



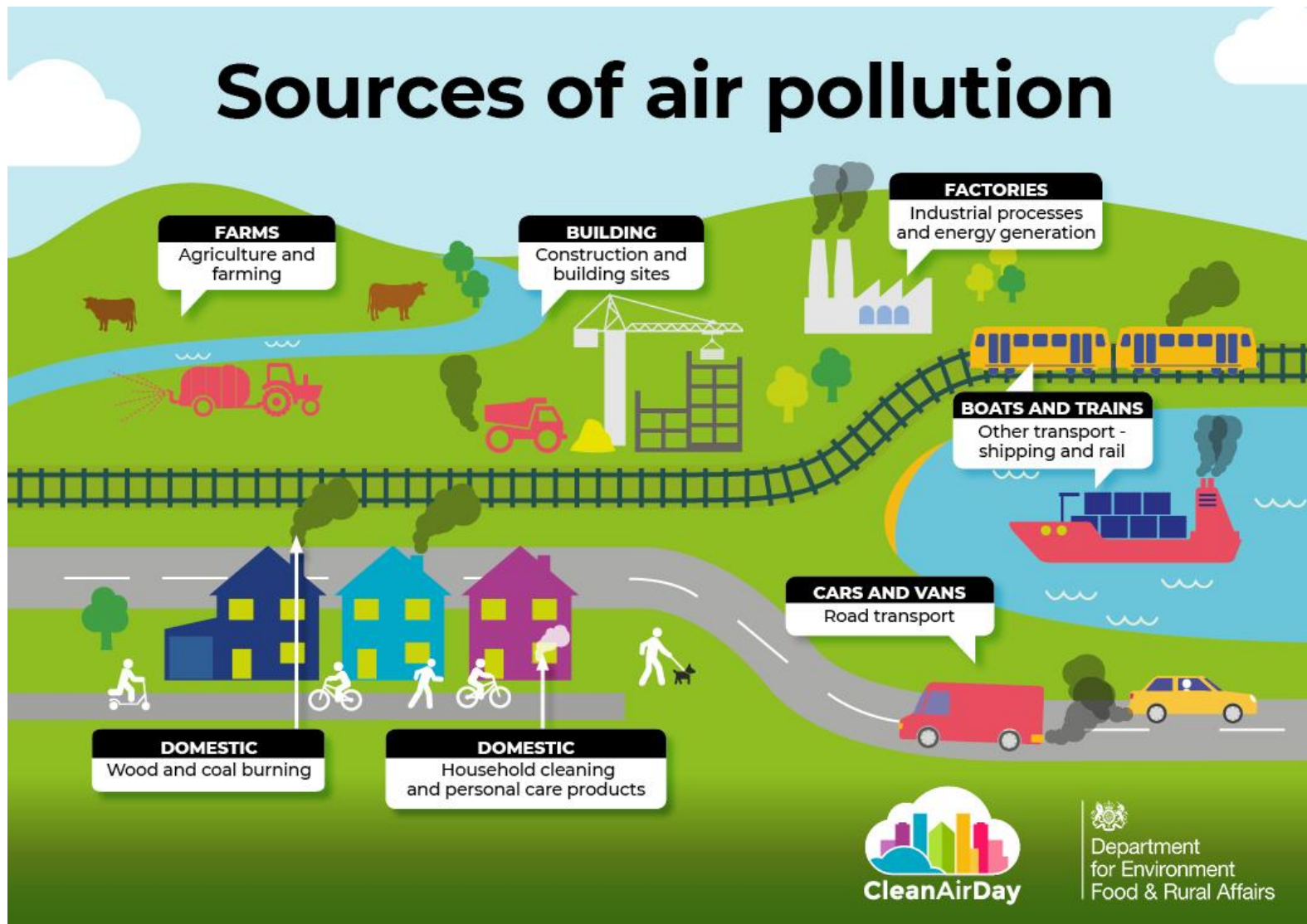
Circular Solar

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, pm, toxin removal (CDR): hybrid DAC, ERW for R/ OAE combination.
- Recycled materials generate additional solar yield.
- Applications: CDR infrastructure and road markings, wind-solar farms, solar canals, data-centers,, mine sites, EV charging stations, highway PV, port infrastructure, shipping containers.

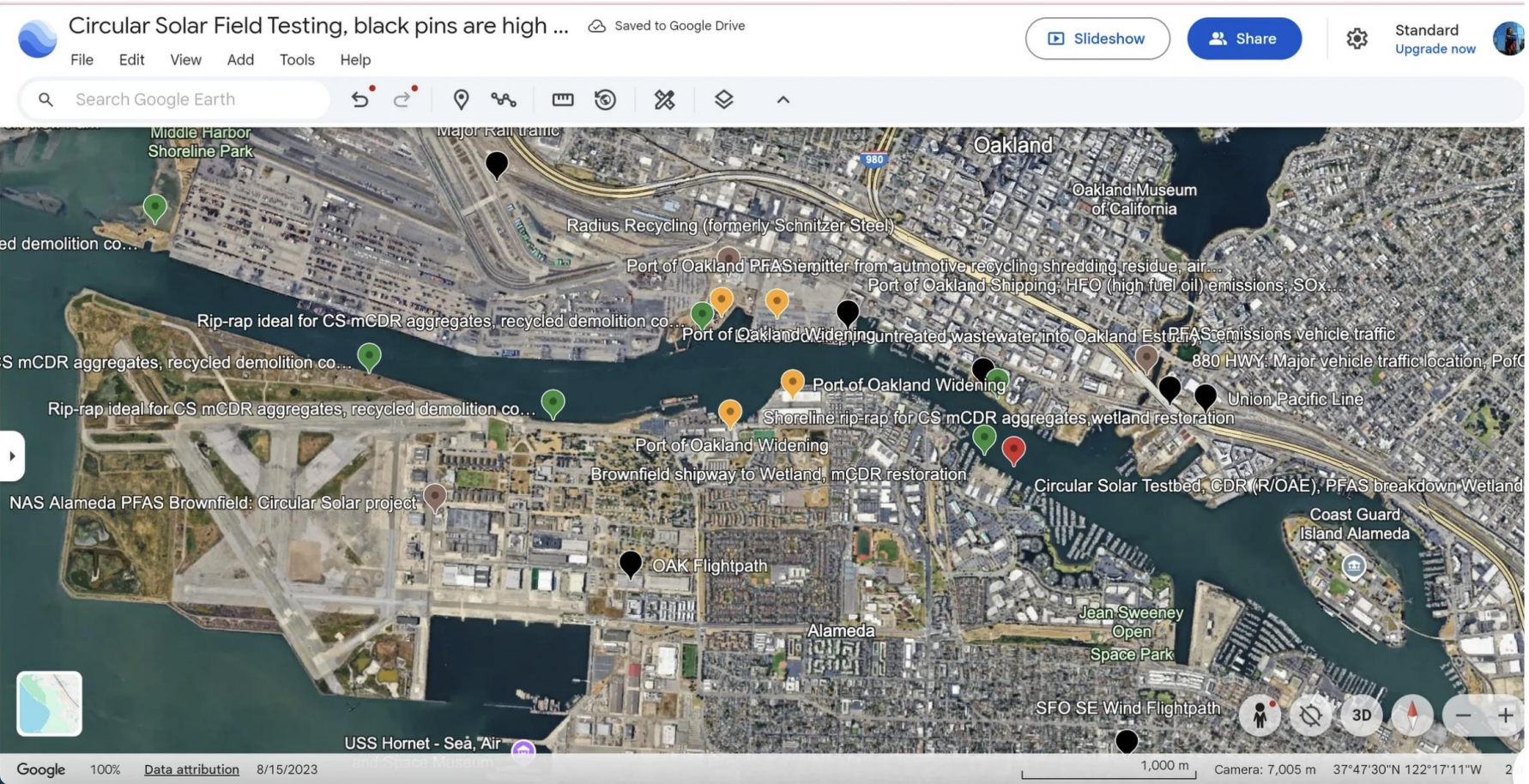
First let's examine the problem, where various pollutants and toxins come from and how they enter and impact air, water, humans, food sources and our ecosystem.



Not defined in these graphics, are airborne from industrial pollution, vehicles to packaging waste leaching from landfills; which Circular Solar has proven the scalable solution for removal, breaking it down into less harmful matter since 2008 on a small real-life infrastructure pilot and visually confirmed from the following field examples since 2023.

Circular Solar field testbed, emitter locations map, pollution buildup example:

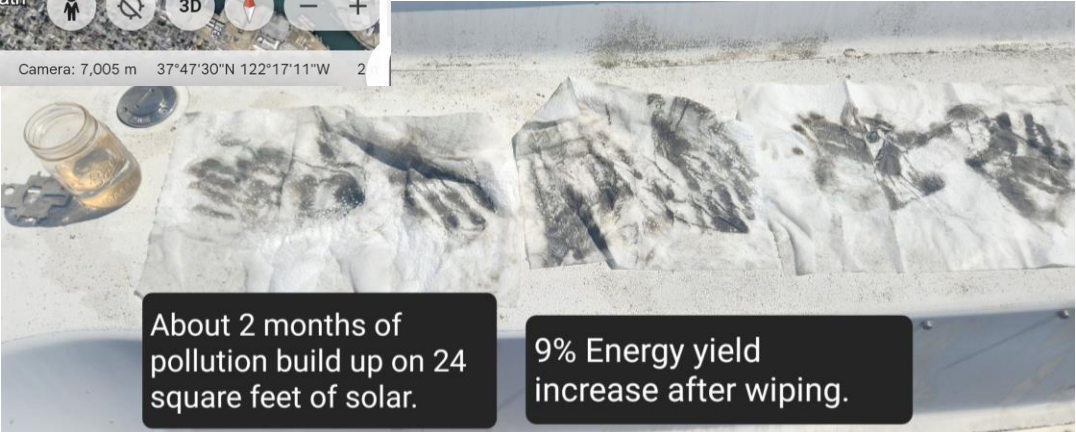
PORT, FREEWAY, RECYCLING:CARBON, PM, TIRE DUST, PFAS & BREAKDOWN



Green pins are ideal CS mCDR locations. Black pins high pollution areas, yellow potential recycled concrete from Port of Oakland widening project to source recycled mCDR. Brown pins are PFAS sources.

