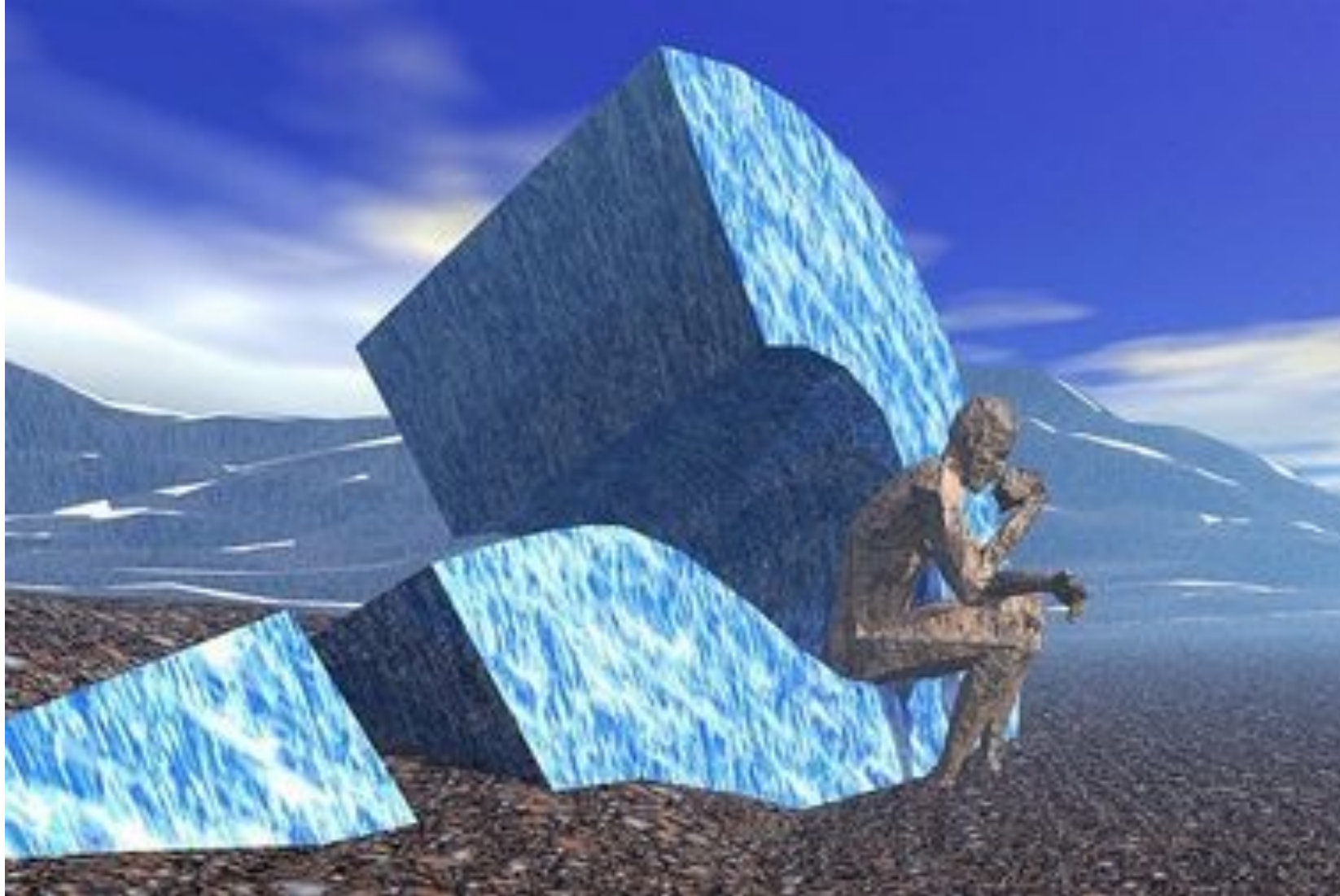


Climate Uncertainty & Risk



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Climate Forecast
Applications Network



Climate “Certainty”

- The Earth’s climate is **warming**
- A warming climate is **dangerous**
- We’re causing the warming by emitting CO₂ from burning **fossil fuels**
- We need to prevent dangerous climate change by **eliminating CO₂ emissions**.

