

# A global perspective on green & low-carbon technologies in energy sector

*International Knowledge Sharing Workshop on*

***Cross-border Innovation, Acceleration and Challenges in International Transfer of Technologies***

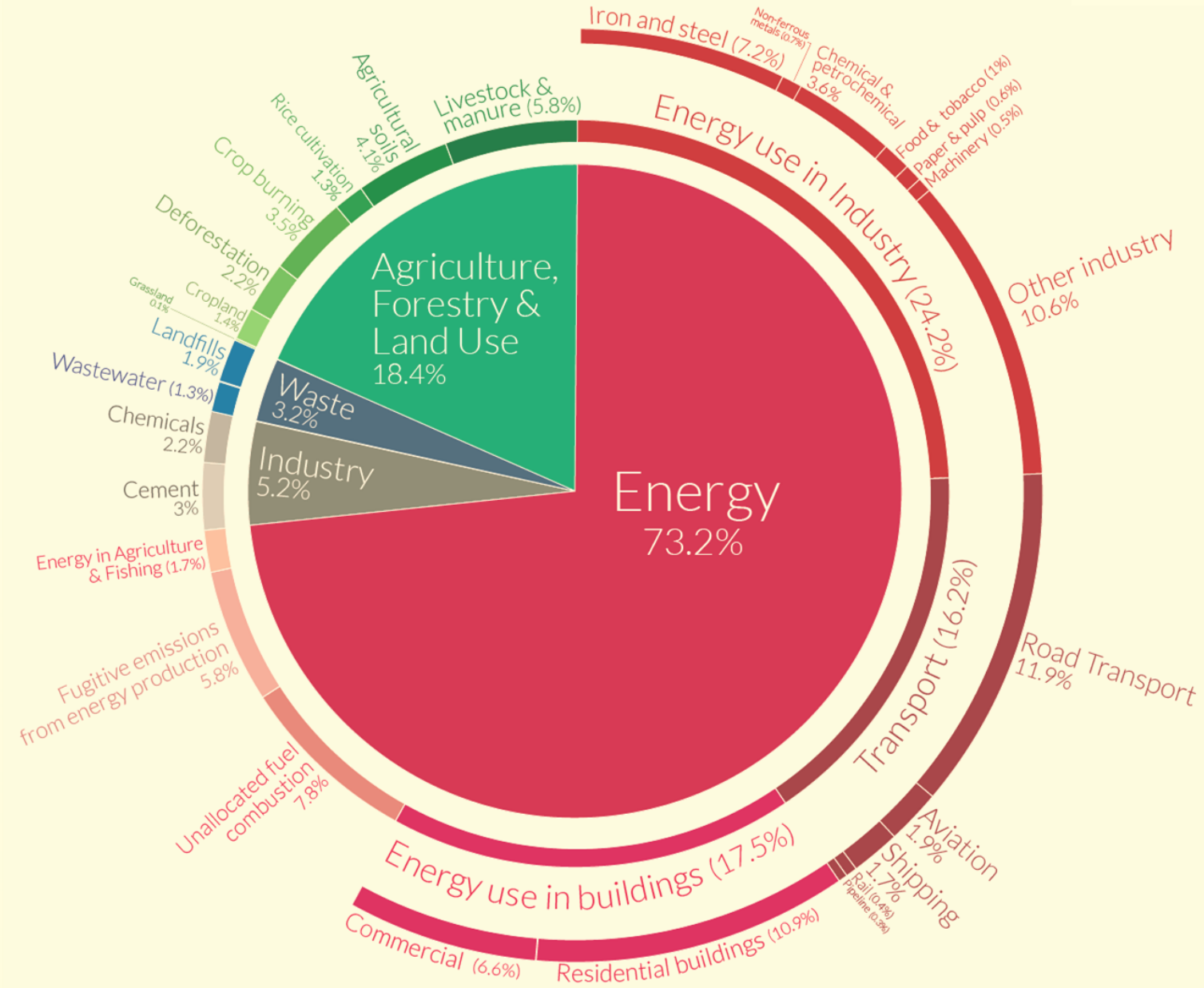
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# Global greenhouse gas emissions by sector

This is shown for the year 2016 – global greenhouse gas emissions were 49.4 billion tonnes CO<sub>2</sub>eq.