This is part of two months of buildup in the glass of water and wiped off solar panels, next to the solution, removal sample/test area.

[Video of this wipe and energy test, location](#)



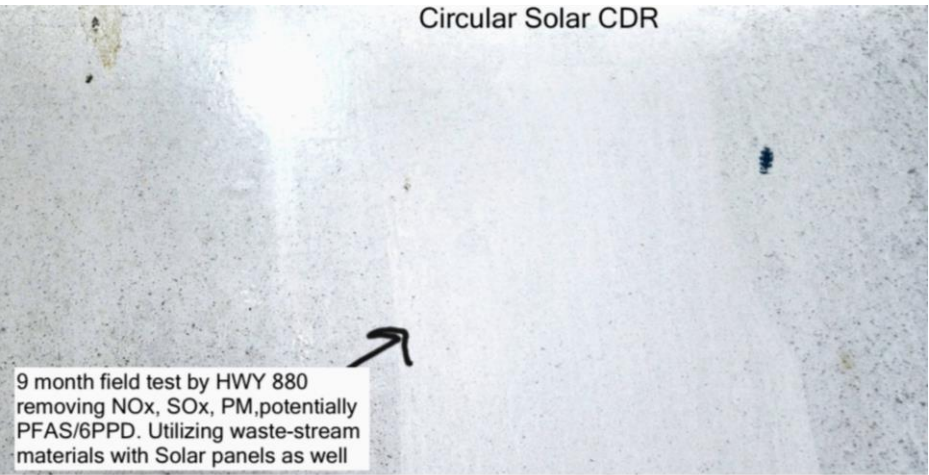
About 2 months of pollution build up on 24 square feet of solar.

9% Energy yield increase after wiping.

**Project Circular Solar CDR (carbon dioxide, pm, removal):
21-month and 9-month field CDR rooftop, over a waterway**

field tests: These materials, ERW limestone marble, recycled glass, composite, vinyl are coating with the nanotechnology to act as low-tech DAC (direct air capture), ERW, mCDR infrastructure and energy generating materials which capture and remove small amounts of airborne carbon, pm (particulate matter) from Port of Oakland activities, including Radius Recycling, rail, HWY 880 passenger vehicles and trucks including organic microplastic (such as from tire dust) emissions. The photocatalytic process removes or breakdown these harmful pollutants into less harmful matter.

Over two-year field test for turbocharged ERW of dolomite, limestone marble: left untreated, right treated since 3/2023 >



Airborne pollutants

CDR 21 months

"rooftop" vinyl bimini



Road marking and rooftop test strips. 3.5 months old comparison example; center untreated.

EoL, restored composite simulating wind blades, towers breaking down pollutants which offers anti-corrosion benefits.

Circular Solar OAE growth mitigating algae bloom: polluted runoff on the port side and on the starboard side we had clean water runoff with alkaline materials above impacting the waterline marine growth. Dew, condensation water or rainwater flow over and down to the decks to the stern steps and waterline. The 14-month test includes where the waterline was cleaned and then left to grow for a year, the vessel was not moved, not washed (only rainwater rinsing) the additional solar panel shade did add to improving the healthy growth, but the primary reason is cleaner water runoff with calcium byproduct producing healthy OAE seaweed vegetation, mitigating algal/algae bloom, cyanotoxins growth.

✕ 10/2/24, 12:59

12 month marine growth. Top half suffering algae bloom. Bottom healthier, restored from solar panel shade and less carbon, tire, brake dust pollution runoff and carbon conversion byproduct; calcium nitrate – Circular Solar

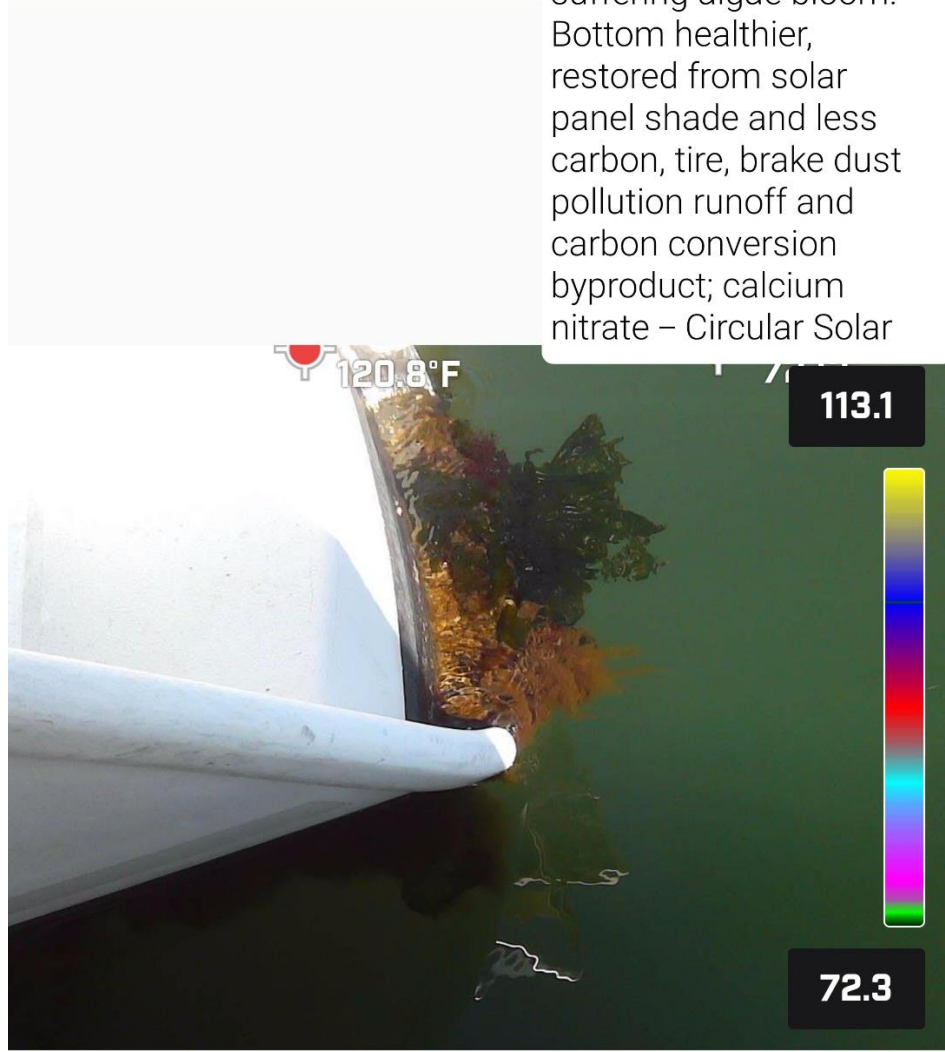
2023- 2024 14-month comparison marine growth study and expected:

This was pitched to EU offshore wind operator Vattenfall, where CS would produce the healthiest carbon capture, OAE seaweed growth. >

Starboard hull: >
with Circular Solar applied above and with alkaline aggregates

< Port hull:
with pollution runoff.

[Public video 9 month stage, solar shade and marine alkalinity enhancement](#)



CDR photocatalyst chemistry, durable carbon removal info, diagram: the chemistry that can compete with DAC, BECCS carbon removal technologies.

This ensures cleaner [high albedo value surfaces to simulate SRM method :surface albedo enhancement" for cooling and energy efficiency](#) and for additional reflectivity into higher solar production and byproduct sequestration of [calcium nitrate for soil](#) in agriculture/farms or storage in water (as a neutral salt; suitable for marine CDR storage). Based on my research when trying to launch the product in 2002 – 2004 for buildings and roads, then my small real-life pilot [in California in a road since 2008](#) (working at least ten years) and the calcium nitrate works improves soil, water quality plant yields; at least .25 ton of CO2 has been removed over the years. I also created this to verify its scale to buildings, road shoulders, bridges, parking spaces and future EV charging, solar infrastructure, wind energy:

SOLUTION:

Paving Out Pollution

A common whitener helps to clean the air

Inorganic photocatalysts, such as titanium dioxide, have been exploited for the past 10 years. It has shown to be a relatively cheap and effective way of removing organic poison compounds and pollutant gases from both air and aqueous environments.

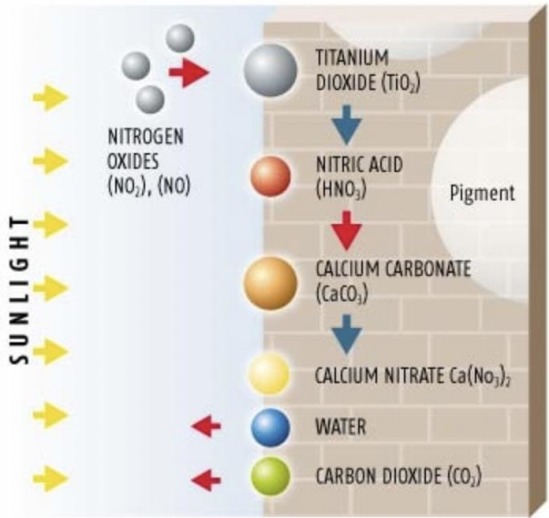
For the past 10 years, our TPXsol photocatalyst material has been successfully integrated by cement, concrete manufacturers in the production. The application has also been introduced through application service provider in the retrofit post application environment. These photocatalyst ecological bricks constitutes a promising technique to reduce a number of air contaminants especially at sites with a high level of pollution: highly trafficked canyon streets, road tunnels, the urban environment, etc. Ideally, the photocatalyst, titanium dioxide, is introduced in the top layer of the concrete pavement for best results. In addition, the combination of TiO2 with cement-based products offers some synergistic advantages, as the reaction products can be adsorbed at the surface and subsequently be washed away by rain.

