

**ERASMUS University. Rotterdam School of Management
Global Business & Sustainability
Grand Challenges**

November 21, 2022

**Sustainability
&
The energy question**

**Aviel Verbruggen
University of Antwerp
www.avielverbruggen.be**

Biographical note:

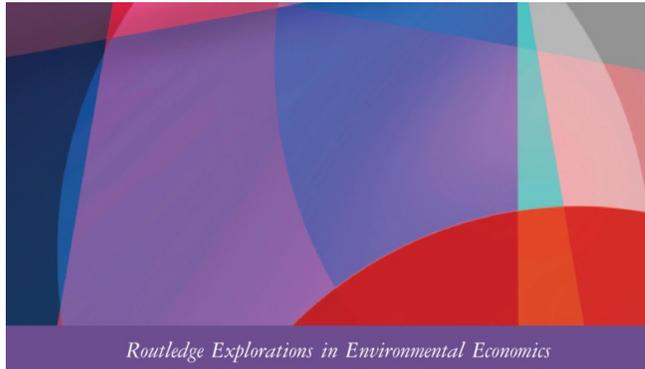
- **Training:** technology – economics – political economy
- **Fields:** energy, environment, climate policy
- **Impact:** stop expansion atomic power in Belgium (1981-1989); closure coal mines (1989); state-of-the-environment reporting & policy planning (1988-1998); water sanitation in Flanders (1999-2001); IPCC (1998-2014), EU & UN energy- & climate policies and politics
- **Experience:** Could it be that stock-stakeholders rule transition arenas?

A cascade of analysis

July 2021 Book

Scientific analysis and arguments

[tedious reading]



PRICING CARBON EMISSIONS

ECONOMIC REALITY AND UTOPIA

Aviel Verbruggen



October 2022 Essay

Selection of topics, leaving out scientific analysis

[based on Book]

Quo Vadis Energy System Transformation?

October 21, 2022

Aviel Verbruggen,

University of Antwerp

<https://www.avielverbruggen.be>

This essay is not an untouchable artifact, yet an invitation to reflection, criticism and comments. Rather than a final construct, it is a composition of sections with different aspects and perspectives, related to energy system transformation and climate policy.

November 2022 Lecture

Snapshots of topics, with focus on essential issues & on action

[based on Essay]

Contents

1. Sustainability: Our Common Future
2. The energy question
3. Energy transformations: 4 strands
Electricity almost exclusive energy supplier
Electricity harvested from light and wind
Eliminate Fossil fuels and nuclear power
4. Inseparable twins: energy & societal transformations
5. Act-Now, but How?
6. Annex A, Annex B

Energy-climate policies cross the Top-down ... Bottom-up dipole

Actual decision-making is

- Multi-leveled
- Polycentric
- Interdependent
- Controversial



The course focuses on communities. Yet, this opening class is mainly top-down analysis.

The two at odds?

Somewhat, mostly NOT because our analysis lands at bottom-up action, being indispensable for escaping climate collapse.

Hence, the role of communities is crucial

WHY then exploring the top-down levels?

1. Understanding context, opportunities, threats, for good local strategies and actions.
2. Top-down policies, actions enormously affect, also may hurt, the communities' work, progress.
3. Community alliances with enlightened entities at higher than the local level, are vital.

Contents

1. Sustainability: Our Common Future

2. The energy question

3. Energy transformations: 4 strands

- **Electricity becomes the almost exclusive energy supplier**
- **Electricity harvested from light and wind**
- **Eliminate fossil fuels + eliminate nuclear power**

4. Inseparable twins: energy & societal transformations

5. Act-Now, but How?

Annex A, Annex B

After the sections, 'wrap up' slides are entered for reflection, questions, discussion, ...

Warning: slides with a  in the North-East corner, are not presented at length



UN World Commission on Environment and Development Brundtland et al. 1987 Our Common Future (OCF)

- **Sustainable Development (SD)**
 - **NOT** vague, abstract, remote idol, worshipped to futility in neoliberal discourses
 - **YES** concrete, hands-on, radical paradigm in **OCF-SD**
 - Clear goals / constraints (limits)
 - Specific action programs are political-societal constructs (**many in communities**)

- **Make Sustainable Development operational**
 - **NOT** by glossy brochures, selfevaluations, voluntary SDGoals, ...
 - **YES** by comprehensive **sustainability assessments** of policies, technologies, projects, programs, actions, **events (like COP27)**, ...
 - Identify criteria (= attributes to own, results to obtain)
 - OCF provides *normative frame*
 - Specific assessments add to the frame their own *constructed criteria*
 - **Annex A** provides example of the sustainability assessment of atomic power



Goal + Substance of Sustainable Development

GOAL statement towards Sustainable Development

quotes from Our Common Future (WCED, 1987)

Humanity has the *ability* to *make* development sustainable – to ensure that it meets the needs of the present generations without compromising the ability of future generations to meet their own needs (p.8)

Growth control (limitations, p.43):

- Demographic developments in harmony with the changing productive potential of the ecosystem (p.44; p.55-57)
- Consumption standards that are within the bounds of the ecological possible and to which all can reasonably aspire (p.44)

Redistribution (overriding priority to the essential needs of the world's poor, p.43):

- Many problems arise from inequalities in access to resources (p.48)
- Economic and social justice within and amongst nations (p.49)
- Economic growth for the alleviation of poverty (p.51)

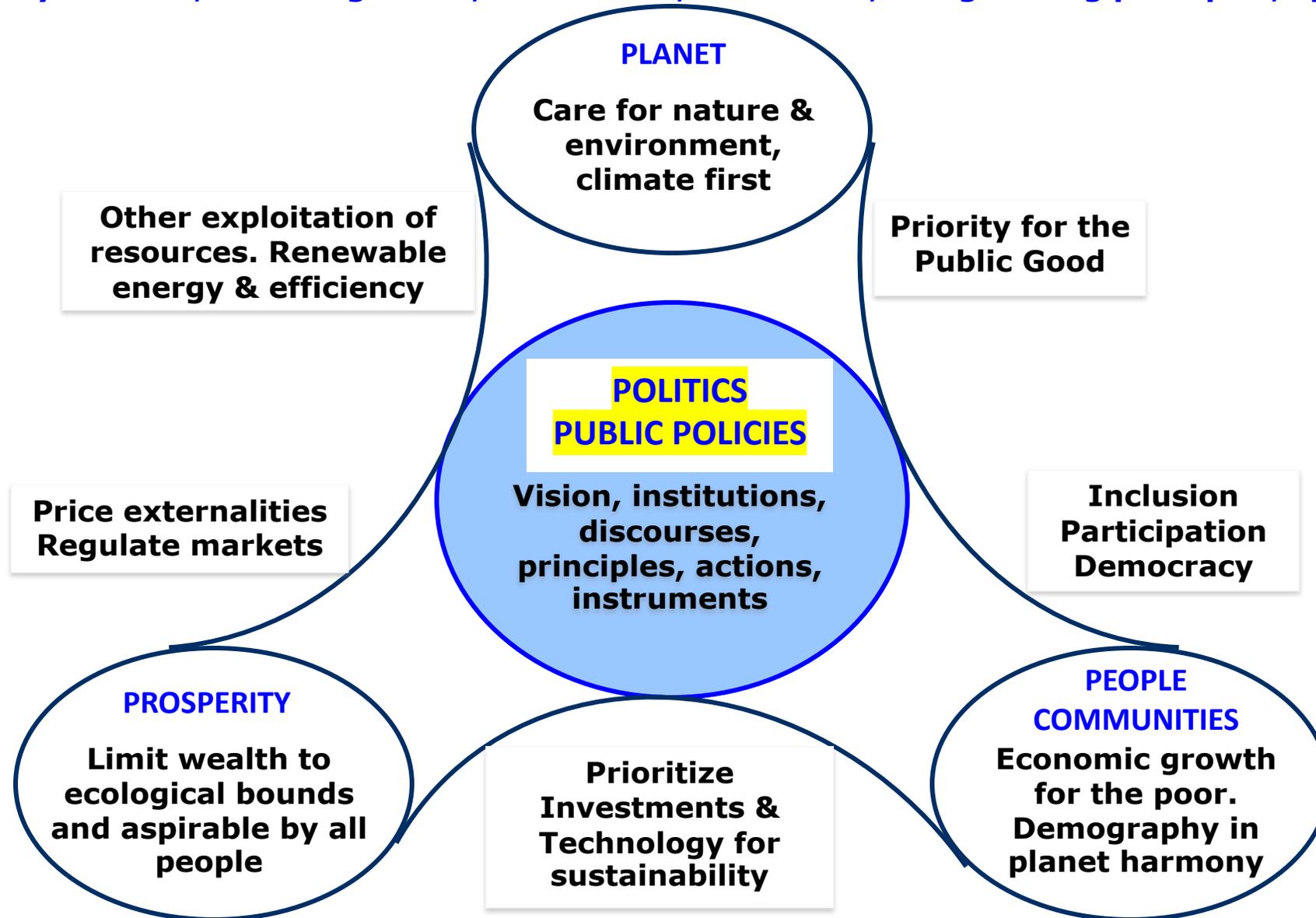
Processes of change in Political, Economic, Social, Ecological systems (p.9, 46, 65)

In case:

- Exploitation of resources
- Direction of investments
- Orientation of technological development
- **Institutional change; the real world of interlocked economic and ecological systems will not change; the policies and institutions concerned must (p.9)**

Sustainable development holds 4 main dimensions.

Politics stays central, moulding vision, institutions, discourses; safeguarding principles; spurring action



1) Why revisiting and lean on Our Common Future, a text published in 1987?

