U.S. Department of Energy
Energy Efficiency and Renewable Energy

Welcome to the NCPV and Solar Program Review

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Solar Energy Technologies Program
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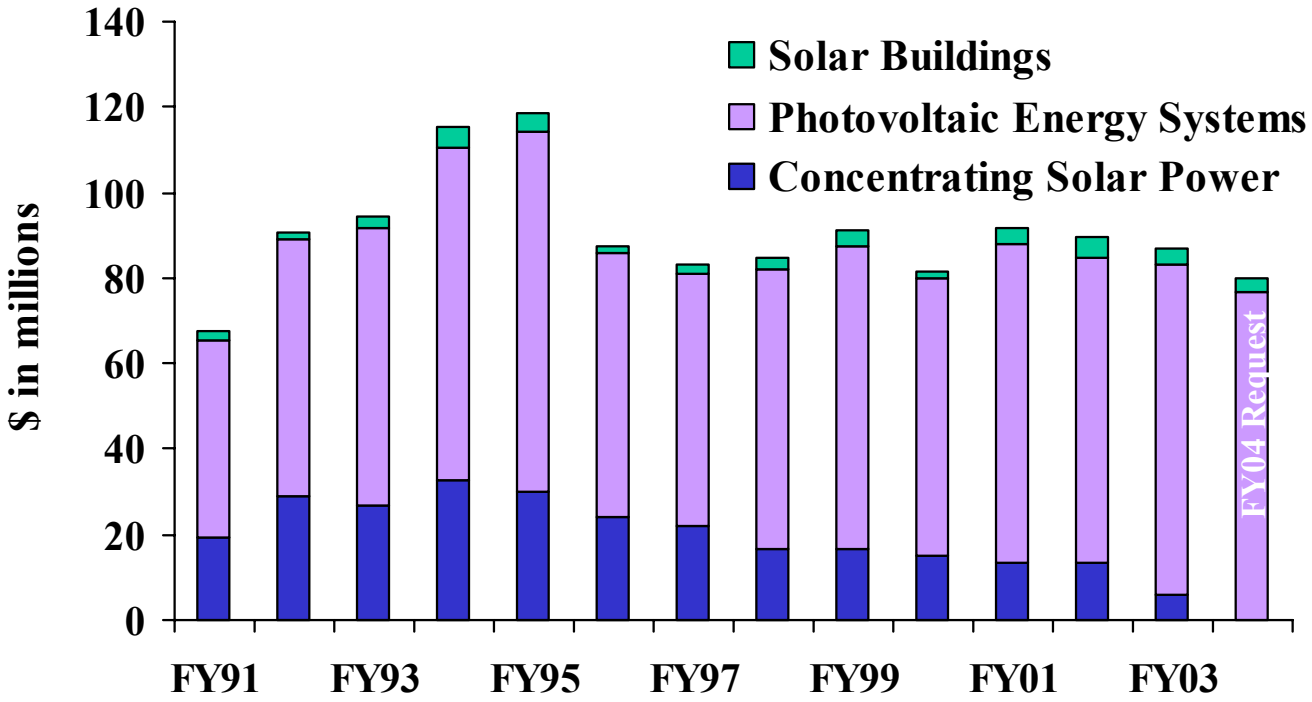
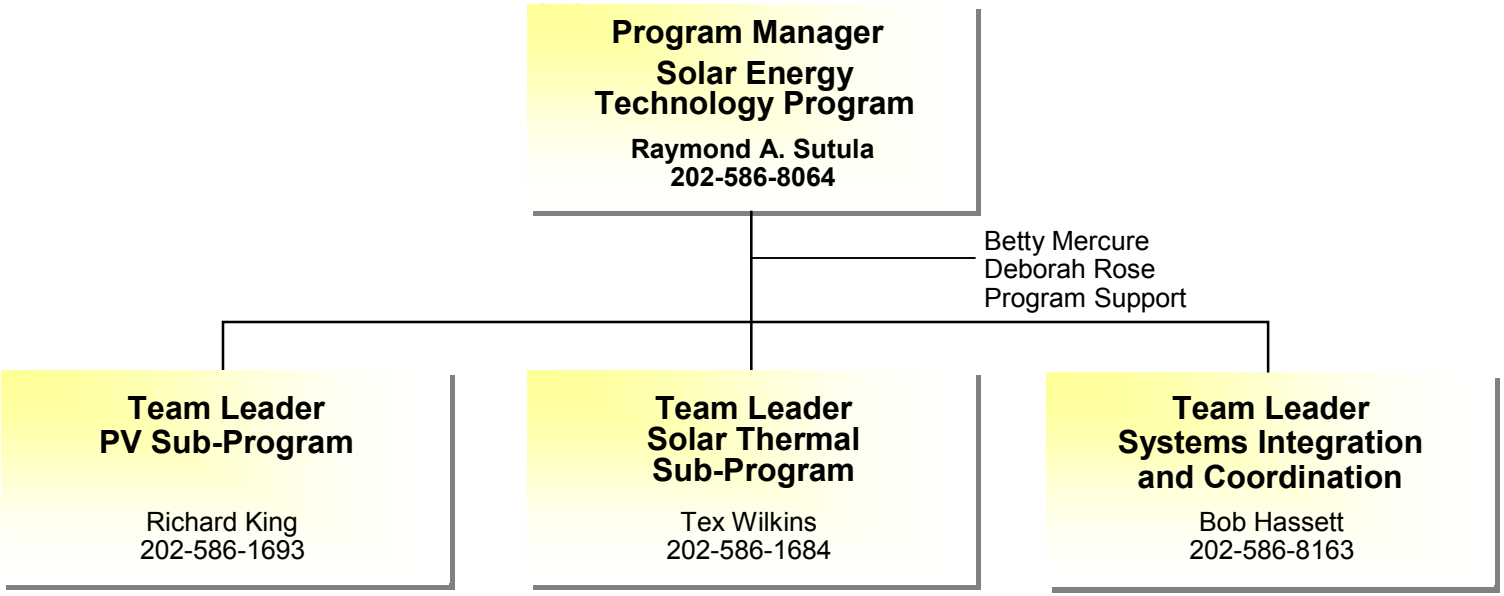
The Solar Budget

