

# Report for the Johnson County Kansas Board of Commissioners on Hazards and Dangers Associated with a Utility Scale Solar Photovoltaic Installation Including Battery Storage

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# About Professor Parkinson

## **Education:**

Iowa State University, 1972, B.S., Chemistry

California Institute of Technology, 1977, Ph.D., Chemistry

Bell Laboratories, 1978, Postdoctoral Studies

## **Appointments:**

2009 – J. E. Warren Professor of Energy and Environment, University of Wyoming

2008 – Professor of Chemistry and School of Energy Resources, University of Wyoming

1991 - 2008 Professor of Chemistry, Colorado State University

1985 - 1991 Senior Research Chemist, DuPont Central Research

1981 - 1985 Solar Energy Research Institute, Senior Scientist

1979 - 1981 Ames Laboratory, Iowa State University, Staff Scientist

## **Honors and Awards:**

David C. Grahame Award, Physical Electrochemistry Division of Electrochemical Society, 2020

University of Wyoming Presidential Research Award, 2019

Humboldt Research Prize, 2014

Fellow, Electrochemical Society, 2014

Marple Switzer Lecturer, Northwestern University, 2012

Fellow, American Association for the Advancement of Science, 2010

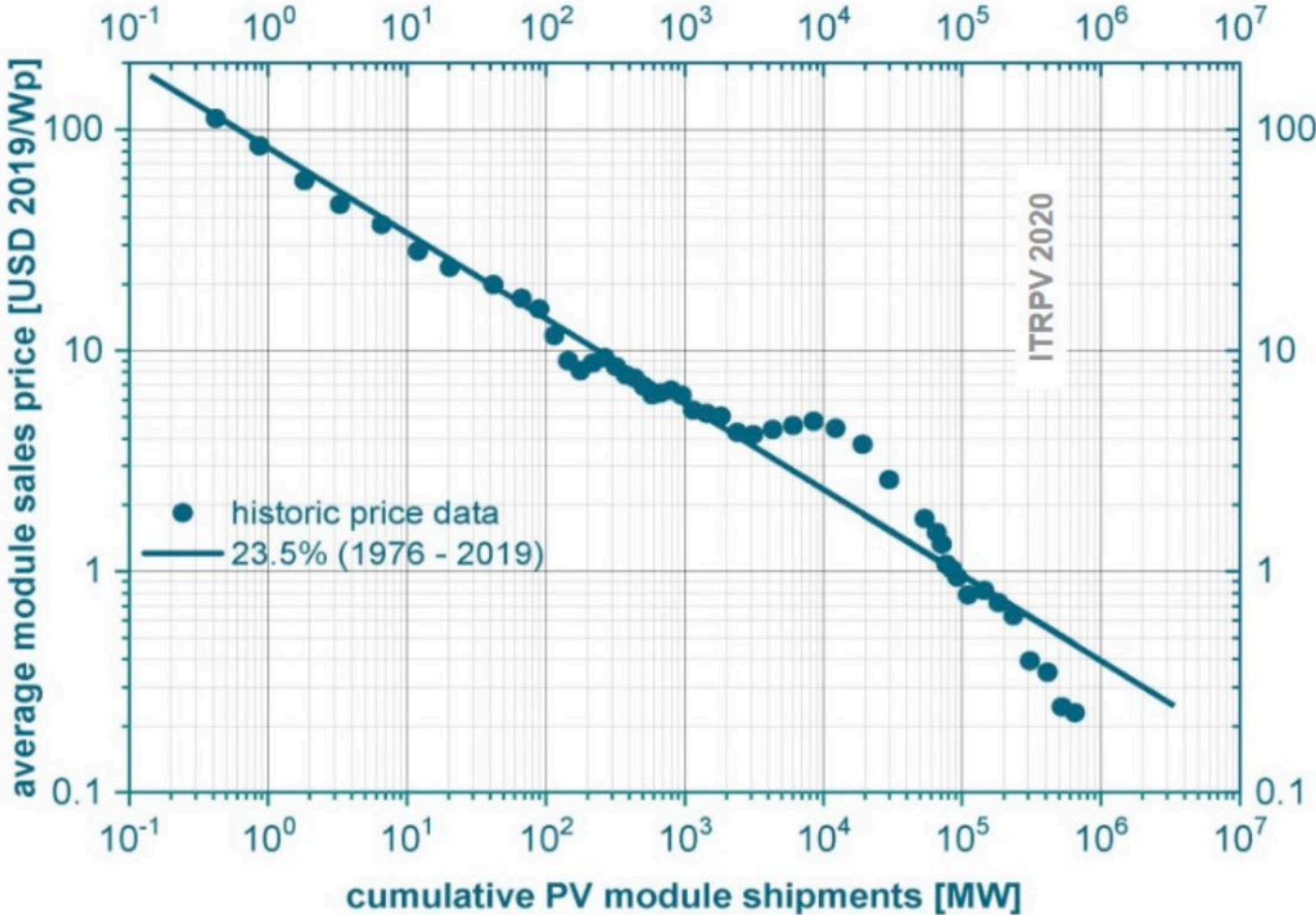
Fellow, Global School for Advanced Studies, 2009