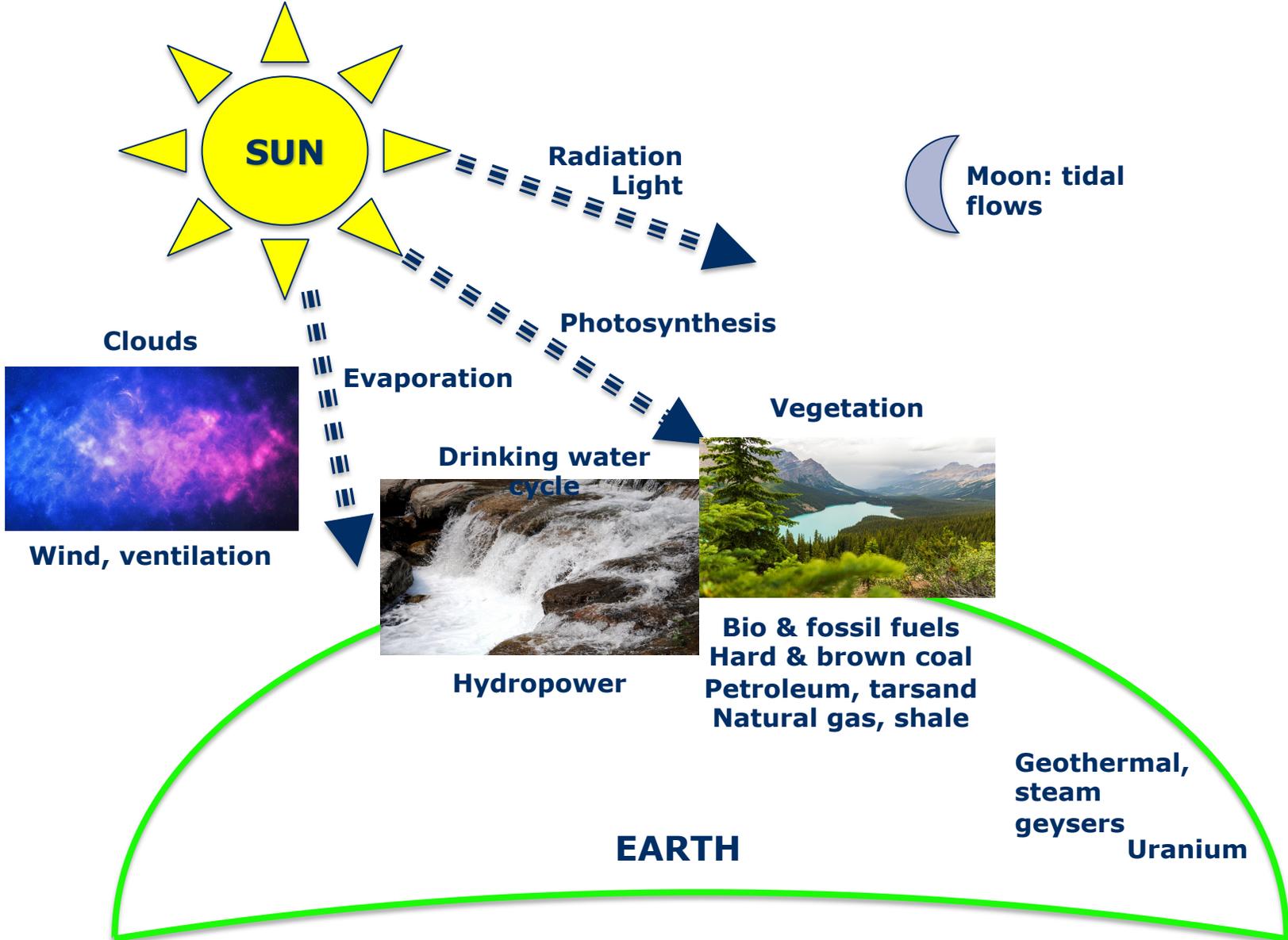
- Replacing present society (values and standards, way of acting, distribution of property and results, ...) by new, sustainable, nature friendly, equitable, ... norms, requests **a new 'paradigm'**, opposite of neoliberalism
- 'Our Common Future' is the result of 4 years work by a global team of 22 knowledgeable experts, chaired by Gro Brundtland (former prime minister of Norway)
- The United Nations (UN), the world authority for addressing global issues, installed the team as The World Commission on Environment and Development (WCED)
- **Environment and Development, the two main challenges growing and bursting in the 1960-70 decades, were (and still are) missing proper answers and effective actions.**
- At the Rio summit (1992) world leaders adopted Sustainable Development as the necessary path to care about the climate, biodiversity, deforestation, desertification, of the globe.

2) Why do OCF and the Rio summit deliver poorly?

- In the 1980s, the vested dominating societal paradigm of liberalism turned in its extreme version of neoliberalism, assigning full priority to private (big-money) interests above the public interest (Wolin 2010)
- **In 1989, the USA emerged as victorious world power, boosting ambitions to global hegemonic dominance. Neoconservatives eroded OCF to toothless talk (3P) and voluntary actions (SDGs, Paris Agreement 2015)**

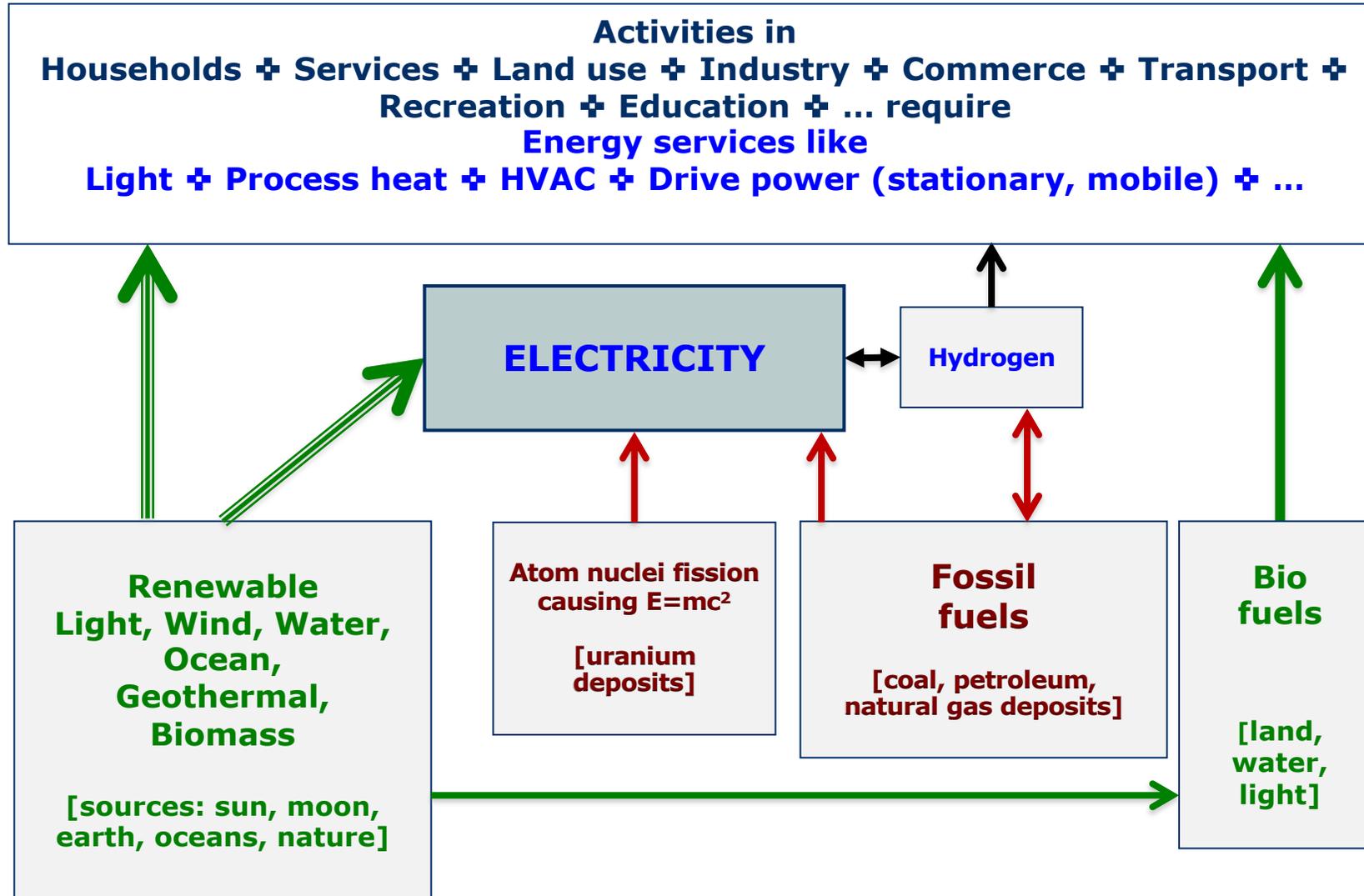
3) Keep or Dump OCF-SD as valid paradigm for the future?

Energy sources for life on planet Earth



2. Energy question

**Demand for energy served by only three groups of energy/matter sources:
renewable, fossil fuels, uranium**



2. Energy question **Wrap up #2**

1) **Energy sources are free**

- The sun is shining continuously, being the most reliable source of energy for earth and life on it
- The availability of energy **currents** derived from solar energy (wind, water, heat, ...) is variable
- Fossil fuels are **stocks** of energy manufactured and stored by sun & earth during the planetary history

2) **Why do people pay high prices for energy used?**

- First: the free stocks of fossil fuels were **appropriated, c.q. privatized, by societal constructions**: “the ones owning the land (or sea) on top of the resource stores, assume ownership of the resources”
- Second, exploiting appropriated stocks and harvesting free currents request technology, equipment, labor
- Third, giant companies are instrumental in exploiting stock resources, in wielding monopoly power, in masterminding ‘democracy incorporated’, in **skimming exorbitant super-profits** (see section 4)

3) **The big picture is simple. However, implementation requests a multitude of varied and new activities**

- There are but 3 main energy sources: renewable currents and derivatives, fossil fuels, uranium
- For the benefit of planet earth and the living species on it, **only renewables should be used**



Of all times, spontaneous, wanted

- Progress by domesticating fire, animals; inventing tools
- Linked to technology from levers, wheels, sails, ... to electronics, ICT, new materials, etc ...
- Revolutionizes civilizations, human societies
 - 18th – 20th century: steam, electricity, internal combustion engine
 - 21st century: renewable power directly harvested in the environment

NOW: forced transitions by climate change, nature degradation, rising risks, ...

ToDo list (blue is economically superior)

- (1) Electricity (+ hydrogen) as major energy transmitters
- (2) Exclusively generated from renewable energy currents and stores
 - + energy conservation (exclude, preclude wasteful activities)
 - + rationally improving energy efficiency

ToDo list (brown is politically problematic)

- (3) Keep fossil fuels underground, immediately
- (4) Phase out atomic power, immediately

Electricity: the major energy vector

Electric energy is a current

- Not available in nature for practical human use (lightning, static electricity are dangerous)
- Electric current is obtained from converting some other energy current
- Currents are non-storable:
within seconds of its generation, electricity is used (= converted in another energy guise)

Steam era (18th – 20th century)

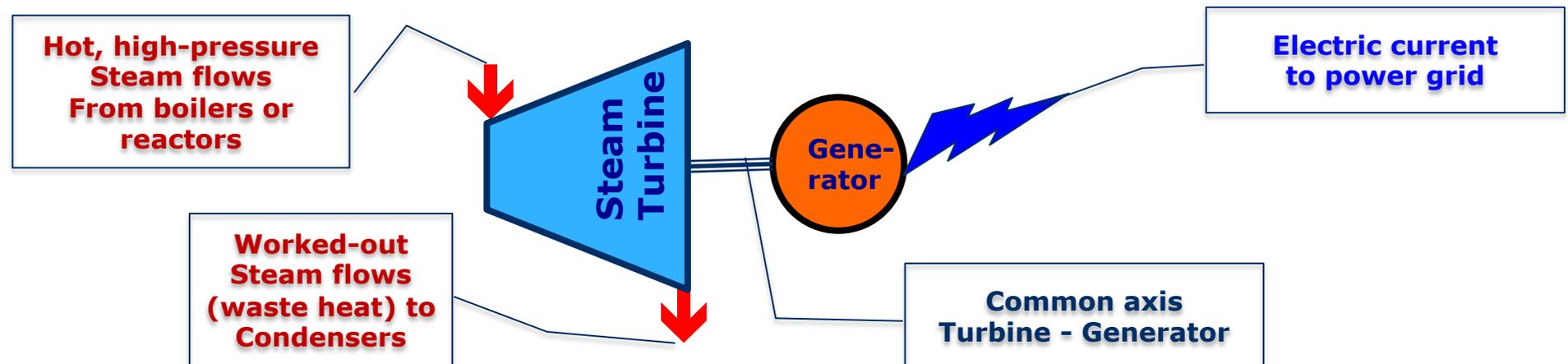
- Geothermal steam at some locations (e.g., Iceland, Kenya), often low pressure, polluted, ...
- Steam from fossil (or bio) fuels, and from atomic nuclei fission

