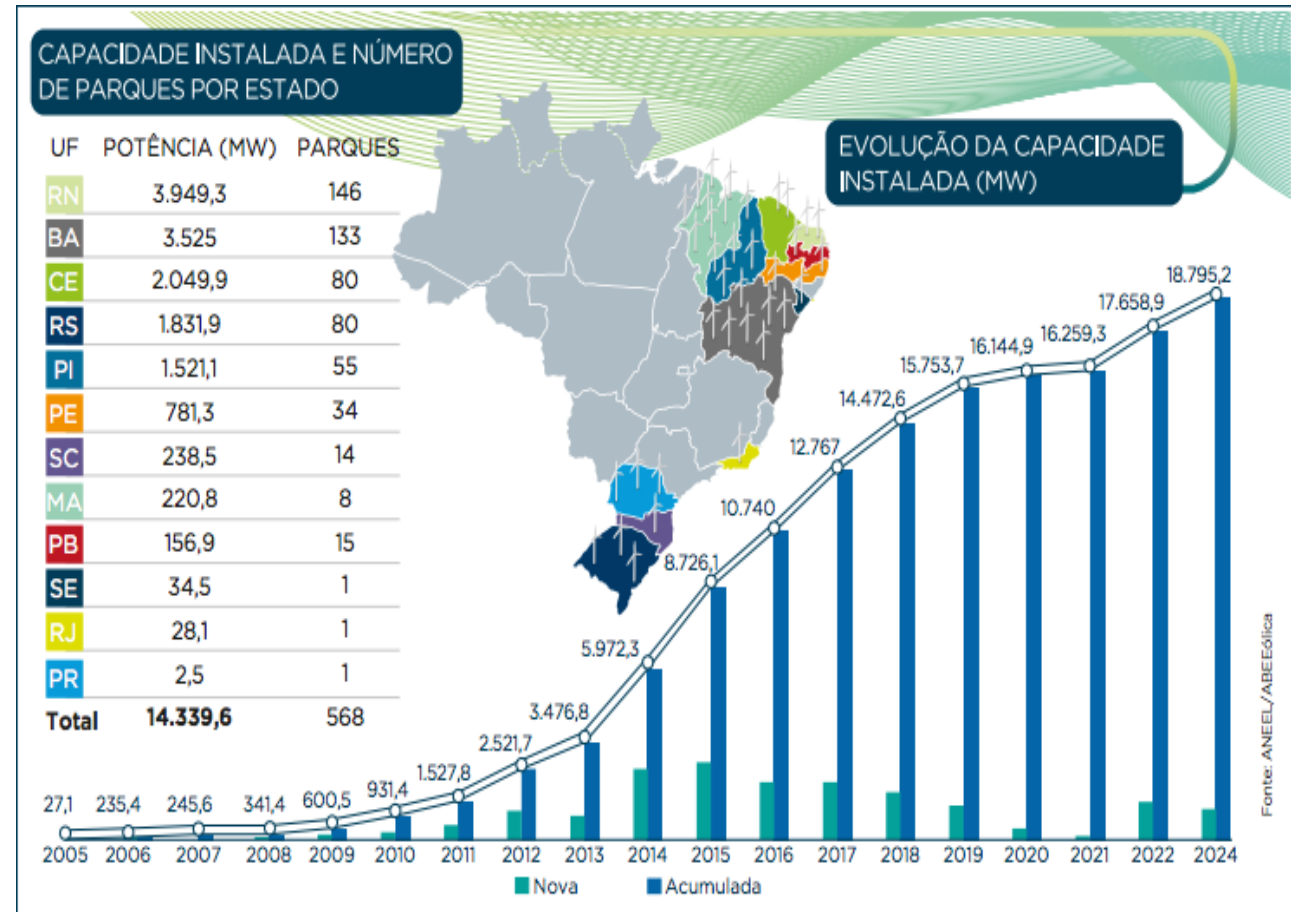
“The challenge to advance in renewables in the country is the supply chain since many of the materials for solar and wind are imported”

Mauricio Bähr, President of Engie in Brazil



ONSHORE WIND ENERGY

- In 2021, wind power was the fastest growing source: a total of 3.83 GW of wind capacity was added to the Brazilian energy matrix
- Winds in Brazil have an average generating capacity of 42.5% whereas the worldwide average is 25%
- Brazil has more than 900 wind farms installed, 85% of them in the Northeast region (mainly in the State of Bahia and Rio Grande do Norte, Ceará, Piauí and Pernambuco)



OFFSHORE WIND ENERGY

- Brazil has a coastline of 7,367 km and great winds with a potential of approximately 700 GW
- Regulatory framework for offshore wind and green hydrogen is expected by the end of 2023/begin of 2024. It is being processed in Congress and will regulate the exploitation of the potential of offshore wind, solar and tidal energy
- Brazilian wind energy is expected to play a vital role, not only in generating electricity and contributing to a more renewable energy mix in the country but also in producing green hydrogen.

