MINUTES

MONTANA HOUSE OF REPRESENTATIVES

68th LEGISLATURE - REGULAR SESSION

COMMITTEE ON (H) ENERGY, TECHNOLOGY AND FEDERAL RELATIONS

Call to Order: Chair Katie Zolnikov-R, on February 22, 2023 at 2:45 PM, in 472

ROLL CALL

Members Present:
Rep. Katie Zolnikov, Chair (R)
Rep. Steven Galloway, Vice Chair (R)
Rep. Katie Sullivan, Vice Chair (D)
Rep. Laurie Bishop (D)
Rep. Larry Brewster (R)
Rep. Paul Fielder (R)
Rep Joshua Kassmier (R)
Rep. Kelly Kortum (D)
Rep. Bob Phalen (R)

Members Excused:
Rep. Paul Green (R)
Rep. Derek Harvey (D)
Rep. Greg Kmetz (R)
Rep. Casey Knudsen (R)

Staff Present:
Lucinda Blair, Secretary
Trevor Graff, Research Analyst

Audio Committees: These minutes are in outline form only. They provide a list of participants and a record of official action taken by the committee. The link to the audio recording of the meeting is available on the Legislative Branch website.

Committee Business Summary:

Hearing & Date Posted:
- HB 477 02/15/2023
- HB 484 02/15/2023
- HB 492 02/15/2023
- HB 524 02/15/2023

Executive Action:
- HB 220 DO PASS AS AMENDED
- HB 558 DO PASS
- HJ 6 DO PASS

HEARING ON HB 477 – Generally revise corporation laws regarding tribal entities

Opening Statement:

14:46:58 Rep. Sharon Stewart Peregoy (D), HD 42, opened the hearing on HB 477, Generally revise corporation laws regarding tribal entities.

Proponent Testimony:

None

Opponent Testimony:

None

Informational Witness Testimony:

None

Questions from Committee:

14:50.30 Vice Chair Steven Galloway

14:51:10 Rep. Sharon Stewart Peregoy

14:54:40 Rep. Laurie Bishop

Closing Statement:

14:55:44 Rep. Sharon Stewart Peregoy (D), HD 42, closed the hearing on HB 477.

HEARING ON HB 484 – Establish broadband advisory committee

Opening Statement:

14:58:30 Rep. Katie Sullivan (D), HD 89, opened the hearing on HB 484, Establish broadband advisory committee.

Proponent Testimony:

15:04:22 Lance Fourstar, Montana American Indian Caucus (MAIC)

15:05:45 Patrick Yawakie, Blackfeet Tribe

15:10:10 Ella Smith, Montana Library Association (MLA)

Opponent Testimony:

15:11:20 Dave Galt, Montana Chamber of Commerce (MCC)

Informational Witness Testimony:

None

Questions from Committee:

15:13.55 Rep. Kelly Kortum

15:14:47 Rep. Katie Sullivan

15:18:28 Rep. Laurie Bishop

15:21:40 Chair Katie Zolnikov

Closing Statement:

15:22:45 Rep. Katie Sullivan (D), HD 89, closed the hearing on HB 484.

15:25:00 Vice Chair Steven Galloway assumes the chair.

HEARING ON HB 492 – Revising telecommunications regulation

Opening Statement:

15:25:54 Rep. Katie Zolnikov (R), HD 45, opened the hearing on HB 492, Revising telecommunications regulation.

Proponent Testimony:

15:28:35 James Brown, Public Service Commission (PSC)

Opponent Testimony:

15:36:00 Geoff Feiss, Broadband Montana

15:41:05 Adrianne Cotton, AARP Montana

Informational Witness Testimony:

15:43:20 Gary Duncan, Public Service Commission (PSC)

15:43:45 Will Rosquist, Public Service Commission (PSC)

Questions from Committee:

15:44.10	Rep. Kelly Kortum
15:44:40	James Brown, PSC
15:47:50	Gary Duncan, PSC
15:48:38	Chair Steven Galloway
15:55:35	Rep. Bob Phalen

Closing Statement:

15:56:00 Rep. Katie Zolnikov (R), HD 45, closed the hearing on HB 484.

15:58:50 Chair Katie Zolnikov resumes the chair.

HEARING ON HB 524 – Revise energy laws relating to solar panels

Opening Statement:

15:58:55 Rep. Joshua Kassmier (R), HD 27, opened the hearing on HB 524, Revise energy laws relating to solar panels.

Proponent Testimony:

None

Opponent Testimony:

16:02:09	Brad Van Wert, Harvest Solar
16:04:18	Makenna Sellers, Montana Renewable Energy Association (MREA)
16:09:30	Charles Denowh, Tesla
16:12:43	Ian Lund, Montana Environmental Information Center (MEIC)
16:15:17	Patrick Yawakie, Blackfeet Tribe
16:16:50	Joan Kresich, Northern Plains Resource Council (NPRC)
16:19:19	John Palm, Bozeman Green Build

Informational Witness Testimony:

None

Questions from Committee:

16:24.42 Rep. Kelly Kortum

16:25:22	Rep. Joshua Kassmier
16:25:54	Chair Katie Zolnikov
16:30:05	Rep. Laurie Bishop
16:31:50	Rep. Greg Kmetz
16:32:24	Rep. Larry Brewster
16:34:25	Brad Van Wert, Harvest Solar
16:38:30	Rep. Bob Phalen
16:39:05	Patrick Zawakie

Closing Statement:

16:39:53 Rep. Joshua Kassmier (R), HD 27, closed the hearing on HB 524.

16:40:00 **Recessed**

16:50:22 **Reconvened**

EXECUTIVE ACTION ON HB 220 – Create select committee on energy resource planning and acquisition

16:50:45 **Motion:** Vice Chair Steven Galloway moved that **HB 220 DO PASS**.

16:51:00 **Motion:** Vice Chair Steven Galloway moved that **HB 220 BE AMENDED**.

Discussion:

16:51:10 Chair Katie Zolnikov

Vote: Motion carried unanimously by voice vote.

16:52:40 **Motion:** Vice Chair Steven Galloway moved that **HB 220 DO PASS AS AMENDED**.

