

Is today's economic growth sustainable?

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Human development, sustainability and equity



*"It would be a gross violation of the universalist principle, if we were to be obsessed about **inter**generational equity without at the same time seizing the problem of **intra**generational equity"*

- Sudhir Anand &
Amartya Sen

21st century challenges: disparities and inequalities

Climate change



- Low HDI countries have experienced the greatest loss of rainfall and greatest increase in variability
- Implications for agricultural productions and livelihoods

Emissions per capita



- Emissions per capita are much greater in very high HDI countries than in low, medium and high HDI countries combined because of energy intensive activities

GHG emissions growth



- Overall levels of GHGs remain much greater in very high HDI countries, though $\frac{3}{4}$ of the growth in GHGs since 1970 comes from low, medium and high HDI countries.
- This stands without accounting for the relocation of carbon-intensive production to poorer countries.

In many cases the most disadvantaged people bear the repercussions of environmental degradation, even if they contribute little to the problem

Linking environmental risks and HDI

Individual level



- Household environmental deprivations – indoor air pollution, inadequate access to clean water and improved sanitation – are more severe at low HDI levels.

Community level



- Environmental risks with community effects – urban air pollution – seem to rise and fall with development.

Global level

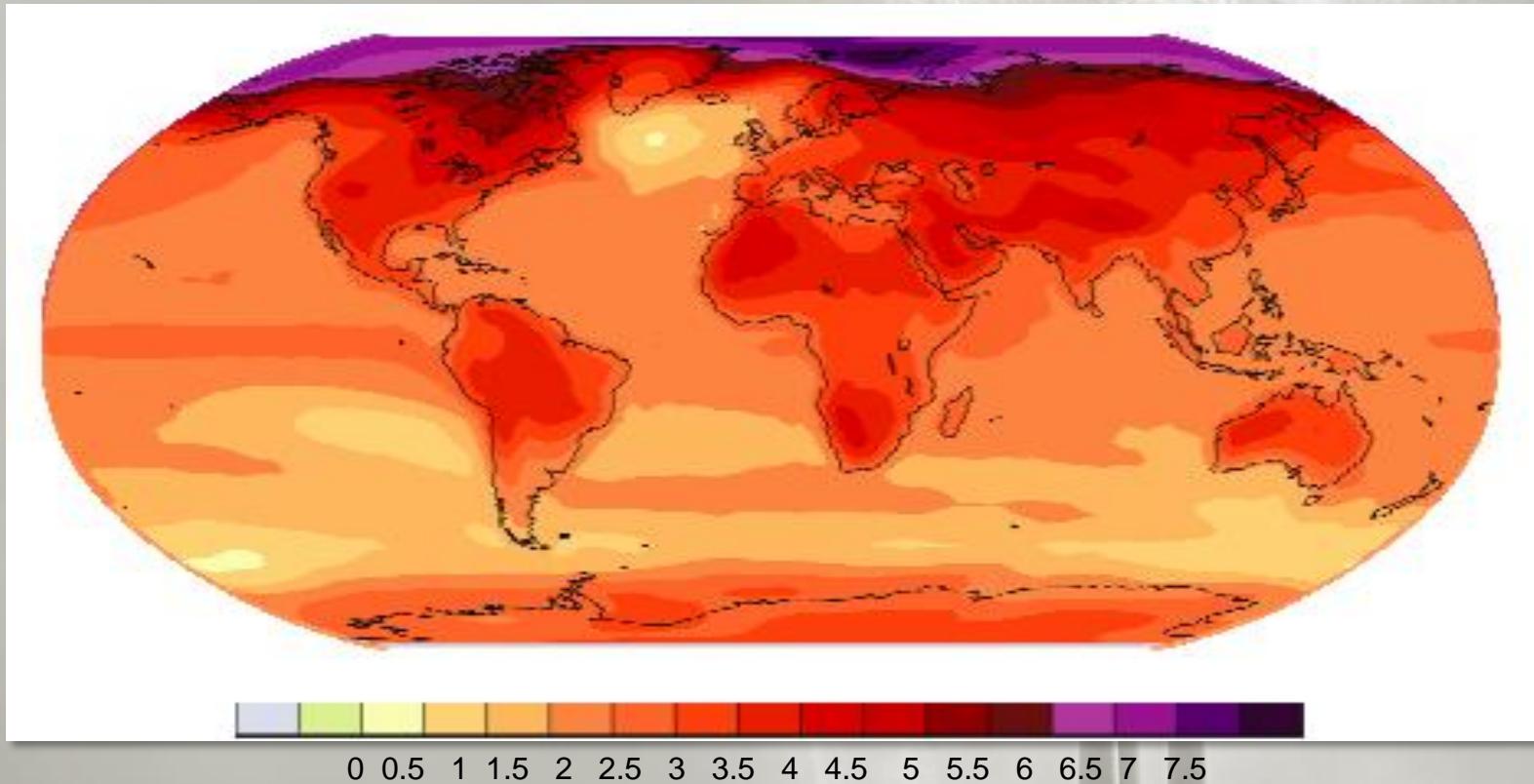


- Environmental risks with global effects – GHG emissions – typically rise with the HDI

