



# A Just Transition to a Sustainable Energy Future

THRIVE : Sustainable Energy, Jobs & Economic Development  
May 19, 2016

# Earth- Our Life Support System

Clean Water

Fresh air

Fertile  
Ground

Biodiversity  
of Species



*Earth in orbit around the Sun*

[www.nsf.gov](http://www.nsf.gov)

5/19/16

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[www.patriciademarco.com](http://www.patriciademarco.com)



# System Under Stress

+ Overpopulation

+ Fossil Fuel Combustion



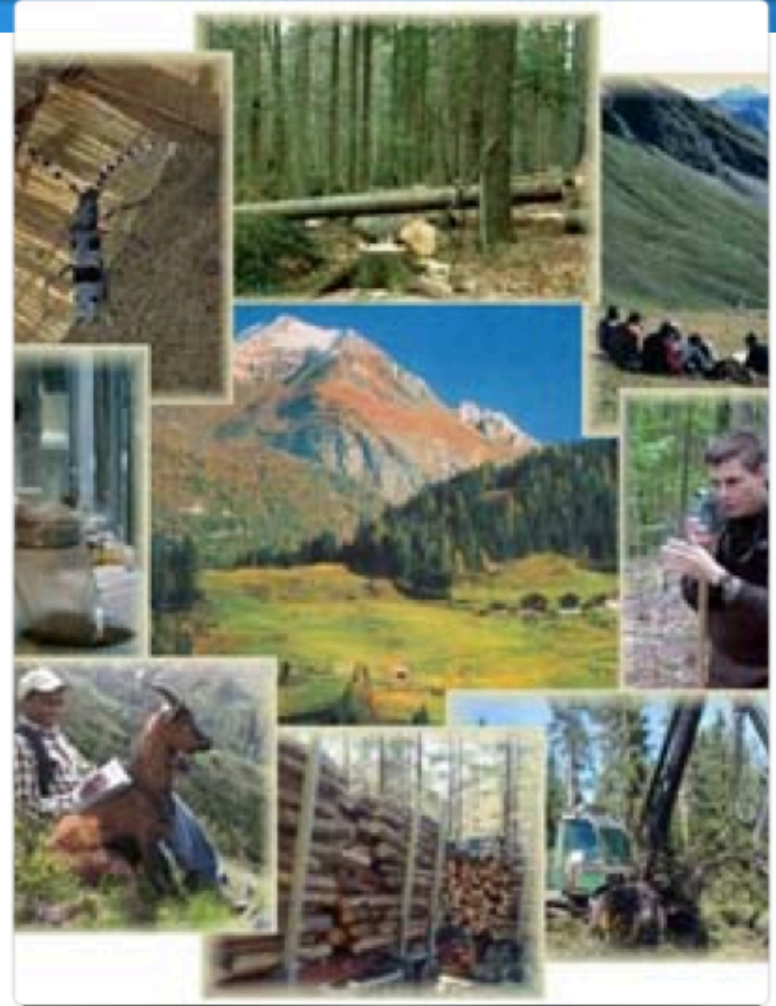
+ Resource  
Extraction

+ Hyper-consumption

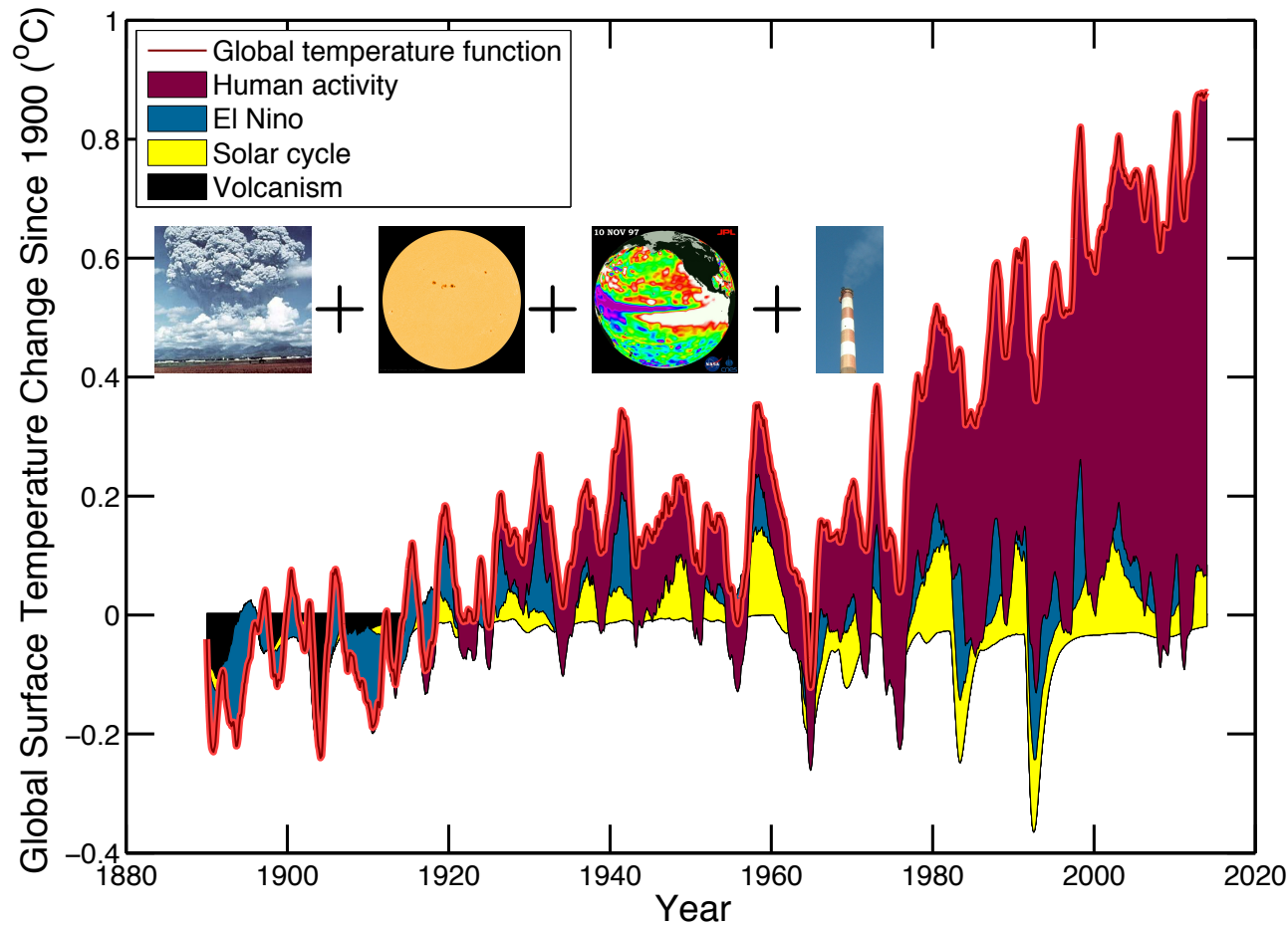
# Interconnected Web of Life

- *“...man does not live apart from the world; he lives in the midst of a complex, dynamic interplay of physical, chemical, and biological forces, and between him and this environment are continuing, never ending interactions.”*