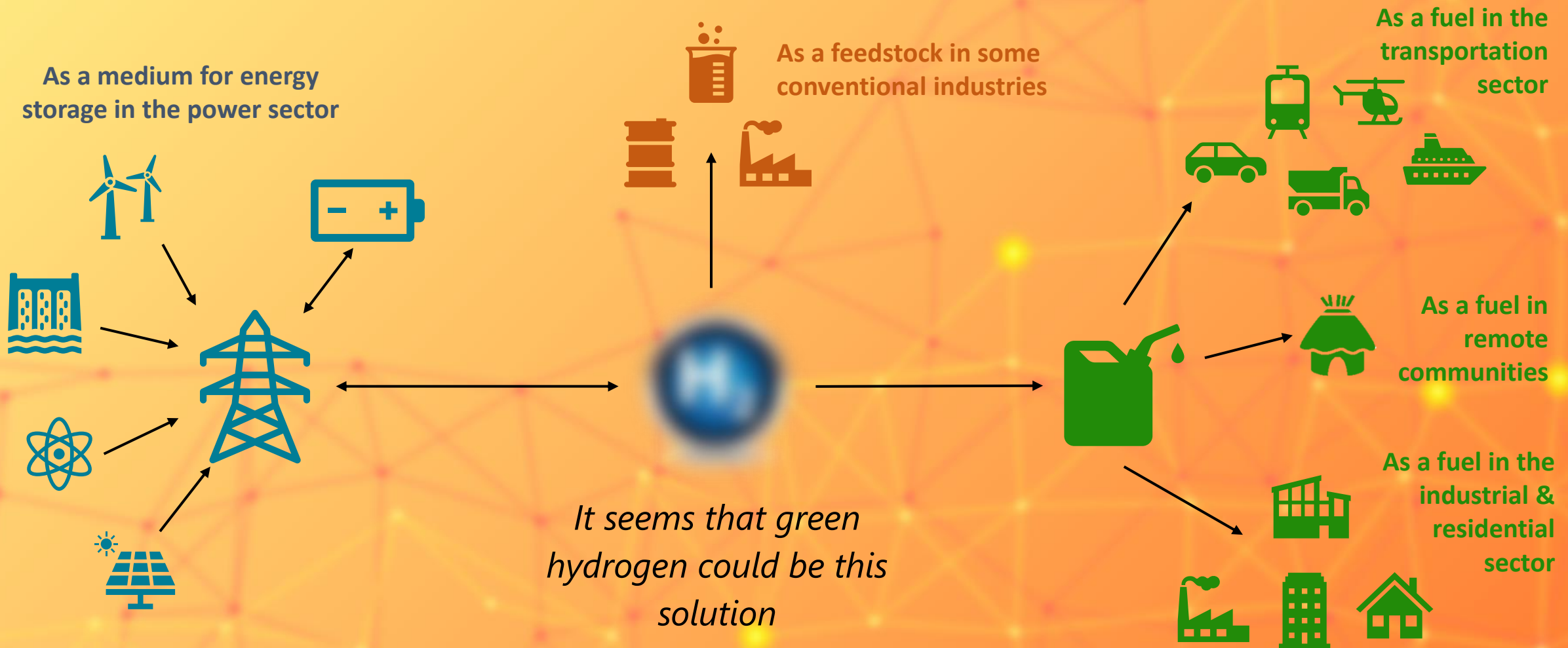
OurWorldinData.org – Research and data to make progress against the world's largest problems.

Source: Climate Watch, the World Resources Institute (2020).

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*Our energy needs, in all its different forms, put together, contributes more to global carbon emissions than any other aspect of human existence*

*The habit of fossil fuels is so deeply ingrained that we need a versatile solution that could easily plug into our current energy systems*



**Greening of the grid; electrification of energy demand; and green hydrogen are probably the technologies of tomorrow**

*Greening of the grid is happening – today approximately 15% of electricity is green in India – solar, wind. Hydro, nuclear, biomass*

*Solar is cheapest – and local manufacturing is growing – thanks to PLI (India), IRA (USA), etc. – but as demand for PV panels increases, geographical diversification is essential to avoid choke points in the supply chain*

*Batteries are essential to reach high levels of green electricity penetration*

*Technology development is occurring in startups in USA and Europe – but now Indian companies are also buying the startups*

*Electrification is also occurring – though much more slowly*

*Electric vehicles are entering the market; in India, base technologies have been purchased, and indigenised; high efficiency, high load carrying 2-wheelers will require local R&D; charging infrastructure has not received R&D support*

*Industry applications are not growing: largely because high temperature applications are dominated by high-temperature steam from coal-fired boilers*

