

WELCOME!

These are the slides for Stratospheric Aerosol  
Injection Inevitability

**SLIDE**

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Please feel free to print and disseminate these.

This is all about the idea.

Please keep in good faith with our goals.



**[sai-reality.com](http://sai-reality.com)**

# WELCOME

Hello, My Name is Kevin Galvin and thank you for your time.

I respect that time so let's make this real easy. You don't have to trust me.

There's a very safe PDF file here, Download it and DON'T read it.

Don't waste your time.

Take your favorite AI that is strong in Science, I use Claude pro but there are others.

Upload this *human-made* file and ask the AI, "Strictly regarding likelihood, analyze the strength of this argument and give a synopsis"

If it doesn't say this is a well-constructed and strong argument with significant likelihood then I apologize.

Troll me if you'd like!



BUT... with that AI check, if I've earned just a tiny bit of credibility...

What does this argument want from us?

Talk about it. That is all we need to do.

Tell a nerdy friend about this site or you don't have to mention this site at all.

The day we see articles about any geoengineering projects as regular clickbait on news sites? Our job is done.

Do you need something a bit deeper to pull you in? I would.

Ask AI, "How conservative are the numbers and how generous are the timeline assumptions for the counterargument?"...

We WILL use a cooling geoengineering project. Almost certainly it will be Stratospheric Aerosol Injection.

But... Inevitability doesn't mean permanence.

There's a path that avoids both warming damage AND *significantly* shortens our use of Stratospheric Aerosol Injection.

Everything is about money, and that's where this path leads.

But to appreciate this path we must understand our financial circumstances.

Thank you again.

# S.A.I. Main Argument

## Inevitability

**S.A.I.**

Are they talking about our kids?



# Stratopheric Aerosol Injection

**We should have started 30 years ago!**



**2040**

**2060**



**We should have started 10 years ago!**

# Stratospheric Aerosol Injection S.A.I.

A global geoengineering project that  
cools the entire earth

The inevitability of S.A.I. is the new idea.  
For one year, 2050, \$38+ trillion damage (~19-51)  
That's just warming damage, -20% world GDP.  
S.A.I. helps a LOT. \$ is reason enough.



**MONEY**



**TIME**



*Warming is everyone's problem.*  
*Greenhouse gases are the rich world's problem.*  
Stratospheric Aerosol Injection makes this a reality.

**S.A.I.**

Are they talking  
about our kids?



For money the rich world will do this, but too late...  
**The developing world needs to discover  
how to save itself → by itself.**

**YouTube: The Insight Flagellant**

## Stratospheric Aerosol Injection (S.A.I.): A Global Cooling Geoengineering project.

This project uses airplanes to deliver Sulfur Dioxide (or possible alternative aerosols) into the upper atmosphere (Stratosphere). It binds with water and reflects solar radiation back into space. S.A.I. has MAJOR RISKS and they are discussed at length in the appendix.



S.A.I is like a low-dose maintenance chemotherapy. It doesn't cure but suppresses the cancer side effects (warming).

Two men have cancer. Both need this chemotherapy but one is still much healthier than the other. A healthier man will delay that chemo (S.A.I.) and a sicker man embraces it sooner. Imagine though if one of those men chose the time both of them started the chemotherapy? Each man would be angry if deprived of choice but only one man getting his way kills the other man.

*If the healthier man hasn't even  
100% accepted his illness...  
then the sicker man needs to be in  
control of that choice.*



---

S.A.I. is necessary. We only need sea level rise to prove it. Too much sea level rise is "locked-in", even for America. Suppose we *magically* achieve carbon neutral by 2050...

2050 ANNUAL costs: (best case scenario)

Carbon Neutral Maintenance: ~\$3.5 trillion.

Damages from warming: 19 trillion dollars minimum. (19-51)

What's the real threat here? Money = life. Un-offset warming will bankrupt the world and multiply the humanitarian disaster.



**KEY POINT:**

**Stratospheric Aerosol Injection**

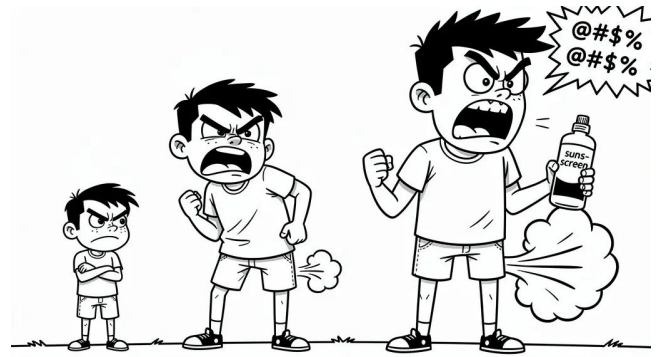
We are not comparing Stratospheric Aerosol Injection to the world now.

It's a comparative risk between S.A.I. and un-offset warming on a progressive timeline.

Warming damage quickly outpaces S.A.I. negatives. The only reason we need to ↑ the amount of aerosol we send up each year is the increase in greenhouse gases to offset.

**Global Mean Temperature?**

S.A.I. decreases  
Un-offset warming increases  
(simple)



**Un-offset Global Warming**

Let's Go:

We assume here that climate science is 100% valid.  
Our disagreement with climatologists isn't about science, it's about money and children.



Ask your phone...

A: "How many southeast Asians will be displaced by sea level rise by 2050?"

- ~49 million
  - That's *only* for southeast Asia. (100 million+ worldwide)
- The rich world won't take millions of refugees
  - Definitely not tens of millions.
- The developing world will quickly lose the ability to adapt.

**REFUGEE CAMPS**

Tens of millions of vulnerable women and children trapped in camps within their own fractured countries; No help coming.

## Trafficking, Malnutrition, Disease, RAPE.

There are already 1.28 million Rohingya refugees in Bangladeshi camps who will never be properly resettled.

- Camps will be the only financial option for poor countries

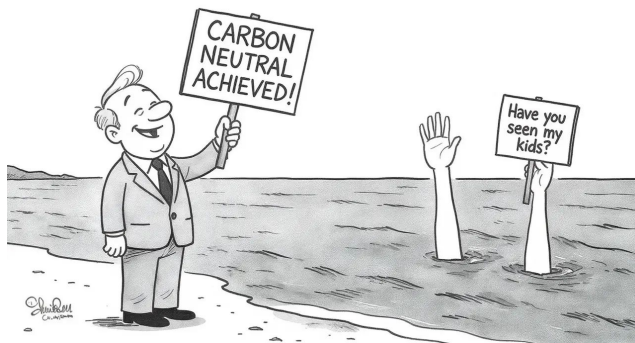
For comparison: By 2050 ~2 million Americans are displaced but we won't be in camps. America is ok in 2050.

---

But hey! What happens if we succeed with 2050 Carbon Neutral? That would would help, right?

OK... let's go **CRAZY** and assume we achieve Carbon Neutral TODAY. That definitely has to help with sea level rise, right?

**WRONG.**



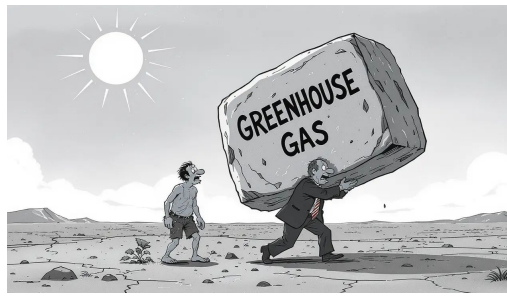
Ask your phone...

