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10

YEAR ANNIVERSARY

Toward Zero Carbon Energy Production

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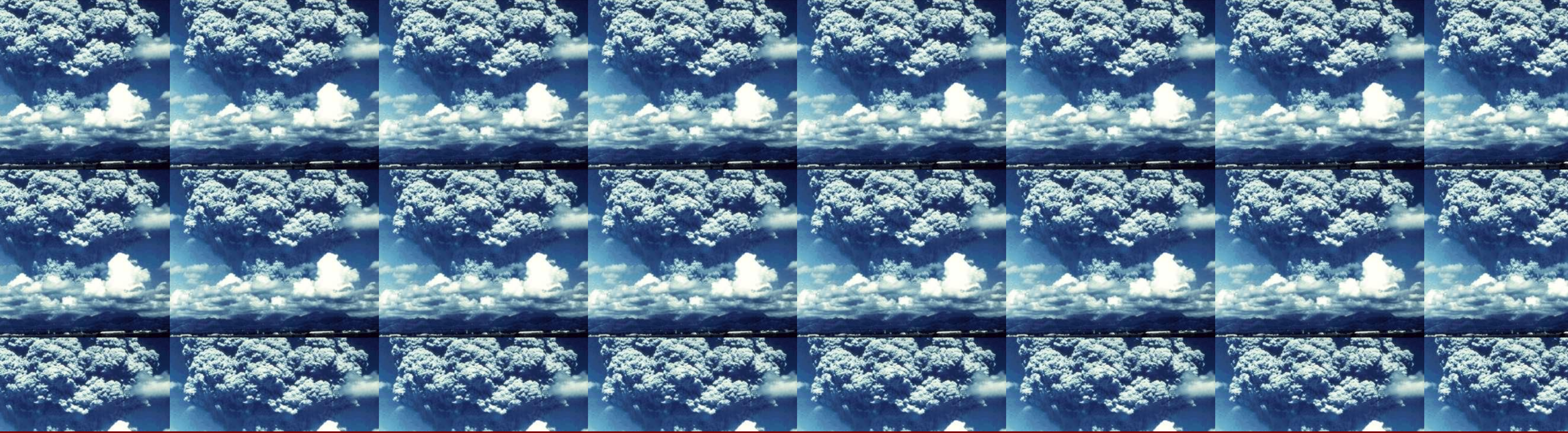
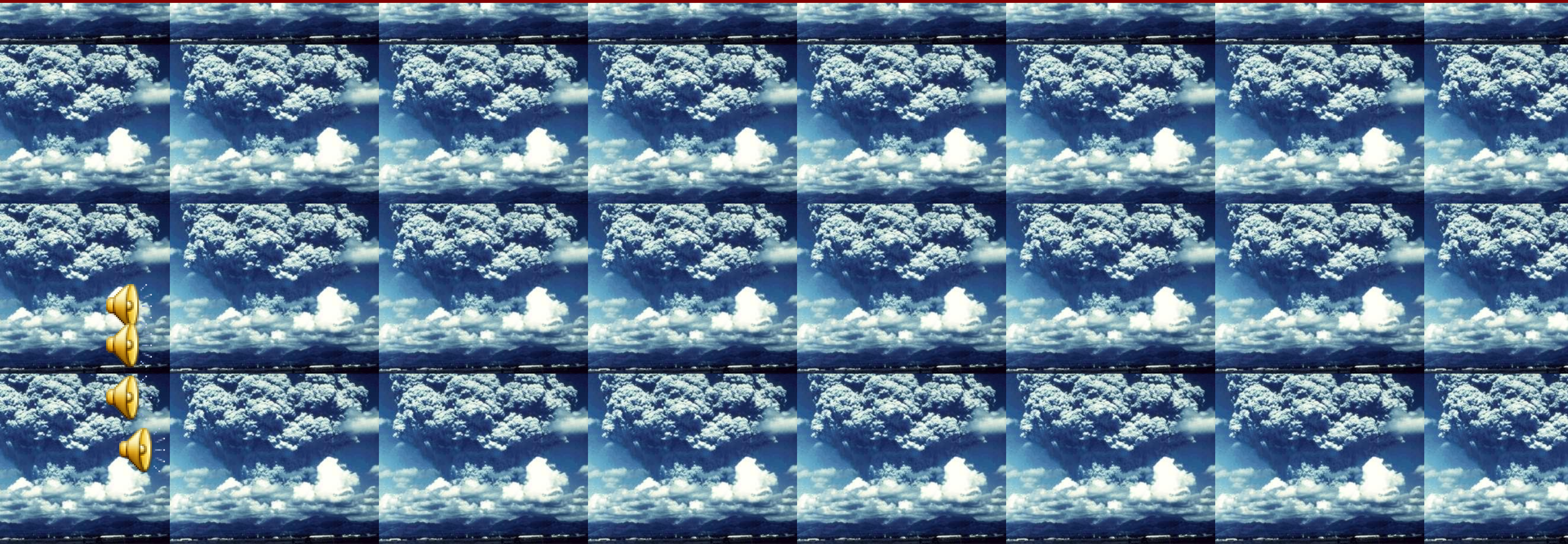
Humans release as much CO_2 into the atmosphere every 2 days

As Released by the 1991 Mount Pinatubo Volcanic eruption in the Philippines



Our Task is to Prevent >18,000 “Volcanic Eruptions” this Century



Tropical Forest Clearing & Burning by Humans Account for 1/5th total global CO_2 emissions

More than global transport sector

~3,600 Vol

Eruptions this

REDD a multi $Trillion triple-win solution for reducing human poverty, species extinction and stabilizing global climate

~11,000 Volcanic Eruptions this century

Fossil Fuel Burning by Humans Account for $3/5^{th}$ total global CO_2 emissions

The 21st Century $700 Trillion ICT/IP Energy Opportunities

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Current GLOBAL ENERGY CONSUMPTION ~ 15 TW-yrs

21st CENTURY BUSINESS-AS-USUAL TRAJECTORY

230 times current amount over 100 years – 3500 TW-yrs

Fossil fuels will account for 3/4th of this sum.

21st Century SMART ENERGY SERVICES (EFFICIENCY)