Vote: Motion carried 10-3 by roll call vote with Rep. Bishop, Rep. Kortum, Rep. Sullivan, voting no.

Rep. Sullivan, By Proxy

EXECUTIVE ACTION ON HB 558 – Revising PSC deposition laws

16:54:00 **Motion:** Vice Chair Steven Galloway moved that **HB 558 DO PASS**.

Vote: Motion carried 9 - 4 by roll call vote with Rep. Bishop, Rep. Harvey, Rep. Kortum, Rep. Sullivan, voting no.

Rep. Sullivan, By Proxy

EXECUTIVE ACTION ON HJ 6 – Interim study of electric power resources

16:55:44 **Motion:** Vice Chair Steven Galloway moved that **HJ 6 DO PASS**.

Vote: Motion carried unanimously by voice vote.

ADJOURNMENT

Adjournment: 16:57:49

Lucinda Blair, Secretary

Additional Documents: EXHIBIT(230222FEH)

The Big Sky Country

MONTANA HOUSE OF REPRESENTATIVES

ENERGY, TECHNOLOGY AND FEDERAL RELATIONS

ROLL CALL

DATE: 2-22-23

NAME	PRESENT	ABSENT/EXCUSED
REP. BISHOP	X	
REP. BREWSTER	X	
REP. FIELDER	X	
VICE CHAIR GALLOWAY	X	
REP. GREEN		X
REP. HARVEY		X
REP. KASSMIER	X	
REP. KMETZ		X
REP. KNUDSEN		X
REP. KORTUM	X	
REP. PHALEN	X	
VICE CHAIR SULLIVAN	X	
CHAIR ZOLNIKOV	X	

13 MEMBERS

House Standing Committee Report

February 22, 2023

To the Speaker,

We, your committee on **(H) Energy, Technology and Federal Relations** recommend that **House Bill 220** (first reading copy – white) **Do Pass as Amended**. The referenced amendment is HB0220.001.001.

Signed: Katie Zolnikov

Rep. Katie Zolnikov-R, Chair

-End-

Committee Vote:

Yes 10, No 3

HH 2-23-23
@ 7:42am

House Standing Committee Report

February 22, 2023

To the Speaker,

We, your committee on **(H) Energy, Technology and Federal Relations** recommend that **House Bill 558** (first reading copy – white) **Do Pass**.

Signed: _____

Rep. Katie Zolnikov-R, Chair

-End-

Committee Vote:

Yes 9, No 4

HB 2-23-23
@ 7:40 am

House Standing Committee Report

February 22, 2023

To the Speaker,

We, your committee on **(H) Energy, Technology and Federal Relations** recommend that **House Joint Resolution 6** (first reading copy – white) **Do Pass**.

Signed: _____

Rep. Katie Zolnikov-R, Chair

-End-

Committee Vote:

Yes 13, No 0

2-23-23 @ 7:40am

The Big Sky Country

MONTANA HOUSE OF REPRESENTATIVES

(H) ENERGY, TECHNOLOGY, AND FEDERAL RELATIONS COMMITTEE ROLL CALL VOTE

BILL NUMBER HB220 DATE 2-22-2023

MOTION Be amended 001.001 V. Galloway V-V.

NAME	AYE	NO	PROXY
REP. BISHOP	X		
REP. BREWSTER	X		
REP. FIELDER	X		
VICE CHAIR GALLOWAY	X		
REP. GREEN	X		Y
REP. HARVEY	X		
REP. KASSMIER	X		
REP. KMETZ	X		
REP. KNUDSEN	X		X
REP. KORTUM	X		
Rep. PHALEN	X		
VICE CHAIR SULLIVAN	X		X
CHAIR ZOLNIKOV	X		

13 MEMBERS

The Big Sky Country

MONTANA HOUSE OF REPRESENTATIVES

(H) ENERGY, TECHNOLOGY, AND FEDERAL RELATIONS
COMMITTEE ROLL CALL VOTE

BILL NUMBER_____ DATE 2-22-23

MOTION HB 720 as amended

NAME	AYE	NO	PROXY
REP. BISHOP		X	
REP. BREWSTER	X		
REP. FIELDER	X		
VICE CHAIR GALLOWAY	X		
REP. GREEN	X		X
REP. HARVEY	X		
REP. KASSMIER	X		
REP. KMETZ	X		
REP. KNUDSEN	X		X
REP. KORTUM		X	
Rep. PHALEN	X		
VICE CHAIR SULLIVAN		X	X
CHAIR ZOLNIKOV	X		

13 MEMBERS

The Big Sky Country

MONTANA HOUSE OF REPRESENTATIVES

(H) ENERGY, TECHNOLOGY, AND FEDERAL RELATIONS COMMITTEE ROLL CALL VOTE

BILL NUMBER 550 DATE 2/2/2023

MOTION Do pass

NAME	AYE	NO	PROXY
REP. BISHOP		X	
REP. BREWSTER	X		
REP. FIELDER	X		
VICE CHAIR GALLOWAY	X		
REP. GREEN	X		X
REP. HARVEY		X	
REP. KASSMIER	X		
REP. KMETZ	X		
REP. KNUDSEN	X		X
REP. KORTUM		X	
Rep. PHALEN	X		
VICE CHAIR SULLIVAN		X	X
CHAIR ZOLNIKOV	X		

13 MEMBERS

The Big Sky Country

MONTANA HOUSE OF REPRESENTATIVES

(H) ENERGY, TECHNOLOGY, AND FEDERAL RELATIONS

COMMITTEE ROLL CALL VOTE

BILL NUMBER HJ 6 DATE _____

MOTION Do pass 2-22-23

NAME	AYE	NO	PROXY
REP. BISHOP	✓		
REP. BREWSTER	✓		
REP. FIELDER	X		
VICE CHAIR GALLOWAY	X		
REP. GREEN	X		X
REP. HARVEY	X		
REP. KASSMIER	X		
REP. KMETZ	X		
REP. KNUDSEN	X		X
REP. KORTUM	X		
Rep. PHALEN	X		
VICE CHAIR SULLIVAN	X		X
CHAIR ZOLNIKOV	X		

13 MEMBERS

The Big Sky Country

MONTANA HOUSE OF REPRESENTATIVES

AUTHORIZED COMMITTEE PROXY 68TH LEGISLATIVE SESSION

I request to be excused from the Energy Committee.