**B:** "If we achieve Carbon Neutral TODAY will it significantly slow sea level rise by 2050?" (just to make the strongest point)

- No. Period. (it will still *accelerate* due to warming lag)
  - A = Tens/hundreds of millions displaced by 2050 due to sea level rise.
  - B = Achieving carbon Neutral TODAY does not prevent any sea level rise before 2050.

**A + B =** The developing world will perish regardless of if/when we tackle greenhouse gases. **BINGO!**

Greenhouse gases and  
ocean acidity?  
The developing world couldn't  
afford to help even if it wanted to.



Ask your phone...

**C:** "What geoengineering method would cool the Earth quickly enough to slow sea level rise and be affordable enough for the developing world?"

- Google gives us one solution, the one it hates:  
Stratospheric Aerosol Injection (S.A.I.)
  - It can slow sea level rise by decades allowing *organized* resettlement and saving the poor world from consuming itself.
  - Only one **AFFORDABLE** solution to save tens of millions of poor people and it's not being researched?
    - over ~\$2 trillion is spent on Climate Change R&D every year.
    - ~\$10 million is spent on S.A.I. R&D
      - <1/100,000 of green research (usual)
        - (1/10,000 lowest # seen)
      - A silly amount. They can't afford a single airplane to test anything.
    - Greenhouse gases mean *nothing* in saving the developing world in the near/mid-term. Who is deciding our research priorities?

- Implementation
- Affordability
- Effectiveness

**A + B + C=** Even if S.A.I. is crazy dangerous (it's not), desperate people will try ANYTHING. S.A.I. is it.

The poor will try a risky unresearched technology if they have to;  
S.A.I. is the only AFFORDABLE project that helps global sea levels and it can be implemented within a decade.

***\*Reactionary developing world politicians will save millions\****



Domestic pressure **ALWAYS** outweighs international pressure.

If uninformed terrified people scream for any hope then Brazilian, Bangladeshi, Nigerian and Indonesian politicians will offer S.A.I. to win elections.

Once started the benefits would be almost immediate. After that there is no going back politically in that country.

It only takes a few developing world countries to afford S.A.I.

With **EXTREME** Action the west could stop the poor world:

- Shoot down the airplanes used for the geoengineering project.
- **Overthrow governments**
  - e.g. Iran, Bay of Pigs Cuba (fail), South Vietnam, Brazil, Nicaragua, Afghanistan, Iraq, Grenada, Panama, and Venezuela.
- How will America threaten these people to give up on their own children?
  - We are the healthy man refusing to start treatment.

So, for a fair argument we must admit it's *technically possible* the west could stop the developing world and doom their vulnerable children to camps.

The only way to truly guarantee Stratospheric Aerosol Injection is used is if the rich world would eventually use it for themselves.

**They will.**

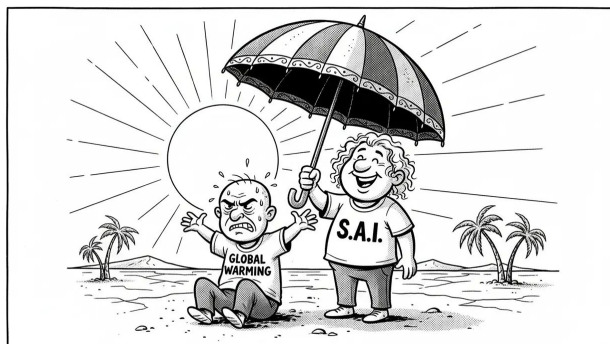
Ask your phone...

“When we achieve carbon neutral when will the earth cool down?”

**CENTURIES.** Annual sea level rise will stop accelerating with Carbon Neutral but that just means a plateau. Every year the seas will still rise at a high baseline rate for centuries.

- There's also a warming lag as the ocean still absorbs excess heat for 10-20 years. So whenever we achieve carbon neutral + lag years, that hot world is our permanent reality.
- As bad as the storms and floods then are, they will remain. The best case for USA heatwave excess deaths in 2060 are ~20K Americans. (that's only the heatwave #!)
  - Even in America the death/damage will be too much
  - Just... FYI, 2060 being max heat (after lag) will require the United States to ban the manufacture of internal combustion engines <9 years.
  - The fleet has to age out... oh and no more oil leases can be given out for ~-5 years. Yes, negative. 2060 max heat is impossible.
    - The United states isn't banning anything within the next couple decades.

Sea level rise (w/out S.A.I.) guarantees economic disaster and massive loss of life; that's true for the rich world post 2050. Money funds our military and social programs. S.A.I. prevents TAXATION.



One last easy question for your phone...

- **“Even if we achieve carbon neutral by 2050 is it likely that the west will eventually use a geoengineering cooling project?”**
  - **YES.** Many scientists suggest it’s guaranteed.
    - Even the answer Google gives references S.A.I.. (space mirror is ~early 22nd century)
  - Even in a best case scenario Google admits what it doesn’t want to happen will almost certainly happen.
    - Even when assuming 2050 carbon neutral
  - Climatologists only talk about 45% of the problem (mostly autos + power generation; see appendix)
    - As shown, even if we achieved Carbon Neutral TODAY it does almost nothing for sea level rise near or mid-term.

Does the guy on the left think he’s in the same boat as the guy on the right?  
(He will, but too late for the sicker guy)



IF S.A.I. is extremely dangerous we can stop and the aerosols dissipate in months. That brief kind of test will not do any serious harm (no termination shock). Scientists even admit that. But most people haven’t even HEARD of Stratospheric Aerosol Injection. Climatologists act like a controlling priest class.



You and me and S.A.I.?

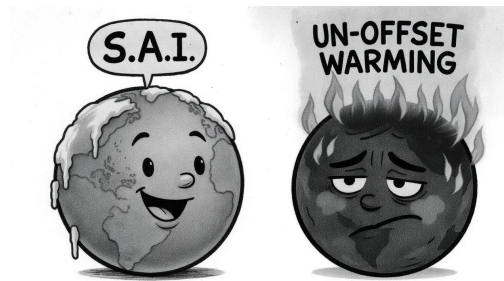
We’re not heretics denying climate science.

Climatologists fear us more.

We are apostates who wield the same science with different priorities (money/children)

# **COOLING PROJECTS**

# Appendix: Geoengineering Cooling Projects



None of us wants to use **any** geoengineering project.  
When you mess with one thing in a complex system...  
a lot can go wrong.

But we've shown that eventually a cooling project will be needed  
even by the rich world. (see Carbon Neutral appendix)

Look around us. Things look pretty normal.

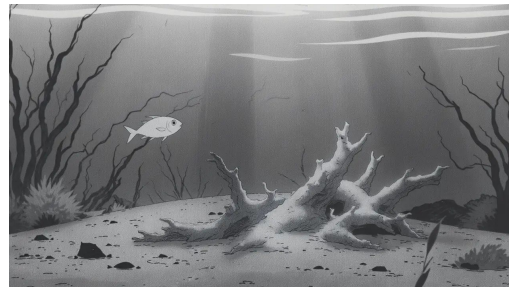
So Global Warming and geoengineering projects  
both seem like nightmares.

