



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

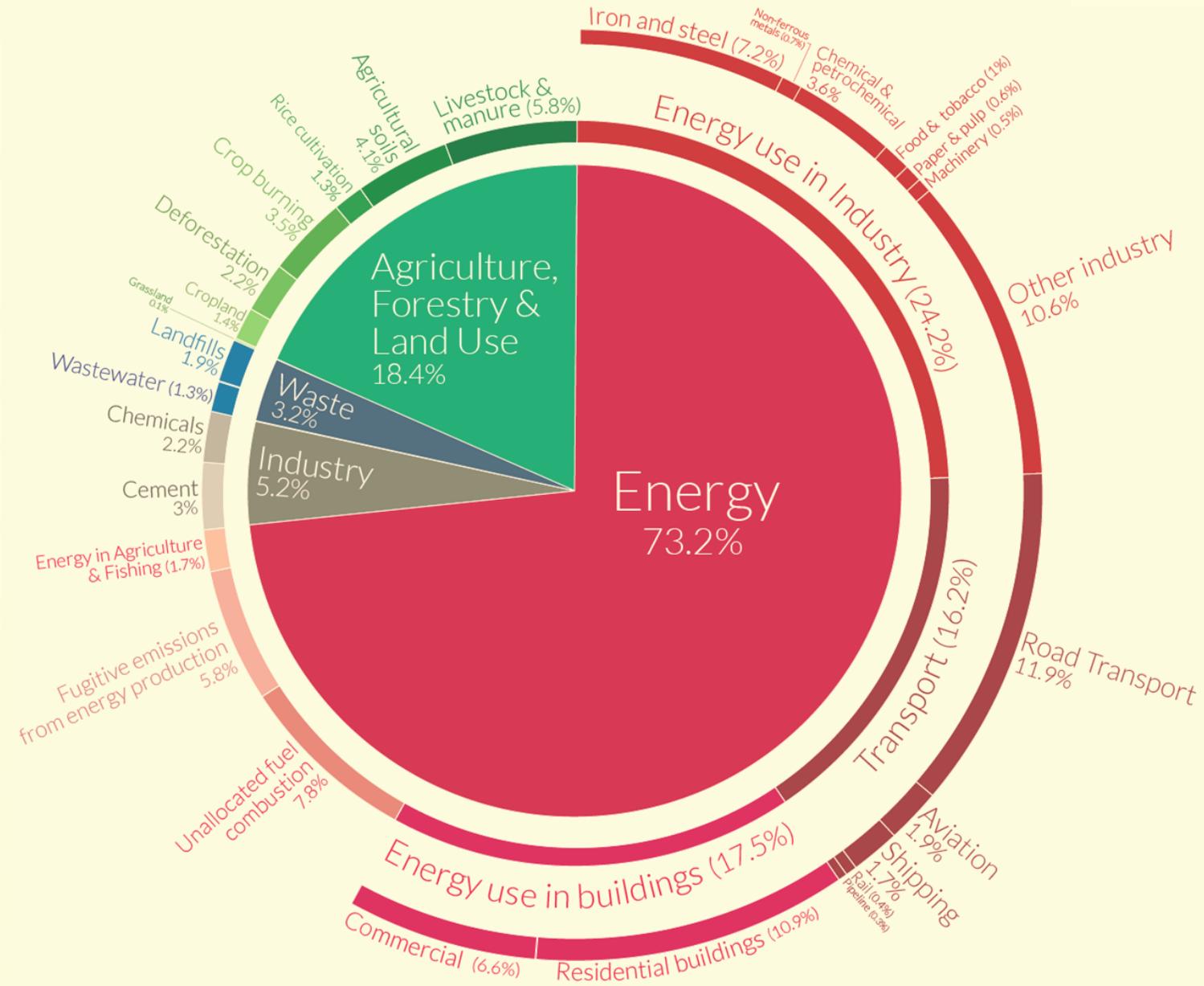
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Global greenhouse gas emissions by sector

This is shown for the year 2016 – global greenhouse gas emissions were 49.4 billion tonnes CO₂eq.



