



ACROPOLIS workshop

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Climate change and energy transitions

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Mainly based on:

Beyond Kyoto, plan B: A climate policy master plan based on transparent metrics. *Ecological Economics* 68 (2009) 2930-37

A Turbo Drive for the Global Reduction of Energy-Related CO₂ Emissions. *Sustainability* 3 (2011) 632-48

Self-governance in global climate policy: An essay (2015), 52p.



Overview

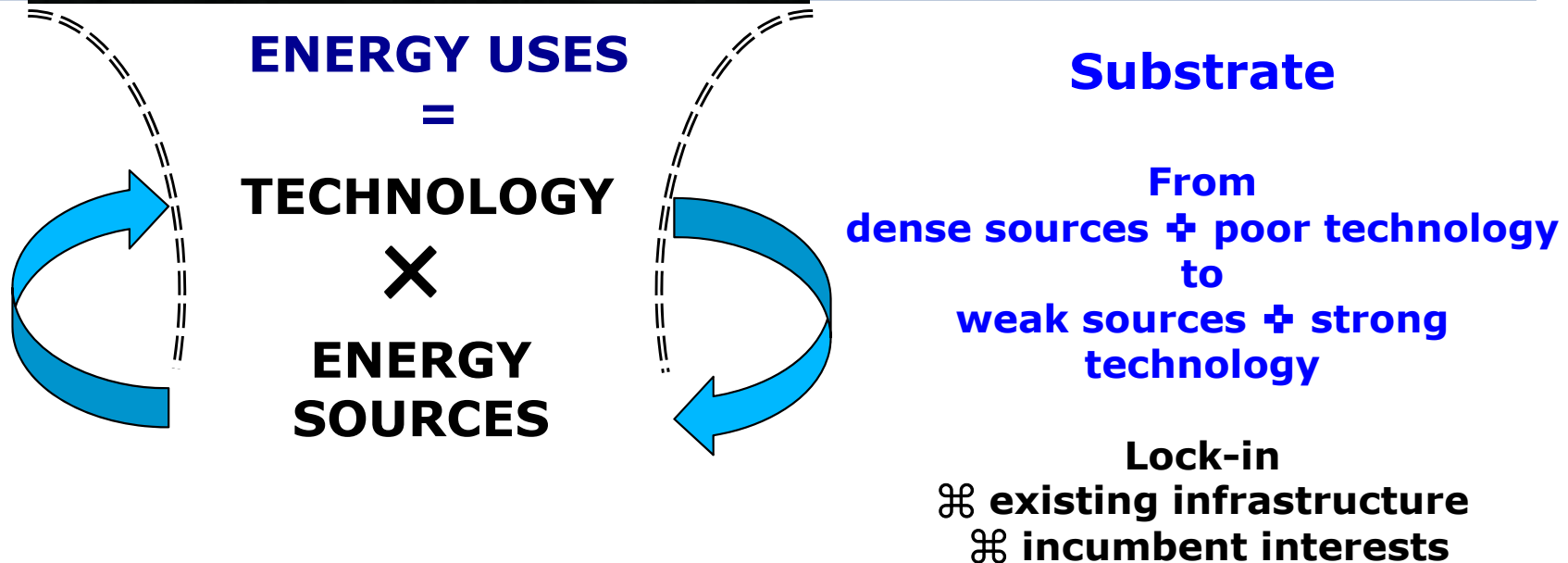
- **Energy: substrate of civilization**
 - **Energy transition spearheading sustainable development**
 - **Two transitions: → renewables + → electricity**
- **Deep Decarbonization**
 - **Energy & climate policies**
- **Energy transitions**
 - **Thorough ⇔ Fake**
 - **Thorough & urgent**

Energy: substrate of civilization



Civilization

⌘ Paradigms
[social construct
policy, politics]



