



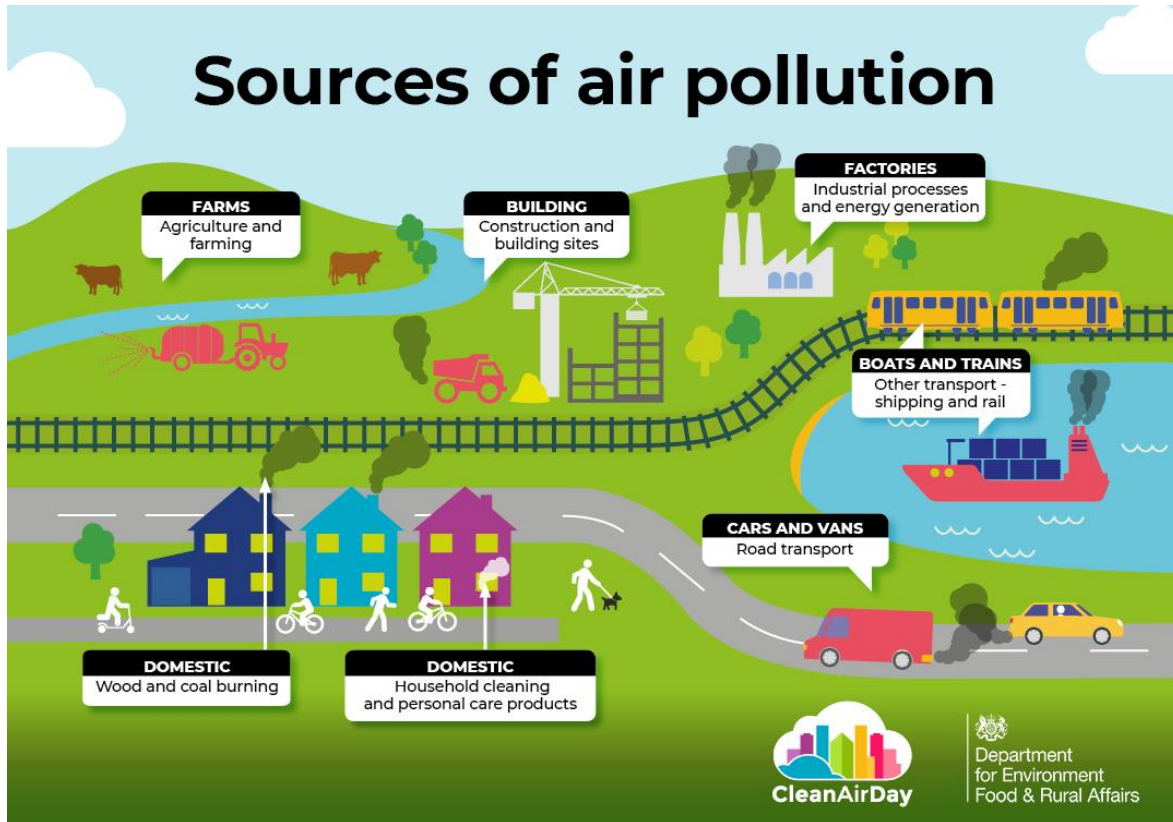
Circular Solar

A zero-waste to energy, negative carbon technology

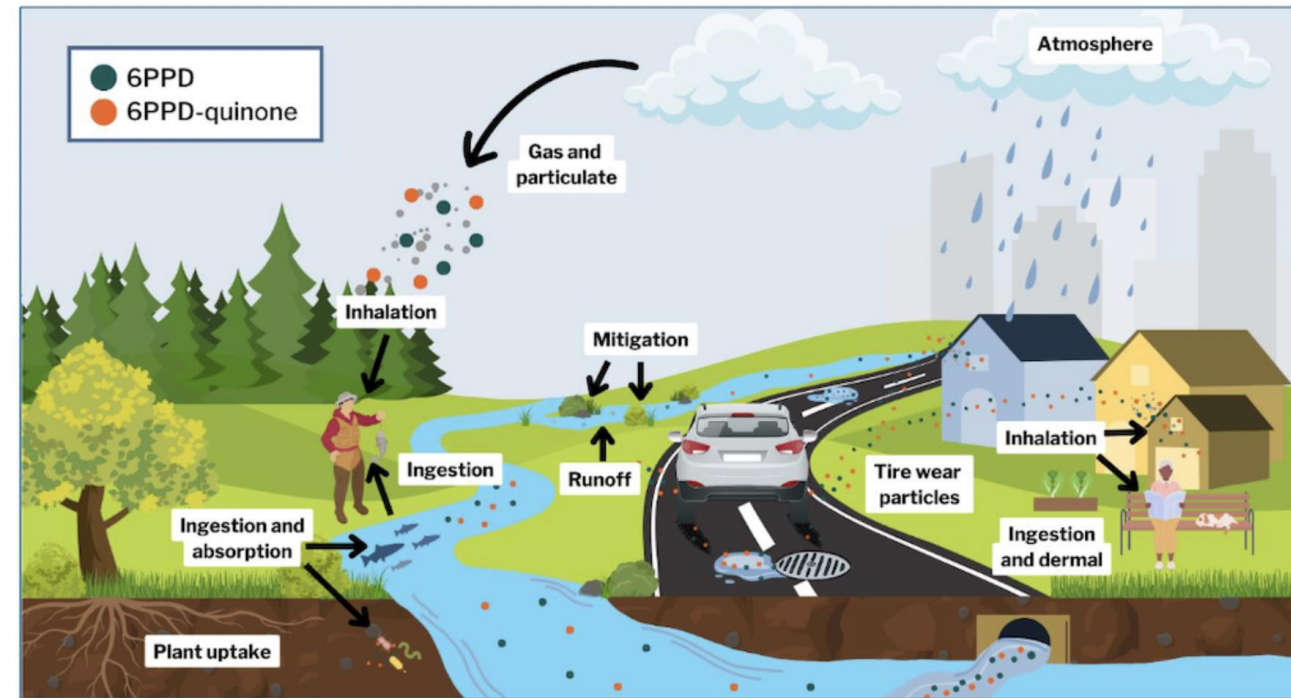
Diverting EoL wind blades, nacelle's, various glass, limestone from landfills, reused as CDR, negative emissions renewable energy infrastructure:

- Carbon removal (CDR) energy infrastructure and materials for: hybrid DAC, mCDR, ERW.
- Recycled materials generate additional solar yield.
- Applications: CDR wind-solar farms, solar canals, data-center cooling, mine sites, EV charging stations, highway PV, port infrastructure, shipping containers.

Let's examine the problem, where various pollutants and toxins from and how they enter and impact air, water and humans. During the Industrial Revolution, which began around 1750, atmospheric carbon dioxide (CO₂) levels were approximately 280 parts per million (ppm). In 2025, carbon dioxide (CO₂) pollution reached 426.03 parts per million (ppm) globally in January. To reverse climate, pollutants, toxins, we need removal technologies, decarbonization and renewable energy.



Potential pathways for human exposure to 6PPD-Q



Solution and applications:

Project Circular Solar CDR (carbon dioxide, pm, removal):

20-month and 9-month field CDR rooftop, over a waterway field tests:

capturing, removing carbon, pm from Port of Oakland, HWY 880 vehicle, rail, providing cleaner stormwater runoff for soil, waterways.

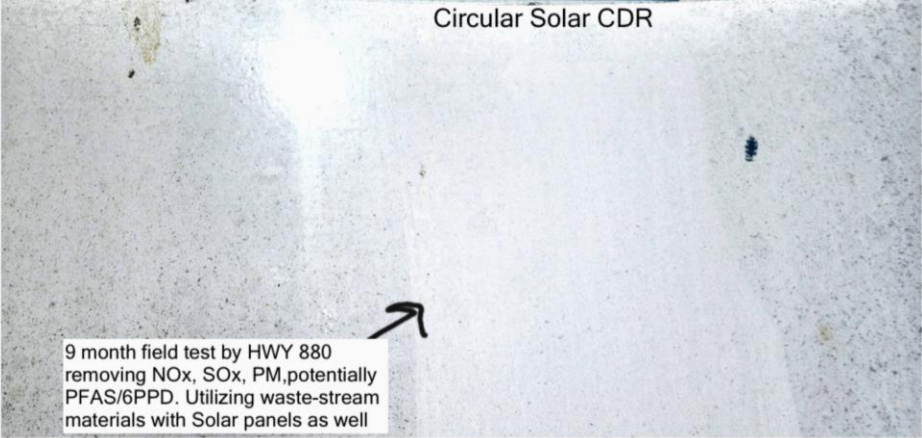
> This is also scalable to mine sites (heavy metal contaminants) and roads.

>A cooling technology using three recycled materials, composite (Eol wind blades, nacelle's), bottle bill, architectural glass, generating more pv yields simulating fresh snow albedo. **CircularSolar.net**