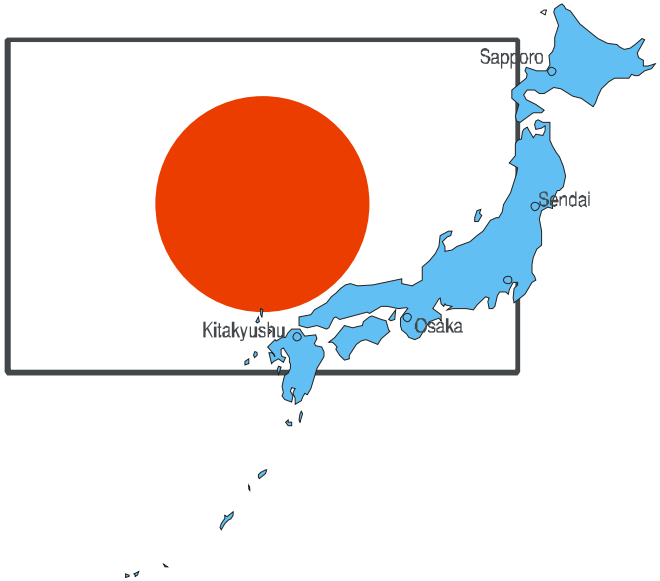


	FY91	FY92	FY93	FY94	FY95	FY96	FY97	FY98	FY99	FY00	FY01	FY02	FY03	FY04 Req.
Concentrating Solar Power	19.2	28.8	26.9	32.7	30.3	24.2	21.9	16.5	16.8	15.2	13.6	13.2	6	0
Photovoltaic Energy Systems	46.4	60	64.8	78	83.8	61.5	59.2	65.5	70.6	64.6	74.3	71.55	77	76.69
Solar Buildings	2	2	2.9	4.8	4.6	1.9	2.2	2.7	3.6	1.97	3.87	4.79	4	3