Energy ☘ Civilization: Present → Future



Present

\$ rich
\$\$ richer
\$\$\$ richest

American
Dream

Fossil fuels
&
Atomic power

Transition 2
societal

Transition 1
energy

Future Global Sustainability



Renewable
Energy

Energy
efficiency

Energy for Social Activities & Services

SOCIETY

Gross Domestic Product (wealth) = spending on numerous Activities

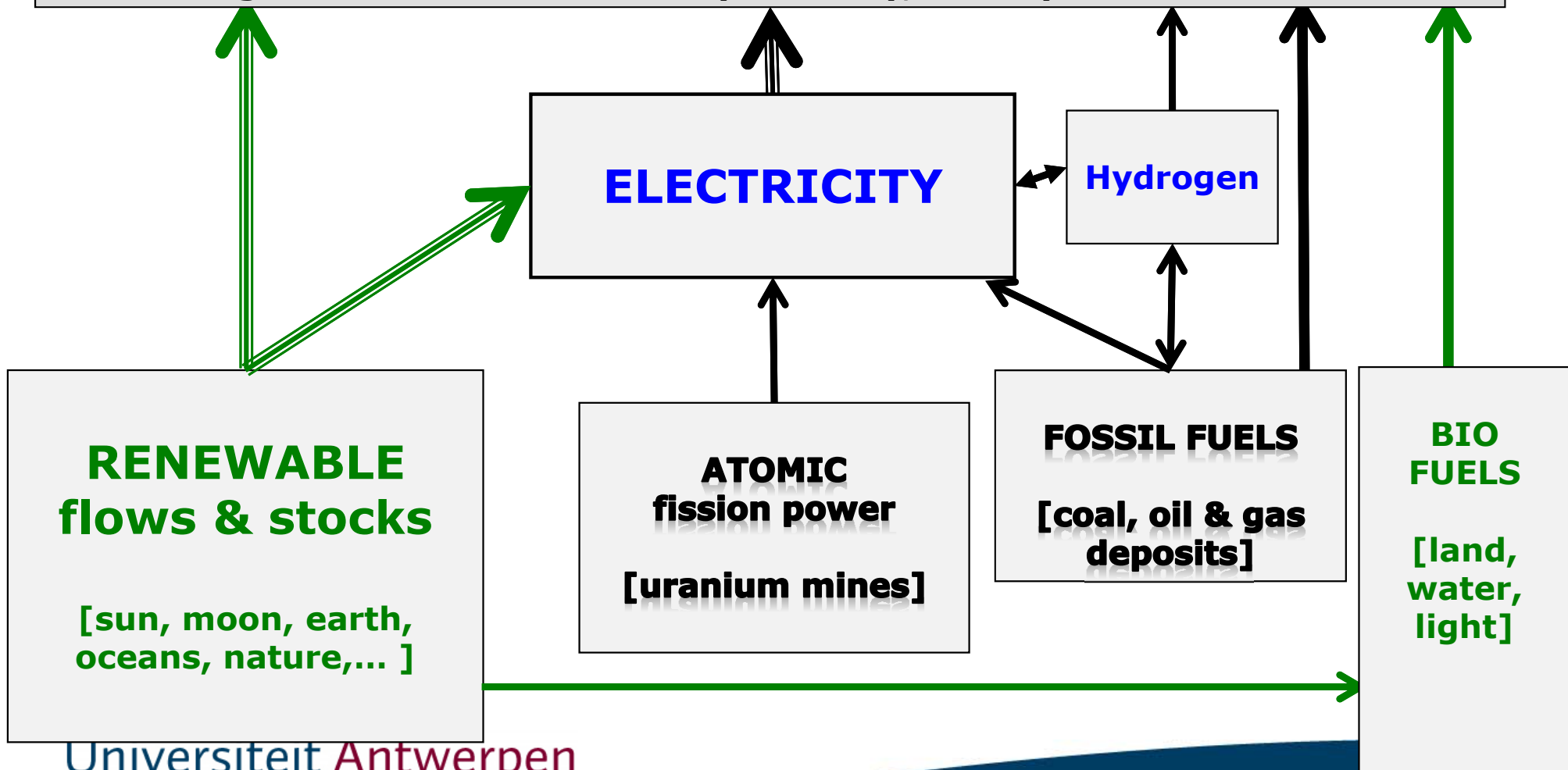
$$GDP = \sum_{i=1 \dots \Omega} P_i \times A_i$$

Activities occur in various sectors, e.g.

