

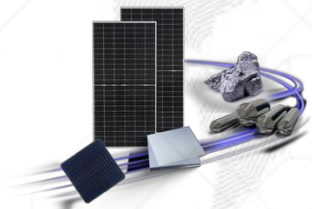
How the DC sausage is made; lessons the U.S. PV industry needs to learn to seize opportunities and remain relevant

Dr. Markus E. Beck

PV CellTech USA, October 8, San Francisco, CA

The RCT Group at a Glance

RCT Solutions



2012
Founded

26 Countries
Operating Worldwide

73 GW Engineered
Integrated PV

RCT Power

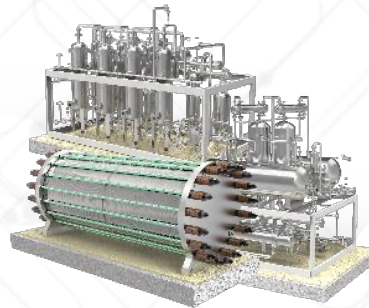


5th Largest ESS provider
Bloomberg Tier 1 listed

>14.5 GWh (6 GWh USA)
Total shipments

Best Storage
Awarded 6 years in a row

RCT Hydrogen



>70 MW
Globally deployed HGS

>1.000 MW
Manufacturing Capacity

Modular Design
100 kW – 20 MW flexibility

RCT Modules



67 Projects
Field-proven reliability

30 Years
Engineering compatibility

3 Manufacturers
RCT-engineered projects

RCT Financial Advisory



2025
Founded

ECA-Backed Financing
Securing longer loans

Clean-Energy Mandate
Solar, storage, hydrogen

RCT Solutions Portfolio

“Ingot to Module Giga Services”

Owner's Engineering (OE) Services ... on behalf of Project Owner	Lender's Engineering (LE) Service ... on behalf of Project Financier
OE services provide the project owner with experienced resources to develop the project from its inception to execution	The LE reviews and challenges the project work done in a specific project at pre-determined stages
The OE serves as an extension of the project owner's team	The LE serves the project lender or sponsor to identify possible risks or technical issues and help derive mitigation strategies if required
The OE seeks the best interest of the project's long-term profitability	The LE work increases confidence of the financier into the project
The OE recommends, ... but the project owner decides	
The OE service is typically more than technical—i.e., can include support in strategy, commercialization, risk mitigation, financial evaluations, procurement, and vendor selection	

End-to-end Service for Integrated PV Manufacturing

RCT Services for a PV Manufacturing Project

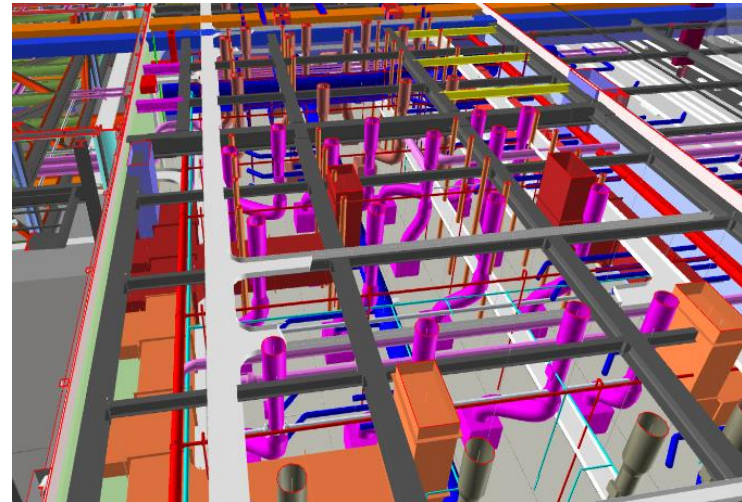
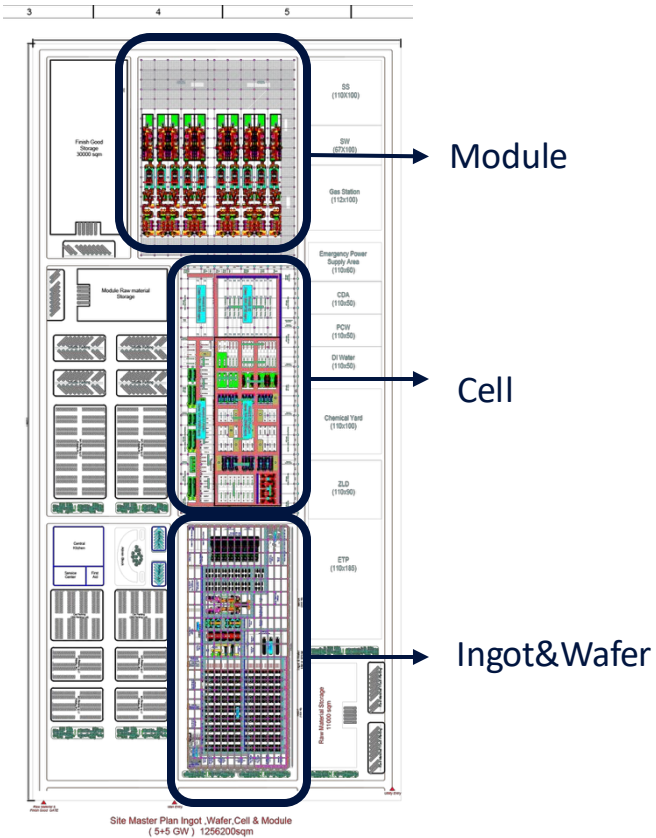
From Planning

