



National Laboratory
of the Rockies

Schedule Risks for New Solar Cell Manufacturing

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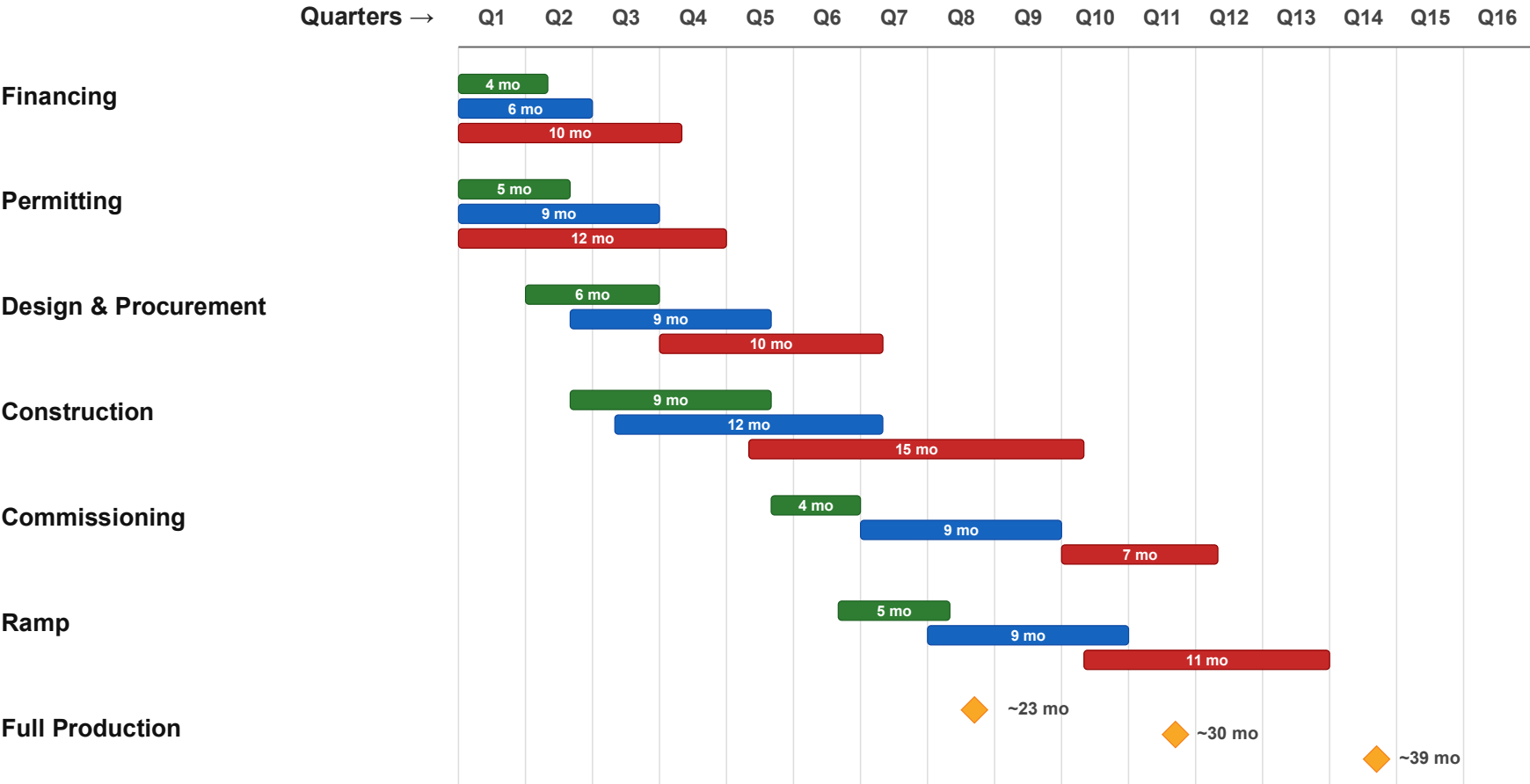
PV CellTech