OFFSHORE WIND ENERGY POTENTIAL

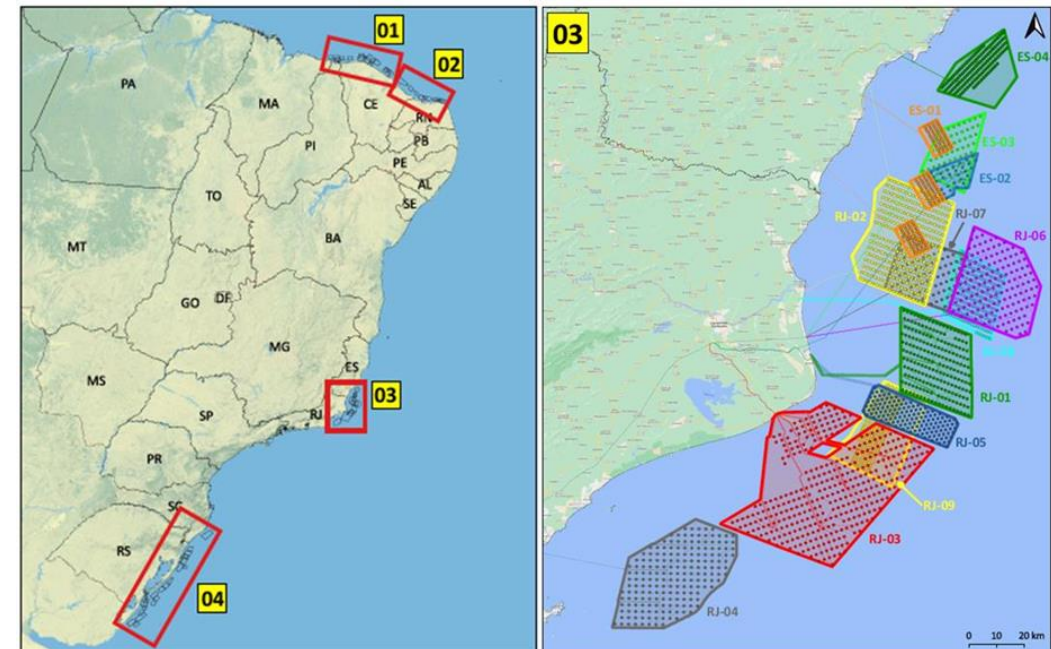


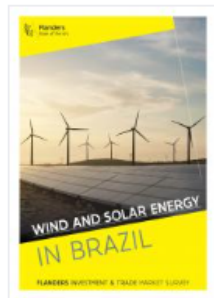
Figure 7.1: Projects under Environmental Licensing at IBAMA

Map Source: IBAMA (August 2022)

SOLAR SECTOR

- The second fastest growing electricity source is solar Photovoltaic.
- Over 22 GW installed capacity (2022) .
- Over USD 21.3 billion in new investments.
- 98.5% of micro and mini energy generation comes from photovoltaic energy in Brazil.
- Solar energy is becoming increasingly more accessible and popular. Today, it is already cheaper to generate your own electricity than to buy it from local utility company.

Wind and solar energy in Brazil



Wil u meer vernemen over de interessante ontwikkelingen die aan de gang zijn in Brazilië op het vlak van onshore en offshore wind- en zonne-energie, consulteer dan deze marktstudie opgesteld door het FIT-kantoor in Sao Paulo.

[Meer info](#)

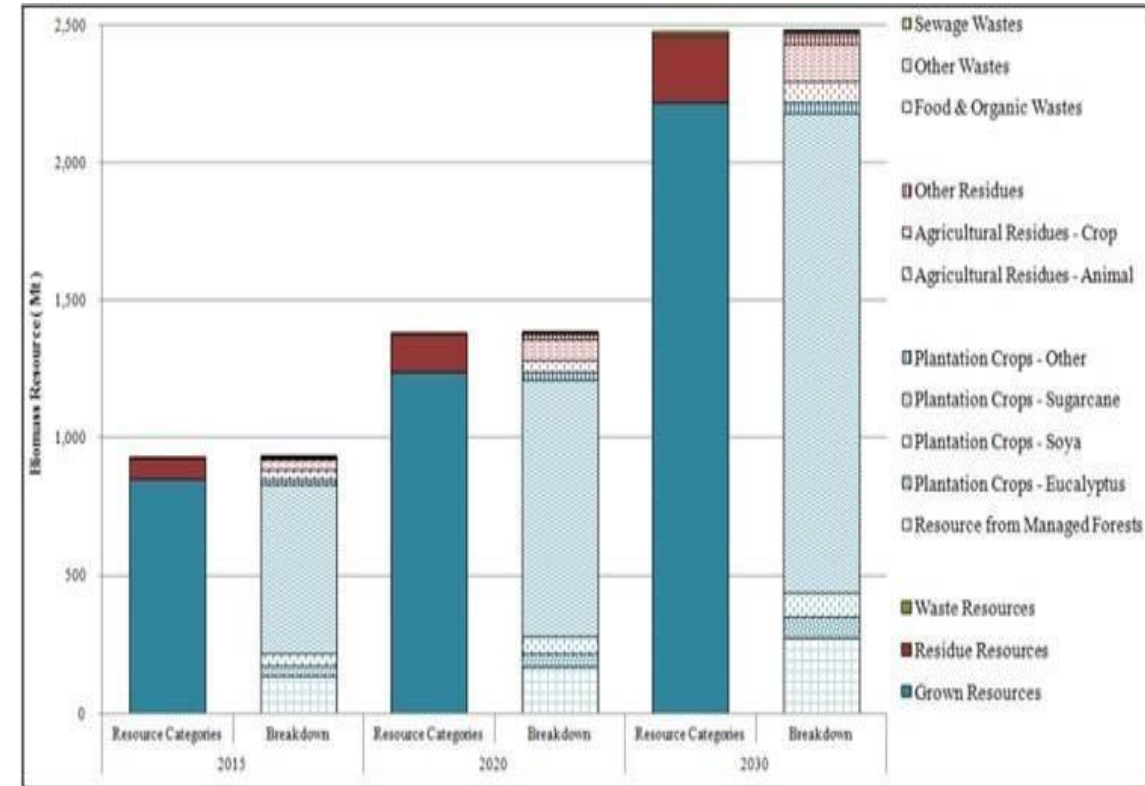
GREEN HYDROGEN

- Potential to become the world's largest producer of green hydrogen, projecting annual revenues of USD 30 billion by 2050. Several projects have already been announced.
- Opportunity to attract direct investment of USD 120 billion over the next 25 years, focusing on expanding the capacity of electrolyzers and fuel cells required for hydrogen production.
- The projects are primarily concentrated in Brazil's port-industry regions: Port of Açú, Port of Suape and the Pecém Complex.
- In addition to the partnerships established by companies, several agreements at the governmental and institutional levels have been identified: mainly with Germany and the Netherlands.
 => Opportunities for Flanders: develop cooperative activities (R&D), aiming to purchase green hydrogen (imports) and also sell products/technologies developed by FL industries
- Brand new market study published by FIT São Paulo!