Over recent decades, environmental deterioration trends have had adverse repercussions for human development, especially for millions of people who are dependent on natural resources for livelihood

Projected surface temperature changes

2090-2099 relative to 1980-1999



Continued emissions would lead to further warming
of **1.1°C to 6.4°C** over the 21st century (best estimates: **1.8°C - 4°C**)

Average arctic temperatures increased at almost twice the global average rate in the past 100 years



Annual average arctic sea ice extent has shrunk by 2.7% per decade

Possible abrupt or irreversible impacts



- Partial loss of ice sheets on polar land could imply meters of **sea level rise**, major changes in coastlines and inundation of low-lying areas



- 20-30% of **species** are likely to be at risk of extinction if increases in warming exceed 1.5-2.5°C



- Large scale and persistent changes in **Meridional Overturning** Circulation would have impacts on marine ecosystem productivity, fisheries, ocean CO₂ uptake and terrestrial vegetation

Climate change and Urbanization



Combination of stresses

- Climate change coalesces with **other stresses** on urban settlements
- Unmet resource requirements, congestion, poverty, political and economic inequity, insecurity, pressure from continuing growth, jurisdictional fragmentation, fiscal strains, aging infrastructure,....

These stresses can be serious enough that any significant additional stress could be the trigger for serious disruptive events.

Projected impacts on water resources



- Without appropriate measures, climate change will likely exacerbate **poverty** and continue to slow down economic growth
- Climate change will be a significant hindrance to meeting the **Millennium Development Goals** over the long term

Climate change adds to the list of stressors that challenge our ability to achieve the ecologic, economic and social objectives that define sustainable development

Projected impacts in the Arctic region



- Sea ice is projected to **shrink** in all scenarios
- **Reductions in the thickness and extent of glaciers and ice sheets**
- Increased coastal erosion

Changes in some Arctic natural ecosystems with detrimental effects on migratory birds, mammals and higher predators as well as on infrastructure and indigenous ways of life

Negative impacts on Europe

Inland and coastal flooding



More North Sea storms leading to increases in storm surges along the North Sea coast, especially in Denmark

Health risks due to heat-waves



Reduction of water availability and crop productivity in South Europe

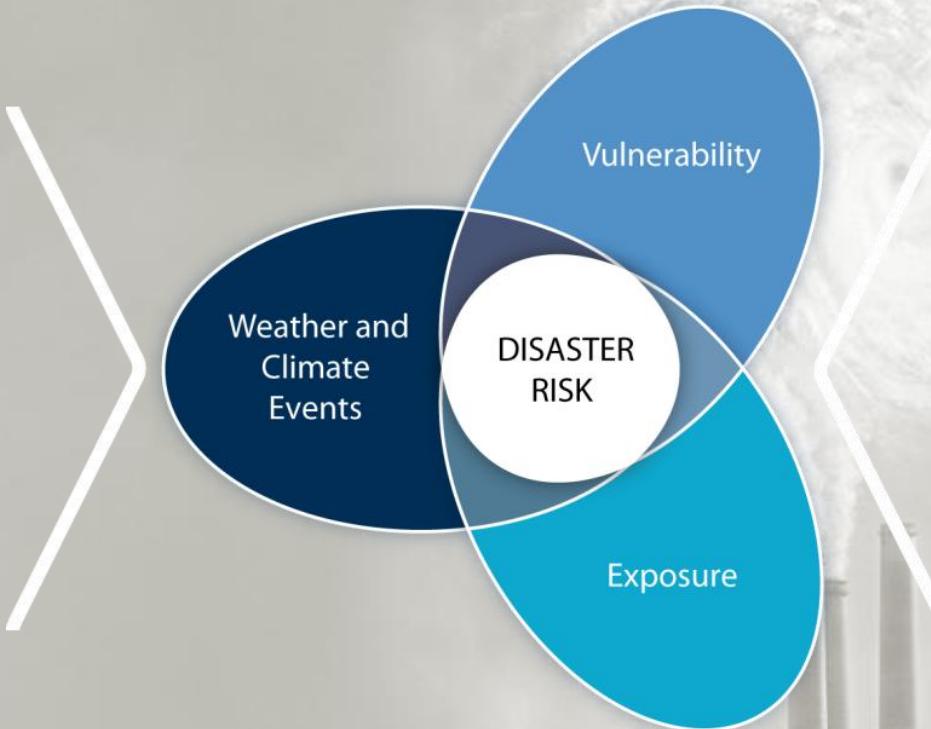


Species losses and reduced snow cover in mountains

Socioeconomic development interacts with natural climate variations and human-caused climate change to influence disaster risk