October 14, 2026

Silicon Solar Cell Factory Timeline Comparison

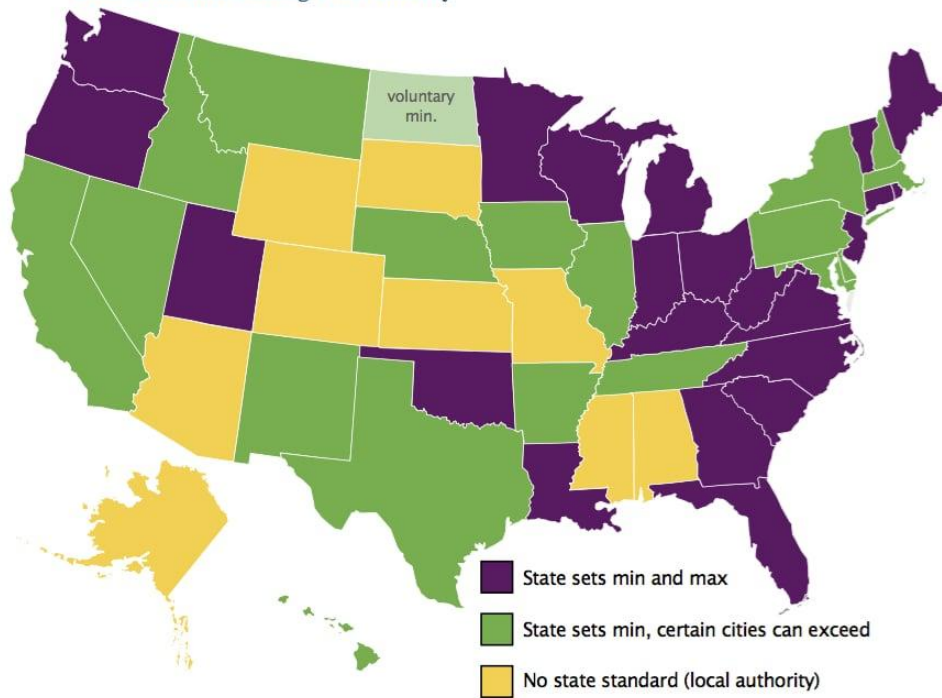
Best, base, and worst-case schedules from project kickoff to full production