Both are nightmares. But that's where the true similarities end.

Projects are managed risk, we have some levers of control.

Un-Offset warming is chaos.

It's cascading collapses.



## Example: Coral death

Coral death isn't even the

worst warming threshold event and that is a bit scary.

Yes, cooling projects are uneven and could kill coral reefs in a  
specific area but un-offset warming threatens worldwide coral  
collapse

- Coral tourism is \$36 billion annually but forget tourism.
- The true value of coral is:
  - 25% of ALL marine species depend on coral reefs.  
(coral is <1% of ocean floor)
  - 500 million - 1 billion people require them for food.
  - They absorb 97% of wave energy. That spares our shorelines.
  - They are in the shallows for light so cooling surface ocean temps helps coral a LOT. (S.A.I.)

Mass coral extinction, like most threshold events, is tied to GLOBAL temperatures.

It's **BLACK** and **WHITE**:

**Cooling projects lower/maintain global temperature; un-offset warming raises global temperature.**

Geoengineering projects are *locally* hit or miss but overall global surface temperatures are the big game.

It's the sea level game!

Implementation

Affordability

Effectiveness

### Our cooling project requirements:

Implementation: Can we deploy this project <15 years?

Affordability: Could a few developing world countries afford this?

Effectiveness: Does it effectively and quickly slow sea level rise?

#1: Marine Cloud Brightening (MCB) is spraying ocean water to make low level clouds that reflect sunlight.

MCB has dangers but it's easy to shut down and affordable enough for a few cooperating developing countries to implement. **None of that matters** because it's all about sea level rise and MCB doesn't have enough global effect even at scale.

We need serious global sea level impact well before 2050.

- Right now MCB would help *mostly* with local (not global) surface temperatures but as the oceans warm Marine Cloud Brightening's mechanics work less and less.
  - Rising ocean surface temperatures means that before 2050 MCB will likely do more HEATING than COOLING in most areas: useless.
- It's usefulness is too limited to waste money on now..
  - MCB could be deployed in the arctic as part of a mixed bag of future cooling projects.
    - (colder water/better MCB mechanics)

#2: Albedo cooling is painting our roofs and roads **white** and in general has to do with material reflectivity.

This has minor risks but those also don't matter as **Albedo is ineffective at scale for significantly slowing sea level rise.**

Even if it did work albedo involves painting an additional 1-2% of the entire Earth white. That is not cost effective for the developing world and likely involves painting entire deserts white.



The decline of reflective white ice at both poles and the diminishment of glaciers is a problem. We'll have to do a lot of Albedo just to offset those reflective losses.

However, sea level rise aside, albedo is extremely useful for local heating, especially in urban "heat islands".

Albedo is one of the few cooling methods normal people can help with. Individuals/towns/states could implement albedo for roofs and use lighter colors for roads.

**For the USA let's keep the federal government out of it.**

## Albedo + Marine Cloud Brightening

Our best Albedo sources are the ones we already have.

Arctic/Antarctic/Greenland ice sheets are highly reflective.

Albedo and Marine Cloud Brightening have an interesting dynamic in this regard.

Marine Cloud Brightening works well with cold water. We could implement MCB in the arctic circle and **INCREASE**



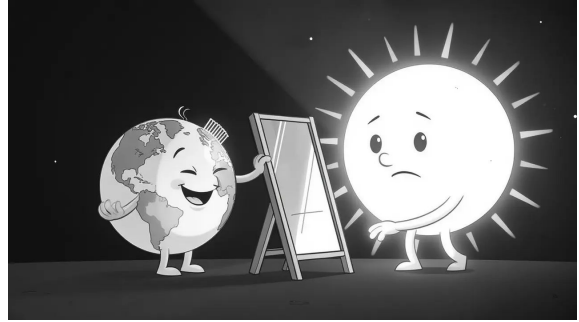
the size of the ice cap. This would be a significant help. Ice cap restoration isn't annoyingly in our face like local albedo projects. Capitalism is our friend but special interests want northern shipping lanes to open via ice cap reduction. In this limited way we need to push back on industry.

### #3: The Space Mirror: *This truly works for global sea level rise.*

We love the space mirror!

The Space Mirror would (will eventually) reflect a small percentage (1-2%) of sunlight away from earth. The mirror is VERY safe for the planet. It will be four times farther away than the moon so not visible to us. It efficiently cools and is adjustable. A dream come true!

The space mirror will cost \$5 - 10+ trillion dollars. (MINIMUM) Doable, but even if we decided to build this today, even if it was FREE,



The mirror will just take too long. The mirror fails in both implementation time and developing world affordability.

The mirror involves sending tens/hundreds of millions of tons of material into space (International Space Station = 450 tons). It will take many years just for that shipping and most scenarios involve mining asteroids or the moon.

- So... mining the moon is the *PRACTICAL* option?

- Let's imagine the moon with established large scale mining operations within the next 15 years... also a giant space factory that itself would take many years to build. A lot of robots will help build it. Just the robots will take years to build. Remember, we're assuming all of this is FREE. We're assuming we don't hit any unexpected delays. Mining, design, construction and deployment, even if we had the money we just don't have the time.

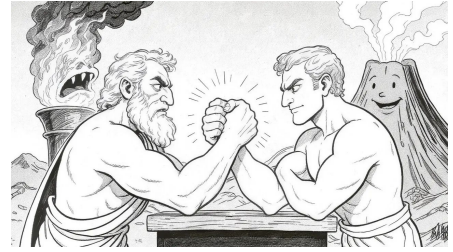


- All of us want the space mirror to be the option... but it isn't. Even the rich world will get desperate before this is logistically feasible.

**S.A.I. ➡ Mirror**

## Stratospheric Aerosol Injection (S.A.I.):

*Prometheus gave us industry,  
Hephaestus saves us from it.*



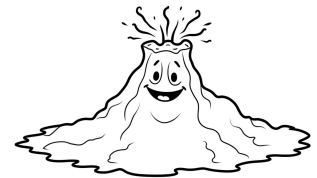
The new idea here is that S.A.I. is inevitable.

IF Stratospheric Aerosol Injection is ~guaranteed then it's risks (hopefully researched) are simply problems we need to work.

Let's explain S.A.I. mechanics and then discuss dangers in a worst case scenario.

Stratospheric Aerosol Injection is not a new idea. It was developed as a geoengineering concept in the 1970's from studying volcanoes. Volcanoes shoot Sulfur Dioxide, an aerosol, (and ash etc.) into the upper atmosphere (stratosphere). When in the stratosphere Sulfur Dioxide (SO<sub>2</sub>) combines with water and is excellent at reflecting sunlight back into space.

In 1991 Mt Pinatubo erupted and cooled the entire earth by ~.5 Celsius for a few years.



