Video #19: The Climate Solution is More R&D

Hi, my name is Glenn Weinreb, and today we're going to look at how to solve the climate problem,
in a way that is both politically,
and economically,
feasible.

But before we begin, let's review the current strategy.

The History of Decarbonization

As you probably know,

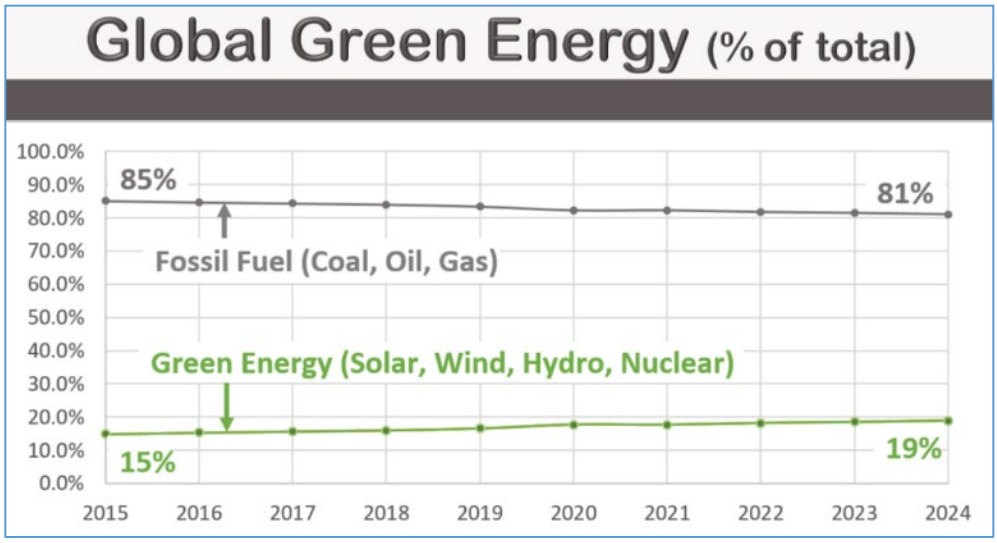
{Pic fossil fuel} the burning of fossil fuel,
{Video reflecting sunlight / carbon-dioxide-co2} causes carbon dioxide gas,
{Video smoke / smoking-factory-chimneys} to be emitted into the atmosphere,
{Video Earth from space / motion-graph-orange} and this leads to, global warming.

Also, in theory, this can be mitigated,
by switching to energy,
that does not emit carbon dioxide,
{Video: Power / Wind / wind-turbines-generating} such as wind,
{Video: Power / Solar / silhouette-of-engineers} solar,
{Video: Power / dam / aerial-view-of-water} hydro,
{Video: Power / nuclear / factory-nuclear} or nuclear.

{SLOW} But at what rate, is this currently, being done?

We can assess, by looking at the percentage of total energy,
that is made without emitting carbon dioxide,
and see how it changes,
with time.

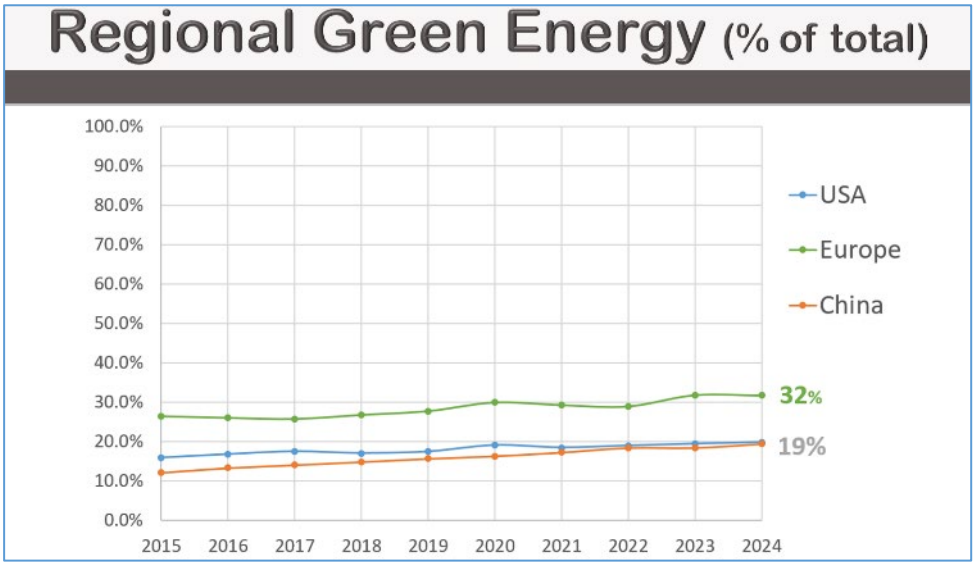
This is all energy, not just electricity.