Best Base Worst Full Production

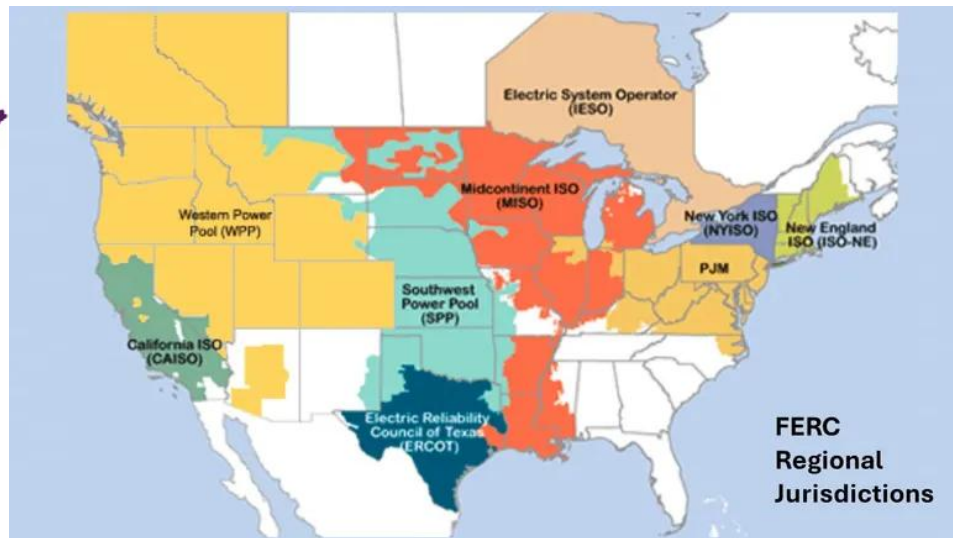


Local Control

Local Residential Building Code Authority

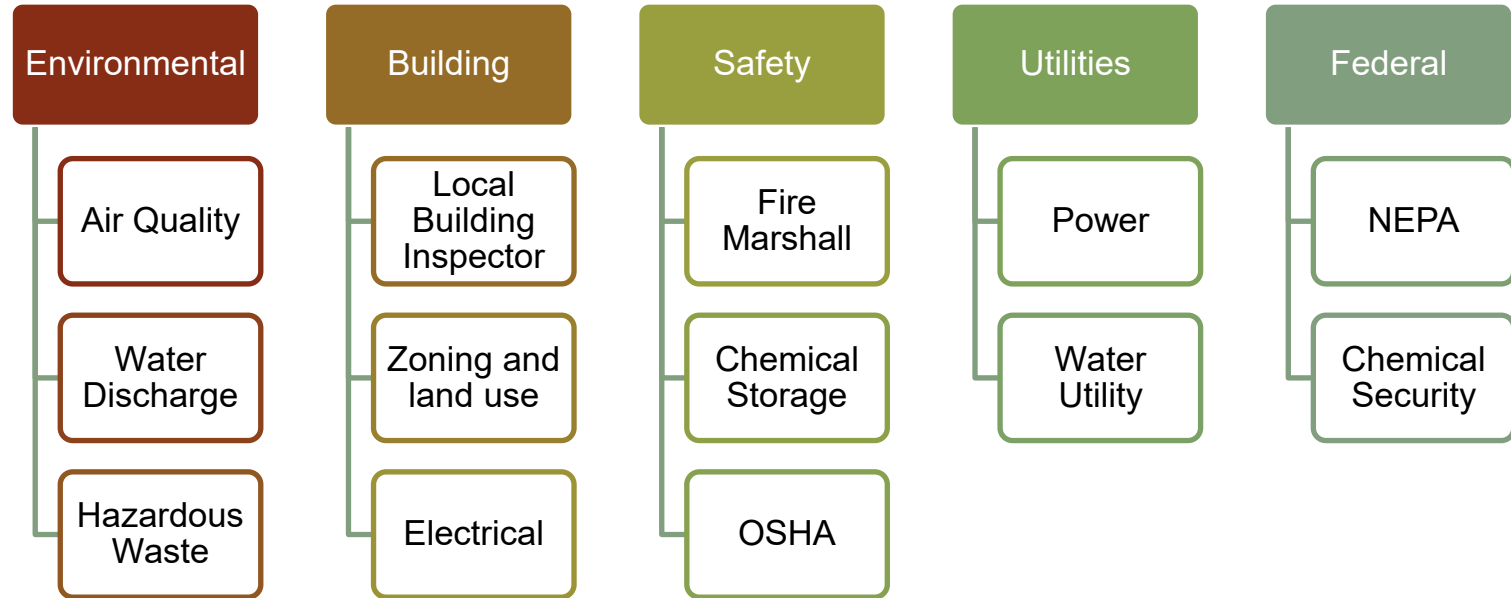


Institute for self-reliance



Overlapping, independent jurisdictions for different processes

The AHJ(s)





Power

- Often the longest lead time
 - Interconnect
 - Equipment
- Greenfield vs. Brownfield
- What else is missing from this picture?

