The Atmospheric Heat Reduction (AHR) Story

Picture a world with a heat problem, the temperature is slowly rising globally. Due to the complexity of the environment, the planet experiences higher highs and lower lows, with an increase in severe weather occurrences.

Now picture a population committed to using every single solution possible to tackle this climate change. Reducing CO2e emissions is a generally accepted approach, but that will take decades if not centuries to have an impact. Clean energy sources to replace combustion engines are being pursued but are of limited ability and have an extended impact timeline intertwined with other CO2e reduction efforts. Carbon capture and storage may help shorten that timeline, but merely delay addressing the produced carbon for future generations. Mega geoengineering solutions involving approaches such as sprinkling various substances into the air are on the table, but they involve significant political and scientific concerns and unknowns.

That's where our story begins.

Picture within the city, in your backyard, you see smallish stylish panels about 6" x 18" blended into every fence post. No batteries nor connecting wires, just a panel and a light emitter pointed at the sky. On the garage roof, you see larger panels, each with its own larger emitter, like a headlamp. On the house you see solar panels that are connected to your utility service or battery storage. You also see emitters that run when the local batteries are at full capacity, the solar energy temporarily diverted.

Strolling down the street you see your neighbours have similar equipment. Walking along the green pathways you see these fenceposts all also have the smallish panels, thousands of these have been placed on the pathways and fence lines where posts already existed – no additional footprint. Like streetlights, they have become a standard part of the backdrop.

Driving through the country you see farmlands, with their acres of fenced farming land, and thousands of the light emitters placed on each of these posts – again no additional footprint needed. You see farms with vertical panels between rows of crops and angled horizontal panels providing shelter to animals and vegetation. No utility hookup, these are all independent with light emitters that operate only during daylight, disturbing no one.

You come across a larger field which was unsuitable for crop, which looks like a traditional solar energy farm, however this has no utility hookups nor wires, and no batteries. You know that companies subscribe to these services, sharing the cost with central management helping them meet their climate targets at minimal costs, far lower than annually purchasing carbon credits.

Panels can be installed individually, in solar farm like settings, vertical, or whatever works, scaled accordingly. There are no batteries, no interconnecting wires, no grid hookup.

You drive past a construction site with a generator running. You see the generator has emitters with a different type of panel attached. The waste heat is powering the emitters, being more economical compared to converting it to usable energy fed into the local grid. You see compressors and other equipment, anything that can generate significant heat, with similar equipment. No strings attached.

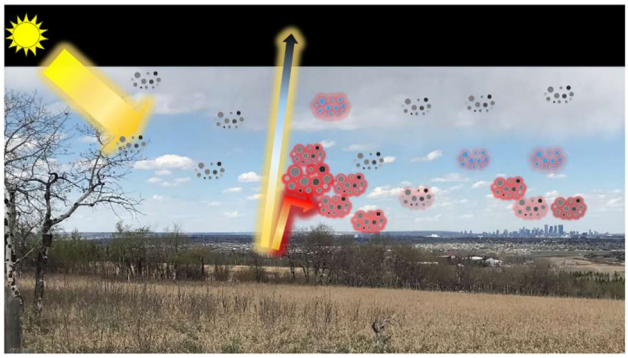
You know that the existing world population is developing with increasing demands, and that the world population is increasing, and with these increases are higher demands for energy and the work provided by that energy: heating and cooling our homes, operating lights and other equipment within the homes and offices, manufacturing goods, transporting goods and people, the list goes on. Each activity requires energy, which results in releasing heat to the atmosphere, regardless of the energy

source being fossil fuel based or clean energy based. You've heard the scientists say that the best explanation to date for the increase in temperature is that CO2e is trapping heat in the atmosphere, so you agree that reducing CO2e will reduce heat in the future, probably. But you also want to reduce the heat now, and maybe you're not convinced it is just CO2e causing the increase, so you've done everything you can to reduce the heat directly. These implementations decease the local temperatures in small pockets, reversing urban heat island effects and rural crop field temperatures. Individually they help locally, together they impact the world.

Thank you for caring about the future.

How it works

Current theory (or 'fact' depending on who tells the story), is that CO2 and equivalent gases are released into the atmosphere in increasing volumes by human activities; the solar radiation arrives from the sun as ultraviolet, visible light, and infrared wavelengths; the radiation is partially absorbed and then reemitted as infrared energy; and the infrared energy is trapped by the CO2e in increasing quantity, which is warming the planet. CO2e absorbs the heat energy instead of letting it continue to space, it then reemits the energy randomly to any direction with only a portion of which continues to space. By emitting it to other CO2e gases or back to earth the heat is effectively trapped from leaving. *For further details on the Earth's energy budget please visit* [*https://takebacktheheat.org/about*](https://takebacktheheat.org/about).