- That is 30% of today's entire global warming.
  - 3 Pinatubos = Zero warming.
    - 4 Pinatubos = Global cooling (just a thought)
- Do any of us remember the great Mt. Pinatubo scare of the the early 90's?
  - No, the eruption was a non-issue to anyone but scientists and the local population.
  - This does not mean 3 yearly Pinatubos don't have severe global risks.
    - S.A.I. DOES have severe global risks



Remember the two cancer patients?  
Suppressive chemo (S.A.I) has risks.  
The healthier man will reject any  
risks/negatives

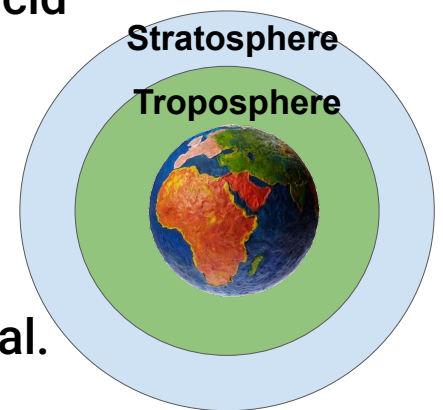
Stratospheric Aerosol Injection uses invisible Sulfur Dioxide (not ash or the other crap) shot very high above our weather (into the stratosphere).



The  $SO_2 \leftrightarrow CO_2$  offset ratios are **AMAZING** for humanity:  
One kilogram (2.2 pounds) of  $SO_2$  offsets hundreds of thousands of kilograms of Carbon Dioxide ( $CO_2$ ).

Some less studied alternatives to Sulfur Dioxide have even better ratios:  
Calcite or Alumina  
(cheaper too!)

We're a bit hypocritical in our fears of Sulfur Dioxide ( $SO_2$ ). It does create some acid rain. However, today human industry puts >34 million metric tons of Sulfur Dioxide into the *lower* atmosphere (troposphere) every year. In the *troposphere*  $SO_2$  is all bad and no benefit.  $SO_2$  in the troposphere creates a LOT more acid rain and pulmonary related deaths (per kg of  $SO_2$ ) than  $SO_2$  in the *stratosphere*. In the troposphere it hardly cools at all (1-2% of stratospheric). We could list acid rain as an S.A.I. negative but we gladly and willfully create a lot more every year by ourselves than would S.A.I.. Given that general  $SO_2$  irresponsibility our fears, at least pertaining to acid rain, are hypocritical.



How much  $SO_2$  does S.A.I. put up?

Less than 50% of what we put up already.

**34 million tons of  $SO_2$  for Industrial profit? OK!**

**~15 million tons to save millions of people? Hell No!**

# An Honest Representation of Dangers:

There are life-threatening risks with SO<sub>2</sub> that are specific to its use *in the stratosphere*.

These include some minor annoyances and three MAJOR risks.

Two of these major risks, while valid, are wildly misrepresented by climatologists.

## A: These are the minor annoyances of S.A.I.

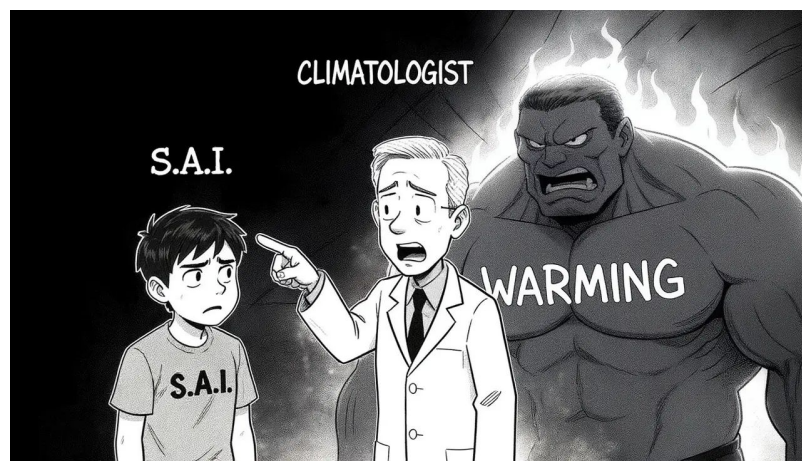
- On clear days our blue sky could be a lighter shade of blue and our sunsets more vivid.
  - Americans will despise that a decision is being made for us. Environmentalists will weep.
- Minor increase in acid rain though this is dwarfed by our willful production of it in the troposphere.

## B: Risk from both S.A.I. AND un-offset warming:

### Shifting air and ocean currents:

(By 2050 warming will be MUCH worse than S.A.I. in this regard)

- NEGATIVES (for both)
  - Could produce spots of extreme heating
  - Changes in monsoons and general precipitation patterns.
- If we choose S.A.I. we can stop any time and the aerosols dissipate in months. (initial tests, see termination shock section)
- Keeping aerosol injections at the poles could minimize risks for S.A.I.; We have no control levers at all for un-offset warming's effect.
- If we choose warming there is no easy off ramp...
  - except S.A.I.. taste the irony.



**No research = uninformed criticism.  
If S.A.I. was the greater evil they'd prove it**

- **KEY FACT:** It may seem that warming and S.A.I. have a few similar dangers but on the most important effect they are opposites:  
**S.A.I. is reducing the global mean temperature;**  
**Warming is, of course, increasing it.**
  - S.A.I. can delay/prevent threshold events, warming causes them.
    - North Atlantic Current Collapse (this might be unavoidable)(AMOC)
    - Self sustaining permafrost melt feedback loop. (scary amounts of CO2/methane)
    - Total coral extinctions (discussed earlier)
    - Boreal/Rain forest dieback (-> savannah)
  - S.A.I. maintains our current climate preventing countless extinctions
    - Environmentalists still hate S.A.I.
      - Myopic Puritans (that's another video)

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**If we decide LATER to cool the earth with S.A.I. we'll create a double extinction event.**

**COLD → HOT**  **HOT → COLD**

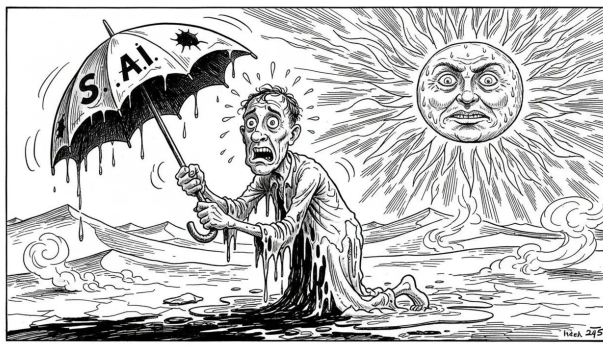
## **#1: MAJOR RISK OF S.A.I.: worst case scenario**

### **Ozone degradation, DANGEROUS.**

- Not instant risk, cumulative risk
- Only after *decades* of use S.A.I. could, worst case scenario, *double* world skin cancer rates.
  - A genuine doubling is a crazy outlier but this is worst case scenario.
  - S.A.I.? America is OUT. American kids put at **ANY** cancer/cataract risk? no way!
- Given their perspective, Americans are right. America is far from a warming December 7th. It's understandable they try to protect their children and discourage S.A.I.
  - There are unrecognized warming excess deaths in America every year but these aren't in the public perception of warming risk.
  - Even if better sunscreen and sunglasses prevented 90% of the risk Americans would say, "Hell No!" to S.A.I.