I desire to leave my proxy vote with Rep. VICE CHAIR GALLOWAY.

PLEASE USE PEN

BILL	MOTION (Include AMENDMENT #)	AYE	NO
HB 220	Amen 001001	X	
		X	
554		X	
HJ6		X	

BILL	MOTION (Include AMENDMENT #)	AYE	NO

I authorize my vote to be matched with that of Rep. _____ for any amendments proposed on this date.

Rep. _____ PAUL GREEN _____

(Signature) (Print Name) (Meeting Date)

The Big Sky Country

MONTANA HOUSE OF REPRESENTATIVES

AUTHORIZED COMMITTEE PROXY 68TH LEGISLATIVE SESSION

I request to be excused from the Energy Committee.

I desire to leave my proxy vote with Rep. HARVEY.

PLEASE USE PEN

BILL	MOTION (Include AMENDMENT #)	AYE	NO
HB-220	Do PASS		X
HB-558	DO PASS		X
HJ-6	DO PASS	X	
HB-220	Amendment HB-220.001.001	X	

BILL	MOTION (Include AMENDMENT #)	AYE	NO

I authorize my vote to be matched with that of Rep. HARVEY for any amendments proposed on this date.

Rep. Katie Sullivan 2/22/23

(Signature) (Print Name) (Meeting Date)

The Big Sky Country

MONTANA HOUSE OF REPRESENTATIVES

AUTHORIZED COMMITTEE PROXY 68TH LEGISLATIVE SESSION

I request to be excused from the Energy Committee.

I desire to leave my proxy vote with Rep. _____.

PLEASE USE PEN

BILL	MOTION (Include AMENDMENT #)	AYE	NO
HB220	Am 22 0101	X	
		X	
558		X	
HJ 6		X	

BILL	MOTION (Include AMENDMENT #)	AYE	NO

I authorize my vote to be matched with that of Rep. _____
for any amendments proposed on this date.

Rep. _____ Casey Knudsen _____

(Signature) (Print Name) (Meeting Date)

The Big Sky Country

MONTANA HOUSE OF REPRESENTATIVES

VISITOR REGISTER

FEDERAL RELATIONS, ENERGY & TECHNOLOGY COMMITTEE

DATE: 2/22/2023 BILL NO: HB 477

SPONSOR(S): Representative Stewart Peregoy

SHORT TITLE: Generally revise corporation laws regarding tribal entities.

Please leave prepared testimony with the clerk.
Witness Statement forms are available if you care to submit written testimony.

PLEASE PRINT PLEASE PRINT PLEASE PRINT PLEASE PRINT

Name	Representing	Support	Oppose	Info Witness
Austin James	SOS			X
Jade Bahr	MBPC	X		

The Big Sky Country

MONTANA HOUSE OF REPRESENTATIVES

VISITOR REGISTER

FEDERAL RELATIONS, ENERGY & TECHNOLOGY COMMITTEE

DATE: 2/22/2023 BILL NO: HB 484

SPONSOR(S): Representative Katie Sullivan

SHORT TITLE: Establish broadband advisory commission

Please leave prepared testimony with the clerk.
Witness Statement forms are available if you care to submit written testimony.

PLEASE PRINT PLEASE PRINT PLEASE PRINT PLEASE PRINT

Name	Representing	Support	Oppose	Info Witness
Dave Galt	Mt. Chamber		X	
[signature]	MAIC	X		
Ella Smith	MT Library Assn.	X		
Jade Bahr	MBPC	X		

The Big Sky Country

MONTANA HOUSE OF REPRESENTATIVES

VISITOR REGISTER

FEDERAL RELATIONS, ENERGY & TECHNOLOGY COMMITTEE

DATE: 2/22/2023 BILL NO: HB 492

SPONSOR(S): Representative Katie Zolnikov

SHORT TITLE: Revising telecommunications regulation

Please leave prepared testimony with the clerk.
Witness Statement forms are available if you care to submit written testimony.

PLEASE PRINT PLEASE PRINT PLEASE PRINT PLEASE PRINT

Name	Representing	Support	Oppose	Info Witness
Tim Brown	PSC	X		
Adrianne Cotton	AARP		X	
Geoff Feiss	Broadband MT		Amend	

The Big Sky Country

MONTANA HOUSE OF REPRESENTATIVES

VISITOR REGISTER

FEDERAL RELATIONS, ENERGY & TECHNOLOGY COMMITTEE

DATE: 2/22/2023 BILL NO: HB 524

SPONSOR(S): Representative Joshua Kassmier

SHORT TITLE: Revise energy laws relating to solar panels.

Please leave prepared testimony with the clerk.
Witness Statement forms are available if you care to submit written testimony.

PLEASE PRINT PLEASE PRINT PLEASE PRINT PLEASE PRINT

Name	Representing	Support	Oppose	Info Witness
Makenna Sellers	MT Renewable Energy Assoc.		X	
Chuck Denowh	Tesla		X	
Brad Van Abbt	Harvest Solar		X	
IAN LUND	MEIC		X	
Sydney Ausen	Northern Plains Resource Council		X	
Patrick YAWARIE			X	

FEH Remote Paticipant List

Date

Date	Committee	H/S	Bill #	Position	Requester Name	Location	Email	Phone	Affiliation
2/22/23	FEH	HB	477	Proponent	Ta'jin Perez	Billings, MT			Western Native Voice
2/22/23	FEH	HB	484	Proponent	Gail Waldby	Livingston mt			N/A
2/22/23	FEH	HB	492	Opponent	Geoff Feiss	Helena, MT			BroadbandMT
2/22/23	FEH	HB	524	Opponent	Joan Kresich	Livingston MT			Northern Plains Resource Council
2/22/23	FEH	HB	524	Opponent	John Palm	Bozeman, MT			N/A
2/22/23	FEH	HB	524	Opponent	Makenna Sellers	Helena, MT			Montana Renewable Energy Association
2/22/23	FEH	HB	524	Opponent	Brad Van Wert	Bozeman, MT			N/A

EXHIBIT 1
DATE 2-22-23
HB 484

MONTANA AMERICAN INDIAN CAUCUS

February 22, 2023

Dear Chairman,

The Montana American Indian Caucus writes in support of HB 484. House Bill 484, sponsored by Katie Sullivan (D) HD 89, establishes a broadband advisory commission. The MAIC supports increased telecommunications in oftentimes remote areas in Indian Country. Communication is key in emergency situations combined with all the critically threatening environmental extreme temperatures and weather Montana oftentimes have.

