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Renewable and Nuclear Power: A Common Future?

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Three nuclear expansion waves

1. 1950s-60s: Atoms for Peace = bringing energy Eden on earth

**No other technology in human history ever received similar support from science, industry, government, public, ...
... but failed by the inherent attributes of the technology (+ overdosis hubris)**

2. 1970s-86: Solving the Oil crisis

⇔ **energy efficiency push (1979-84) created huge supply overcapacities (prices tumbled down – the push became short-lived – energy corporates organised fatwa against energy taxes)**

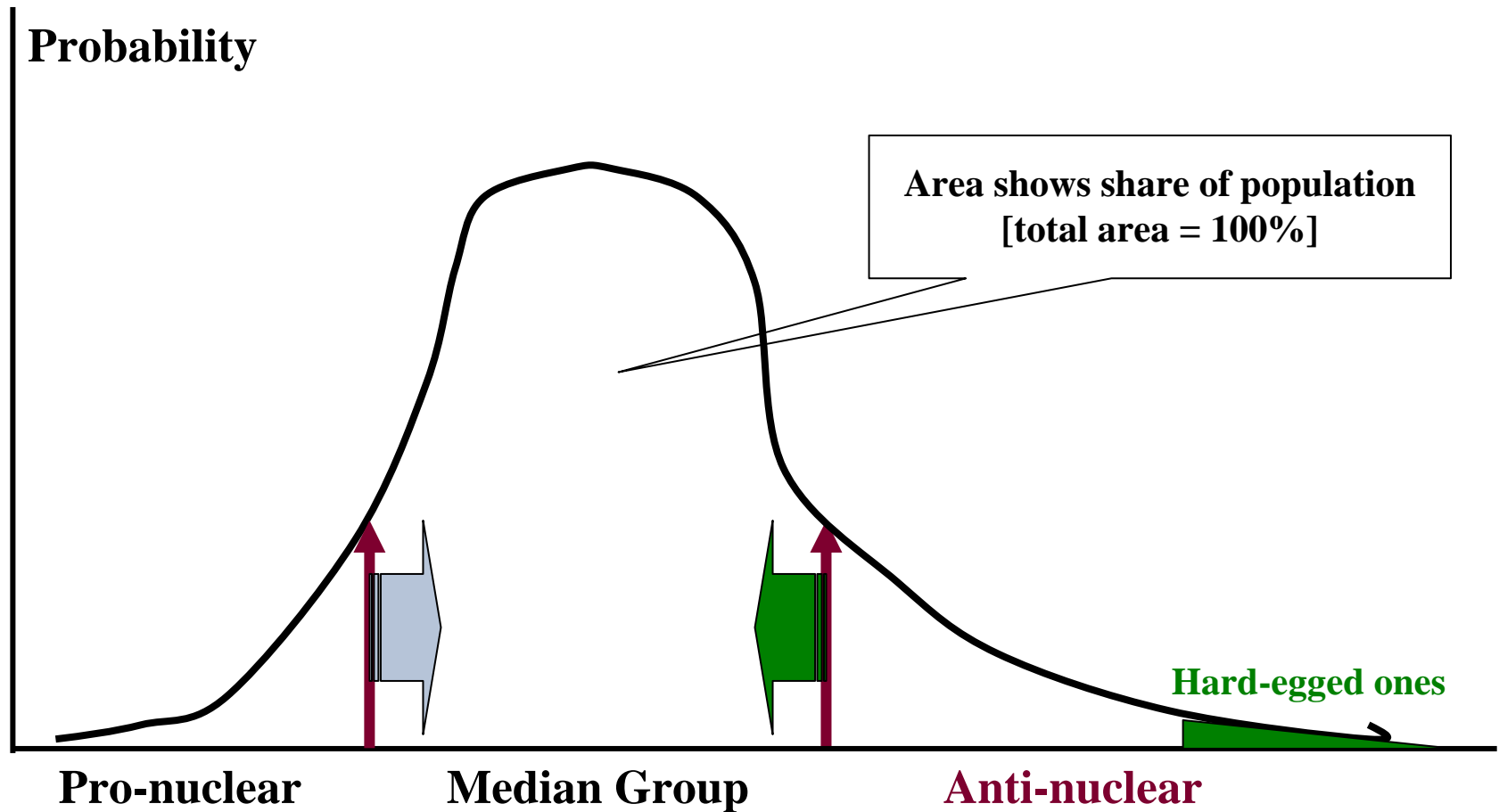
Chernobyl ended second wave

3. 1997 - ... : Solution for the Climate crisis

... ???



