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The Perfect Storm
What does it mean for Seaweed?
Rotterdam
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Perfect Storm

world in chaos without direction

spreading populism

increasing inequality

autocrats in power

geopolitical tensions

battle over resources & energy

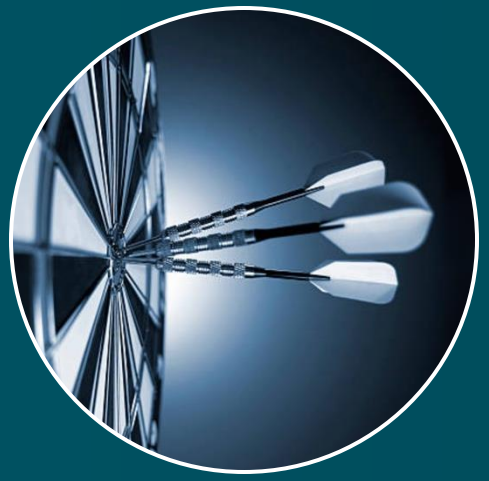
ecological disruption

CHAOS

CHAOS

Unknown Order

Everything is open



Getting closer to the core

Prerequisite for real change

In Times of Chaos

The old is dismantled and something new arises

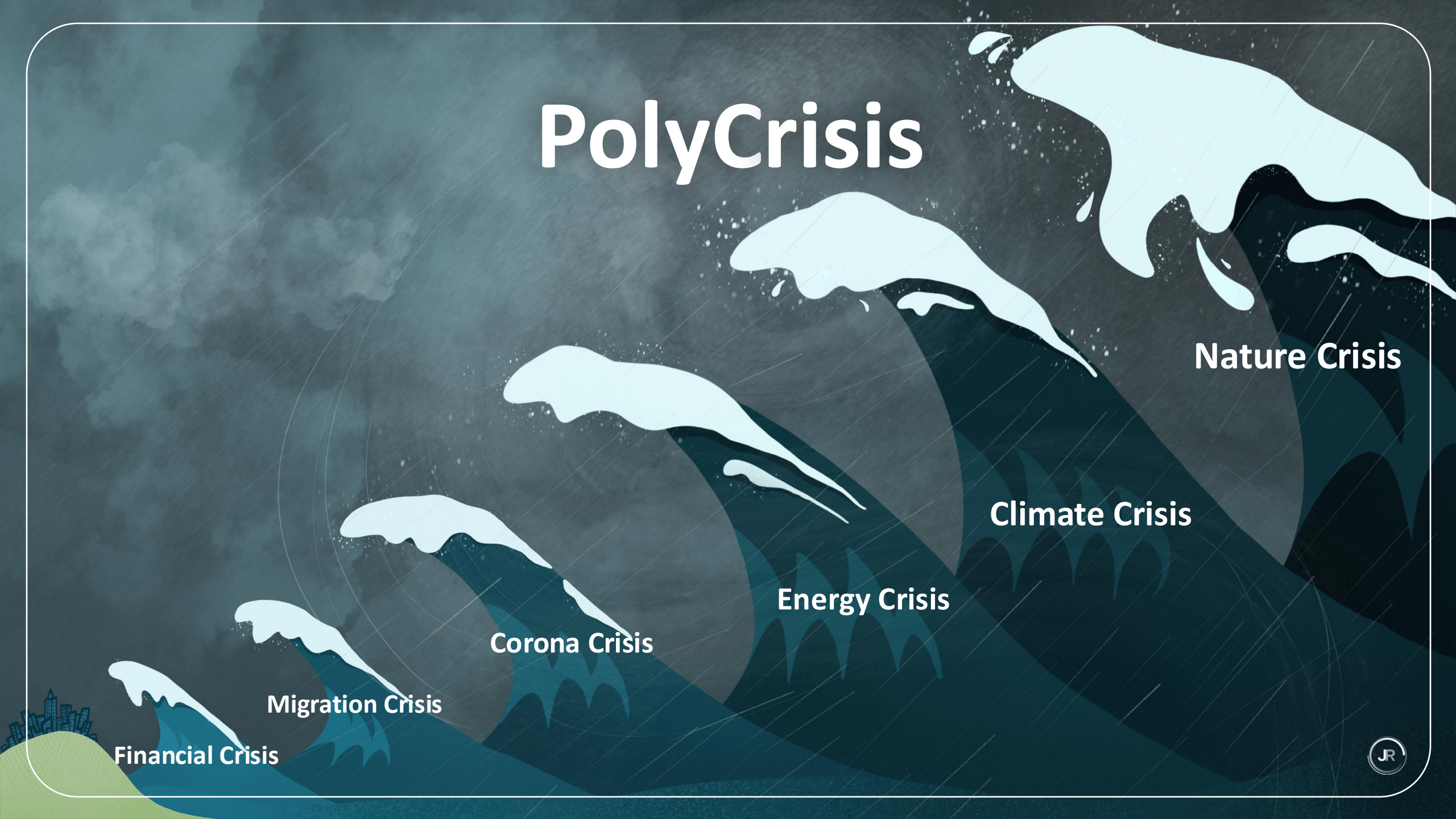
Mainstream

grim times

high, wild waves

permanent threat

chaos at its peak


PolyCrisis
Nature Crisis
Climate Crisis
Energy Crisis
Corona Crisis
Migration Crisis
Financial Crisis