BIOMASS

- Brazil has 16.6GW of installed biomass capacity
- It is the fourth-largest electricity source in the country (2022)
- Electricity production from biomass is important especially in the Center-West and South States of Brazil because the harvest takes place during the dry period with reduced hydropower generation





SUSTAINABLE AGRICULTURE

There are opportunities for cleantech in following segments of the Brazilian agriculture:

- Cultivation (use of water, ...)
- Agriculture in a controlled environment (vertical farms, ...)
- Sustainable forestry (traceability, ..)
- Animal breeding (water, health, traceability, ...)
- Infrastructure (renewable energy, ...)

Examples:

- ✓ Pink Farms, the largest vertical urban farm in Latin America.
- ✓ World leader in meat production JBS announced a commitment to achieve net-zero greenhouse gas (GHG) emissions by 2040.





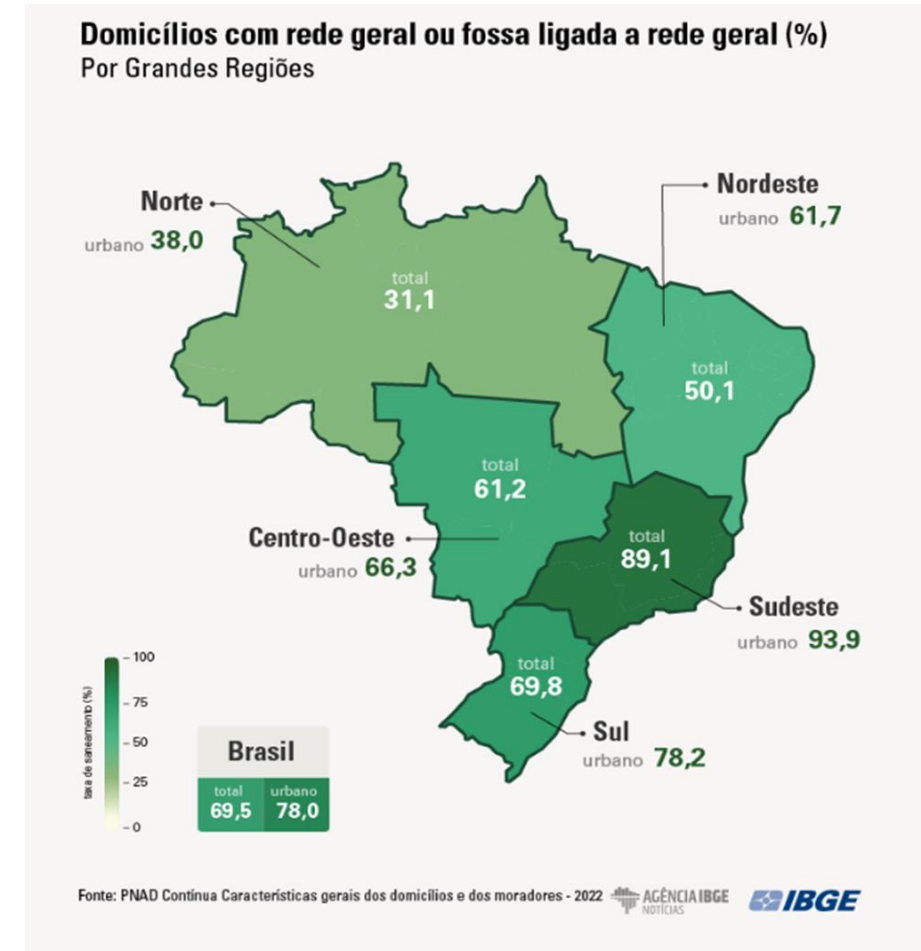
WASTE MANAGEMENT

- Brazil is the fourth largest producer of garbage in the world.
- National Solid Waste Policy: targets for recycling, landfill diversion and energy recovery from waste.
- Generation of MSW reached a total of approximately 81.8 million tons (2022).
- 75.1% of the total amount of municipalities presented some initiative to selective collection of waste (2021).
- Destination of waste:
 - ✓ Most of the collected waste goes to landfills: 61%.
 - ✓ The amount of waste that goes to inadequate units (dumps): 29.7 million tons/year
 - ✓ Existence of reverse logistics systems for post-consumer products and packaging



WATER TREATMENT

- New Basic Sanitation Legal Framework to provide universalization of sanitation and water supply in Brazil by 2033, fostering domestic and foreign private investment (USD 128 billion).
 - Four components: drinking water supply; sewage collection and treatment, rainwater drainage & management, solid waste management.
 - 35 million Brazilians lack supply of treated water.
 - 100 million deprived of proper sewage coverage.
 - More than half of wastewater is not properly disposed of.
 - “Água Doce Program” – desalination systems to serve rural communities.
- **Industry and Agribusiness are looking for new solutions:** reuse of water, water treatment, new technologies, corrosion protection, solutions to avoid fouling, flotation, reverse osmosis



FLANDERS INVESTMENT & TRADE

Webinar

**Cleantech for Latin America:
Opportunities in Argentina, Brazil, Chile and Peru**

FLANDERS INNOVATION & ENTREPRENEURSHIP **flux50** Clusters for Growth

Cleantech Flanders Powered by VITO

We gaan zo meteen van start...



Flandres,
região norte da Bélgica
**expertise em
energia eólica
offshore**

Flanders State of the Art

Flandersinvestmentandtrade.com

G-STIC Conference in Rio de Janeiro
13 – 15 February 2023

PLUG INTO FLANDERS' G-DRIVEN CLEANTECH SCENE

GET YOUR SDG VITAMINE BOOST IN FLANDERS

PLUG INTO FLANDERS' G-DRIVEN CLEANTECH SCENE

Bélgica
Oportunidades de Negócios e Parcerias em Tecnologias Limpas

16/2 | 9h30 às 12h

Sala do Firjan

Firjan



**FLANDERS
INVESTMENT
& TRADE**

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OBRIGADA!

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Kansen voor de Cleantechsector in Brazilie, **Chili** en de VS.



SOME HIGHLIGHTS

The South American country has the best conditions for extracting copper and lithium.

Chile has gained worldwide attention with its energy transformation and relies on a green growth strategy.