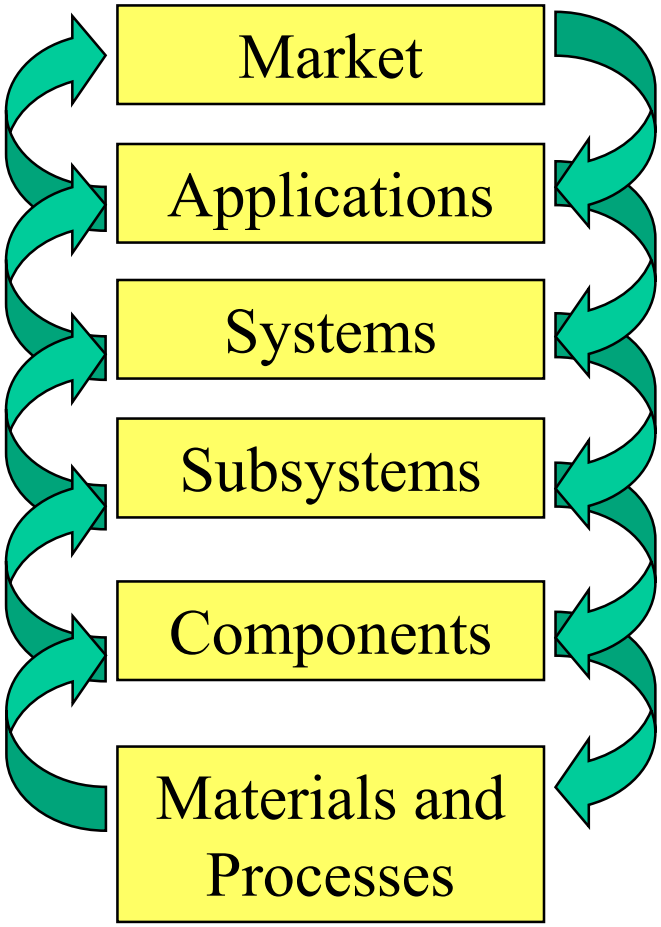
Solar Program Organization



Quality Research



Systems Driven Approach



What is the population of flat commercial roofs, by state and utility?

What are the high-value uses of solar on flat commercial roofs?

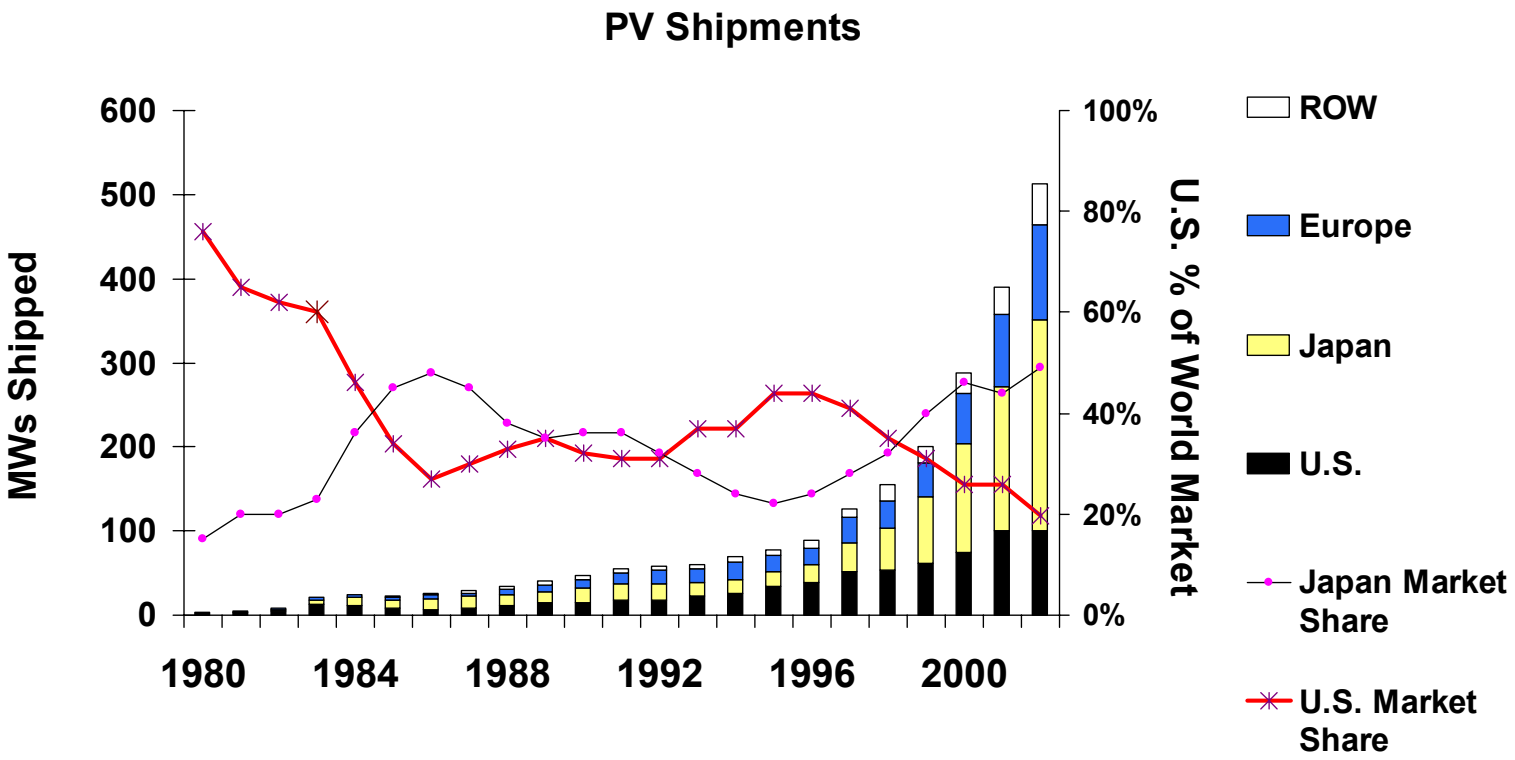
What are the performance and cost characteristics of a flat-roof solar system for heat and/or power?