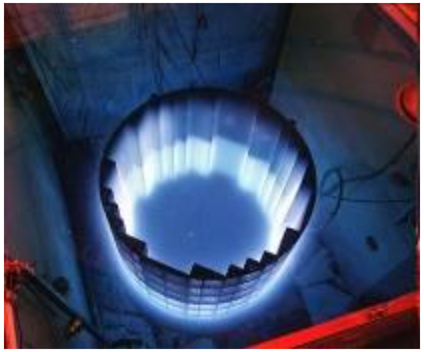
Can deliver 1750 TW-yrs

Capture $700 trillion market share

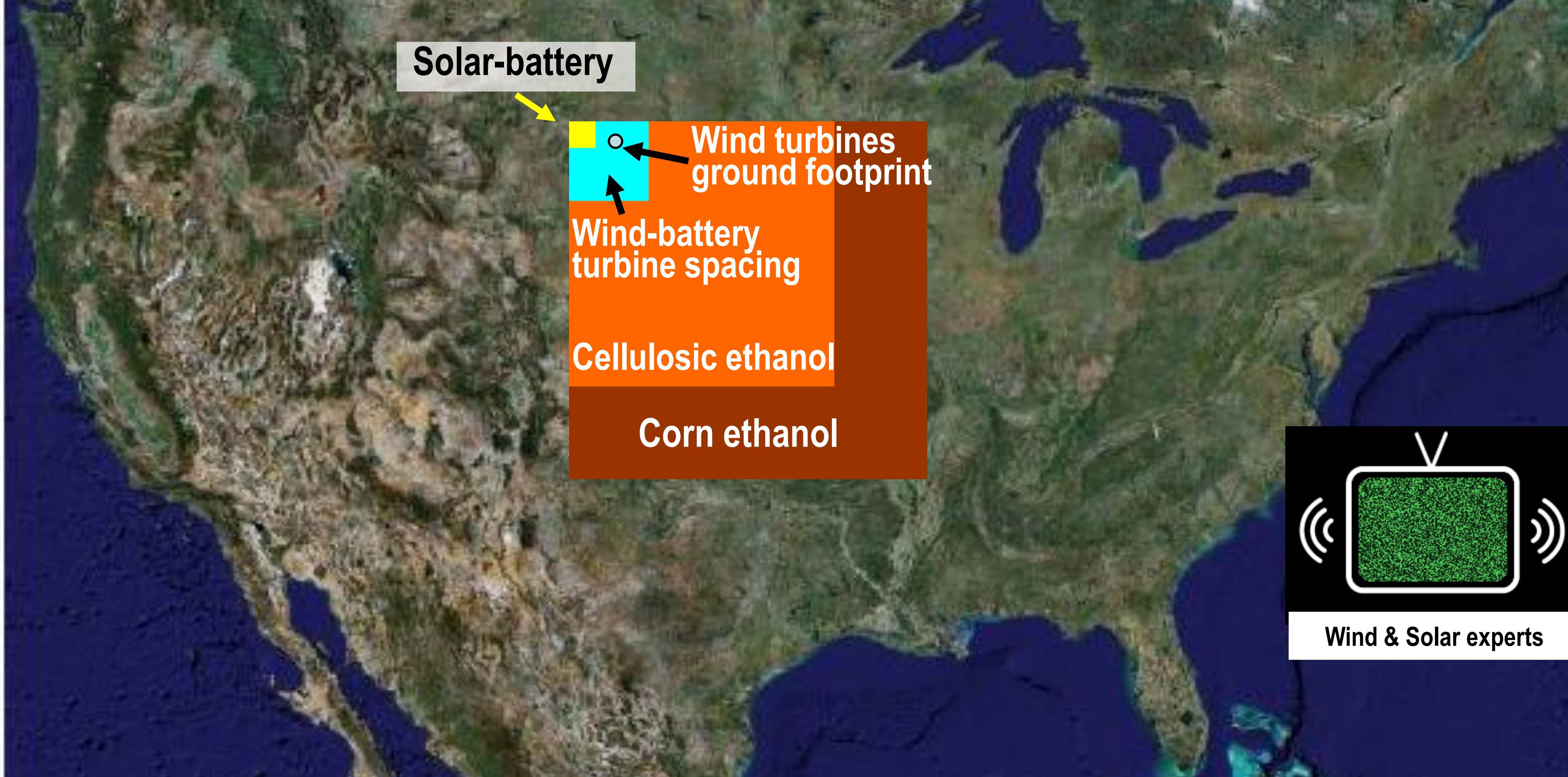
Avoid several trillion tons CO_2 emissions (worth trillions $)

Envision eliminating the need this century for:

3.5 billion rail cars of coal.	AND 2,500 giant offshore oil platforms.	AND 1,674 large nuclear reactors.	AND 4.25 million LNG tanker shipments.



Area to Power 100% of U.S. Onroad Vehicles

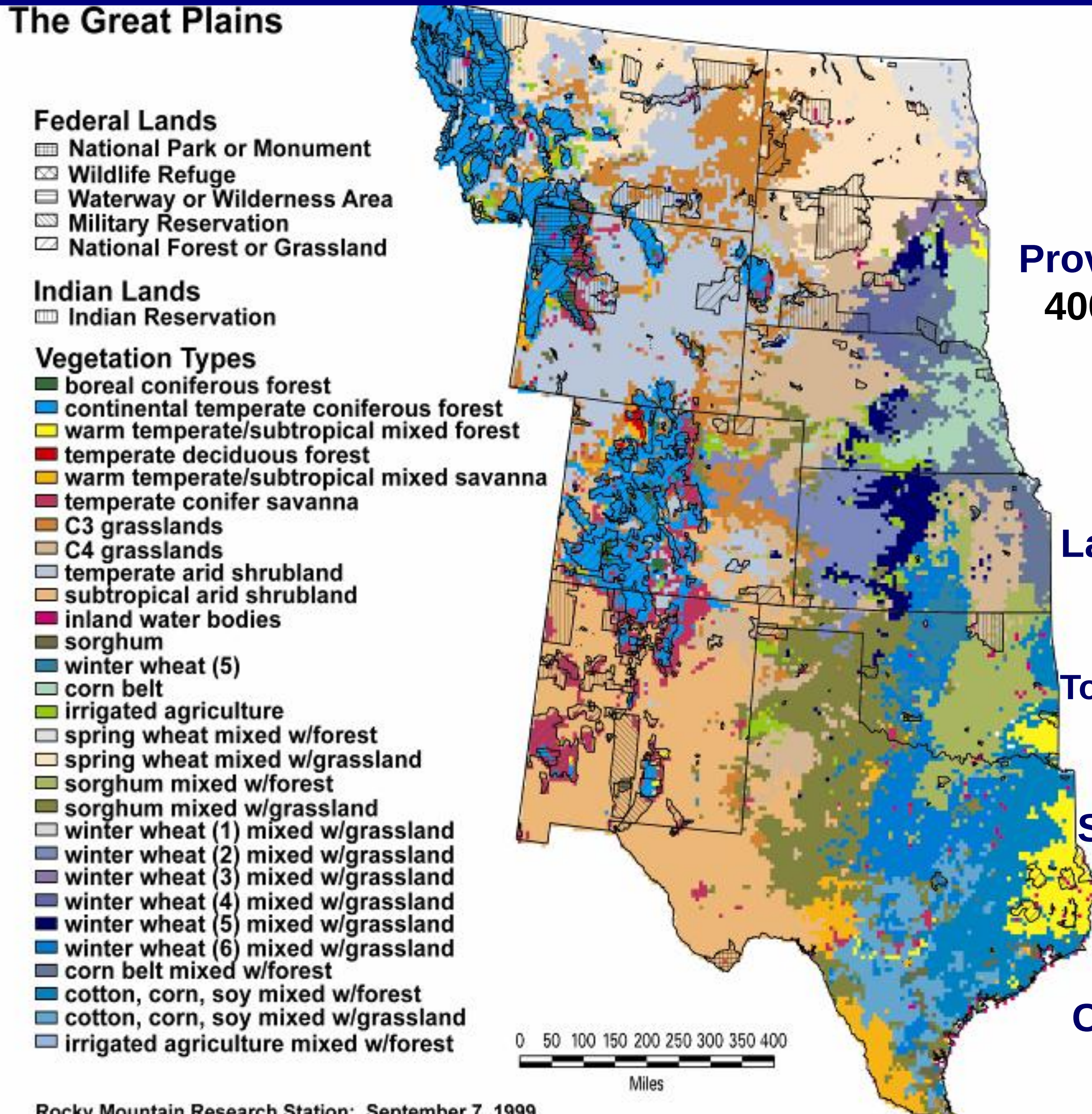


Solar-battery and Wind-battery refer to battery storage of these intermittent renewable resources in plug-in electric driven vehicles

WEB CALCULATOR- VISUALIZER – COMPARISON OF LAND NEEDED TO POWER VEHICLES

Mark Z. Jacobson, Wind Versus Biofuels for Addressing Climate, Health, and Energy, Atmosphere/Energy Program, Dept. of Civil & Environmental Engineering, Stanford University, March 5, 2007. http://www.stanford.edu/group/efmh/jacobson/E85vWindSol