PAINT REACTION

Capturing energy from sunlight to neutralise pollution

Titanium dioxide particles absorb energy from UV in sunlight. Nitrogen oxides adsorbed onto the particles are converted to nitric acid

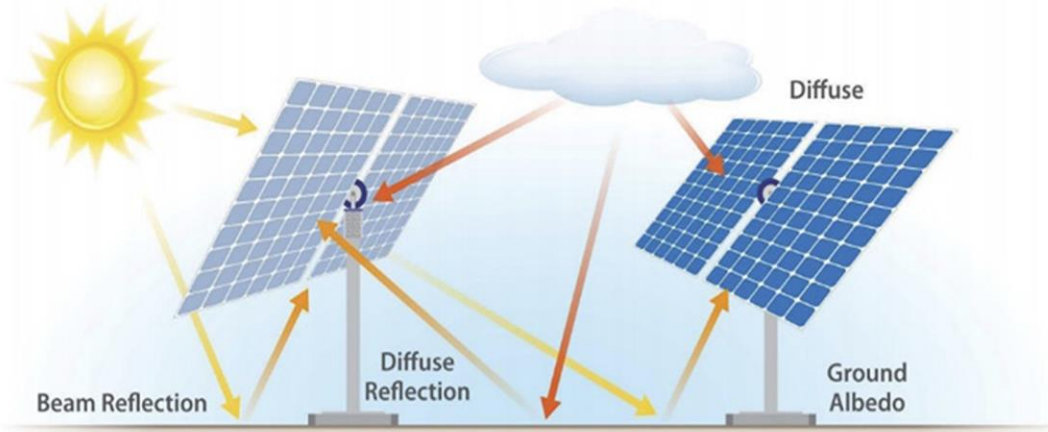
The acid then reacts with calcium carbonate, locking the NOx gases up in calcium nitrate, releasing CO₂ and water



How does Circular Solar work?

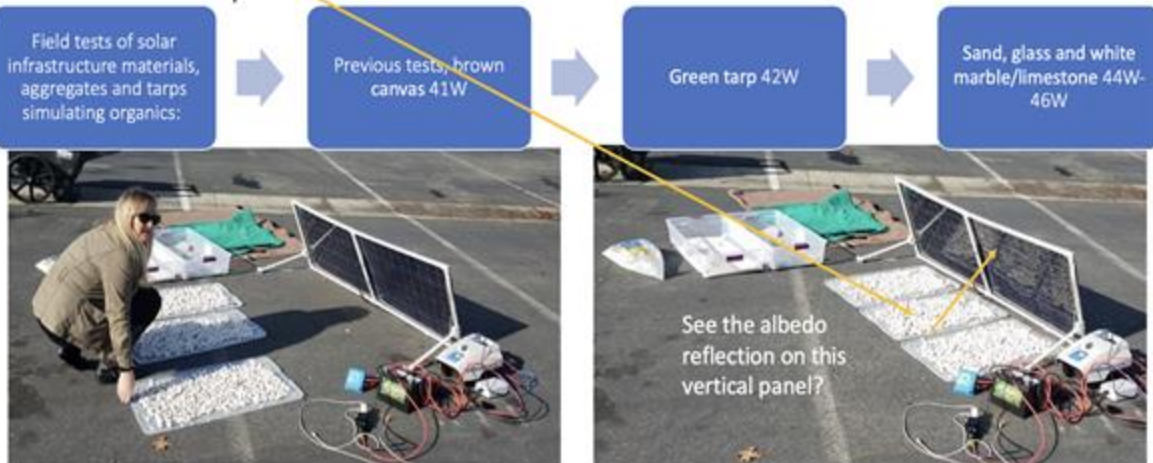
First, we need to learn more about Bifacial Solar panels and how they manage ground albedo

- 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.



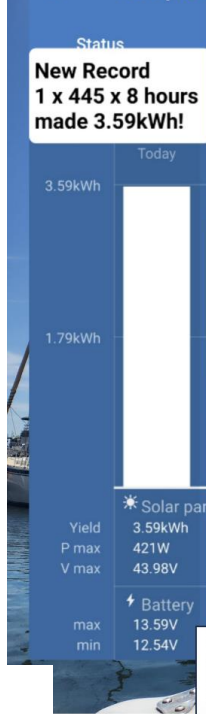
Source NREL: <https://www.nrel.gov/pv/pv-bifacial-irradiance-toolkit.html>

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.

Before – After! The same composite materials, thicknesses and similar shapes of Wind turbine blades and nacelles.

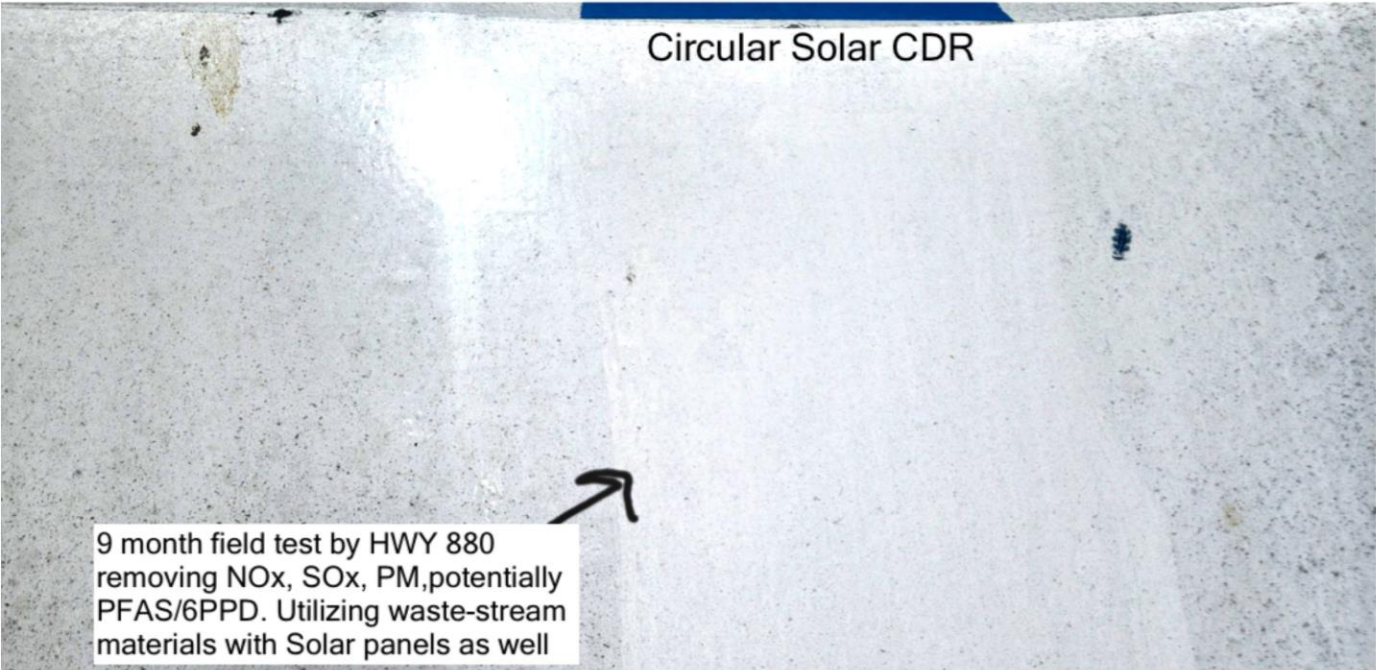


Restored, converted into a small floating solar-battery remote minigrid and CDR carbon, pm, heavy metal, PFAS breakdown emissions testbed; for buildup and removal tests. To test and scale in a high pollution and saltwater environmental the anti-corrosion coating extending wind lifecycle and reducing the potential of environmental damage (reducing failure). 14-month CDR waterline marine growth comparison results in slide 5, OAE seaweed growth below the starboard hull.

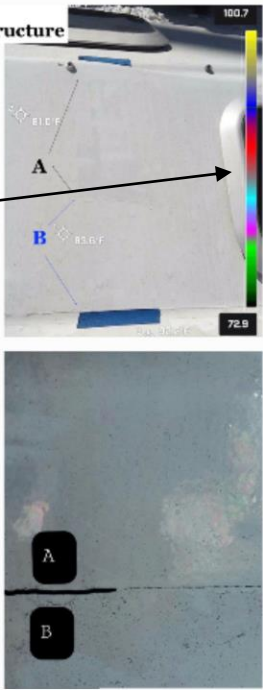
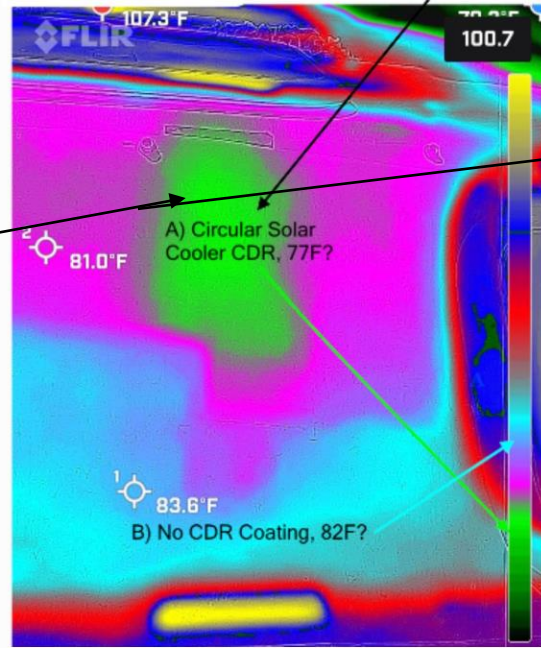


This comparison test includes the use of the technology over part of the stainless-steel hardware next to test section A.

