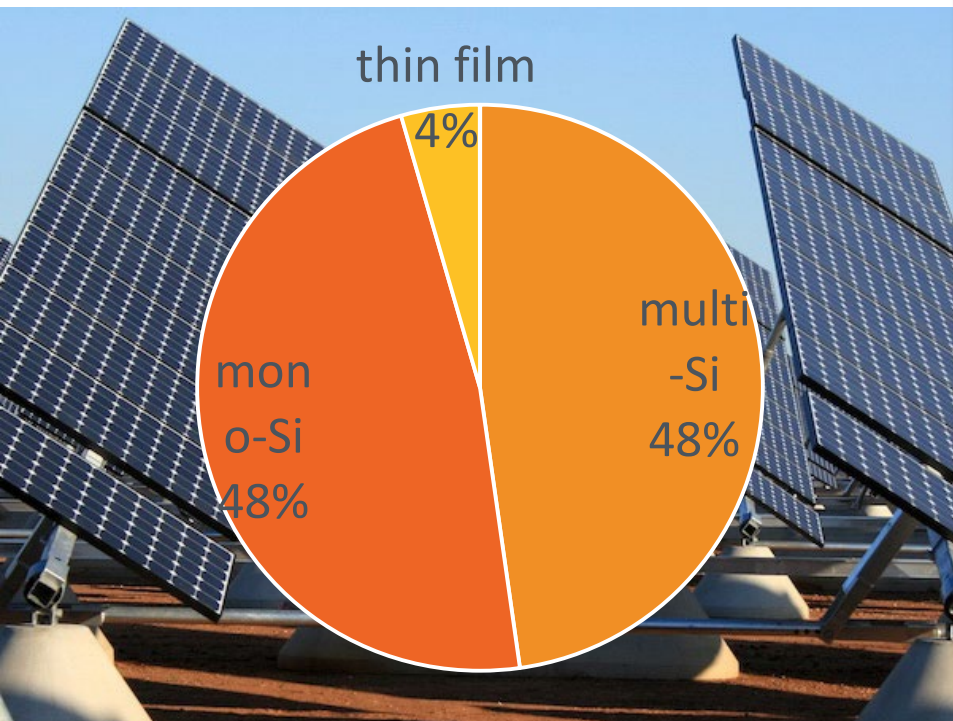


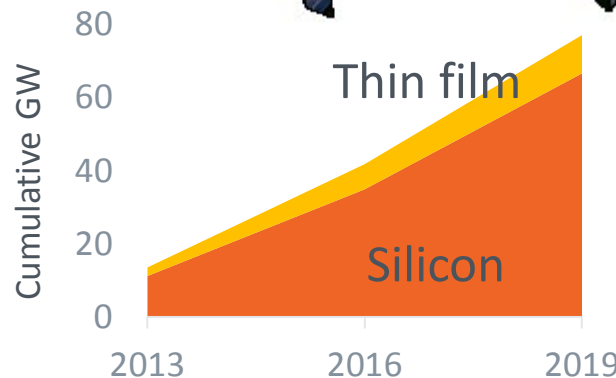
Commercial Photovoltaics: silicon

Goals and portfolio overview

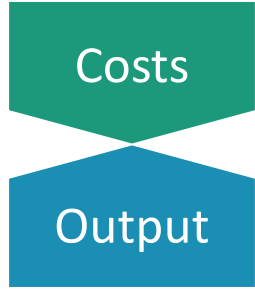
2018 manufacturing capacity 103 GW



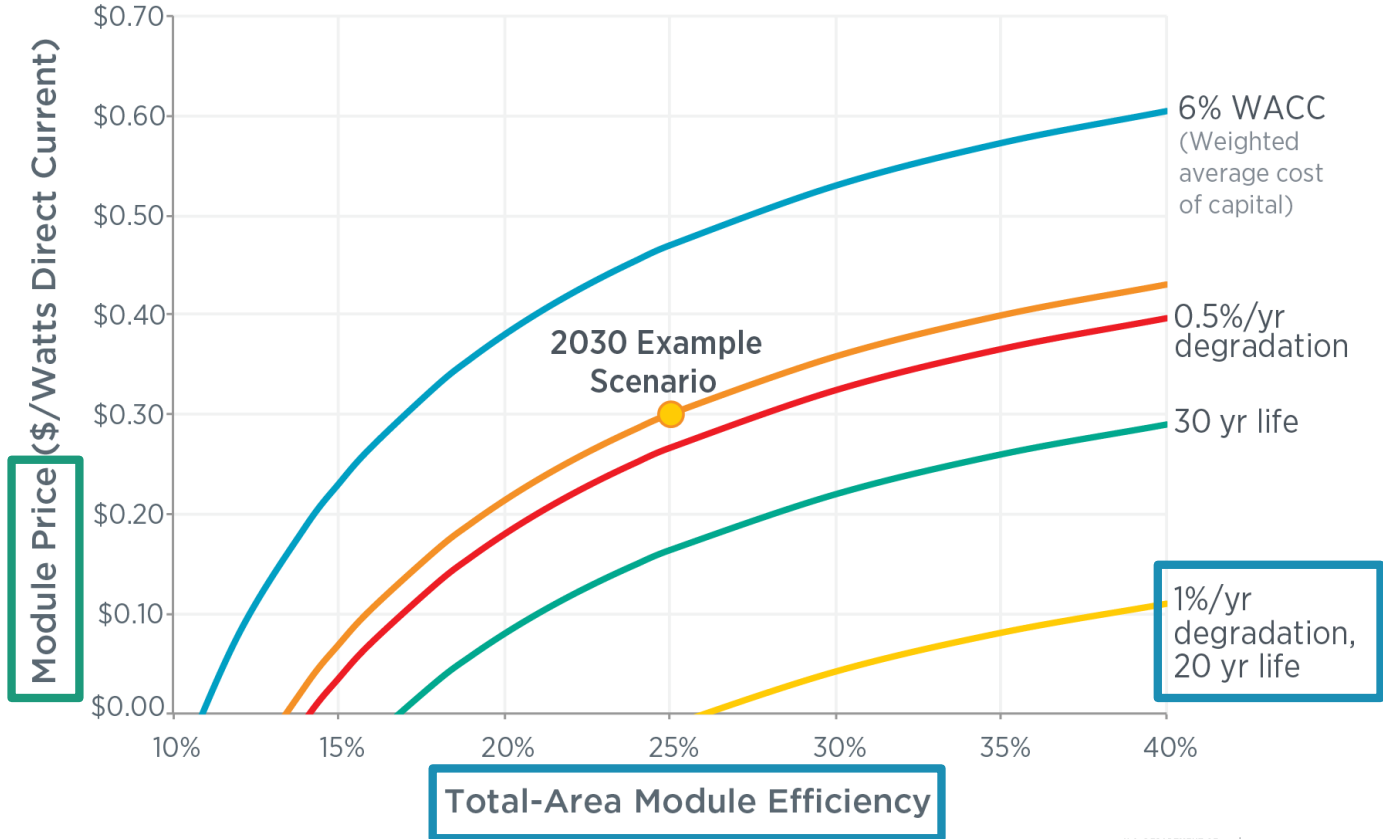
2019 U.S. installed capacity 76 GW







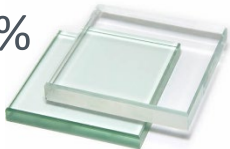
All curves represent 3¢/kWh LCOE at a location with an average U.S. climate