Disaster Risk:

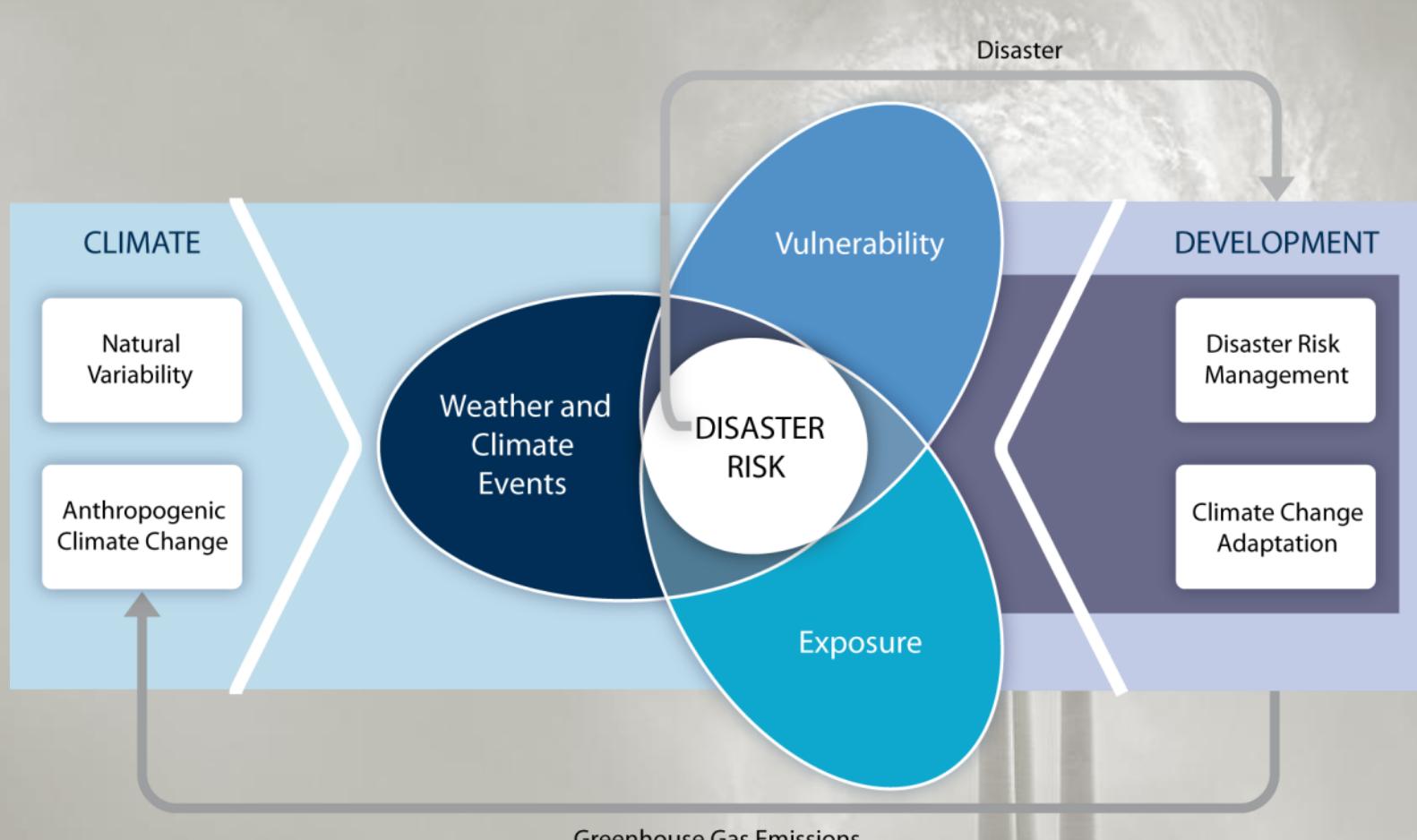
the likelihood of severe alterations in the normal functioning of a community or society due to weather or climate events interacting with vulnerable social conditions



Vulnerability:

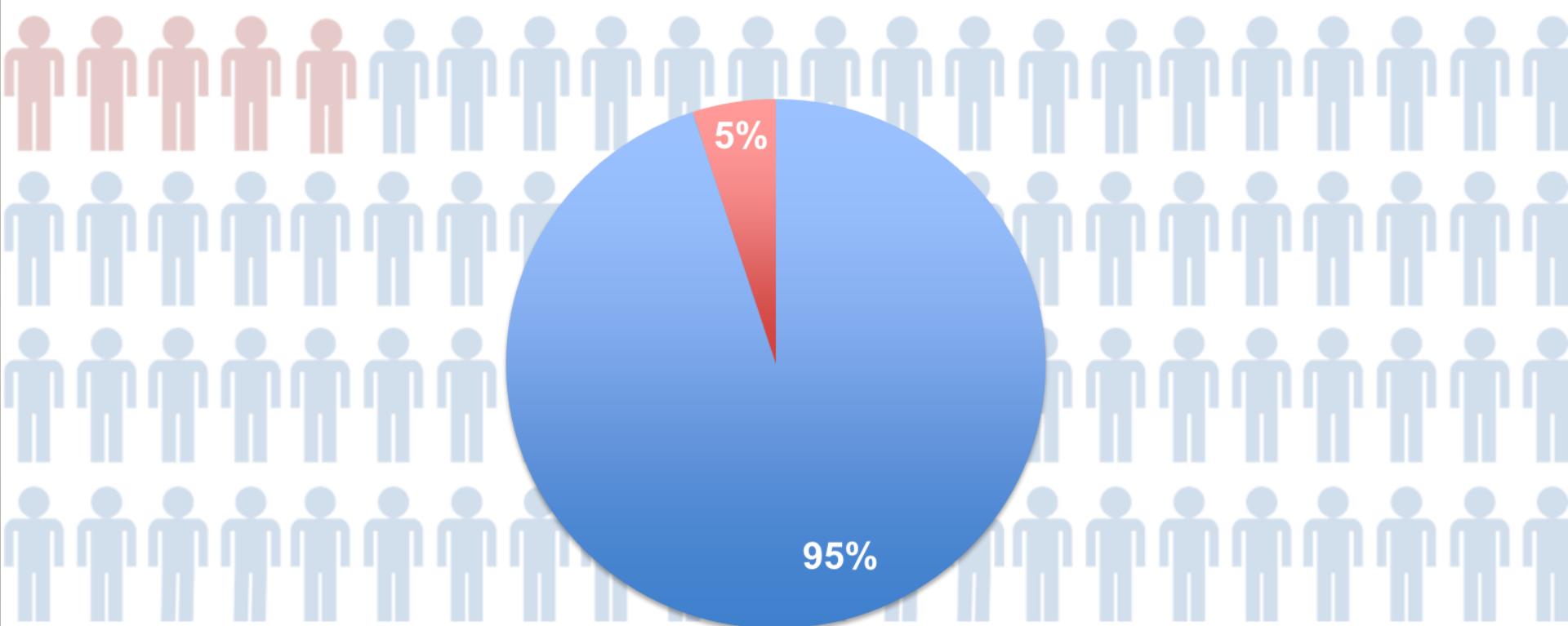
The predisposition of a person or group to be adversely affected

Increasing vulnerability, exposure, or severity and frequency of climate events increases disaster risk



Disaster risk management and climate change adaptation can influence the degree to which extreme events translate into impacts and disasters

Fatalities are higher in developing countries



From 1970-2008, over 95% of natural-disaster-related deaths occurred in developing countries

There are strategies that can help manage disaster risk now and also help improve people's livelihoods and well-being



The most effective strategies offer development benefits in the relatively near term and reduce vulnerability over the longer term

Alternatives to inequality and unsustainability: adaptation strategies

Increasing income levels, education and technical skills



Informing and educating to enhance the level of awareness and understanding



Improving disaster preparedness and management



Improving health care systems, access to water and sanitation



Promoting good governance including responsible decision making and communities empowerment



Increasing access to renewable energy



Sustainability is not exclusively or primarily an environmental issue

Adaptation and development



- Adaptation to the impacts of climate change & promotion of sustainable development share **common goals**:
 - Access to resources and equity
 - Stocks of human and social capital
 - Access to risk-sharing mechanisms
 - Institutional capacity



Social and environmental issues are often without effective support when economic growth takes precedence

