DOCKETED	
Docket Number:	19-SB-100
Project Title:	SB 100 Joint Agency Report: Charting a path to a 100% Clean Energy Future
TN #:	236040
Document Title:	Hemlock Semiconductor Comments - Hemlock Semiconductor Comments on SB 100 Draft Report Workshop
Description:	N/A
Filer:	System
Organization:	Hemlock Semiconductor
Submitter Role:	Public
Submission Date:	12/18/2020 2:31:06 PM
Docketed Date:	12/18/2020

Comment Received From: Hemlock Semiconductor
Submitted On: 12/18/2020
Docket Number: 19-SB-100

Hemlock Semiconductor Comments on SB 100 Draft Report Workshop

Additional submitted attachment is included below.

HEMLOCK SEMICONDUCTOR

December 18, 2020

California Energy Commission
Docket No. 19-SB-100
1516 Ninth Street
Sacramento, CA 95814

RE: Docket 19-SB-100 – SB 100 Joint Agency Draft Report

Hemlock Semiconductor (HSC) appreciates the opportunity to submit comments on the SB 100 Draft Report, which was presented at the December 4, 2020, Joint Agency Workshop. HSC is encouraged by the leadership of the California Energy Commission (CEC), California Air Resources Board (CARB), and California Public Utilities Commission (CPUC) in crafting the first iteration of this Joint Agency Report, and supports California's tremendous effort to achieve 100% renewable electricity by 2045.

HSC, based in Hemlock Michigan, manufactures hyper pure polycrystalline silicon (or "polysilicon") for the solar and semiconductor industries. Producing polysilicon is the first step, and also the most energy-intensive and carbon-intensive step, in the photovoltaic (PV) solar supply chain. HSC is a world leader in reducing the carbon emissions associated with polysilicon production, which it has achieved by electrifying its operations and drawing power from a relatively low-carbon grid to power its manufacturing operations. HSC also uses sophisticated energy management practices to shift production to off peak periods to maximize its use of renewable energy from the grid. We are proud to be a member of the Ultra Low-Carbon Solar Alliance, which is comprised of companies from across the solar PV value chain committed to reducing the carbon footprint of their manufacturing processes. This solar supply chain decarbonization produces solar modules with significantly lower supply chain or "embodied" carbon emissions which are available in the market today. Collectively, these companies have the ability to fulfill significant market demand for PV solar created with lower carbon products, which can cut the embodied carbon of solar projects almost in half, and demonstrates the potential to further decarbonize the solar industry.

It is an unfortunate fact that much of the growth in the solar supply chain in recent years has been based on solar products manufactured with coal fired electricity. Given the explosive growth in solar deployment projected in the coming years, we believe it is critical to send the signal that this growth should embrace low-carbon manufacturing to avoid the significant carbon emissions that would otherwise occur. As Salesforce recently pointed out in their white paper entitled "More Than A Megawatt: Embedding Social & Environmental Impact in the Renewable Energy Procurement Process"[1], it is important for solar purchasers and policymakers to take ESG considerations into account in how they purchase and deploy solar. Furthermore, in a recent article in Utility Dive,[2] San Jose State University professor Dustin Mulvaney made similar observations stating that problems will arise if supply chain emissions go unaddressed. We think it is equally important that policymakers and solar purchasers broaden their focus.

[1] c1.sfdcstatic.com/content/dam/web/en_us/www/assets/pdf/sustainability/sustainability-more-than-megawatt.pdf

[2] utilitydive.com/news/no-green-halo-for-renewables-first-solar-veolia-others-tackle-wind-and/589249/

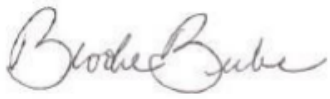
Climate emissions of the solar supply chain should be considered as part of the clean energy transition. To achieve SB 100's clean energy goals by 2045, California may need as much as 67 GW of utility-scale solar, as well as 39 GW of customer solar installation.[3] This extraordinary build-out will have a significant climate protection impact. As all solar is not created equal, this climate protection impact could be greater still if it incorporates ultra-low carbon solar.