\$/W

10%



10%



13%



17%



50%





\$/W

60%



20%



20%





\$/W



2020: \$15/kg
2008: \$465/kg

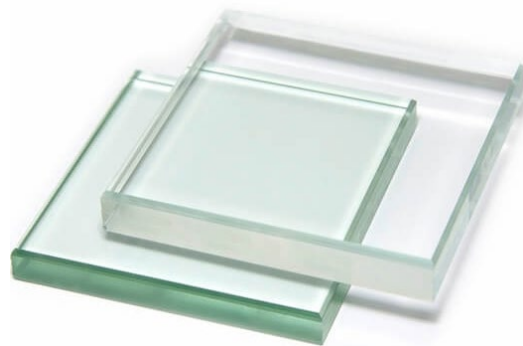
2020: \$18/oz
2011: \$46/oz





kg/W

75%



10%



7%



3%

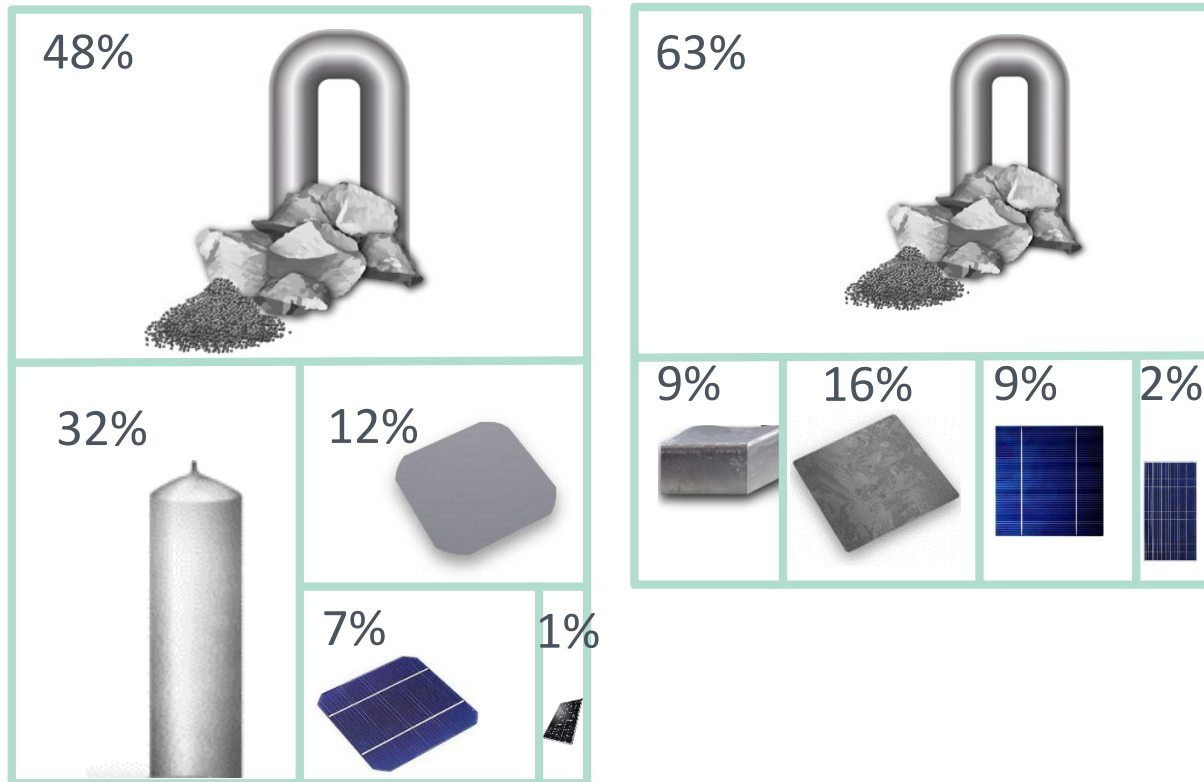


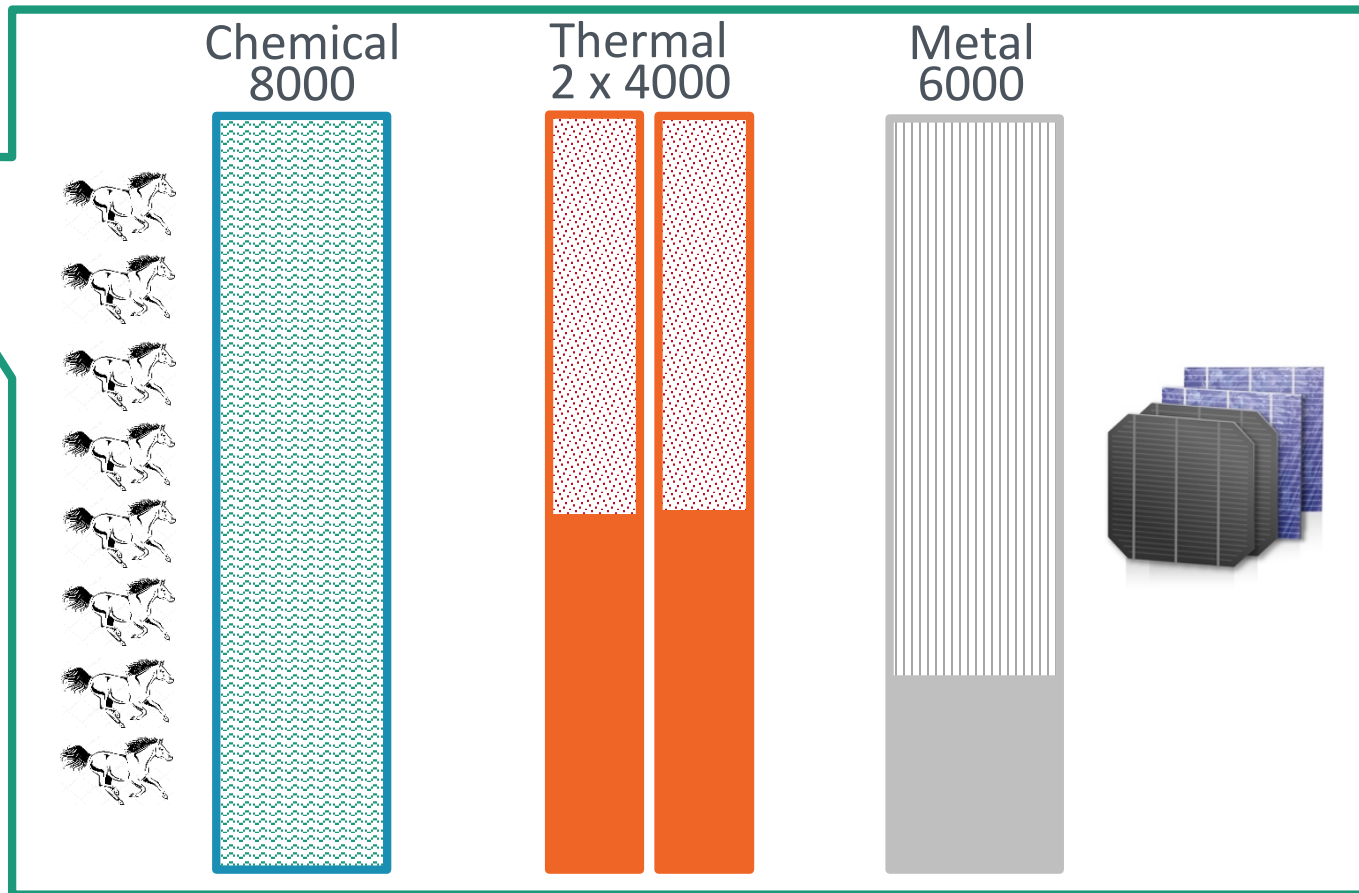