Bell distributed opinions on nuclear





Nuclear advocates

Polls reveal:

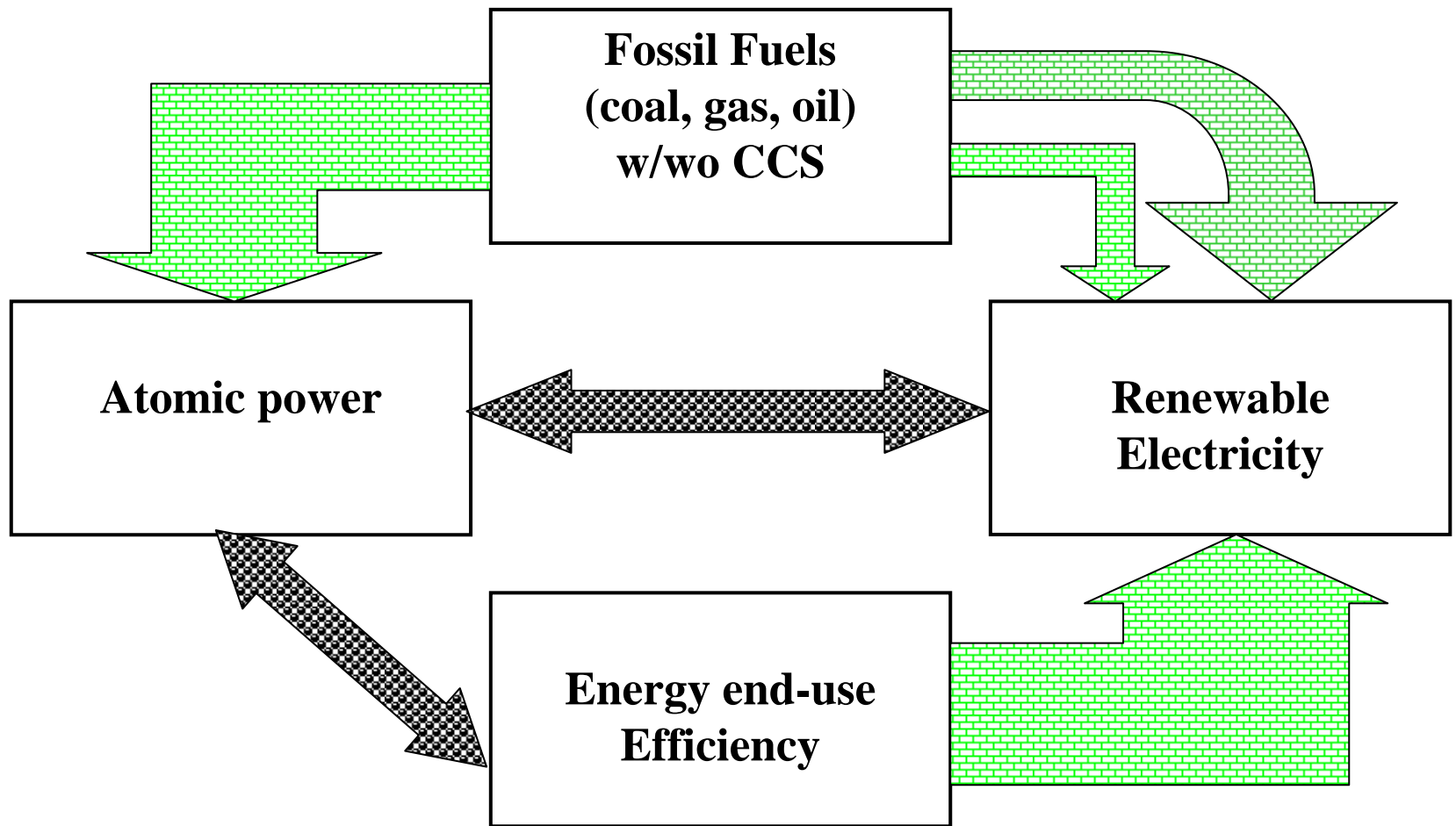
- Gauss distribution in public attitude towards atomic energy
- Large median voters group: willing to accept atomic power **AFTER** all efficiency/RE opportunities are exhausted