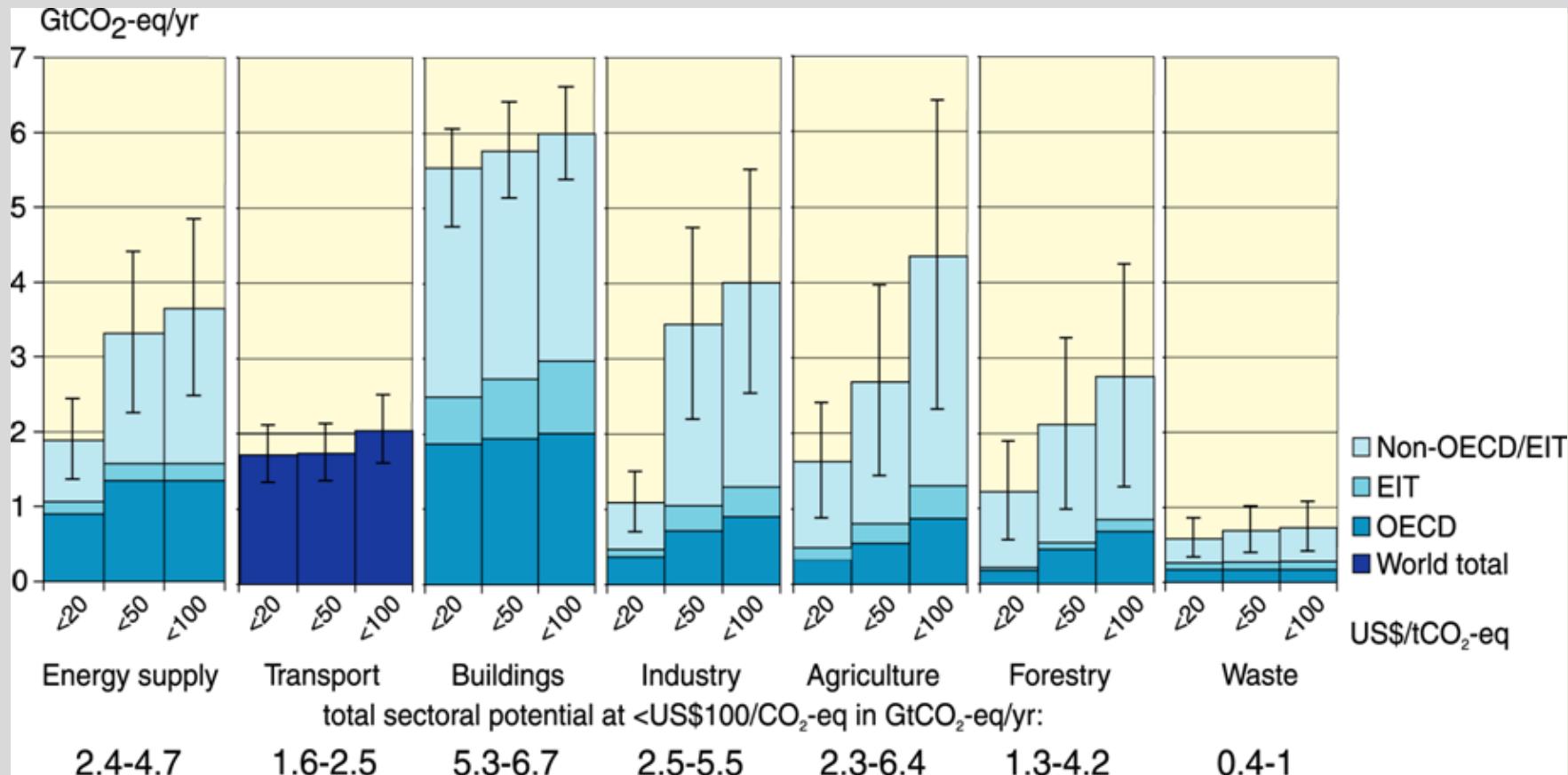
Characteristics of stabilization scenarios