“The clock is ticking towards **climate catastrophe**” – *Ban Ki-moon, UN Sec’y-General, 2015*

“We are on a **highway to climate hell** with our foot still on the accelerator” – *Antonio Guterres, UN Sec’y General 2023*

“Climate change is literally an **existential threat** to our nation and to the world” – *President Biden 2022*



Climate Policy: Between a Rock and Hard Place

Paris Agreement: keeping warming to within 1.5°C requires **NETZERO** emissions by 2050

Concerns:

- technical, economic & political feasibility
- priority relative to other world/local problems
- unintended consequences

- “Almost half of UK adults fear falling into fuel poverty before the years end”
- “Why Dutch farmers are protesting over emissions cuts”
- “Rich countries’ climate policies are colonialism in green”
- “African nations expected to make case for big rise in fossil fuel output”



Putting the policy cart before the scientific horse

IPCC

FAR 1990: “The size of this warming is broadly consistent with predictions of climate models, but also of the **same magnitude as natural climate variability**”

SAR 1995: “The balance of evidence suggests a **discernible** human influence on global climate.”

UN

UN Toronto Conference 1988: “**reduce CO₂ emissions** by approximately 20% of 1988 levels by the year 2005 as an initial global goal”

1992 UNFCCC Treaty: “stabilization of GHG concentrations in the atmosphere at a level that would **prevent dangerous anthropogenic interference** with the climate system.”

1997 Kyoto Protocol: “With a view to **reducing their overall emissions** of such gases by at least 5 per cent below 1990 levels in the commitment period 2008 to 2012.”



policy-driven science

“The consideration of climate change has now reached the level where it is the concern of professional foreign-affairs negotiators and **has therefore escaped the bounds of scientific knowledge (and uncertainty).**”

- ***Pierre Morel***, *Director of the World Climate Research Programme*, 1991

“The strategy behind the Kyoto Protocol has **no grounding in economics or environmental policy.**”

- ***William Nordhaus***, *Nobel Laureate in Economics*, 2007

Problems with mixing politics and science

"What you get when mix politics with science is . . . just politics, unfortunately."

Policy makers misuse science by:

- demanding scientific arguments for desired policies
- funding a narrow range of projects that support preferred policies.
- using science as a vehicle to avoid 'hot potato' policy issues

Scientists misuse policy-relevant science by:

- playing power politics with their expertise
- conflating expert judgment with evidence
- entangling disputed facts with values
- intimidating scientists whose research interferes with their political agendas