New strategy by nuclear advocates

1. Avoid hubris (at least publicly) with Newspeak: "Nuclear is not the solution, but there is no solution without nuclear"
2. Isolate the opponents (avoid debate – reduce their public exposure – liquidate socially the 'hard-edged' ones)
3. All who says 1 good word of nuclear is a friend (⇔ before: all who says 1 bad word of nuclear is an enemy)
4. **Sollicite a marriage with renewable power**



Four players at the power table





Sustainable Backstop Technology

1987: *Our Common Future*

“Sustainable Development” : 4 dimensions (P’s)

Participation, Policy, Democracy, Governance	Publicly decided, agreed Citizen involvement
Fairness, redistribution opportunities & wealth	Supplies & Technologies accessible for all/nations
Ecological benign Planet	Exhaustion, pollution, life- support systems!
Economic efficient Prosperity	Low risks, affordable



Nuclear Sustainable?

Democracy Participation	<ul style="list-style-type: none">• Rejected by risk-aware citizens• Technocratic decision-making
Globally accessible?	<ul style="list-style-type: none">• Capital & old technology intensive• Proliferation (e.g. Israël, Iran, etc.)
Ecological benign?	<ul style="list-style-type: none">• Low carbon• Isotopes, waste, inert gases
Low risk?	<ul style="list-style-type: none">• Rolling-off risks (not insurable)• How expensive is safe enough?
Unlimited?	<ul style="list-style-type: none">• Breeders failed• Will Fusion ever deliver?



Renewables Sustainable?

Democracy Participation	<ul style="list-style-type: none">• Distributed and co-op systems• Procedural fairness feasible
Globally accessible?	<ul style="list-style-type: none">• RE is everywhere, most in the South• Technologies can be made accessible
Ecological benign?	<ul style="list-style-type: none">• Low carbon• Other impacts minor
Low risk?	<ul style="list-style-type: none">• Natural embedment• Large-hydro, non-sustainable biomass!
Unlimited?	<ul style="list-style-type: none">• Sun is reliable• Hydro/biomass are limited & competing



Compare Nuclear and Renewable candidates on 5 dimensions

1. **Role in the energy system**
 - **BAU ⇔ Sust.Dev. (“Urgent & Drastic Change”)**
2. **Fossil fuel add-on**
3. **Renovating & rebuilding Electric Grids**
4. **Risks and externalities**
5. **R&D and production capacities**



1. Role in the Energy System: Nuclear BAU

Logic remains

- **Risks are minor – society should be rational and accept**
- **Problems will be solved by future technology**