CORE of steam power generation plant

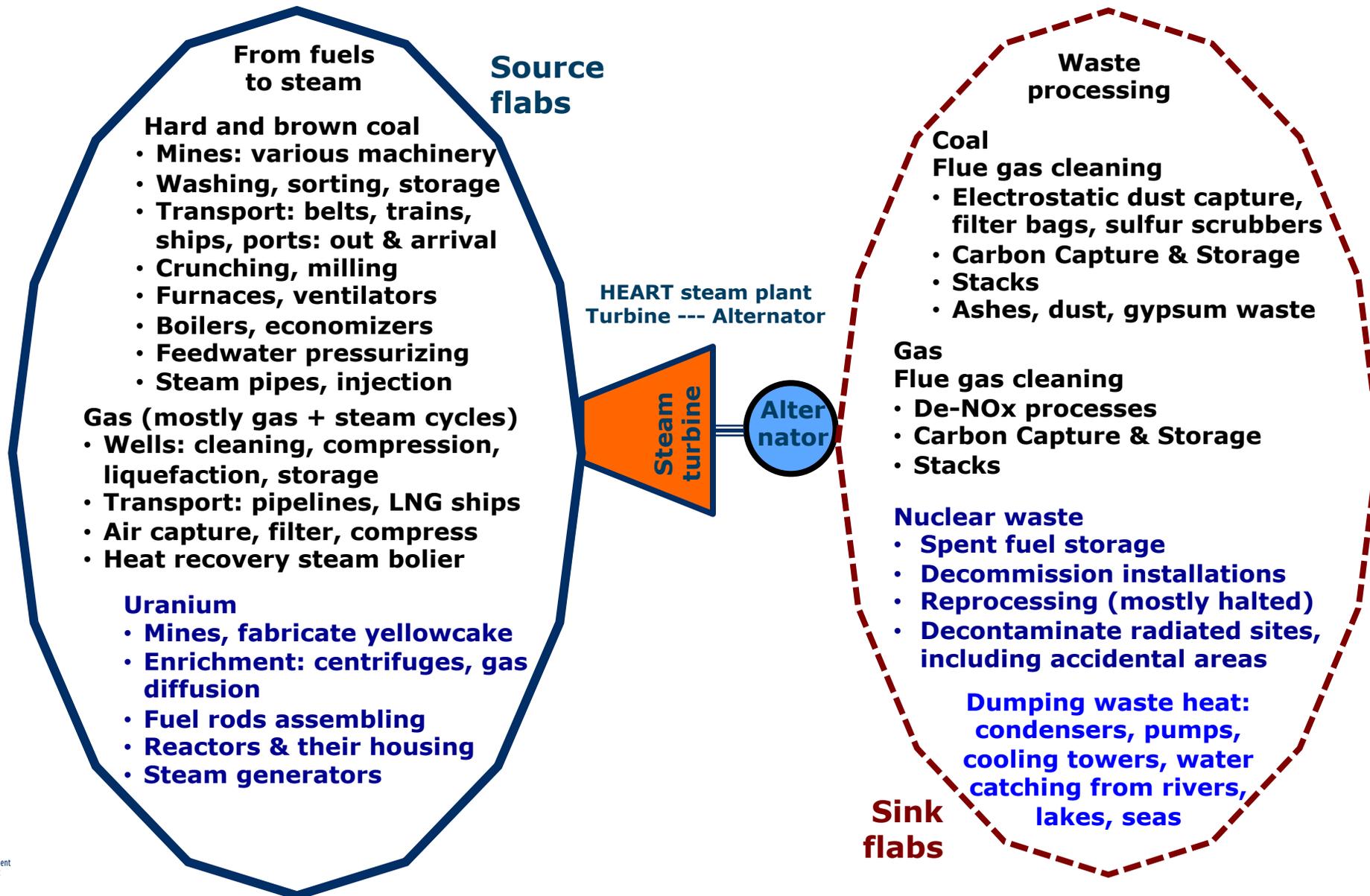
SteamTurbine: kinetic energy in high-pressure steamflows

Causes turbine-axis to rotate

Generator converts rotation in electricity



Electricity generation from steam (or gas) flows requires expensive, risky, polluting, activities and techniques: see non-exhaustive lists in Source and Sink flabs



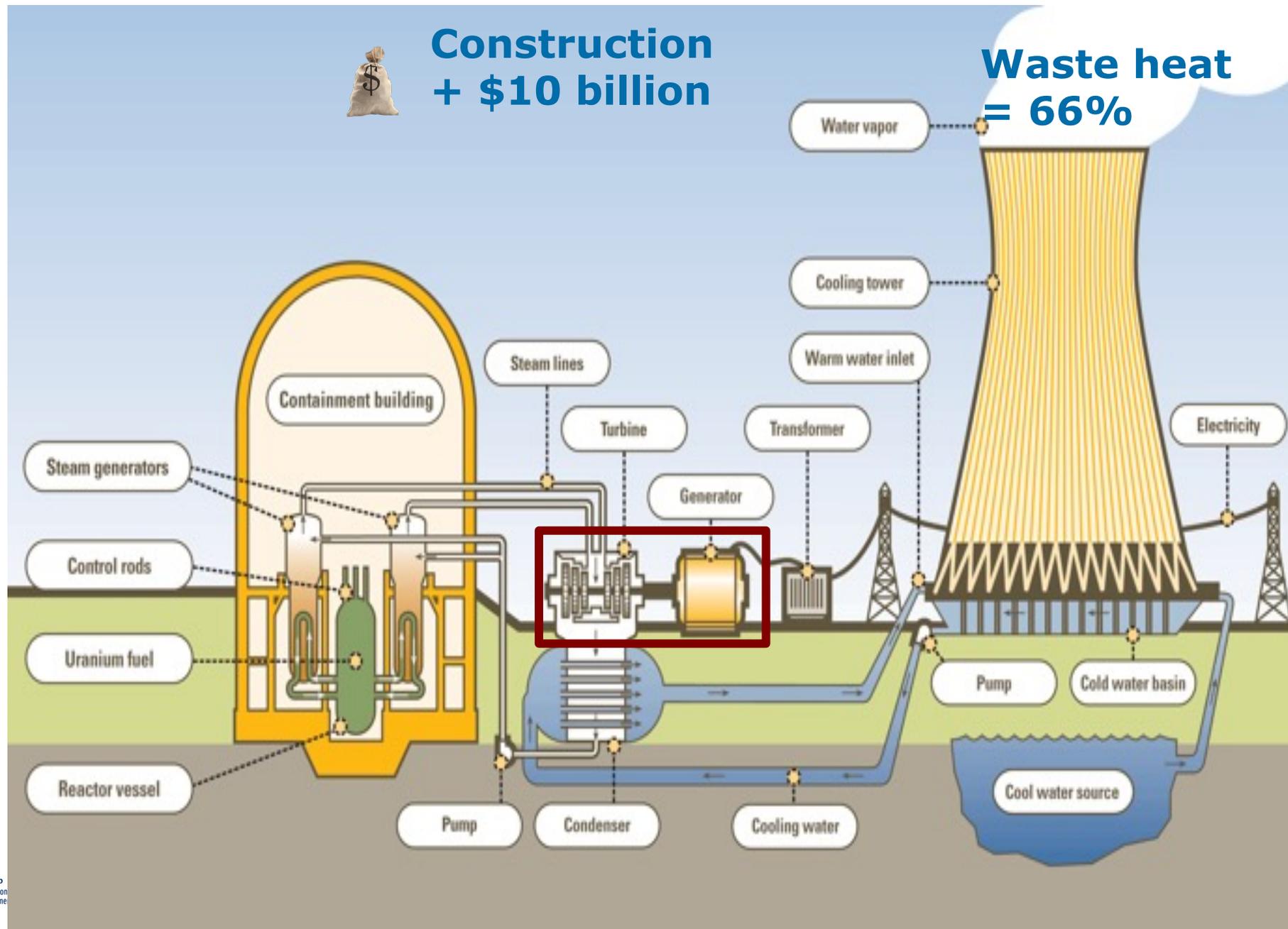


Illustration of Source flab installations coal pit, overseas transport, storing, gas pipeline

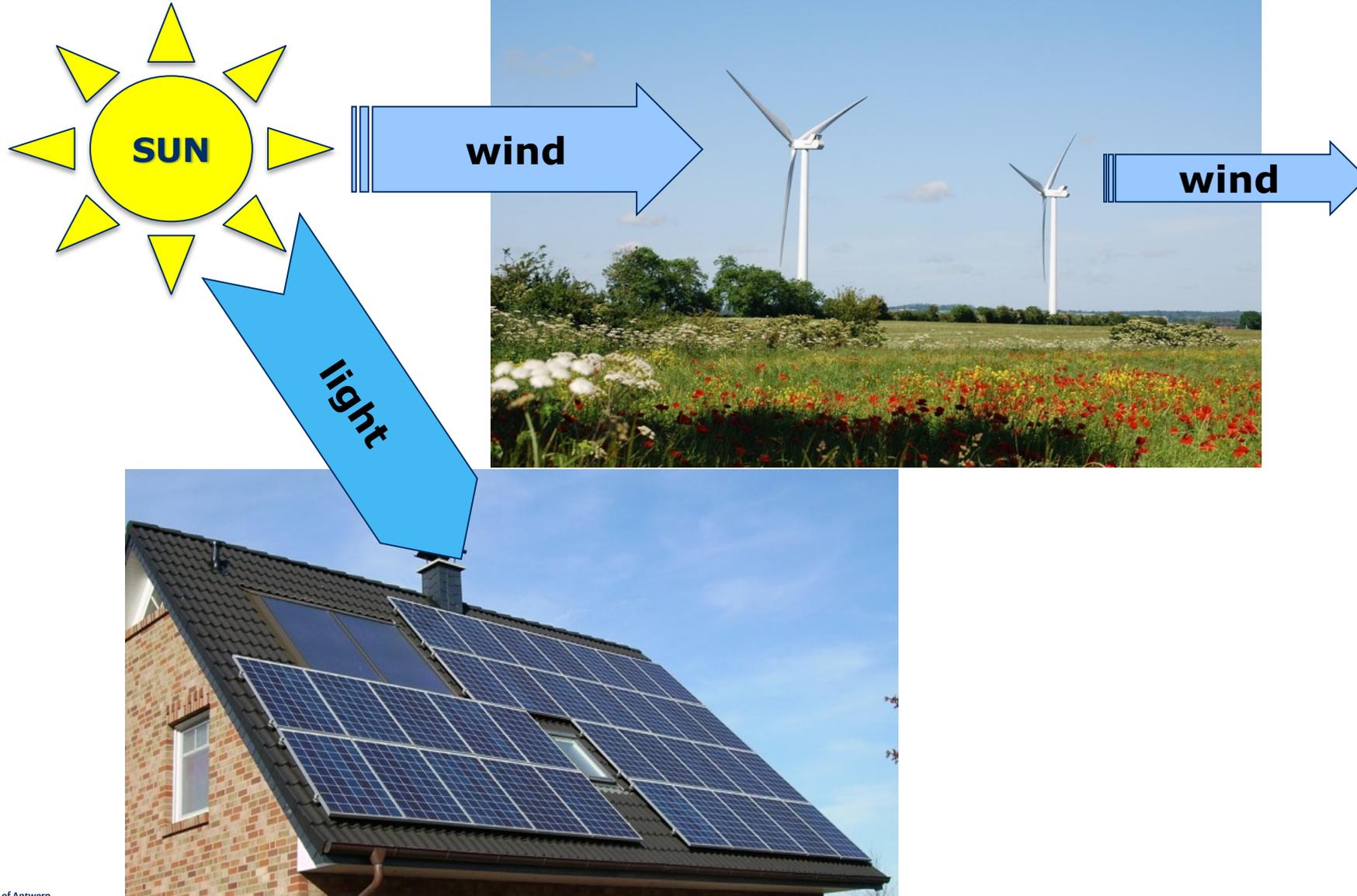


Offshore oil&gas platform, refinery, coal power plant, Fukushima Daichi nuclear plant destroyed



3. Energy transformation

Harvesting ambient currents for power without source and sink flabs, without major risks