The Montana American Indian Caucus asks for a DO PASS of HB 484 which expands the commission to an additional representative from a tribally owned telecommunications company or tribal government.

Montana American Indian Caucus

Senator Mike Fox (SD 16)	Rep. Tyson Running Wolf (HD 16)
Senator Shane Morigeau (SD 48)	Rep. Frank Smith (HD 31)
Senator Jason Small (SD 21)	Rep. Sharon Stewart Peregoy (HD 42)
Senator Susan Webber (SD8)	Rep. Marvin Weatherwax (HD 15)
Rep. Donavon Hawk (HD 76)	Rep. Jonathan Windy Boy (HD 32)

DOCUMENT PREPARED BY THE
MONTANA PUBLIC SERVICE COMMISSION
IN SUPPORT OF HOUSE BILL 492
SUBMITTED BY JIM BROWN, PRESIDENT OF THE MONTANA PSC

STATUE REVISIONS IN HB 492 OTHER THAN THE REPEALER SECTION

Section 1. Section 15-53-129, MCA, is amended to read:

15-53-129. (Effective on occurrence of contingency) Definitions. As used in this part, unless the context requires otherwise, the following definitions apply

(3) (a) "Sales price" means the consideration paid for the distribution, supply, furnishing, sale, transmission, or delivery of retail telecommunications services to the end-user customer.

(b) Sales price does not include:

(i) an amount added to the customer's bill because of a charge made pursuant to the tax imposed by this part;

(ii) charges added to a customer's bill under 10-4-201, and 53-19-311 ~~and 69-3-844~~;

Section 2. Section 17-7-502, MCA, is amended to read

"**17-7-502. Statutory appropriations -- definition -- requisites for validity.** (1) A statutory appropriation is an appropriation made by permanent law that authorizes spending by a state agency without the need for a biennial legislative appropriation or budget amendment.

(3) The following laws are the only laws containing statutory appropriations: ~~69-3-870:~~

Section 3. Section 45-8-213, MCA, is amended to read:

"45-8-213. Privacy in communications.

(1) ~~Except as provided in 69-6-104, a~~ A person commits the offense of violating privacy in communications if the person knowingly or purposely:

(3) ~~Except as provided in 69-6-104, a~~ A person commits the offense of violating privacy in communications if the person purposely intercepts an electronic communication. This subsection does not apply to elected or appointed public officials or to public employees when

the interception is done in the performance of official duty or to persons given warning of the interception.

Section 4. Section 69-3-225, MCA, is amended to read:

"**69-3-225. Overbilling of regulated telecommunications tariff charges -- statute of limitations for recovery.** (1) A person or entity alleging overbilling of tariffed telecommunications charges by a regulated telecommunications company shall file the action before the commission or a court of competent jurisdiction within 2 years of the date of overbilling.

2) This section is intended to be consistent with limitations on actions as provided in 47 U.S.C. 415.

(3) For purposes of this section, the following definitions apply:

(a) "Overbilling" means presenting a bill to a customer of a regulated telecommunications company that includes charges that overstate the amount owed by the customer pursuant to the tariff for the service as approved by and on file with the commission.

(b) "Regulated telecommunications company" means all public utility companies that are regulated pursuant to 69-3-101(1)(f), Title 69, chapter 3, part 8, and ~~69-3-803(10)~~ 69-3-803(9).

Section 5. Section 69-3-302, MCA, is amended to read:

"**69-3-302. Changes in schedules.**

(1) Except as provided in 69-3-308, a change may not be made in any schedule, including schedules of joint rates, except as approved by the commission~~, upon~~ or on the passage of 9 months~~, or by operation of 69-3-907(1)~~. If the 9-month time period expires prior to commission approval of a schedule, a utility may waive the time period.

Section 6. Section 69-3-305, MCA, is amended to read:

"**69-3-305. Deviations from scheduled rates, tolls, and charges.**

(1) Except as provided in subsection ~~(5)(a)~~ (4)(a), a public utility may not:

~~(4) The provisions of this section do not prohibit the sharing of profits or revenues with customers in conjunction with an alternative form of regulation approved under 69-3-809.~~

Section 7. Section 69-3-803, MCA, is amended to read:

"**69-3-803. Definitions.** As used in this part, the following definitions apply:

~~(4) "Fund" means the universal service fund established in 69-3-842.~~

WORLD

Behind the Rise of U.S. Solar Power, a Mountain of Chinese Coal

Reliance on coal-fired electricity to produce solar panels raises concerns in the West

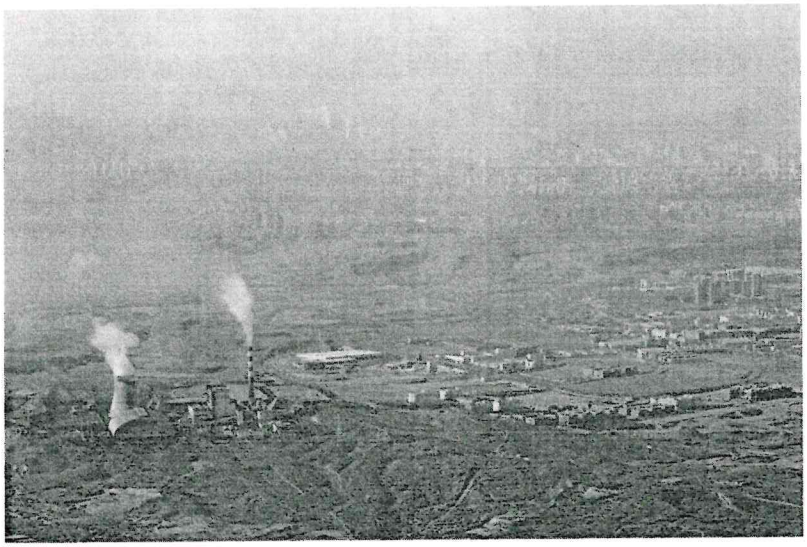
By Matthew Dalton Follow

July 31, 2021 8:32 am ET

Solar panel installations are surging in the U.S. and Europe as Western countries seek to cut their reliance on fossil fuels.