95% U.S. terrestrial wind resources in Great Plains



Figures of Merit

Great Plains area
1,200,000 mi^2

Provide 100% U.S. electricity
400,000 3MW wind turbines

Platform footprint
6 mi^2

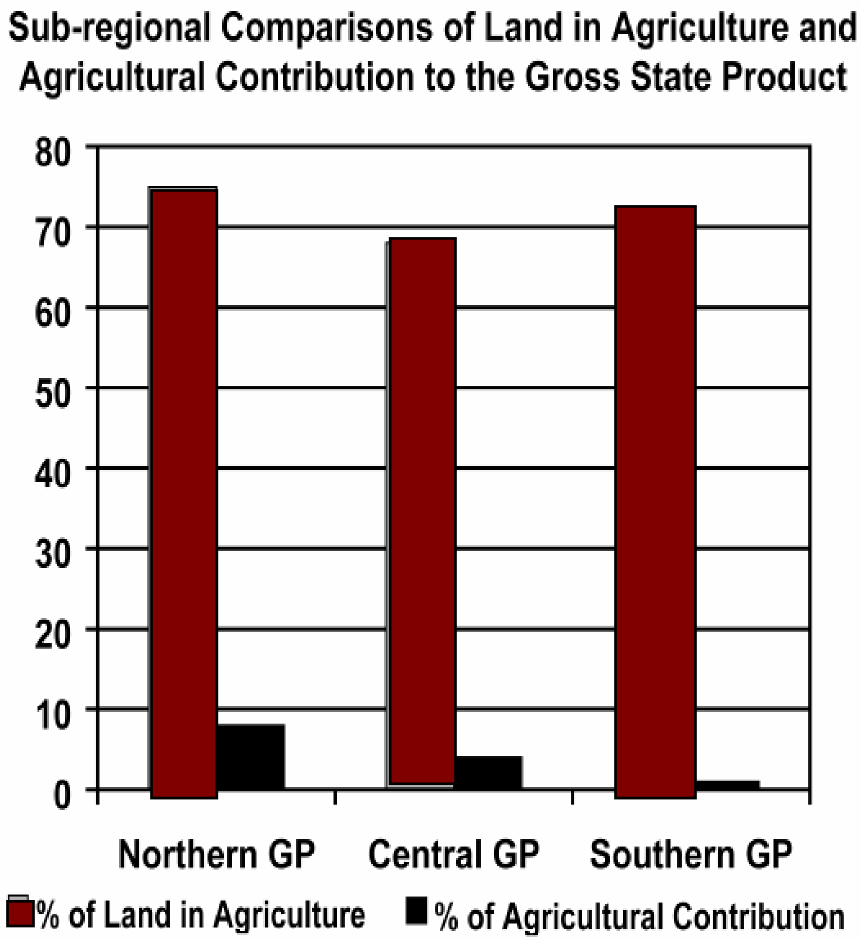
Large Wyoming Strip Mine
>6 mi^2

Total WindFarm spacing area
37,500 mi^2

Still available for farming and prairie restoration
90%+ (34,000 mi^2)

CO_2 U.S. electricity sector
40% USA total GHG emissions

Wind Farm Royalties – Could *Double* farm/ranch income with 30x less land area



Although agriculture controls about 70% of Great Plains land area, it contributes 4 to 8% of the Gross Regional Product.

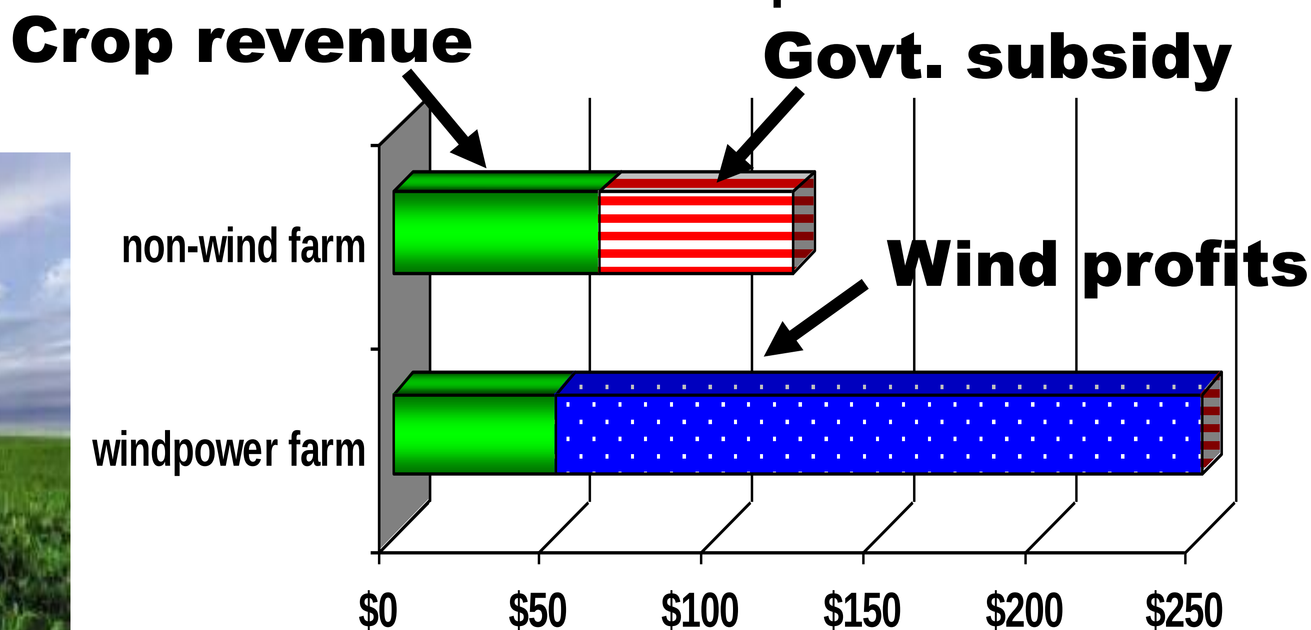
Wind farms could enable one of the greatest economic booms in American history for Great Plains rural communities, while also enabling one of world's largest restorations of native prairie ecosystems

How?

The three sub-regions of the Great Plains are: Northern Great Plains = Montana, North Dakota, South Dakota; Central Great Plains = Wyoming, Nebraska, Colorado, Kansas; Southern Great Plains = Oklahoma, New Mexico, and Texas. (Source: U.S. Bureau of Economic Analysis 1998, USDA 1997 Census of Agriculture)

Wind Royalties – Sustainable source of Rural Farm and Ranch Income

US Farm Revenues per hectare

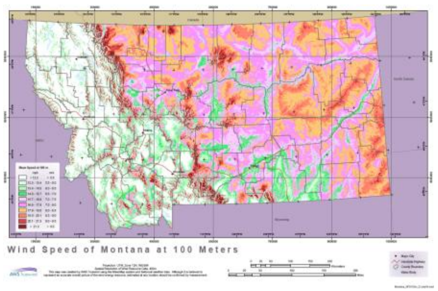


	windpower farm	non-wind farm
govt. subsidy	$0	$60
windpower royalty	$200	$0
farm commodity revenues	$50	$64

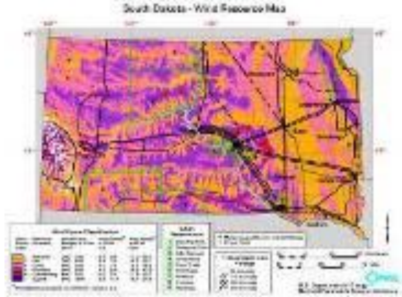
Williams, Robert, *Nuclear and Alternative Energy Supply Options for an Environmentally Constrained World*, April 9, 2001, http://www.nci.org/

Great Plains Multi-TW Wind Resources in Varying Stages of ICT/IPC Technical, Ecological, Economic, Financial Assessment, Mapping, Visualization, Installation, Operation & Post-Production Options