Rachel Carson

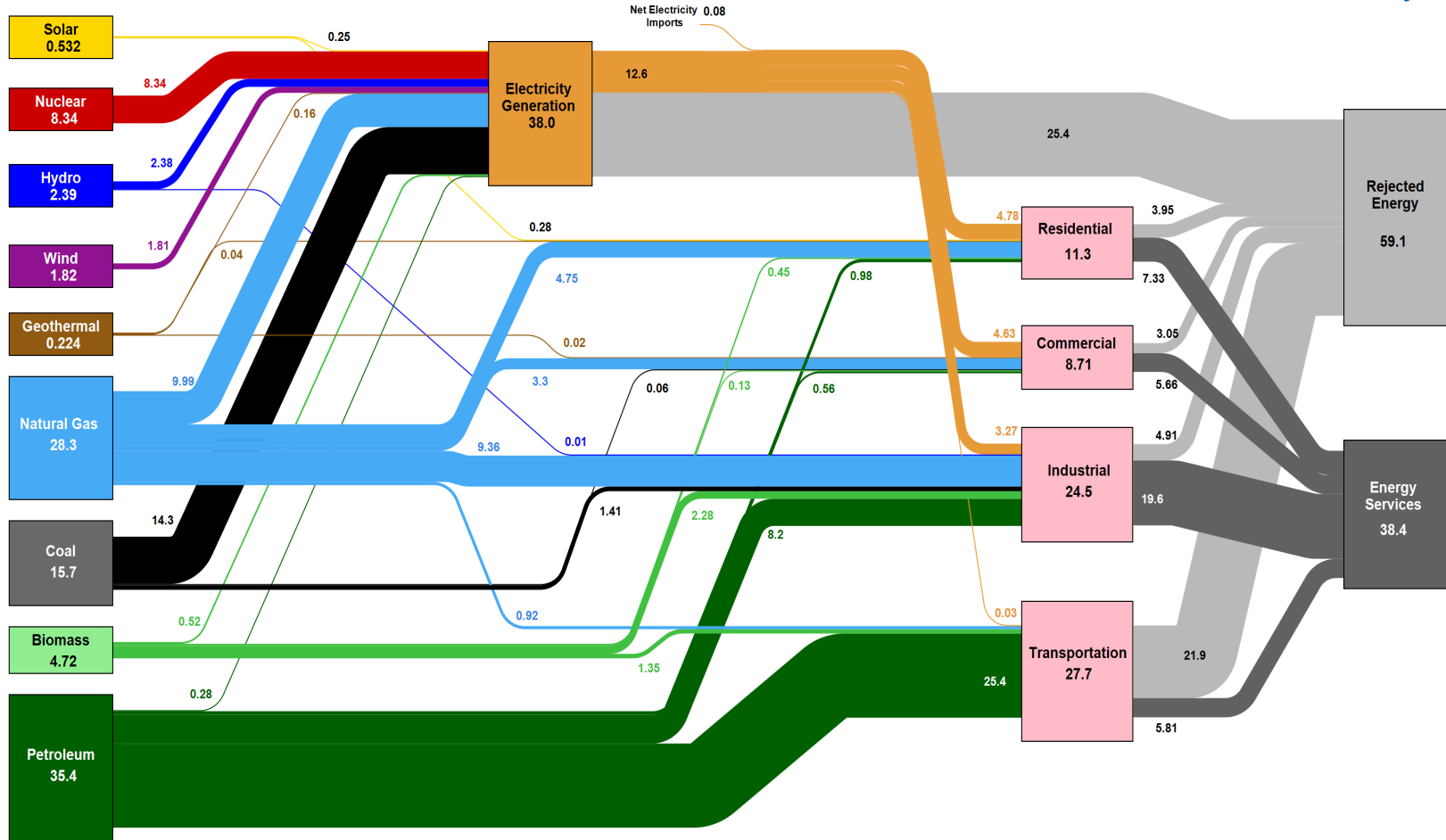


# Natural and Human influences on Global Temperature



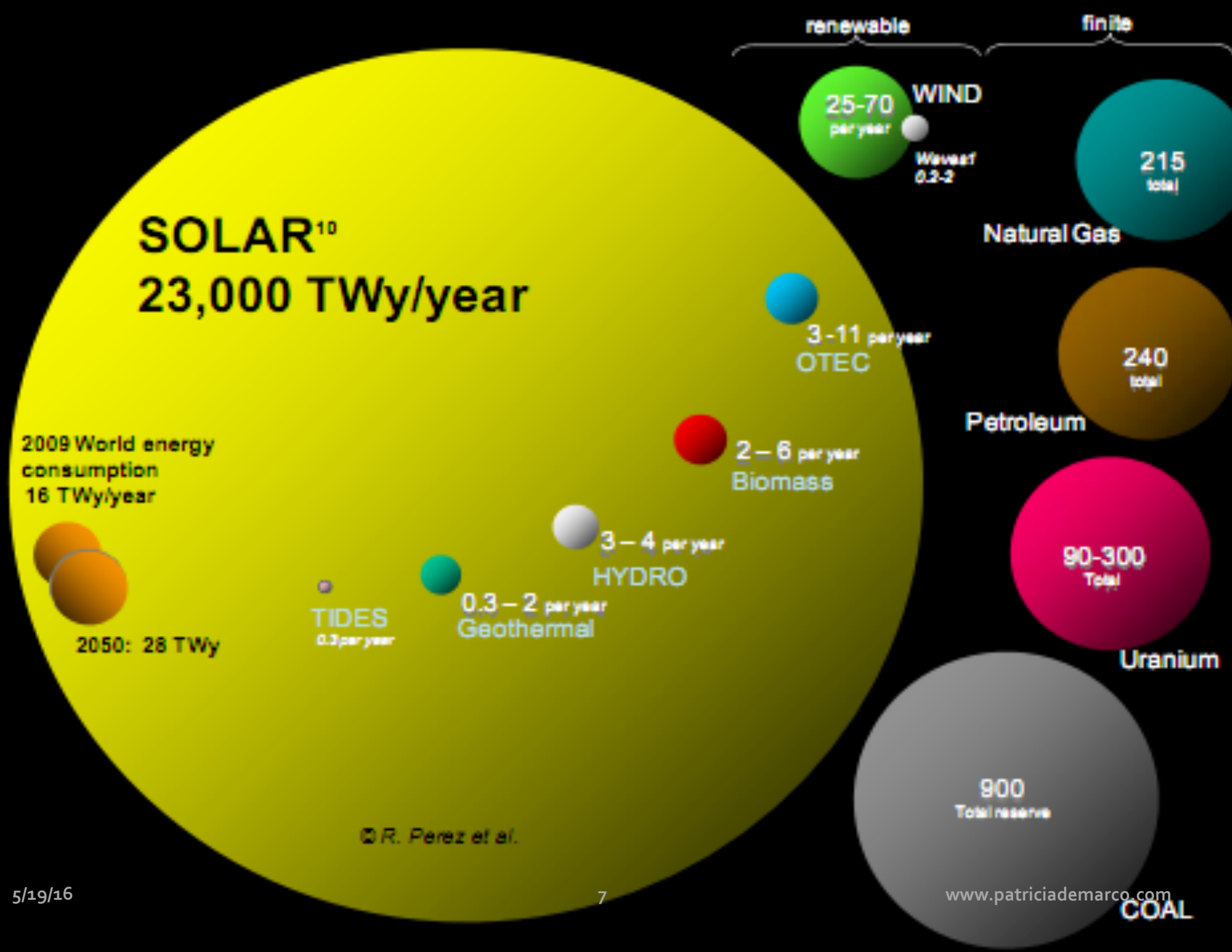
Judith L. Lean<sup>1</sup> and David H. Rind<sup>2</sup> How natural and anthropogenic influences alter global and regional surface temperatures: 1889 to 2006  
 GEOPHYSICAL RESEARCH LETTERS, VOL. 35, L18701,  
 doi:10.1029/2008GL034864, 2008