...

to Design

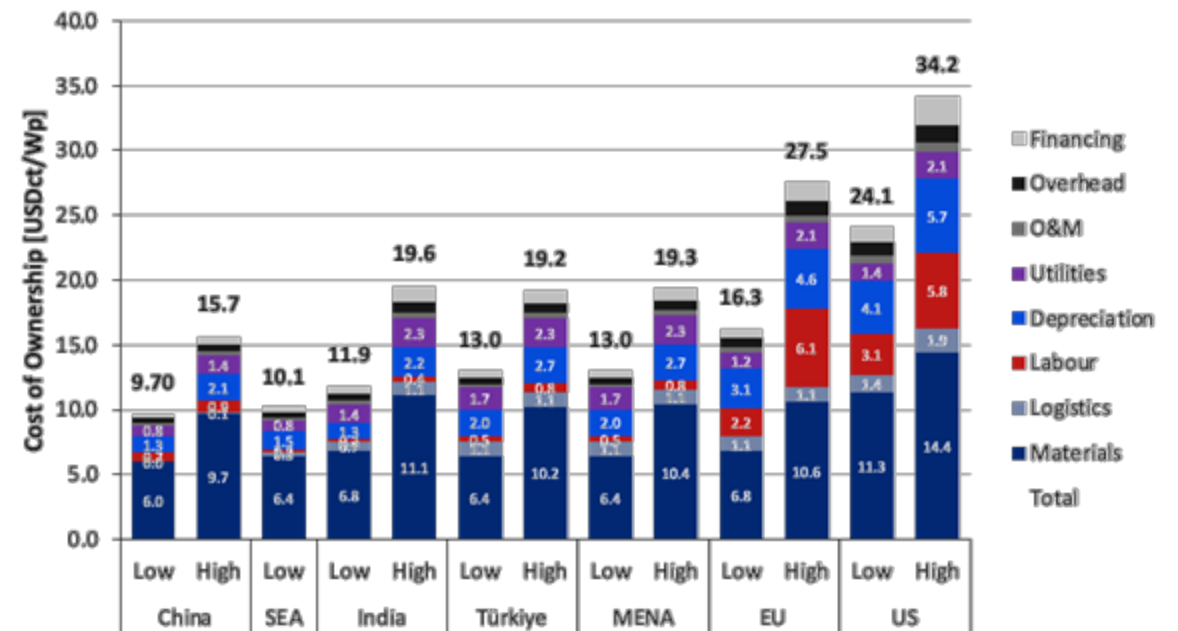
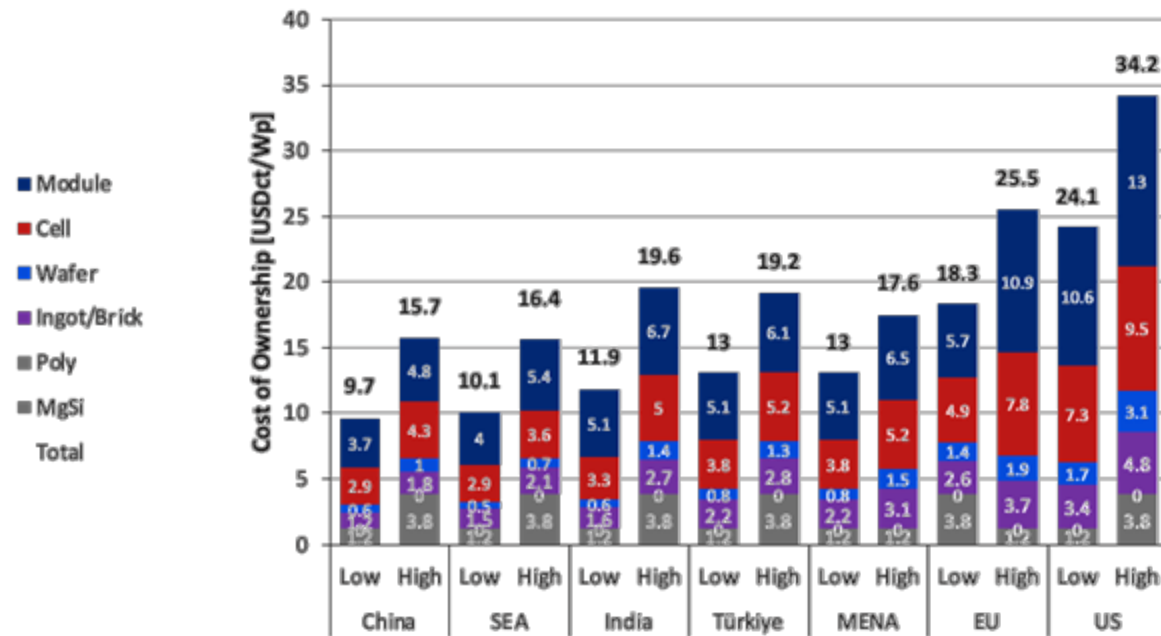
...