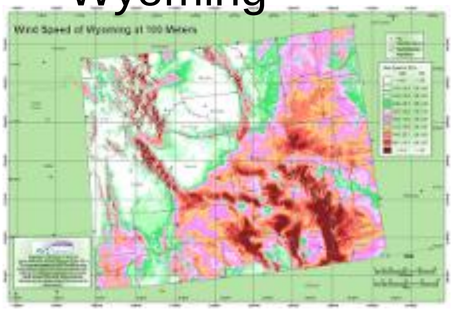
Montana



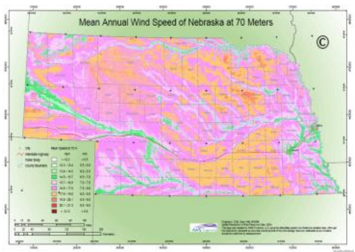
South Dakota



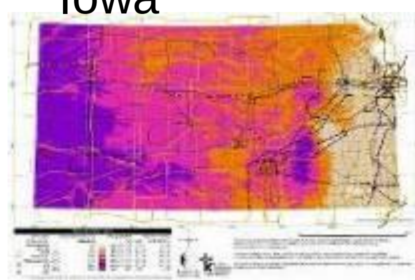
Wyoming



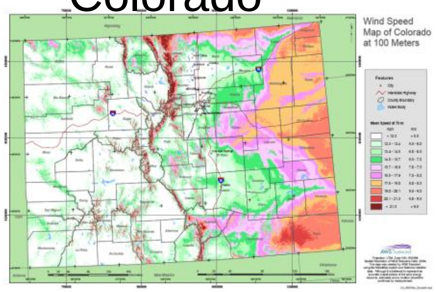
Nebraska



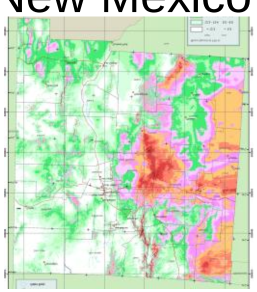
Iowa



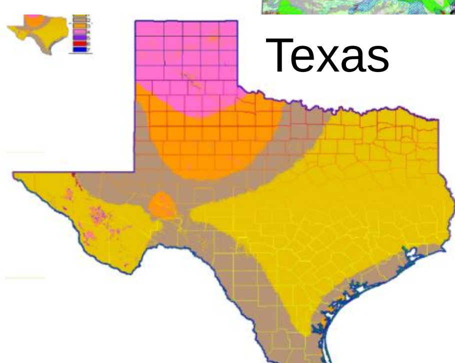
Colorado



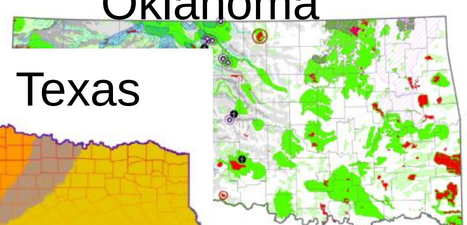
New Mexico



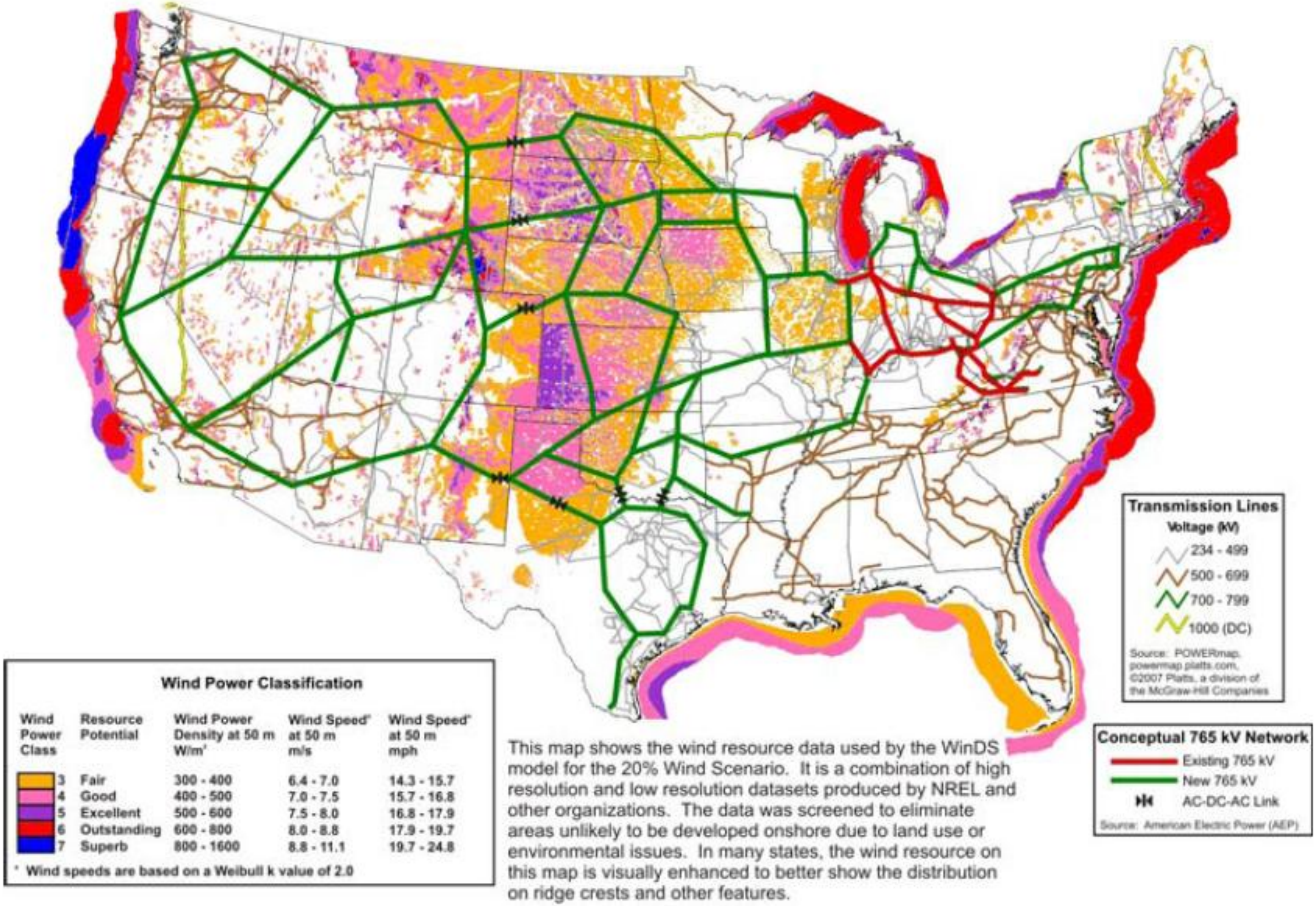
Texas



Oklahoma



Conceptual transmission plan to accommodate 400 GW of wind energy



Potential Synergisms

Two additional potential revenue streams in Great Plains:

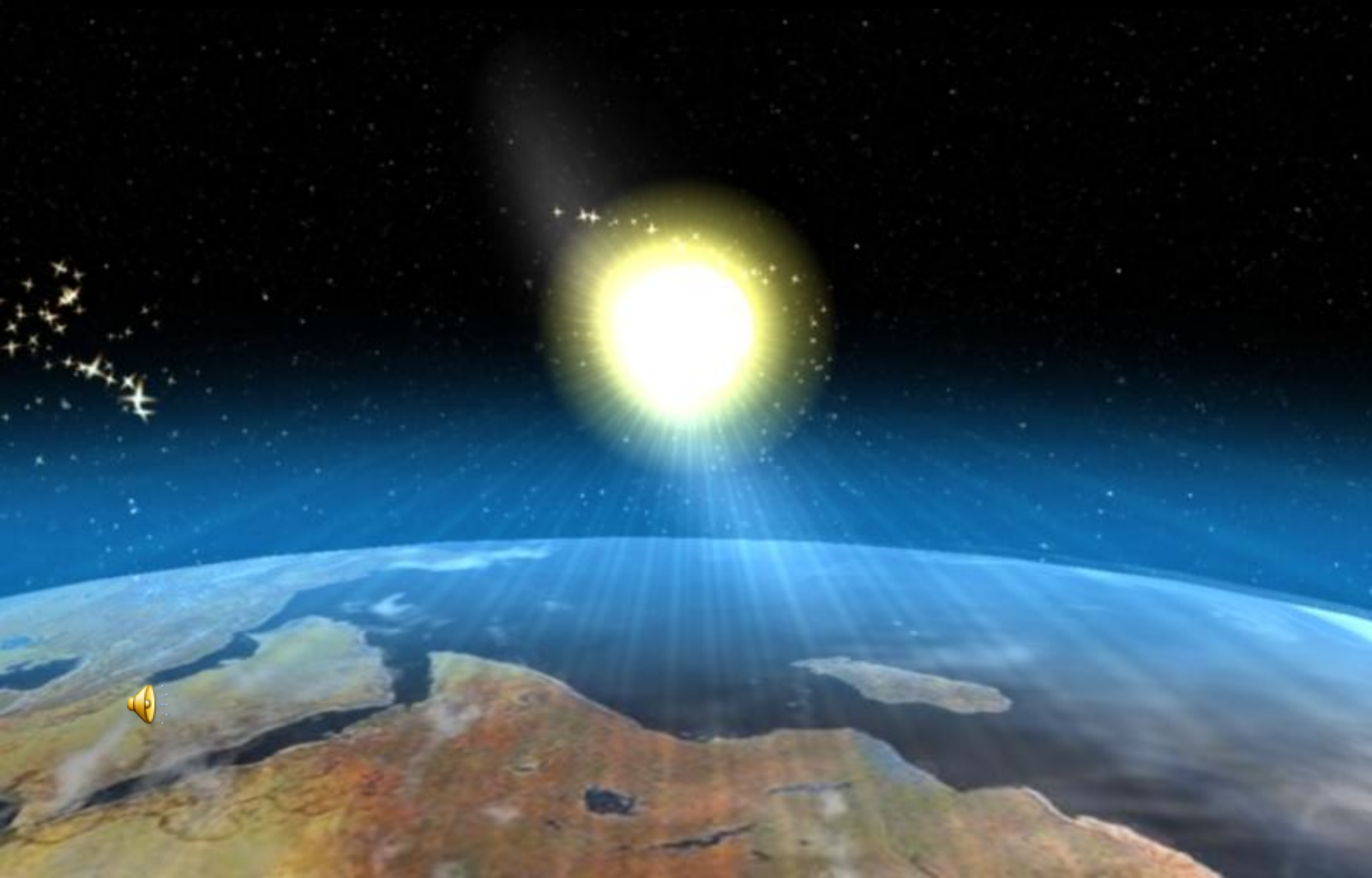
1) ***Restoring the deep-rooting, native prairie grasslands*** that absorb and store soil carbon and stop soil erosion (hence generating a potential revenue stream from selling CO_2 mitigation credits in the emerging global carbon trading market);

2) ***Re-introducing free-ranging bison*** into these prairie grasslands -- which naturally co-evolved together for millennia -- generating a potential revenue stream from marketing high-value organic, free-range beef.