# Estimated U.S. Energy Consumption in 2015: 97.5 Quads



Source: LLNL March, 2016. Data is based on DOE/EIA MER (2015). If this information or a reproduction of it is used, credit must be given to the Lawrence Livermore National Laboratory and the Department of Energy, under whose auspices the work was performed. Distributed electricity represents only retail electricity sales and does not include self-generation. EIA reports consumption of renewable resources (i.e., hydro, wind, geothermal and solar) for electricity in BTU-equivalent values by assuming a typical fossil fuel plant heat rate. The efficiency of electricity production is calculated as the total retail electricity delivered divided by the primary energy input into electricity generation. End use efficiency is estimated as 65% for the residential sector, 65% for the commercial sector, 80% for the industrial sector, and 21% for the transportation sector. Totals may not equal sum of components due to independent Rounding. LLNL-MI-410527





# A Global Agreement.....



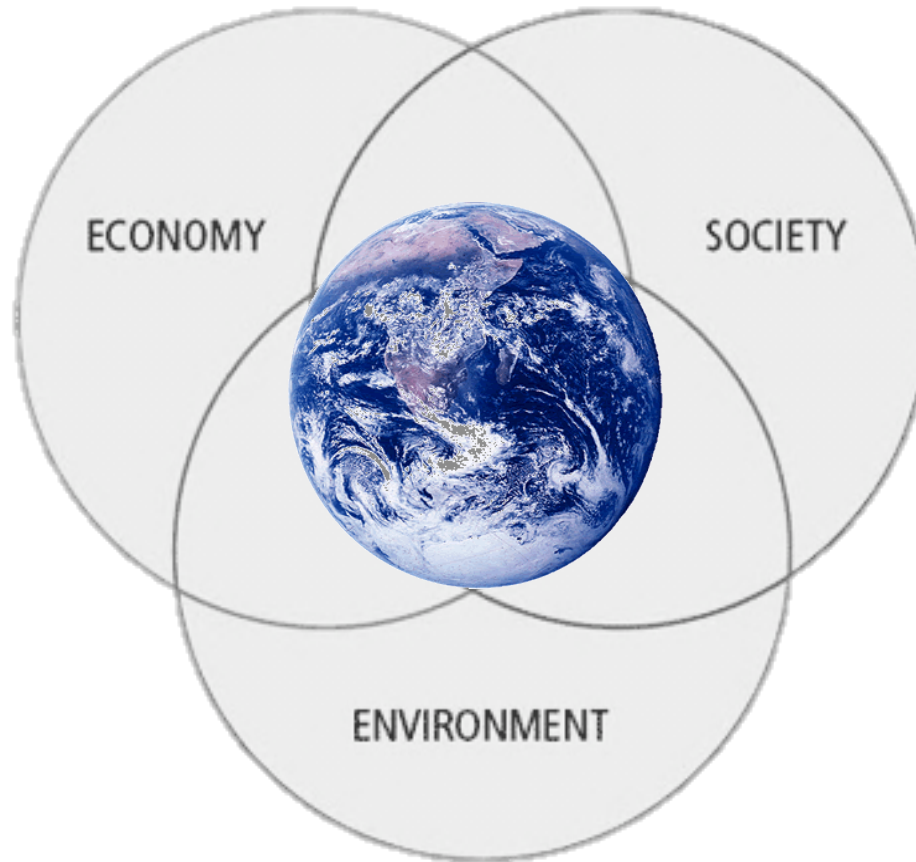
# The Concept of Sustainability:

- + *"Meet the needs of the present without compromising the ability of future generations to meet their own needs."*
- + a global imperative
- + an inter-generational imperative

Report of the World Commission on The Environment and Development  
"Our Common Future." United Nations 1985.