Technological reversals in electricity generation

18th – begin 21st century ⇔

3rd millennium

Thermal flows, costly & risky ⇔

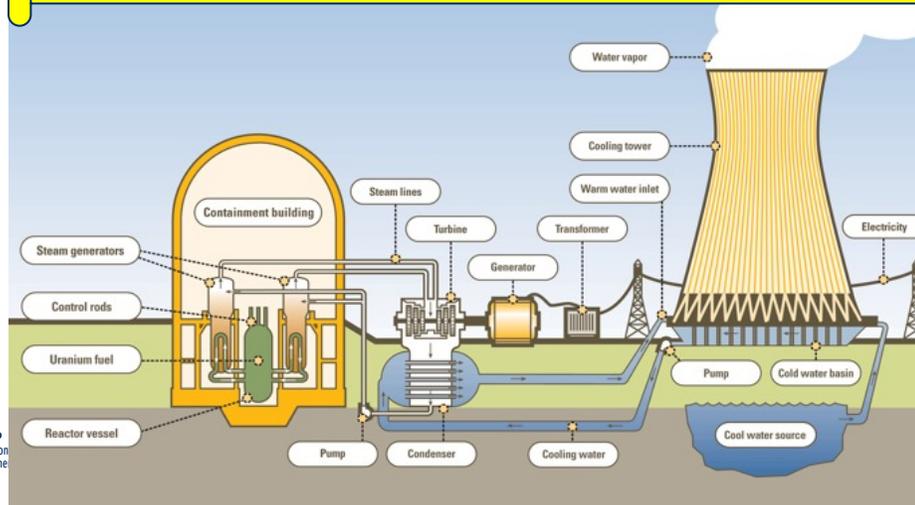
Harvesting light, wind, water



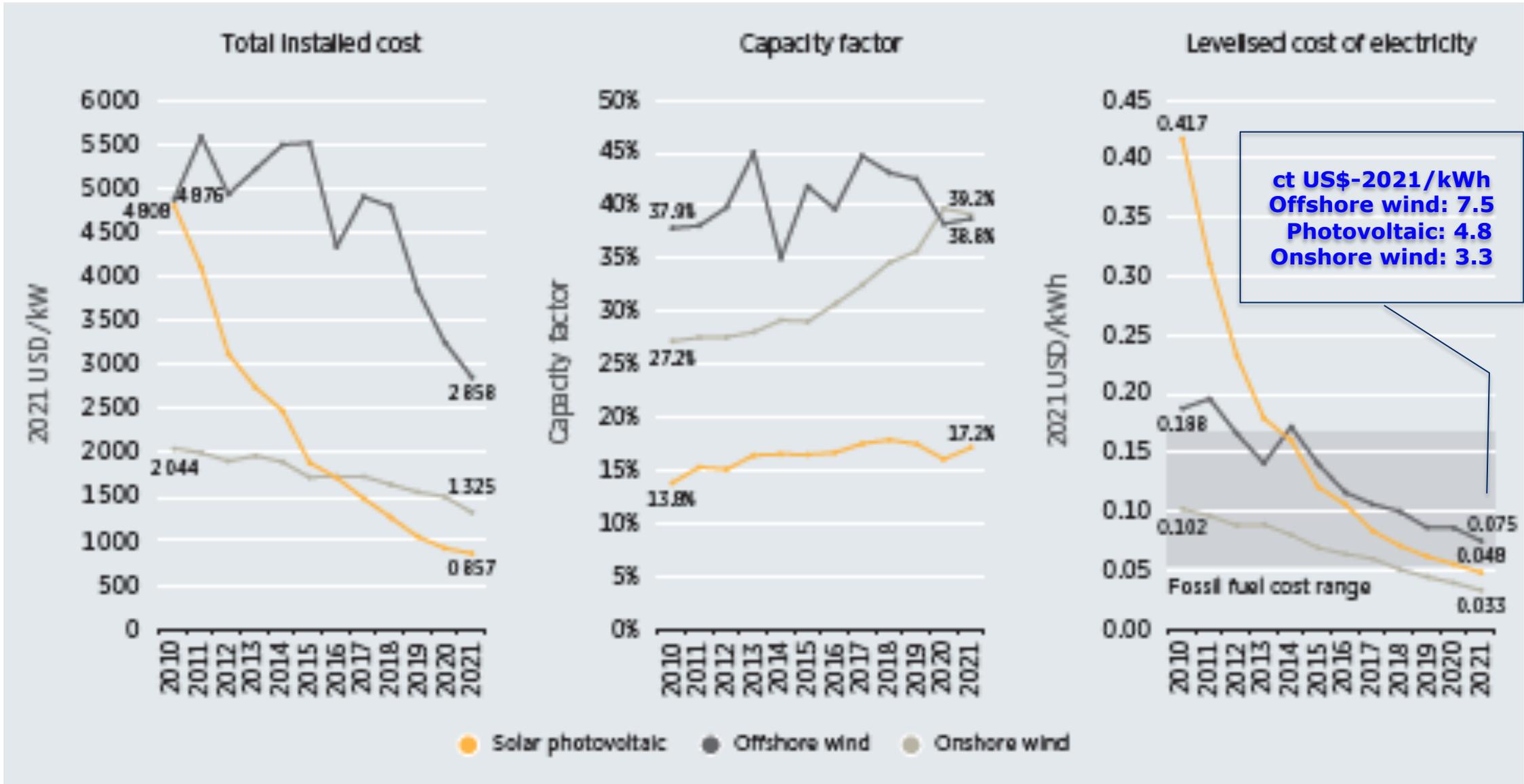
From cumbersome techniques
on concentrated energy sources



To direct harvesting
of diffuse, variable flows



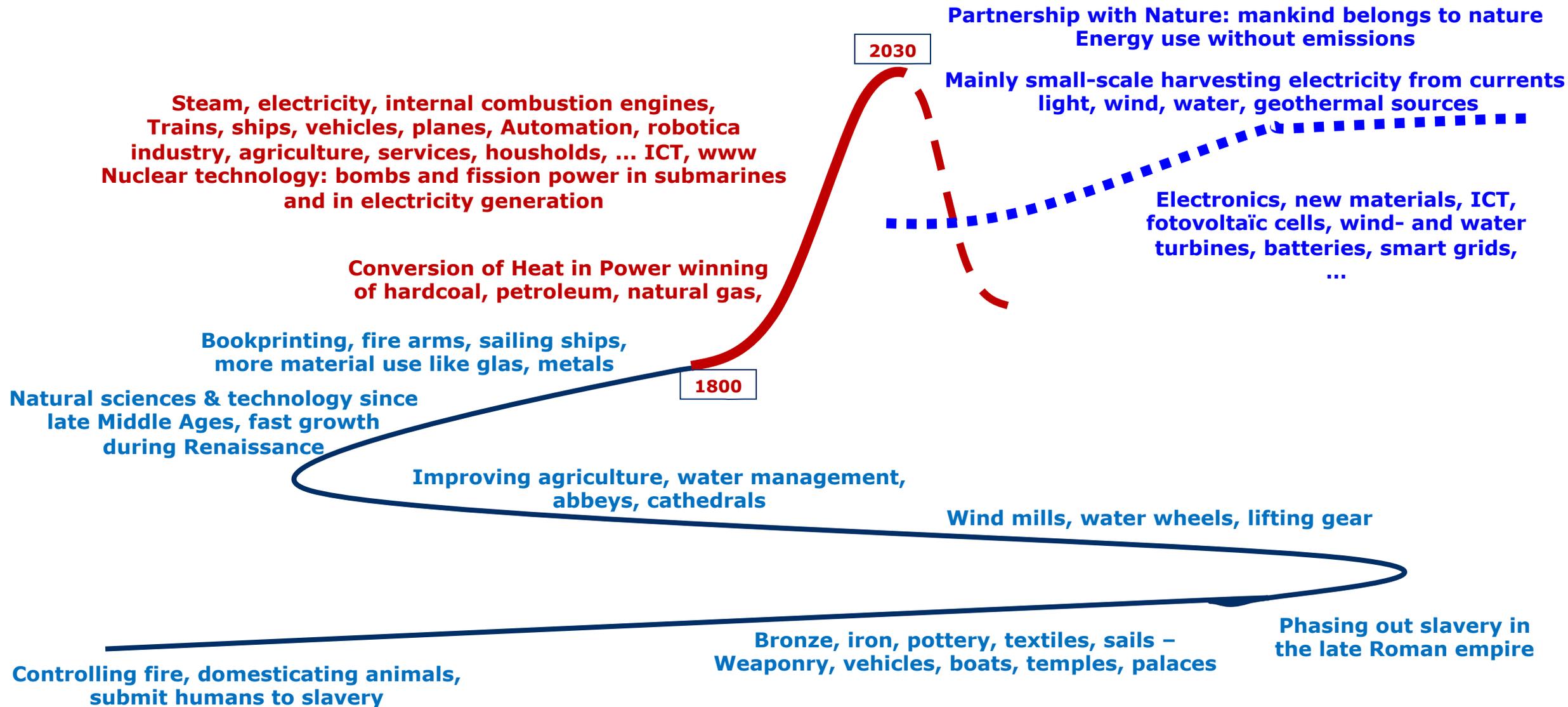
Electricity generated from light, wind is the least expensive





Three periods in the history of energy use (Europe as example)

1 [prehistory-1800] 2 [1800-2030] 3 [2000- ∞]



3. Energy transformation **Wrap up #3**

1) **Electricity is a superior energy supplier when managed properly**

- Electric current, made from energy source currents, is clean and safe when handled properly. Emissions are few (e.g. SF6 used in old transformers). Electricity transport causes electromagnetic radiation.
- Electric currents require **cables and grids** for distant transport at electronic speed. Grid stability (frequency, voltage) is **permanently controlled**, while the flows are **transient** and **unable to store**.

2) **Thermal power generation is wasteful, risky, ... no longer competitive to solar and wind power**

- Source and sink flabs of thermal power are enormous, when based on fossil or bio fuels or atomic fission. Such thermal power is being knocked out by its **environmental and economic handicaps** (see the flabs).
- 'Arguments' about atomic power are baseless: the **atomic flabs are the worst of all**. They aggravate with so-called **announced** GEN-4 and GEN-5 reactors for the **distant** future (2035 and beyond).

3) **Three periods in the history of energy use**

- Mankind has been thriving on the use of renewable currents always: exclusively in period 1 and in coming period 3; partly in the disruptive period of fossil fuel and uranium supremacy, suppressing their use.
- Period 3 started around the year 2000: after pioneers experimented wind and solar power since the 1970s, **local organisations, authorities, grassroots, scientists**, and more augmented the initiatives, with impact on **German and Danish politics**. Mainly wind and PV were pulled in the market by adapted financial support.
- **Main issues: fast speeding, global spreading of community renewable power – electric & societal**

Fossil and uranium fuel use causes gaseous litter, waste, risks, ...