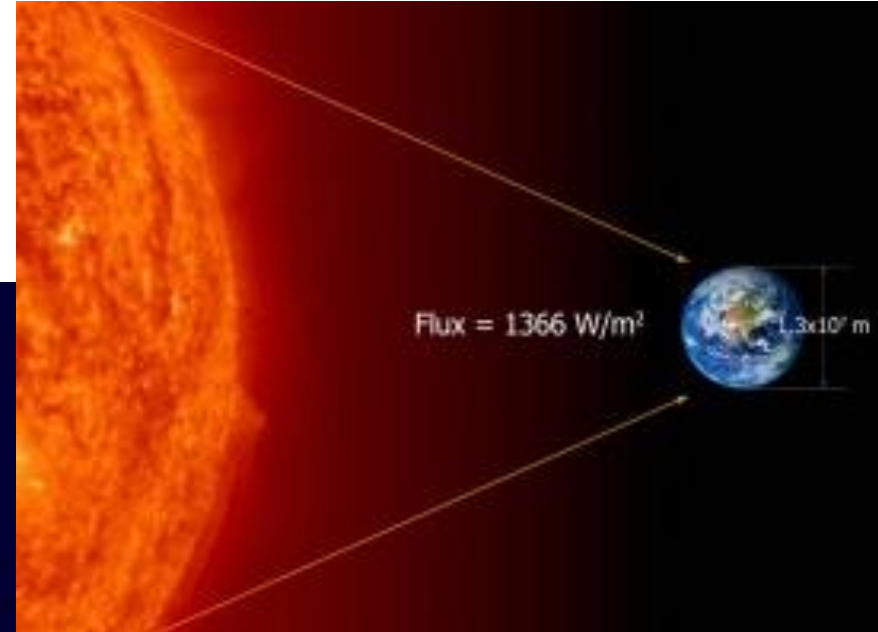
Also More Resilient to Climate-triggered Droughts

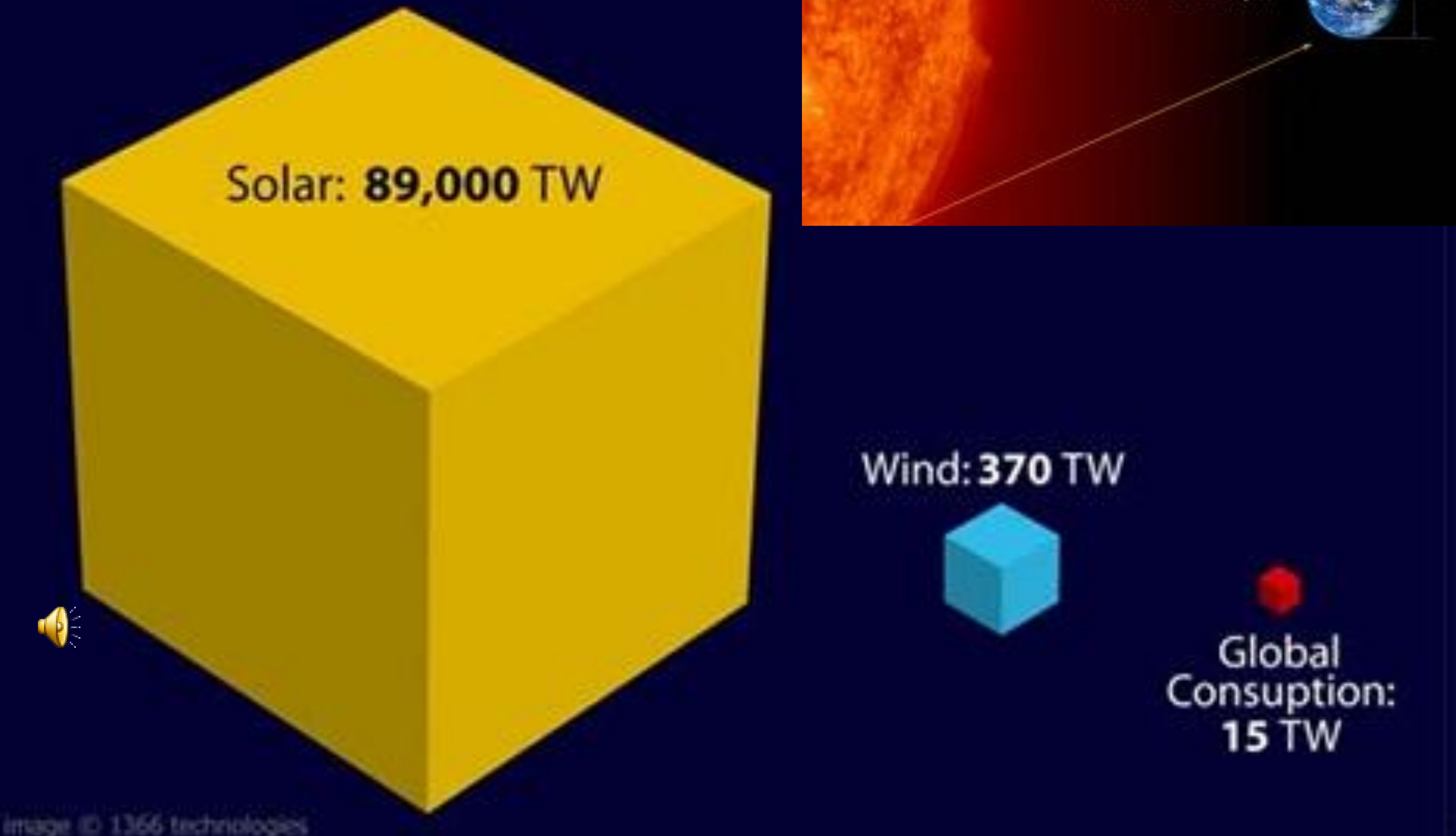
Far Far Better than Facing the Consequences

Solar Fusion Waste as Earth Nutrients – The Power in the Information Bitstream



Earth receives more solar energy every 90 minutes than humanity consumes all year






Solar

In the USA, cities and residences cover 56 million hectares.

Every kWh of current U.S. energy requirements can be met simply by applying photovoltaics (PV) to 7% of this area—on roofs, parking lots, along highway walls, on sides of buildings, and in other dual-use scenarios.

Experts say we wouldn't have to appropriate a single acre of new land to make PV our primary energy source!

Solar Photovoltaics (PV) satisfying 90% of total US electricity from brownfields

90% of America's current electricity could be supplied with PV systems built in the "brown-fields"— the estimated 2+ million hectares of abandoned industrial sites that exist in our nation's cities.

Larry Kazmerski, Dispelling the 7 Myths of Solar Electricity, 2001, National Renewable Energy Lab, www.nrel.gov/;

Economics of Commercial BIPV
Building-Integrated Photovoltaics

SunSlate Building-Integrated Photovoltaics (BIPV) commercial building in Switzerland

Net Present Values (NPV), Benefit-Cost Ratios (BCR) & Payback Periods (PBP) for 'Architectural' BIPV (Thin Film, Wall-Mounted PV) in Beijing and Shanghai (assuming a 15% Investment Tax Credit)

Material Replaced	Economic Measure	Beijing	Shanghai
Polished Stone	NPV ($) BCR PBP (yrs)	+$18,586 2.33 1	+$14,237 2.14 1
Aluminum	NPV ($) BCR PBP (yrs)	+$15,373 1.89 2	+$11,024 1.70 2

Byrne et al, *Economics of Building Integrated PV in China*, July 2001, Univ. of Delaware, Center for Energy and Environmental Policy, Twww.udel.edu/ceep/T]

Economics of Commercial BIPV

Reference costs of facade-cladding materials

BIPV is so economically attractive because it captures both energy savings and savings from displacing other expensive building materials.