Crises are a blessing in disguise

People are stubborn

We only learn from crises

Crises help to change

We need a series of crises

25% of the people means a tipping point

The remaining 75% can go fast

Undercurrent

seeds of the future

bottom-up movement

globally 1 billion people

in the Netherlands 6 million people

inspiring initiatives

Transition

undercurrent reaches mainstream

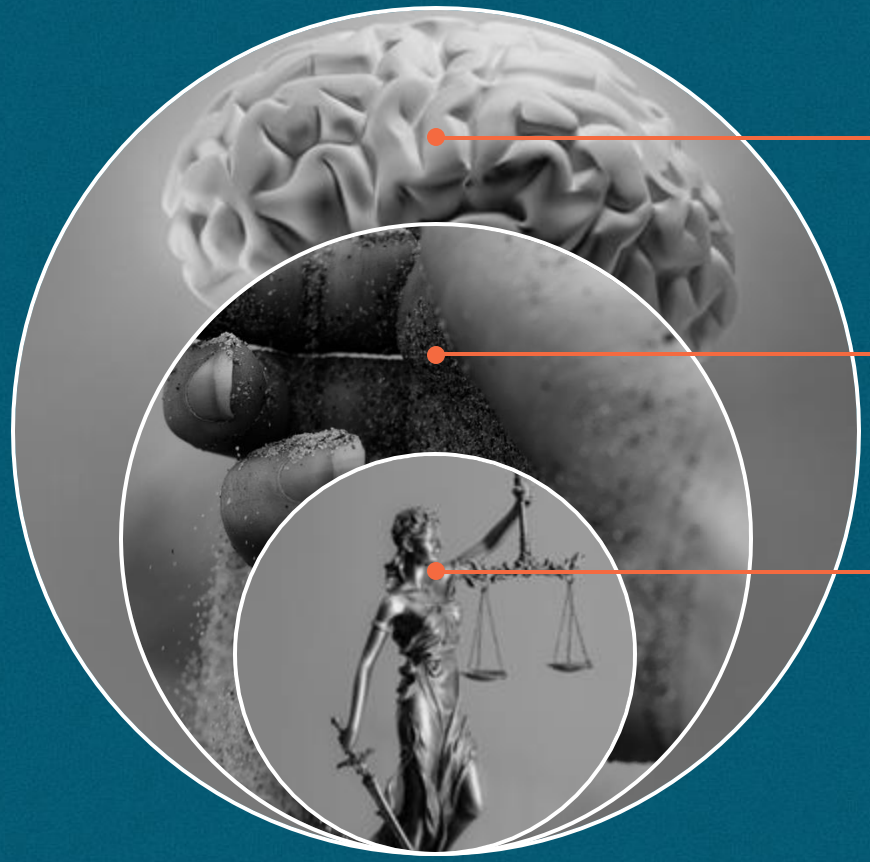
until tipping point is reached

ca. 25% of people is tipping point

in the Netherlands tipping point is reached

Transition

FUNDAMENTAL SHIFT IN:



THINKING

Values,Paradigms

ACTING

Attitude,Behaviour

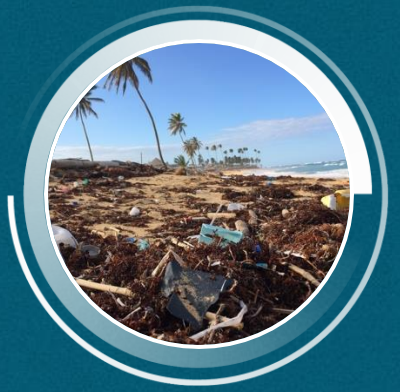
ORGANISING

Laws, Rules, Norms

Palette of Transitions

ENERGY

RESOURCES



CIRCULAR

AGRICULTURE

SPATIAL

FINANCIAl

HEALTH CARE

EDUCATION

SOCIAL

DEMOCRACY

Buttons to Push

Policy

Fiscal impulses: taxes & mortgages

Financial impulses: subsidies & loans

Legal impulses: laws & rules

Technology

Knowledge, R&D, institutions, money, implementation

Behaviour

Social norms, group influence


NL 2121
Land with a Plan


Energy Transition

We are part of a Revolution

The rise of ‘electrotech’ transforms the global energy system

Electrotech is the integration of sustainable energy (solar & wind), electrification of usage (electric cars and heat pumps) and the connection of demand and supply (batteries and software)