Chile is becoming a leader in renewable energy. The country's green hydrogen industry is crucial to its energy transformation





Chile is the country **worldwide** leader in **mining** and also very rich in natural resources

The country is the world's largest **copper** producer and has significant reserves of lithium, silver, gold, iron ore, coal, and molybdenum

The largest source of copper production and reserves are primarily located in the north of Chile

Two interesting **investments** of Chileans groups in Flanders : **SQM** in Antwerpen and **Molybmet** in Gent





Chile is the world's second-largest **lithium** producer after Australia. The country's Salar de Atacama is home to one of the world's largest lithium reserves.

The country's lithium production is expected to increase in the coming years as demand for electric vehicles (batteries) and renewable energy storage systems grows

The creation of a **National Lithium Company**. It is a historic milestone that will increase the country's wealth through a state-led effort that will **involve the private sector** in the entire production process¹.

In addition to this, an **Institute** will be created whose central objective will be to generate knowledge and technologies to improve extraction, production, **value addition**, application and recycling processes





Interest of the European Union

The EU and Chile agreed to explore the great potential for collaboration on **raw materials** within the context of the **Global Gateway strategy**. The recently concluded EU – Chile **Advanced Framework Agreement** contains a very ambitious Energy and Raw Materials chapter. The cooperation articles of this chapter could be implemented by a strategic partnership on sustainable raw material value chains, securing **access** to lithium and copper for the EU

Chile expects large foreign **investments** and the EU made important **financing** facilities available

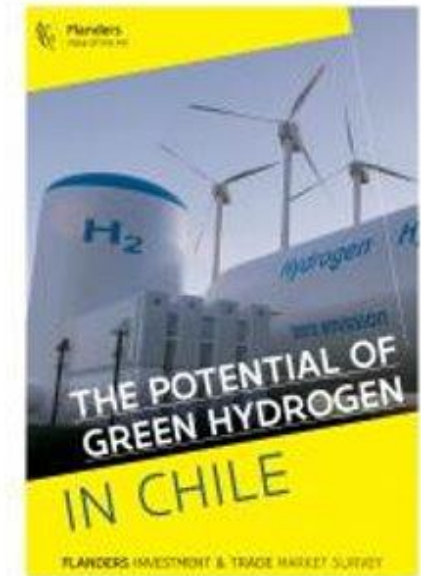


Chile has a very ambitious national green hydrogen strategy !

Chile wants 20 % of its energy matrix to be renewable by 2025
--- target was reached in 2017 !

Goal is to obtain 70 % of its energy from renewable by 2030
and reach carbon neutrality by 2050 !

Chile's national green hydrogen strategy is a plan to develop and export green hydrogen, a clean and renewable energy source. The strategy has three main objectives: to have **5 GW of electrolysis capacity under development by 2025**, to produce the most cost-efficient green hydrogen by **2030**, and to be among the top three exporters by **2040**. The strategy could generate up to US\$ 330 billion in private investment opportunities and US\$ 30 billion in exports by 2050





Chile has a diverse set of renewable resources

Solar Energy

Chile has exceptional solar resources

Northern regions

The highest levels of solar radiation in the world

Large-scale solar projects

Solar parks and photovoltaic installations

Atacama Desert : Cerro Dominador





Wind Energy

Vast wind potential

Particularly in Southern regions

Wind farms along coastlines

Windy areas inland – No offshore !

Increased capacity in recent years

Forecast : quadruple capacity from now to 2050,
reaching nearly 20 gigawatts by then





Interest of Belgium/Flanders

**Joint Declaration of Intent between
the Ministry of Energy of the Republic of Chile and
the Ministry of Energy of the Kingdom of Belgium
on
Strengthening Cooperation on Energy Transition
with a special emphasis on Electric Grid Flexibility and
Storage Technologies**





Memorandum de Entendimiento (MdE)

En este MdE, el Ministerio de Energía de Chile, el Puerto de Amberes y el Puerto de Zeebrugge expresan su interés en explorar colaboración en torno al tema estratégico y relevante del establecimiento de un corredor para el transporte mantimo de hidrógeno verde o derivados entre sus pai'ses, con producción en Chile y recepción en los puertos de Amberes y Zeebrugge, con tal que su posterior distri.bución pueda satisfacer la demanda esperada en Bélgica y otros pai'ses de Europa.

Already interested and present or in contact ...

Fluxys, Engie, John Cockerill, Solvay, Ineos, Tractebel, Exmar, Machiels, Waterleau o.a.

Possibilities :

Electrolysers

Storage capacity hydrogen

Transport hydrogen

Wind and solar equipment

Feasibility studies



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**Muchas
Gracias !**

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the Art

THIS IS FLAN DERS

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COVID

\$\$\$

Inflation

IRA

Trump vs China



Biden vs China

BUILD BACK BETTER

Chips Act, ...

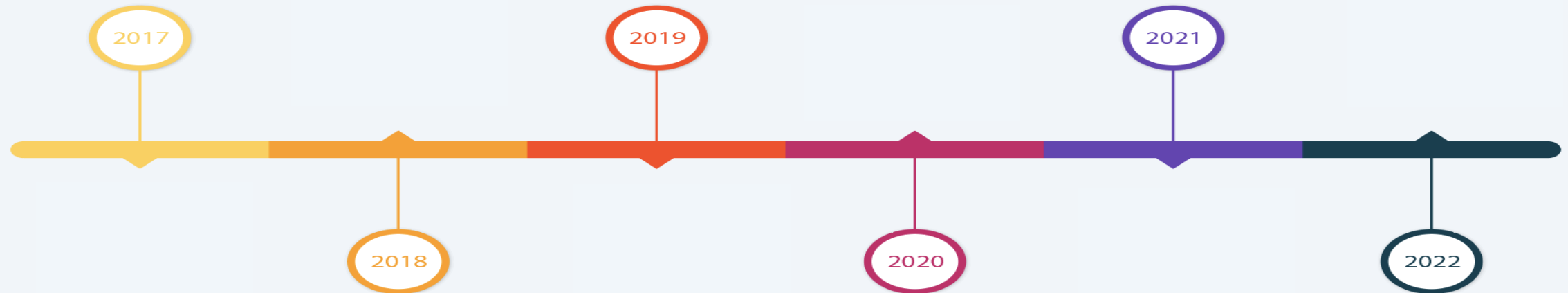
OSW / 30 by 2030

Russia vs...

energy shock

...