<http://www.un-documents.net/our-common-future.pdf>

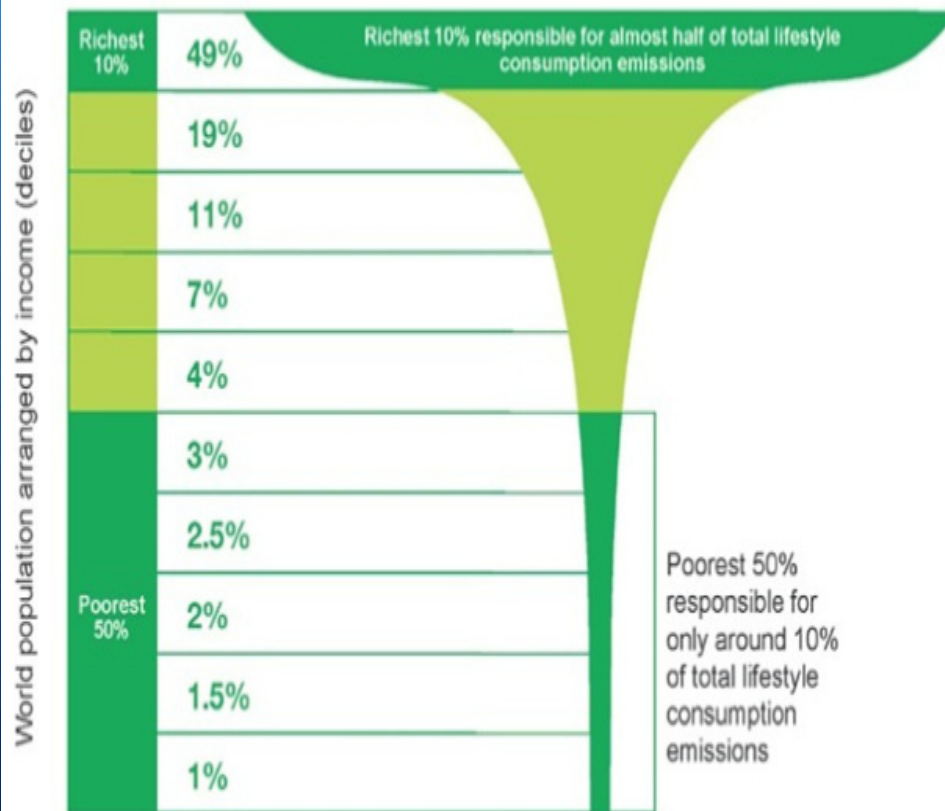
# Sustainability as a Goal:





# A matter of justice

Percentage of CO<sub>2</sub> emissions by world population



## International Justice:

- + Developed vs emerging economies

# Disparities in Location of Effects

- + Globally, the greatest causes of pollution are in the northern hemisphere and industrialized countries



- + Greatest resource extraction damages are in southern hemisphere and among poorer nations



# A matter of justice



Lower Manhattan after Hurricane Sandy

## Geographic disparities in impact

- + Island Nations and coastal cities submerged by rising seas
- + Coalmine and oil field towns – the boom is over

# A matter of justice



## Intergenerational Justice

+ current vs future generations

Sumerset- Century old coal town



# Address The Needs of People

- + Locational disparities
- + Economic disparities
- + Workers Rights
- + Healthy Conditions



*Syrian-Kurd Refugees approach  
Turkish Border  
UPI photo October 2015*

# Catalysts for Change

- + Public values and attitudes
- + Vivid imagery
- + Ready institutions and organizations
- + **Available solutions**



Cuyahoga River on fire in Ohio



# A Just Transition

## Fossil Fueled Economy



NEW BEECHWOOD BOULEVARD; ONE OF THE SPLENDID VIEWS—HOMESTEAD AND UP THE MONON

## Sustainable Economy





# Renewable Energy Systems

From Coal, Oil & Fossil Gas  
Combustion



To Renewable Resource  
Systems





# Choices and Values



Coal for 20 years

[www.pdwv.org](http://www.pdwv.org) Progressive Democrats of West Virginia

View of Coal River Mountain from nearby Kayford Mountain which has been ravaged by a 10,000 acre strip mine.



Power 150,000 homes indefinitely

# Steps in the Transition

## + Rules of the Road

Horse and buggy collision  
With horseless carriage 1869



- Roads were paved
- Traffic signal system deployed
- Vehicles were licensed
- Fuel stations replaced horse shoe stalls

## + Distributed generation?

Scalo Solar in Crafton PA



- Utility interface
- Insurance and financing issues
- Zoning issues
- Building codes
- Safety standards