J. E. Warren Professor of Energy and Environment, University of Wyoming, 2010

## **Publications:**

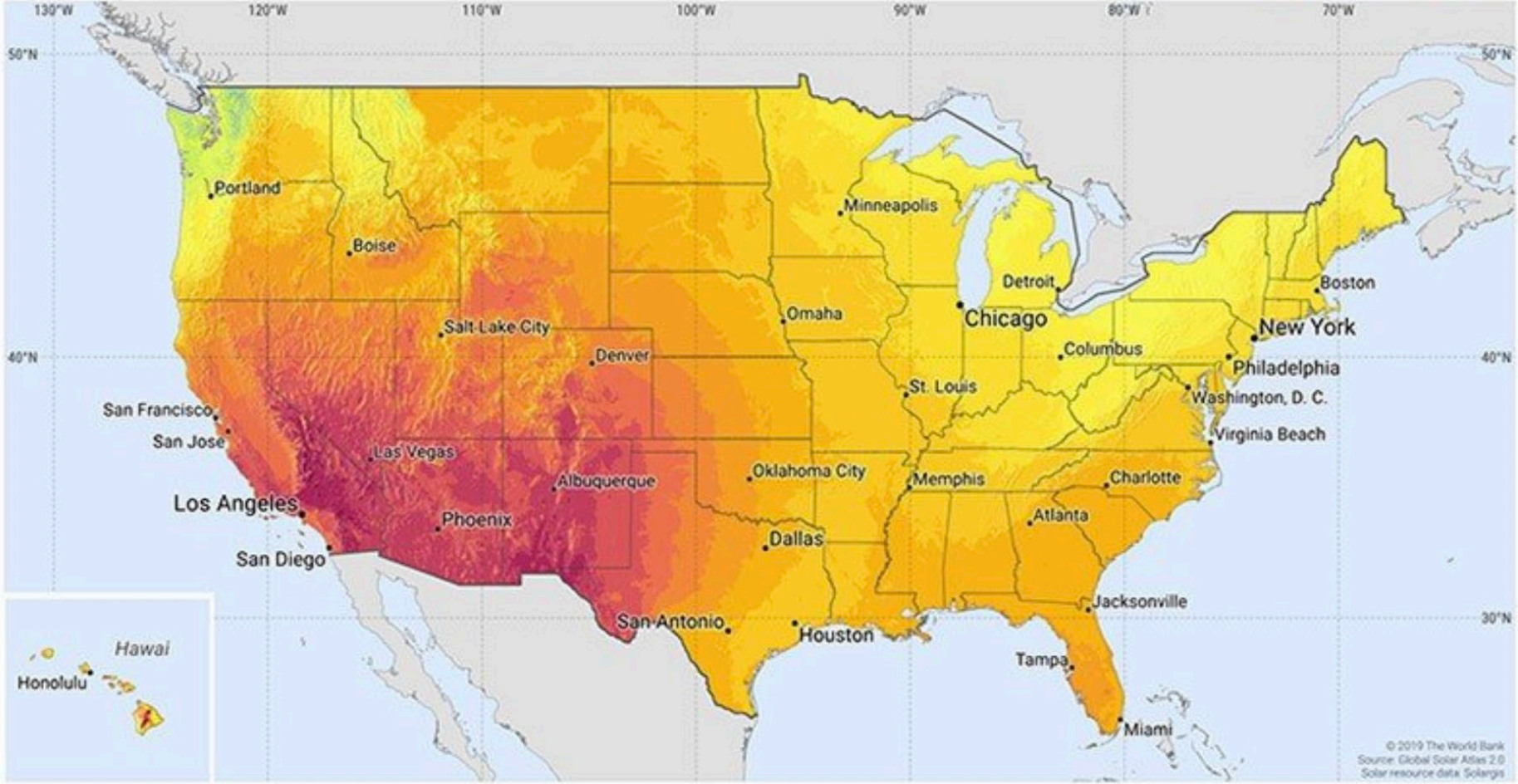
Over 270 in peer reviewed journals

# Learning curve for module price as a function of cumulative shipments



Log-Log Plot!