to Execution



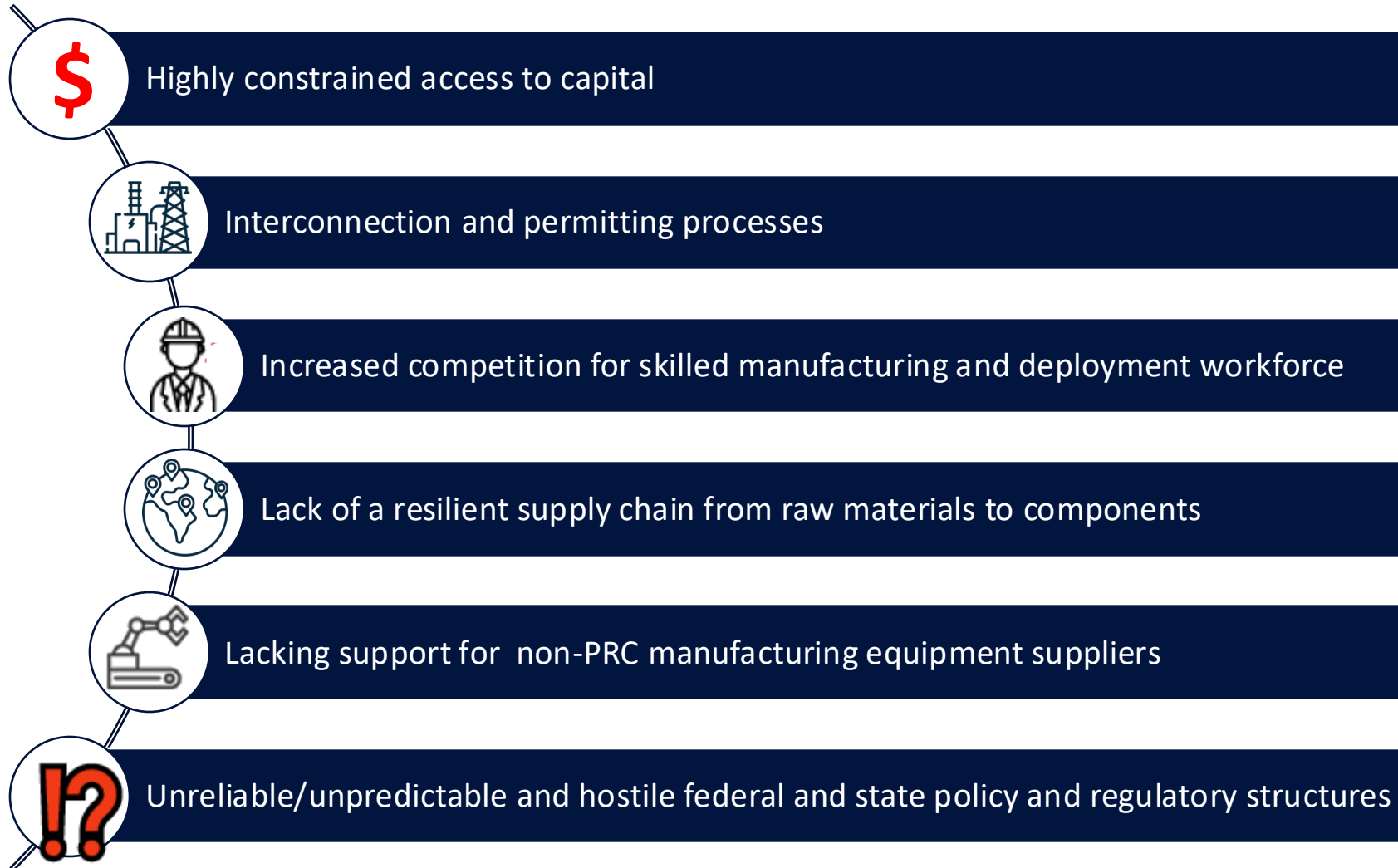
Cost of Ownership

RCT Engineering Services



The Challenge:

Six Factors currently impeding a sustainable domestic PV Ecosystem



Simply: The M&Ms of PV Manufacturing



Money



Market



Manpower



Machines