Post-tar stabilization scenarios

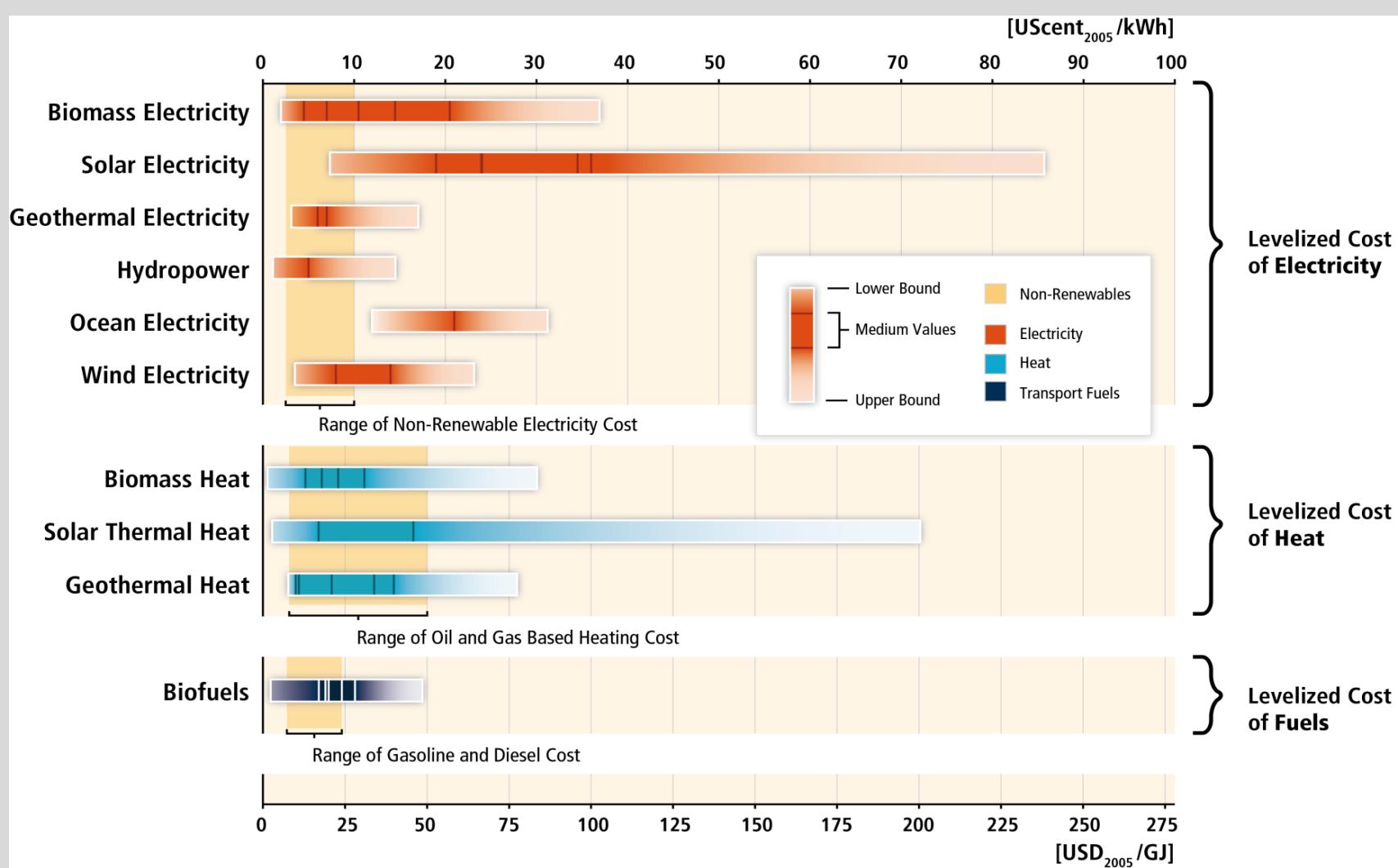
Stabilization level (ppm CO ₂ -eq)	Global mean temp. increase (°C)	Year CO ₂ needs to peak	Global sea level rise above pre-industrial from thermal expansion (m)
445 – 490	2.0 – 2.4	2000-2015	0.4 – 1.4
490 – 535	2.4 – 2.8	2000-2020	0.5 – 1.7
535 – 590	2.8 – 3.2	2010-2030	0.6 – 1.9
590 – 710	3.2 – 4.0	2020-2060	0.6 – 2.4

Opportunities – Mitigation targets

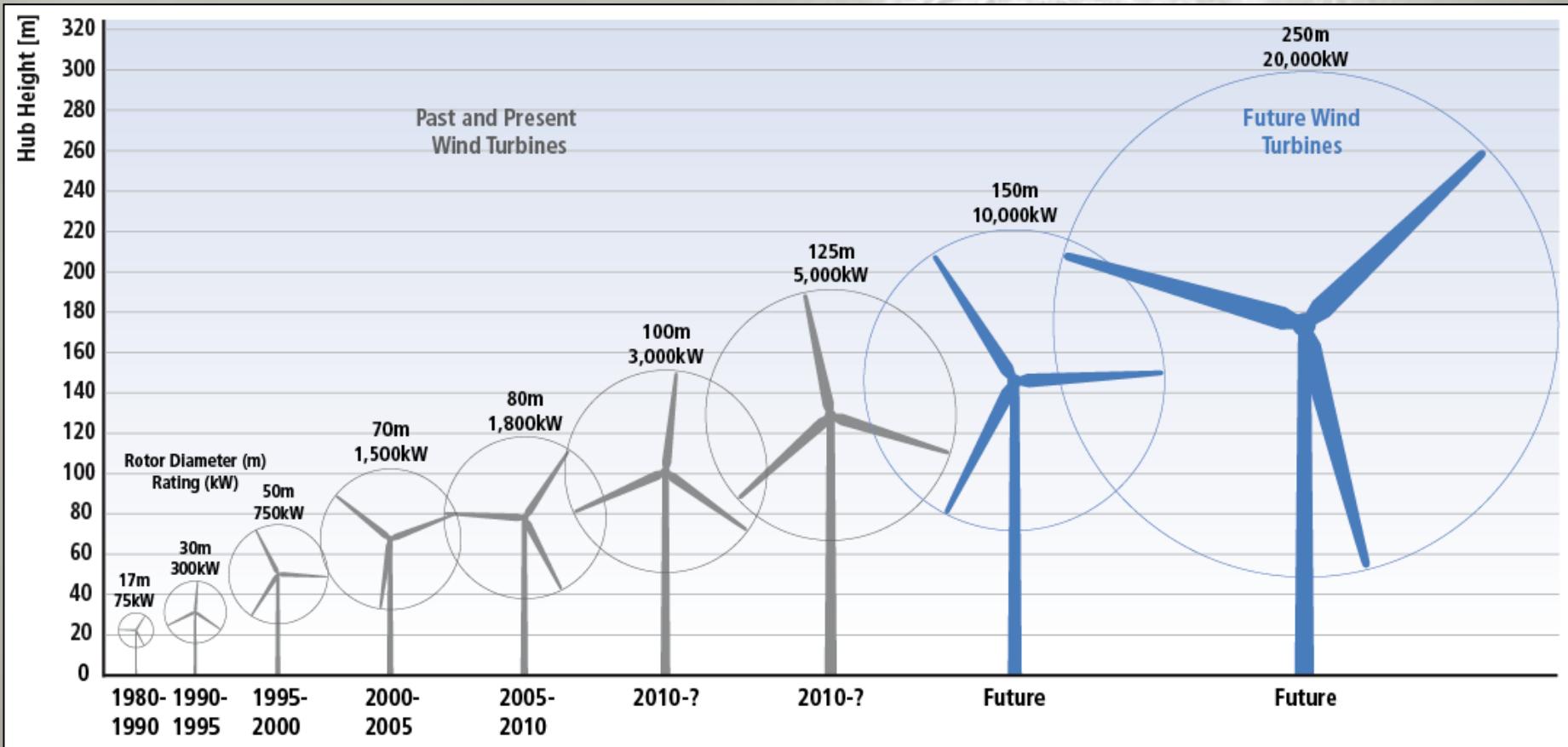
Economic mitigation potential by sector in 2030