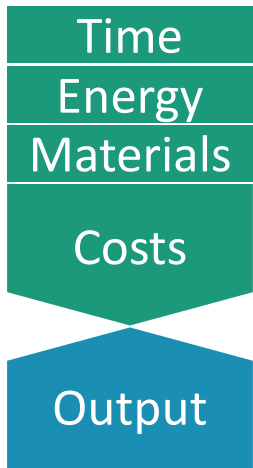
1%

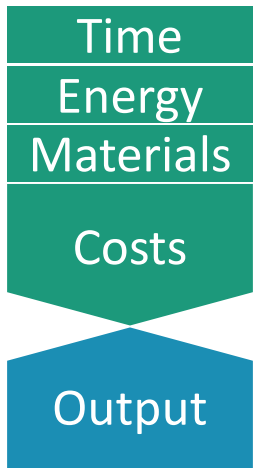




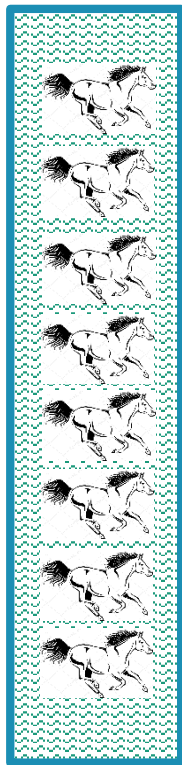
kWh/W



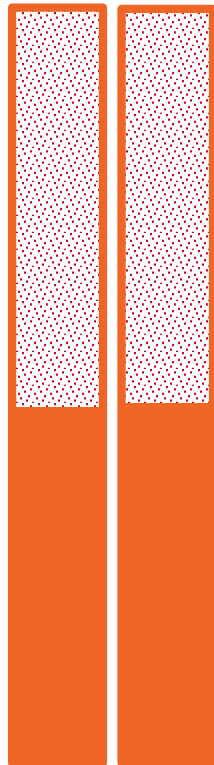




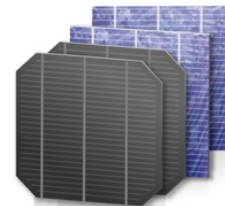
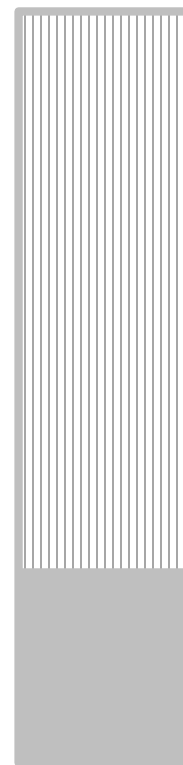
Chemical
8000