Centralised, bulky supplies

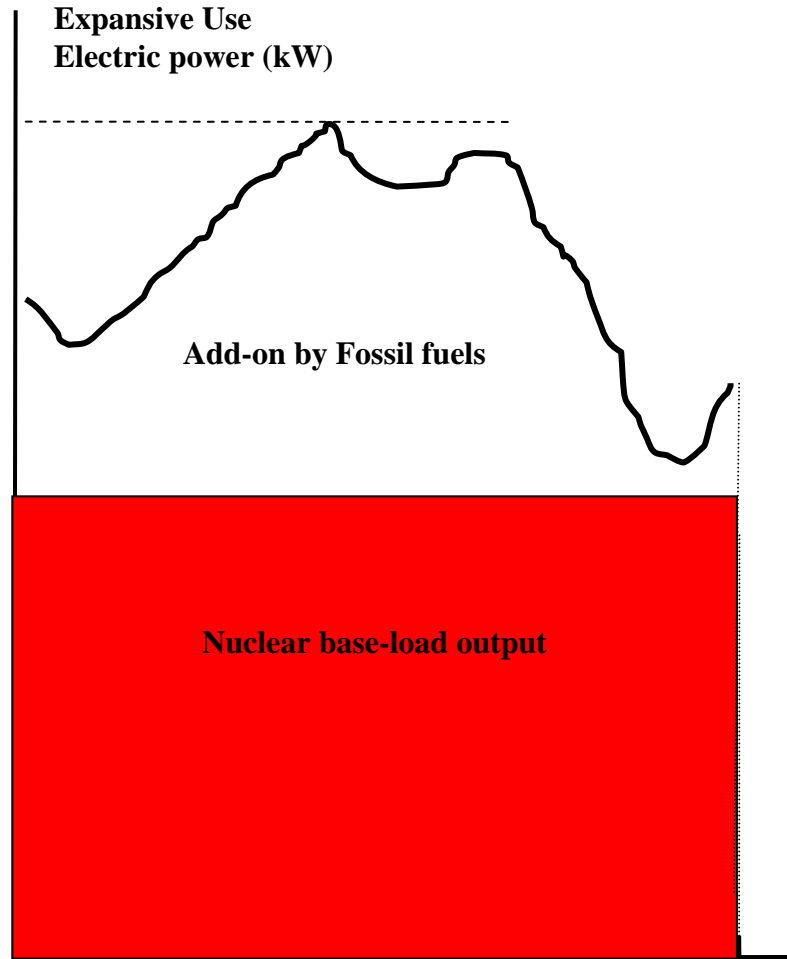
- **High capital investments**
- **Larger scales**
- **Multiple units (higher centralization of the power systems)**
- **Serial production**

Nuclear = BAU

- **Heraut / Architect of the post-war energy obesity**
- **Industrial societies have tried as hard as they could to make nuclear viable**
- **Ratio “Outcome/Inputs” is extremely low**
- **No indications of any significant changes**

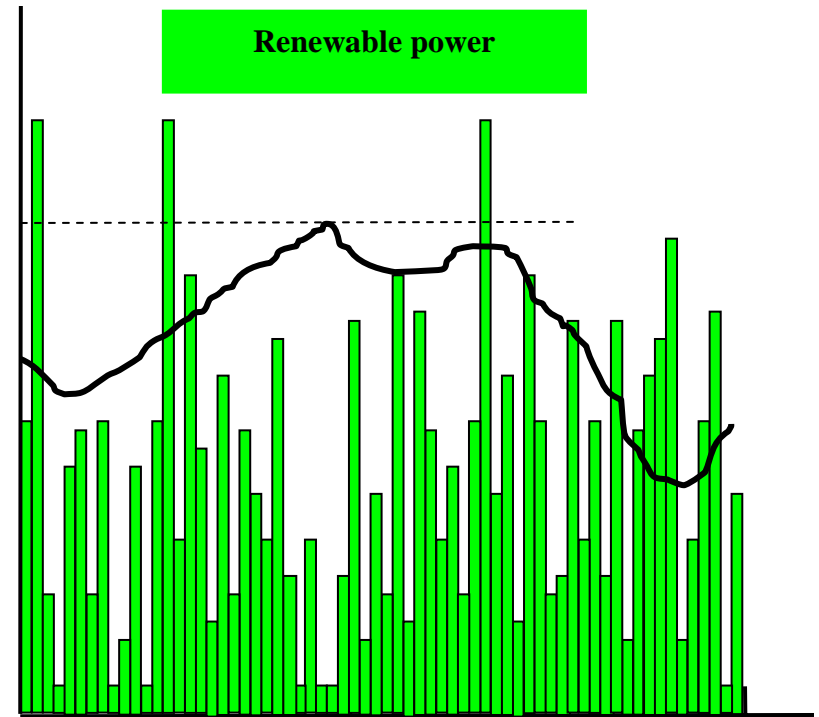


2. Fossil fuel add-on



Time

Efficient Use Electric power (kW)