Current: Incoming Solar Radiation is partially absorbed and emitted as infrared radiation, which is 'trapped' by BHBs in turn heating up the planet.

The panels in discussion above instead convert the received energy to visible light wavelengths which is emitted to space. These visible light wavelengths are not impacted by CO2e, so the heat is not trapped, and it reaches space as originally destined.

AHR: Incoming solar radiation is partially converted to visible light, emitted out to solar system unchallenged by GHGs (which have no impact on visible light wavelengths).

As an example, each year, one 100-watt panel will effectively retransmit the equivalent of removing 4.4 metric tonnes of CO2e, depending on location. In other words, the heat energy converted and emitted to space is roughly equal to the energy that would have been trapped by 4.4 metric tonnes of CO2e over 20 years.

This is calculated by looking at theoretical carbon delta to increase global temperature 1 degree Celsius over 20 years (200 giga tons) divided by theoretical joules for 1 degree Celsius (2.2E+21) globally.

For complete calculations please see the 'watt to carbon equivalent' forum post at TakeBackTheHeat - General - Information.

Example Estimates (Canadian dollars, all rough estimates)

1 gigatonne CO2e removed annually (for comparisons purpose)

Delivered using 500-watt panels (17.5 CO2e) would require approximately 56.8 million panels, and if using the 'solar farm layout' approach would require 56,800 acres, which is approximately one third the size of Alberta though obviously could be spread out in pieces anywhere in the world. For comparison, the Claresholm 2 solar farm in Alberta, Canada is approximately 1,280 acres. **Initial cost in the $46 billion range, with 10% yearly maintenance** for 25 years, puts **setup cost per CO2e tonne at $38**, subsequent **yearly maintenance at less than $1 per CO2e** annually. In reality this goal would be accomplished using a combination of different solutions such as the waste heat recovery, post installations and roof top installations as mentioned above, and would need to be phased in over multiple years. Please see [TakeBackTheHeat - Model] for an example plan and planning tool to remove 1 degree Celsius by 2100.

Compare AHR equivalent with annual 7,000 Canadian Carbon Credit Purchases

Approx. $1 million initial setup and $90,000 annually for 10 years results in 70,000 CO2e tonnes equivalent, compared with purchasing carbon credits would save approximately:

$6.4 Million.

~ $1 MM initial

Year	tCO2e	Current Credit Price	Current Cost	Proposed AHR Cost	Proposed AHR Savings
1	7,000	$ 50	$ 350,000	$ 900,000	$ (550,000)
2	7,000	$ 65	$ 455,000	$ 90,000	$ 365,000
3	7,000	$ 80	$ 560,000	$ 90,000	$ 470,000
4	7,000	$ 95	$ 665,000	$ 90,000	$ 575,000
5	7,000	$ 110	$ 770,000	$ 90,000	$ 680,000
6	7,000	$ 125	$ 875,000	$ 90,000	$ 785,000
7	7,000	$ 140	$ 980,000	$ 90,000	$ 890,000
8	7,000	$ 155	$ 1,085,000	$ 90,000	$ 995,000
9	7,000	$ 170	$ 1,190,000	$ 90,000	$ 1,100,000
10	7,000	$ 170	$ 1,190,000	$ 90,000	$ 1,100,000
Total:	70,000		$ 8,120,000	$ 1,710,000	$ 6,410,000
avg per tCO2e:			$ 116	$ 24	
Total savings 10 years:					**$ 6,410,000**

Compare AHR equivalent to purchasing 1 million credits annually for 10 years

Approx. $52 million initial setup and $500,000 annually for 10 years results in 10 million CO2e tonnes equivalent, compared with purchasing carbon credits would save approximately:

$1.1 Billion.