But the West faces a conundrum as it installs panels on small rooftops and in sprawling desert arrays: Most of them are produced with energy from carbon-dioxide-belching, coal-burning plants in China.

Concerns are mounting in the U.S. and Europe that the solar industry's reliance on Chinese coal will create a big increase in emissions in the coming years as manufacturers rapidly scale up production of solar panels to meet demand. That would make the solar industry one of the world's most prolific polluters, analysts say, undermining some of the emissions reductions achieved from widespread adoption.



The coal-fired Urumqi Thermal Power Plant in western China.

PHOTO: MARK SCHIEFELBEIN/ASSOCIATED PRESS

For years, China's low-cost, coal-fired electricity has given the country's solar-panel manufacturers a competitive advantage, allowing them to dominate global markets.

Chinese factories supply more than three-quarters of the world's polysilicon, an essential component in most solar panels, according to industry analyst Johannes Bernreuter. Polysilicon factories refine silicon metal using a process that consumes large amounts of electricity, making access to cheap power a cost advantage. Chinese authorities have built an array of coal-burning power plants in sparsely populated areas such as Xinjiang and Inner Mongolia to support polysilicon manufacturers and other energy-hungry industries.

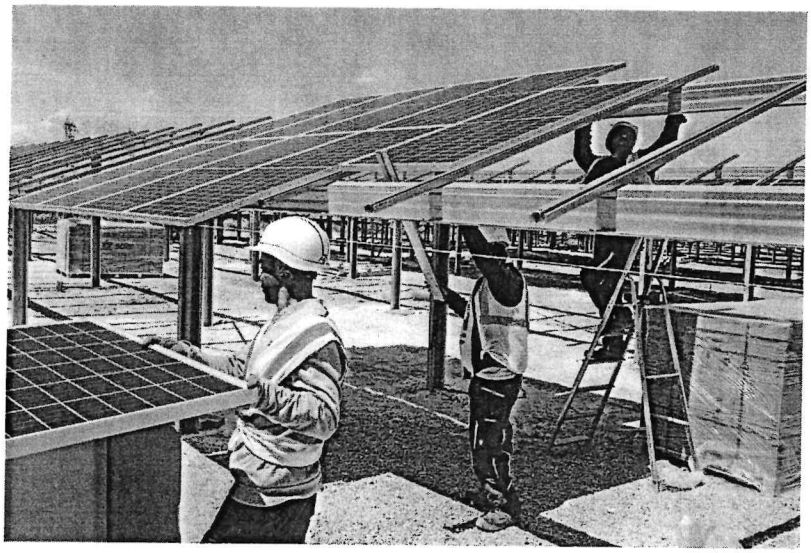
"If China didn't have access to coal, then solar power wouldn't be cheap now."

— Climate researcher Robbie Andrew

Producing a solar panel in China creates around twice as much carbon dioxide as making it in Europe, said Fengqi You, professor of energy systems engineering at Cornell University. In some countries or regions that don't rely heavily on fossil fuels for electricity generation, such as Norway and France, installing a high-carbon, Chinese-made solar panel might not reduce emissions at all, Mr. You said.

"Yes, we are clean" in the West, said Mr. You. "But then the process of getting these panels from another country—China now, maybe somewhere else later—produces a lot of emissions."

Scientists say, however, that installing Chinese-made panels almost always results in a net reduction in carbon dioxide emissions over time, because the panels are usually replacing electricity generated from fossil fuels. The emissions avoided after the first few years of a solar panel's 30-year lifespan can offset the emissions required to produce it.



Workers install solar panels in Laudun L'Ardoise, France, a country that doesn't rely heavily on fossil fuels for electricity generation.

PHOTO: JEREMY SUYKER/BLOOMBERG NEWS

Some Western governments and corporations are attempting to shift the solar industry away from coal. Companies that buy renewable energy are laying the groundwork to favor low-carbon solar panels when financing solar projects. The U.S. federal government is drafting a policy to do the same when it buys solar panels, said a spokesman for the Environmental Protection Agency. And the European Union is considering whether to regulate the carbon content of panels sold throughout the 27-nation bloc, EU officials say.

These policies would also help rebuild the West's solar industry, which has withered under competition from higher-polluting Chinese producers, Western executives say.

U.S. solar power capacity in the last two years has jumped 48%, according to consulting firm Wood Mackenzie. In Europe, it is up 34%. Those installations amount to tens of thousands of solar panels shipped each year.

"Large energy buyers can influence supply chains," said Jen Snook of the Renewable Energy Buyers Alliance, which represents Amazon.com Inc., Salesforce.com Inc. and more than 200 other corporations. "Solar hopefully will continue on a very strong growth rate, and we want to ensure that growth is sustainable."

The dilemma is becoming more apparent as world leaders prepare to meet in Glasgow, Scotland, in November to make a new push to reduce greenhouse gas emissions. Part of that effort involves coaxing China, the world's largest emitter, to shift away from coal-burning electricity to slash emissions even as the West gorges on Chinese gear from solar panels to lightweight aluminum for electric vehicles. At a July meeting of environment ministers from

the Group of 20 leading economies, China and India blocked an agreement to phase out coal-fired electricity.