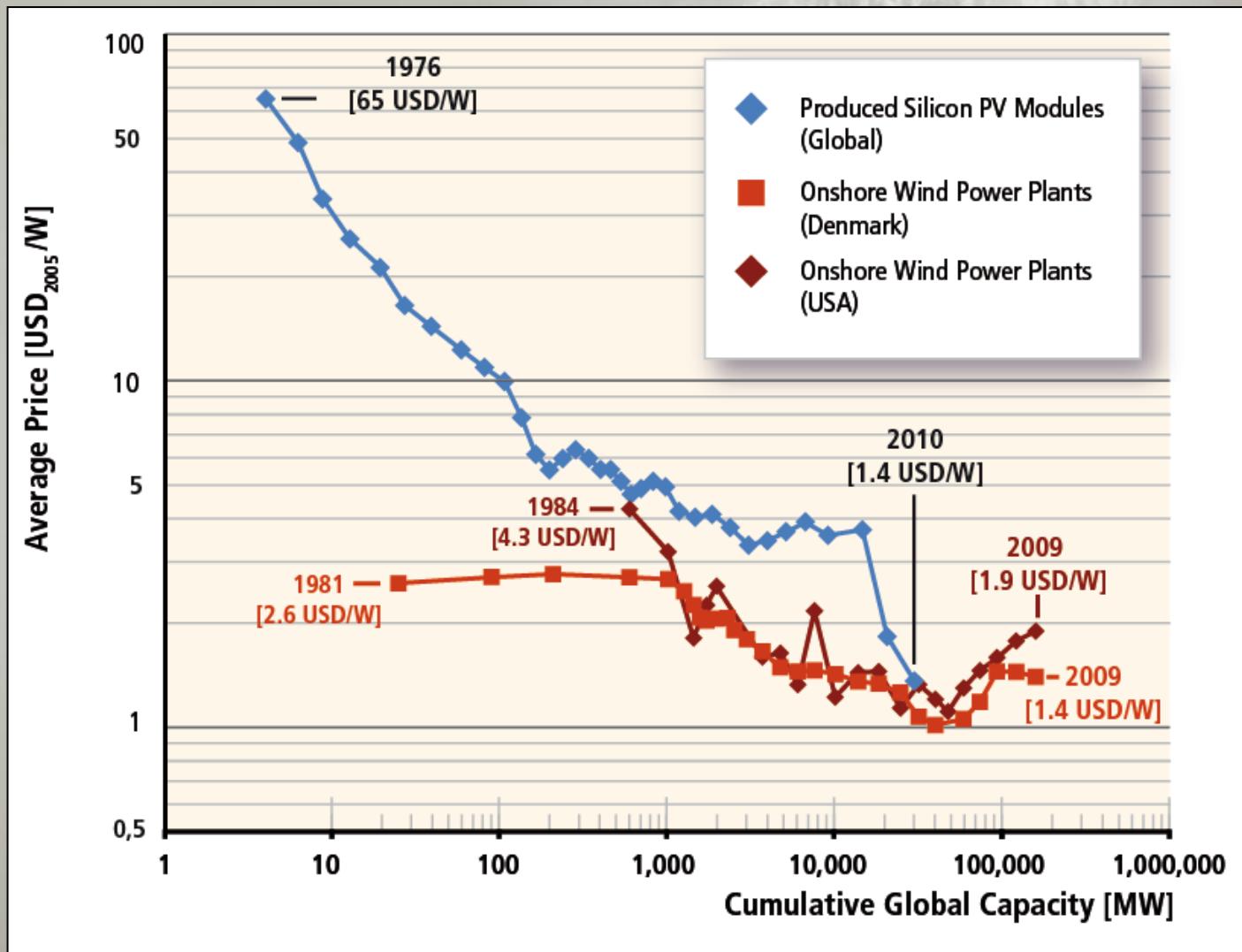
RE costs are still higher than existing energy prices but in various settings RE is already competitive