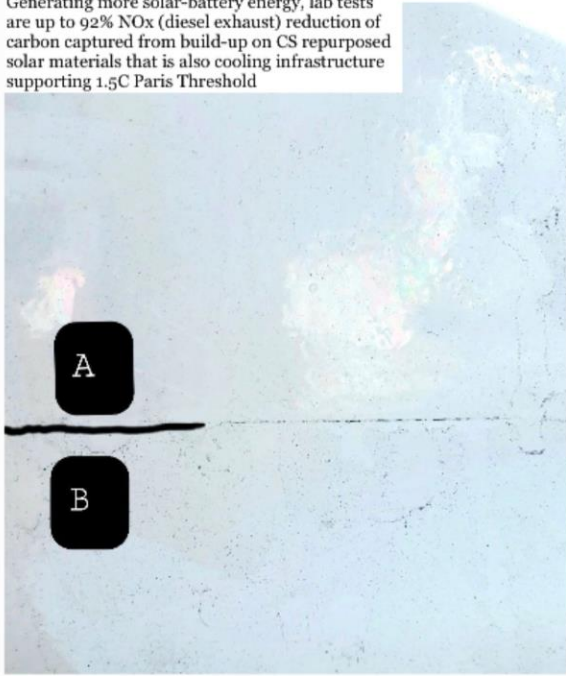
It also remained much, much cleaner from organic heavy metal airborne particle pollution which when combined with saltwater accelerates corrosion and thus increases the likelihood of failure in offshore wind and oil and gas facilities. Circular Solar offers protection, reducing care and maintenance costs or environmental pollution.



PM from Port, trucking, vehicle, rail PM, NOx are visually seen reduced. As well as it being cooler infrastructure



Generating more solar-battery energy, lab tests are up to 92% NOx (diesel exhaust) reduction of carbon captured from build-up on CS repurposed solar materials that is also cooling infrastructure supporting 1.5C Paris Threshold



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

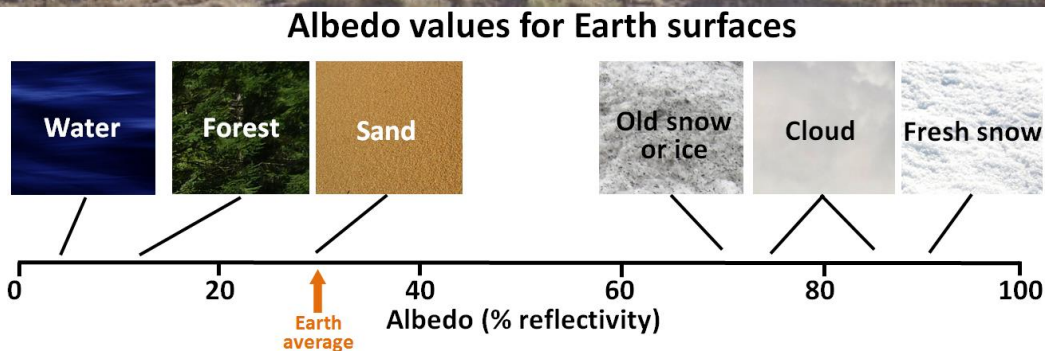
CircularSolar.net

Rural Agricultural, Highway, Rail CDR

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

More about Albedo Effect here:

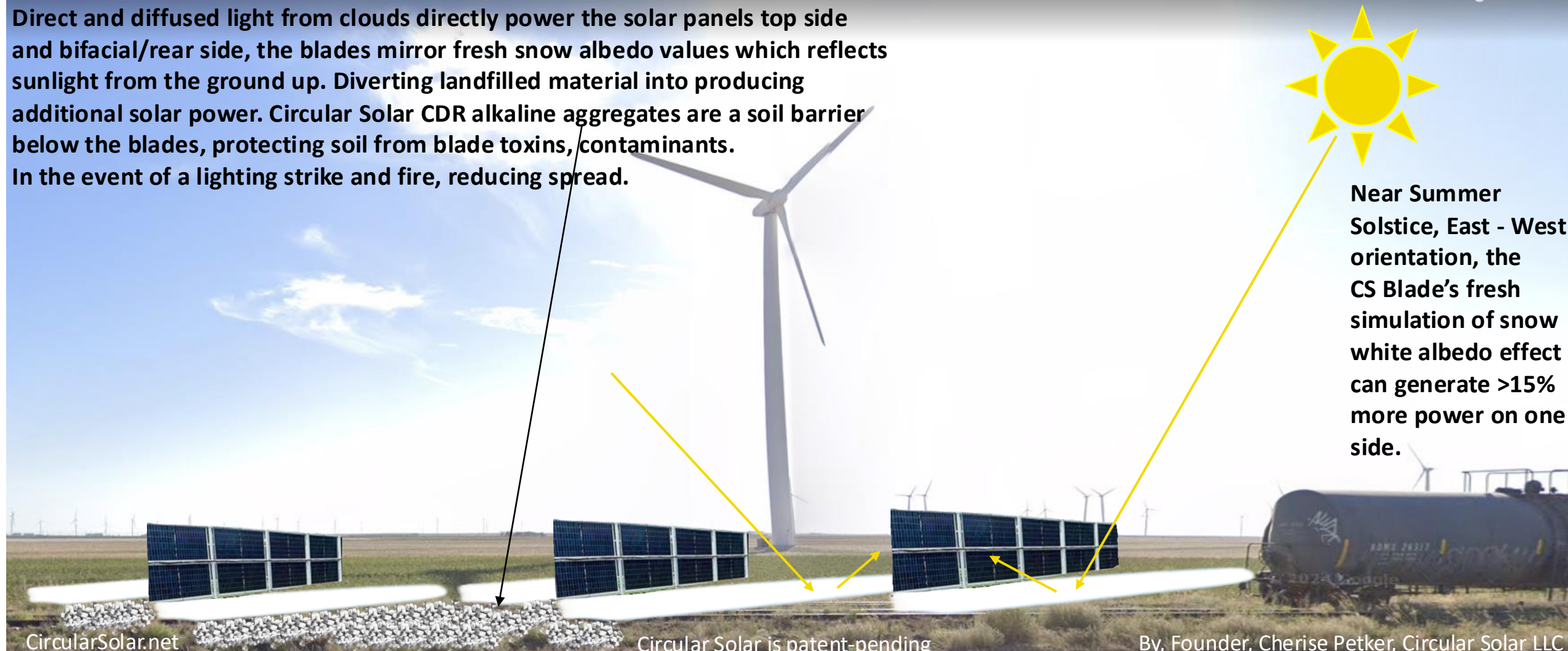
[climate feedbacks that impact weather, climate](#)



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. Circular Solar CDR alkaline aggregates are a soil barrier below the blades, protecting soil from blade toxins, contaminants. In the event of a lighting strike and fire, reducing spread.



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.



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 CDR Wind: With slides 4,5, 13 CDR removal results in mind, we have hybrid DAC Wind, then its EoL materials reused as CDR by roads, ports, transportation, data-centers using fossil fuel 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 NOx, SOx, 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,

[Demo video](#) of exhaust emissions onto the materials, improving solar efficiency.

CS OAE growth from wind turbine runoff, and shoreline

< **Shipping CDR**, here is Port of Rotterdam, NL. Circular Solar would love to pilot here because we've already proven the technologies working, removing any wind pollution buildup and emissions buildup by as demonstrated by Port of Oakland. Improving plant, soil health (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](#).

One-page summary for Circular Solar applied to Alameda Naval Base PFAS remediation project which will increase PFAS remediation (and new airborne pollution buildup over this vegetation).

This follows up on initial Circular Solar PFAS remediation on infrastructure and around plants, soil, pilot in Fairfield, CA in 2008, on Alameda, Oakland Estuary field testing airborne and waterway contamination and remediation since 2023. Info at CircularSolar.net

alamedapost.com/news/navy-to-lock-down-pfas-in-groundwater-with-carbon/

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DONATE!

How new PFAS remediation method works

Firefighter training area with PFAS contamination.

Activated charcoal injection zone

Groundwater monitoring wells

Alameda Point Site 14 PFAS remediation diagram

Activated charcoal barrier

Groundwater monitoring well

Oakland Estuary

With Circular Solar, this can improve as we can now add CS aggregates which will breakdown PFAS which comes to the surface and other airborne pollution deposition (Port of Oakland, pleasure craft Radius Recycling, vehicle, rail etc.).