Airborne pollutants

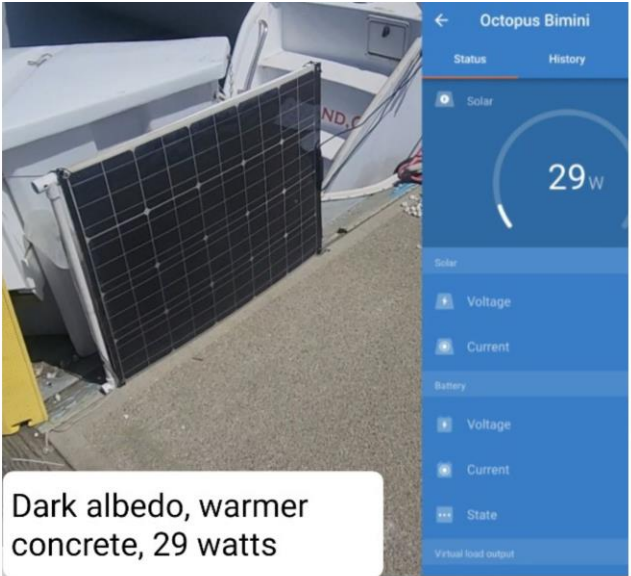
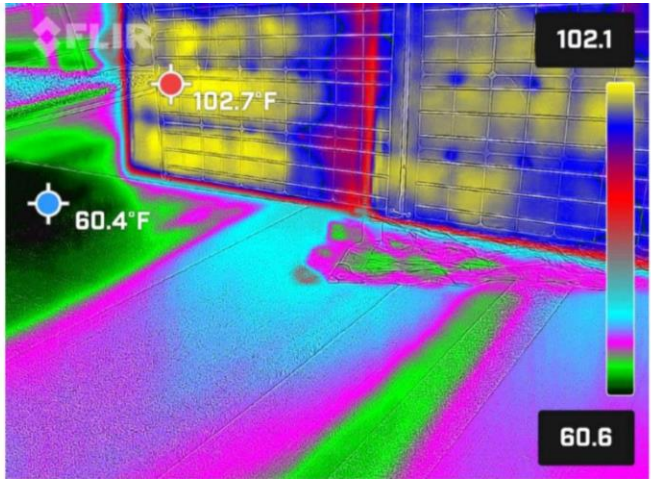
CDR 21 months



Circular Solar CDR

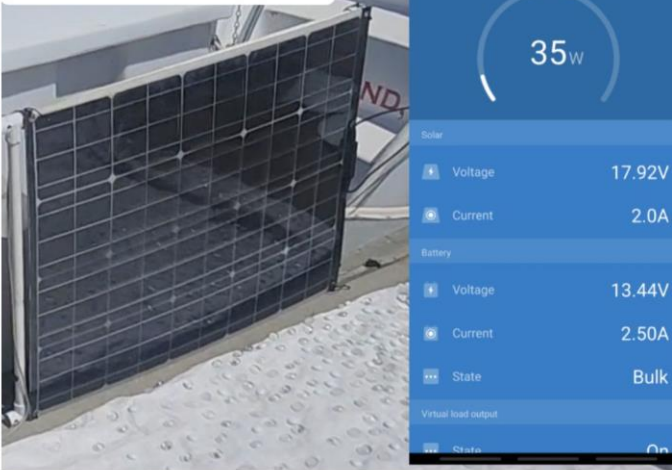
Product Circular Solar: applied over concrete, for solar and EV charging efficiency and cleaner stormwater runoff to soil, waterways including improving ERW and ocean alkalinity effect (12-month controlled study, test results of improved marine vegetation buildup are available). Up to 50% change in solar output, daily yield improvement of >15%

[Video of this application in Arizona](#)



Dark albedo, warmer concrete, 29 watts

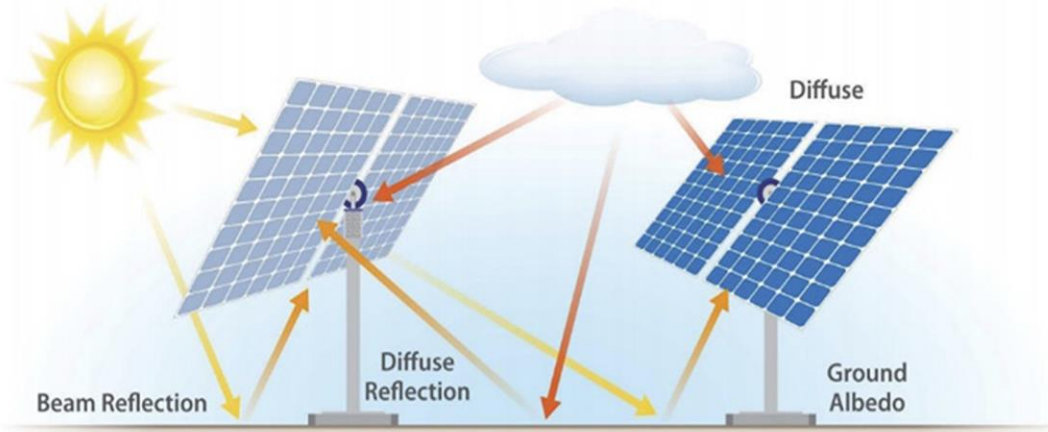
3. American made recycled, landfilled content is integrated.



How does Circular Solar work?