- Indonesians or Brazilians or Nigerians are also 100% right in protecting their societies and women and children.
  - Simply numbers: Even in this worst case scenario, by the time (decades) skin cancer rates double in the developing world those annual EXCESS cancer deaths will be a tiny fraction of the warming related annual EXCESS deaths.
    - The ratio is less stark but this would also be true of the rich world. (~10,000 Americans die from melanoma each year.)
- Check out the brief appendix on the developing world to better understand their situation.



bullsh\*t  
accusation

## **#2 MAJOR RISK - TERMINATION SHOCK:** **Blaming the chemotherapy for the cancer**

Technically, Termination Shock is real and straight forward:  
First, if we start S.A.I. today then global temperatures will stay the same as now.

-> Fast forward to 2060:

- If a crazy event suddenly stops S.A.I. in 2060 the earth will quickly heat to what it would be in 2060 as if we never used S.A.I. at all.
- That sudden warming will cause a lot of sudden deaths.
  - It's like stopping suppressive chemotherapy and the cancer quickly rebounds.

### **KEY FACT:**

The sudden deaths that start in 2060 from termination shock could be **MORE** than the accumulated deaths from un-offset warming between now and 2060.

That is a serious argument against Stratospheric Aerosol Injection. We must admit it's technically true.

The above is a fair representation of the facts.  
**Termination Shock is extremely dangerous.**

### **However...**

By "sudden" reheating we mean 1-2 decades;

Not some instant deadly 12 month spike.(a few years to hit really hard)

Key: Not solving Greenhouse gases also adds even more heat to the additional reheating from Termination Shock.

## Why TERMINATION SHOCK is a *false* risk.

Climatologists need to look up the word “**redundancy**”,  
it’s under “**R**”.

They already work with NASA who are brilliant at redundancy.

S.A.I. is dirt cheap compared to most climate costs.  
(10’s of billions) So money isn’t the issue.

We could have 2 or even 3 backup fleets of airplanes for S.A.I. in  
case something happened.

“Sudden” Rewarming still takes at least 10 years.

We can rebuild a fleet in a couple years if we put our minds to it

### **EVEN BETTER! Combo Cooling.**

While using S.A.I. we can ramp up Albedo cooling and use Marine  
Cloud Brightening in polar regions. We’ll have more money for  
these solutions because S.A.I. is staving off the worst damages.

If a termination shock occurred, this multi faceted cooling  
strategy would significantly reduce it.

We can quickly scale up the backups. (we’ll have years to do it)

Every bit we diversify our cooling, we need to use less aerosol for  
S.A.I., which also reduces the severity of termination shock.

- We still need some S.A.I. to effectively slow sea level rise.

### **FLEXIBILITY**

There are alternative aerosols to Sulfur Dioxide  
(Alumina or Calcite) that need to be studied. A mix of aerosols  
instead of one could significantly mitigate risks. Maybe alternate  
between them throughout the years?

Albedo and Marine Cloud Brightening can also be used locally to  
offset the uneven cooling effects of S.A.I. (Uneven regional  
heating is eventually FAR worse with un-offset warming)

**If climatologists are right then how could  
MAXIMUM Termination Shock occur?**

What's a situation where we don't have airplanes and can't manage Albedo or MCB?

- World War 3? An asteroid hitting us?
  - Termination Shock is then the least of our problems

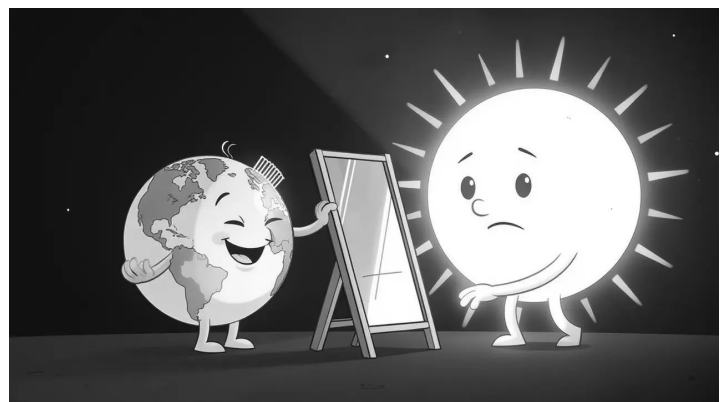
(we have to keep saying this)

**S.A.I does not heat the world. It COOLS it!  
Greenhouse gases heat the world and  
increase Termination Shock.**

- A: The amount of S.A.I. we use is proportional to our greenhouse gas problem.
- B: the severity of termination shock is proportional to the amount of S.A.I. we use.
- = The severity of termination shock is proportional to our greenhouse gas problem.

Stratospheric Aerosol Injection is a lesser evil, but it is evil.  
**It's also a miracle.**

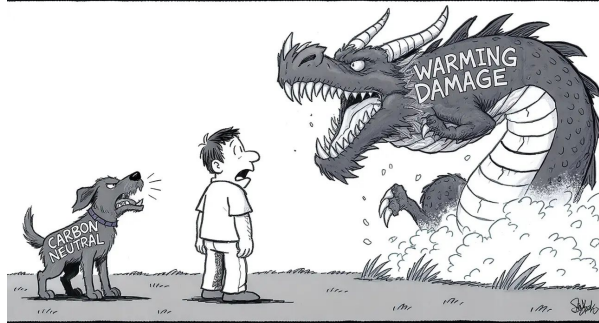
The effectiveness of S.A.I. and the efficiency of solar panels  
are essentially gifts from God.  
We'd be in deep SH\*T without them.



**CARBON  
NEUTRAL**

# APPENDIX

## CARBON NEUTRAL REALITY



*(2050 annual warming Damage 19-51 Trillion Dollars)*

### Stratospheric Aerosol Injection saves the RICH world:

Money is the vehicle to accomplish everything.

S.A.I. is about ECONOMICS.

What's important near-term for the rich world?

S.A.I. is about preventing taxes, not deaths.

"Trillions" is overwhelming. Let's simplify:

Imagine having to pay \$9 every day for an after-school tutor. But each day a school bully took \$19 from you. Every month it's \$270 for the tutor and \$570 for the bully.

How long until the bully payments hinder the tutor payments?

The 19\$ Bully = annual warming damage costs.

Standing up to the bully = Stratospheric Aerosol Injection

The \$9 (max) = annual green transition costs.

(S.A.I. does cause some damage but much less than warming)

9 trillion seems crazy but it's doable.

2050 World GDP = ~225 Trillion.

9+19 Trillion every year is NOT doable.

The Bully is eating your TAXES.



# WARMING DAMAGE

**Why warming damages (not Greenhouse Gases)  
are THE threat to rich world economies**

Let's assume the world goes all-in on green investment and we achieve carbon neutral by 2050!

If we went all-in today on the green transition every year between now and 2050 will cost, **AT MOST**, 9 trillion dollars (We chose the "at most" number to show feasibility)

- 2026 investment? 9 trillion
- 2050 investment? 9 trillion (+ inflation)

In 2025 warming damages **only** cost the world \$220 billion dollars. That's not much.

- That 220 Billion warming damage number is a low estimate but let's triple that and it's still a LOT less than the annual green transition cost (9 Trillion max)
  - So the green transition is more expensive than warming damage, right?

**Wrong.**

\$220 Billion is the tip of the warming damage iceberg.  
(ironic analogy intended)



## KEY POINT:

If we stay on track the green transition costs are ~static.  
(~9 trillion every year, no change)

No matter what we do with carbon neutral the warming damage costs are dynamic and multiplicative.