What are the key factors in an inverter? A mounting subsystem? A heat recovery element?

How does a component like inverter software impact costs for interconnection? Reliability?

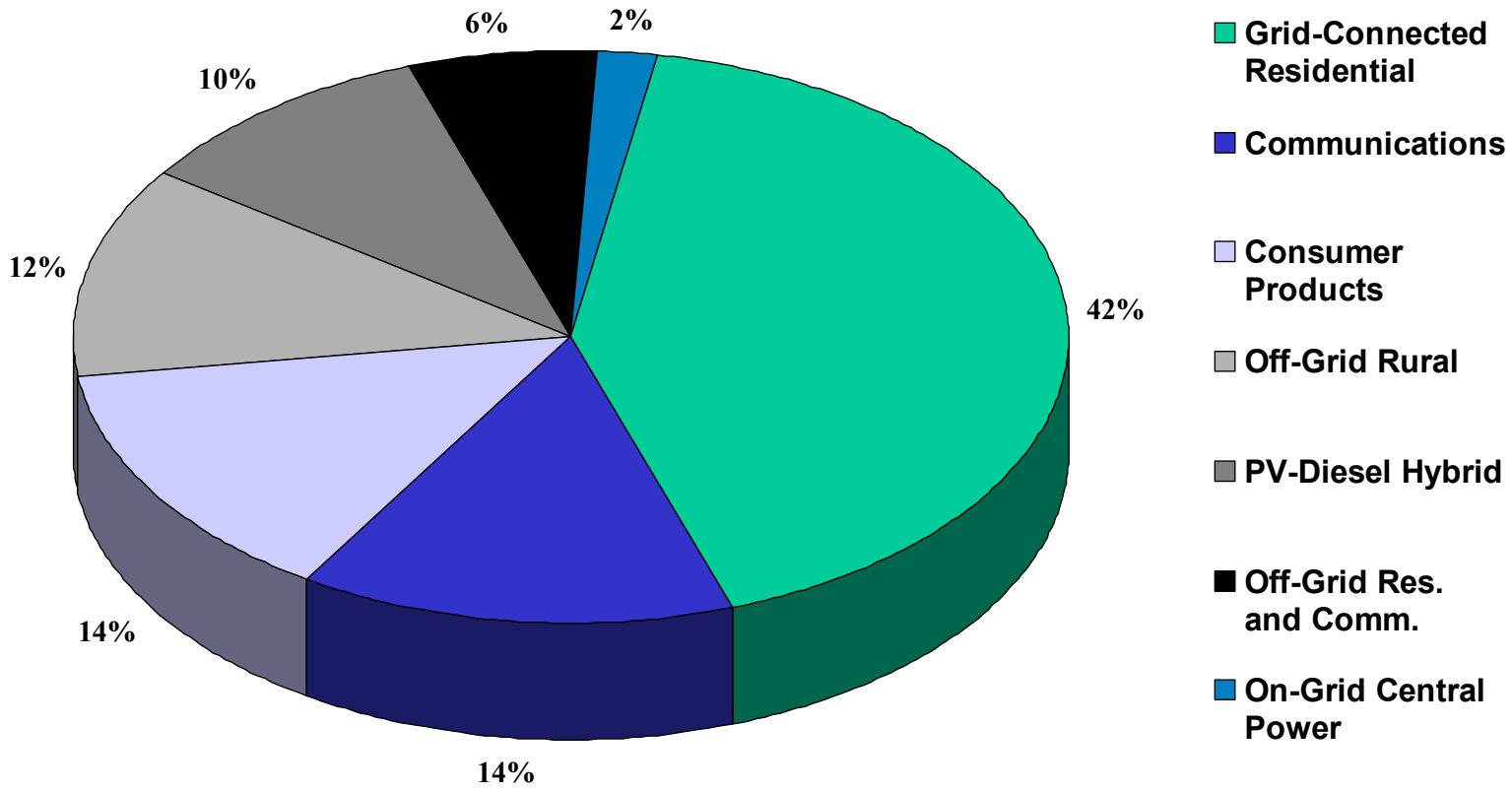
Are thin-films reliable components of roof systems? Can insulation/weatherproofing and module production be integrated to lower costs?