Significant solar supply chain carbon emissions could be avoided in California's SB 100 buildout by using ultra low carbon solar. These emission savings would come at little or no additional cost as ultra low-carbon solar modules are fully commoditized products competing directly with higher carbon modules in a price driven market. We, and other manufacturers along the solar supply chain are working to drive down climate emissions through efficient manufacturing and by relying on decarbonized energy to power production processes. Recognizing these advances would send a powerful market signal to all solar stakeholders to reduce supply chain emissions. As carbon emissions linger in the atmosphere for years, carbon eliminated from the supply chain will have a greater benefit to reducing climate impacts per ton than emissions avoided over the life span of generating equipment. The opportunity to achieve these significant emissions reductions may be lost unless California's climate programs make avoiding supply-chain carbon emissions an explicit priority.

We encourage the Joint Agencies to consider opportunities to reduce the carbon embodied in supply chains in future iterations of the SB 100 report, particularly through the use of ultra low-carbon solar. We also encourage CARB to consider opportunities to reduce supply chain emissions in its upcoming AB 32 Scoping Plan process.

Thank you for your consideration of these comments. We look forward to continuing to work with CEC, CARB, and CPUC in their efforts to implement SB 100 and make progress toward California's clean and equitable energy transition.

Sincerely,



Brooke Beebe
VP External Affairs
Hemlock Semiconductor Operations, LLC

[3] SB 100 Joint Agency Report: Charting a path to a 100% Clean Energy Future

HEMLOCK SEMICONDUCTOR

Making Solar Energy Even Cleaner:

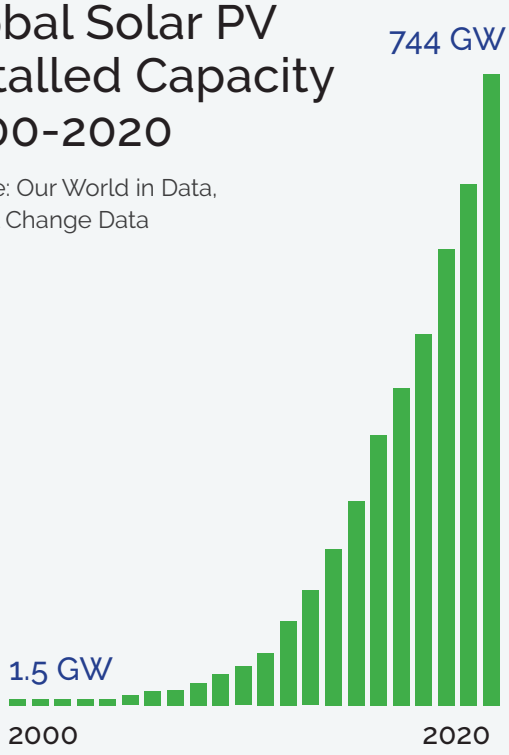
A Primer on How Ultra Low-Carbon Solar Can Help Decarbonize the Solar Industry's Value Chain Through Market Signals

Solar is Winning

Solar is the fastest growing global electricity source due to its competitive cost and superior carbon footprint. Governments and leading companies are increasingly looking to solar photovoltaics (PV) as a key element of their carbon and ESG goals. Economies are rapidly electrifying and decarbonizing, including their buildings, manufacturing and transportation, making the role of low-carbon energy technologies all the more important. And solar is stepping up, with production and deployment in the next five years anticipated to equal the total of all solar deployed to date. Those solar panels are becoming steadily more efficient and long lived. And some of them are produced with decarbonized supply chains that have significantly reduced embodied supply chain carbon emissions as compared with other solar panels.

Global Solar PV Installed Capacity 2000-2020

Source: Our World in Data, Global Change Data



All of this continual growth is great.
But what if we could make this next wave of solar even cleaner?

We can, merely by how companies purchase solar PV modules. Like any manufactured product, there are carbon emissions at each step of the solar supply chain. These emissions are quite small compared to the lifetime carbon avoidance of solar, but they are relevant, and we can drive them lower. How? Through the use of ultra low-carbon solar, which can have on the order of one-half the embodied carbon of other PV panels and half the carbon payback time.

You see, not all solar is created equal. The aggregated supply chain emissions that go into a PV module, often referred to as "embodied carbon," are driven by how the materials that go into that panel were made.

Some companies manufacture their solar components using cleaner, renewables-rich electricity, closed loop manufacturing and energy efficient operations. Others, power their plants with much higher carbon energy sources such as coal-fired electricity and have less efficient operations. This is particularly relevant in the production of solar grade polysilicon, silicon ingots and wafers, which are energy intensive to produce. There are real but smaller differences in the subsequent steps in the value chain, such as cell production and module assembly.