(S.A.I could help a lot)

- 2025 warming damages = \$220 Billion.
- 2050 warming damages = ~\$38 Trillion. (19-51)

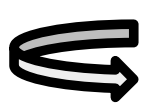
(That's not a typo.)

- That crazy \$ amount still assumes we magically hit 2050 carbon neutral!
- The real warming damage cost plateau will be the 2060+ price tag after a warming lag.
  - Lag = ocean still absorbs heat for 1-2 decades
  - The damages on that peak year will become a permanent yearly cost. So the world pays/loses 38+ trillion every year? YES. BINGO. YES.
    - Those damage costs will still rise annually since sea level rise will be creeping up for centuries (much slower with S.A.I.)

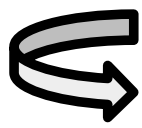
"The first and most imperative necessity in war is money, for money means everything else - men, guns, ammunition." - Ida Tarbell



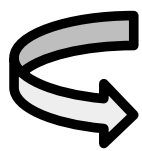
**MONEY won WW2.  
If I break the bank...  
I break America**



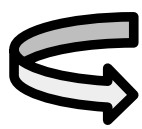
**S.A.I. saves trillions**



**green transition becomes easier**



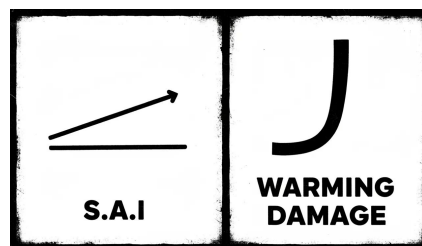
**cap established on how much aerosol we need each year**



**Trillions saved to develop/build mirror**

**Stop using Aerosol.**

Warming damages increase on a scary non-linear progression.  
(J-shape curve)



- S.A.I. damage follows a much less steep curve.
  - Our not reaching Carbon Neutral is a large part of the S.A.I. annual damage increase
    - Once we hit carbon neutral we hit a ceiling on how much aerosol we have to send up each year.

---

This appendix talks about the **reality of Carbon Neutral.**

It's a reality of half measures for the easiest gains.

Adding to our woes, Carbon Neutral isn't a finish line.

- It's a perpetual and costly process maintaining a carbon balance.
  - Yearly carbon neutral maintenance estimates are a few trillion dollars. But we shouldn't despair.

A few trillion is extremely manageable for maintenance.

**\$9,000,000,000,000**  
**+**  
**\$19+,000,000,000,000**

**EVERY  
YEAR**

---

**We just can't add ~38 trillion (19-51) in annual warming damages to Carbon Neutral transition or maintenance costs.**

With S.A.I. we can keep our prosperity and still hit Carbon Neutral (not 2050 but hopefully not decades later)

**We can do this:**

Carbon Neutral is achievable and sustainable for humanity.

If we ever want to replace S.A.I. with the (someday feasible) space mirror we need MONEY.



The west will eventually use S.A.I.

***Almost certainly BEFORE achieving Carbon Neutral***

(Ask google about this given realistic politics)

We simply cannot afford the green transition AND warming damages.

Let's put warming damages and S.A.I. aside for a moment.

We'll focus on green transition costs.

So, How difficult is Carbon Neutral?

# Carbon Neutral: Reality Check

We'll assume 2050 Carbon Neutrality wherever we can.  
(so generous of us!)

A: What have we actually achieved so far today? (2026)

Electric vehicles (EVs) and green energy production (solar/wind) are less than 50% of the greenhouse gas problem

- Almost all our green transition progress is in these two areas. EV's and green energy are the "success" stories.
- EVs and solar/wind are market driven products. Consumers purchase them.
  - EVs aren't charity. Their owners feel their purchase reinforces status and identity.
    - EVs have a political element.
      - politics also unfortunately creates a ceiling on adoption
  - Solar/wind is more than competitive price-wise with fossil fuels. Governments have an actual financial incentive to choose green energy.
    - Solar/wind is poisoned by politics, slowing adoption (everybody's fault)
    - China's solar industry dominance also creates political headwinds for solar adoption. (years ago we dominated it)



## EVs and green power generation are the low-lying fruit.

- Even though market driven, it will take decades for these technologies to become dominant.
- Even the low lying fruit takes decades? Yes.



Almost every other facet of the green transition is not market driven: pure cost, our taxes.

- The primary purpose of sea walls, land management, carbon extraction, and redesigning entire industries is defensive, not wealth creation.
- Taxes will pay for most of the green transition. It won't be consumers/governments buying competitive products.
  - Every man building a sea wall is not building something else.
  - Every dollar spent on a sea wall is not spent on something else.
  - Every tax dollar spent on a sea wall is a tax dollar that otherwise didn't need to be collected from the citizenry.

“Every tax dollar spent fighting a wildfire” etc...



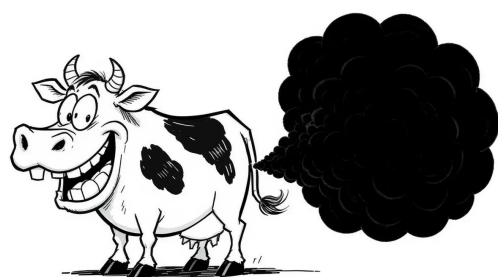
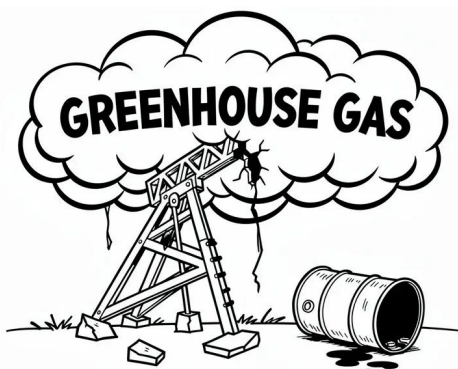
**We have many problems**  
**We have many workers**  
**We lack solutions**

- Mining, refining, plastics, cement, livestock, airplanes and farming (most pesticides and fertilizer are hydrocarbon based)... we have no near or mid term solutions to these.
- Advances in materials and feed etc. shave off *percentages* of greenhouse gas emissions but that points to a crippling issue:
- percentages are not complete capture/prevention.

**There's a lot of gas we can't catch:**

Example: There are millions of uncapped spent oil wells throughout the world leaking methane and CO2. Many are in unfriendly nations. There are countless examples like this, emissions we can't control.

- When will the world's entire livestock population be kept indoors to capture methane?
  - We won't choose this impossible task because we have CO2 general atmosphere extraction.
    - But Methane and CO2 aren't the same. What does capturing CO2 have to do with Methane? (see below)



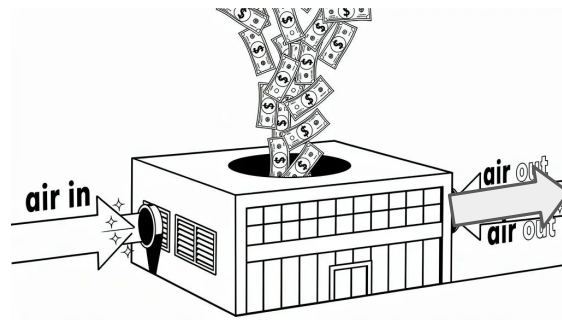
## General Atmospheric Extraction:

Let's focus on CO<sub>2</sub> for a moment, for clarity.