"energy independent"



USA spending its way out of a crisis!

Directly COVID related = 2 trillion USD

- American Rescue Plan Act
- American Jobs Plan
- American Families Plan

Rebuilding the economy:

- Infrastructure Investment and Jobs Act / IIJA = 550 bn USD
- Inflation Reduction Act / IRA = ~ 500 bn USD + cheap loans
- Chips Act = 280 bn USD

... making strategic choices along the way

BIG, GREEN AND MEAN

Joe Biden's plan to remake America's economy



Objective #1 =

Re-build America
& create jobs



Climate Change Mitigation
= positive externality
= big (unintended ?) winner

IRA biggest ever funding scheme for energy transition? Yes, but...

Clear focus on Climate Change?
Somewhat!

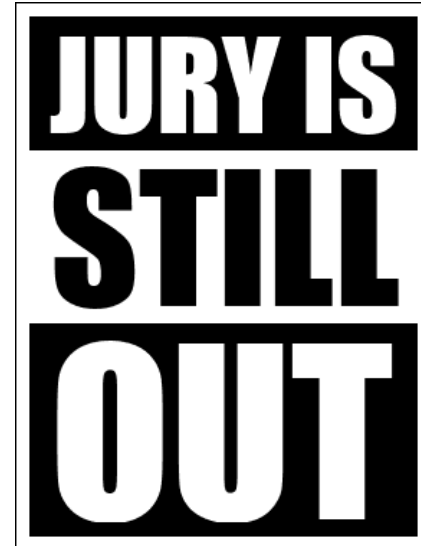
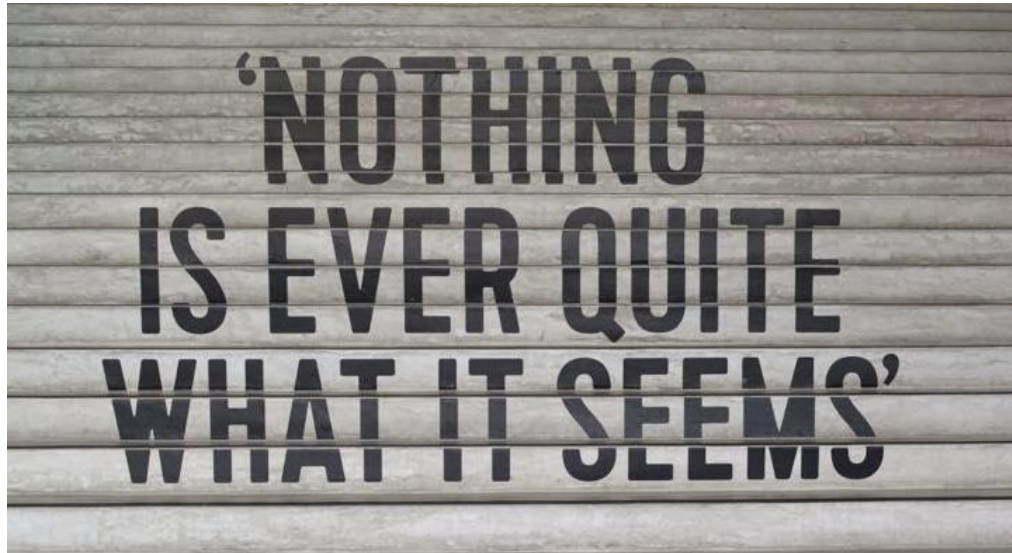
Inflation Reduction Act was designed to reduce inflation? ...

Oil & Gas are out? No!

Cluster building! Yes

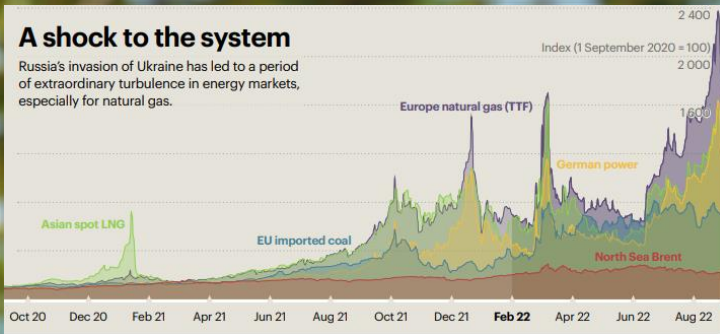
Coordinated large funding schemes?

USA mimicking Europe?



Climate & Cleantech battle grounds

- Battery technology & EV
- H2
- Scaling up Offshore wind capabilities
- Solar PV: next gen & manufacturing
- SMR
- Deep earth geothermal
- Agro & Food tech – Alternative Proteins
- Materials & Chemicals
 - Access to strategic resources
 - Advanced recycling
 - Industrial biotech ~ biomaterials, nutrients, ...



THE CLIMATE PROVISIONS
OF THE
**“INFLATION
REDUCTION
ACT”** (IRA) OF 2022



Transforming the EU's economy for a sustainable future

Mobilising research and fostering innovation

Increasing the EU's Climate ambition for 2030 and 2050

A zero pollution ambition for a toxic-free environment

Supplying clean, affordable and secure energy

Preserving and restoring ecosystems and biodiversity

Mobilising industry for a clean and circular economy

From 'Farm to Fork': a fair, healthy and environmentally friendly food system



Building and renovating in an energy and resource efficient way

Accelerating the shift to sustainable and smart mobility

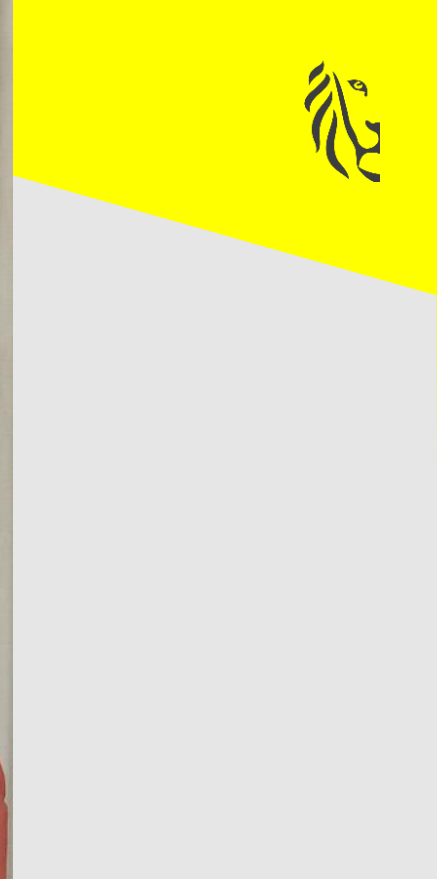
Financing the transition

Leave no one behind (Just Transition)