1 megatonne CO2e yearly

Year	tCO2e	Current Credit Price	Current Cost	Proposed AHR Cost	Proposed AHR Savings
1	1,000,000	$ 50	$ 50,000,000	$ 52,200,000	$ (2,200,000)
2	1,000,000	$ 65	$ 65,000,000	$ 5,220,000	$ 59,780,000
3	1,000,000	$ 80	$ 80,000,000	$ 5,220,000	$ 74,780,000
4	1,000,000	$ 95	$ 95,000,000	$ 5,220,000	$ 89,780,000
5	1,000,000	$ 110	$ 110,000,000	$ 5,220,000	$ 104,780,000
6	1,000,000	$ 125	$ 125,000,000	$ 5,220,000	$ 119,780,000
7	1,000,000	$ 140	$ 140,000,000	$ 5,220,000	$ 134,780,000
8	1,000,000	$ 155	$ 155,000,000	$ 5,220,000	$ 149,780,000
9	1,000,000	$ 170	$ 170,000,000	$ 5,220,000	$ 164,780,000
10	1,000,000	$ 170	$ 170,000,000	$ 5,220,000	$ 164,780,000
Total:	10,000,000		$ 1,160,000,000	$ 99,180,000	$ 1,060,820,000
avg per tCO2e:			$ 116	$ 10	
Total savings 10 years:					**$ 1,060,820,000**

Compare with a recent CCUS Project

From their web site, it is estimated to be available by 2030 at approx. $16.5 billion, capture 10 to 12 million tonnes of CO2 each year. Assuming 10% yearly operational costs.

Pragmatically both should move forward, however for comparison would save approximately:

$31.8 Billion.

CCUS phase 1: 12 megatonne CO2e yearly, estimate 10% operation

Year	tCO2e	2030+ Cost (16.5B + 10%) 16,500,000,000	Proposed AHR Cost 52,200,000 x 12	Proposed AHR Savings
1	12,000,000	$ 18,150,000,000	$ 626,400,000	$ 17,523,600,000
2	12,000,000	$ 1,650,000,000	$ 62,640,000	$ 1,587,360,000
3	12,000,000	$ 1,650,000,000	$ 62,640,000	$ 1,587,360,000
4	12,000,000	$ 1,650,000,000	$ 62,640,000	$ 1,587,360,000
5	12,000,000	$ 1,650,000,000	$ 62,640,000	$ 1,587,360,000
6	12,000,000	$ 1,650,000,000	$ 62,640,000	$ 1,587,360,000
7	12,000,000	$ 1,650,000,000	$ 62,640,000	$ 1,587,360,000
8	12,000,000	$ 1,650,000,000	$ 62,640,000	$ 1,587,360,000
9	12,000,000	$ 1,650,000,000	$ 62,640,000	$ 1,587,360,000
10	12,000,000	$ 1,650,000,000	$ 62,640,000	$ 1,587,360,000
Total:	120,000,000	33,000,000,000	1,190,160,000	31,809,840,000
avg per tCO2e:		$ 275	$ 10	
Total savings 10 years:				**$ 31,809,840,000**

Are these carbon credits?

Atmospheric Heat Reduction (AHR) volumes are not carbon credits. They represent real energy removed from otherwise heating the atmosphere and hence the planet, which is the purpose of removing CO2e (to reduce the energy retained). Carbon credit equivalents are estimated for comparison purposes only. There are no federal nor provincial incentives for AHR, there is no recognition.

It is anticipated that once the world catches on to the more immediate results provided by AHR, this situation could change, but given what we've seen to date this process could take many years if at all. This is in part why we reach out to curious and innovative leaders, we know that typically line staff are unable to champion nor implement non-standard solutions that have not been fully mainstream accepted. In a perfect world all proposed global warming / climate solutions would be rated as per heat removed, as this is the problem, however realistically CO2e is the measure of choice.

Summary and further actions

Addressing global warming will take multiple solutions deployed globally, no one solution can do it all. What is described here is just one path for one solution (AHR), which as it grows will initiate industries for validation, implementation, optimized design, optimized calculations, further research, and more globally and locally.

But it must start somewhere, with leaders that don't wait for others to clear the path.

Further information can be found at https://takebacktheheat.org, which covers the general path and background leading up to this approach. Contact me to arrange a discussion on how we can move forward.

Below is the panel calculation link for approximately 1 mega watt (net) of converted energy (CO2e tonnes / y). These are the values shown above. Try the link, adjust to what you consider practical.

https://www.takebacktheheat.org/CalcPanel?desc=Panel+configuration%3A+2x500W+vertical+%287%27x3%27%29+with+12%27+access+path+between+rows%2C+on+208%27+x+208%27+land+%281+acre%29.+Alberta+land+prices.&ppa=1000&cpp=+400&wpp=500&epp=200&ipp=+200&tmw=22700&cpa=5000&sred=85&mpy=+227000000&paneff=90&dceff=75&deff=70&dlhpd=14&dlf=85&ctpwd=0.000157

thank you for your time,

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