Carbon neutral is far off because while we can reduce output and capture CO<sub>2</sub> at the source, there will be considerable excess CO<sub>2</sub> gas we can't reduce or capture.

To achieve Carbon Neutral we'll need to suck out that **excess CO<sub>2</sub> from the general atmosphere.**

- We'll need to do this every single year **forever**.  
(Carbon Direct Removal via Direct Air Capture with Carbon Storage)(CDR via DACCS).



Every excess CO<sub>2</sub> molecule not captured or prevented will need to be extracted.

- CO<sub>2</sub> is .04% of our general atmosphere.
  - We will filter CO<sub>2</sub> out of the air with giant complexes (we are already testing) of fans and alkaline materials. This is like sifting Everest size mountains of hay for a few CO<sub>2</sub> needles.

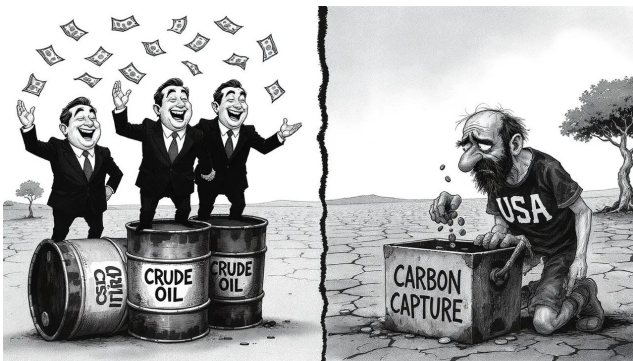
**We can sift air for CO<sub>2</sub>.  
it's just crazy  
expensive and  
inefficient**



## UN-AMERICAN:

We'll be paying to extract all the greenhouse gas emissions from bad actors. Russia or others will sell a barrel of oil for profit and Americans will pay taxes to extract foreign countries excess CO2. (really?)

- Two barrels of oil = ~1 ton of CO2 emissions (extraction/refining/burning)
  - Two barrels of oil sell for ~\$120 today, removing that same oil's total carbon from the atmosphere costs ~\$500 - \$1900
    - Will America just cut Russia, Venezuela, Nigeria and Saudi Arabia blank checks?
  - even in 2050 it will be, best case, \$100+ to remove a ton of CO2.
  - The amount of CO2 we need to remove by 2050 is, best case, ~3 gigatons (could be 10 gigatons; that # looks like 10,000,000,000 tons.)
    - If we do the numbers? It's less than \$1 trillion. That seems ok except...

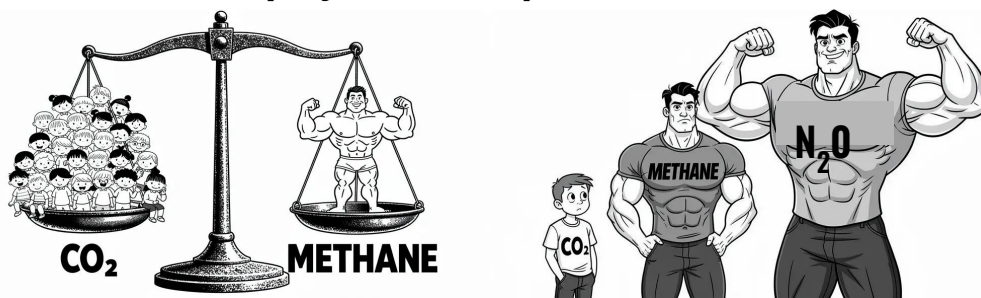


Most of this work must happen LONG before the extraction price drops close to \$100 per ton.

### \*Scary, VERY Scary: Back to Methane and Nitrous Oxide...

Because we don't even have *conceived* methods to extract free methane and nitrous oxide from the general atmosphere we will have to extract their CO2 warming equivalent annually.

- Methane and  $N_2O$  are tens to hundreds of times more potent than  $CO_2$  so that's a lot more  $CO_2$  extraction to achieve neutrality. Cripplingly expensive!
- The magic number for methane is 400 million tons, which is the excess caused by human activity each year
  - Methane is 30X more powerful than  $CO_2$  so we need to extract it's  $CO_2$  equivalent each year. Let's assume the crazy cheap cost of \$100 per ton for  $CO_2$  extraction.
  - 400 million X30 X\$100 = \$1.2 trillion annual costs for methane removal and it's actually a multiple of that given realistic prices.
    - That cost only offsets methane.
    - We'll need to pay this every year forever
      - World meat/dairy consumption is expected to increase for decades.
- Nitrous oxide is ~280X more powerful than  $CO_2$  so, best case, we pay \$2,800 per ton.



The numbers above ONLY pertain to greenhouse gas removal.

Those costs don't include:

- Annual green infrastructure/R&D costs
- Every climate change issue not surface temp related.
- The truly unavoidable sea level rise damages (there's still some annually even if we use S.A.I.)

## The RICH world needs Stratospheric Aerosol Injection.

The green transition is barely affordable on it's own.  
The world will still have all the problems we have now...

***In fact, we'll have many more problems!***

- For the first time in the post-Neolithic (advent of farming) era, all of humanity will be under extreme stress at the same exact time.
  - Where do you emigrate when most ecologies are degrading?
  - Who do you borrow from when everyone is desperate for money?

Our normal problems are expensive and will include events disruptive to the green energy transition.



We can't add tens of trillions of dollars per year in warming damage and expect us to make it through this transition while maintaining our prosperity.

The rich world does not meet its own green transition goals:  
Every year the west laughably falls short (60% short).  
The amount we fall short is added to the ever decreasing remaining years before 2050.

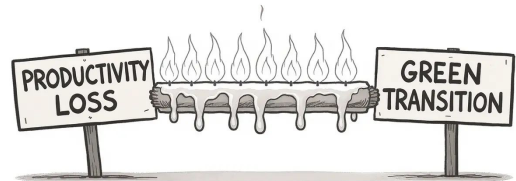
***You don't have to be a math wiz to see what's going on.  
Failure is a certainty.***

## S.A.I. is "America First":

America needs S.A.I. economically and not just to afford the green transition.

- S.A.I. protects funding for the military, social programs and... PREVENTS FUTURE TAXATION!
- Warming is *insanely* expensive and warming reduces our productivity.

*S.A.I. stops us from burning our economy at both ends.*



We know conservatives hate any tax.

But liberals are naive children regarding tax levels.

The taxes for uncontrolled warming damages?

Liberals will **piss their pants**. Goodbye social programs!

All of us need to grow up about researching S.A.I.!



We just need to get ready for S.A.I.

Carbon Neutral gets ~\$2 trillion annually for R&D.

S.A.I. gets 1/50-100k (1/10K min seen anywhere)

Just steal from Paul to pay Peter!

We do need to hurry.

The problem is the ocean surface temperature.

It causes most problems, and accelerates sea level rise.