1. People
≈
8 billion (2022)

2. Wealth
≈ trillion US\$
96.1 (2021)

3. Fossil fuels
≈ 11.7 billion toe (2021)
as coal, crude oil, natural gas

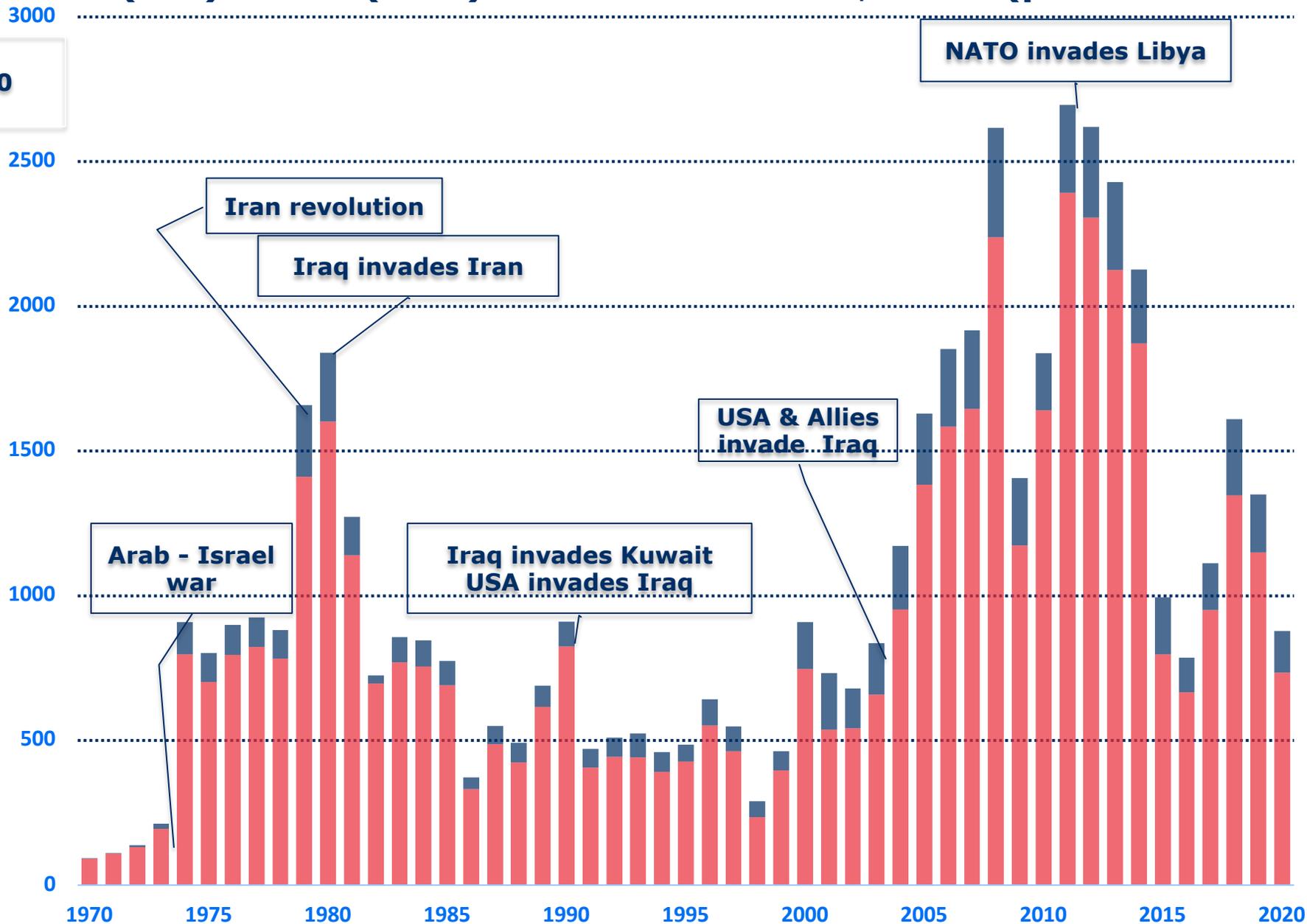
Gaseous litter
≈ 36 billion tons CO₂ (2021)
+ SO₂, NO, NO₂, PICs, PAHs
+ Particulate Matter (2.5, 10), .

4. Nuclear fuel
< 2% of final energy use
< 10% of generated power

Eternal waste problems
Accidents, Catastrophes
Spreading Atomic Weapons

Oil (red) & Gas (blue) rents in billion US\$-2020 (period 1970-2020)

Billion US\$-2020



**Sanctions
+
War in
Ukraine
+
Embargos

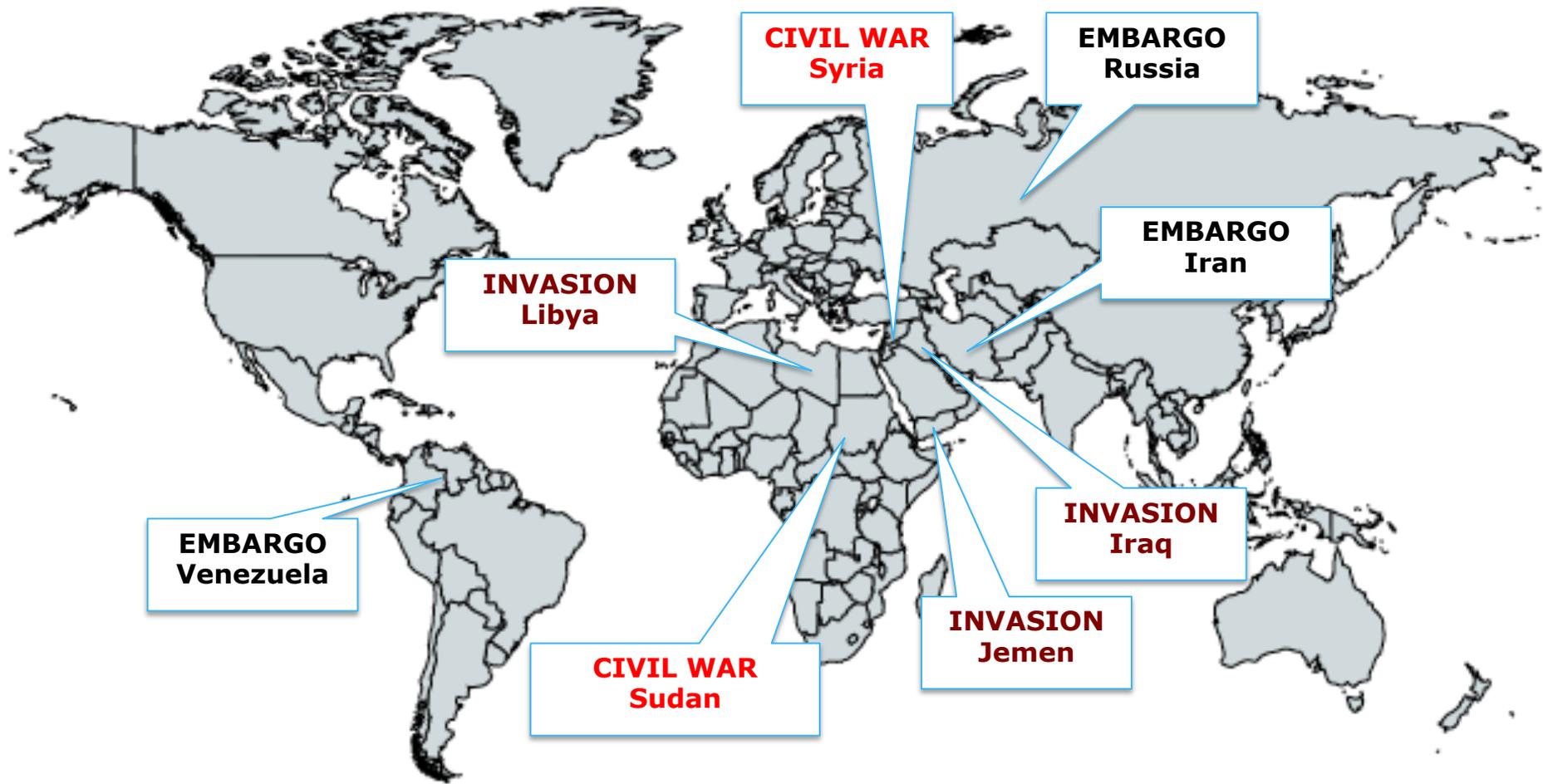
=

Super -
Profits
are again
excessive**

2021-2022



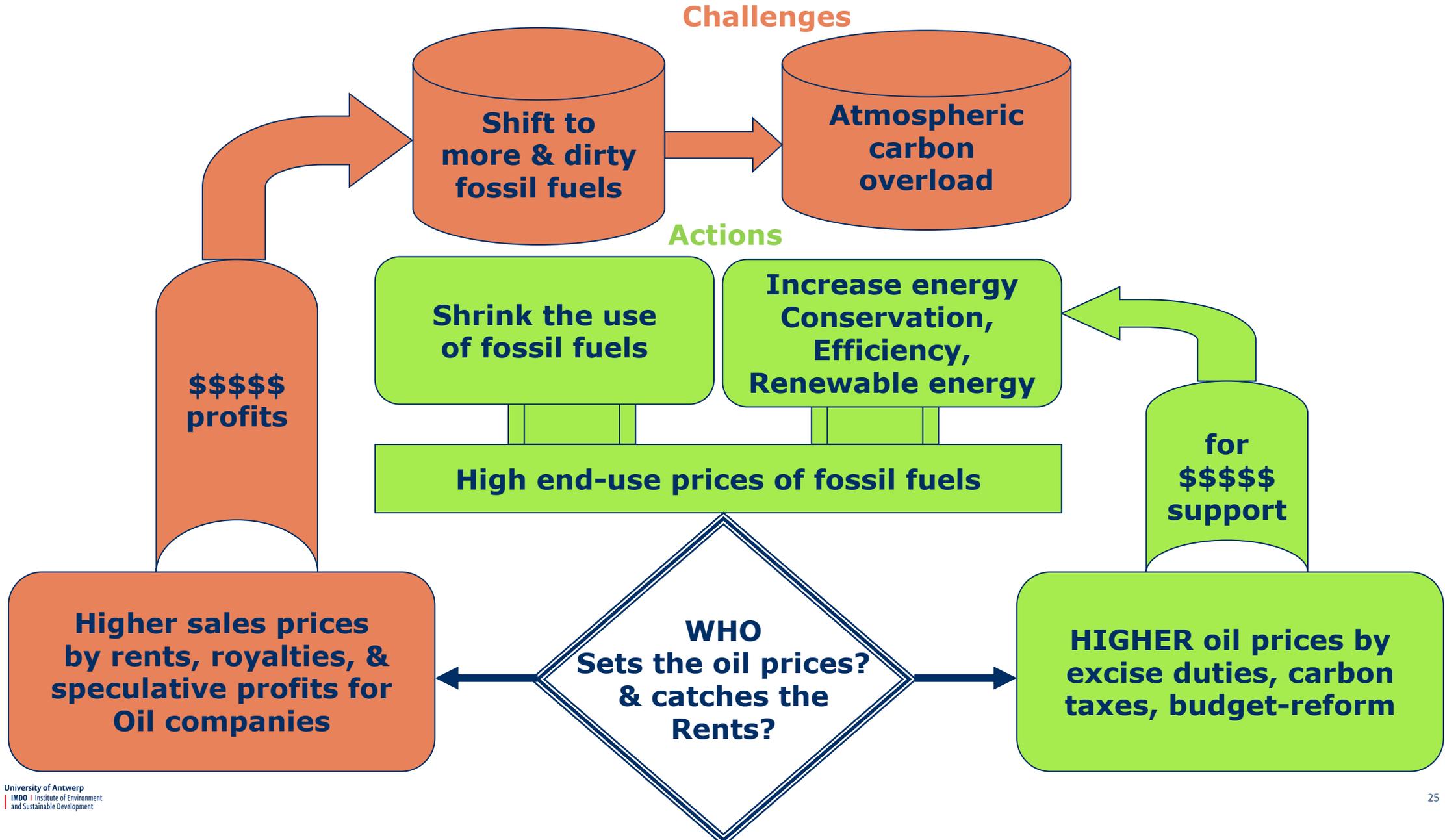
Shrinking oil & gas use = geopolitical conflicts
EMBARGO – INVASION – CIVIL WAR



USA, Oil&Gas multinationals, Gulf states claim the lion share of oil & gas sales



High end-use prices of oil (fossil fuels) helpful for climate change mitigation?