these technologies can replace 70% of fossil fuels

Energy Transition goes faster than ever

Global

China is green motor, invests 150 billion per year in renewables

China generates more solar energy than all other countries together

China installs 2.5 times more solar than all other countries together

China invests in solar, wind, elektrification, hydrogen, nuclear energy

China wants strategic autonomy in terms of energy & resources

Geopolitics is Key

strategic autonomy is the driving force behind the energy transition

big global players want to become independent from each other

Europe is vulnerable and for a large part dependent on import

The faster the energy transition goes the less vulnerable Europe is

China at Turning Point

China generates 35% of the global CO2-emission

CO2-emission has decreased by 1% in China for the first time ever

China wants in 2035 7 à 10% less greenhouse gases than at its peak

China wants to triple the capacity of wind- and solar energy China

Rest of the World

rest of the world doubles the capacity of solar and wind in 5 years

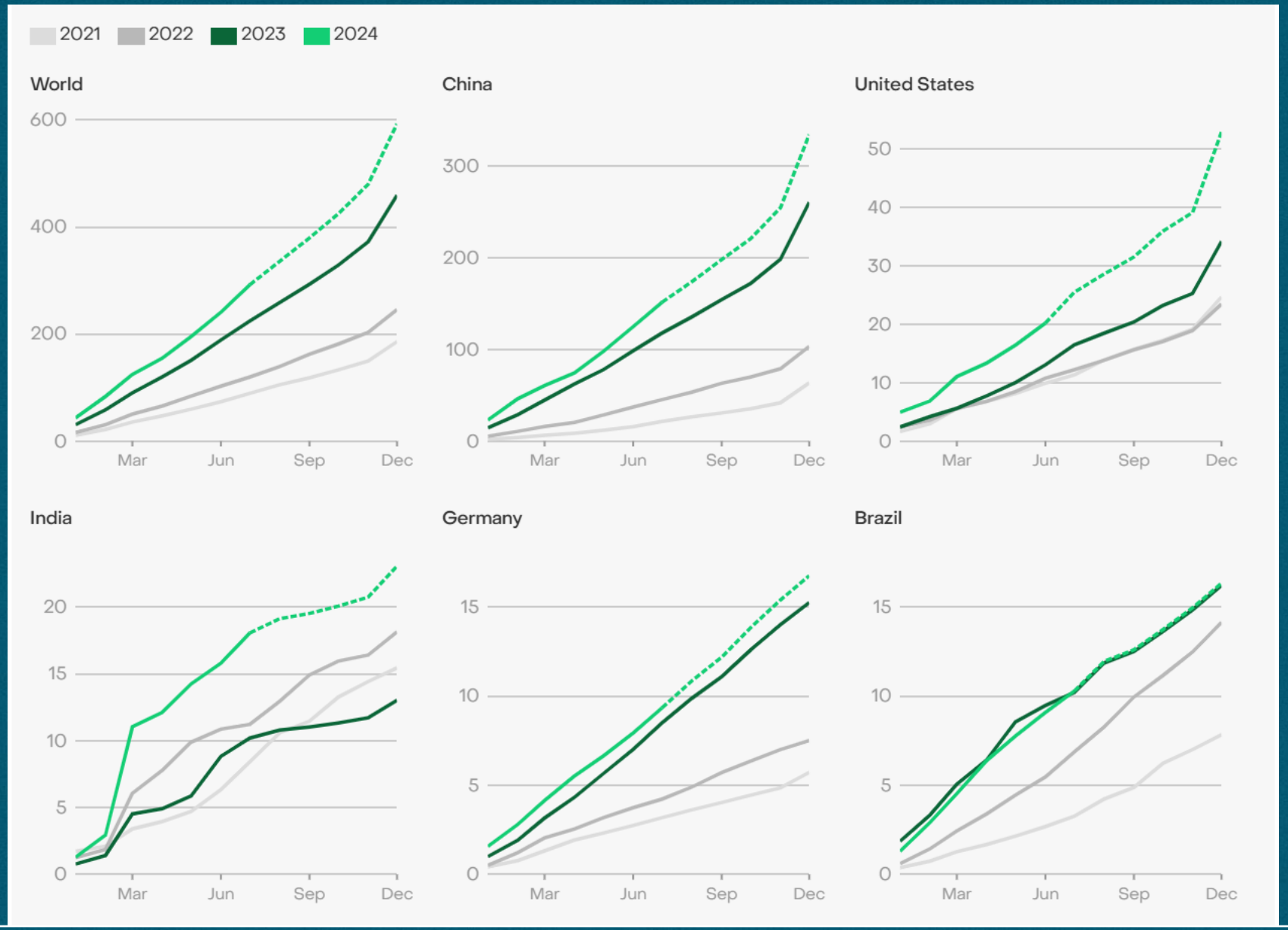
1/3 of the electricity generated is sustainable [more than from coal]

in US 93% of the newly installed energy is sustainable

solar energy grows fastest, followed by wind energy

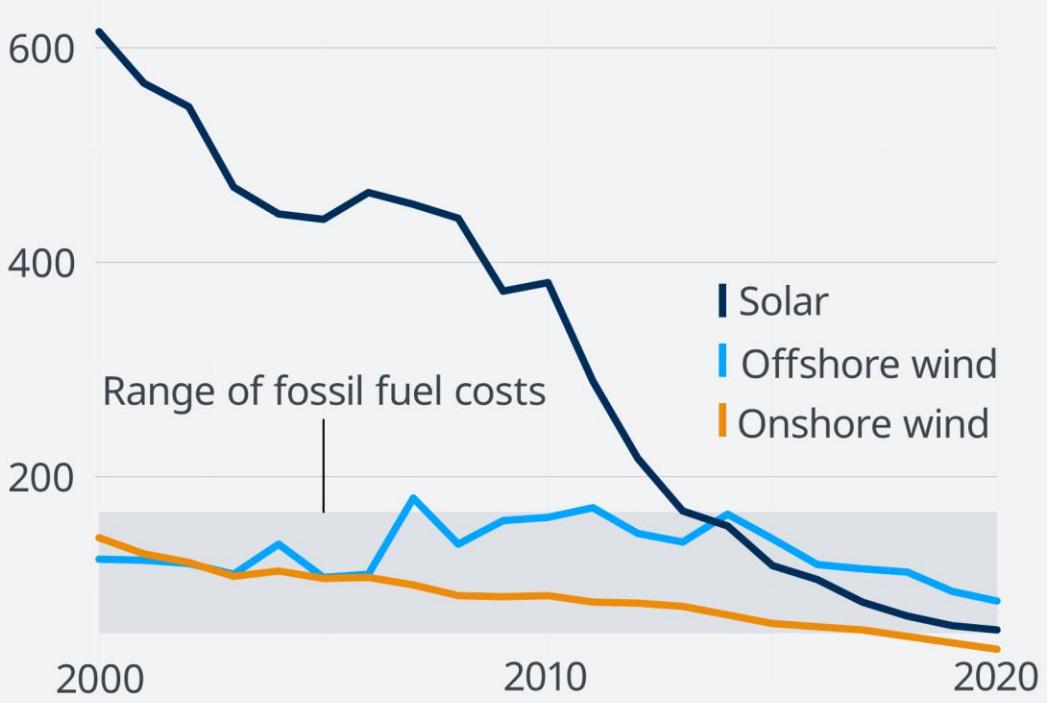
Price of batteries decreased by 90% during the last 10 years