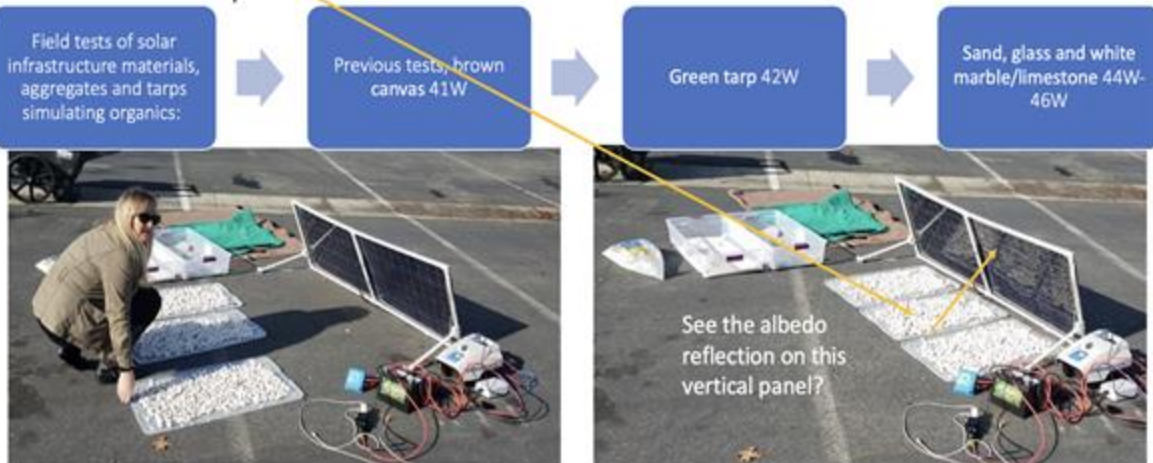
First, we need to learn more about Bifacial Solar panels and how they manage ground albedo

- They have a transparent glass backsheet where the rear/bifacial side also collects sunlight to convert to electricity.
- On average the rear side could collect up 70 - 85% of the frontside.
- This varies highly on ground, surface albedo and tilt/angle.



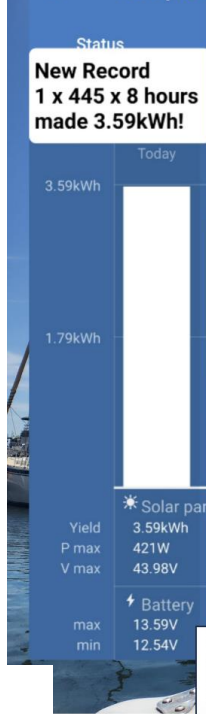
Source NREL: <https://www.nrel.gov/pv/pv-bifacial-irradiance-toolkit.html>

Future Circular Concrete Solar Aggregates For High Albedo Value, Effect



12/24/2022, increasing solar-battery charging efficiency, cooler for the battery, all sunlight reflected to panel, simulating fresh snow albedo. [Video: Product applied](#)

FIG. 2
← Octopus



June 2024 E-W fixed Bi-PERC,
single day yield of 3.59 kWh's.
2023 record 3.62kWh's.
CircularSolar.net

NOx, SOx, tire dust (potential PFAS buildup), Recycling (including Lithium and lead acid batteries), Port, Freeway, Flightpath Emissions locations:

Field Prototype Distances From:

- .01 mi. superfund site (WW1-2 Union Iron Shipway, Alameda).
- .38 mi. from UP/Amtrak Rail
- .58 mi. 880 freeway
- .66 mi. SF Ferries
- .83 mi. Port of Oakland
- 1.2 mi. Radius Recycling (name change from Schnitzer Steel)
- .07-1.0 mi. USCG ships, tugs emissions

Flightpath, SFO & Oakland, distance varies, bad weather is very close above

** Other tests up to 90% removal*

Carbon captured, removed over water, by a major port on EoL wind type fiberglass (composite) as mCDR, with limestone, glass as ERW is also utilized into solar efficiency. Calcium byproduct sequestered into soil or ocean alkalinity enhancement; marine growth comparison test results [here](#)



Example art for: Circular Solar; EoL blade waste-to-renewable energy; housing BESS, making 20% or more pv, tracking to vertical or fixed vertical helps flatten the duck curve, located at Wind repower.

Circular Solar CDR Wind Blades Repurposed Into Energy.

Left: Dual axis circular CSP (concentrated solar power) where fresh snow albedo may offer <50% higher daily solar yields vs fixed horizontal. Solar efficiency records are expected (which may already have been achieved in 2023 for a fixed mount panel; see slide 6).

This dual axis option would be ideal with sections of cut blades surrounding panels in four corner patterns to mirror all light possible. Landfilled waste into CSP!

Additionally, these are hosts for CDR (carbon dioxide removal) coating removing vehicle to data center generator emissions buildup; byproduct water, soil amendment. 12 months controlled mCDR study results on slide 6.

Middle: Single axis tracking may offer more energy versus vertical.

Right: near Summer Solstice, East - West orientation, the CS Blade's fresh simulation of fresh snow, cloud white albedo effect can generate >15% more power on one side vs brown albedo value.