Atomic power: a death horse

Atomic power: World War-II fetish

- Trailblazer of energy obesity since 1950s (slogan “*electricity too cheap to meter*”)
- **1950-2000: ALL** means for developing & experimenting all nuclear technologies
- ‘Outcomes/Inputs’ ratio is far smaller than 1, if not negative
 - Huge costs and risks, already in present GEN-III+ reactors
 - Technological failure of GEN-IV breeder, high temperature, small modular reactors, plutonium and thorium fuel cycles

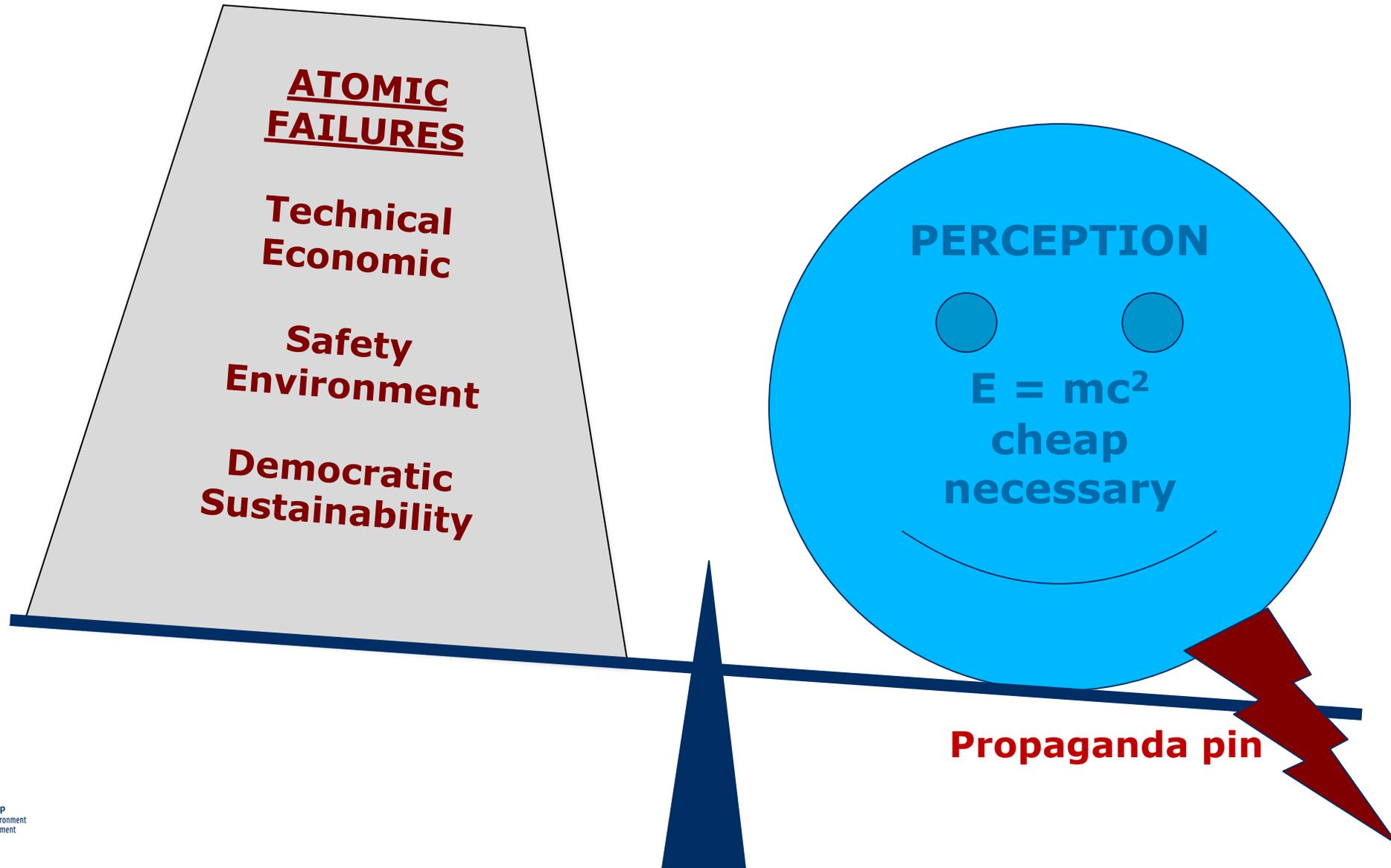
Persistent problems:

- Fake ‘Risks of *atomic power are negligible; people, behave rational: accept the risks*’
 ⇔ **global re-insurance companies refuse to insure the risks**
- IEA (International Energy Agency) states: Financial affordability requests ‘giant power stations (1700 MW), several units on one site, series building’ (like France did in 1980s)
- Atomic waste is a burden for all future generations; no country has viable solutions
- Illusion: GEN-V fusion (ITER demo-project: 10 million parts, expected building expense is now €34bn , no single electric kWh will be produced)

Opposite to Sustainable Development (Annex A)

Atomic power conflicts with wind, solar, water flow power

Nuclear support = Political Mystery





Creation of virtual reality discourse by Nuclear Forum based on Saatchi & Saatchi advice

1. Confuse the minds

'Nobody knows well: not we, not you, who could?'

'No real case, so why we need independent experts?'

'Anti is stupid: how can you be anti when you don't know well?'

'Pro or Anti is personal taste like football game or Pepsi/Coca; be tolerant!'

2. Flirt with renewable energy as *'perfect matching partner'*

3. Adopt modest slogan *'Nuclear power is not the solution, but there is no solution without'*

4. Lime virtual support: *Pro* nuclear is who is not *explicitly* against, i.e. The silent majority is marked as pro

5. Silence, eliminate independent critics / opponents

No debate, no public forum

Media control: spend advertising money, influence journalists,

6. **Obscure facts about nuclear failures (accidents, costs, technologies); inanity is praised as strength by neo-modernists**

7. **Hide when Fukushima burns: after March 11, 2011, the Nuclear Forum skipped the public ether & theater until 2012**

1) Fossil and nuclear fuel uses are the **main culprits** of the environmental crisis

- In 2021, energy-related CO₂ emissions are at 36 Gtons due to the combustion of 11.7 Gtoe fossil fuels. **Thermal power generation** emits 14.4 Gton CO₂ (40%). When adding the emissions of the Source and Sink flabs, **18 à 20 Gton CO₂ emissions (and possible fast reduction)** is a prudent estimate.
- **CO₂ emission mitigation by ending thermal power generation is the best spearheading policy.**

2) **Billions US\$ super profits on oil & gas resources**

- The global oil & gas rents over the 51 year period [1970-2020] amount to **52.54 trillion US\$-2020**, or yearly **1030 billion on average**. In years of war on some oil & gas rich nations, the rents exceed 2 trillion, likely again in 2022 with the Russia-Ukraine war and ongoing embargos.
- Rents are super-profits (**'profit without effort'**) on top of already huge profits of multinationals delivering oil & gas. Who benefits from rents and huge profits conceals the money flows. **Follow the money is needed for democratic transparency.**

3) **The death horse of atomic power is kept up by advocacy and deceit**

- In the 1950-60s, atomic power was heralded as the aurora of a new clean and cheap energy future. The unseen support for this utopia has created **tombstone beliefs and endowed organisations (IAEA, a.o.)**.
- The atomic epic fails on all sustainability criteria, but one: CO₂ free steam (**sufficient as compensation?**) Atomic power conflicts with power from renewable energy currents: they **spoil each others renewability.**
- Atomic discursive power is still influential, benefiting from a 1950-60s bequest in beliefs, organisations, finances, networks, etc. The advocacy is similar to the one of climate change deniers (**merchants of doubt**).

Energy use: main substrate of human Civilization and development

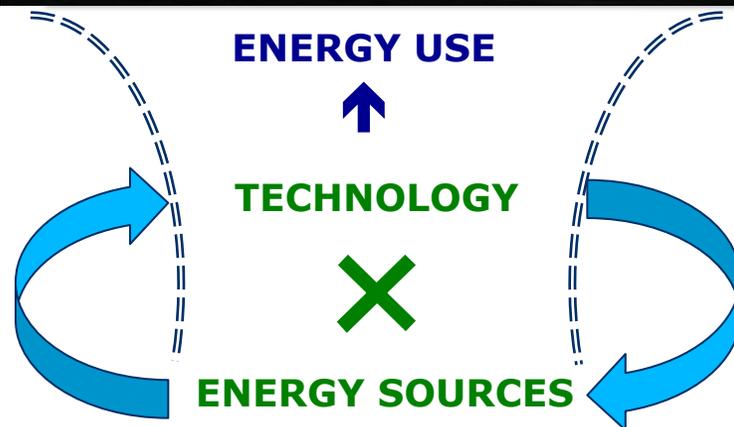


Civilization

Humankind fenced in

- Paradigm of economic growth
 - Myths and Discourses
- Institutions (norms, institutes)
 - Interests, small to big

Emancipation feasible ☸
revolting youth, activists, ... all honest
citizens for changing institutes, politics



Energy use

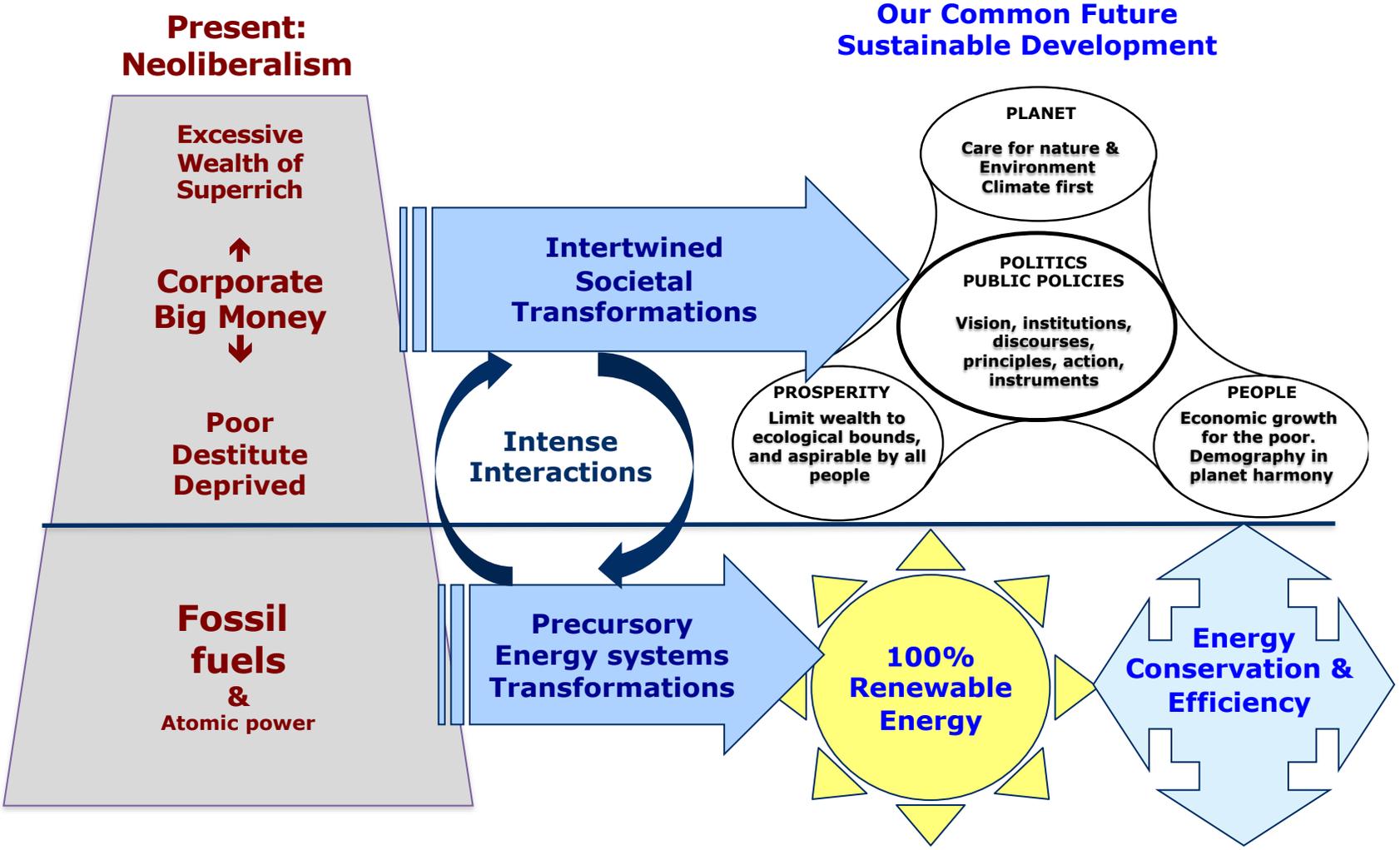
Urgent change obstructed by

- Infrastructures
- Habits (e.g. mobility)
- Powerful interests (coal, oil & gas, electricity, atomic power & weaponry)