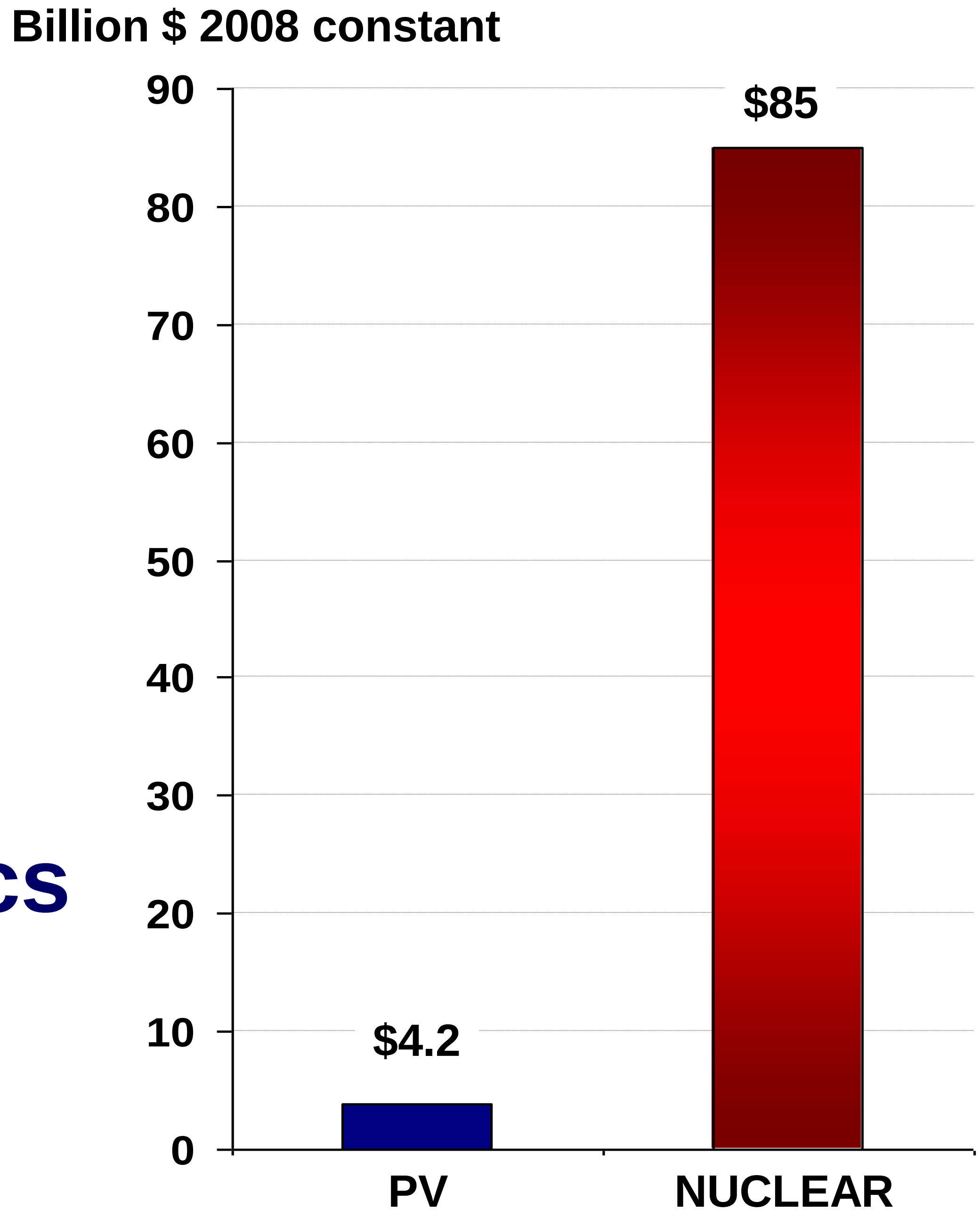
Eiffert, P., Guidelines for the Economic Evaluation of Building-Integrated Photovoltaic Power Systems, International Energy Agency PVPS Task 7: Photovoltaic Power Systems in the Built Environment, Jan. 2003, National Renewable Energy Lab, NREL/TP-550-31977, www.nrel.gov/

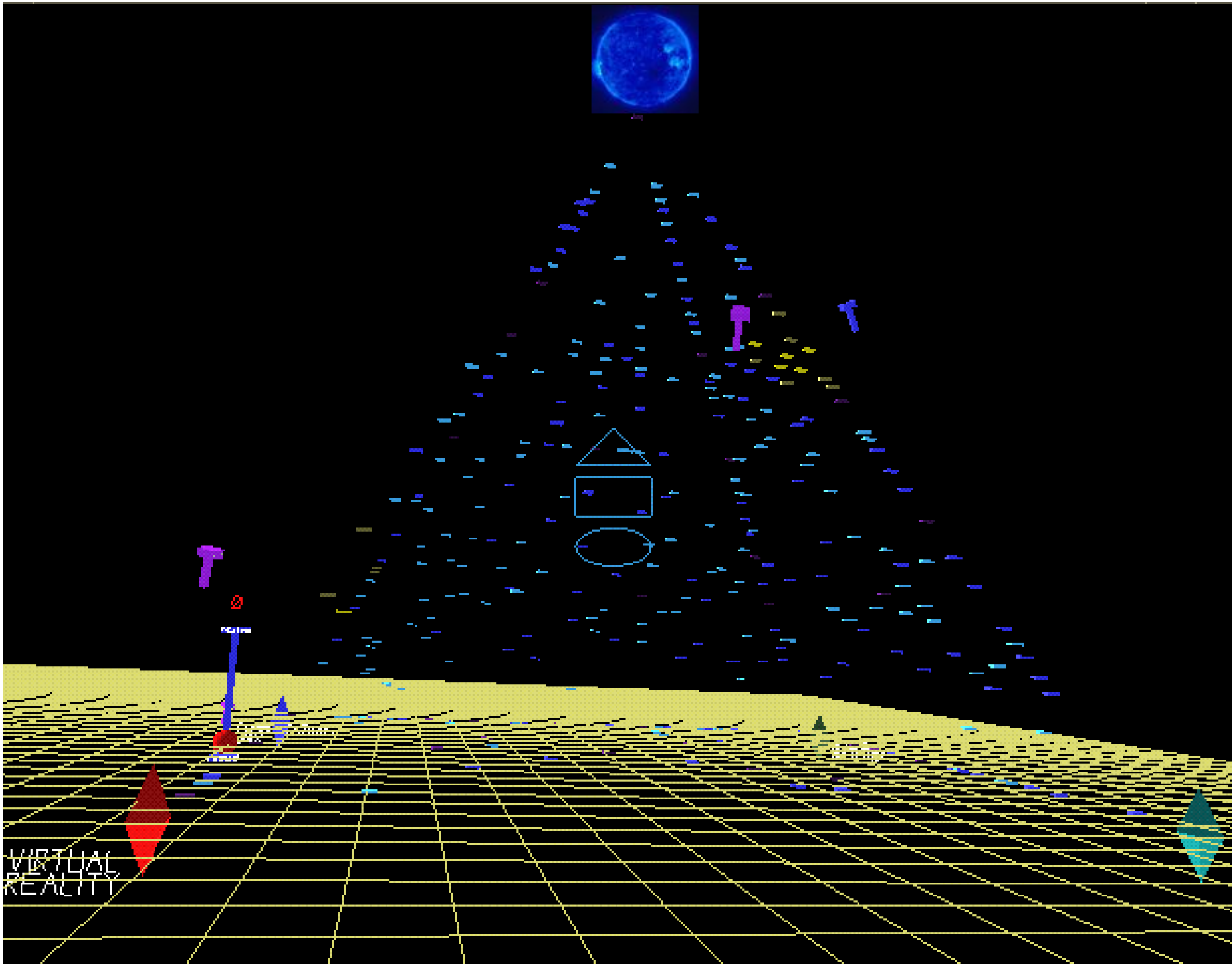
Federal R&D Appropriations

Civilian Nuclear Power
(1948 – 2009)