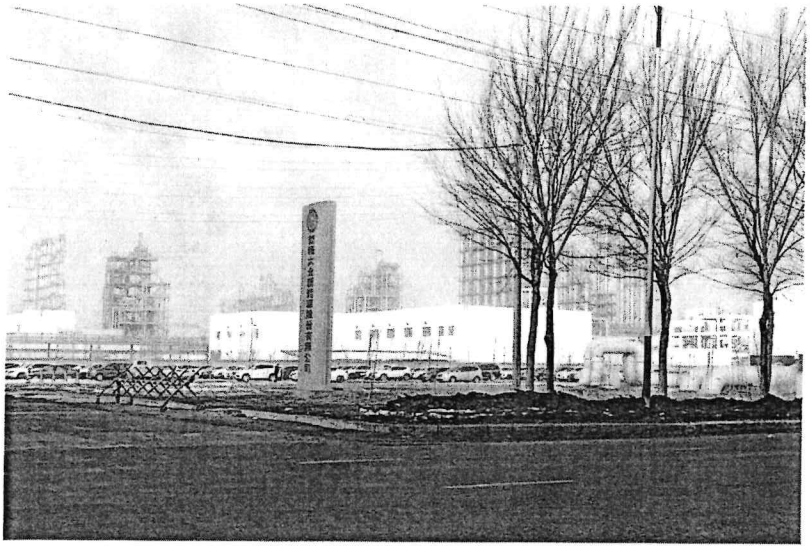
Finding alternatives won't be easy. China's surging and cheaper polysilicon production has harmed U.S. producers, forcing the shutdown of several factories that use power sources with lower carbon emissions than Chinese producers. Wacker Chemie AG, the West's largest producer of solar-grade polysilicon, pays up to four times as much for power at its factories in Germany compared with Chinese producers in Xinjiang, said company spokesman Christof Bachmair.

China has pushed down the price of panels so sharply that solar power is now less expensive than electricity generated from fossil fuels in many markets around the world. Imports of the solar cells that make up the panels are also flooding into the U.S. and Europe.

Those shipments are either coming directly from China or contain key components made in China.

"If China didn't have access to coal, then solar power wouldn't be cheap now," said Robbie Andrew, a senior researcher at the Center for International Climate Research in Oslo. "Is it OK that we've had this huge bulge of carbon emissions from China because it allowed them to develop all these technologies really cheaply? We might not know that for another 30 to 40 years."

Some Chinese polysilicon producers are well-placed to respond to Western demand for low-carbon panels. Tongwei, the world's largest producer, has some factories that run on hydropower. However, Daqo New Energy and GCL Poly, Tongwei's main Chinese competitors, rely overwhelmingly on coal, according to the companies.



Daqo New Energy Corp., which runs this facility in Xinjiang province, is among Chinese polysilicon producers that rely on coal.

PHOTO: COLUM MURPHY/BLOOMBERG NEWS

France is one of the few countries that regulate the carbon content of solar panels, requiring low-carbon panels for large solar projects. That has encouraged some Chinese panel manufacturers to use renewable energy in some processes, allowing them to sell into the French market. South Korea this year adopted rules inspired by the French system, and other European countries have expressed interest, officials from the region say.

China's dominance of the solar supply chain also makes it harder on the handful of companies that are trying to rebuild solar-panel capacity in the West. China is home to most of the companies that slice polysilicon into wafers, package the wafers into cells and assemble the cells into panels. U.S. tariffs on Chinese solar panels and cells have pushed Chinese companies to set up factories for these parts in other countries.

JinkoSolar, a Chinese firm, built a panel assembly plant in Florida to supply NextEra Energy, one of the largest U.S. renewable-energy companies. But the wafer and polysilicon are from China, analysts say.

Italian energy company Enel SpA is planning to expand its solar-panel factory in Sicily, one of the few left in Europe, but the factory will still rely on silicon wafers coming from China.

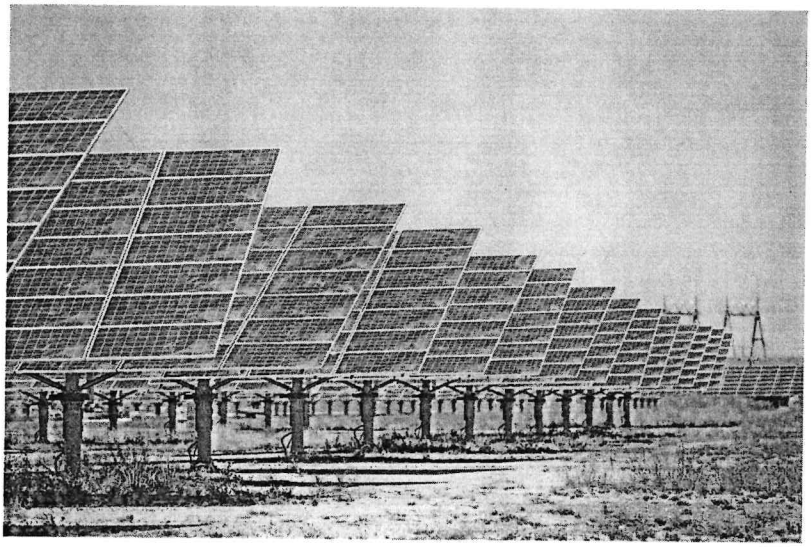
"We would be happy if the other part of the value chain would be established in Europe," said Antonello Irace, director of the factory in Sicily. "Think about sustainability, think about labor conditions, think about logistics costs and proximity."

Beijing has further hobbled Western efforts by placing tariffs on U.S. polysilicon as part of a long-running trade dispute over solar panels. That blocked U.S. producers from selling raw

material to Chinese wafering factories—which have more than 95% of global capacity—leaving them with almost no buyers for their product.

The tariffs led REC Silicon ASA in 2019 to idle a plant in Moses Lake, Wash., that runs on carbon-free hydropower. The company hoped negotiations between the Trump administration and Beijing would result in the tariffs being dropped. Instead, Beijing last year extended the tariffs for five years.

"We have a lot of polysilicon capacity," said David Feldman, a researcher at the U.S. government's National Renewable Energy Laboratory, "and it would be good for them to have customers."



A solar farm near Bakersfield, Texas, on Saturday, April 10, 2021.
PHOTO: BILL CLARK/CQ ROLL CALL/ZUMA PRESS

Write to Matthew Dalton at Matthew.Dalton@wsj.com

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EXHIBIT 4
DATE 2-22-23
HB HB 524

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

Life Cycle Greenhouse Gas Emissions from Electricity Generation

As clean energy increasingly becomes part of the national dialogue, lenders, utilities, and lawmakers need the most comprehensive and accurate information on GHG emissions from various sources of energy to inform policy, planning, and investment decisions. The National Renewable Energy Laboratory (NREL) recently led the Life Cycle Assessment (LCA) Harmonization Project, a study that gives decision makers and investors more precise estimates of life cycle GHG emissions for renewable and conventional generation, clarifying inconsistent and conflicting estimates in the published literature, and reducing uncertainty.