Transformation now necessary, possible, desirable ☸
new knowledge & technology

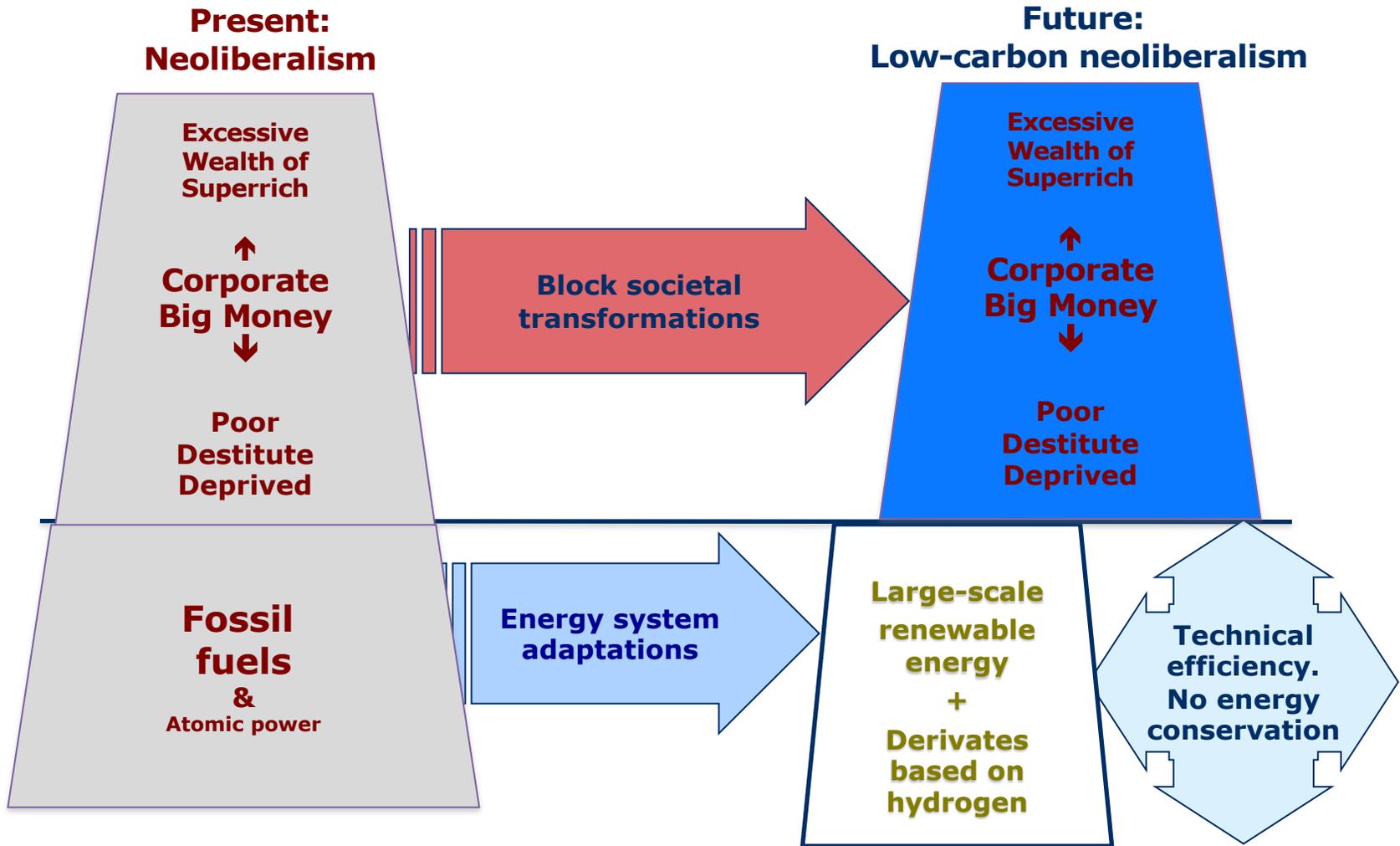
4. Twin Transformations

**Societal and Energy transformations for the public good:
Sustainable Development and 100% renewable energy**



4. Twin Transformations

Decarbonising, 'carbon-neutral' energy system preparing a future of low-carbon neoliberalism as EU's 'Fit for 55' package pursues



1) Energy use

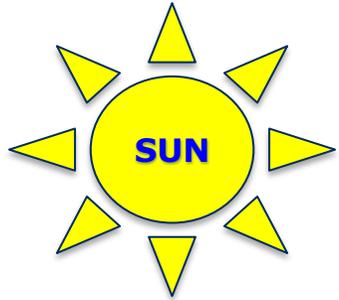
- **Combinations of energy sources and adapted technologies deliver useful energy**: the right quantity of the right kind, available at the right place and time.
- Energy use is substrate and precursor of human development, both **interacting intensively**. **Political steering** may stimulate Our Common Future or fortify neoliberal big-money.

2) “ **Humanity** has the **ability** to **make** development sustainable”

- Urgent and ubiquitous electrifying of most human activities, powered by locally harvested electricity from natural, renewable currents (light, wind, water, geothermal). **The most promising and cheap harvesting technologies are small to medium scale, neatly fitting with personal, cooperative, communal initiatives.**
- Energy conservation and efficiency are soulmates of sustainable energy transformation. **Conservation holds deep changes in human activities, with forced reductions for the rich and well-dosed expansion for the poor.**

3) The road to perdition: **fortifying neoliberalism** (example EU’s ‘**Fit-for-55**’ package)

- Only focus on decarbonization skips the intense interaction between energy and societal transformation. Priority is assigned to large-scale, offshore wind parks and assemblies of PV-cells to MegaWatt fields, for **saving the business model of the giant power companies. Energy efficiency is accepted, not conservation.**
- Societal transformation is silenced: neoliberalism is worshipped, economic growth is pushed, sustainable development (Political responsibility, redistribution, growth control) is absent. Since 1992, three decades have been lost. **Business-as-Usual energy and climate policy plans to add another or more lost decades.**



IDEAS
 Myths
 Symbols
 Images
 Language
 Narratives
 Discourses
 Ideology
 Paradigms
 ...
INFLUENCE
LEGITIMACY

INSTITUTIONS
 Habits
 Norms
 Rules
 Laws
 Institutes
 ...
POLITY



INTERESTS
 Positions
 Power
 Knowledge
 Property
 Capital
 Income
 ...
MONEY

INFRASTRUCTURES
 Buildings
 Transport
 Production
 Commerce
 Recreation
 ...
ASSETS





Identify Business-as-Usual (BaU)

- **Neoliberalism as societal paradigm**
 - **Financial power of giant companies and super-rich clans, dominates the strategic agenda of politics via subservient politicians and officials.** This implies imperialist interventions across the own borders by the USA as hegemonic superpower (Wolin, 2010)
 - **Economic growth is unrestrained for increasing the fortunes of the super-rich (Annex B), with little care about trespassing crucial ecological limits, planetary boundaries.**
 - **Gross inequality is accepted as normal: charity is considered sufficient to alleviate extreme poverty.**
 - **Giant oil & gas companies capture huge rents (Profits without Effort) by geopolitical conflicts**
- **Troubled thinking and talking**
 - **Continuous brain-washing by big-media (part of big-money)**
 - **Misinforming bombardments of fake news, complacent press commentaries**
 - **Expecting solutions by "Asking", "Pressuring" neoliberal captains and politicians**
 - **Imaginary 'we' talk overlooks the many conflicting ideas and interests in present societies**
 - **Neoclassical economics' deceiving utopias ('free markets' controlled by oligopoly corporates, top-down uniform carbon price, carbon emissions trading) stifle workable climate policies**

If not BaU, what else?

Determining FACTORS change* starts with ACTORS FOR CHANGE

Actors for change are ...

- already numerous, and daily increasing in numbers
- understanding and experience are growing
- more cooperation is starting around common vision, mission and startling strategies

Vision

- People are part of nature and activities are in tune with natural processes, e.g., by using available energy currents; care is shown for nature and the environment
- Reject neoliberalism & Reclaim Sustainable Development for Our Common Future
- Make big-money irrelevant (because BaU Interests cannot be convinced, nor bribed, nor coerced)
- Re-establish happiness, well-being of the majority as ultimate goal of politics (Aristotle)

What more to do?

- Unite individuals and organizations pursuing the mission
- Include migrants, refugees, ... the global population
- Experts from all disciplines are needed to transform societies for the third period of civilization
- Use temporary concentrations of goodwill for exceptional efforts to build binding institutions

- Renovate IDEAS, INTERESTS, INSTITUTIONS, INFRASTRUCTURES, ENERGY & TECHNOLOGY SUBSTRATES

Salient inversions, with a focus on energy

IDEAS

- Emitting GHGs is **Gaseous Littering**, hence a **crime**: perpetrators must immediately stop littering and clean up, pay for the caused Loss & Damage. This turns privileges of rich emitters into duty.

INTERESTS

- Private interests are part of and **subordinated** to public interests and policies for creating well-being for the entire community

INSTITUTIONS

- The local market is suitable for trading goods and services, provided political oversight and regulation are in the public interest

INFRASTRUCTURES

- Deconstructing Source and Sink flabs of thermal power plants is '**natural degrowth**'. Degrowth is **not a goal, yet a spill-over** in industrialized nations. Growth in developing nations is necessary

ENERGY & TECHNOLOGY SUBSTRATES

- Harvest light, wind, water, geothermal currents for electricity
- Sue the investors in fossil fuels and nuclear power
- End thermal power generation from fossil and nuclear fuels
- Leave the Energy Charter Treaty to get it abolished
- Communities, cooperatives, cities, ... construct solar buildings, smart grids, nearby wind turbines, ...
- At regional level, design new rules for grid access, billing electricity, reliability standards, ...