{Pic 3x global energy} And according to the data,
the percentage of global energy,
that is so-called "green",
has increased {*} from 15%,
{*} to 19%,
over the last decade.

And, at this pace,
it would take the world 200 years,
to reach full decarbonization.

{*} The United States is also on track to decarbonize over 200 years,
{*} while Europe is at 125 years,
{*} and China at 100 years.



{video activism / thoughtful-woman}
And, all of this is too slow, to be helpful.

{video activism / a-tiny-snail} Okay, so why the snail-like pace?

Well, there are several reasons, which we will now review.

Climate Economics

{Pic 3x} In some cases,
{*} the green option costs less
{*} than the carbon option, and switching over is easy.

While in other cases, the green option costs more,
and switching over,
is less popular,
especially at large scales.

In these cases, the additional cost of the green product, {Pic Green P} is referred to as the "green premium."

And, consumers tend to {Pic woman 2 hands} **avoid** this so-called premium.

Prisoner's Dilemma

{Video: house / BBQ / 603914_Cooking_Skewers} This is because they do not benefit from
{SLOW} reducing their own emissions.

They're {VERY SLOW} too small.

{Video: city / smog / Shenzhen-urban} Instead, harm comes from the {SLOW} **collective emissions**
{Video: city / ped / 98801_pedestrians_and_traffic} of our planet's {SLOW} eight billion people.

{Video: activism / successful-business-man-with-megaphone}
For this reason, {SLOW} **each person**, wants {SLOW} **everyone else**, to reduce.

Macroeconomics (competition)

Furthermore, companies

{Video: city / office bld / 605055_Clouds_Cityscape} need to compete with other companies,

{Video: city / highway / time-lapse-of-automobiles} and regions need to compete with other regions,

and they do not want

{video signs / money / frustrated-businessman} additional costs,

to make them less competitive.

In the end, climate action, is limited by, these economic constraints.

{video signs / money / coins-stack-increase} Okay, that's **economics**.

Now, let's look at {SLOW} **politics**.

Climate Politics

{Video gov't / flags-of-the-nations} Nations are dominated politically

{Video city / factory / food-processing-industry} by large industries

{Video activism / people-of-the-world} that employ **millions of people**.

Examples are,

{Pic 4x} the fossil fuel industry, {*} labor unions, {*} auto makers, {*} and factories.

{Video activism / Unrecogniazble-woman-putting-her-vote} Employees and their friends vote,

{Video economics / mans-hand-transmits} while employees and companies make political donations.

To connect the dots,

{Video gov't / 166307_People_Business} lobbyists suggest to lawmakers that donations,

are contingent on support, for specific measures.

{Video: activism / 479180_Girl_Holding_Sign_Forest} Climate, in comparison, employs

{Video: signs / glowing-figure-with-info} few people, and is therefore, politically weak.

In a sense, {Pic gorilla} large industries are like political gorillas,

while {Pic monkey} climate is the small monkey.

And, as we know, the strong, sometimes take from, the weak.

For example, the U.S. Inflation Reduction Act

{Video: power / solar / aerial-view-of-large-solar} **required** builders of solar farms

{Video: power / solar / eco-friendly-solar-panel-manufacturing} to buy U.S.-made solar panels, to qualify for subsidies.

While this created factory jobs, it also raised the cost of solar farms —

ironically leading to higher carbon dioxide emissions.

In other words, labor hijacked the climate issue, for their own purposes.

The hard truth is,

climate is politically weak,

in part,
due to employing relatively few people.

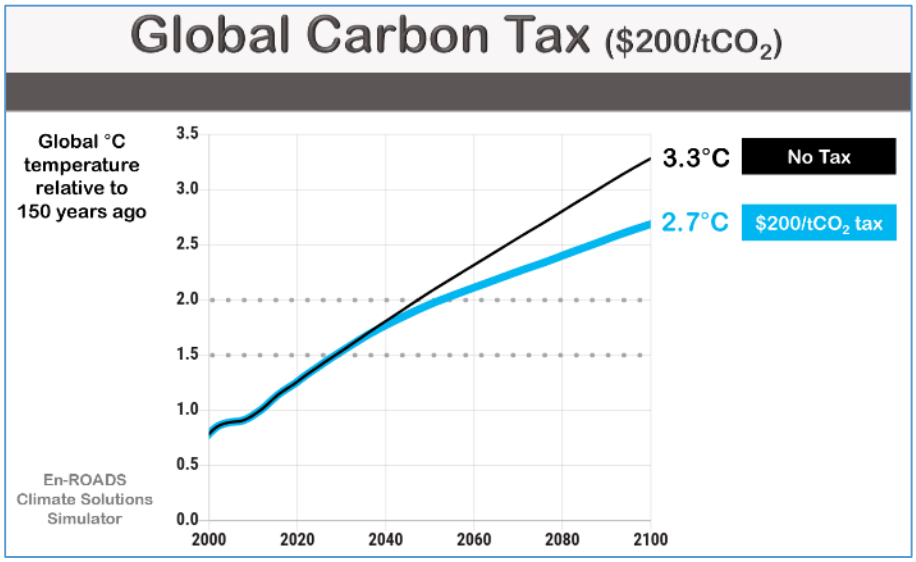
The Global Warming Problem ("The Bathtub")

Okay, so climate faces both, political and economic constraints.