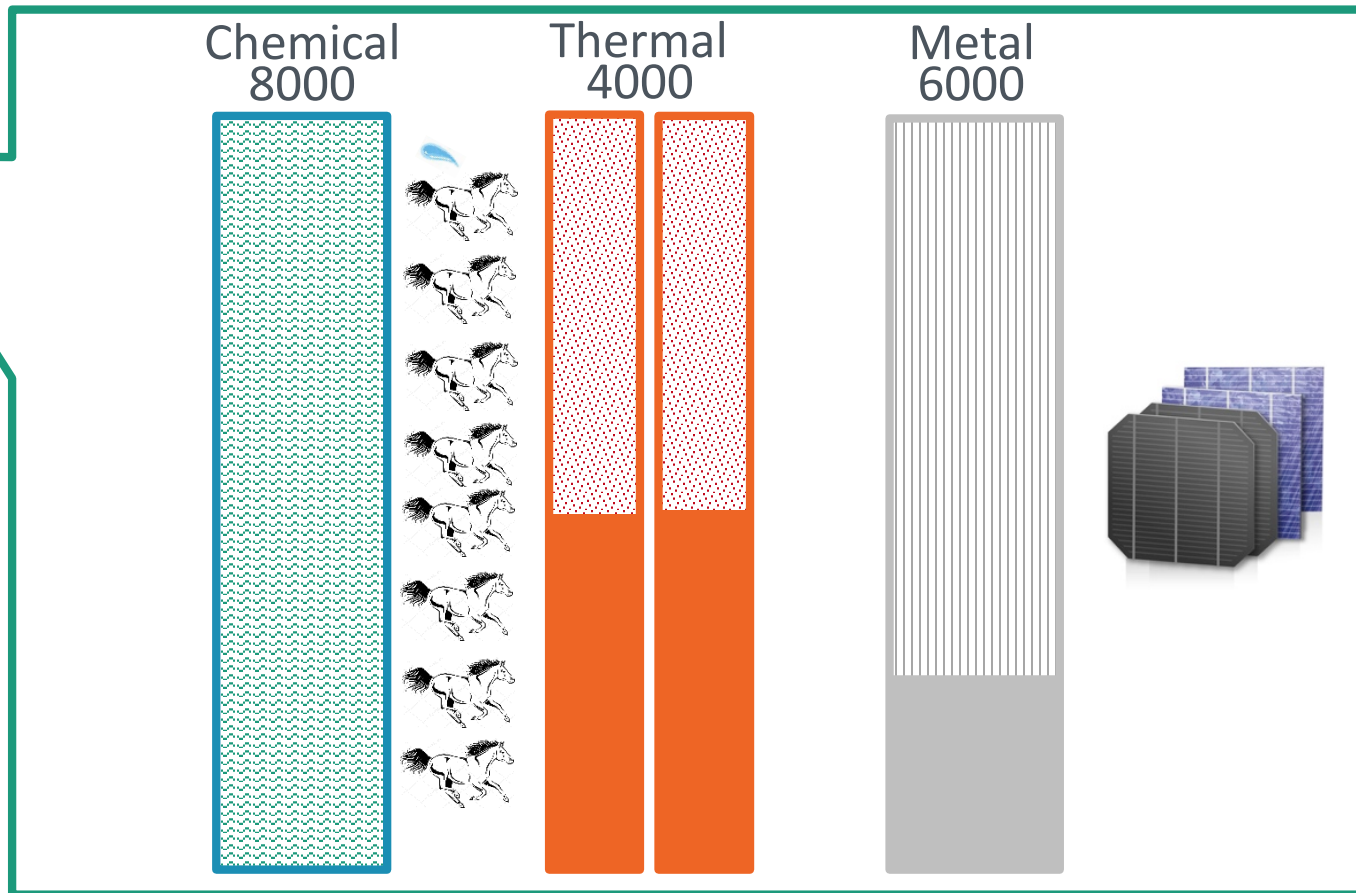


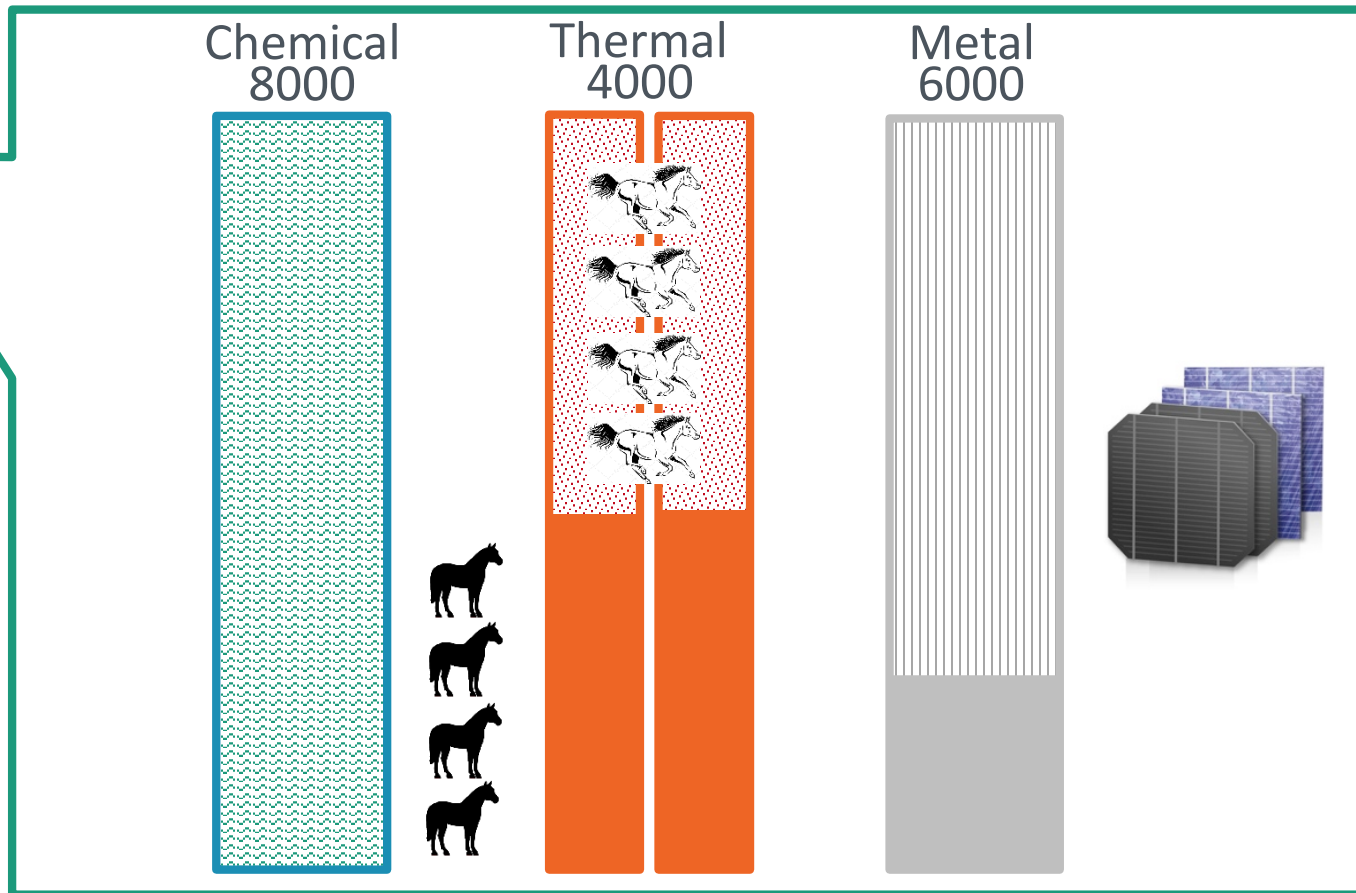
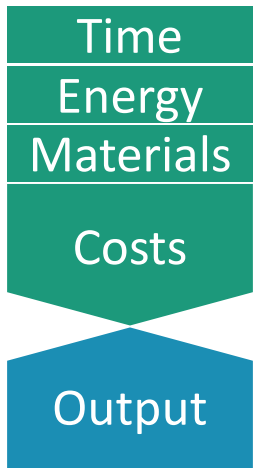