Oversimplifying both the climate change problem and its solution

Tame Problem

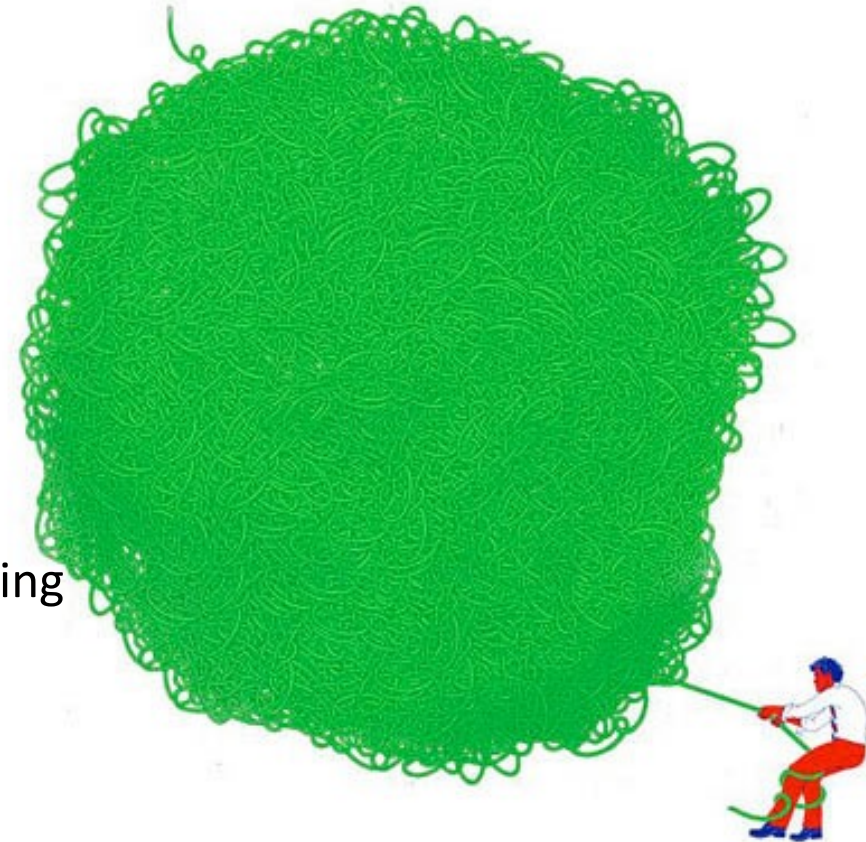


“speaking consensus to power”
Precautionary Principle

versus

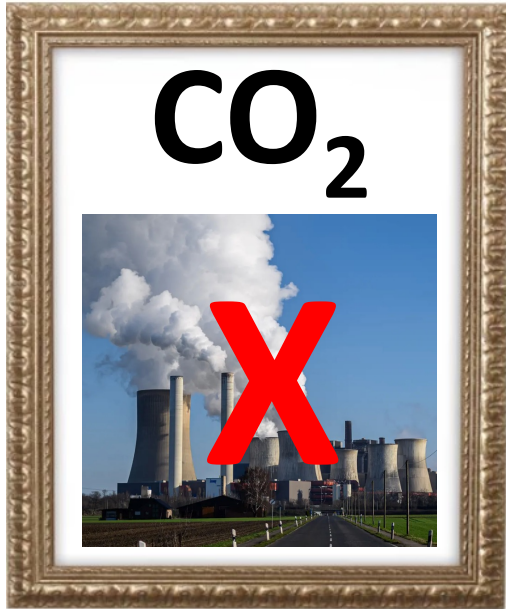
Wicked Problem

- Structural complexity
- Uncertainty and ignorance
- Contentious methods of understanding
- Clashing values



Climate Change – 2 different perspectives

Tame problem



Goal: controlling the climate
Solution: global



Climate Change – 2 different perspectives

Tame problem



Goal: controlling the climate
Solution: global

Complex, wicked problem

Reduce vulnerability

Solutions:

- abundant clean **energy**
- manage **water** resources
- **food** productivity
- economic **development**

Unknowns – known and unknown

Climate change:

- ocean/atm circulations
- solar effects
- volcanoes
- **emissions**
- land use
- tidal effects

We can't control the climate

Goal: understanding the climate
Solutions: regional

"97% of climate scientists agree"

- Surface **temperatures** have **increased** since 1880
- Humans are **adding carbon dioxide** to the atmosphere
- Carbon dioxide and other greenhouse gases have a **warming effect** on the planet

Disagreement among scientists:

- How much of the warming has been **caused by humans**
- How much the planet will warm in the **21st century**
- Whether warming is '**dangerous**'
- How we should **respond** to the warming, to improve human well being



How We Misjudge Risk

Psychological characteristics that make risks feel more or less frightening, relative to the actual fact.
In each pair, 1st risk type is preferred to 2nd:

- natural versus **manmade** risks
- controllable versus **uncontrollable** risks
- voluntary versus **imposed** risks
- risks with benefits versus **uncompensated** risks
- future versus **immediate** risks
- equitable versus **asymmetric distribution** of risks.

Climate communications emphasize:

- **manmade** aspects
- unfair burden on the **poor**
- **extreme weather** events
- uncontrollable **tipping points**



Inconvenient Truth:

The climate 'crisis' isn't what it used to be

Recent signals from the UNFCCC and IPCC:

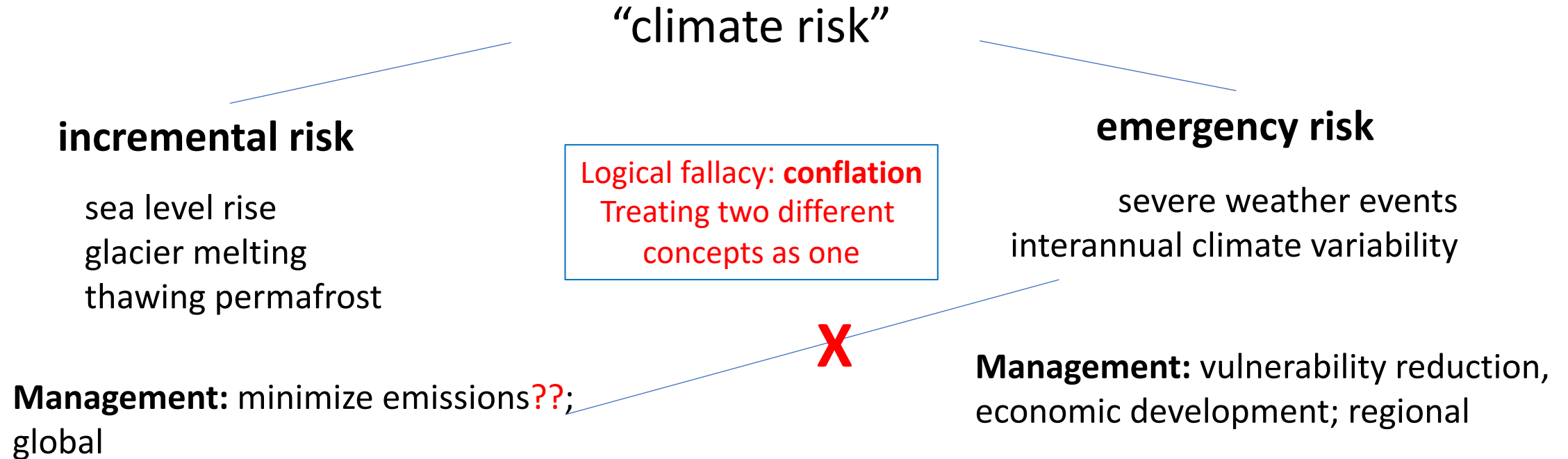
- Extreme emissions scenario RCP8.5 is **implausible**
- As 2°C warming target is in reach, **target is reduced** to 1.5°C
- IPCC AR6 **lowered** the upper *likely* bound of climate sensitivity to CO₂
- IPCC AR6: many climate models are running **too hot**

COP28: expected warming of 2.4°C by 2100

- 1.2°C warming has already occurred



“Warming is less than we expected, but the impacts are worse”



Urgency of addressing **emergency risk** is used to motivate the urgency of reducing emissions

Energy poverty from reducing emissions **increases** emergency risk

Emphasis on emergency risks should **prioritize adaptation** over mitigation

Moral dilemma implicit in climate policy debates

Possibly preventing **future** harm from climate change

versus

Helping **currently** living humans.

← UNFCCC

← UNSDG



NETZERO is hampering progress on UN Sustainable Development Goals

UN Sustainable Development Goals

1. No poverty
2. No hunger
- .
- .
- 7. Affordable and clean energy**
8. Industry, innovation & infrastructure
- .
- .
13. Climate action
- .
- .



Neglecting higher ranked sustainability goals in favor of rapidly reducing CO₂ emissions is slowing down or even countering progress on the most important Sustainable Development Goals.

“Under current trends, only about one third of countries will meet the target to halve national poverty levels by 2030.”

“Shockingly, the world is back at hunger levels not seen since 2005, and food prices remain higher in more countries than in the period 2015–2019.”

“At the current rate of progress, in 2030 some 660 million people will remain without electricity, and close to 2 billion people will continue to rely on polluting fuels and technologies for cooking.”

We have mischaracterized climate risk

“The current thinking and approaches have been shown to lack scientific rigour, the consequence being that climate change risk and uncertainties are poorly presented. The climate change field needs to strengthen its risk science basis, to improve the current situation.”

- risk scientist Terje Aven, former President of Society for Risk Analysis

“The global climate change debate has gone badly wrong. Many mainstream environmentalists are arguing for the wrong actions and for the wrong reasons, and so long as they continue to do so they put all our futures in jeopardy.”

– philosopher Thomas Wells, applied ethics and political philosophy





Climate Risk

"climate is everything"

global control
fragile environment

CLIMATE CHANGE

extreme
weather

many of
the world's
problems

Energy Policy
eliminate
fossil fuels

too many people
anti-capitalism



Climate Risk

"climate is everything"

global control
fragile environment

CLIMATE CHANGE

extreme
weather

many of
the world's
problems

Energy Policy
eliminate
fossil fuels

too many people
anti-capitalism

human centric

Sustainable
Development
Goals

ENERGY POLICY

- abundant
- secure
- cheap
- clean

Flourishing
Thriving

Extreme Weather

- local problems
- reduce vulnerability
- anti-fragility

Climate Change

- slow warming:
- sea level rise
 - glacier melt

Towards a reset of climate and energy policies

Inconvenient truths about climate risks

Risks from extreme weather and climate change are fundamentally **local**.