21 months of airborne pollution buildup

R: Circular Solar nanotechnology removal

12 month marine growth. Top half suffering algae bloom. Bottom healthier, restored from solar panel shade and less carbon, tire, brake dust pollution runoff and carbon conversion byproduct; calcium nitrate – Circular Solar

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120.8°F

113.1

72.3

FLIR

Circular Solar runoff, marine growth; seaweed

170.3°F

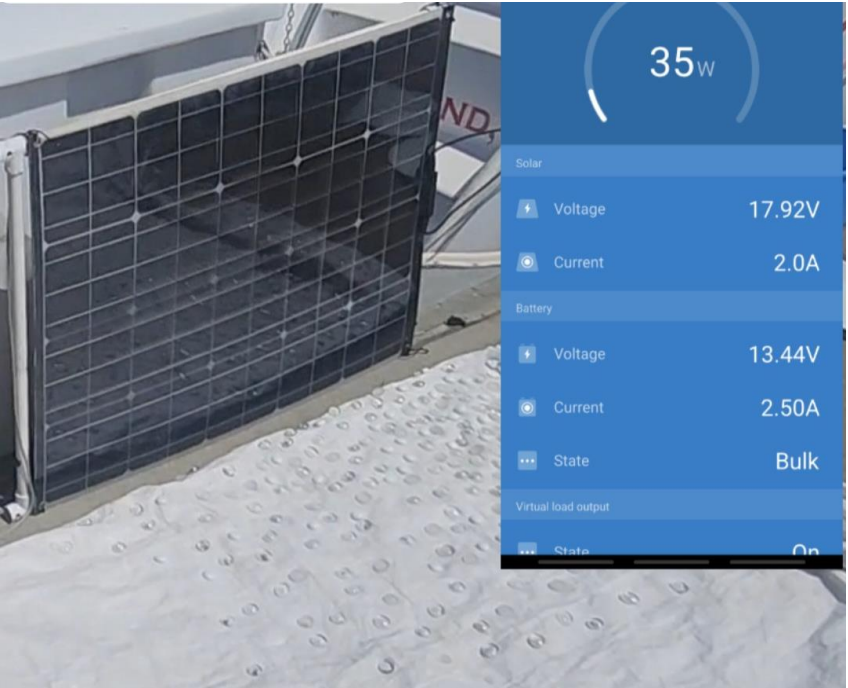
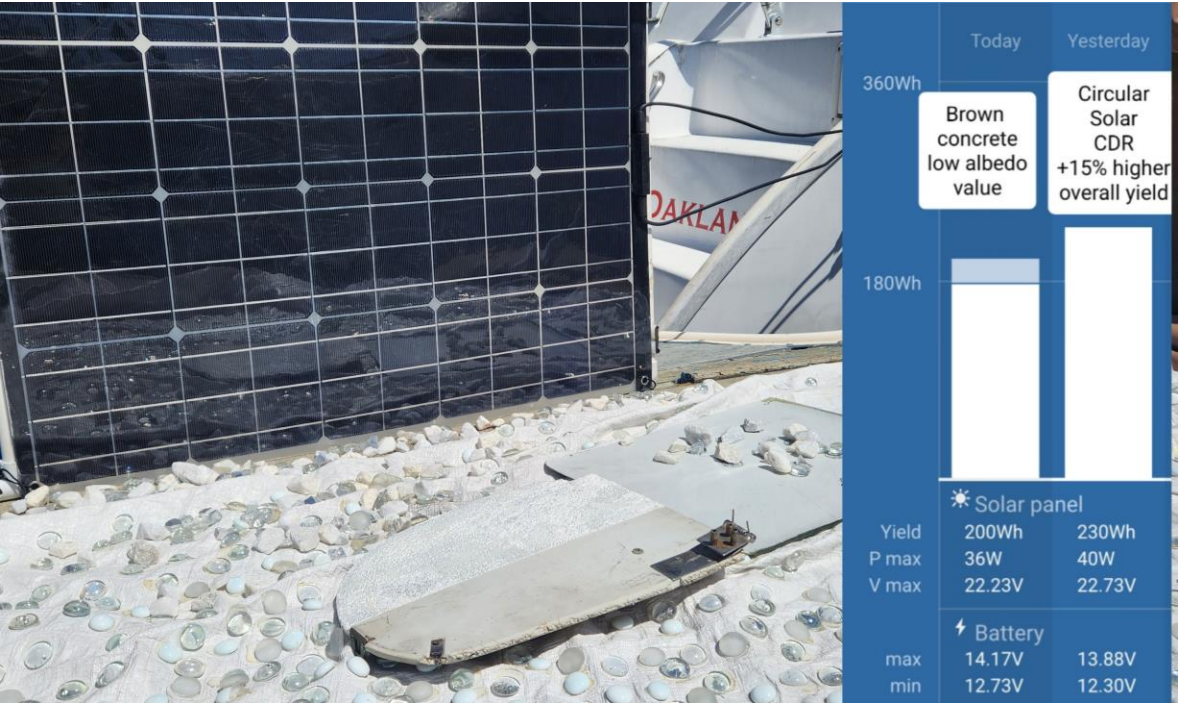
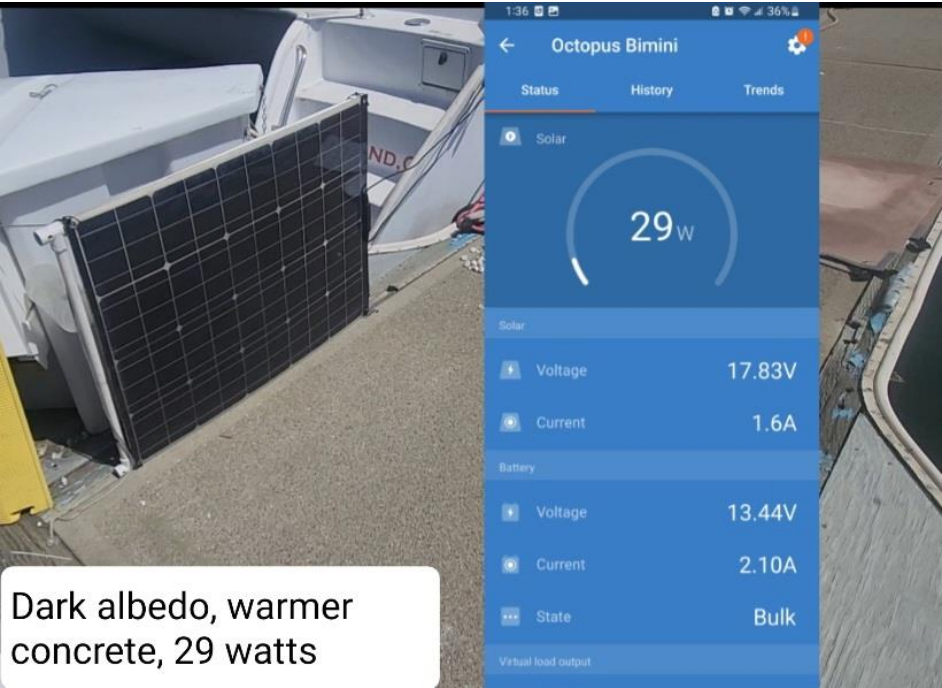
114.7

72.6

Current method

Circular Solar comparison, with OAE rock integration

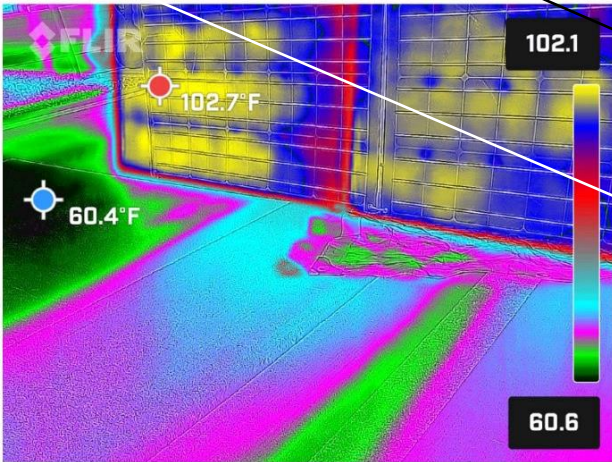
Benefits to energy, cooling infrastructure, vegetation management
Solar energy benefits: 18% increase comparison [video](#) test with thermal imaging



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

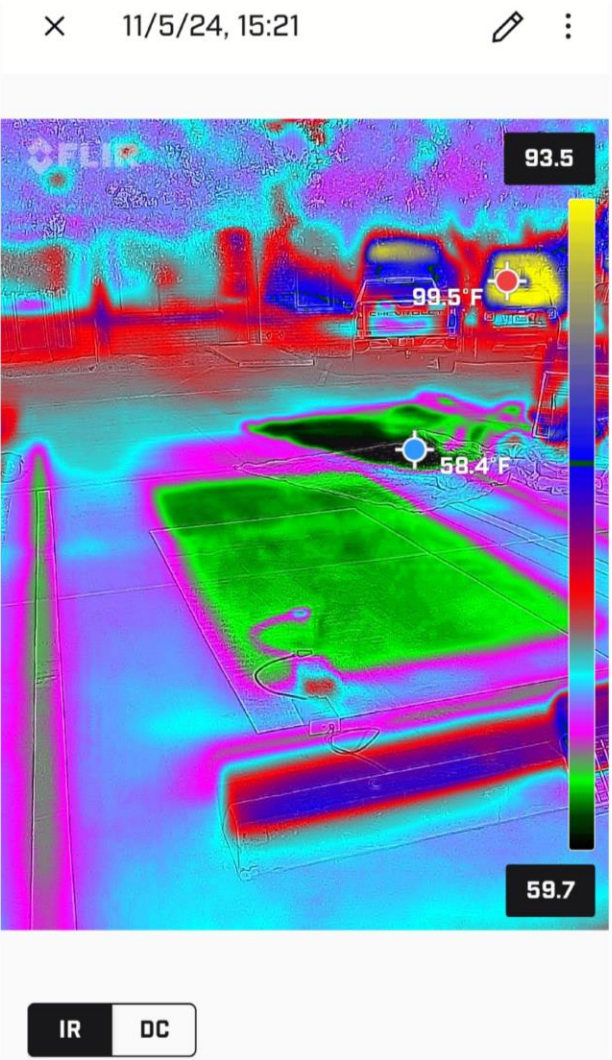
Circular Solar is also a data-center rooftop, reflective, circular, CO2 removal product, as seen here over concrete, it is almost as cool as the plastic tarp