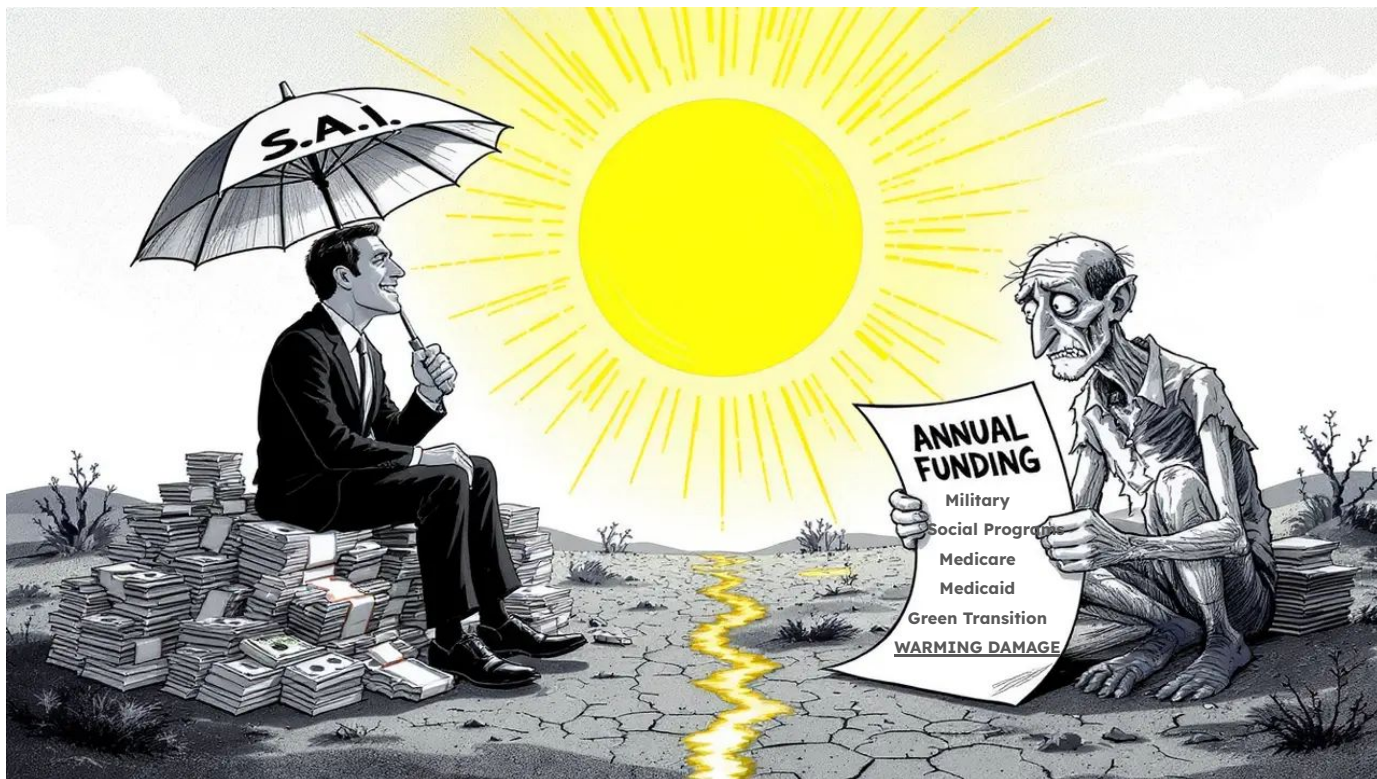
Ocean surface temperatures take years, maybe a decade, to significantly drop once S.A.I. is implemented.

Carbon Neutral is a challenge.

Even \$1 trillion seems better spent elsewhere.

But un-offset warming damage is cataclysmic, Biblical.

It will make us despair and threatens global stability



No conspiracy but Scientists are wrong about S.A.I.

They have no grasp of how money = life.

The greatest threat to the green transition *isn't* that

S.A.I. could demotivate that transition.

The greatest threat is warming damages bankrupting us

Demotivation causes “do we want to?”

Extreme warming damages cause “are we able to?”

that second one is terrifying.



**~Guaranteed S.A.I....**

**How long until we escape it?**

# The argument above is a harsh reality. But let's talk solutions.

Here is where the PRIVATE sector helps us avoid long-term stratospheric aerosol injection AND avoid warming damage.

Remember the space mirror?

That huge orbital array we couldn't possibly build for decades?

This argument lays out SAI's inevitability in order to prove that the need for the mirror or another escape hatch from SAI isn't a joke or easily dismissed.



But that escape hatch can be either a long-term solution or private investors can make it a *mid-term* solution.

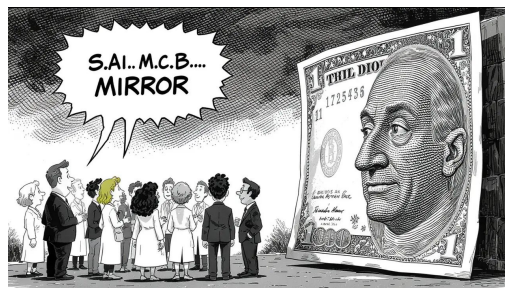
Stratospheric Aerosol Injection just entering the public debate will draw interest from investors. Some might invest in SAI research which is a good thing to make it safer and happen sooner to prevent more loss of prosperity.

But, at least compared to now, there will also be increased forward looking investment into any feasible alternative as an SAI off-switch.

SAI negatives, while far less than un-offset warming, will still make us desperate for what the mirror accomplishes;

We must speed up that accomplishment.

Market driven forces are the answer.



Do we see how just talking about this is effective?

Even if it's *negative*, it works... Geoengineering is on the radar.

Investors smarter than us are always looking to get in early on an opportunity.

This is about money and fear predicating choices;

NOT a sense of international responsibility.

I will never personally invest in any project to keep this argument ethical but several companies are already testing the aerosols we've mentioned and even some different aerosols.

Different companies, different angles (e.g. Stardust Solutions or Make Sunsets). Each company and solution are hit or miss but this TYPE of investment is exactly what we want.

The long term solutions, Mirrors, etc., come sooner the very day we start understanding the harsh realities of our near-term solutions. (SAI)



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Each individual great power, Including the UNITED STATES, should think on this:  
WHEN SAI is implemented your people could be one of the losers with many areas suffering extreme local heating.

If the United States, Russia, India, Europe or China use SAI...  
There is NOTHING the other great powers can do about it.  
All these nations have nuclear weapons.

*(let's pause a moment on that)*

### And the UN helping?

The great powers we're talking about are the security council who control the U.N.  
...and even they ignore the U.N..

The United States or Europe SHOULD use their resources and technical expertise on these projects for their own good but that won't happen anytime soon.



That's why  
**PRIVATE** investment,  
with it's risk tolerance and (useful) amorality,  
is the pioneer.



We should have no problem with investors making billions in profit given what  
all of us are getting from it.

Many facets remain to discuss but let's stop here.

There are supplemental videos for SAI/mirror you can check out.

Here's a teaser though... China hates sticking its neck out and prefers wait and  
see patience. But the moment the party's control over the domestic population  
erodes even the slightest? All bets are off.

And the Chinese know how to  
get things done cheap and fast.

Look out America!

Someone else's hand will be on that lever!



Money = everything else, so let's preserve our prosperity.

Please use any and all ideas here, develop them, make them yours.

Working to spread this idea is all that matters.

Thank you.

If you watch the video you'll hear that gratitude in my voice.

Say hi if you see me spreading this idea in Boston!



**sai-reality.com**