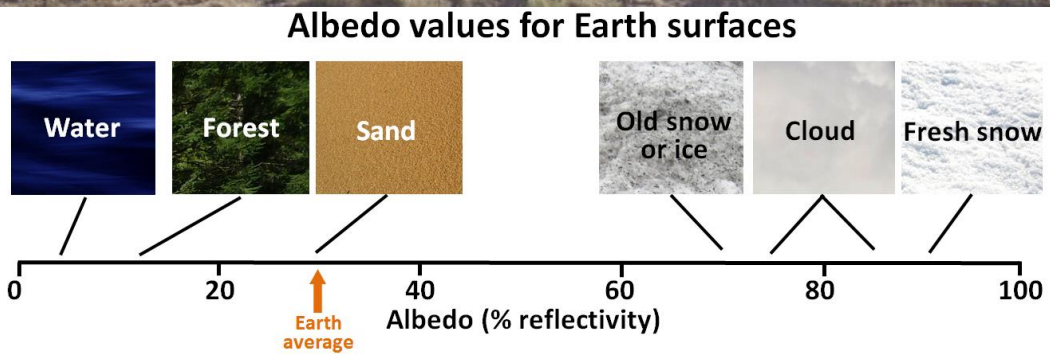
Circular Solar is patent-pending

CircularSolar.net

Rural Agricultural, Highway, Rail CDR

[Video: Live energy validating 25% higher output](#)

More about Albedo Effect here:
[climate feedbacks that impact weather, climate](#)



Direct and diffused light from clouds directly power the solar panels top side and bifacial/rear side, the blades mirror fresh snow albedo values which reflects sunlight from the ground up. Diverting landfilled material into producing additional solar power.



Near Summer Solstice, East - West orientation, the CS Blade's fresh simulation of snow white albedo effect can generate >15% more power on one side.



CircularSolar.net

Circular Solar is patent-pending

By, Founder, Cherise Petker, Circular Solar LLC

1. A global solution for recycling EoL waste onsite, reusing it back into energy production and host for carbon removal technology.
2. Reusing blades with the Circular Solar CDR technology (that's also applied to in-use Wind) generates 15%+ solar energy yields and work for 20+ years in solar PPA.
3. Solar-bess costs are separate, 80% of the normal EoL wind decommissioning/recycling/landfill costs (\$6-11k/blade) go towards construction, CDR, CS IP fee. The wind project owner saves 20% and will most likely become the solar PPA. It is expected to offer >15% more power. Circular Solar LLC receives a % of the PPA rev.
4. Additional hybrid CDR & power microgrid for onsite EV charging station can be installed utilizing our [pavement product](#).
5. Passive DAC/CDR project produces additional PV energy, removes 1 ton CO2/year from 10,000sq.ft. with CDR; as low as \$100.00/CO2 carbon offset (goal by 2028).
6. Demonstrations of [carbon removal](#) on fiberglass composite by a freeway, port & [live energy tests](#) of CS CDR making more pv energy, [fixed horizontal](#), up [to 26% eff](#).

Circular Solar Hybrid DAC Wind: With slide 2 CDR removal results in mind, we have hybrid DAC Wind, its EoL materials reused as CDR by roads, ports, transportation, AI data-centers using diesel backup generators, placed below solar generating more power and batteries in nacelle's.

An optional addition would be using vertical solar, for grid tie or micro battery grid, solar that would be boosted by the additional albedo effect of Circular Solar CDR.

Vehicle, Trucking, & Rail emissions such as NO_x, SO_x, particulate matter pollution are within 1,000 feet of freeways. 2,000/tons/mile/lane/year are emitted, most freeways have four lanes with rail emissions or 8,000/tons/year per mile.

Airborne vehicle exhaust, brake, tire dust, freight truck, rail emissions build-up in the sky onto Wind energy and their EoL materials placed below, generating higher solar yields,

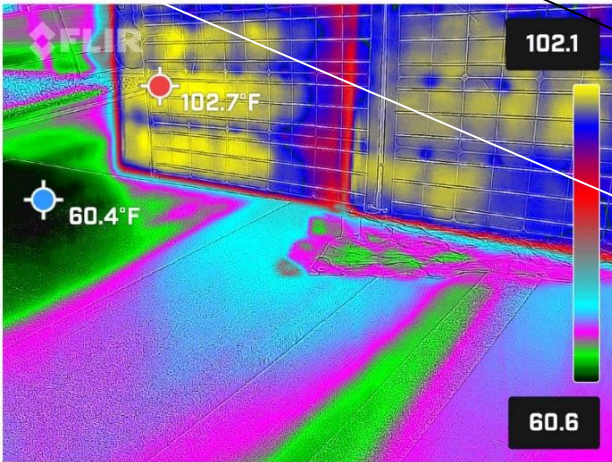


< **Shipping CDR**, here is Port of Rotterdam, NL. Circular Solar would love to pilot here because we've already proven the technologies working, removing emissions by a Port of Oakland, improving soil (2008 example in a road) and now ocean alkalinity restoration; [12-month example of algae bloom and restoration](#) and [here](#) and visual [of ship emissions](#) Rotterdam is a bunker hub for fossil fuels – high emitter. 4/2025: IMO agrees to a [global carbon pricing: \\$100 or \\$380](#).