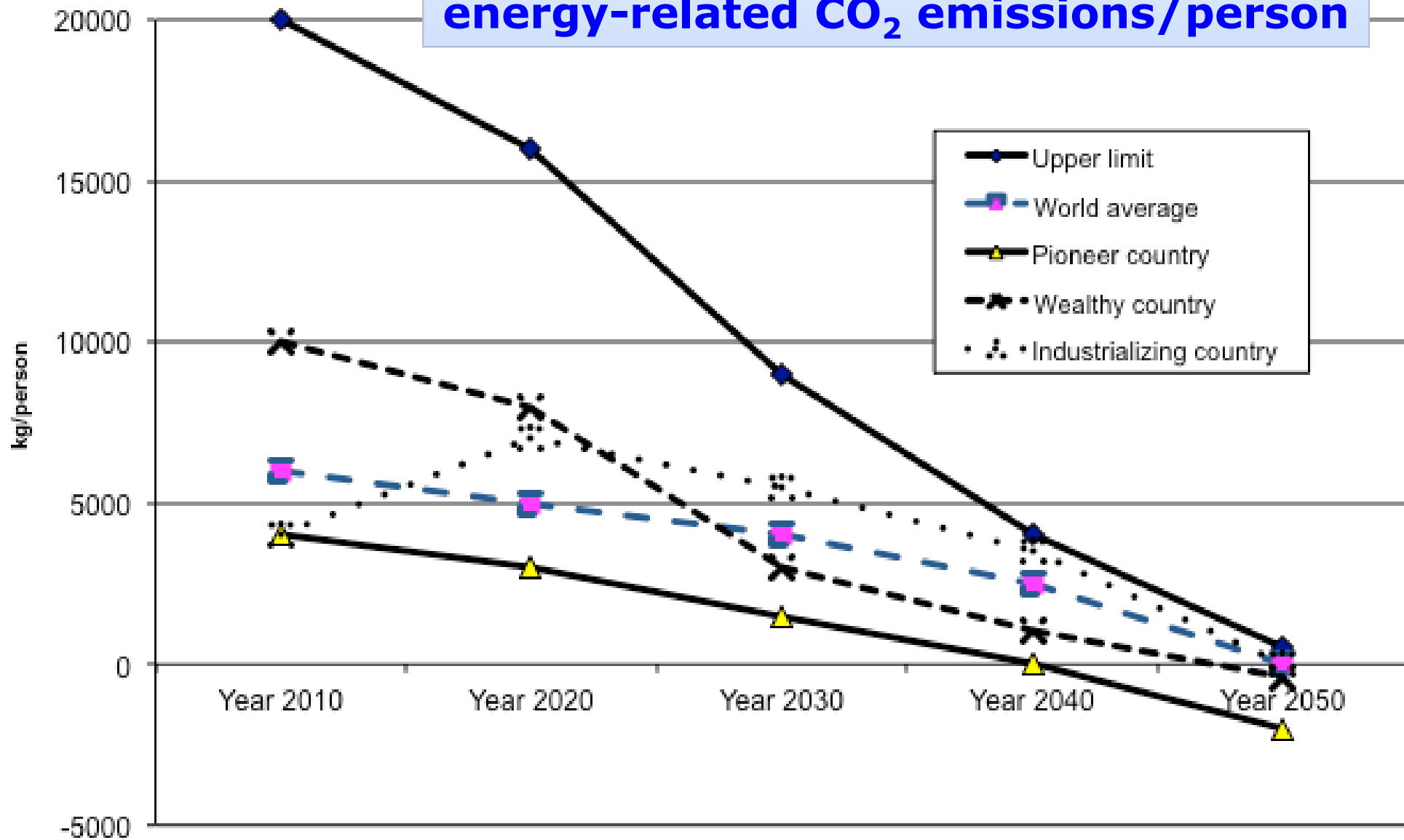
Agriculture + Industry + Commercial + Transport + Households