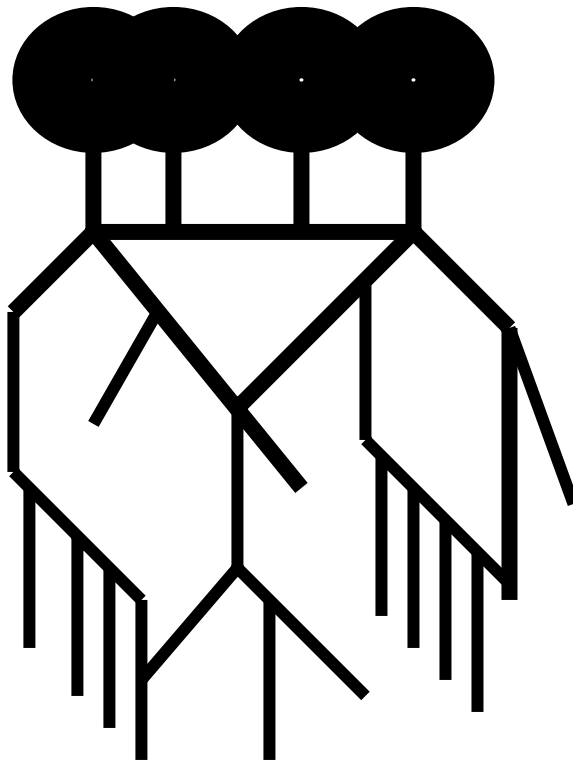


Time

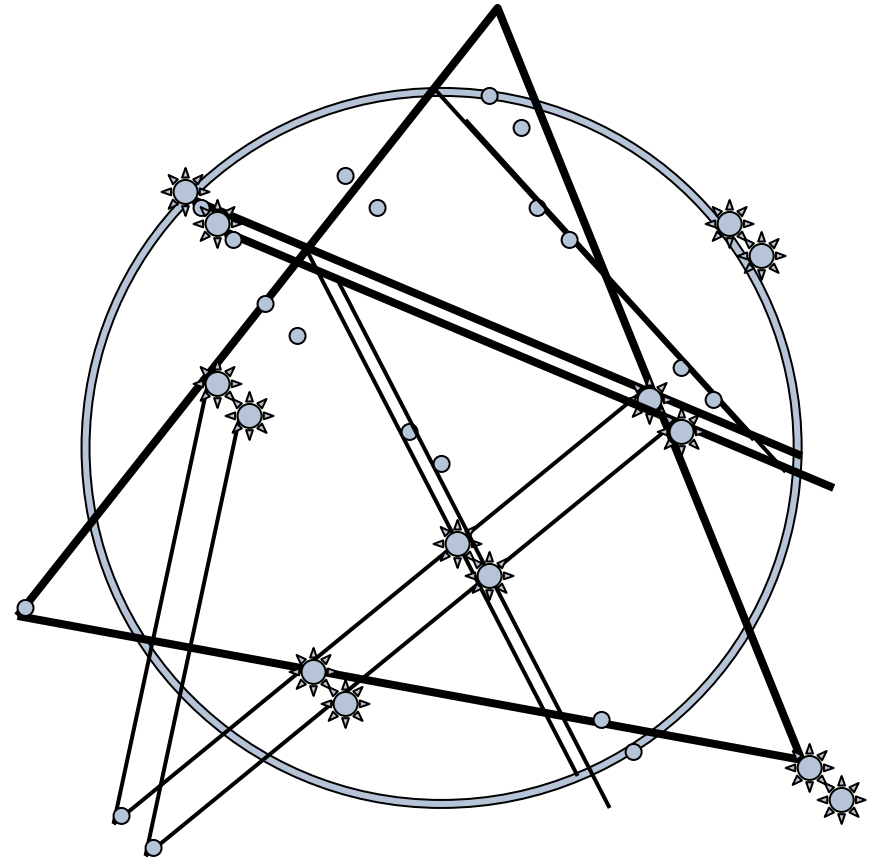


3. Electric Grid Structures

Pyramidal

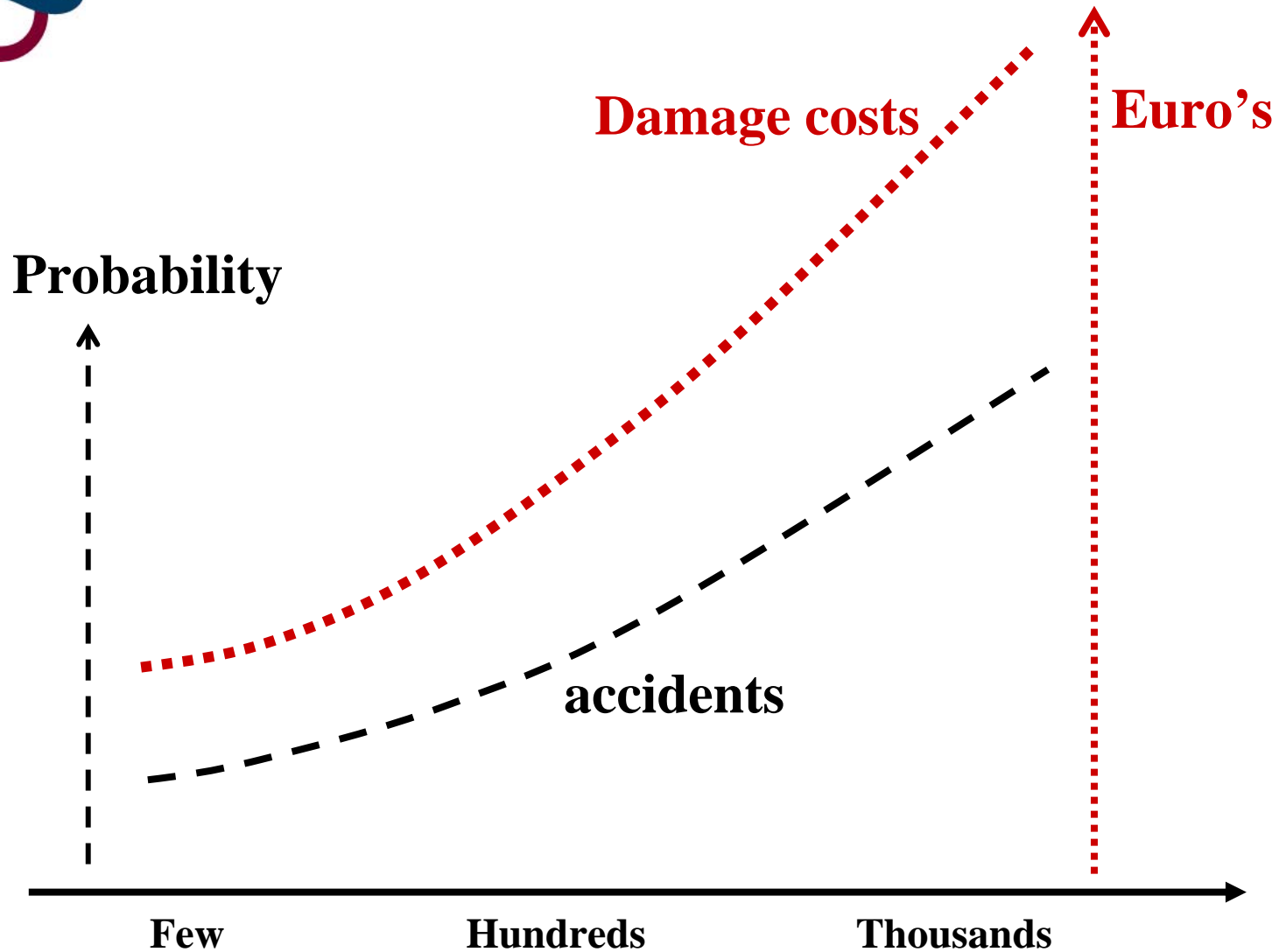


Multilateral





4. Nuclear risks not measurable but growing





Risk analysis & assessment

Risk analysis: technical job

- **huge problems: myopia (spatial and temporal), uncertainty, ignorance**
- **standard methods fall short (e.g. CBA, discounting)**

Risk assessment: personal matter

Social aggregation for policy making:

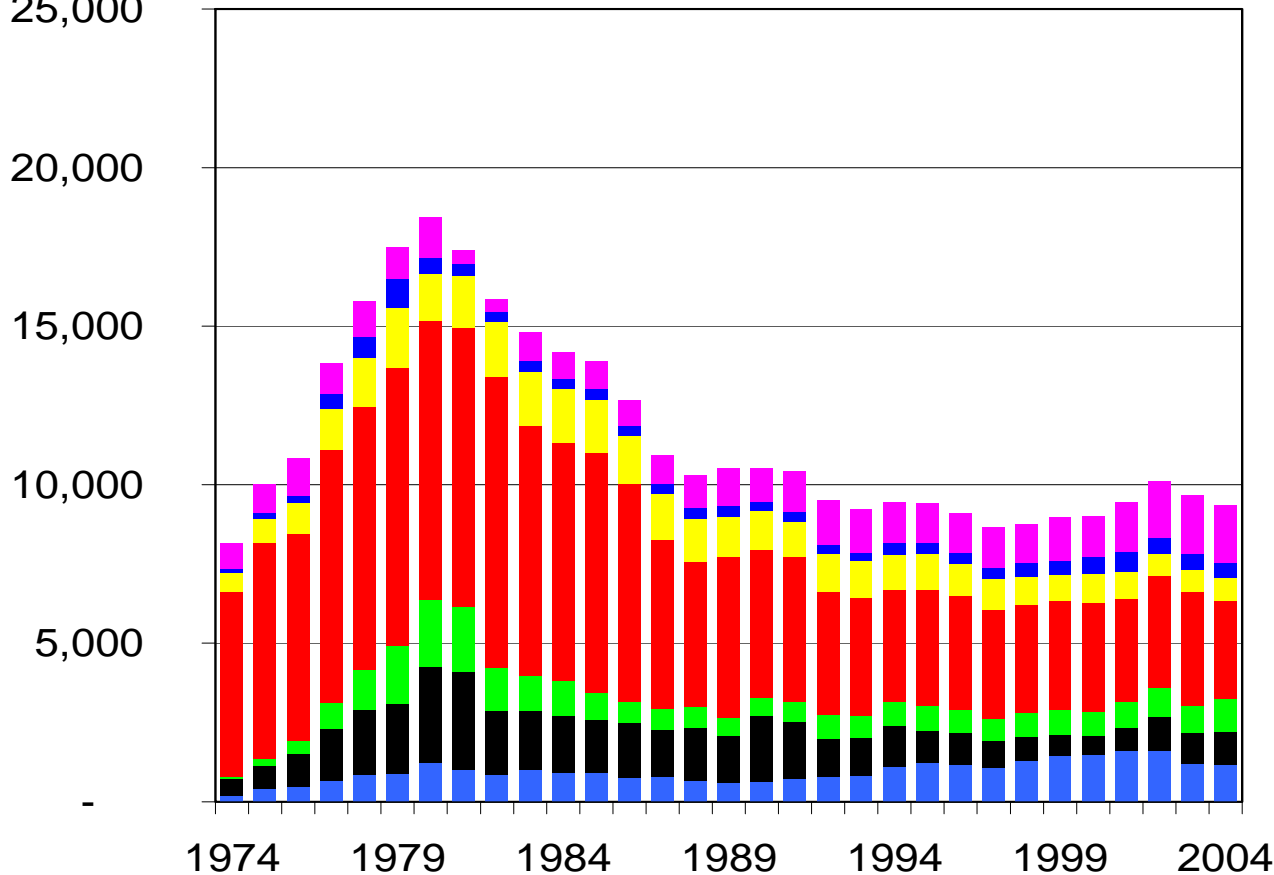
- **precautionary principle**
- **insurance is the workable institution**
 - * **principle: give up immediate gains for avoiding eventual high expenses in the future**
 - * **voluntary vs. mandatory – when the actions of one can (irreversibly) harm (many) others**