The Longest Lead Times

Transformers

Structural
Steel

HVAC

Water
Treatment

High Purity
Components

Skilled Trades in High Demand

High
Voltage
Electrical

Clean Room

Custom
Exhaust and
Ventilation

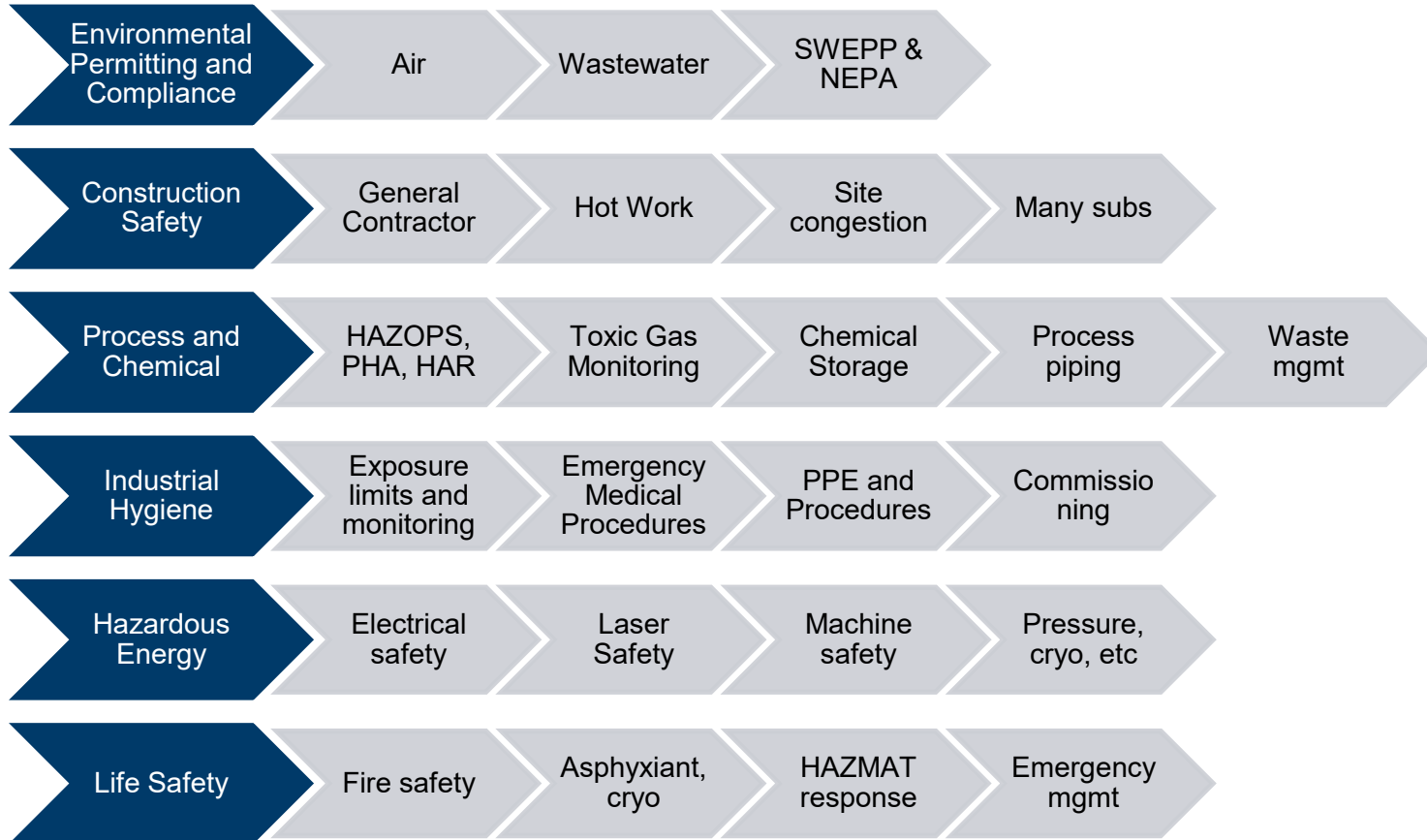
Specialty
HPM
Handling

Don't Overbuild Utilities

	Solar Cell	Semiconductor
Clean Room	ISO class 5-7	ISO class 1-3
DI Water	“Standard”	Ultra Pure
Structural Slab	Reinforced concrete	Vibration isolated slabs
Hazardous production materials	Similar requirements	Similar requirements

- Feature size/film thickness drives clean room requirements.
- Clean room requirements drive **power requirements** for semiconductor
- Optimize power interconnect for future growth vs. interconnect delays

The Safety Workforce



Turn Key Line Considerations

- Equipment from outside the US is probably not UL listed unless they have already sold a lot of it here.
- You can't plug it in if it is not UL listed.
- It is important to get it inspected and certified BEFORE it ships.
- Most safety requirements are similar around the world. Enforcement, implementation, and the details vary. Meet the requirements here.
- Interfaces are difficult. "Mind the gaps" between your line and your utilities, monitoring, and local authorities

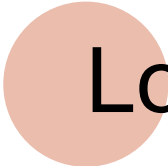
Will Your Turn-Key Line Pass Inspection?

	UL/NRTL Listing	SEMI S2
Driver	Legal Requirement and Code Compliance	Industry performance standard
Scope	Electrical safety, fire safety, component safety for everything	Comprehensive, holistic approach to semiconductor safety
Hazards	Overcurrent, arcs, fire, overtemperature, wire sizes, etc	Chemical, structural, electrical, monitoring, etc.
Who “certifies”?	NRTLs only	Independent 3 rd party
When/Where do you certify?	At the factory, before FAT, OR at your site	Depends on the contract
Risk	You cannot operate	Contractual issue

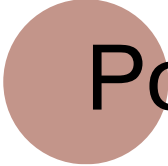
Minimizing Schedule Risk



Local Control



Long Lead Time Items



Power



Safety



Workforce

Thank You!



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