Top 5 Solar Markets



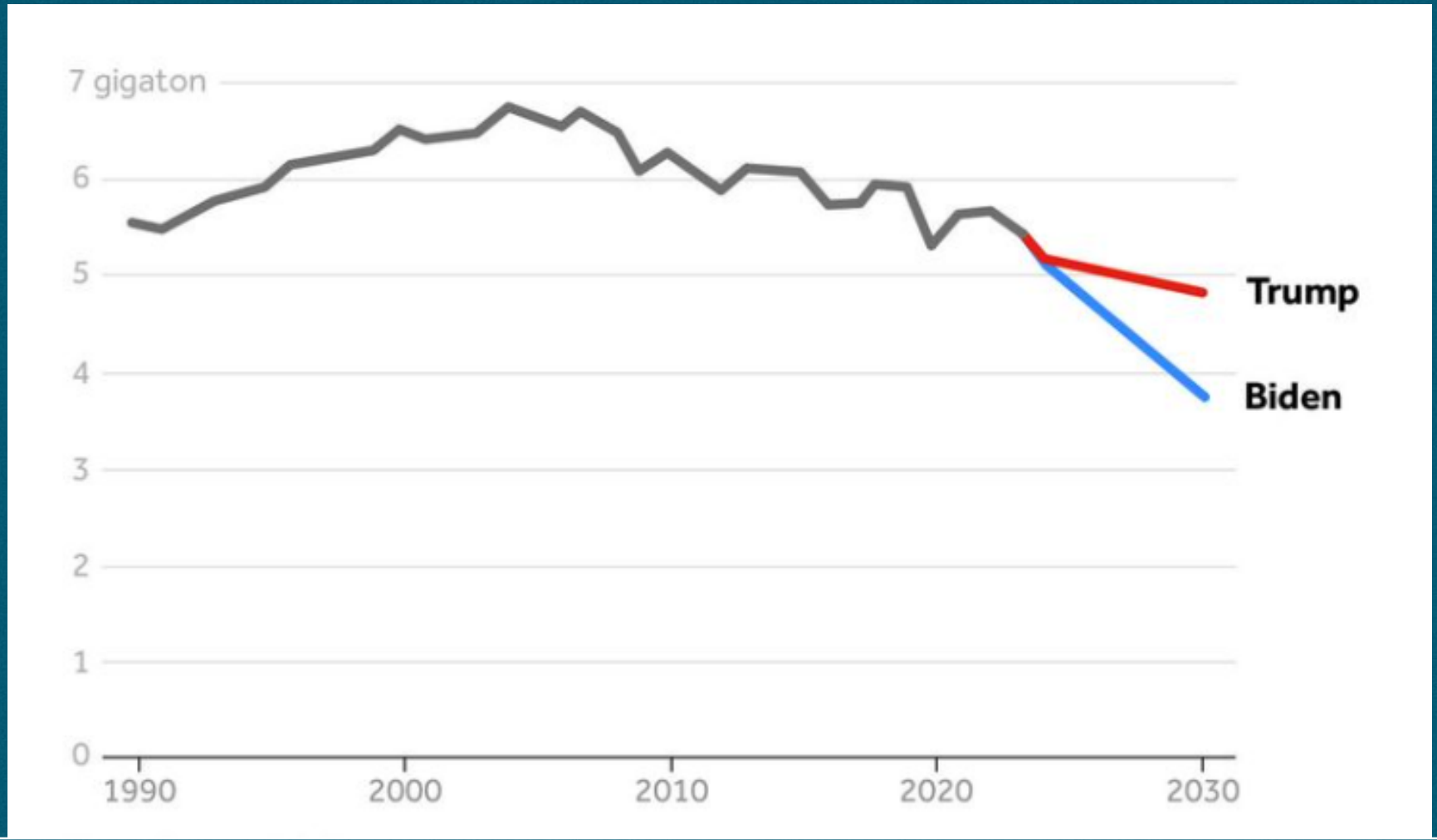
Solar and wind power have grown cheaper than fossil fuels