But {SLOW} what would happen if this was not the case?

For example, what would happen if a $200 per ton, global tax,
was levied on carbon dioxide emissions?

This would cost the world {Pic $5T}
roughly 5 trillion dollars annually,
and it is not politically feasible
{En-ROADS shows this}.



Yet let's ignore that for a moment,
and assess the impact,
this would have,
on the planet.

Well, according to the {Pic 4x En-roads}
MIT climate solutions simulator,
we get runaway climate change
{*} both *with* this tax.
{*} and *without* this tax.

In other words, a massive worldwide tax on carbon, would not solve the problem.

This might seem confusing,
since we've been bombarded {Pic 4x Climate Message} with the following message:

{SLOW} Carbon dioxide emissions,
cause global warming,
{*} and eliminating these emissions,
{*} will solve the problem.

However, this is only slightly correct.

The Bathtub

Instead, {Pic 5x Causes} global warming is caused by
excess carbon dioxide in atmosphere,
that has been built up over 150 years,
plus methane emissions,
plus declining sea ice,
plus thawing permafrost,
etcetera.

{Pic Bathtubs} The climate problem is like a faucet, with several bathtubs.

{*} The faucet represents annual carbon dioxide emissions,
while {Pic 4 tubs} the water in the tubs represents global warming.

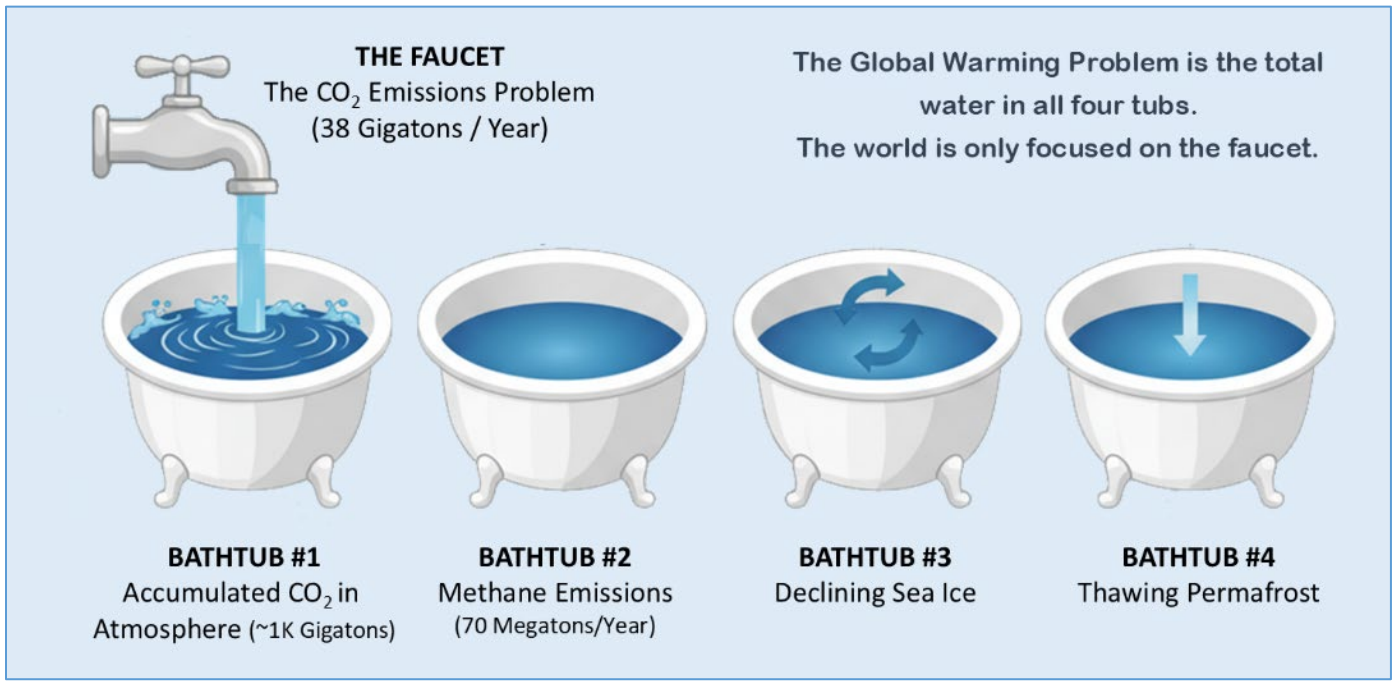
More specifically,
{{Pic circle faucet} the water at the faucet,
is proportional to the amount of carbon dioxide,
that is emitted,
into the atmosphere,
each year.