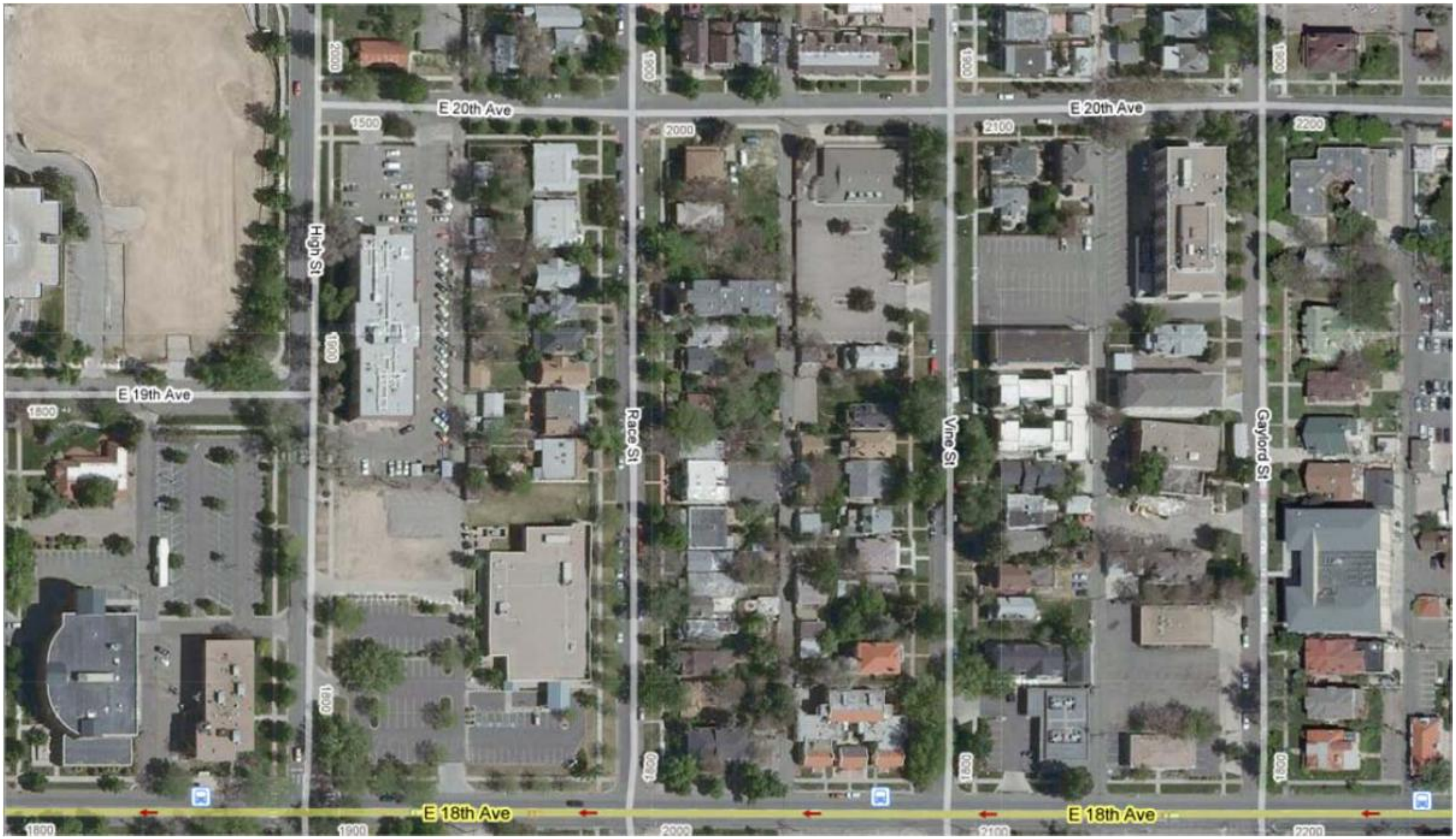
vs.

Solar Photovoltaics
(1975-2009)



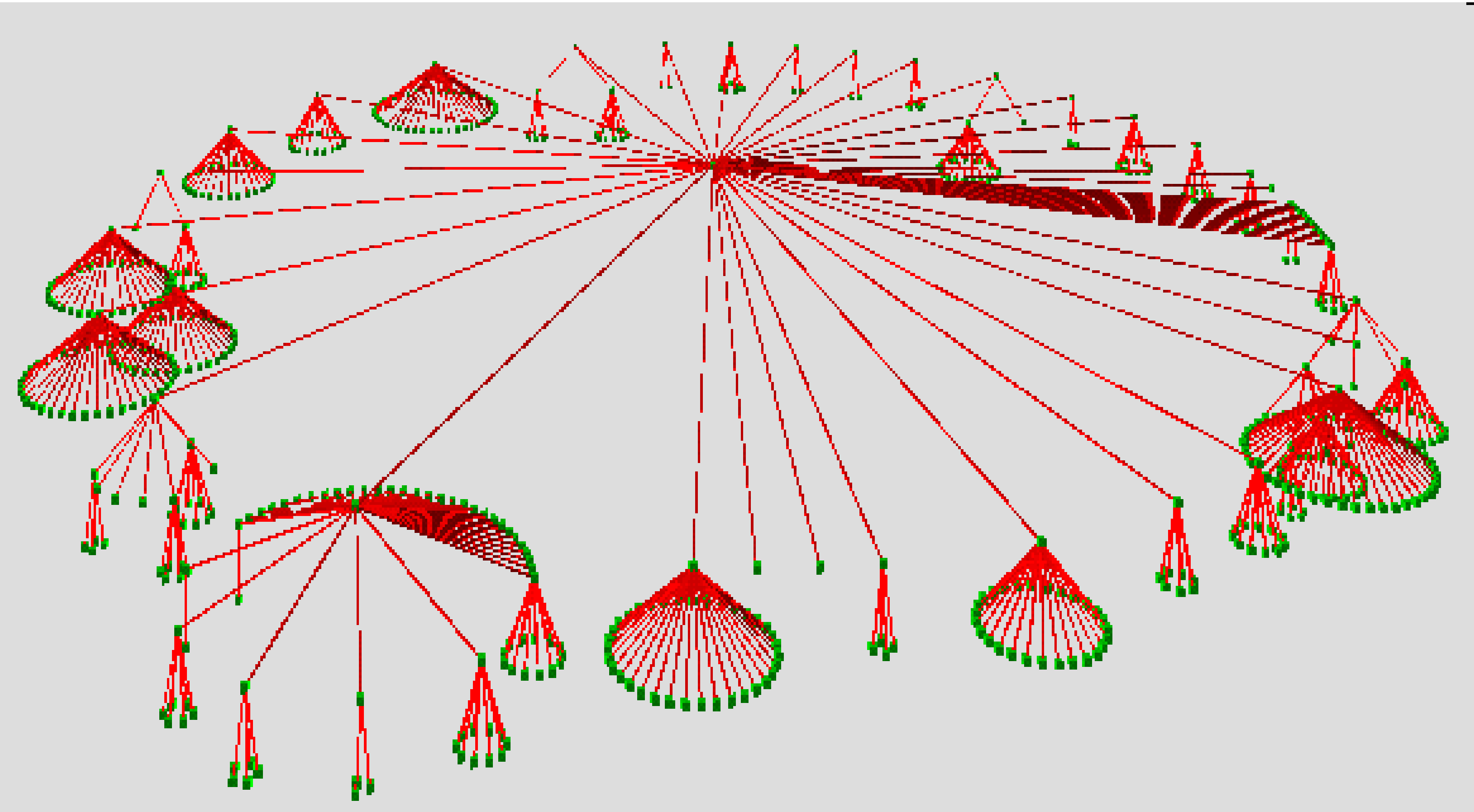

VIRTUAL
REALITY

Denver Neighborhood solar smart mini-grids – City Park West



Denver Neighborhood solar smart mini-grids – City Park West

Smart Grid Web-based Solar Power Auctions



Smart Grid Collective intelligence design based on digital map algorithms continuously calculating solar gain. Information used to rank expansion of solar panel locations.