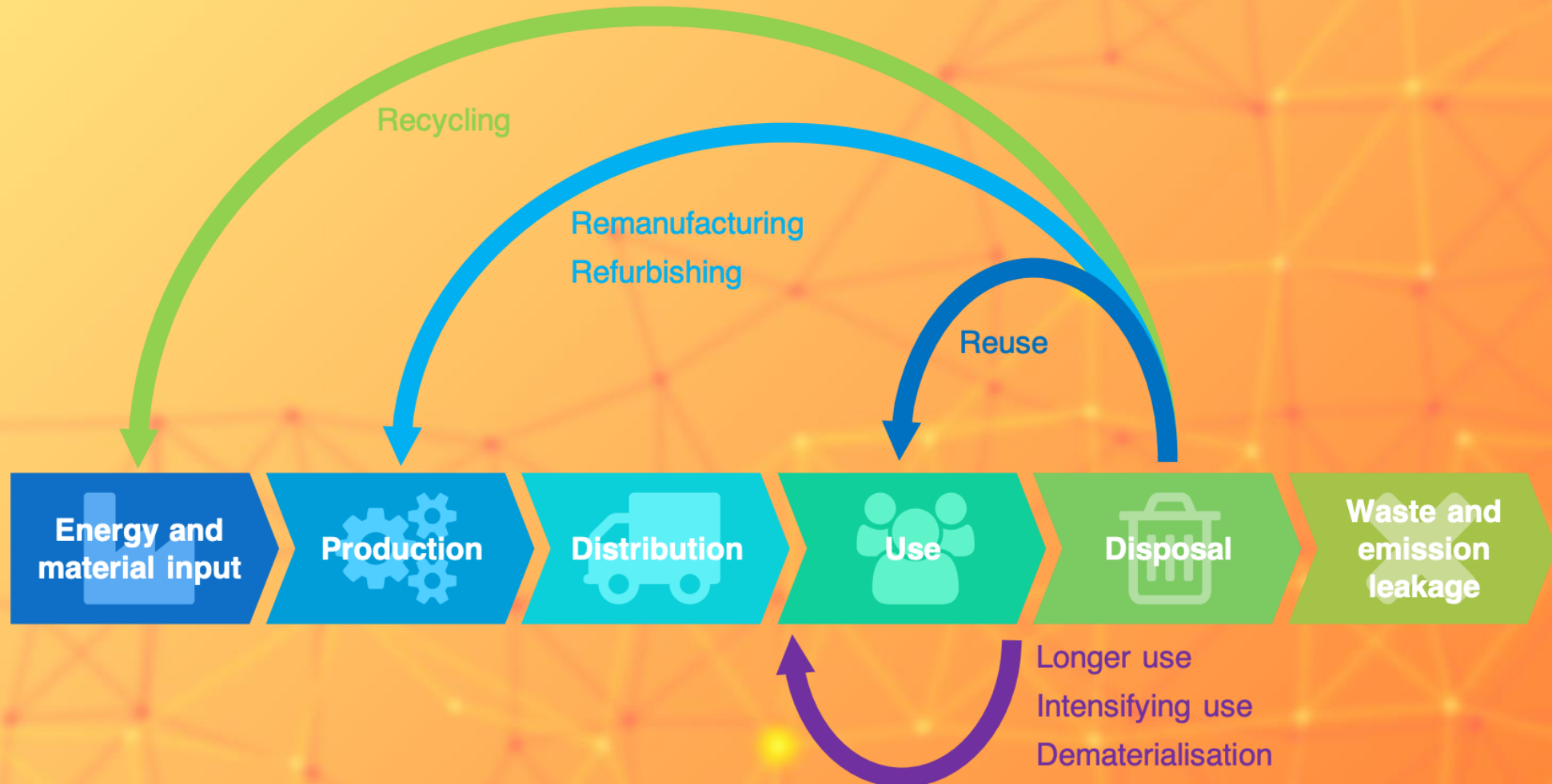
*Integration of renewables (especially solar) in buildings requires indigenous technologies*

*Hydrogen manufacturing is being built on base of current electrolyser technologies; several Indian companies are scaling up size and efficiency of electrolysers*