Expect the unexpected – be prepared and responsive

- Transformation requires **U-turns** i.e. without U-turns no transformation happens
- What seems impossible today, will be **inevitable tomorrow**
- Reject half-heartedness; go for the **interlinked transformations** of societal paradigm & of energy
- **Facts** instead of myths, symbols, images and words
- Facts are facts if **verified** from the different sides of the diverse world
- Identify who has what **interests** in specific proposals and outcomes
- Request **transparency of money** flows and batches in energy and climate policy
- Give **priority to local, small-scale electricity** production and significant energy conservation
- Reject any investment in fossil and nuclear fuels and power plants
- Handle power in such a way that the use of power for Evil stops, and its use for Good grows
- Build countervailing power from the bottom up
- **Fundamental transformation can only grow bottom-up**; people in power today will obstruct it

Critical analysis of present climate policies as flawed

... is not cynic, but hopeful

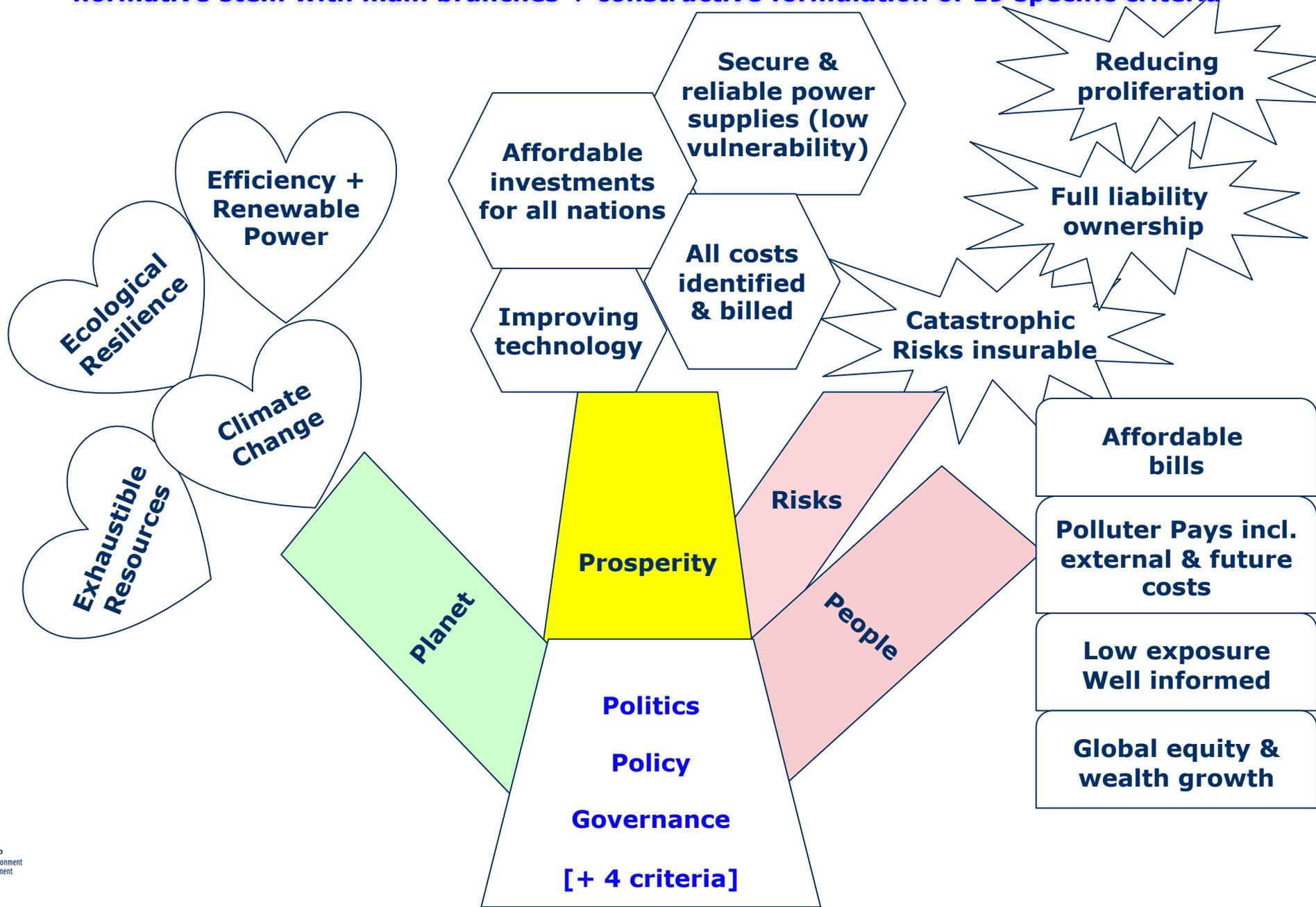
Emancipation of the South billions means Sustainable Development

Migration, climate change, inequality, rents robbery, ... dynamite for transformations

Deep reversal, like ancient Rome switched from *Eagle (105 BC)* to *Cross (313 AD)*

Sustainability Assessment Criteria (attributes to hold, results to obtain)

Nuclear Power case study tree:
normative stem with main branches + constructive formulation of 19 specific criteria





4 Sustainability Assessment Criteria for proper POLITICS on Nuclear Power:

Criteria (attributes to hold, results to obtain):

- 1. A global, independent agency studies nuclear power issues and choices in terms of their longevity, uncertainties, and irreversible impacts**
- 2. Independent and accountable nuclear regulatory institutions and processes are established and monitored publicly**
- 3. At national/regional levels, the public interest prevails over private profit, and democratic institutions prevail over technocracy**
- 4. At local levels, citizens can engage in debate about energy system governance, and participate in the deployment of local energy systems**

Source: Verbruggen, A., Laes, E., Lemmens, S. (2014). Assessment of the actual sustainability of nuclear fission power. Renewable and Sustainable Energy Reviews 32: 16-28



Atomic power ↔ sustainable development

<p>Environmentally benign?</p> <p>Non-exhaustible?</p>	<ul style="list-style-type: none"> • Reactors do not emit CO₂ • Emissions of noble gases • Radioactivity, waste, accidental releases • Breeder reactors failed • Fusion controllable (ITER experiment)?
<p>Social responsible?</p> <p>Global?</p> <p>Safe?</p>	<ul style="list-style-type: none"> • Radioactivity; loss of habitats • Capital & technological intensive • Weapons proliferation (Israel, Iran, ...)
<p>Low risk?</p> <p>Prosperous?</p> <p>Affordable?</p>	<ul style="list-style-type: none"> • Risks not insurable = not economic • Negative learning curve (increasing costs) • 'Safe enough' is excessively expensive
<p>Democratic?</p> <p>Participative?</p>	<ul style="list-style-type: none"> • Rejected by risk-aware citizens • Technocratic decision-making



Political Economy: introductory note

Definition: “Study of **rational decisions** in a context of political and economic **institutions**”

- **Institutions** appear as internalized conventions and norms [≃ values] and externally sanctioned formal rules [≃ law]
- Paramount is the interaction of individuals, institutions and markets, all being **human made & governed constructions**
- **Ideas** help frame interests and incentives to bring about transformative change
- Discourses bundle ideas to action

Political economy is like studying icebergs (10% visible; 90% under water)

Part is visible – most happens below the surface

... networking, lobbying, advocacy, discourses ...

Usual standards of scientific analysis not applicable

Political economy = original economics science 1776-1876

**Renewed attention from sectors where neo-classical economics fails:
development aid, financial crisis, ...**

Indispensable for studying energy & climate politics

Nipping distributed Renewable Energy growth (2014) by giant energy companies lobbying EU Commissioner J. Almunia



- **Magritte Group of giant energy companies (March 19, 2014) recommends:**
 - Preference for 'mature renewables in the regular market'
 - Priority to the utilization of existing competitive power capacity rather than subsidizing new constructions
 - Restore the EU's Emissions Trading System as climate and energy policy flagship
- **EU (April 9, 2014) New Energy State Aid Guidelines**
 - Refrain the German Energiewende
 - Payments for UK coal power capacity
 - Subsidize planned atomic plant at UK Hinkley Point (£92,5/MWh during 35 years)
 - Since then, EU lost pace and leadership in Renewable Energy deployment
- **Nuclear discourse molds fake reality**
 - No real sustainability assessment of atomic power
 - Hides incompatibility of nuclear with wind & solar power



Control the “Energy Policy” discourse

In the EU, vested giant energy interests

- are centralized power houses
- principal in the Brussels and national lobbyism webs
- active in universities and on scientific fora

Control EU and Member State regulation

Stock-stakeholders participate (**victoriously**) in comitology meetings

EU officials are **limited** in capability, capacity, action radius

Member States maintain significant energy authority

Control the hearts and minds

Dominant discourse by superior advocacy

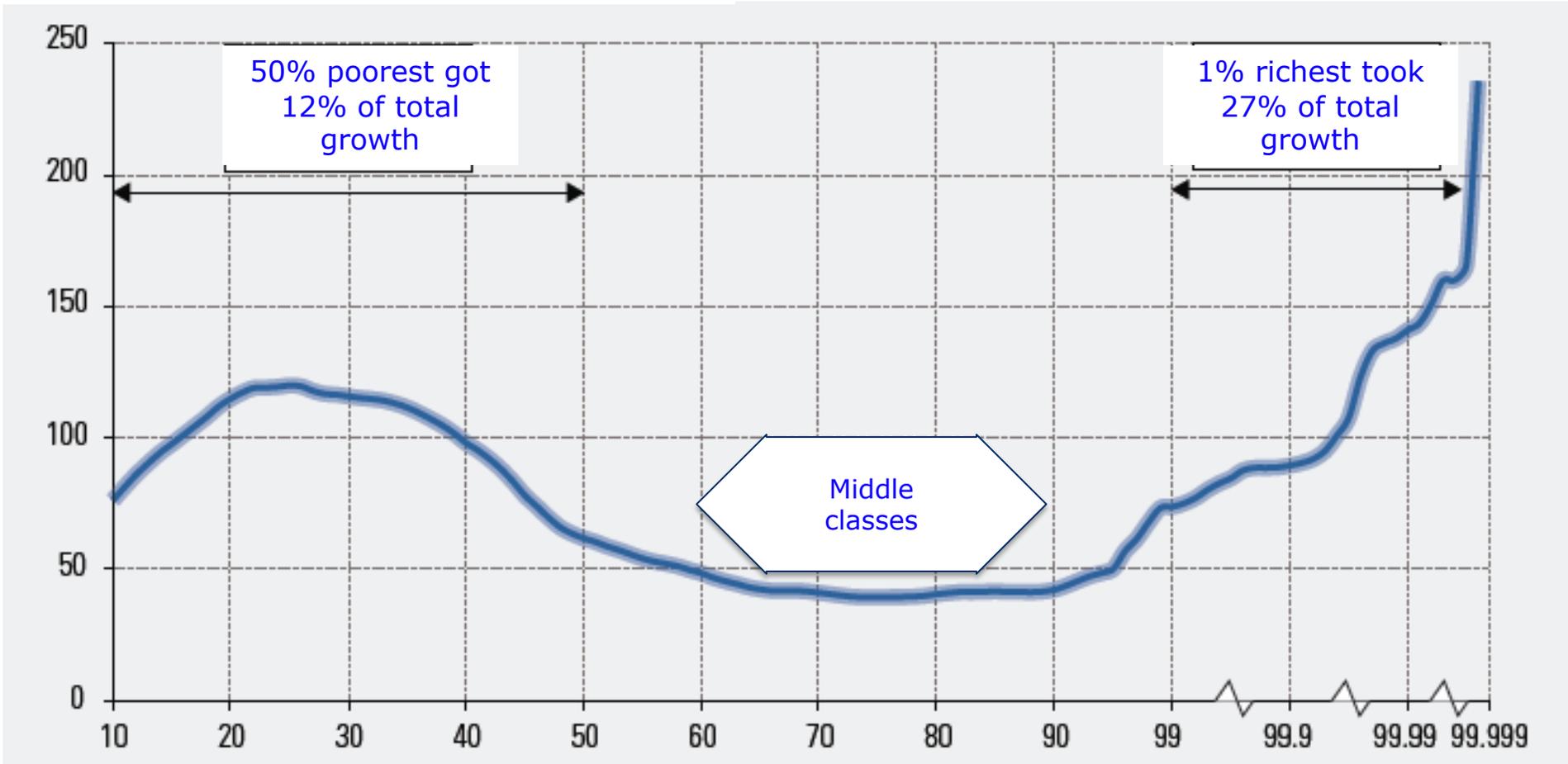
Changed editors of the Journal *Energy Policy* **reject** disclosing analysis

IPCC accepts nuclear power as valid mitigation option, by **not assessing the critical literature, against its ‘Principles Governing IPCC Work. Section 4.3.3’**



Elephant curve of global income inequity & shares in economic growth

% increase of real income of adults over the period
[1980-2016]



Decile classification of world population ranked by income of adults. The poorest decile is not shown; the richest 1% is shown in more detail highlighting the enrichment of the super-rich.