# Rethink the Problem

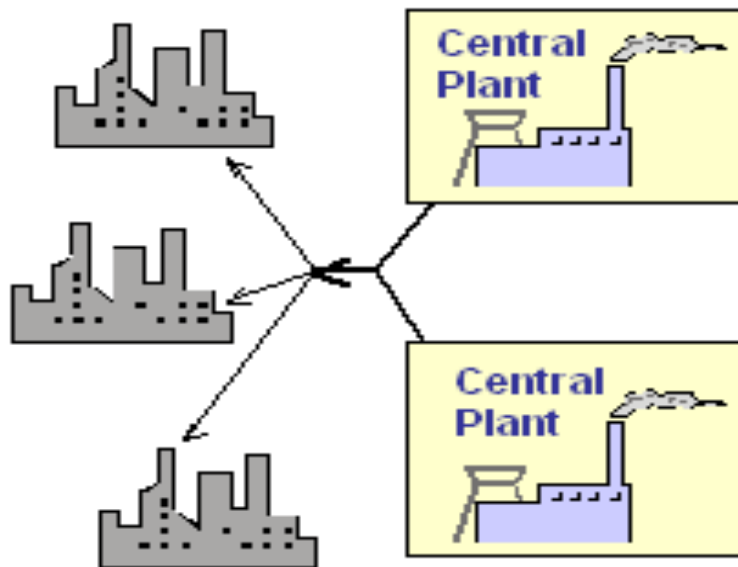
How can we use the least amount of energy and natural resources to perform **NECESSARY** work?

- + Space conditioning buildings
- + Lighting & Machinery
- + Transportation
- + Communication
- + Manufacturing