*Hydrogen utilization in industry requires R&D*

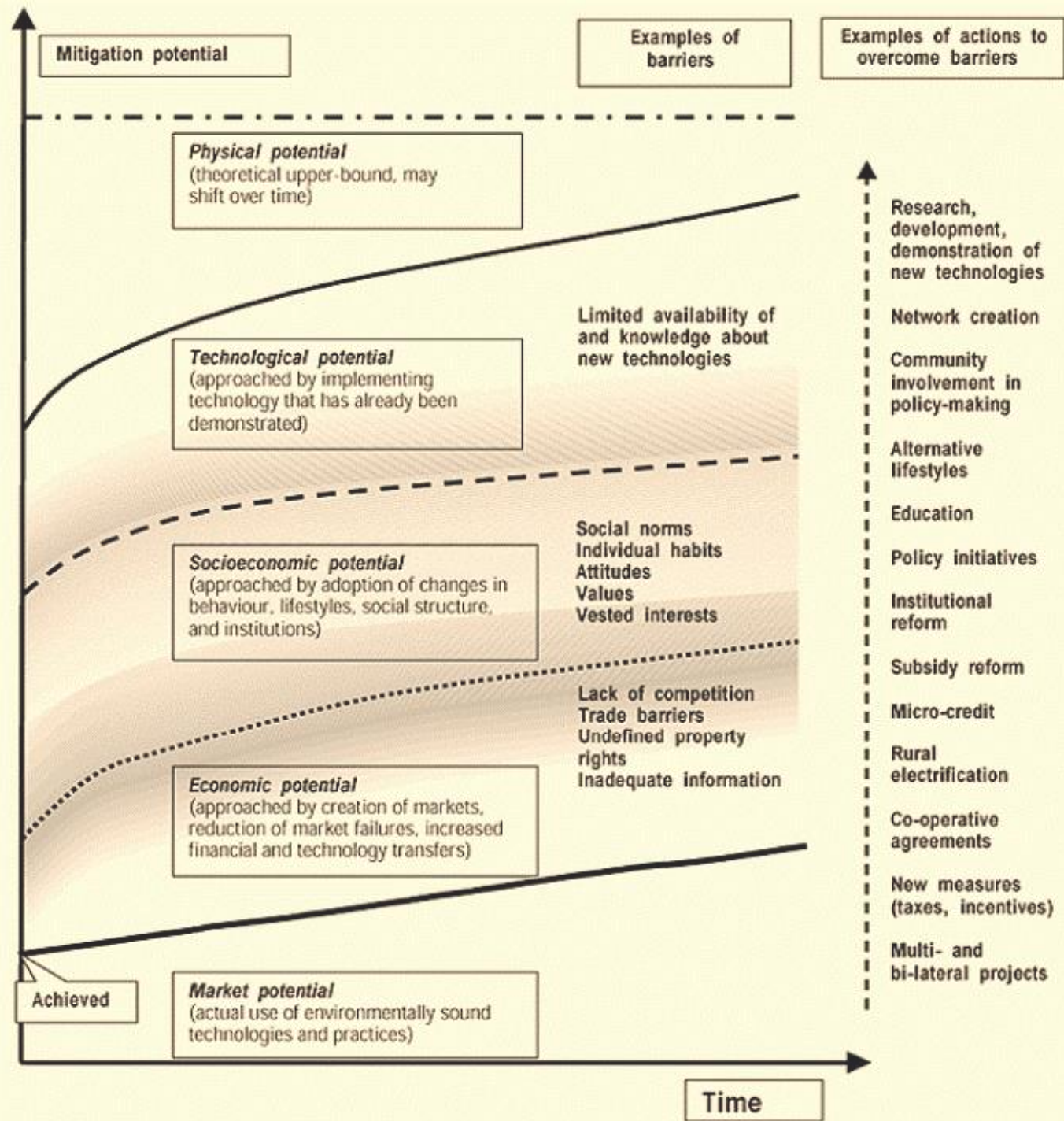
- Steel industry is building up on technology being developed in Sweden*
- Fertilizer uses hydrogen, but technologies are supplied by a small group of technology suppliers*
- Petrochemicals needs new technologies*

*While some habits cannot be quit easily, it is imperative that we establish other practices like energy efficiency and a circular economy that make the transition easier*



*For emerging technologies to take root, cultivate the right environment with policy tools*

- *Market creation activities*
- *Subsidising R&D*
- *Setting technology & performance standards*
- *Subsidising dissemination of technology*
- *Taxation and cap-and-trade systems*
- *Policy mixes – Price mechanisms, regulatory measures,*
- *International collaborations and technology transfer policies*





*Thank You*

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