# Solar Energy Potential Based on Latitude and Cloud Cover

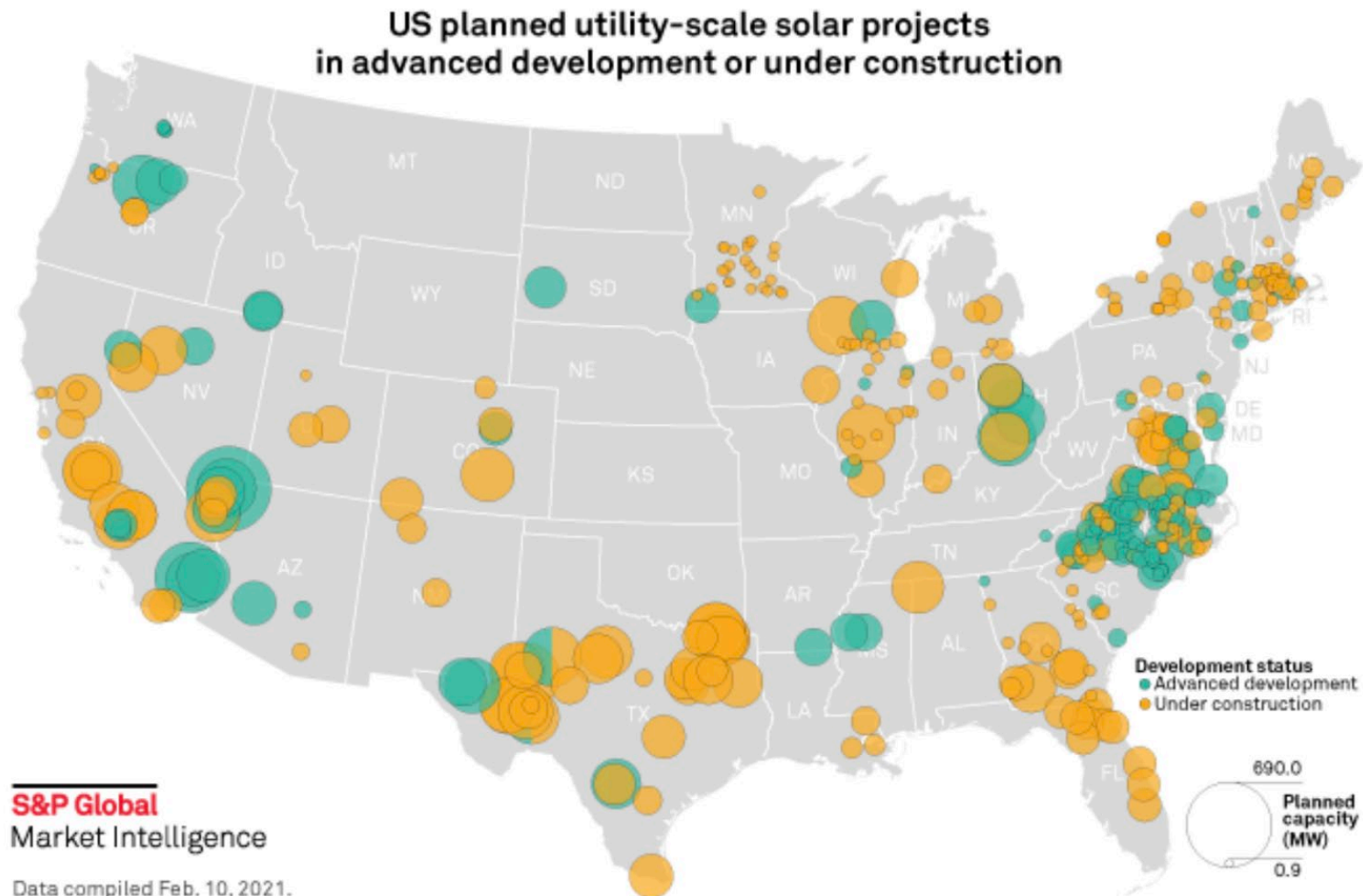


Long term average of PVOU, period 1999-2018

Daily totals:	2.0	2.4	2.8	3.2	3.6	4.0	4.4	4.8	5.2	5.6	kWh/kWp
Yearly totals:	730	876	1022	1168	1314	1461	1607	1753	1899	2045	

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Source: Global Solar Atlas 2.0  
Solar resource data: Solargis

# Utility Scale Solar Planned or Under Construction in the Last Two Years



**S&P Global**  
Market Intelligence

Data compiled Feb. 10, 2021.

Map is limited to projects where there is a reported latitude and longitude.

Map credit: Ciaralou Agpalo Palicpic

Source: S&P Global Market Intelligence

# Battery Storage is Recently a More Common Addition to Photovoltaic Installations



The Hornsdale Power Reserve, a 100-megawatt battery storage facility in South Australia using Tesla lithium batteries. Some safety issues depending on chemistry and safety features.



Typical redox flow batteries 0.3 to 40 megawatt hours from stackable units with 2-12 hour discharge times and 25 year lifetime. Lithium batteries lose capacity over time and may only have up to a 10 year lifetime with current technology.