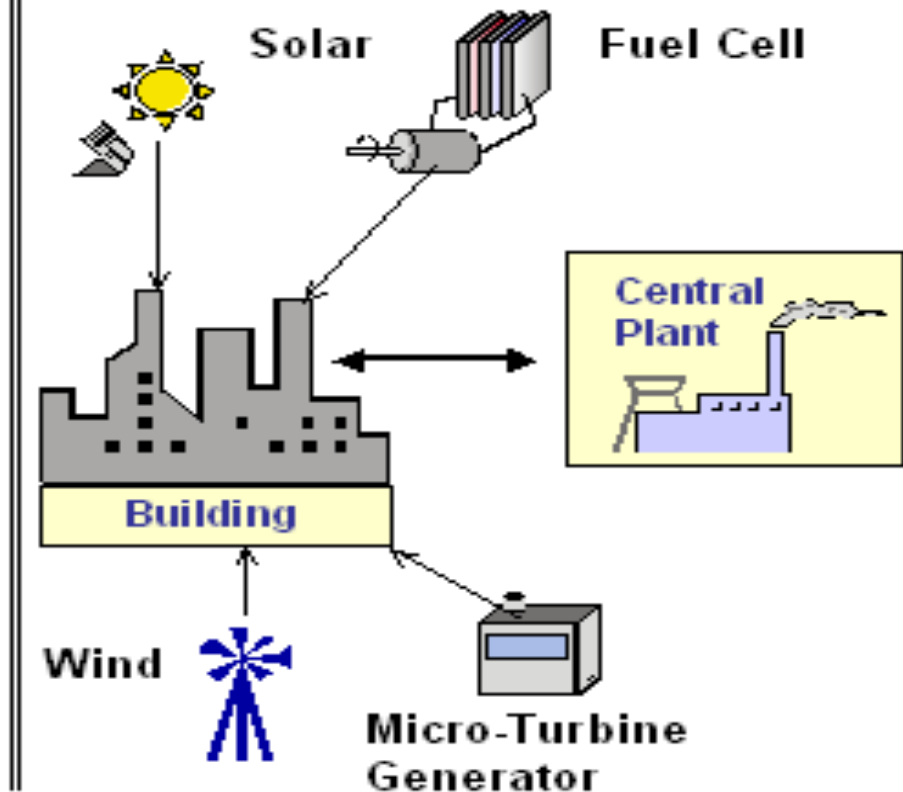


# CENTRAL vs. DISTRIBUTED GENERATION

## Central Generation

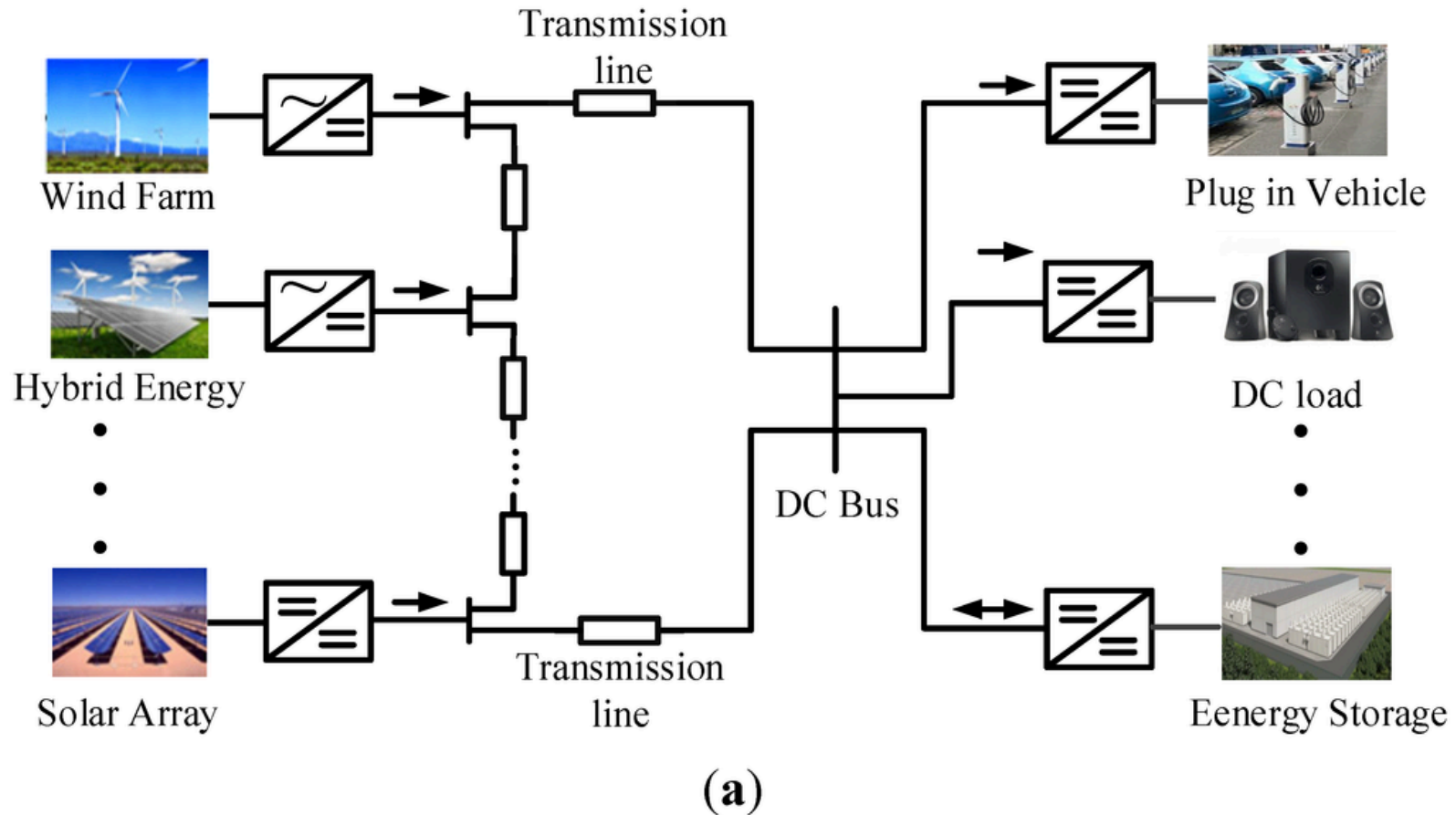


## Distributed Generation





# Micro-grids on DC electricity



# NET ZERO HIERARCHY



# System Solutions