The EU as a global leader

A European Climate Pact





Green Deal Industrial Plan



Plan industriel
du pacte vert
#industrynetzero



Green Deal
Industrial Plan



Plan industriel
du pacte vert
#EUIndustrialStrategy

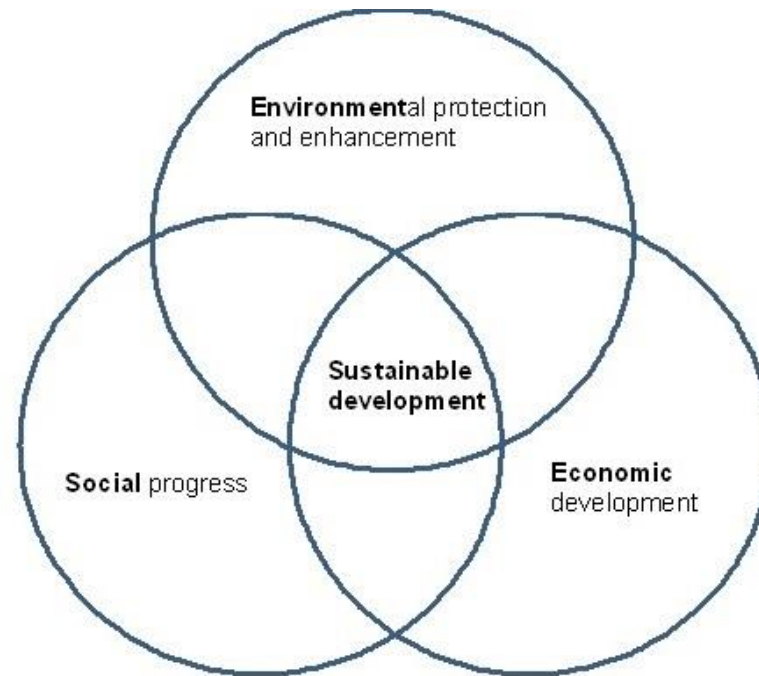


Commission européenne |
European Commission



Why invest in Cleantech & Energy Transition?

A panacea for climate change?



Economic independence?





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2



How?

- 'Made in America' requirements
- Import & Export restrictions
- Tax breaks, cheap loans & grants