The result is that a finished PV module made with cleaner energy sources and input materials has significantly lower embodied carbon than panels made with more carbon-intensive supply chains. We call these cleaner modules "Ultra Low-Carbon Solar PV (ULCS)." These modules with lower embodied carbon are not some whiz bang innovation just around the corner, they are fully commercialized and are in the market today from multiple suppliers at competitive prices. **If all of the solar expected to be deployed globally during the next ten years used ultra low-carbon solar panels, we could avoid more than 2 billion metric tons of CO_2 in solar supply chain emissions.** That's equivalent to the emissions from consuming nearly 5 billion barrels of oil, or 1 billion metric tons of coal.

What Can Ultra Low-Carbon Deliver?

Can avoid
2 Billion metric tons
of Supply Chain Emissions

Equal to conserving
236 Billion
gallons of gas

Gasoline consumption value from EPA Greenhouse Gas Equivalencies Calculator.

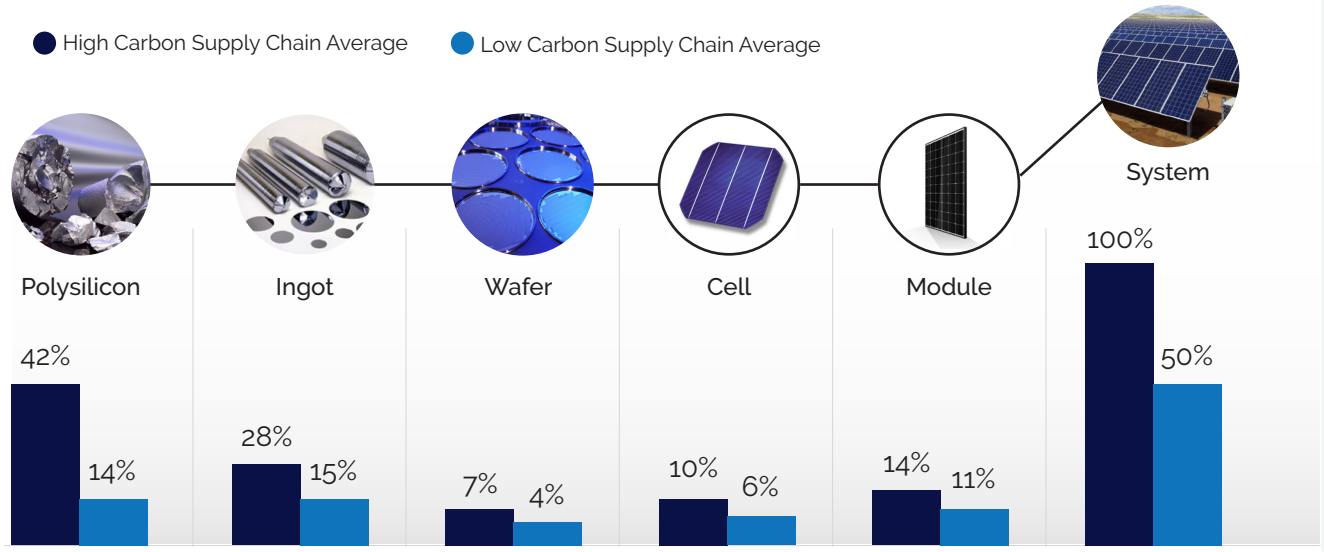
Making Clean Energy Even Cleaner

So why aren't all solar modules made this way?

Because the market has not recognized these differences in embodied carbon or demanded these better modules until recently. While solar manufacturing expanded dramatically and module prices tumbled, buyers were content to buy on price with little knowledge of or regard for supply chain sustainability issues. Companies, though, are increasingly focused on ESG issues in their supply chains. In recent years, solar supply chain emissions and embodied carbon have also begun to receive more attention from leading researchers.