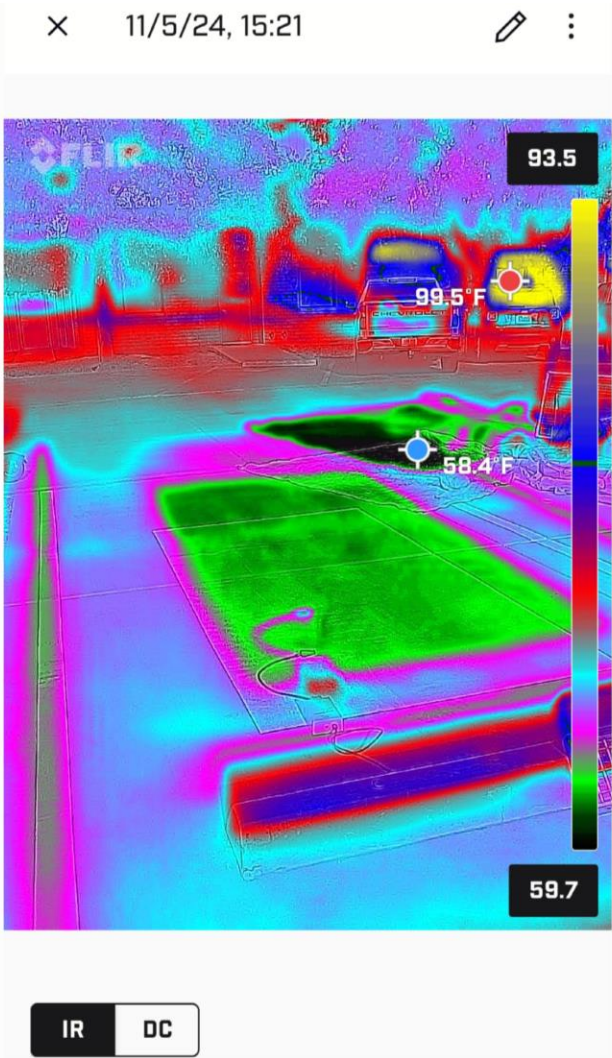
EV, Solar CDR and Cooling: EV/Port charging applications, scalable to data-center buildings.

Hot concrete in Arizona (location below) will stay cooler when EVs, park or charge over the space. Both wired but especially future wireless induction charging remains cooler, thus improving charging efficiency and component, battery lifecycle, due to less heat losses as the product is reflective and has a cooler UHI (urban heat island effect). When not charging vertical or canopy solar can be added and the product generates higher solar output. Additionally, the CDR breakdown airborne accumulated ICE vehicle or data center fossil generator power emissions to tire dust

Circular Solar is also a data-center rooftop, reflective, circular, CO2 removal product, as seen here over concrete, it is almost as cool as the plastic tarp



[Wireless induction pad over concrete](#)



Circular Solar has applied to join the Open Power Ai Consortium: as a project to pilot for landfill diversion, high efficiency renewable energy project and data-center rooftop infrastructure product to reduce CO2; reduces water use for interior cooling.

- 1. Coolest, CDR carbon removal rooftop (less water required for interior cooling).
- 2. Cooler EV charging spaces for employees or autonomous fleets (slide 7).

- 3. Hybrid DAC Wind (slide 6)
- 4. Circular Solar Wind: EoL wind blades repurposed below solar panels, with CDR (slides 3-6). Texas and California have wind blades being decommissioned now ideal this project.



The Lancium Clean Tech data center campus is being constructed by contractor DPR Construction in Abilene, Texas, with Crusoe Energy as its developer.



By Crusoe Energy

Urban, smart city art example by Siemens: with Circular Solar examples notated with white arrows as ideal applications to pavement, buildings, data centers, EV charging stations, Wind and Solar farms. Scalable on buildings, roads, restoring landscaping: [Video of the first small Pilot: recycled glass, concrete CDR example in 2008 in a road in California](#)



Carbon Dioxide Removals (CDR) Market was valued USD 3.4 billion: in 2024, and is expected to reach \$25 billion by 2029, rising at a CAGR of 49%. – source: businesswire.com "carbon dioxide removals"

Circular Solar CDR:

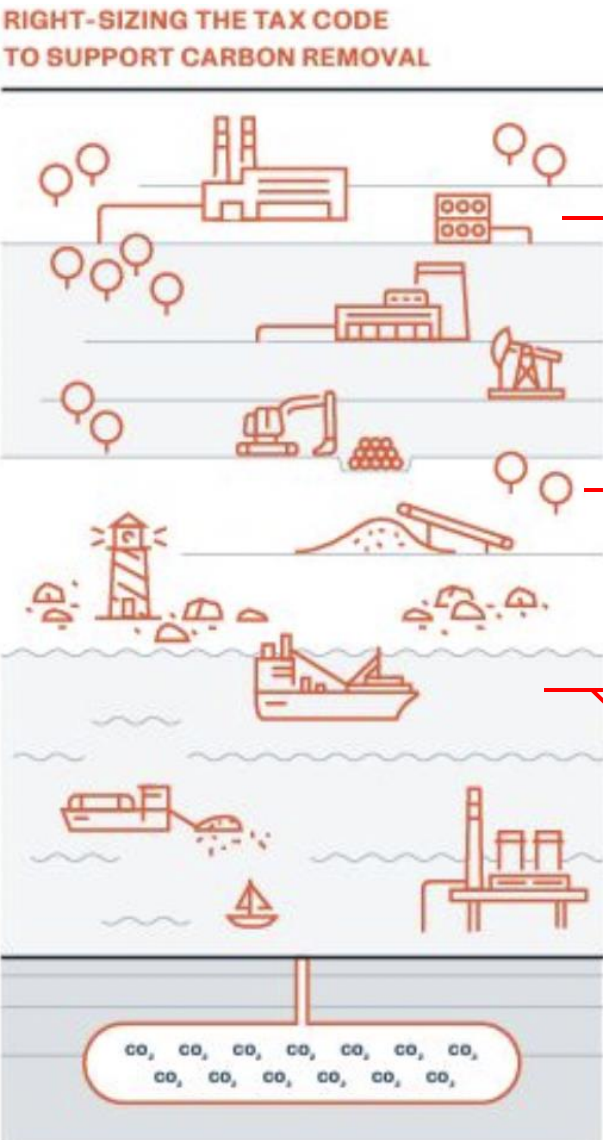
- Wind, infrastructure as **hybrid DAC**
- Limestone, mine site byproducts, recycled concrete **ERW**
- **mCDR**

All three methods can be combined with pv/solar increasing daily yields as added revenue towards lowering CO2 removal cost/ton to; \$195/2040

EoL wind and recycled glass materials, limestone as host for CDR photocatalyst placed below panels simulate high albedo value snow generating >15% solar yields. Example, if 20% more yield a 20% efficiency bifacial module, now is 24% efficiency.

As of April 2025, now we have IMO shipping carbon pricing of \$100 or \$380/ton!

RIGHT-SIZING THE TAX CODE TO SUPPORT CARBON REMOVAL



The diagram illustrates various carbon removal methods categorized into three main groups: Industrial/Point Source (top), Land-based (middle), and Ocean-based (bottom). Red arrows point from specific methods in the diagram to the corresponding rows in the table.

Method	45Q Tax Credit	Bennet-Murkowski Legislation Tax Credit*	Mitigation Potential
Carbon Capture Sequestration (CCS)	\$85 per gross ton	N/A**	N/A**
Direct Air Capture (DAC)	\$180 per gross ton	\$250 per net ton	Large
Biomass Carbon Removal & Storage (BiCRS)	Not eligible	\$250 per net ton	Large
Bio-oil Injection	Not eligible	\$250 per net ton	
Biomass Burial	Not eligible	\$250 per net ton	
Enhanced Rock Weathering (ERW)	Not eligible	\$250 per net ton	Large
Minerals (in-situ and ex-situ)	Not eligible	\$250 per net ton	Small
Marine Carbon Dioxide Removal (mCDR)	Not eligible	\$250 per net ton	Large
Ocean Alkalinity Enhancement (OAE)	Not eligible	\$250 per net ton	
Direct Ocean Carbon Capture & Storage (DOCCS)	Not eligible	\$250 per net ton	

* The Carbon Dioxide Removal Investment Act introduced by Senators Bennet and Murkowski

** CCS is a carbon dioxide reduction technology, not removal. Therefore, it would not be eligible under the Carbon Dioxide Removal Investment Act.

† Potential mitigation estimates originate from State of CDR, Second Edition

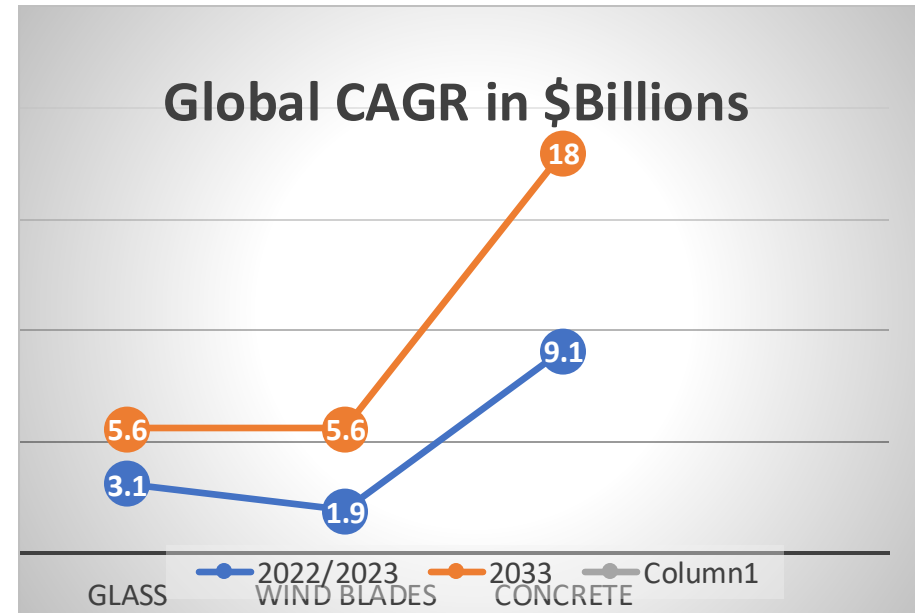
Image Source

CAGR Recycling Values of Three Global Waste Problems

Glass \$3.3B by 2033: Global glass recycling market was valued at approximately USD 3.1 Billion in 2023 and is expected to reach a value of around USD 5.6 Billion by 2033, at a compound annual growth rate (CAGR) of about 5.4% - yahoo finance.
9 million tons of US glass end up in landfills annually.