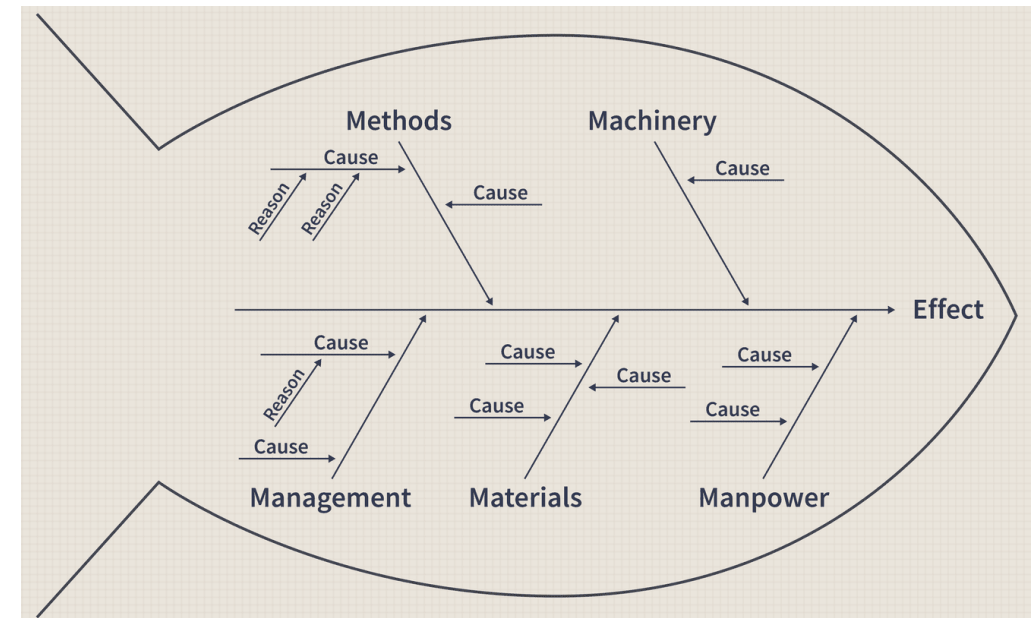


Materials



Methodology (policy, regulatory structure)

Easy to remember, similar to the 5Ms of Lean Manufacturing in the Ishikawa Diagram



Know this guy?



Current Federal U.S. Policy Landscape

'nothing is certain but death and taxes' ...