PV Markets and Market Share



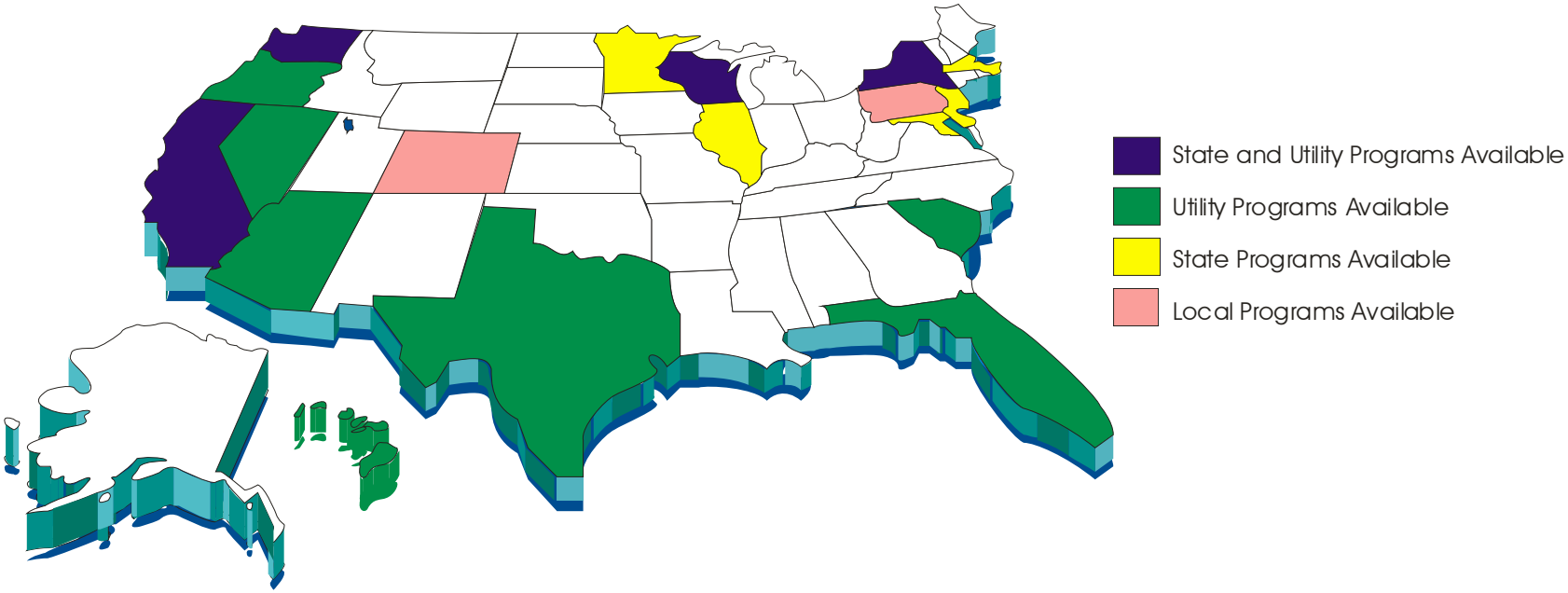
* PV News, February 2002

PV Market Pie



* RenewableENERGYWorld, January-February 2003, Erik Lysen, based on data from Paul Maycock.

Incentives – State Rebate Programs



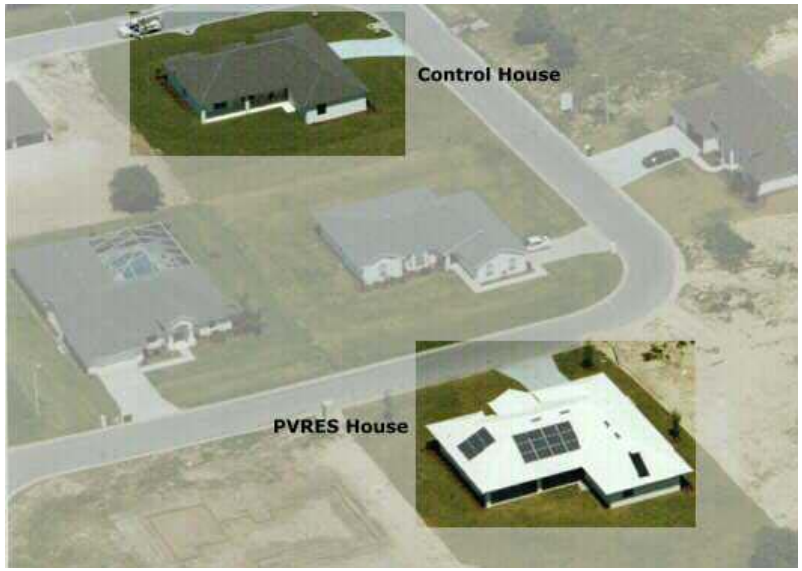
Source: DSIRE Database

CSP Highlights

- Solar Tres proceeding in Spain – thermal storage advances
- NV negotiating for 50 MW trough installation at Boulder City site
- Continued development of dish-Stirling systems
- Dispatchable solar power is on the horizon

Solar Buildings

- Working with ZEB to integrate solar technology and energy efficient buildings resulting in an annual energy bill of less than $600 for an average size home by 2004, and "net-zero" by 2010
- Complete R&D on new polymers and manufacturing processes to reduce the cost of solar water heating from today's 8 cents/kWh by 2004.