Wind \$5.6B by 2033: Wind Turbine Blade Recycling Market was valued at USD 1.86 billion in 2022 and is estimated to grow to USD 5.6 billion by 2033, with a CAGR of 20.16% during the forecast period- AmericanRecycler.com
Total mass of decommissioned blades in the US will reach *1.5 million metric tons (t) by 2040 and 2.2 million t by 2050.*
The annual rate of wind blade material being decommissioned globally, both on land and offshore, is projected to reach 2 million tons per year by 2050.
In Germany, blade decommissioning, transport, taxes, landfill fees etc., can be up to [1,400/ton \(Euro\)](#).

Concrete \$17.4 billion by 2028: Recycled concrete aggregates market size, growth 2024 to 2033 was values at \$9.1B in 2023 and to reach \$17B by 2033, growing at a 6.8% CAGR - precedenceresearch.com

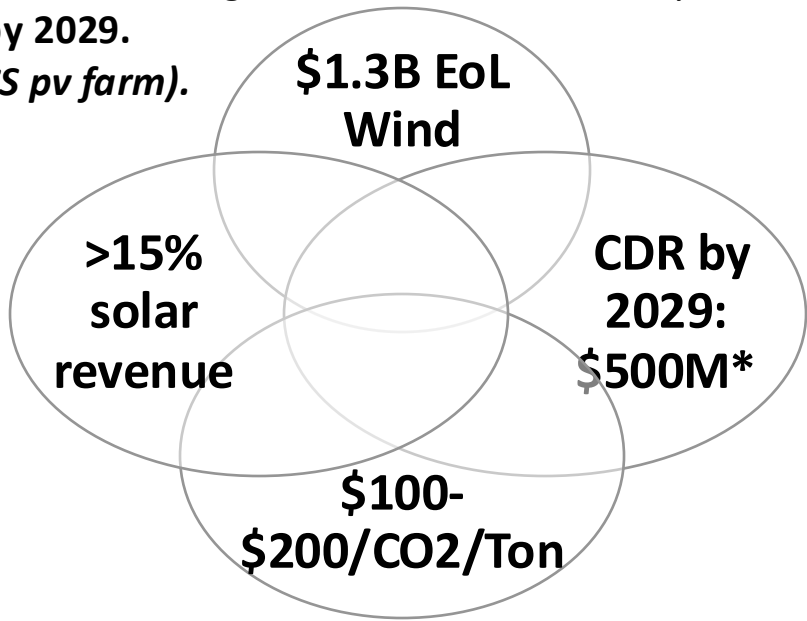


Of the three recycling values, let's focus on reusing/recycling EoL wind blades, nacelle's, for project Circular Solar CDR, where there will be 500,000 tons by 2030, at a 5.6B value by 2033.

This waste to energy and carbon removal breakthrough could attain 25% of the market share, or \$1.3B by 2033. By 2033 Wind, Glass Concrete recycling values total \$20.3B. Circular Solar CDR utilizes recycled material from each sector and if 5% were utilized in our solar farms or EV charging products this accounts for: \$1B

Circular Solar generates an additional 15% or more solar daily yields. In the case of 20% yield increase, a 20% efficiency panel would be 24% eff. CDR becomes a solution to a growing waste and recycling industry into CDR infrastructure, which seeks a \$100/ton/CO2 removal by 2030. Solar is the highest demand renewable energy source and this generates record efficiency.

Circular Solar could be a unicorn, \$1B company by 2029.
Seeking \$3M seed, \$1.5M FOAK funding (1MW CS pv farm).



Circular Solar is a viable solution as the answer to three industry problems: recycling EoL wind (glass, concrete), CDR (carbon dioxide removal) as solutions to one another: cashflow, divert materials from landfill and CO2 emissions avoidance from transporting up to 1 Ton/12T EoL*, solar efficiency increases thus revenue to lower the cost of hybrid wind-solar-battery microgrids.

* For example; in California where all blades are shipped out of state to TX, WY, OK, IA where about 1,400 miles of diesel trucking for 12 tons of wind blades is almost 3 tons of carbon emissions. Circular Solar CDR removes this carbon and annual tons thereafter. *CDR is expected to be a [\\$25B market by 2029](https://circularsolar.net/); Circular Solar CDR products make up 2% CDR market it's \$500M marketshare.