Trade & Policy Measures	Supply Chain Segment			
	Poly	c-Si Wafers	c-Si Cells	Modules
AD/CVD Duties (PRC, Taiwan)			X	X
AD/CVD Circumvention Duties			X	X
AD/CVD Duties (SE Asia)			X	X
Section 201 Tariffs				X
Section 301 Tariffs (PRC)	X	X	X	X
45X (MPTC) [°]	mutually exclusive	X	X	X
48C*			X	X
48D (CHIPS)		X		
Transferability (45X)	X	X	X	X
Domestic Content Bonus			X	X
BABA Requirements			X	X
Loan Guarantees	X		X	X
RD&D Support ⁺				
FEOC Restrictions	X	X	X	X

- Downstream Incentives
 - 25D resi. ITC through 12/31/2025
 - 45Y PTC
 - 48E ITC
 - Transferability (also for 45X)
- AD/CVD 'Solar IV' under way
- Section 232 polysilicon investigation ongoing

Various state-level policies either supporting or penalizing solar (both DG and UPV)

[°] can stack

* closed, unclear if a new round would open if allocated \$10B are not used

⁺ unclear if new projects will be funded, Administration's 2026 SETO request at \$0, House Mark \$115M

PV's true opposition is the incumbent fossil industry with deep pockets

Big oil spent \$445m in last election cycle to influence Trump and Congress, report says

Investments 'likely to pay dividends', analysis says, as Trump unleashes dozens of pro-fossil fuel executive actions



📷 Donald Trump with billionaire oil magnate Harold Hamm in Pittsburgh in 2019. Photograph: Evan Vucci/AP

Source: [The Guardian 01/23/2025](#)

Congress

- Are they stupid or what?
 - They are human (with all the flaws of the species)
 - Too many different subjects to legislate—not even “Jack of all trades, master of none” applies, it is worse
 - Do not ask SETO
 - Listen to those who donate the most, talk the loudest and with the most consistent message
 - Weight whether your message fits with their political calculus

White House

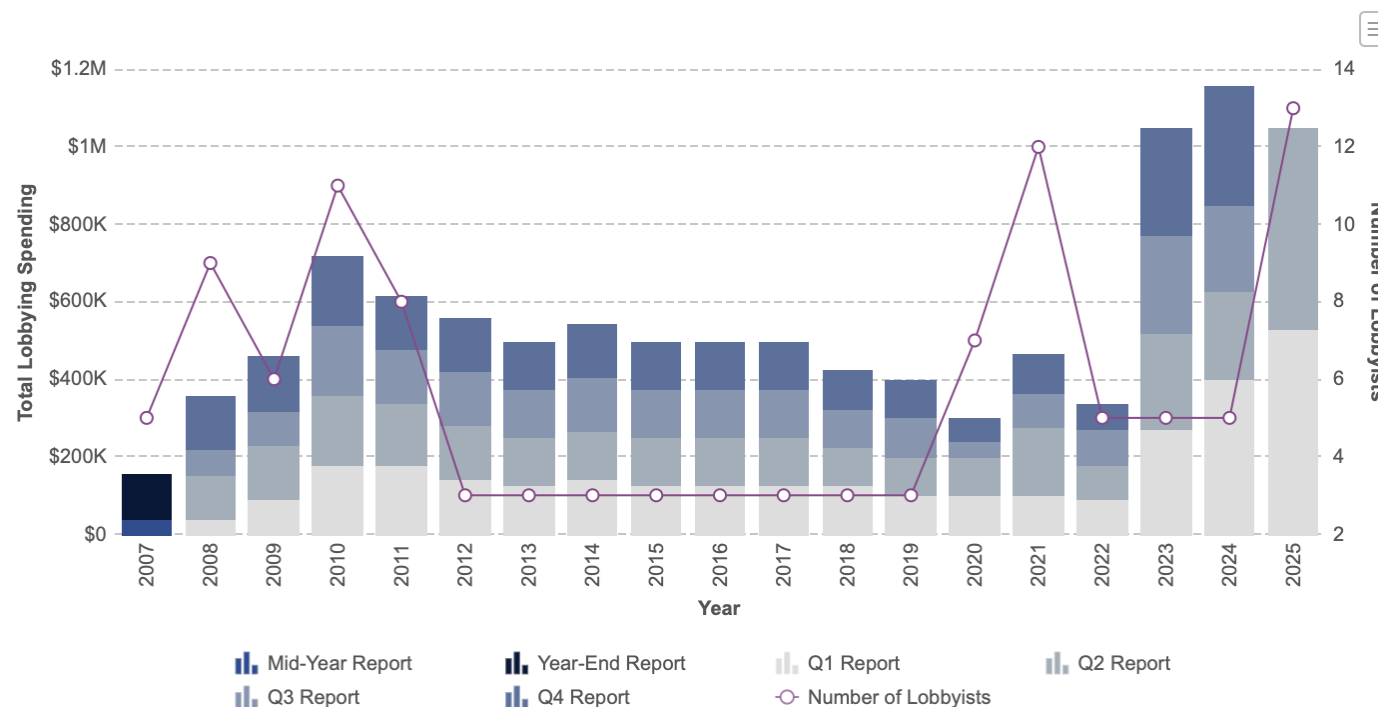
- Advisors change frequently—loss of consistency and ‘institutional’ knowledge
- More ‘politics for hire’