Levelized cost of energy in 2020 USD/MWh

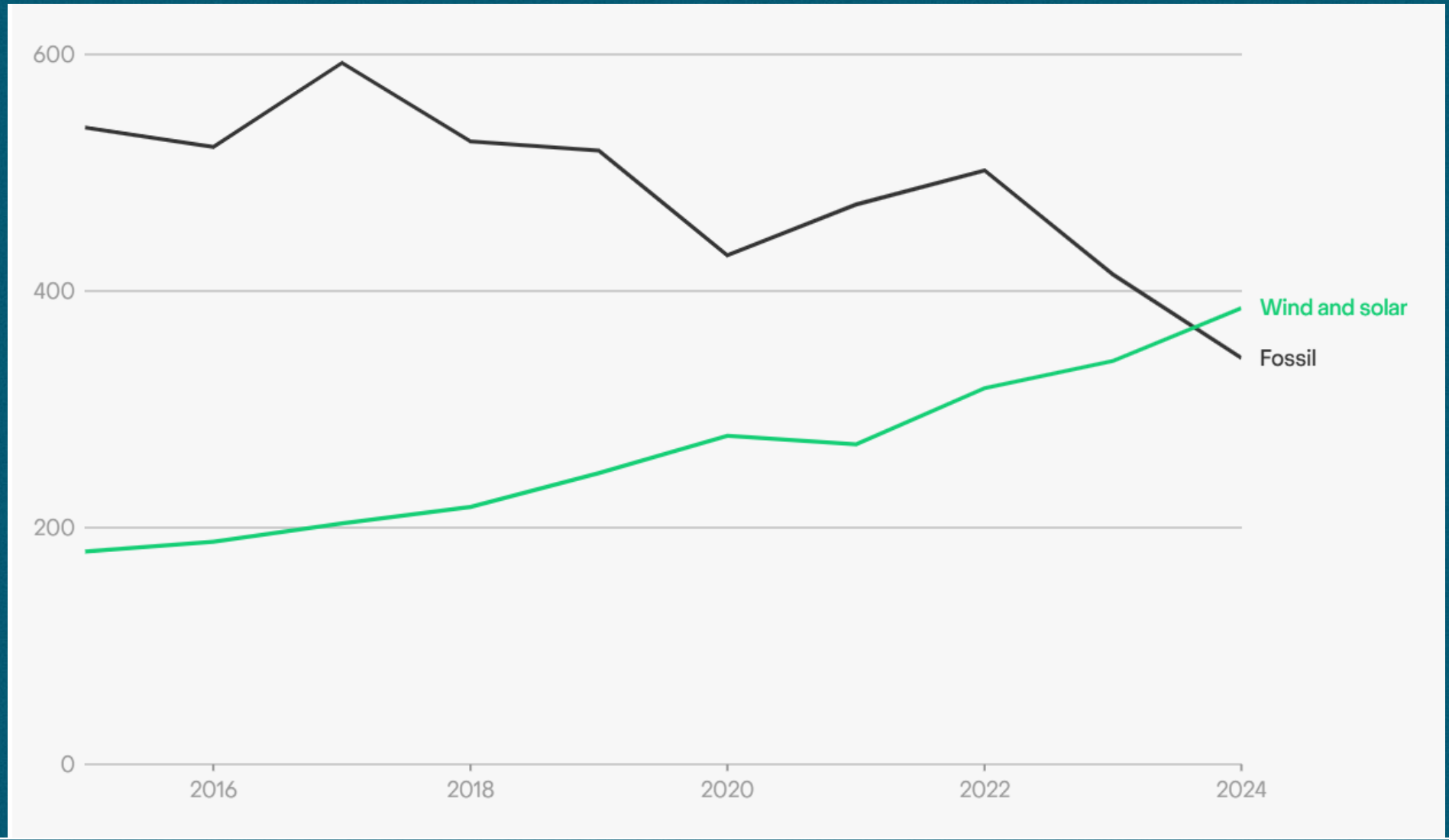


Source: IPCC AR6 2022, IRENA 2022

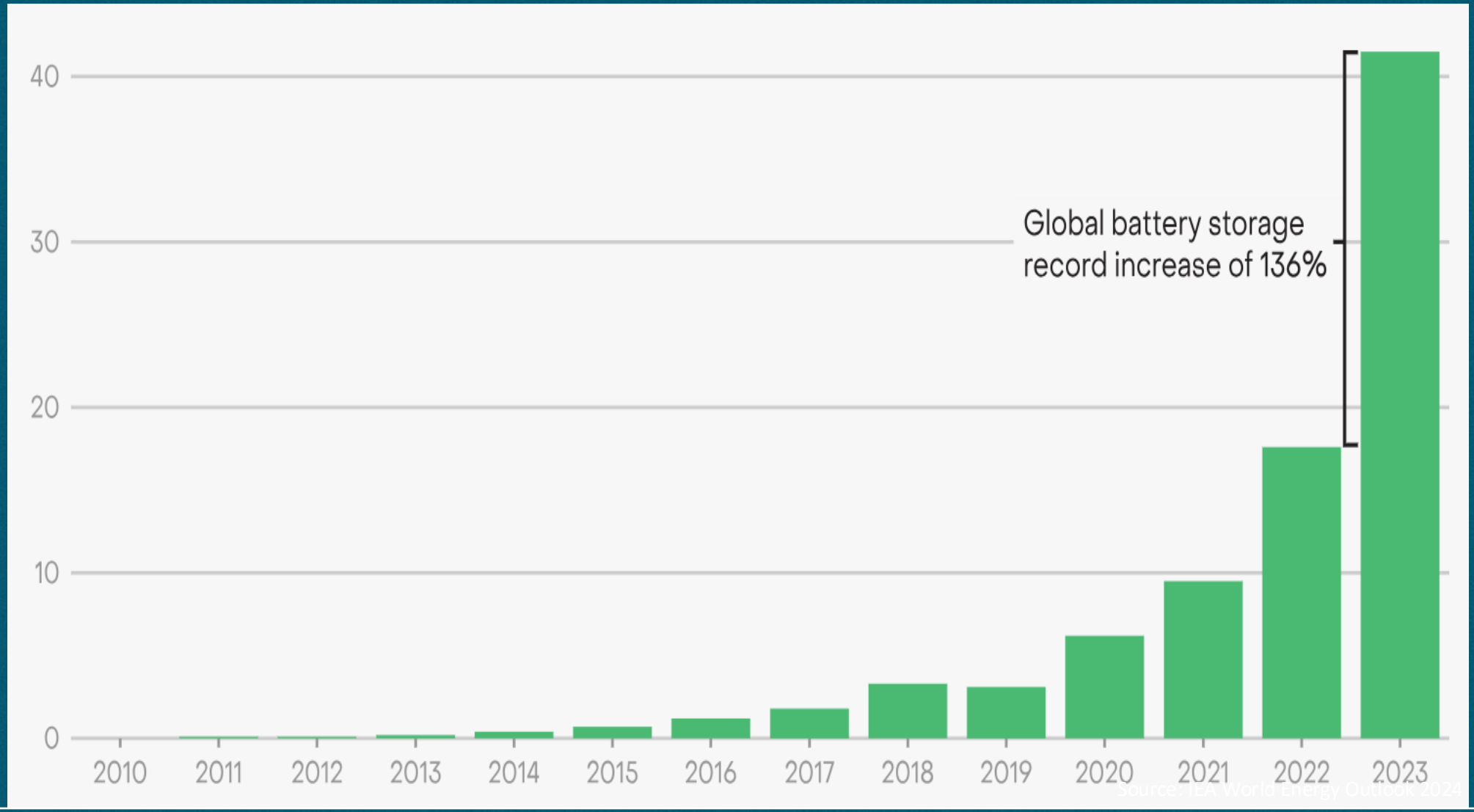
Forecast annual CO2-emissions USA



In EU wind & solar overtake fossil



Global Battery storage



Source: IEA World Energy Outlook 2024

The acceleration of the energy transition is now accelerating

Conclusion

Nobody can stop the energy transition, at most slowing down

The energy transition has become an autonomous process: renewable energy will become cheaper and fossil energy not