[summary video of application](#)

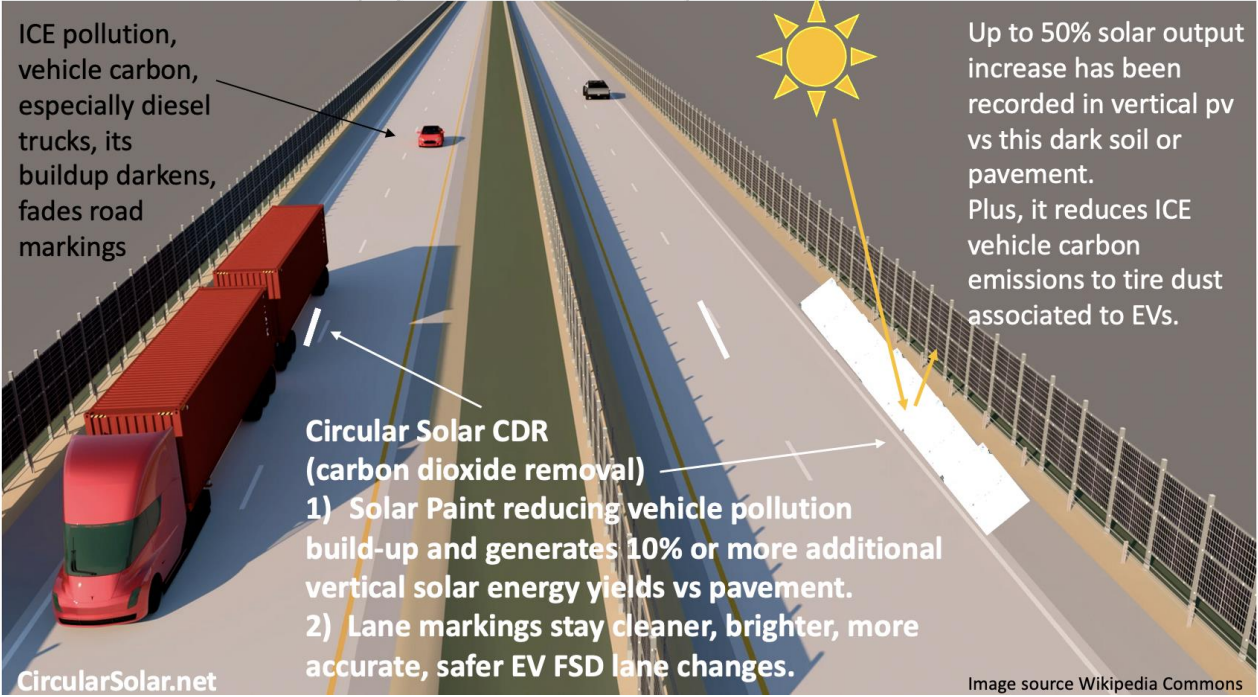


[Wireless induction pad over concrete](#)



Updated Field Test R&D for Circular Solar CDR (carbon removal) Highways and applications: for safer road markings supporting Autonomous Vehicle FSD permitting and cooler, reflective Solar Paint for CS Highway PV (future wireless charging) and product for AI Data-Center's for carbon management parking spaces, concrete buildings, rooftops (remain white, reflective cooler; less water required for interior cooling).

Circular Solar CDR Highways: Increasing canopy or vertical solar efficiency and vehicle safety with brighter, cleaner road markings. This helps keep EVs, such as Tesla FSD safer when using "Auto Lane Change" because the reflective markings stay cleaner, brighter in low light, dirty when high carbon pollution events, or something covering the pavement. Circular Solar's vertical efficiency record is 50% higher output vs dark albedo when the sun is directly over top vertical pv. Circular Solar is also a landfill diversion project to ensure a cleaner planet, "Buy Clean" and American Made



August 16th, 2025: A test section was added in May 2025 onto the field testbed in the high pollution location (including freeway pm buildup). It was rinsed with water one time. We see the Circular Solar section is much cleaner, more reflective (bright white, or for the solar portion, reflective off-white or green glass CDR paint) for safer road markings in low light which can equate to less traffic accidents and health care costs and support AV FSD.



Circular Solar has completed the MOU as [an Epri-Open Ai Consortium Member](#): as a potential “use-case” pilot with utilities and hyperscalers with four use-cases: 1. as a CDR project. 2. as a PPA with the highest possible daily solar yields. 3. Our product for data-center infrastructure, especially cooler rooftops by reducing airborne dust buildup, retaining high albedo effect to reduce interior water use for cooling as seen in previous slide. 4. Which can breakdown PFAS in the event of leak within the data-center or as pollution outside the building; see side five for pollution breakdown which includes PFAS water and airborne pollution from Radius Recycling (automobile shredder residue [ASR PFAS](#)).

- 1. Coolest, CDR carbon removal rooftop (less water required for interior cooling).
- 2. Cooler EV charging spaces for employees or autonomous fleets (slide 12) which doubles as higher efficiency, faster charging vehicle to data-center).

- 3. Hybrid DAC Wind (slide 10)
- 4. Circular Solar Wind: EoL wind blades repurposed below solar panels, with CDR (slides 7-10). 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.

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:

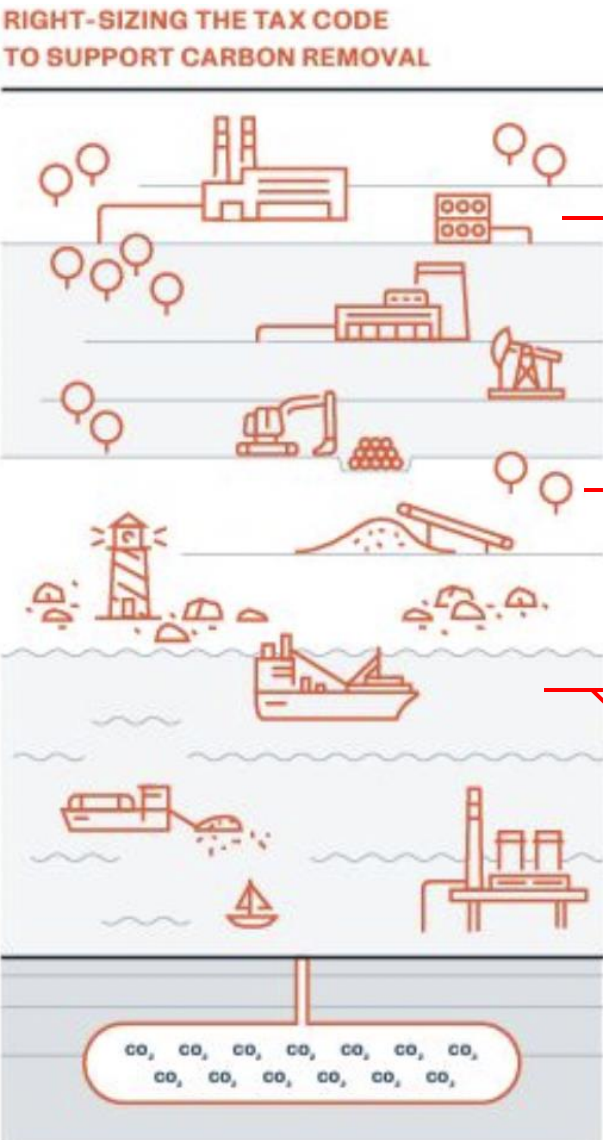
- Wind, infrastructure as **hybrid DAC**
- Limestone, mine site byproducts, recycled concrete **ERW**
- **mCDR**

All three methods can be combined with pv/solar increasing daily yields as added revenue towards lowering CO2 removal cost/ton.

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 Capture, Direct Air Capture, and Marine Carbon Dioxide Removal. Red arrows point from 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