Activities require Energy Services

Light + HVAC + Drive Power (stationary, mobile) + Process Heat



**DEEP DECARBONIZATION =
Contracting & Converging
all countries' average
energy-related CO₂ emissions/person**



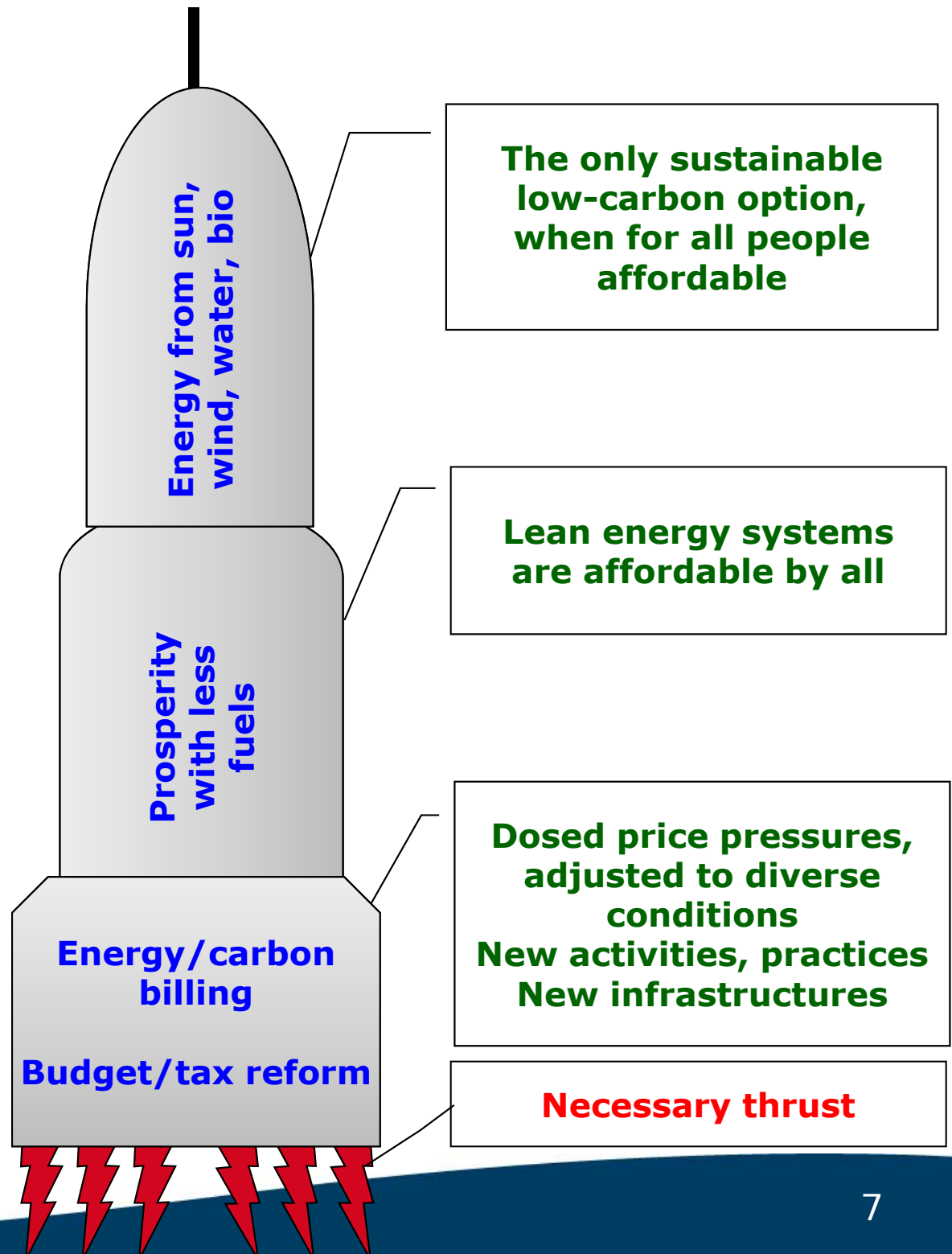


**Blow up the climate gridlock
=
All countries continuously
improve three indicators**

- Matches**
- SE4All
 - Polluter Pays
 - fairness

**Rejects
emissions trading
with offsets**

Universiteit Antwerpen





Transitions

Thorough ↔ Fake

1. Nuclear phase-out + local, public RE initiatives	1. Nuclear as low-carbon + large-scale RE
2. Technological innovation: <ul style="list-style-type: none">• energy efficiency• PV, wind, batteries	2. Questionable innovation: PWR? CCS? biomass combustion? large-scale tidal?
3. FIT (Feed-in tariffs): support innovations per RE category	3. Subsidies for nuclear PWR: UK price guarantee £92.50/MWh during 35 years (not enough!)
4. Superior RE technologies: mediocre RE sources harvestable, redundant powergen. capacities, regulatory solutions needed, independent public regulators	4. Old power supply model: capacities on command, Optimal composed systems Marginal cost pricing Now amended with payments for capacity
5. Emulation by all countries: essential for global solution & sustainable development	5. Emulation by developing countries: Unlikely, impossible



Transitions: Thorough + Urgent

- **Sustainable Development ↔ Business-as-usual**
 - No general mantras, but practical bolts and nuts
 - Sustainability assessments of technologies, projects, policies
- **Thorough electricity/energy transitions**
 - Rich countries develop & deploy technologies
 - Other countries will emulate techniques & practices
- **Only valid reference = future sustainable energy systems**
 - Renewable energy + efficiency ↔ energy 'Pantheon'
 - Local natural flows, prosumers first • complemented by centralized renewable plants
 - Kickstart transition, even stranding existing assets
 - Apply 'polluter pays principle': incumbents are liable, not the sustainable challengers
 - New electricity economics: most capacities not on command but stochastic and redundant (public interest regulation!)