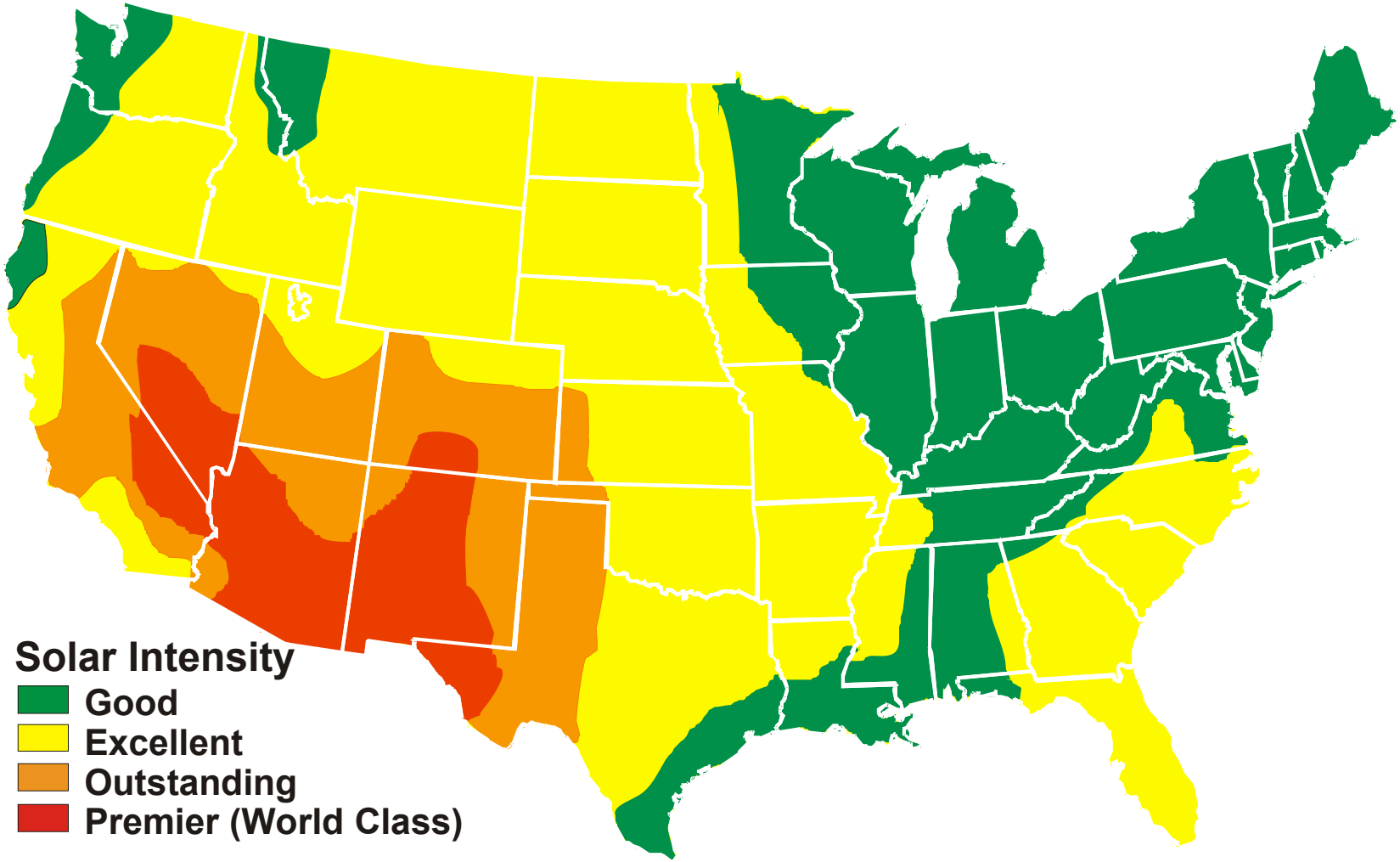


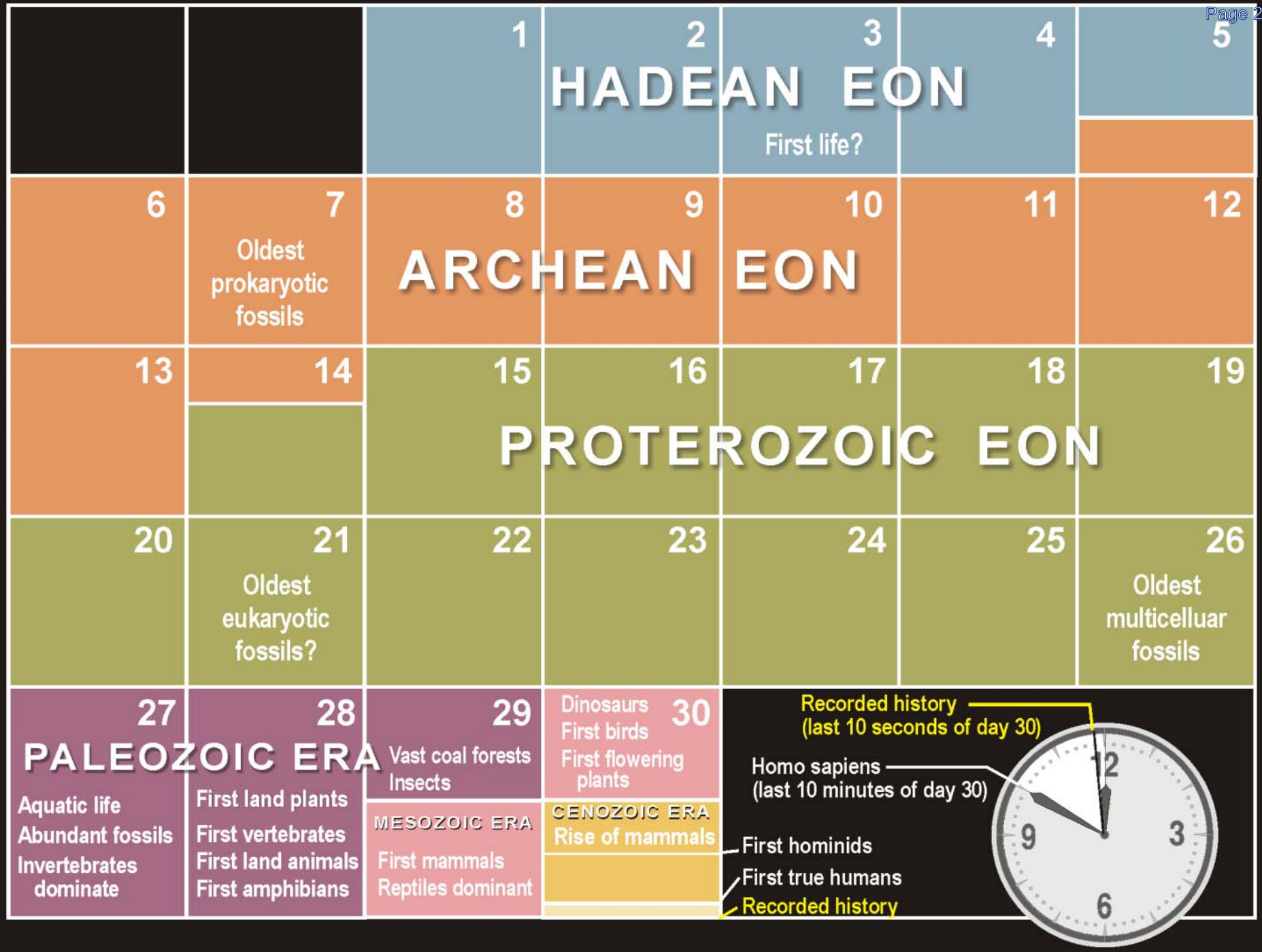
PVRES ZEH Experiment, FSEC

Solar Decathlon

"We want people to realize that solar design can look good and doesn't need to be the dated designs we all remember from the 70s,"
Matthew Henry, a CU Boulder senior.

Solar Resource: Enormous and Widespread

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HADEAN EON
First life?
6
7
Oldest prokaryotic fossils
8
9
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ARCHEAN EON
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PROTEROZOIC EON
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21
Oldest eukaryotic fossils?
22
23
24
25
26
Oldest multicelluar fossils
27
28
29
30
PALEOZOIC ERA
Aquatic life
Abundant fossils
Invertebrates dominate
First land plants
First vertebrates
First land animals
First amphibians
Vast coal forests
Insects
MESOZOIC ERA
First mammals
Reptiles dominant
Dinosaurs
First birds
First flowering plants
CENOZOIC ERA
Rise of mammals
Recorded history
(last 10 seconds of day 30)
Homo sapiens
(last 10 minutes of day 30)
First hominids
First true humans
Recorded history
12
3
6
9