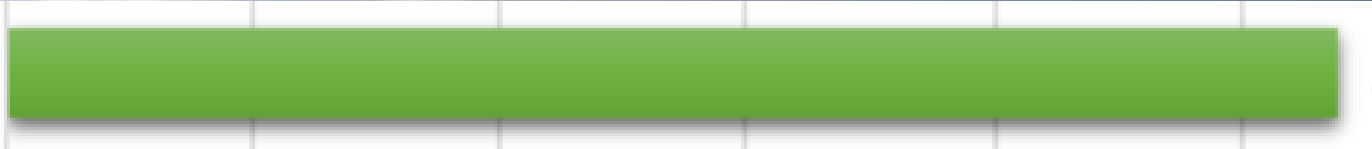


CRISIS

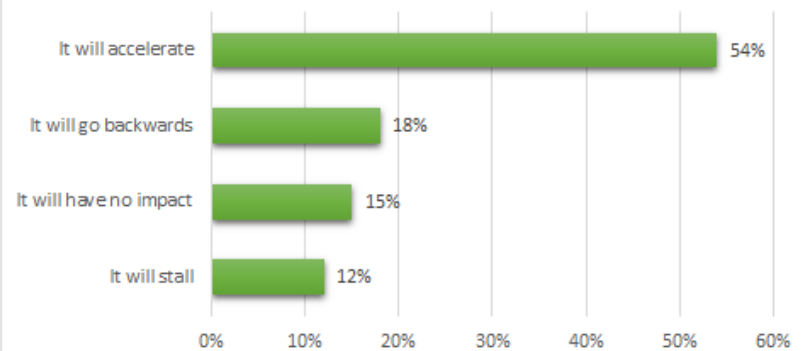
OPPORTUNITY



It will accelerate

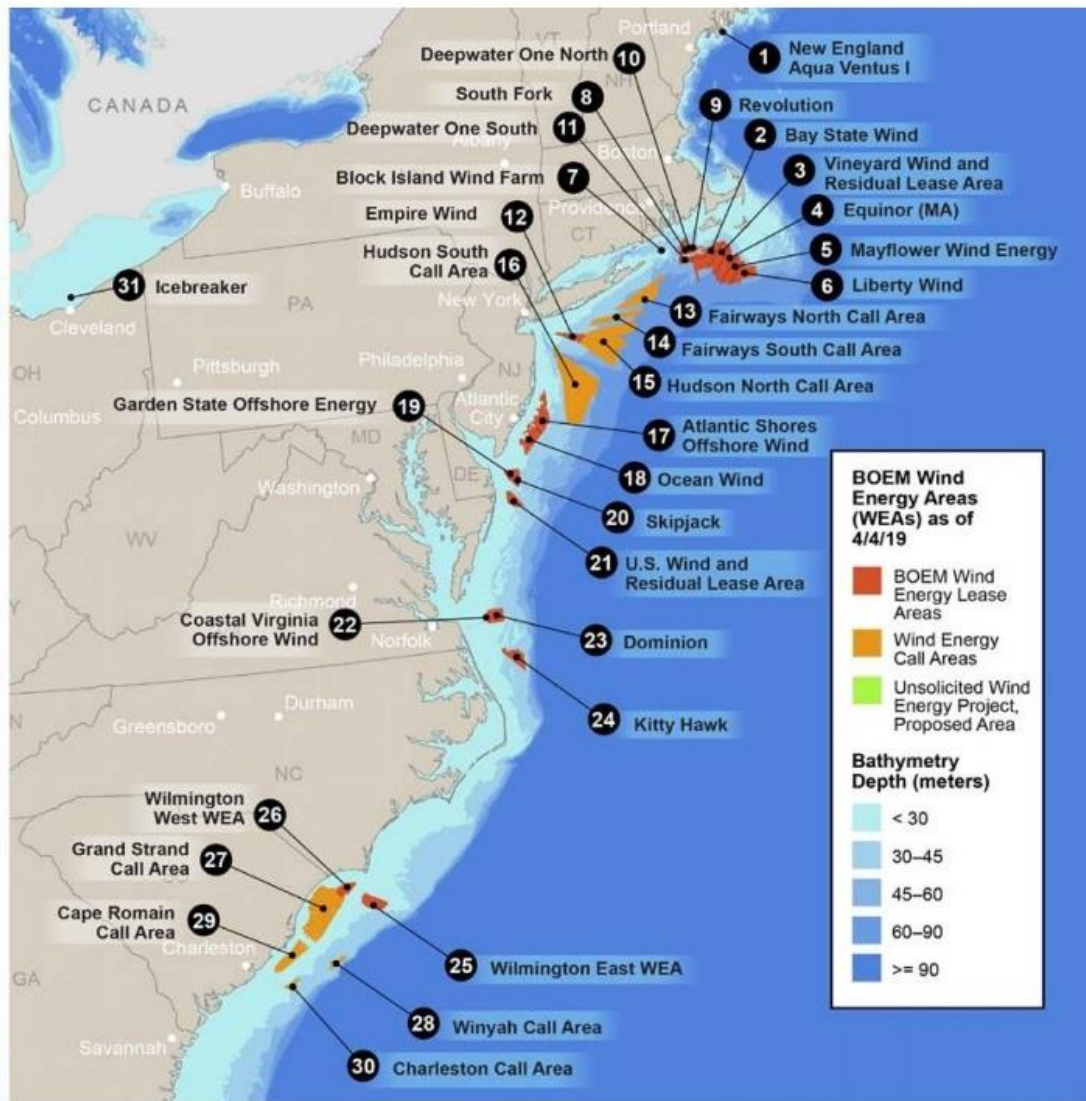


What will the impact of the Russia Ukraine war be on the energy transition?





US Jumpstarts Offshore Wind
Targets 30 GW by 2030



US JUSTICE
Targets 3

THE CLIMATE
 OF
**“INFL
 REDU
 ACT”**



VINEYARD WIND SELECTS JAN DE NUL GROUP FOR INTER-ARRAY CABLE SUPPLY AND INSTALLATION .

Home > News > Vineyard Wind selects Jan De Nul Group for inter-array cable supply and installation



SHARE



OFFSHORE

19 August 2021



Project

Fisheries Policy
Fisheries Science
Charts, FAQs
Internships
EXPLORE Program

Vineyard Wind Selects DEME Offshore US for Wind Turbine Installation



Agriculture & Food

- **Soil Health** - monitoring and measuring **for carbon management**
- Recent deals: [Boomitra](#), [Croptimistic](#), [EarthOptics](#)



Energy & Power

- **Renewable and low-carbon hydrogen production** - the mission to drive down costs has begun
- Recent deals: Electric Hydrogen, Kaizen Clean Energy, Sapphire Technologies



Materials & Chemicals

- Increasing interest in **battery materials**, including fast-charge anodes, additives and coatings - and **strong interest in biochemicals production**, including cell-free manufacturing.
- Recent deals: Allozymes, Debut Technology and [FabricNano](#)



Resources & Environment

- Emerging tools helping to set, validate and **monitor emissions, action on carbon and climate change risk**
- Recent deals - Patch, [Persefoni](#), Plan A, Sust Global, Fire Maps and Storm Sensor



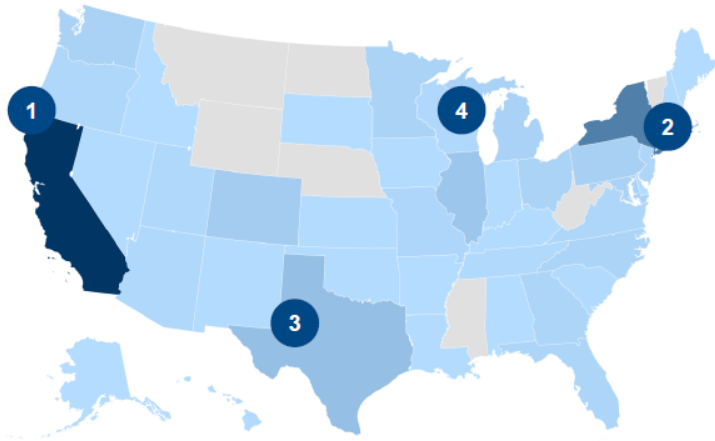
Transportation & Logistics

- Logistics & Last Mile - **enabling future supply chains**
- Recent deals: Coco, Elroy Air, Parcel Perform

Innovation in business models and enabling technologies

Ultra-low latency data processing, Sensors (enabling condition monitoring, soil health, DER management etc.) and IoT security are strong themes in early-stage investing

Cleantech investors are located in four major geographical hubs



Number of Investment Organizations Per State 2 538
 Total number of cleantech investors in U.S.: 1788*
Powered by Bing © GeoNames, HERE, MSFT

Source: Crunchbase, Brookings, Energy News, Austin Chamber of Commerce, NYSERDA

Cleantech investment organizations tend to be located close to industry clusters and universities

1) West (California, Oregon, Washington)

▶ The West Coast accounts for a disproportionate amount of cleantech funding in the U.S. Driving factors include the number of large cities with close proximities to universities that generate startup activity and attract VC investments

2) Northeast (New York, Massachusetts, Virginia/D.C.)