- + Address the technology to displace fossil fuels
- + Build the infrastructure to support new systems
- + Electricity
- + Transportation



# Planning for a Transition



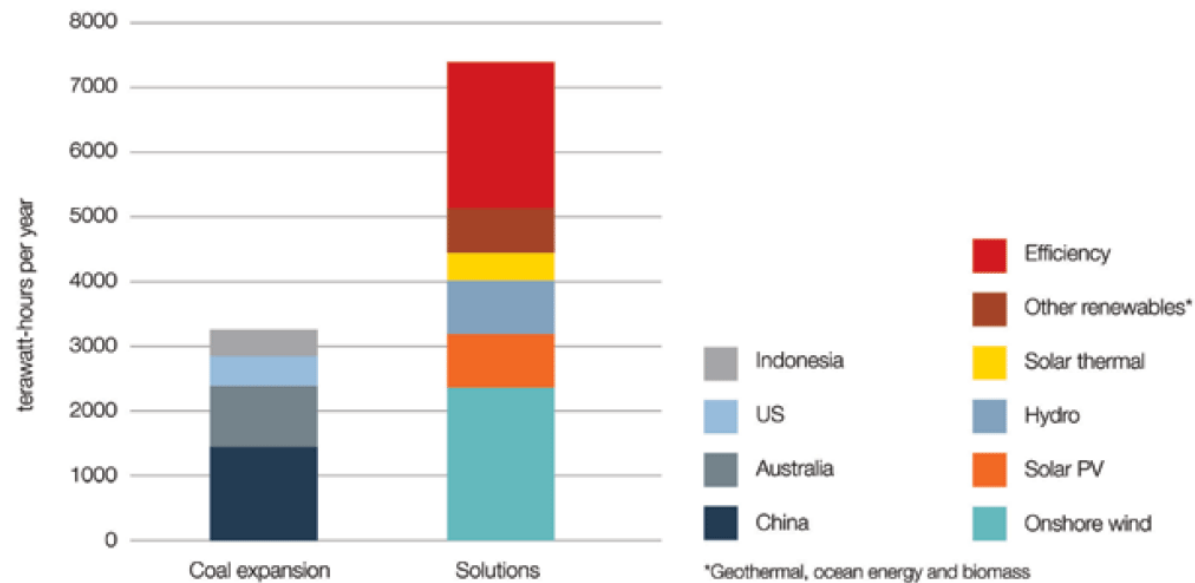
+ What is the pillar on the other side?