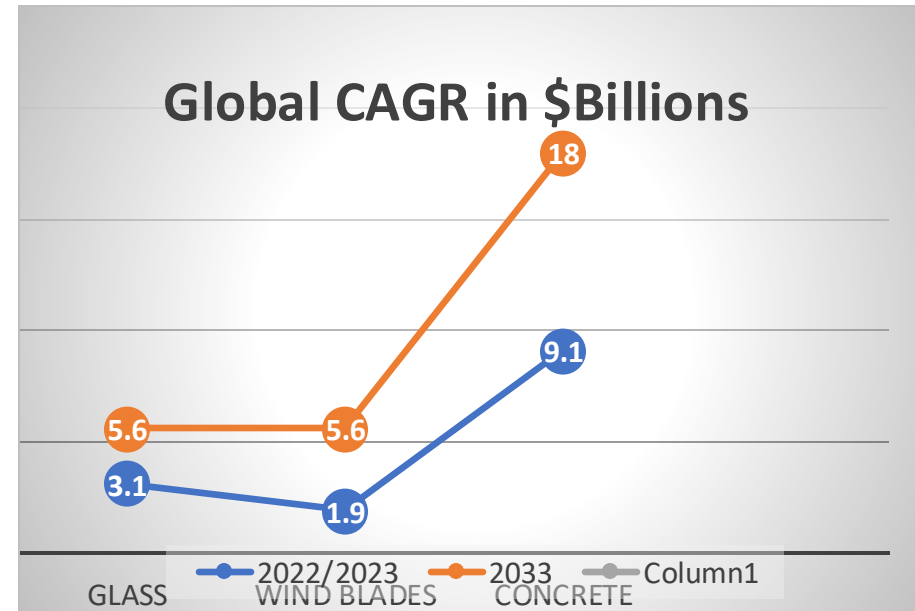
Image Source

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

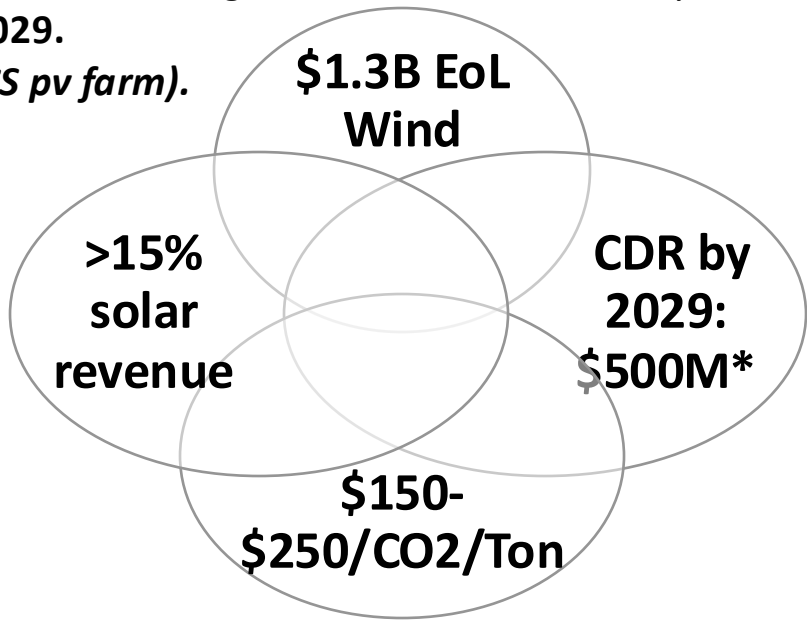


Of the three recycling values, let's focus on reusing/recycling EoL wind blades, nacelle's, for project Circular Solar CDR, where there will be 500,000 tons by 2030, at a 5.6B value by 2033.

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 value by 2029.
Seeking \$2M seed, \$1.2M 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.

Examples for Mitsui & Co., MOL Switch Fund:

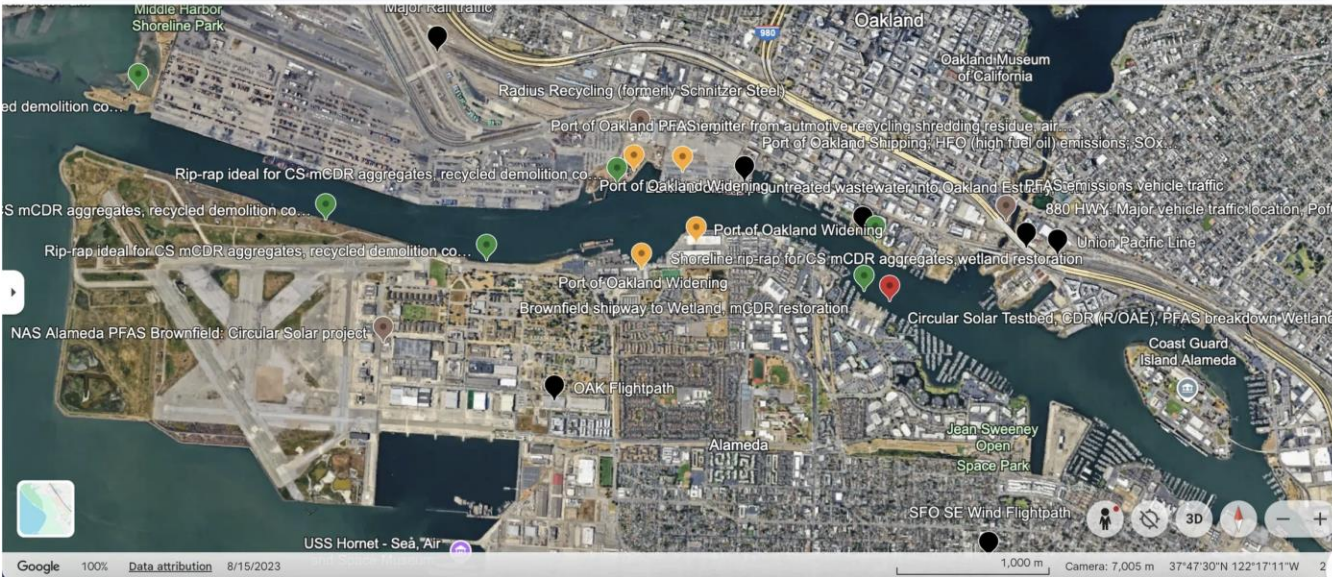
Circular Solar Hybrid DAC Infrastructure:

Port, Freight, Portside Communities

Circular Solar can be applied right away and is ideal for:

- 1. **Shipping containers**; as hybrid DAC CS containers passively remove carbon dioxide, pm buildup at sea, at the port transiting on freeways, rail for cleaner water runoff to farms, waterways.
- 2. **Existing buildings** in the Port of Oakland community. For every 10,000 sq ft of photocatalyst is 1/ton of carbon removal/year. 100 tons removal per 1M sq ft. 10T sq ft for 1 gigaton.
- 3. **Shoreside CDR infrastructure, mCDR by roads** for cleaner stormwater runoff.
- 4. **Circular Solar wind and solar farms hybrid DAC**: demonstrated in previous slides and next specific MOL and partners farms.

1.-3. Portside CDR infrastructure and OAE project locations in green.



2.- 3.



1.



1. Ships, shipping containers that decarbonize ship, freeway, rail exhaust, pm 2.5,20 as hybrid DAC transportation:

If 10,000,000 40' shipping containers has Circular Solar this would remove at least 1M tons/CO₂/Year in hard to abate sectors and locations (airborne pollution several feet above roads, rail, ships but within feet of exhaust emission source)

1. **Ship: topside hull:** a 1,000 ft ship's hull topside is about 40' h x 1,000 x beam 165': 87,000 sq ft, it would remove up to: **8.6 tons CO₂ per/ship/year**. If there were 1,000 ships with Circular Solar, they could remove 8,600 tons of carbon per year.
LNG carriers have even more topside area:



2. MOL (and other lines) Shipping Containers:

- 17M – 530M shipping containers [are in circulation](#), roughly 20M are in transit daily.
- Circular Solar Containers offer carbon, particulate matter build-up removal as a hybrid direct-air-capture option for containers on ships in port and at sea (the ones stacked on the outside, on top with exposure to sunlight), rail – driving thru, capturing, removing emissions.
- The majority of carbon, pm removal will be once on truck or rail transit on/by roads; capturing, removing exhaust emissions to forever chemicals, toxins, PFAS from brake dust and 6PPD-quinones from tire wear, microplastic dust fatal to certain fish species and impacting soil health; food sources for humans.
- Older lab tests reveal it takes about 9,800 square feet of photocatalyst coating near a pollutant source to remove 1 ton of carbon per year.
- A 20-foot container surface area with sun exposure = 544 sq. ft. or about 18 containers per 1-ton/CO₂/removal/year.
- A 40-foot container = 1,024 sq. ft. or 9.5 containers per 1ton/CO₂/removal/year. **10M containers = >1M tons/CO₂/year.**
- **If Port of Oakland has 80,000/containers/month deployed which were 40', coated in Circular Solar, one month of containers would remove 8,000/tons/CO₂/year. Multiply this by 50 USA ports for example, >400,000/tons/CO₂/year in America alone (4M. 40', containers).**

3. Portside areas, city buildings, infrastructure:

Green, park areas by ports can utilize the Circular Solar ERW (enhanced rock weathering) option, which offers the highest removal of CO2, pm management for a ERW project. Let’s take city, community high-rise concrete building surface areas.

- [A 282-unit apartment](#) with a concrete/stucco exterior, may offer 200,000 square feet of surface area suitable for Circular Solar. Which would remove about 20 tons/carbon/year with benefit and sequestration in plants, soil and Estuary water for durable, 1,000-year carbon storage.
- If there were **200 buildings within 5 miles of Port of Oakland with the same surface area (total 40M sq. ft.), 4,000/tons/CO2/removal/year.**
- If 400 American portside, port freight related cities copied this plan, amount, that is 16B sq. ft. and 1.6M/tons/CO2/removal/year.
- **Scaled globally, if 1,000 portside, port freight cities could scale this; 4M/tons/year**

4. Road Infrastructure:

510 cities in America with 50,000 population or more. On average repave 50 miles of roads. If we assume an average **shoulder** width of 4 feet per side: 1 mile of Circular Solar = 42,240 sq. ft. or 4.3 tons/CO2/year/mile x 50 miles: 215 tons/year
x 510 cities: 109,910 tons/year.