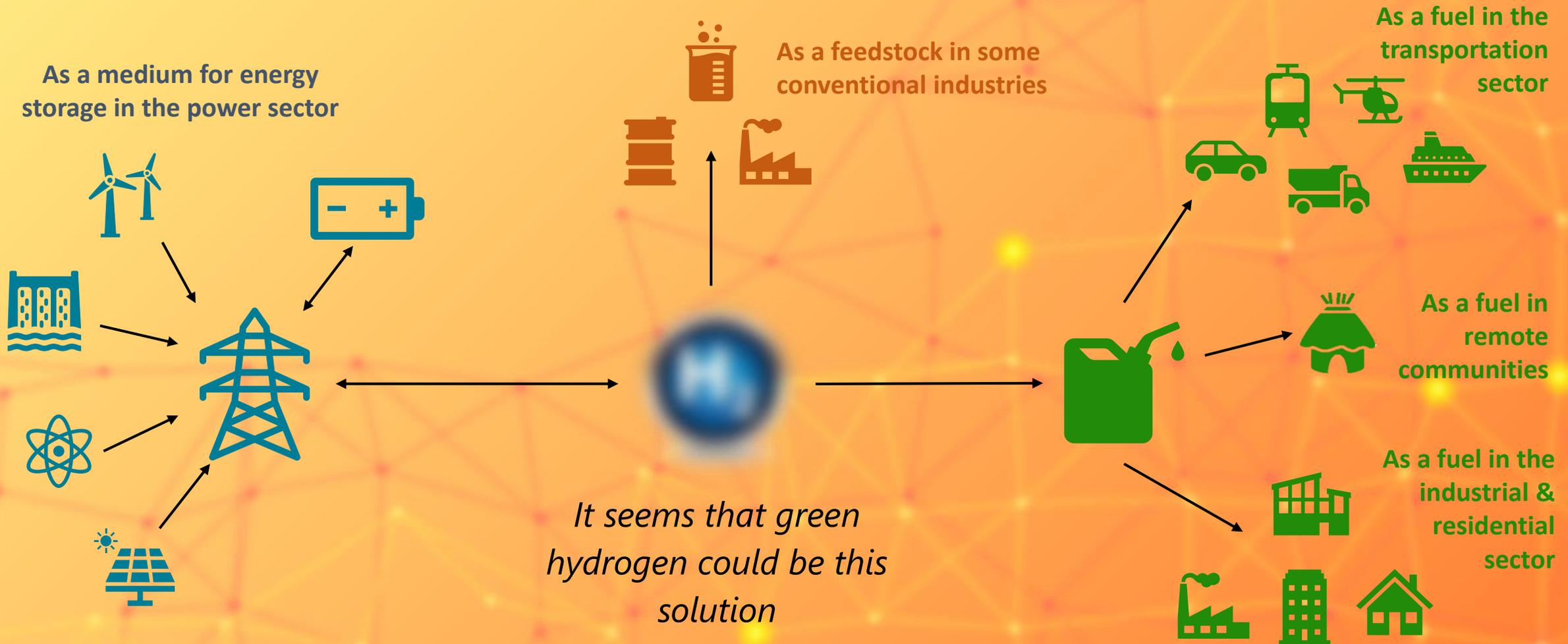
OurWorldinData.org – Research and data to make progress against the world's largest problems.