Thermal
4000

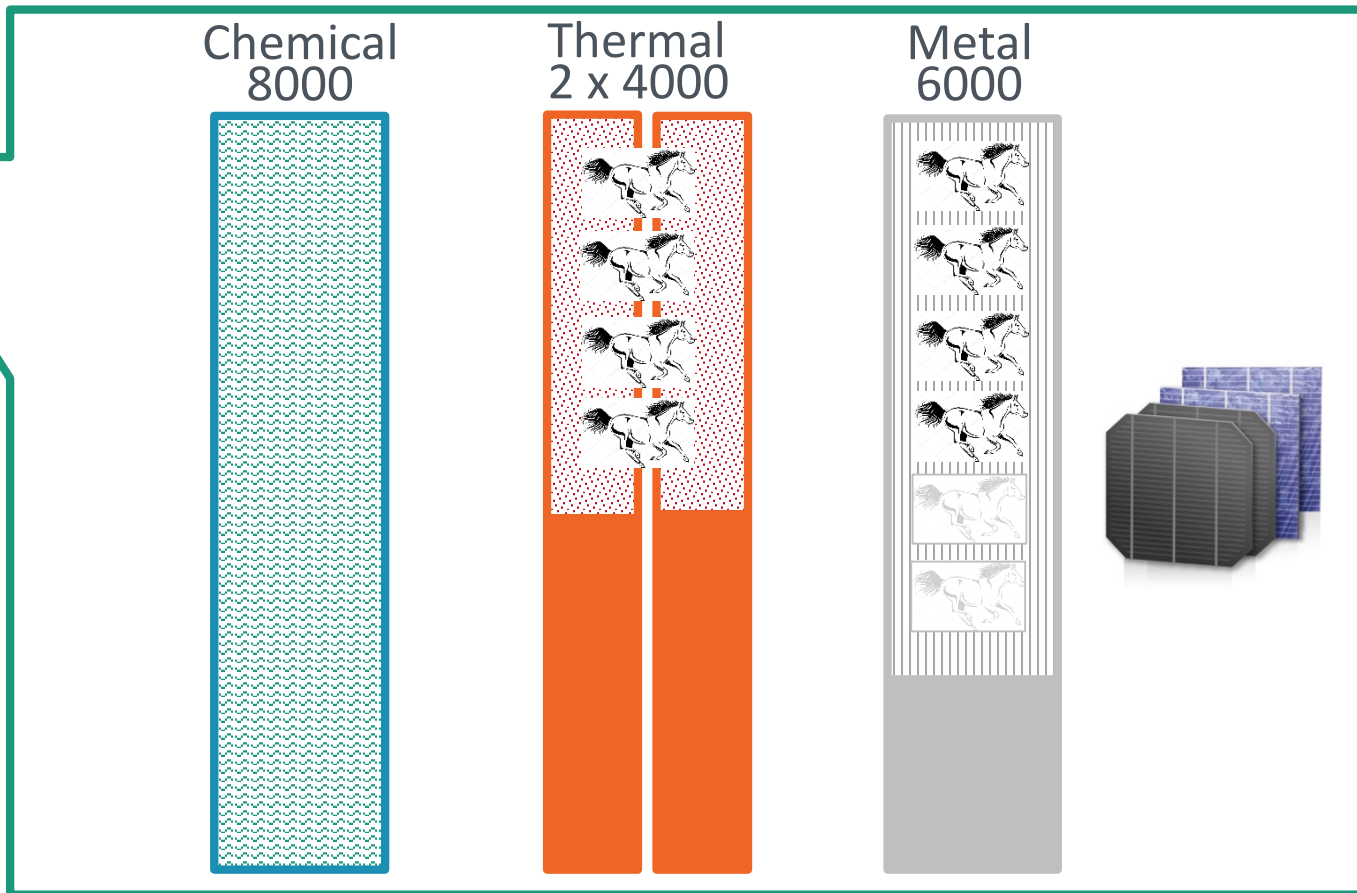
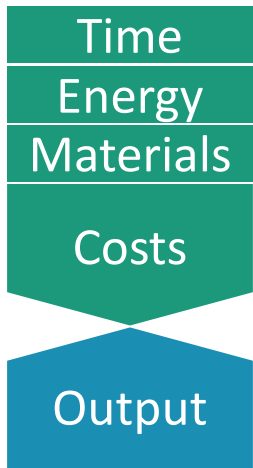