{Pic 4 tubs} While the combined water, in all the tubs,
is proportional to the increase,
in Earth's temperature,
each year,
in units of degrees Celsius.

{Pic 1st tub} The water in the first tub,
is due to 150 years of **past** carbon dioxide emissions --
not one year's emissions.

{Pic no circle} And the water in the other tubs is proportional to
{Pic 2nd tub} warming from methane emissions,
{Pic 3rd tub} warming from declining sea ice, and
{Pic 4th tub} warming from thawing permafrost.

{Pix Four tubs} Ultimately, multiple sources of warming, combine, and increase, the planet's temperature.



{Video activism / bottom-view-of-eco-activists} Global policy, media, and activism are all obsessed
with slightly turning down the faucet,
while completely ignoring the fact that
water **already** in the tubs, is what's
{Video global w / city / 496570_Berlin} causing catastrophic global warming.

{Video earth / drought/ clear-skyline} So, while the planet heads towards disaster,
{Pic running} the people responsible for fixing it,
{Pic woman pushing boulder uphill} are trying to solve, the wrong problem.

{glenn\Documents\Manhattan2\projects\The Climate Solution FILM\
Climate Solution - MIT Freshman Feature Film} ALSO, see PowerPoint Slides.

The Climate Solution

{SLOW} Okay, let's review the key points.

{tick 3 fingers} {f1} One, climate faces economic limitations.
{f2} Two, climate faces political limitations.
{f3} And, three, policymakers, are confused.

{Pic can't sleep} Now, the situation might seem bad;
{Pic light bulb} however, {SLOW} there is a simple solution.

It is to think of the climate problem, as two problems,
{Pic people at board} and do R&D,
to the extent required,
to resolve each.

One problem,
is {bathtubs, faucet} carbon dioxide emissions,
while {bathtubs, tubs} the other,
is global warming.

We can {SLOW} solve the first problem,
{Pic girl at computer} by doing R&D,
{SLOW} to drive down the cost of 24/7 green energy,
{SLOW} to below that,
of fossil fuel.

Consumers, would then {SLOW} go green, {SLOW} to save money.

{Pic Videos 11…16 /drd} For details, see climate videos 11 through 17.

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Low-Cost Nuclear Power [#11]
https://www.youtube.com/watch?v=AIlbovU67wI
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Automated Nuclear Power Construction [#12]
https://www.youtube.com/watch?v=afO0cy1l7Qo

How to Make $10 Trillion Dollars [#13]
https://www.youtube.com/watch?v=4gqmKGV1h5Y

Fusion Moonshot [#14]
https://www.youtube.com/watch?v=CvZzGHSugy4

Green Cars: Swappable Batteries [#15]
https://www.youtube.com/watch?v=jY_jNQ77FA8

Next Generation Building Automation [#16]
https://www.youtube.com/watch?v=T_obb_z77co

Next Generation Solar Farms [#17]
https://www.youtube.com/watch?v=3aOSrsZD2MY

And we can solve the second problem, {SLOW} by doing R&D, {SLOW} to determine {Pic Reflect} how to reflect sunlight back into outer space, {SLOW} to cool the planet, {SLOW} to offset warming.

{Pic Videos 9...10 /rsv} For details, see videos 6 through 10.

The Climate Acceleration Problem [#6]
https://www.youtube.com/watch?v=6r3Xag24iOI

The Science of Global Warming [#7]
https://www.youtube.com/watch?v=Por9aWKLdc4

The Uncertainty of Climate Change [#8]
https://www.youtube.com/watch?v=HoqX7uBaeKU

Reflecting Sunlight [#9]
https://www.youtube.com/watch?v=AJ-ddFDiA4w

Can Air Pollution Save the Planet? [#10]
https://www.youtube.com/watch?v=p4O2hv9tSDA

As noted previously, climate involves, both political, and economic constraints.

However, these do not apply, to research and development.

This is because R&D can be funded by a small number,
of high-net-worth individuals,

foundations,
and governments.

And, reflecting sunlight,
would move forward,
if some time in the future,
{Pic 2 piles of money} reflecting,
was considered easier than,
not reflecting.

In other words,
{Video: activism / happy-children-holding-hands} a path forward exists,
{very slow} **and** it is not blocked, by politics, economics, or confused policymakers.

{Pic /v3} For details, see climate video number 3.

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The Climate Lab Strategy [#3]
https://www.youtube.com/watch?v=9UlB_1wgpAo
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Okay, that's it for me, and I'll talk to you all, real soon.