STUDENT SHEET

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Tipping points: from peril to prosperity

Summary

We are currently on track to pass the internationally agreed danger thresholds of 1.5°C and 2°C above pre-industrial temperatures, with dangerous consequences: more severe weather, sea-level rise, droughts and floods.

While stopping emissions would stop warming, parts of the climate system risk being pushed past tipping points into a collapsed state they may never recover from, much like a Jenga tower that stays standing as blocks are removed, until suddenly and irreversibly it doesn't. Coral reefs, the Amazon rainforest, and the Greenland and Antarctic ice caps are among the systems closest to these thresholds.

But rapid, large-scale change is also possible, and often happens faster than expected. Just as AI tools went from niche to a normal part of student life within a few years, cars replaced almost every horse-drawn vehicle on New York's Fifth Avenue between 1900 and 1913 once they became affordable, useful and socially accepted.

Decarbonisation is following a similar pattern, driven by two reinforcing feedbacks: economies of scale (the more we make clean technologies like solar panels, the cheaper and better they get) and social feedback (visible movements like Greta Thunberg's normalise change fast). Together these produce exponential "S-curve" adoption, where a technology's market share stays small for a long time before suddenly taking over.

This is already happening: solar is now the cheapest electricity source in almost every country; EVs are cheaper over their lifetime in many markets; and renewables supplied over a third of global electricity last year.

This is simultaneously a moment of real danger and real opportunity. Momentum is building fast in energy and transport, but similar acceleration is still needed in food and farming, nature restoration, the Global South, and heavy industry.

Key concepts

- Tipping points & the Jenga tower analogy - systems that stay stable until a threshold is crossed, then collapse irreversibly
- Named tipping risks - coral reefs, the Amazon rainforest, and polar ice caps among the closest to collapse
- S-curve adoption - technologies and social change can go from niche to dominant far faster than expected
- Reinforcing feedbacks - economies of scale and social normalisation both accelerate clean technology adoption
- Current momentum - renewables now over a third of global electricity; fossil fuel generation growth has stalled

Discussion prompts

1. The lecture uses a Jenga tower as an analogy for tipping points – stable until suddenly it isn't, and then unrecoverable. What makes this a powerful (or misleading) way to explain this kind of risk to a general audience?

2. Cars replaced horses on New York's streets within 13 years, and AI tools became part of everyday student life within a few years too. What do these examples suggest about how quickly society can change, and what conditions seem to make that speed possible?

3. The lecture credits both "economies of scale" and "social feedback" (like the Greta Thunberg-led movement) with accelerating clean technology adoption. Which of these two forces do you think matters more, and why?

4. Renewables passed a third of global electricity last year, and fossil fuel generation had its first flat year in 150 years. Does this change how urgent or hopeful you feel about climate change, or does it feel disconnected from the tipping points described earlier in the lecture?

5. The lecture argues this is simultaneously "the moment of acceleration for all the positive stuff" and "the moment of danger for all the negative stuff." Do you find this framing reassuring, unsettling, or both? Discuss.