State Rankings on Net Metering & Interconnection Standards

http://www.newenergychoices.org/uploads/FreeingTheGrid2008_report.pdf

State	Net Metering	Interconnection	State	Net Metering	Interconnection
IREC	A	A	FERC	n/a	C
Colorado	A	C	Ohio	C	D
Maryland	A	B	Maine	C	n/a
Florida	A	D	Louisiana	C	F
New Jersey	A	B	Montana	C	F
Oregon	A	B	Virginia	C	F
Pennslyvania	A	B	Wyoming	C	F
California	B	B	Hawaii	C	F
Connecticut	B	D	DC	C	F
Massachusetts	B	B	Oklahoma	D	n/a
Delaware	B	F	Minnesota	D	F
Arizona*	B	B	Utah	D	F
Nevada	B	B	Washington	D	D
Iowa	B	F	Wisconsin	D	D
Vermont	B	C	Indiana	D	D
Kentucky	B	n/a	North Dakota	D	n/a
New York	B	C	Georgia	F	F
Arkansas	B	F	Texas	F	C
Illinios	B	B	Michigan*	F	D
New Mexico	B	B	North Carolina	F	B
Missouri	B	F	West Virginia	F	D
Rhode Island	B	n/a	South Carolina	F	F
New Hampshire	C	D	Idaho*	F	n/a

STATES WITHOUT STATEWIDE NET METERING		
Alabama	Michigan	South Dakota
Alaska	Mississippi	Tennessee
Idaho	Nebraska	Kansas

STATES WITHOUT STATEWIDE INTERCONNECTION STANDARDS		
Alabama	Maine	Rhode Island
Alaska	Mississipi	South Dakota
Idaho	Nebraska	Tennessee
Kansas	North Dakota	
Kentucky	Oklahoma	

Municipal Solar Financing – Long-Term, Low-Cost Financing

Ca$h Po$itive Day of In$tallation

CityFIRST
Overview
Turnkey Solution
How to Implement

CaliforniaFIRST Statewide Program

Statewide AB811 Clean Energy Finance Program

As an alternative financing service for your property owners, we are developing a program where the municipality may opt into a new statewide clean energy financing program to be provided by the California Statewide Communities Development Authority (California Communities). As a statewide Joint Powers Authority, California Communities is authorized to provide this program pursuant to AB811, the State of California Energy Municipal Financing Law signed into law last year.

When all program ... the program is intended to have no direct cost or risk to participating ... costs will be included in the financing package. ... with each participating municipality to tailor and brand a turnkey ... community. The program team, which also includes the California ... EcoMotion, will provide program education, application processing, financing and customer service for property owners who choose to participate.

Next Step: Non-Binding Statement of Interest

Boulder County's Municipal Solar Financing Program (Property Tax Financing)

Congratulations, Boulder County residents! You live in an area that supports property tax solar financing.

How does Boulder County's municipal solar financing program work?

The ClimateSmart Loan Program allows homeowners to pay for solar panels and other energy efficiency improvements through property tax bills. The loans carry a fixed interest rate and stay with the house-so if you move, the next tenant continues to pay for the loan through property taxes. That means you don't have to worry about paying for panels on a house that you don't live in anymore. Applicants pay a $75 application fee along with a a loan processing fee that falls somewhere in the range of 1 percent to 2 percent of the total loan value.

That sounds great! How is Boulder able to do this?

Boulder County's solar financing program is possible thank to Boulder County's Ballot Measure

Municipal Solar Financing: The Biggest Revolution that You've Never Heard Of

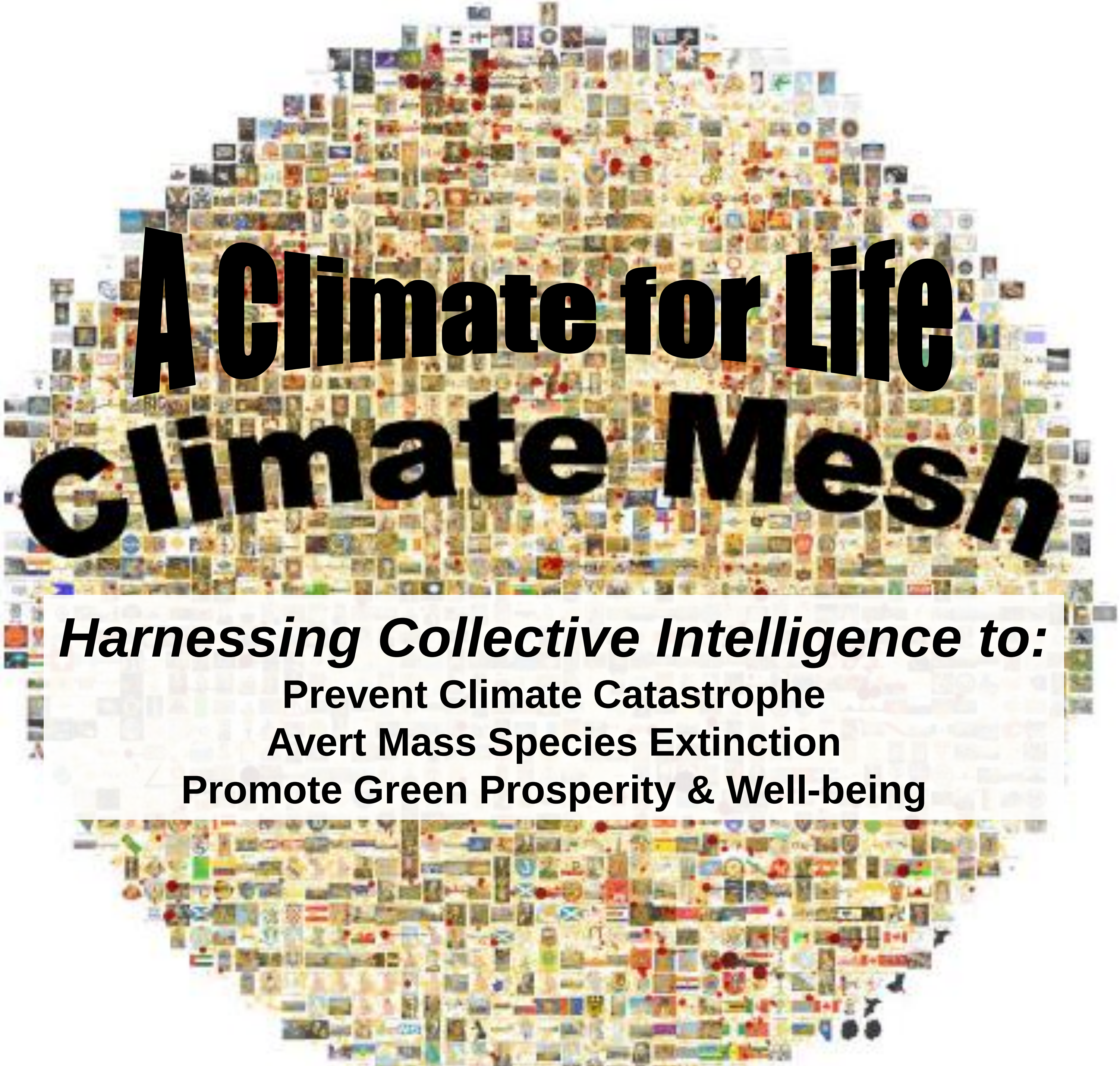
Written by Ariel Schwartz
Published on May 15th, 2009

1 Comment

The whole thing is happening without flashy ad campaigns, so it's not surprising if you ... heard of municipal solar financing. But the financing program, also known as property tax financing, is a veritable underground solar revolution.

It all started in Berkeley, CA with the Berkeley FIRST Program, which allows homeowners to pay for solar panels through property tax bills over a 20 year period. The bills carry a fixed interest rate and stay with the house, so there's no need to worry about paying for panels on a house you don't live in anymore. The Berkeley program was so popular that California passed the AB811 bill to let any interested city in the state launch a similar program.

Since the passing of AB811, Palm Desert, San Diego, San Francisco, and Sonoma County have decided to launch their own municipal solar financing programs. And AB811 has been such a hit overall that Boulder, CO, Annapolis, MD, and the entire state of Louisiana have come on board with property tax financing programs. Rest assured that similar financing initiatives will come to your state soon–the Berkeley program launched less than a year ago, and we can only imagine how far the movement will spread in another year.


A Climate for Life
Climate Mesh
Harnessing Collective Intelligence to:
Prevent Climate Catastrophe
Avert Mass Species Extinction
Promote Green Prosperity & Well-being