The risks are entwined with natural climate variability, land use, & **societal vulnerabilities**.

Blaming weather catastrophes on fossil fuel emissions deflects from the real **causes of our vulnerabilities**.

Many people fear a future **without** cheap, abundant fuel and continued economic expansion far more than they fear climate change.

Inconvenient truths: climate & energy policies

The **urgency** of meeting NETZERO targets is causing us to make **bad choices** about future energy systems.

Wind & solar power **is impairing grid reliability**.

If we reach net zero by 2050, we **won't notice any change** in the climate before 2100, relative to natural variability.

We **can't control** the climate or extreme weather events by eliminating emissions.

Towards Better Management of Climate Risk

UN decision making frameworks:

Tame problem with simple solution

The problem and solution are irreversibly global

Control

Agree on problem

Speaking consensus to power

Precautionary Principle

Impose targets and deadlines

versus

Climate Pragmatism and Decision Making under Deep Uncertainty:

Wicked problem with no single solution

Problems and solutions are local/regional

Understand and manage

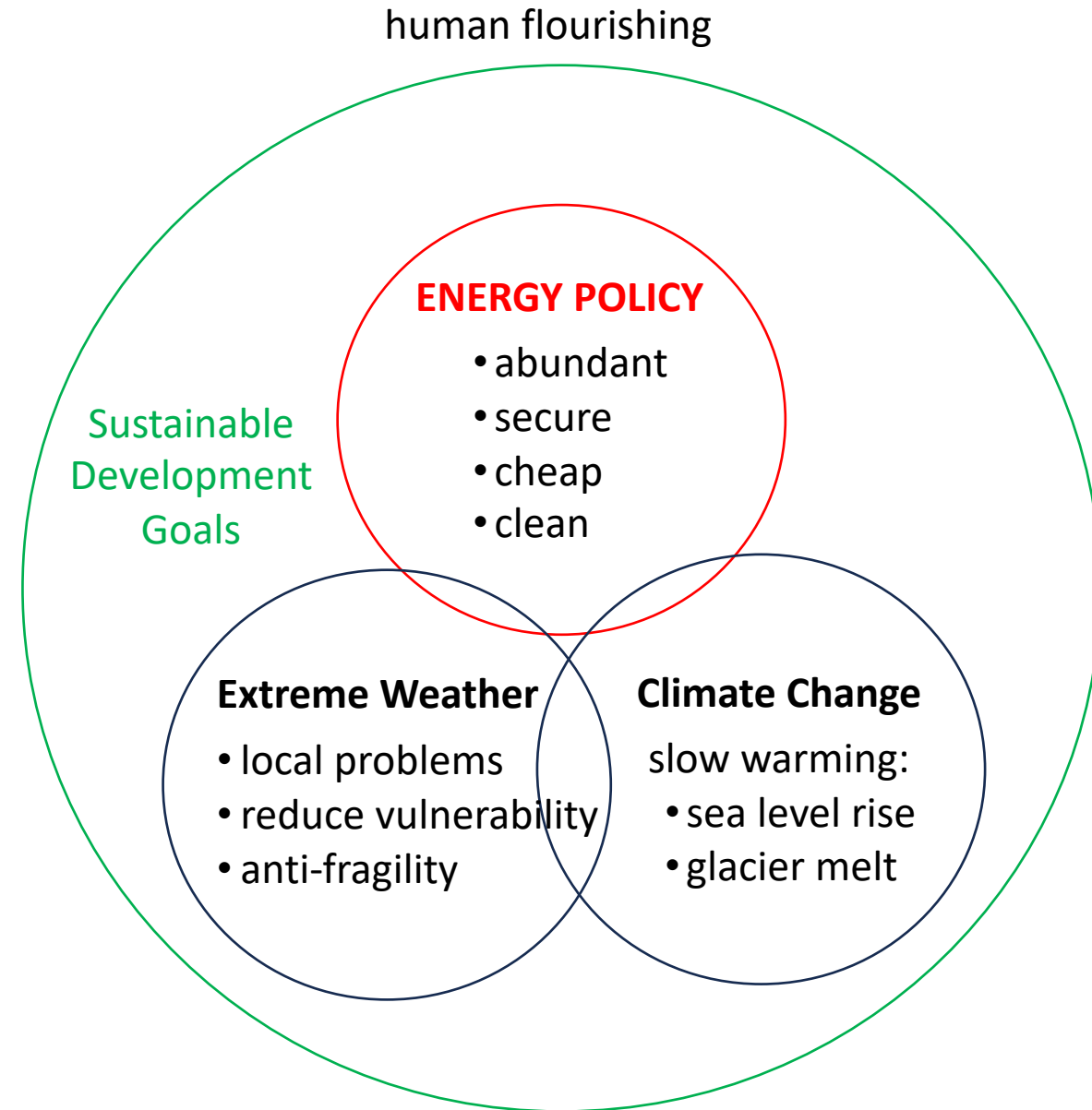
Agree on solutions

Acknowledge uncertainty & disagreement

Robust decision making

Adaptive management

Climate Risk



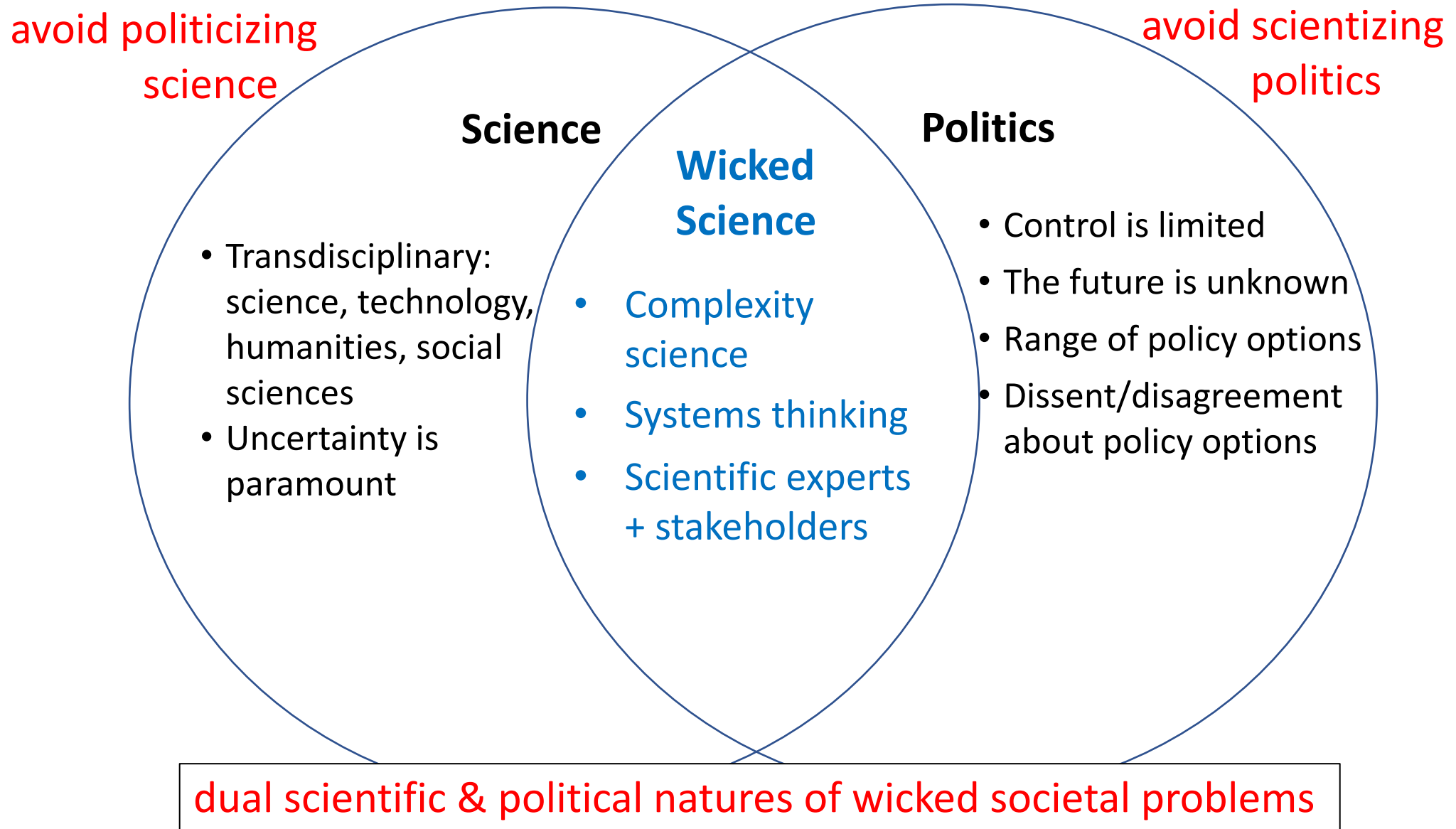
Vision for energy systems for the 21st century