▶ The East Coast attracts a large amount of cleantech investments in part due to the proportion of higher learning institutions like MIT and Harvard and cleantech innovations in the areas of green buildings and clean transportation

3) Southwest (Texas, Colorado)

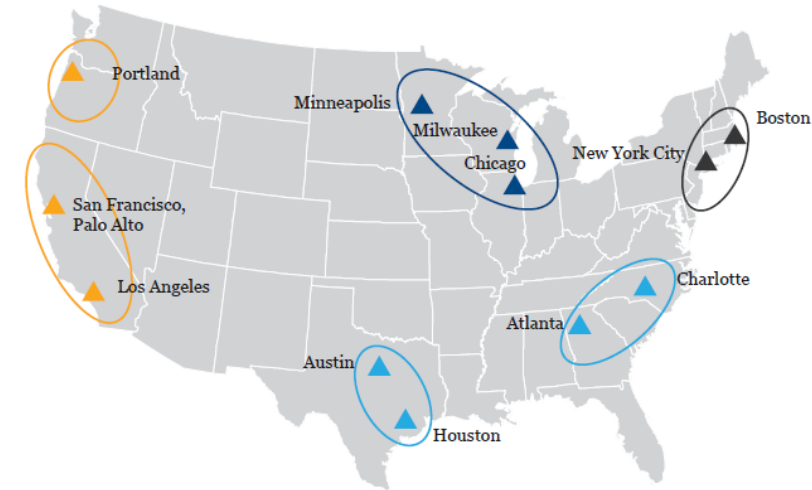
▶ Another prominent center for cleantech activity and innovation is the Southwest, with a large number of cleantech incubators and accelerators. This region, especially Texas, has established itself as a key hub for renewable energy and green materials

4) Midwest (Illinois, Michigan)

▶ Chicago, Minneapolis and Detroit are known for being research hubs for clean technology and producers of relatively high patent numbers. The Midwest continues to grow in importance especially with ties to transportation and automotive sectors

* Approximation based on Crunchbase database searches and filters

Major locations of cleantech accelerators and incubators* closely mirror the location of cleantech investment hubs

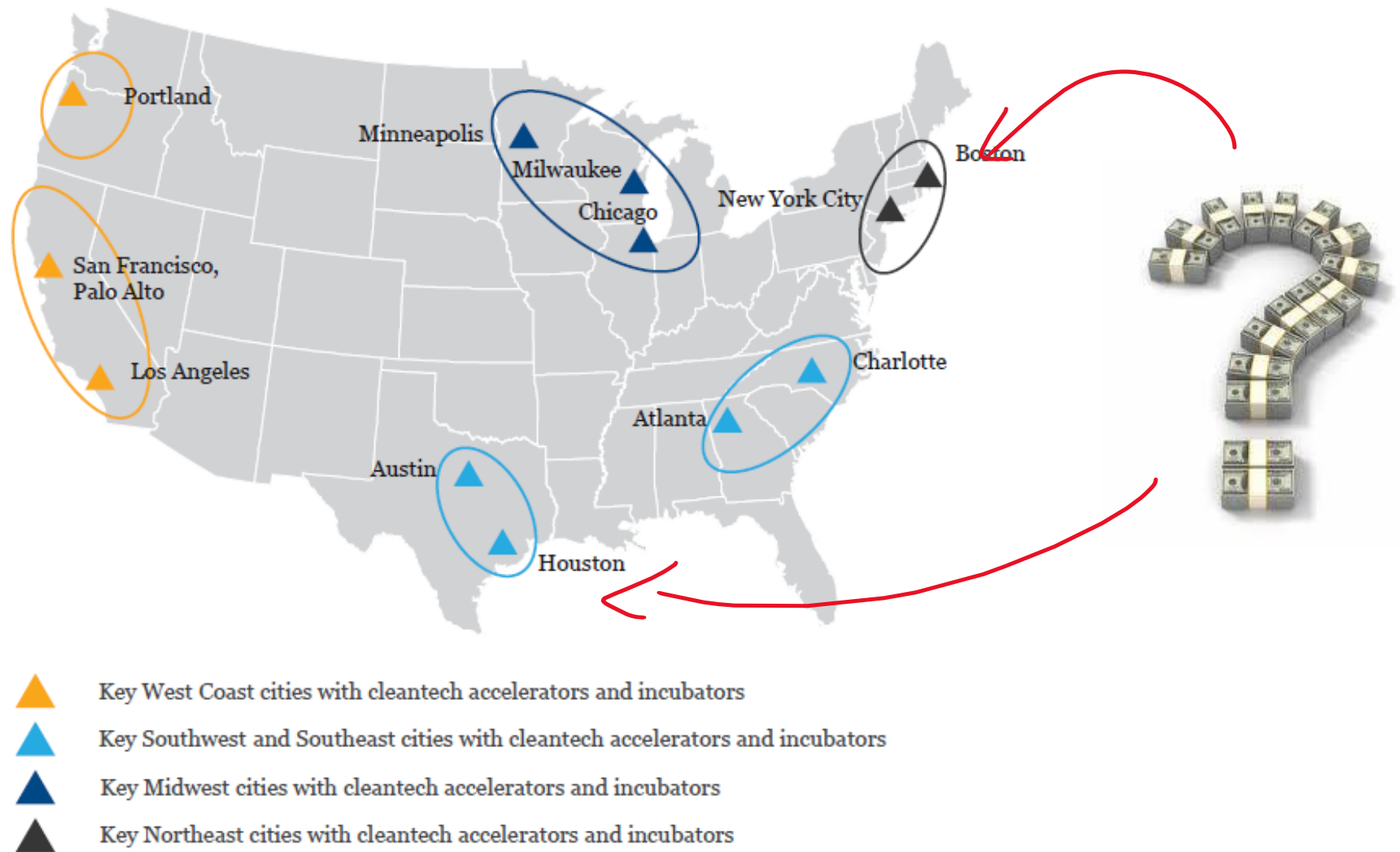


▲ Key West Coast cities with cleantech accelerators and incubators
 ▲ Key Southwest and Southeast cities with cleantech accelerators and incubators
 ▲ Key Midwest cities with cleantech accelerators and incubators
 ▲ Key Northeast cities with cleantech accelerators and incubators

Source: Department of Energy, Crunchbase, GreenTechMedia, CleantechIQ, ImpactAlpha, Incubatenergy



Major locations of cleantech accelerators and incubators* closely mirror the location of cleantech investment hubs



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