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

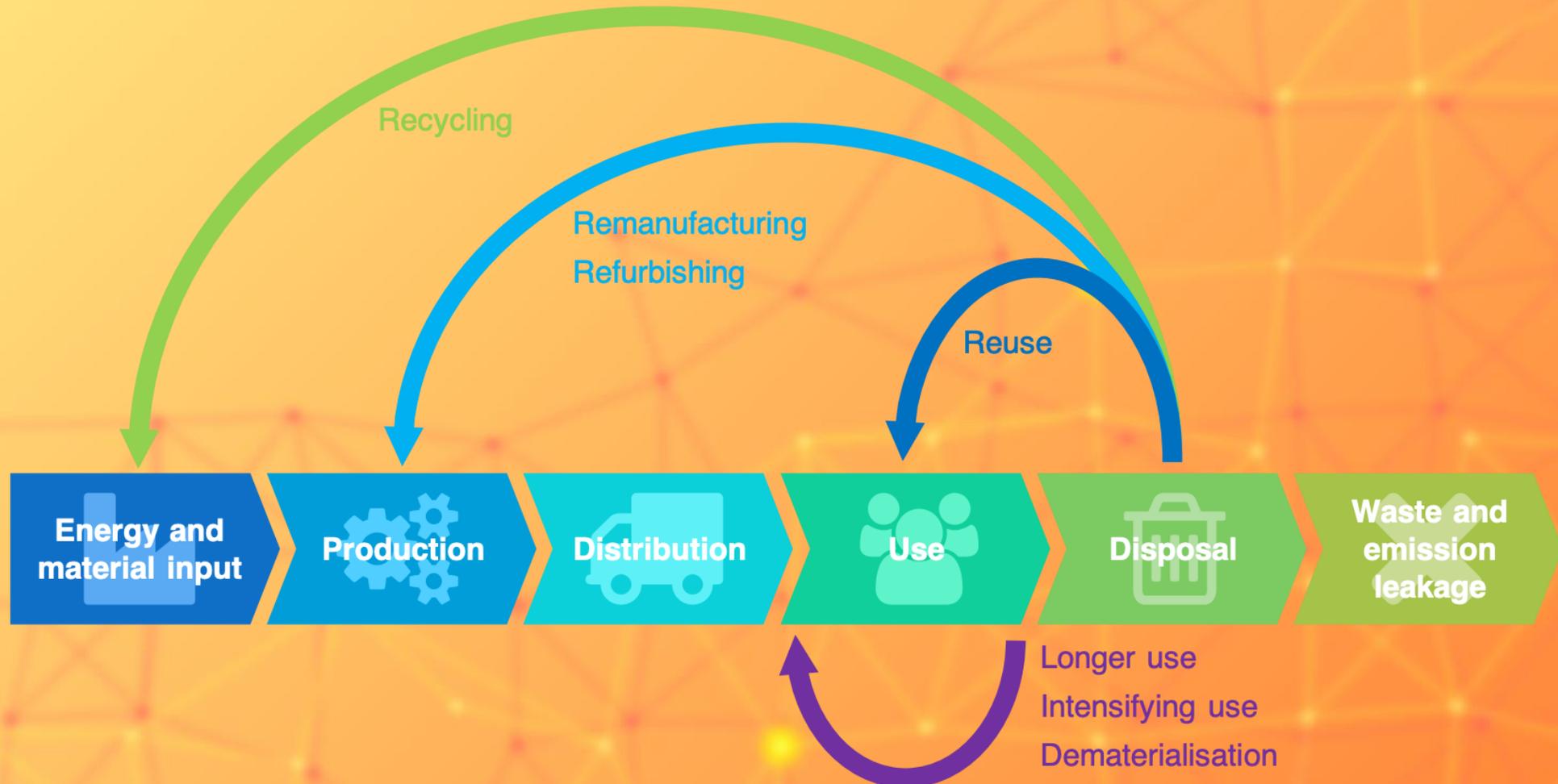
Integration of renewables (especially solar) in buildings requires indigeneous technologies