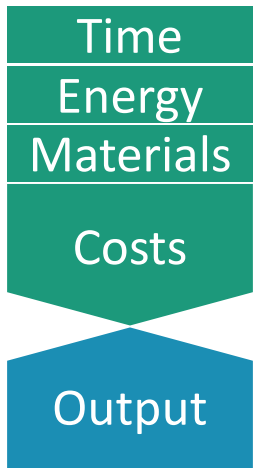
Metal
6000



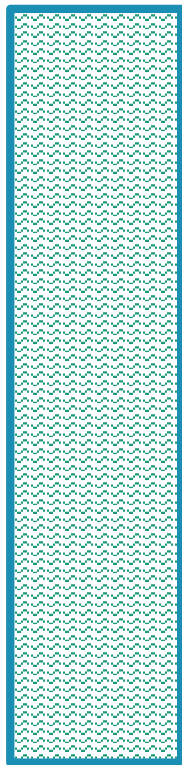




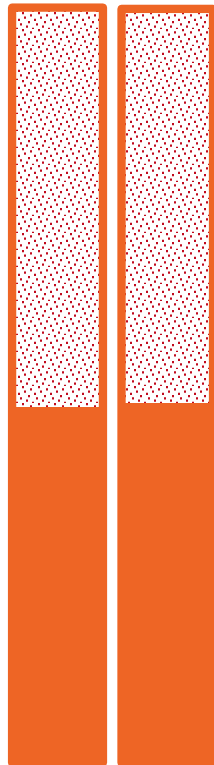




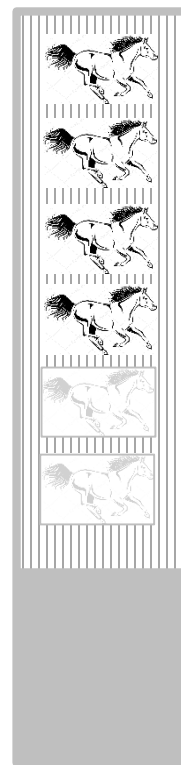
Chemical
8000

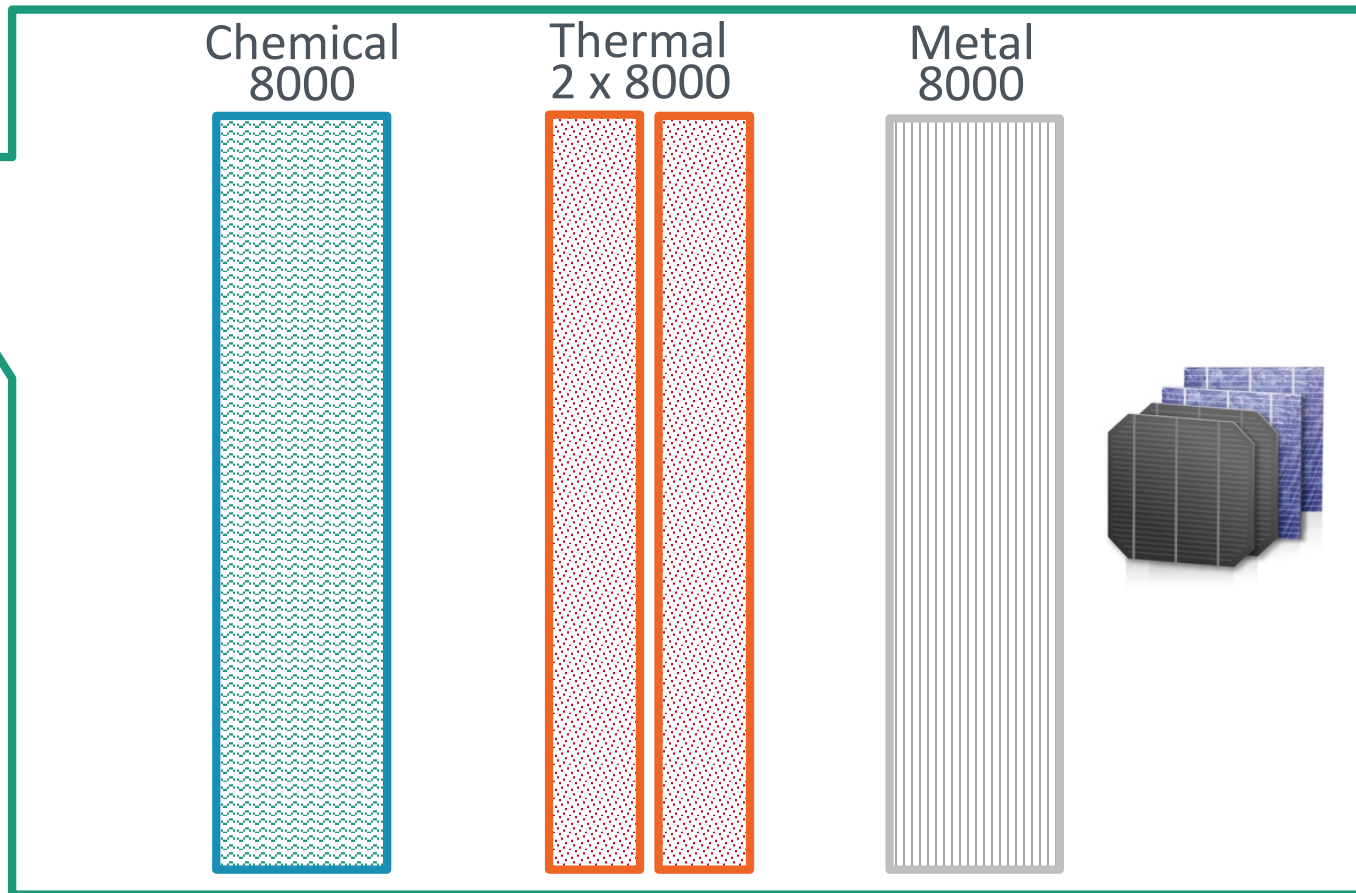
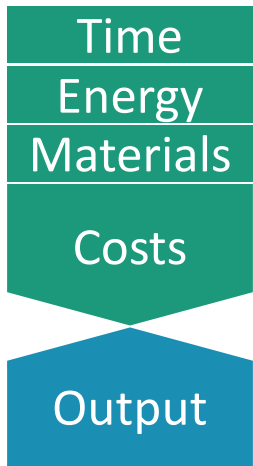