United we stand, divided we fall—**Seriously!**

- Industry has to unite its message
- Can SEIA and SEMA cooperate?
 - No more *“I want it all, I want it all, and I want it now”* for downstream, need to wean off cheap imports that do not reflect the true cost of PV components; the upfront cost is only a small part of solar economics
- Stop harping unproven technologies and fairytales
 - Need to focus on deploying proven and bankable c-Si and CdTe
 - The U.S. will not innovate its way into GW production with Perovskites—keep on dreaming ...
- FSLR the ‘holy cow’ in opposition to c-Si—is cooperation feasible?

United we stand, divided we fall—**Seriously!**

Annual Lobbying by First Solar



- FSLR the ‘holy cow’ in opposition to c-Si—is cooperation feasible?

Source: [OpenSecrets](https://www.opensecrets.org)

Innovate—do it, don't just talk about it

- Industry has to simplify the message
- Revamp the message
 - Stop positioning PV as combatting climate change
 - Promote the national security and economic benefits (if full supply chain is re- or friend-shored)
 - Is this truly an energy transition threatening the incumbents or in reality an energy addition like in the past?



20-25 seconds ...

- Adapt a customer focus approach and embrace the unique opportunities of PV
 - Distributed generation and ability to scale from balcony solar to UPV
 - Distributed PV+ESS benefits grid operators as it helps avoid costly distribution grid upgrades
 - Hedge against rising electricity prices for businesses and households (retirees with a fixed-income)
- Innovate on product
 - Abandon the “one product fits all” approach—instead offer application-specific modules
 - Abandon the “cheap, cheap, cheap” mentality—instead focus on quality and customer value



- Here to stay, bipartisan support
- The U.S. is in dire need for tech transfer
but be aware of PRC; think this through beyond just FEOC—e.g.,
how will you differentiate? IP protection (trade secrets),
cybersecurity, ...
- Innovate with non-PRC equipment and material vendors, explore
exclusivity ...

and then there is the Section 232 polysilicon case ...

Although we meet in CA, we are a long way from El Dorado County

- If you are in PV for the “*Easy, Easy Money*” you are in the wrong business
- Low-margin business, need to be competitive, and operational excellence takes time
- Consolidation is coming
- Consider vertical integration incl. ESS

If we f this up again this will likely be it for PV manufacturing in the U.S.

So are you really after sustainable operations or just a quick buck? Take a hard look at what you really know, what you want to accomplish in the long term, and what it will take to get there.



And now for something completely different

A word about golf ...

Local opposition towards DG, community solar, and UPV—perceived land conflict with agriculture but not with golf courses

- U.S. has 16,297 golf courses covering 8,014km² (3094 square miles)
- At 50% coverage this would accommodate the current installed PV capacity on only 3,000 of the courses

Data: Environ. Res. Commun. 7 (2025) 021012



What to make of it all?

- PV industry needs to get its act together
- Cooperate, overcome current division, and beware the black sheep
- No need for more module capacity; need to achieve better utilization and quality for existing module capacity; some module assembly operations likely to close down
- Despite policy uncertainty now is the time to invest in ingot/wafer and cell capacity
- FEOC is here to stay, leverage it to your advantage and overcome the dependency on China
- If 232 tariffs and quotas are implemented, use the opportunity wisely
- Need to advocate for public funding to sustain RD&D
- Lobby Congress and the Administration with a united voice and consistent message
- Don't put PV on a golf course ...



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Thank you 

**RCT Solutions is here to support your PV manufacturing project
with our expertise**

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