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

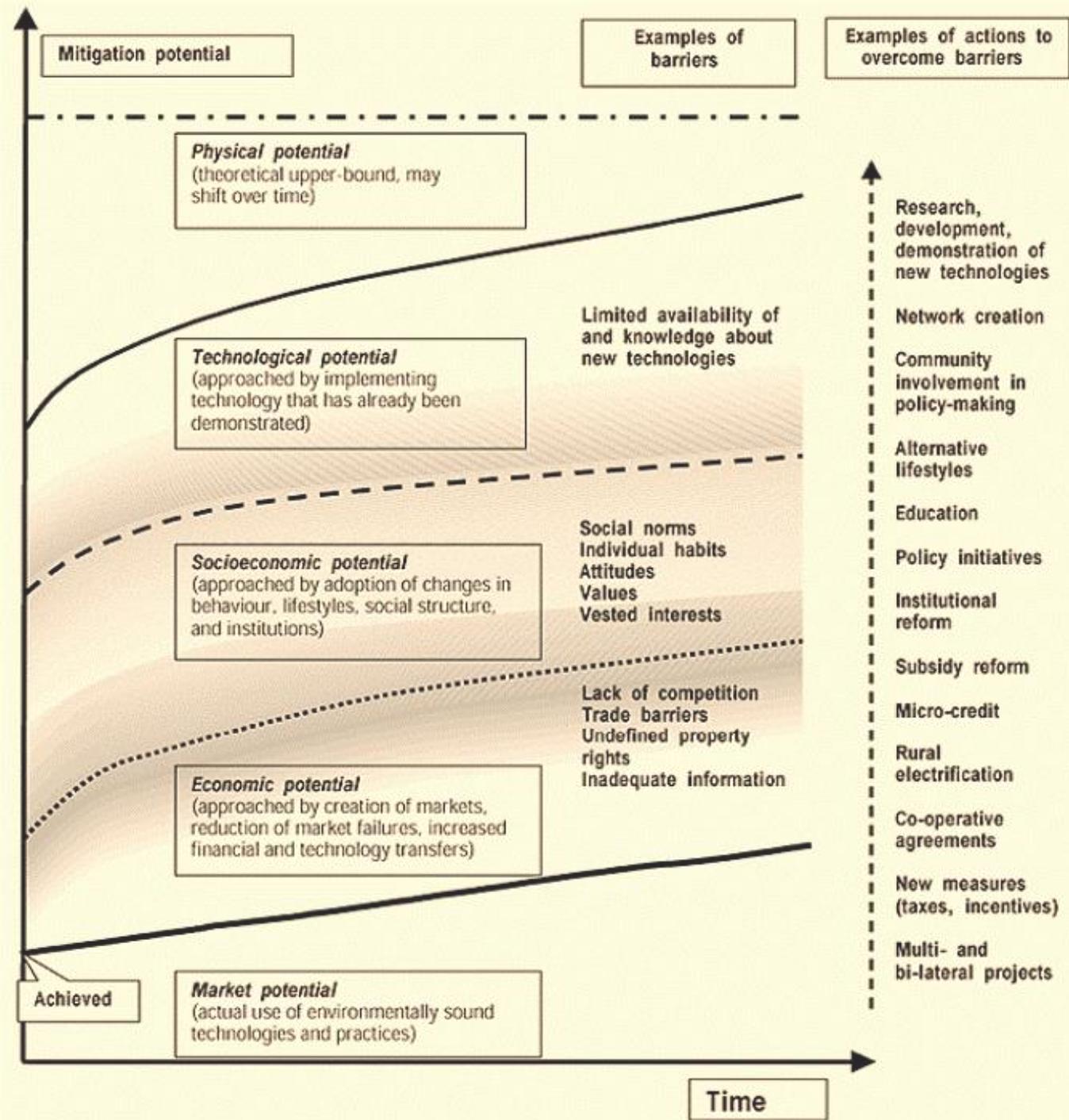
- Steel industry is building up on technology being developed in Sweden*
- Fertilizer uses hydrogen, but technologies are supplied by a small group of technology suppliers*
- Petrochemicals needs new technologies*

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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