

One way of looking at possible future climate change pathways

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Business As Usual Path

Driving forces of inertia, special interest, profits, denial, implementation delays

World energy demand will grow in the "business as usual" scenario of the Energy Agency and most other forecasters.

Locked into Business As Usual Path

Interaction of multiple "tipping points" begin to trigger possible runaway cascades

Early warning shocks possibly occur

Use any of the following become a frequent occurrence:

- material damages in excess of \$500 billion (or more than 30 million displaced persons) for climate related phenomena
- Example: 4 or 5 Katrina-like events within 10 or 5 years

Forced transition to clean energy path

More rapid, abrupt, and dangerous climate change phenomena begin

Examples:

- Widespread drought
- Melting of glaciers
- Severe water shortages
- Shifts in warm ocean currents

Maybe as early as 2055 plus or minus 10 years

Very messy but localized economic and political effects, disruptions

Examples:

- Regional wars over water, food, and mass migration
- Regional economic stagnation and downturn
- Serious regional epidemics
- Mass migrations

Maybe as early as 2065 plus or minus 10 years

Localized tensions, strain global relations and lead to possible widespread chaos

Examples:

- Possible large-scale wars over water, food, and mass migrations
- Regional disruption of large urban areas

Geo-engineering path

Large geo-engineering plans are being developed separately or together

Examples:

- Sprinkling sulphates in the stratosphere to block sunlight
- Deploy large array of mirrors in space to deflect sunlight

Next Term (i.e. by 2050) outcome

Long-term binding international agreements interfere with the climate system committed to implementing

World leaders find that the tipping points and tipping points are happening and are threatening that geo-engineering is the only chance to prevent changes in the climate system that are dangerous for humanity

Very uncertain variable timing

Global average temperatures pass 3 degrees Centigrade above pre-industrial levels

Uncertain variable timing

Interaction of multiple "tipping points" begin to trigger possible runaway cascades

Uncertain variable timing

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Uncertain variable timing

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Today Clean Energy Path

Global average temperature changes Centigrade (Celsius) (2000-2100)

Prompt and successful implementation of major changes to clean energy use

For the world

Substantially reduce emissions of greenhouse gases 80% or more below 2050, and promptly make a strong policy system agreement that would include:

- economic disincentives for greenhouse gas emissions such as carbon taxes or carbon sinks such as rain forests
- economic incentives for preserving natural resources
- developing countries like China, India, and Brazil to immediately begin using best available technologies for renewable energy and clean coal

For the USA

Promptly adopt clean energy policies that would include:

- carbon tax to reduce emissions of greenhouse gases 80% or more below 2050
- Implement massive renewable energy infrastructure
- Implement an Apollo-like project to change energy generation and use

Clean Energy (Maybe Just in Time) Path

Were lucky - energy researchers discover soon enough

Peak oil happens soon enough that high oil prices incentivize the world to low-carbon fuel sources (not coal)

Oil production peaks

Peak oil increases use of coal increases CO2 emissions increase global warming

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Climate Change Research Path

Currently US budgets for clean energy and other R&D have been decreasing

Climate Change Research Path

R&D breakthroughs on clean energy systems about energy storage, and behavior change implemented in time to prevent dangerous interference

Wild Card

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MicroVU Analytics

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