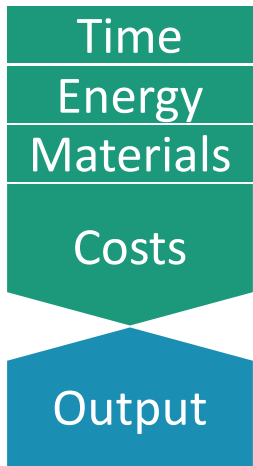
Thermal
2 x 4000



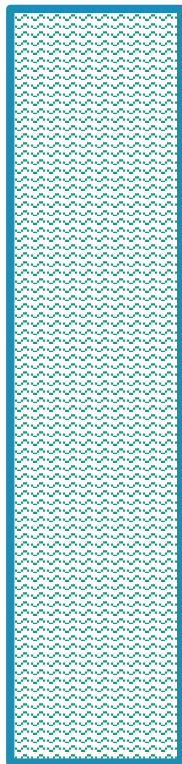
Metal
6000



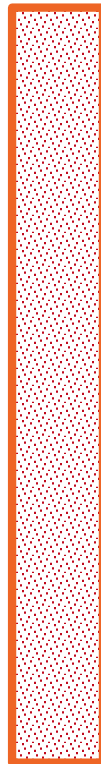




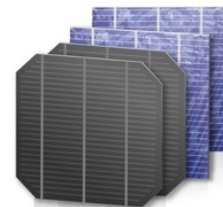
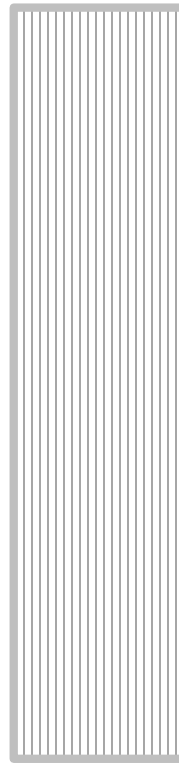
Chemical
8000

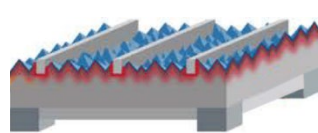


Thermal
8000

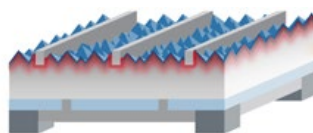


Metal
8000

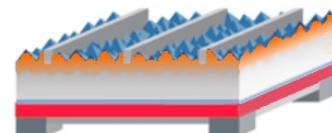




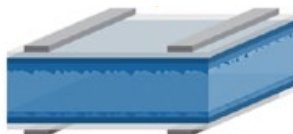
Al BSF
~20%



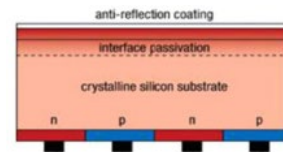
PERC
~23%



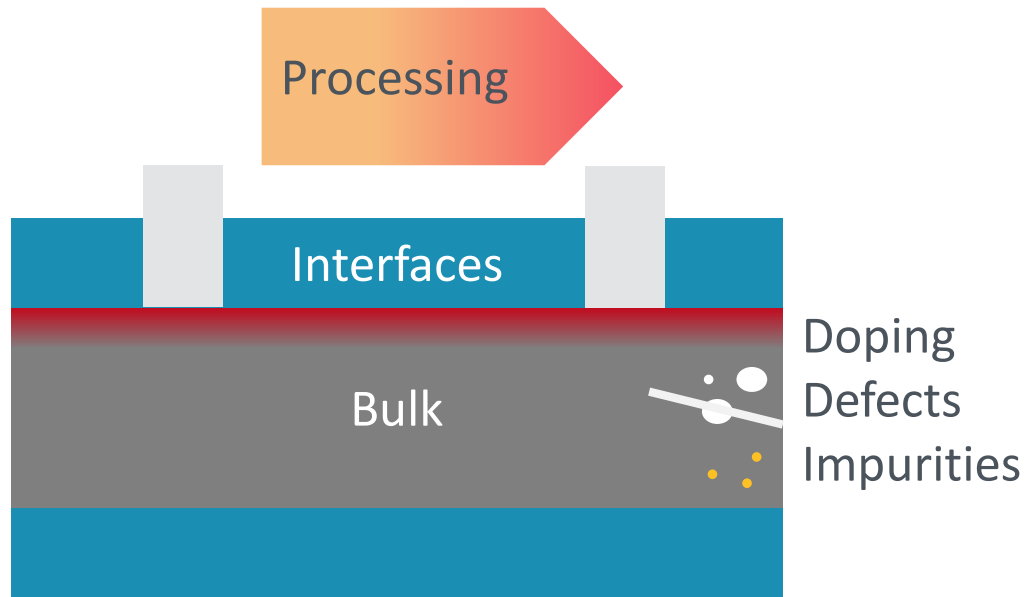
TOPCon
(~26%)