atomic power: mandatory insurance = phase-out



5. Public R&D subsidies (source: IEA)

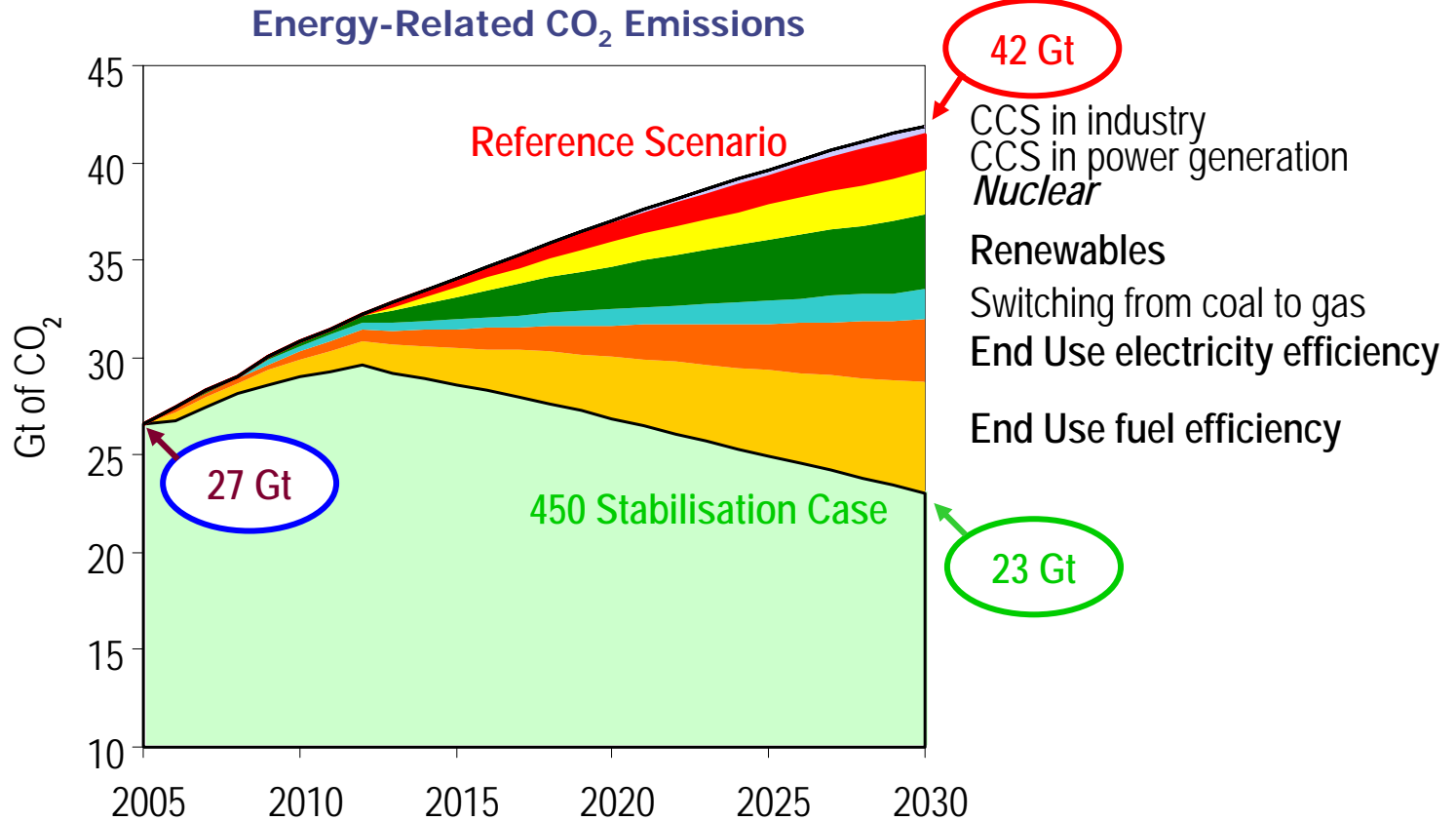
mil USD, 2004 prices and exchange rates
25,000



- Other
- Power & Storage technologies
- Nuclear Fusion
- Nuclear Fission
- Renewable Energy
- Fossil Fuels
- Conservation



IEA (Baron, 2008) turns sustainable





Conclusions

**Nuclear power is part of the climate problem,
not part of the solution**

**Real Sustainable Development (SD) is a drastic
& urgent change vs. BAU**

**Renewable energy is an essential component
of Sustainable Development**