Over the last thirty years, thousands of LCAs have been published for a variety of electricity generation technologies. These LCAs have shown wide-ranging results. Variability can be attributed to technologies evaluated (e.g., differing system designs, commercial versus conceptual systems, system operating assumptions, technology improvements over time) and LCA methods and assumptions. Analysts at NREL developed and applied a systematic approach to review the LCA literature, identify primary sources of variability and, where possible, reduce variability in GHG emissions estimates through a procedure called "harmonization." This harmonization methodology is based on a two-step meta-analytical approach, which statistically combines the results of multiple studies, as follows:

Systematic Literature Review. NREL considered more than 2,100 published LCA studies on utility-scale electricity generation from wind, solar photovoltaic (PV), concentrating solar power (CSP), biopower, geothermal, ocean energy, hydropower, nuclear, natural gas, and coal technologies. Systematic review, comprising three rounds of screening by multiple experts, narrowed the field to select references that met strict criteria for quality, relevance, and transparency. Less than 15% of the original pool of references passed this review process.

Harmonization and Data Analysis. After the systematic review, NREL applied harmonization to adjust the published GHG emission estimates to a consistent set of methods and assumptions, specific to the technology under investigation, in two main stages:

- *System harmonization* ensured studies used a consistent set of included processes (e.g., system boundary, set of evaluated GHGs) and metrics (e.g., global warming potentials).
- *Technical harmonization* of key performance parameters (e.g., capacity factor, thermal efficiency) or primary energy resource characteristics (e.g., solar resource, fossil fuel heating value) ensured consistent values that reflect a modern reference system (typically a modern facility operating in the United States).

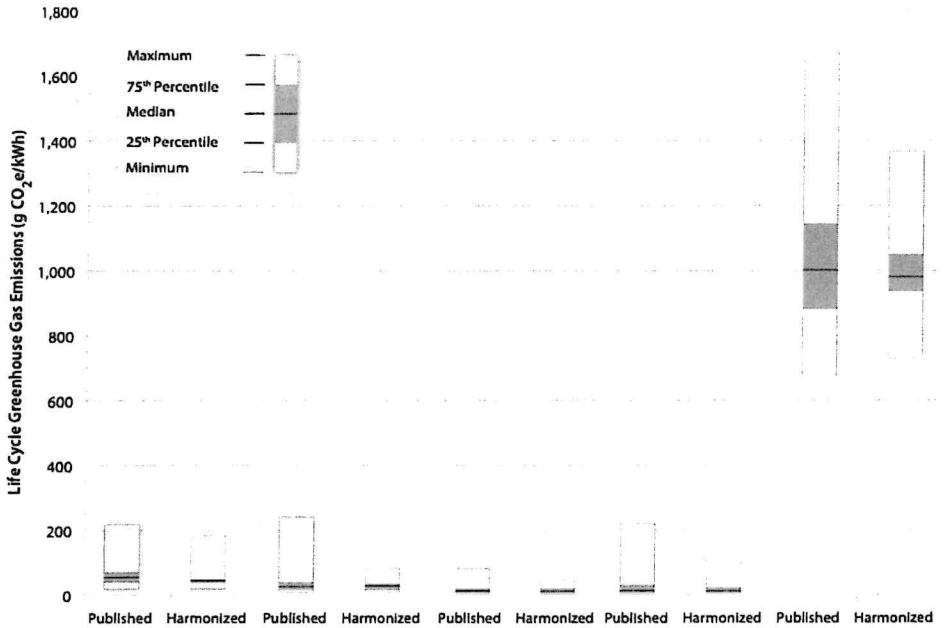
To date, NREL has completed harmonization of life cycle GHG emissions for wind, PV, CSP, nuclear, and coal technologies, with analysis of natural gas technologies forthcoming.

LCA of Energy Systems

LCA can help determine environmental burdens from "cradle to grave" and facilitate more consistent comparisons of energy technologies.

Figure 1. Generalized life cycle stages for energy technologies
Source: Sathaye et al. (2011)

Life cycle GHG emissions from renewable electricity generation technologies are generally less than those from fossil fuel-based technologies, based on evidence assembled by this project. Further, the proportion of GHG emissions from each life cycle stage differs by technology. For fossil-fueled technologies, fuel combustion during operation of the facility emits the vast majority of GHGs. For nuclear and renewable energy technologies, the majority of GHG emissions occur upstream of operation.



	Photovoltaics (C-Si and Thin Film)	Concentrating Solar Power (Trough and Tower)	Wind (Offshore and Onshore)	Nuclear (Light Water)	Coal (Sub- and Supercritical, IGCC, Fluidized Bed)
Estimates	46	36	126	99	164
References	17	10	49	27	53

Electricity Generation Technology	Photovoltaics (C-Si and Thin Film)	Concentrating Solar Power		Wind (Onshore and Offshore)	Nuclear (Light Water)	Coal (Sub- and Supercritical, IGCC, Fluidized Bed)
		Trough	Tower			
Driving Parameter	Solar Irradiation (kWh/m²/year)	Solar Fraction (%)	Operating Lifetime (years)	Capacity Factor (%)	Operating Lifetime (years)	Carbon Dioxide Emission Factor (kg CO_2/kWh)
Definition	Amount of solar energy incident upon a unit area of collector in the solar field during one year	Percentage of electricity produced only from solar energy	Assumed lifetime for the LCA or facility	Ratio of actual electricity generated to the maximum potential electricity generation	Assumed lifetime for the LCA or facility	Mass of carbon dioxide emitted per kilowatt-hour of net electricity generated—a function of thermal efficiency, coal carbon content, and coal lower heating value
Published Range	900-2,143	75-100	25-40	9-71	25-60	0.64-1.64
Harmonized Value	1700	100	30	Onshore: 30 Offshore: 40	40	0.97

Published and harmonized estimates of life cycle GHG emissions for solar (PV and CSP), wind, nuclear, and coal technologies are compared in the figure on this page. The figure includes the median value, the number of estimates, and the number of references analyzed for each technology. These results show that:

- Total life cycle GHG emissions from renewables and nuclear energy are much lower and generally less variable than those from fossil fuels. For example, from cradle to grave, coal-fired electricity releases about 20 times more GHGs per kilowatt-hour than solar, wind, and nuclear electricity (based on median estimates for each technology).
- Harmonization reduces the variability of GHG emissions estimates to varying degrees (from about 25% to 70%) for the technologies evaluated. The key drivers of variability are a subset of the factors harmonized for each technology, with the most important listed in the table.
- Harmonization has little impact on the median value of the technologies evaluated. A shift of 20% or less was typically observed for analyzed technologies.