Technical Advancements: For instance growth in size of typical commercial wind turbines

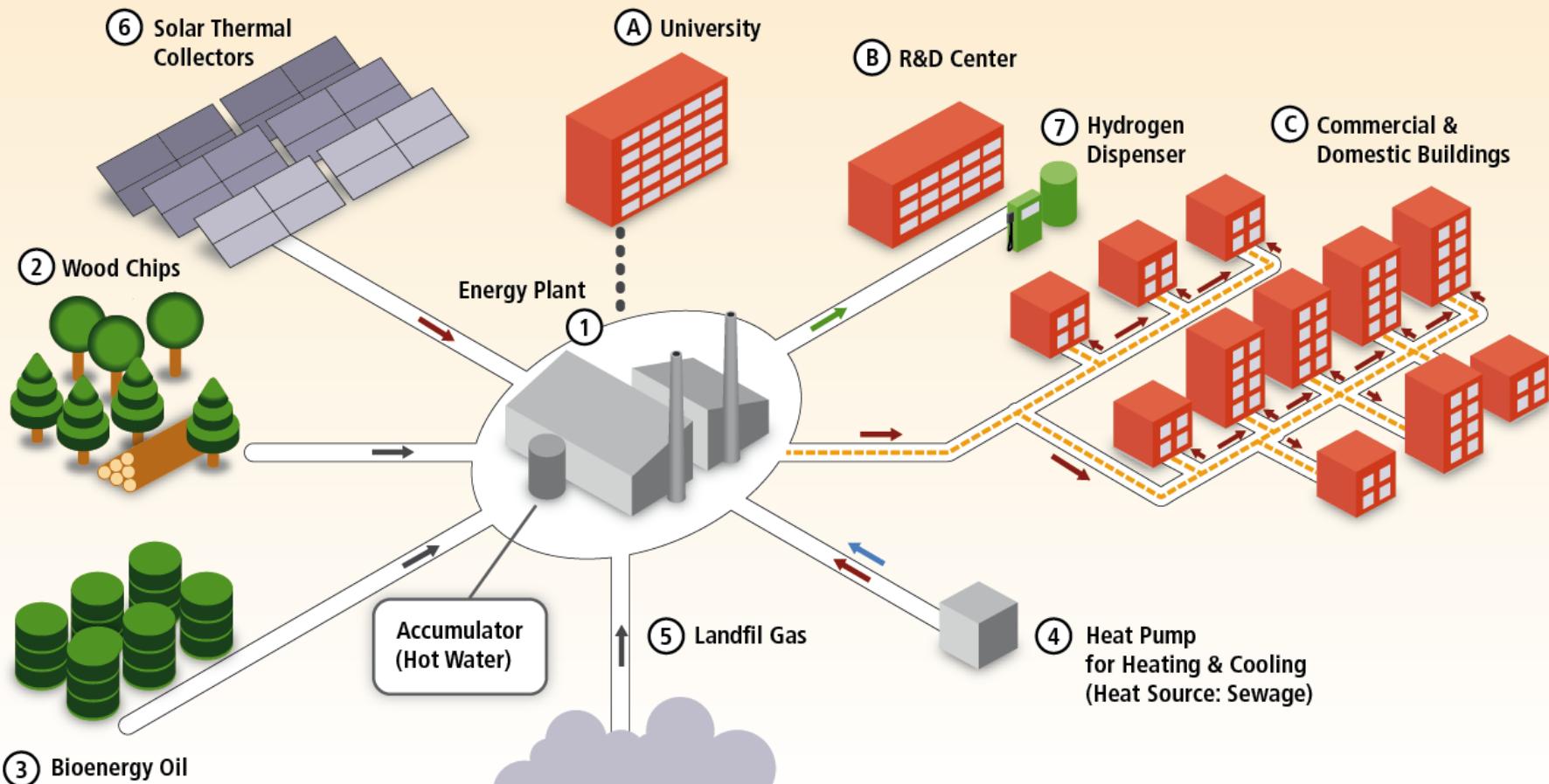


RE costs have declined in the past and further declines can be expected in the future



An integrated RE-based energy plant in Lillestrøm, Norway, supplying commercial and domestic buildings

Integrated Renewable Energy District Heating & Cooling System





LaBI
LIGHTING A BILLION LIVES

*"A technological society has two choices.
First it can wait until catastrophic failures
expose systemic deficiencies, distortion
and self-deceptions..."*

*"Secondly, a culture can provide social
checks and balances to correct for
systemic distortion prior to
catastrophic failures.."*

- Mahatma Gandhi