Studies such as that by Yue, You, and Darling of Argonne National Laboratory and Northwestern University documented these wide differences in embodied carbon and their sources. Additional work by the National Renewable Energy Laboratory and the International Energy Agency have confirmed them. **They found that, depending on how the modules and input materials are made, there can be up to a 50 percent reduction in embodied carbon in the finished PV panel.**[1]

[1]Yue, You, Darling; Domestic and overseas manufacturing scenarios of silicon-based photovoltaics: Life cycle energy and environmental comparative analysis; Argonne National Laboratory and Northwestern University



% Of Embodied GHG Emissions in Finished Module

The French energy regulator has established embodied carbon requirements in its system of publicly funded PV projects and rewarded lower embodied carbon. South Korea is following their lead with a similar program.

US solar buyers are now becoming aware of these differences in supply chain sustainability. The recent white paper by Salesforce, "More Than A Megawatt: Embedding Social & Environmental Impact in the Renewable Energy Procurement Process," illustrates this growing awareness, discussing their work with the Renewable Energy Buyer's Alliance to encourage broad considerations of sustainability linked to the UN Sustainable Development Goals in PV purchasing. Solar energy companies and others are becoming increasingly concerned about evidence of the use of forced labor in some parts of the Chinese solar industry.[2]

We believe these concerns and consideration of solar supply chain emissions are the next step in the solar sustainability journey.

[2] Michael Copley, S&P Global; "Human rights allegations in Xinjiang could jeopardize solar supply chain," Oct. 2, 2020

SUPPLY CHAIN MATTERS

Decarbonizing Solar With Market Signals

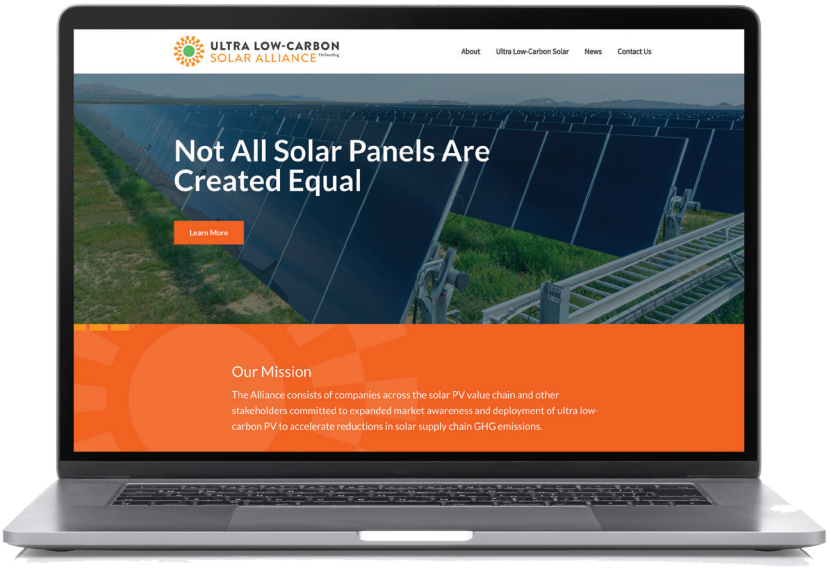
So, when companies specify their next PV project, they should ask more questions about the source of the key raw materials used, the resulting embodied carbon and specify the use of ULCS. This will improve the carbon performance of the energy systems these companies are purchasing. It will also help to send a clear market signal that says:

The next tranche of solar materials required to meet global solar demand must be made more sustainably.

Talk about a win-win.

Recently, Hemlock and other leading renewable energy companies from a diverse cross-section of the solar industry joined together to launch the **Ultra Low-Carbon Solar Alliance** (The Alliance). The Alliance works to build greater market awareness about how solar supply chain decarbonization is producing solar panels with low embodied carbon to help governments and companies meet aggressive sustainability goals.

For more information or to collaborate with the Alliance, **click here**.



About Hemlock Semiconductor

Hemlock Semiconductor Operations (HSC) is a leading provider of hyper-pure polycrystalline silicon and other silicon-based products used in the manufacture of semiconductor devices, solar cells and modules. HSC is passionate about silicon-based technology and its unique potential to connect and energize the world we share. HSC's polysilicon enables customers to produce high-tech electronics and solar energy, and our efficient manufacturing process delivers products with an ultra low-carbon footprint. HSC began operations in 1961.

For more information:
Visit www.hscpoly.com
Watch our YouTube Channel

Follow us on:
LinkedIn: hemlock-semiconductor
Twitter: @hscpoly
Facebook: hscpoly

HSC® HEMLOCK SEMICONDUCTOR