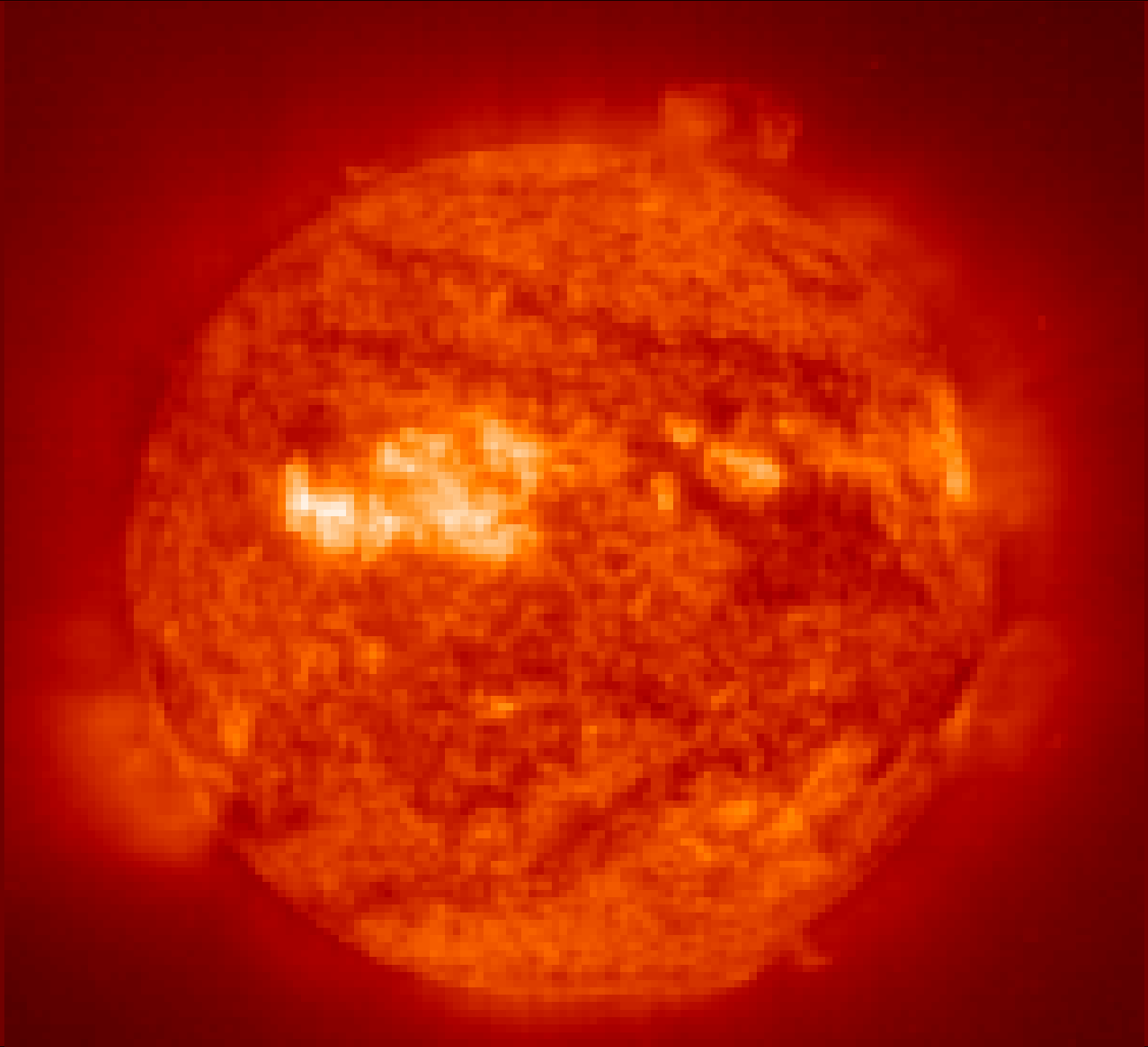
each day = 100 years		Fire Bow & arrow	1000 B.C.E.	900	800	700
600 copper & bronze irrigation wheel	500	400	300	200	100 B.C. Iron smelting	100 A.D.
200	300	400	500	600	700	800
900	1000 Harnessing water and wind power	1100	1200	1300	1400	1500 Brass mfg
1600						2000 Human genome sequence

1700

- Steam engine
- Coal used instead of charcoal in iron smelting
- Rotative steam engine
- Industrial Revolution
- Stephen Gray discovers the conduction of electricity

1800

- First steam locomotive
- Steam turbine
- Diesel engine
- Joseph Henry built one of the first electrical motors
- Michael Faraday discovered electromagnetic induction

1900

- Internal combustion engine
- Atomic power
- Expansion of electric power generation and distribution