Energy Transition goes faster than ever

Netherlands

53% of electricity is generated from renewables

35% of households has solar panels

10% of households has a heat pump

3.5 solar panel per capita, highest in the world

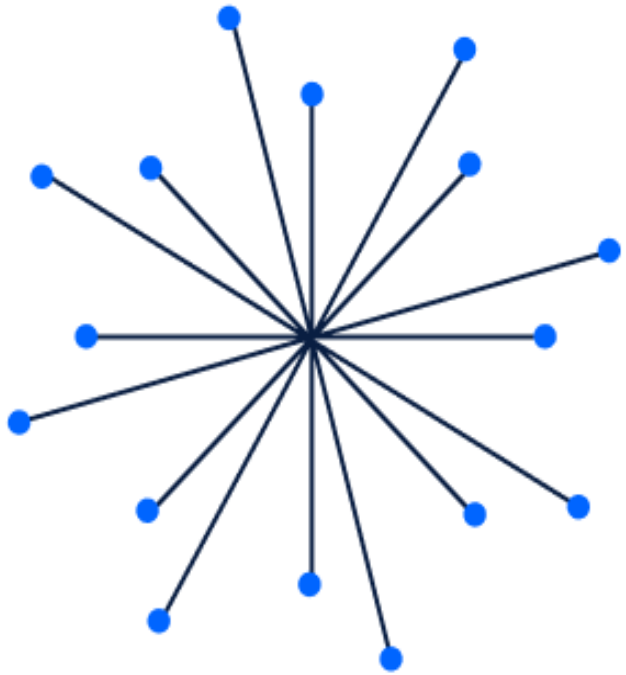
Energy Transition

Is not the same as substituting coal, oil, gas by wind, solar, hydrogen

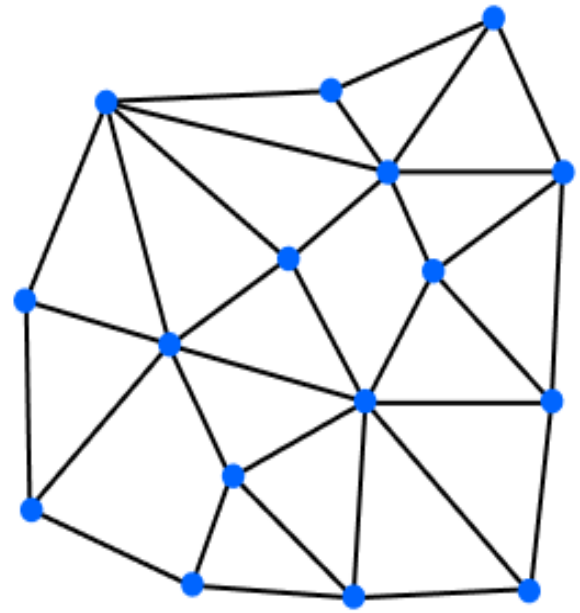
Is building up a completely new, distributed energy infrastructure

Is breaking down the existing fossil, central energy infrastructure

Exchange of electricity & heat at every scale level



Centralized



Distributed

Smart Grids

Utrecht

smart charging stations that can charge & discharge electric cars, thus cars can provide houses with energy

An energy triangle of a car, house and smart charging station
Creating a small power station for the solar energy storage

Energy Storage

The Netherlands has 7 GW wind on land & 5 GW wind at sea

The Netherlands has 0.15 GW energy storage, but in 2030 9GW is needed

0.15 GW op 12 GW = 1.25% !

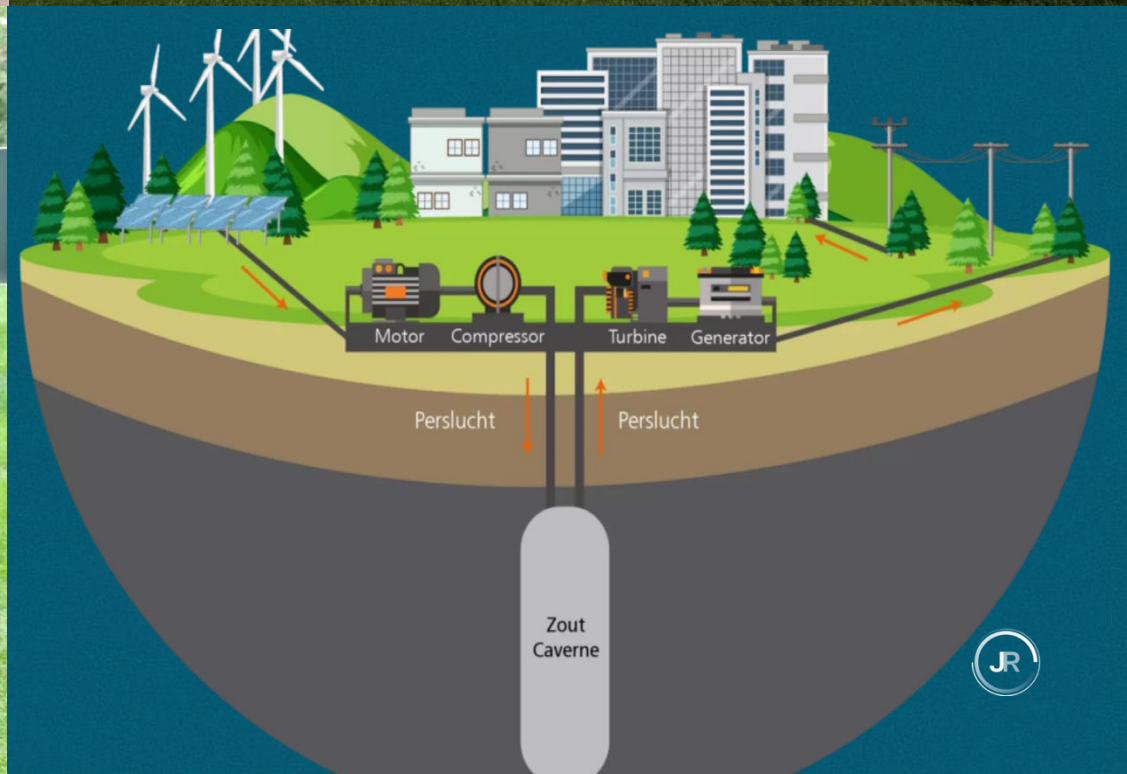
0.15% op 9 GW = 1,67% !

Ratio between generating & storing energy is absurd

The Netherlands wants to generate 4-5 times as much sustainable energy in the coming decades, which means that 40-50 times as much must be invested in energy storage


H2
H2
H2


OWENS CORNING
FOAMULAR
R-3.0


Motor
Compressor
Turbine
Generator
Perslucht
Perslucht
Zout
Caverne

Conclusion

the energy transition is growing exponentially

but the most difficult phase is yet to come

What does it mean to Seaweed?