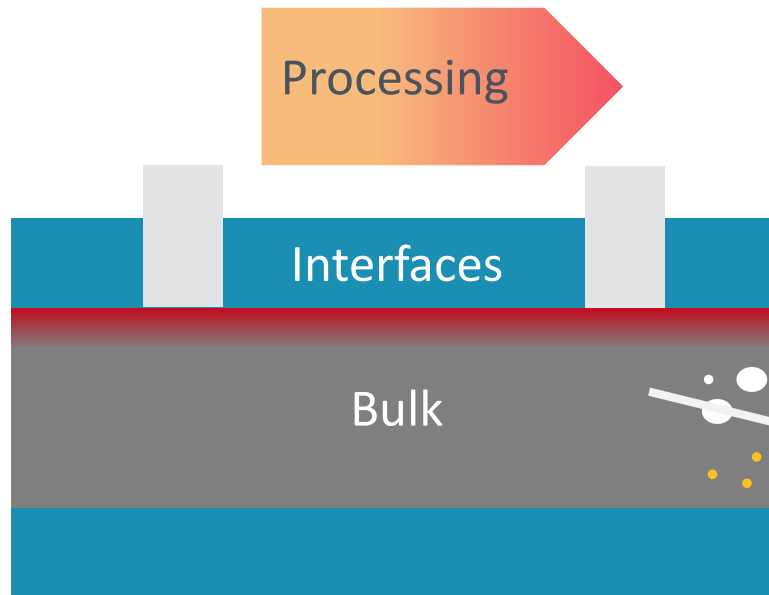


Heterojunction
(26.7%) /
Passivated contact



Back
contact



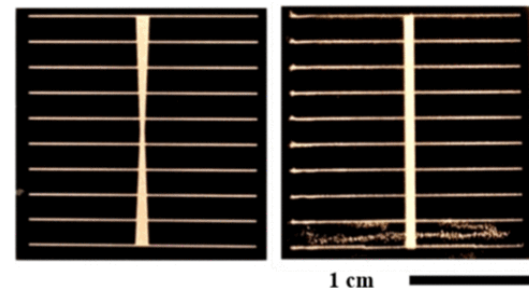
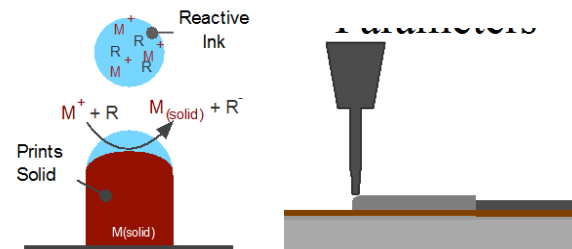


Doping
Defects
Impurities

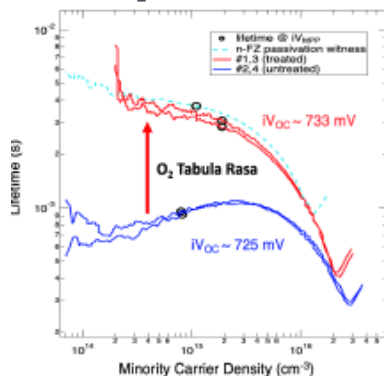
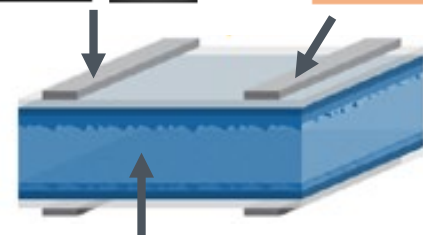
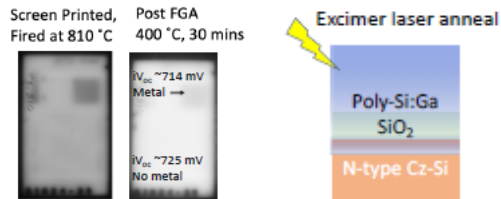
Alison Greenlee



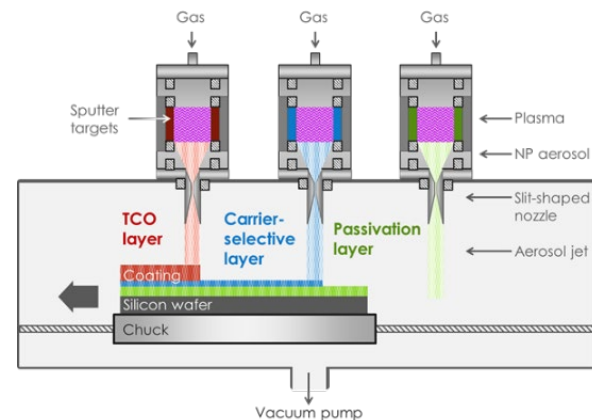
Owen Hildreth



Paul Stradins, David Young



Zachary Holman



8971

8980

8742

8166

8975

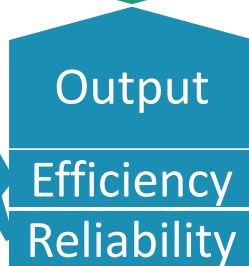
8979

8547

8554

8562

8743



8988

8553

8155

8166

8566

8984

8542

8549