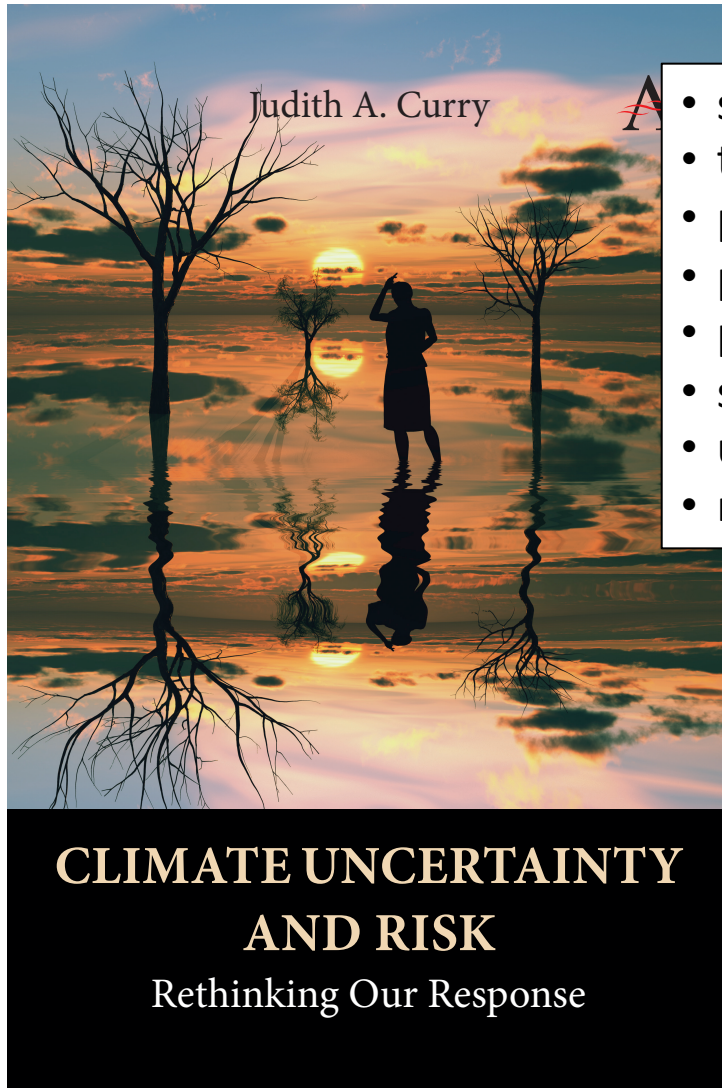
Goal: abundant, secure, reliable, cheap & clean energy

The energy transition can be facilitated by:

- accepting that the world will continue to need & desire much **more energy**
- **removing the restrictions** of near-term targets for CO₂ emissions.
- developing a **range of options** for energy technologies
- using the next 2-3 decades as a **learning period** with intelligent trial & error
- evaluating the technologies **holistically** for abundance, reliability, lifecycle costs and environmental impacts, land and resource use.

Wicked science





- science
- technology
- politics
- policy
- philosophy
- social psych
- uncertainty
- risk

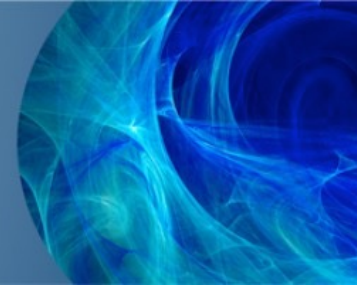
Navigating the wickedness of climate change

Rethinking the climate change problem, the risks we are facing, and how we can respond.

Judith Curry, **Climate Uncertainty and Risk**,
Anthem Press



Climate Etc.



<http://judithcurry.com>



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Thank you



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