Potential of Seaweed

Food	sushi, snacks, soups, salads, hamburgers
Agriculture	natural fertilizers
Animal Feed	added to livestock feed to improve nutrition
Cosmetics	in creams, masks, and lotions for hydration
Energy	resource for biomass, biofuels, bioplastics
Industry	gelling, thickening or stabilizing agents
Pharmacy	bioactive compounds, dietary supplements

Benefits of Seaweed

Seaweed has many benefits, both for human health & the environment

Nutritional Value	rich in minerals [iodine, calcium, magnesium, potassium, iron]
	vitamin source [vitamins A, C, E, K, B are abundant]
Health Benefits	supports hormone production, cholesterol & blood sugar regulation
	weight management
Sustainability	carbon capture storage
	low environmental impact
	biobased applications

Seaweed is still a niche

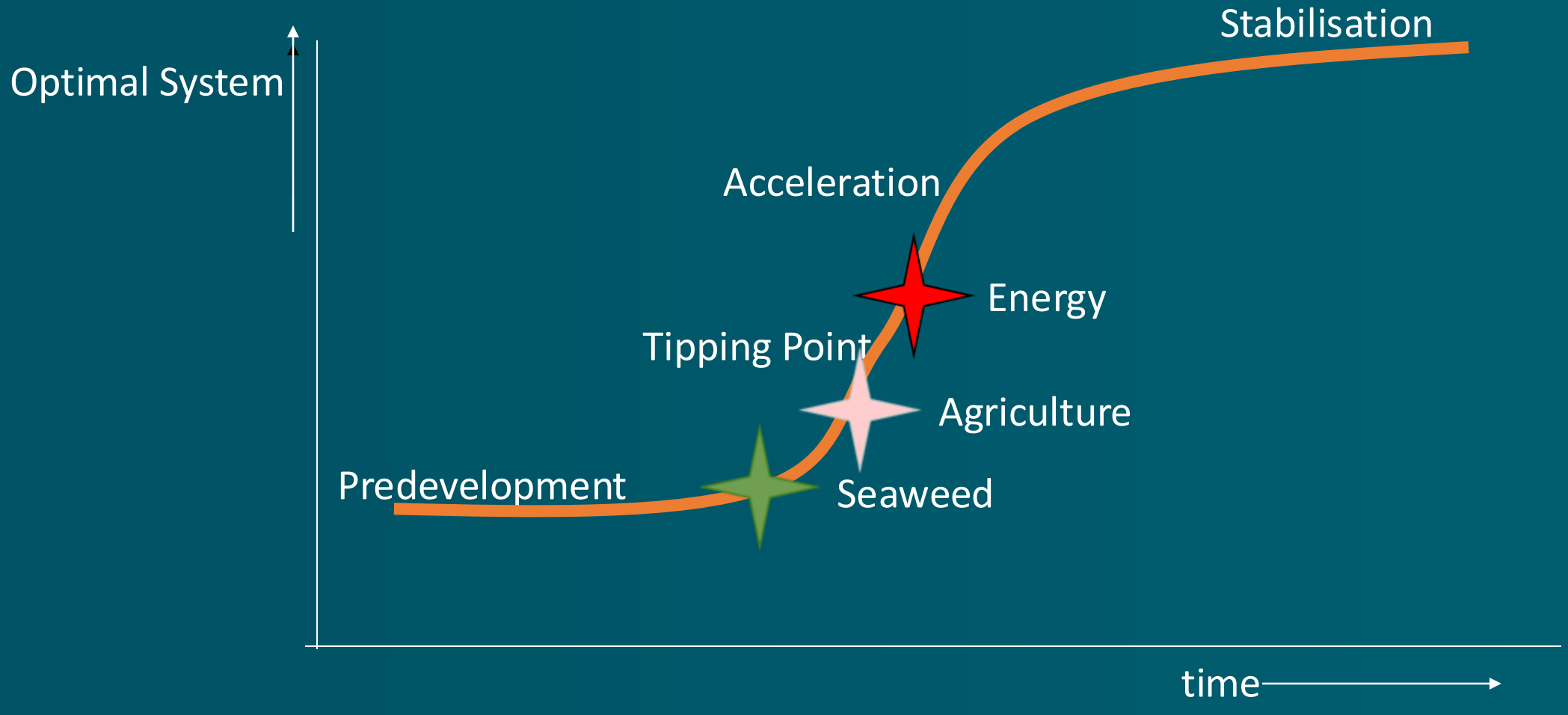
Economic Barriers	hhigh production costs in open sea small-scale applications competition with cheaper alternatives as soja
Technological Barriers	automatisation of harvest & processing is difficult requires robust infrastructure against weather extremes
Law- and Regulation	complex & slow trajectories for licenses lack of transparent quality norms
Market Acceptation	consumers are not used to seaweed in diets products that are tasty, affordable en recgnizable
Chain Development	logistics and processing are still in experimental stage

It is a cultural problem. Too many engineers & researchers, too few entrepreneurs and connectors

History of Seaweed

2000–2010	first small-scale seaweed experiments in Europe
2010–2015	innovation programs & subsidies for food & feed
2015-2020	scaling up seaweed farms & first commercial products
2020-2025	pilot offshore seaweed farms, biofuels & bioplastics

Phase of different Transitions



How can Seaweed become mainstream?