Harmonization provides increased precision and helps clarify the impacts of specific electricity generation choices, producing more robust and policy-relevant results. Project developers, investors, manufacturers, and utilities can use harmonized estimates as building blocks to making their own estimates for specific projects or to inform policy and investment decisions.

See also:

- For general information about the LCA Harmonization project: www.nrel.gov/harmonization
- For data visualization and downloading: http://en.openei.org/lca
- For journal articles from the LCA Harmonization Project and other LCA meta-analyses: http://jie.yale.edu/LCA-meta-analysis.

References

Sathaye et al. (2011). "Renewable Energy in the Context of Sustainable Development." In *IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation*, [O. Edenhofer et al. (eds)], Cambridge University Press, 84 pp., http://srren.ipcc-wg3.de/report/IPCC_SRREN_Ch09.pdf/.

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

National Renewable Energy Laboratory
15013 Denver West Parkway
Golden, CO 80401
303-275-3000 • www.nrel.gov

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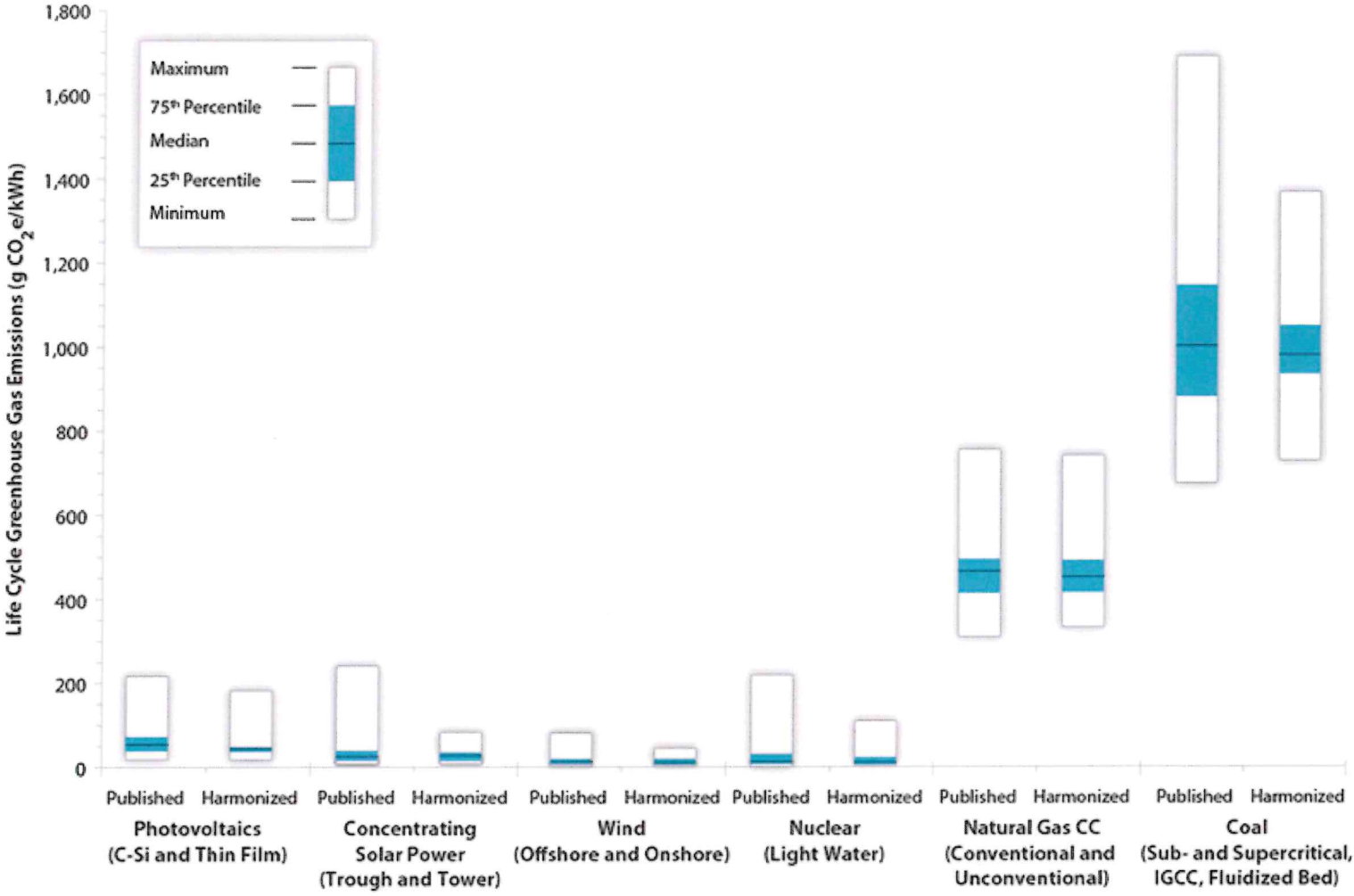

	Photovoltaics (C-Si and Thin Film)	Concentrating Solar Power (Trough and Tower)	Wind (Offshore and Onshore)	Nuclear (Light Water)	Natural Gas CC (Conventional and Unconventional)	Coal (Sub- and Supercritical, IGCC, Fluidized Bed)
Estimates	46	36	126	99	61	164
References	17	10	49	27	45	53

*CC = combined cycle