Acropolis Workshop

Slides in Annex

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Interacting INFRA ⌘ SUPER structures

- **Dynamic history of mankind**
- **Energy & Technology are intertwined**
- **Histories are evolutionary & revolutionary, with inertia, lock-in, leapfrogging, ...**
- **Interests reign human actions**
 - **Incumbents ⇔ Innovators**
- **Paradigms sum-up visions and positions**
 - **Obsolete (deceiving) ⇔ Vanguard (promising)**
- **Actions on the floor = actual change, transition**

'Climate tax revenues' : indicator of GDP reform



4 money flows (2 positive – 2 negative)

	“Climate Goods”	“Climate Bads”
Levies, charges, taxes	B1 -	B2 +
Subsidies, support, feed-in tariffs	B3 +	B4 -

$$\text{'Climate tax revenues'} = (B2 + B3) - (B1 + B4)$$



At country level: Decompose factors in activities & actors, down to specific policy niches

Wealth Intensity of Persons: prices x activities by whom?

$$\text{Wealth Intensity} = \frac{\$ \text{ GDP}}{\text{Person}} = \sum_A \frac{P_A \times \text{Activity}_A}{\text{Person}} \quad (3)$$

Energy Intensity of Wealth: budget shares x efficiency

$$\text{Energy Intensity} = \frac{\text{kWh energy}}{\$ \text{ GDP}} = \sum_A \frac{P_A \times \text{Activity}_A}{\$ \text{ GDP}} \times \frac{\text{kWh energy}}{P_A \times \text{Activity}_A} \quad (4)$$

CO₂ emissions Intensity of Energy: energy mixes

$$\text{CO}_2 \text{ Intensity} = \frac{\text{CO}_2 \text{ emissions}}{\text{kWh energy}} = \sum_E \frac{\text{kWh type}_E}{\text{kWh energy}} \times \frac{\text{CO}_2 \text{ emissions}}{\text{kWh type}_E} \quad (5)$$



Lock-in (2014-....) Large energy companies ☸

EU Commission ☸ Nuclear discourse

- **Magritte Group (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 ETS as a flagship climate and energy policy**
- **EU (April 9, 2014) New Energy State Aid Guidelines**
 - **Refrain the German Energiewende**
 - **Payments for UK coal power capacity**
 - **Subsidize planned EDF EPR at UK Hinkley Point (€115/MWh during 35 years)**
- **Nuclear discourse molds fake reality**
 - **IAEA & IPCC option low-carbon (↔ renewables)**
 - **No real sustainability assessment**

Self-governance in global climate policy