Integration of Offshore Wind & Seaweed farms

Develop seaweed farms on land

Focus on fast-growing, resilient strains adapted to Northsea

Boost consumer adoption [into familiar Dutch food, in cafes & restaurants]

Breakthrough subsidies [learn from offshore wind case]

History of Offshore Wind

Netherlands

Pioneering phase	1990–2000	small demonstration projects
Demonstration phase	2000–2010	first commercial parks
Breakthrough phase	2010–2020	reducing costs, less subsidies
Mature phase	2020–now	global expansion

Lessons of Offshore Wind

Netherlands

Offshore wind broke through in 2015, 25 years after first experiments

Crucial factor was the smart tender scheme in 2015, with 18 billion subsidies and market parties could submit in competition

it takes a generation and requires a facilitating government, entrepreneurship, a smart instrument and leadership

Transition Strategy for Seaweed

bring together market, government, technology

create an atmosphere of urgency

develop a smart tender strategy for subsidies

focus on popular seaweed products

use influencers to promote seaweed

develop a roadmap for the next 10 years

Transition Approach

is no project or program but a process

requires perseverance, patience & time

make it human and attractive

process is as important as substance

Create Breakthrough Coalitions

coalitions of the willing & able

parties that want & can change

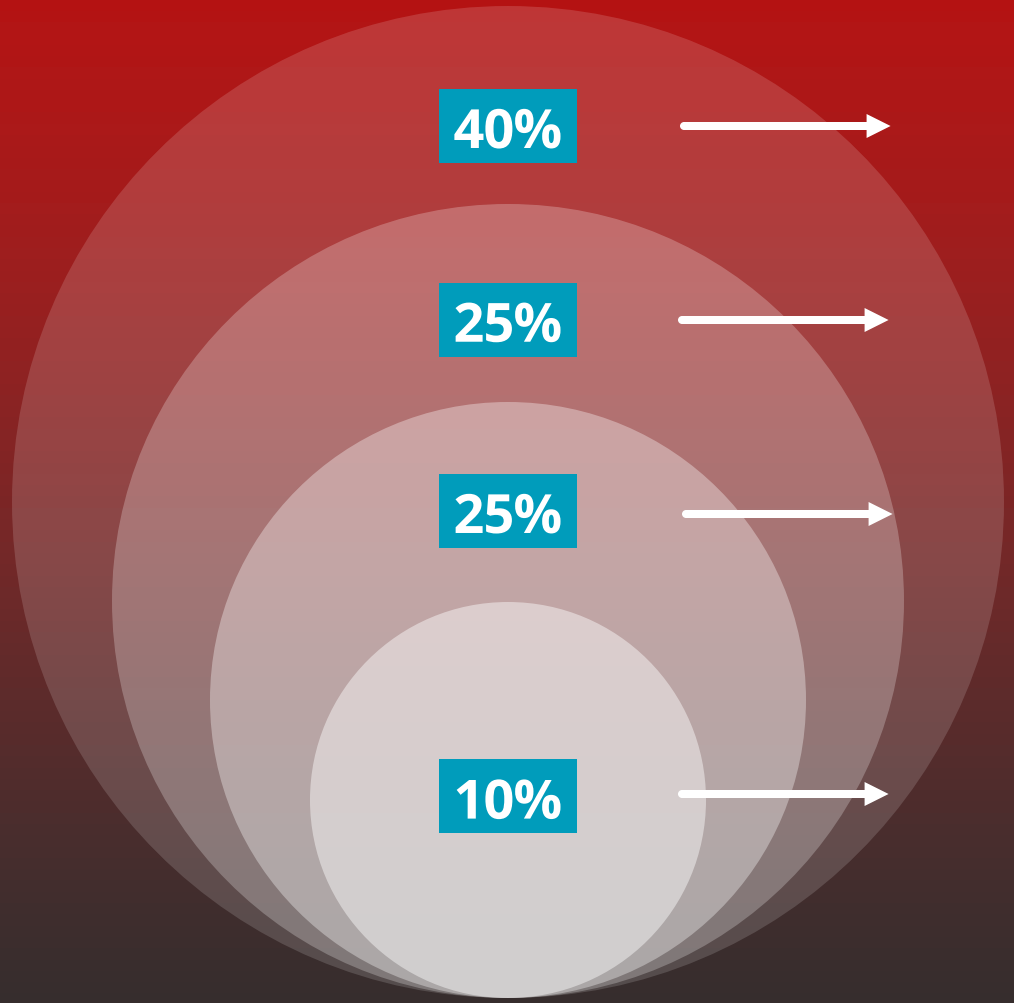
ignore the parties that pretend but do not act

focus on parties that work on breakthroughs

Nó Bureaucratic Circus

nó working groups, sounding board groups, steering groups, coordination groups

FEAR OF CHANGE



people who don’t want to change and cannot change

people who don’t want to change but can change

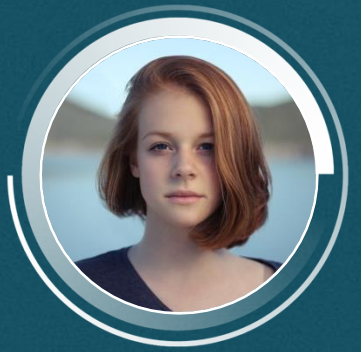
people who want to change but cannot change

people who want to change and can also change

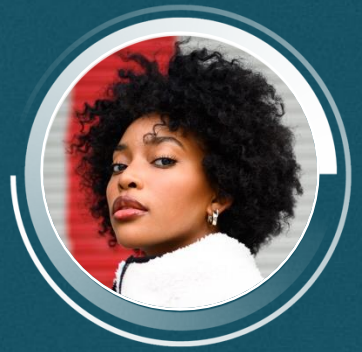
What kind of change-agent are you?

Frontrunner
Substance driven, hard to connect

Toppler
System breaker, strategic



Connector
Secondary to the bigger picture



Builder
Builds for a higher goal

Demolisher
Breaks down for a higher goal

Follower
Strong as a second person

Form a Gideons Tribe

5 people with courage & perseverance

change-agents with complementary characteristics

give the Gideons Tribe free space and time

give the Gideons Tribe mandate to do bold things

LEADERSHIP ASKED

In difficult times

real leaders stand up

Everyone has a role to play in this

People often look up for leadership

Don’t look up, look within yourself

Call to Action

The coming 5 years are decisive for the future of seaweed. The Netherlands is worldwide leader in the seaweed industry. Either it will die out, or it will become an important pillar of the new, circular economy. It’s up to you!

My grandchildren will later say: where were you to make the world a little more beautiful and to leave the world a better place?