If 50% of a mile had a single concrete **barrier**, 32” height = 29,040 sq. ft. or about 3 tons/CO2/year/mile x 50 miles: 150 tons
x 510 cities: 76,500 tons/year. **Shoulder and Barrier/Divider per mile: 7.3/tons/year/mile.**

The US has 4M miles of public roads (street, urban, rural). If the above was applied to 10% of 4M, shoulder and barrier under re-pavement and then just for this project (especially adjacent to Agriculture and waterways with fish), **400k miles: 2,920,000/tons/CO2/year**

If all completed by, clock ticking 2030-2040: 2,920,000/tons/CO2/year for ten years removal: 29.2M tons removed

Total tonnage per year, methods:

2. Shipping containers: 1M

3. Portside (within 5 - 10 miles port, port freight related transport): 1.6M

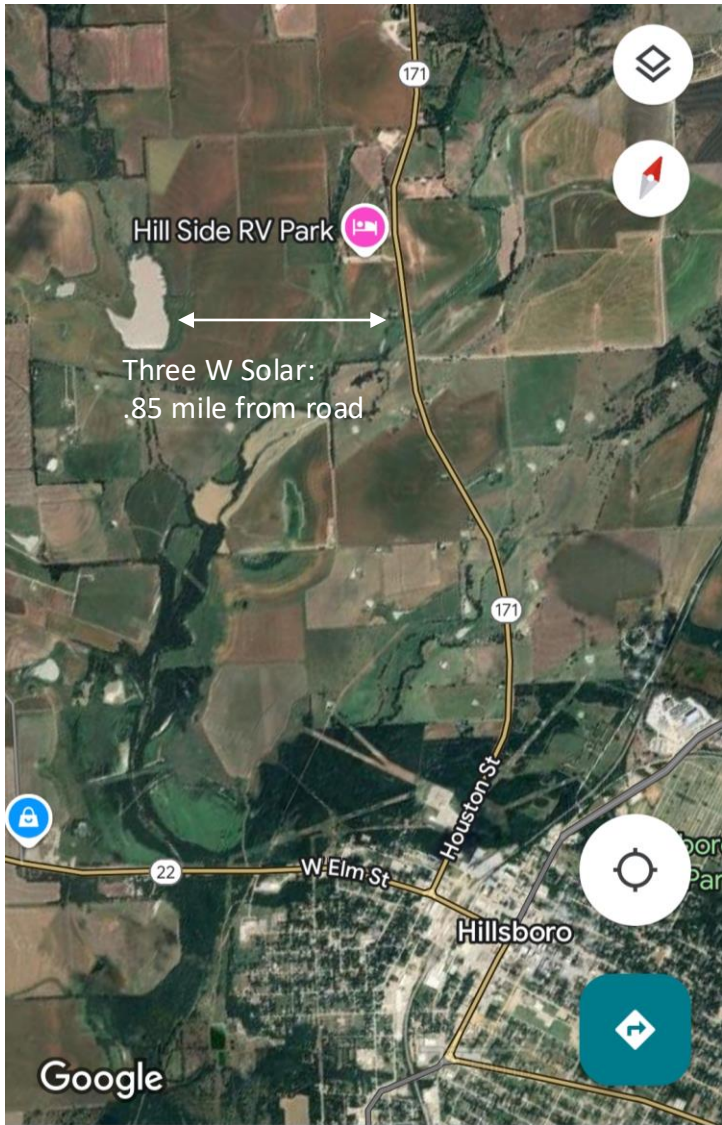
4. Road shoulder, barriers: 2.9M

Total per annum: 5.5M/tons/year. One average between 2030-2040 a total removal: 55M tons removed

Scaled globally, this footprint, multiply by 6 regions: 33M/tons/year or 2030-2040: 330M tons removed globally

Examples for Mitsui & Co., MOL Switch: Circular Solar Pilot For Three W Solar, a 110MW farm in Hillsboro, Texas

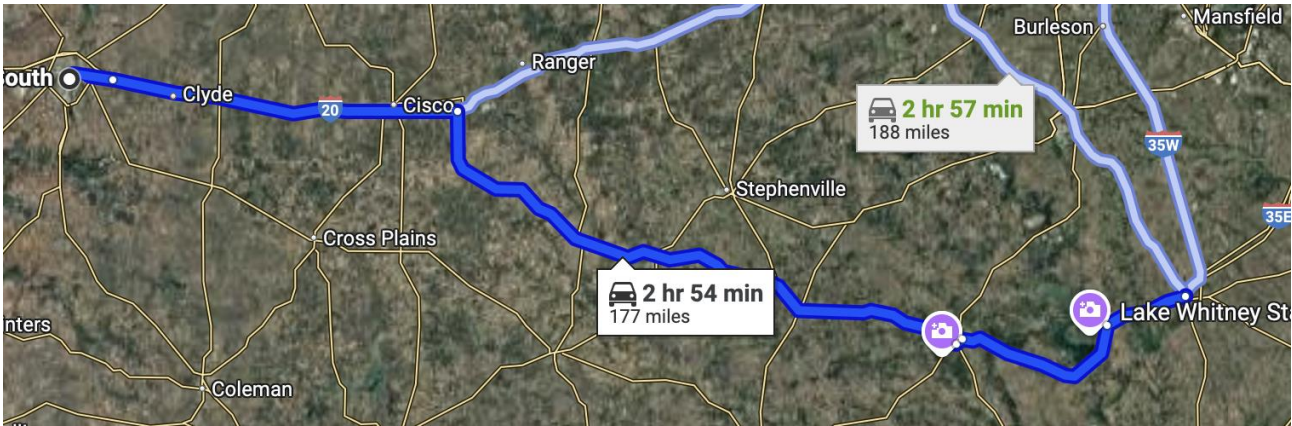
1MW could be converted to a CS CDR farm: a first-of-a-kind project example for EoL wind blades and/or limestone ERW, and pending the existing surface material seen below, for negative carbon solar energy and sequestration in limestone, soil. This example can increase the odds of a Circular Solar pilot for the Epri-OpenAI Consortium that CS has been invited to submit their project for potential pilot for Stargate, next meeting is on May 5th.



The Three W Solar Farm is Perfect For Circular Solar:

1. Airborne tailpipe carbon, and tire wear dust often reaches beyond a mile from highways, this location is .9 miles away.
2. Economic feedstock of EoL wind blades and limestone for photocatalyst coated hybrid DAC, ERW.
3. Short distance for FOAK project for Project Stargate AI, Circular Solar also reduces heat, water use, on the rooftop of data centers, while removing community or backup generator carbon, pm.

Abilene, Stargate AI distance to Three W Solar Farm

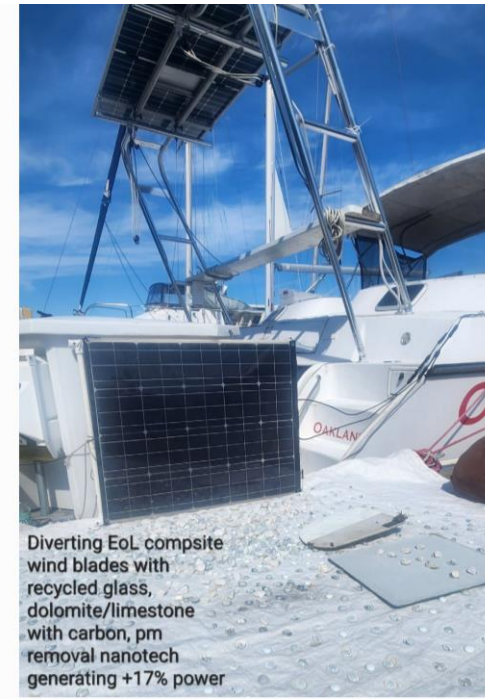
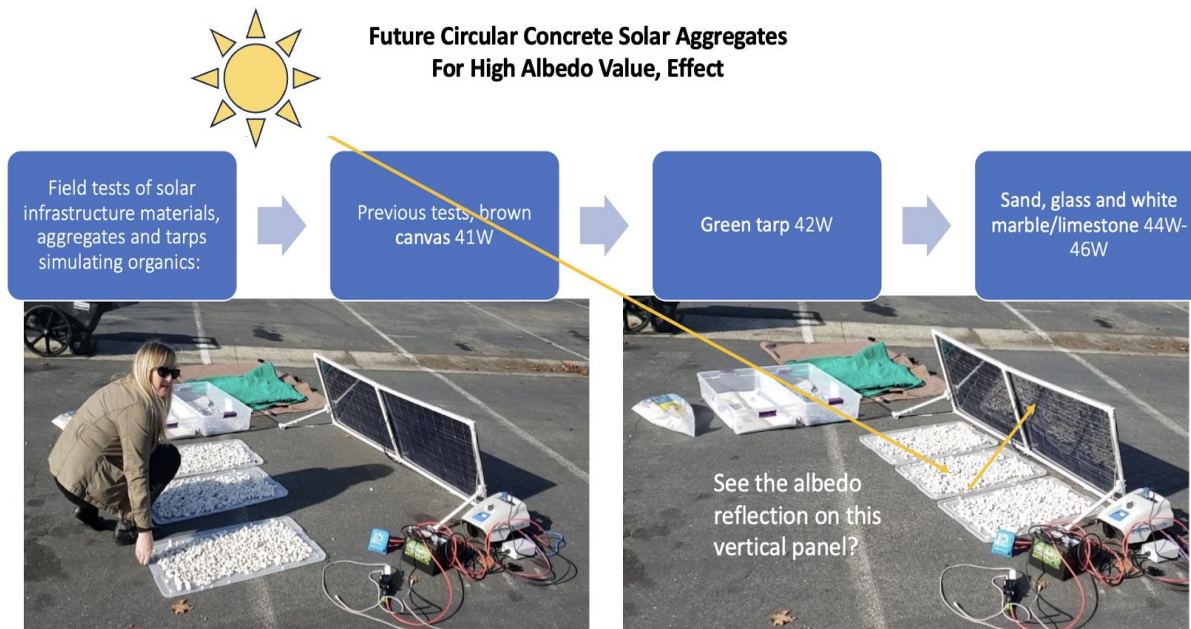




Three W in Texas is ideal for pilot of all Circular Solar technologies; including as a negative carbon solar farm.



Blade sections placed below tracking or fixed vertical are easily sourced in Texas.



California and soon Texas have new bottle deposit/ return recycling laws (DGS, Bottle Bills), which consumer recycling efforts can [help supply this project](#)