# A Vision for Success at 1.5 °C Target

## Dirty vs. Clean energy

Solutions for Coal: Realistic deployment by 2020



Source: Greenpeace 2012: *Energy Revolution: A Sustainable World Energy Outlook*

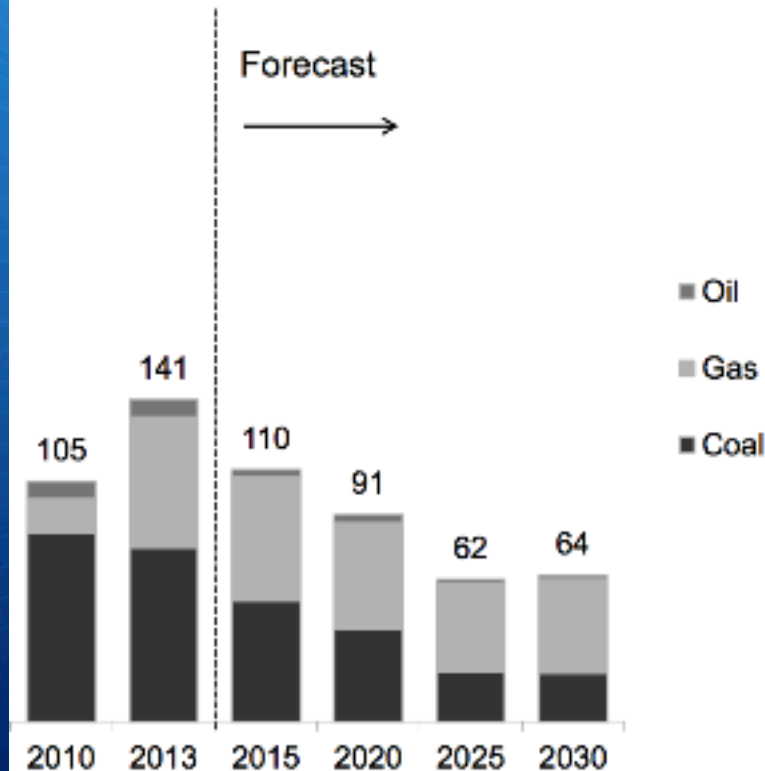
**+ “We reject the notion that we have to choose between good jobs and a clean environment. We need to have both or we will have neither!”**



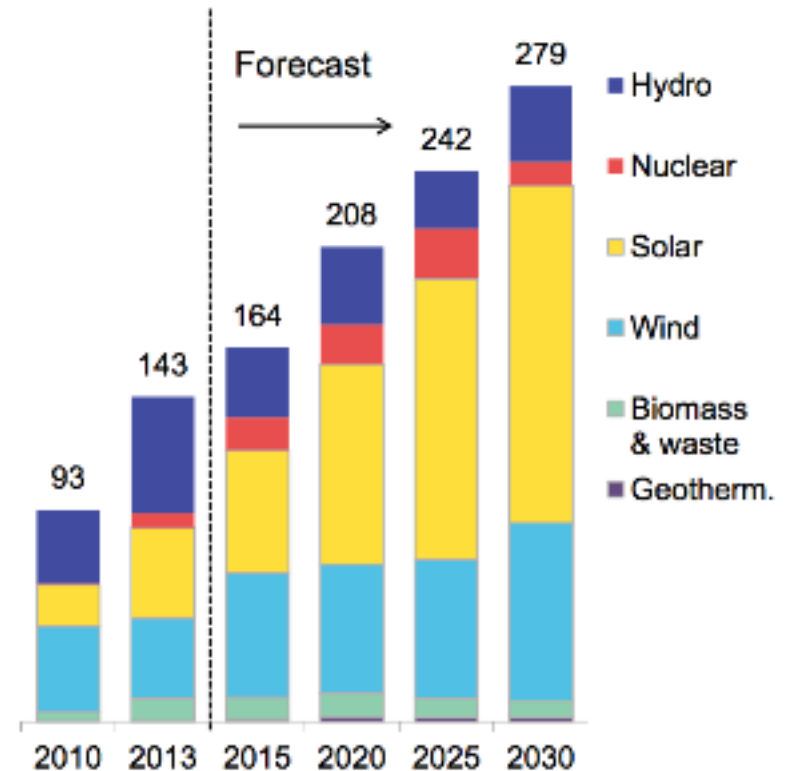
Leo Gerard, United Steel Workers Union  
Good Jobs, Green Jobs Conference March 2009

# Energy Industry Job Trends to 2030 - US

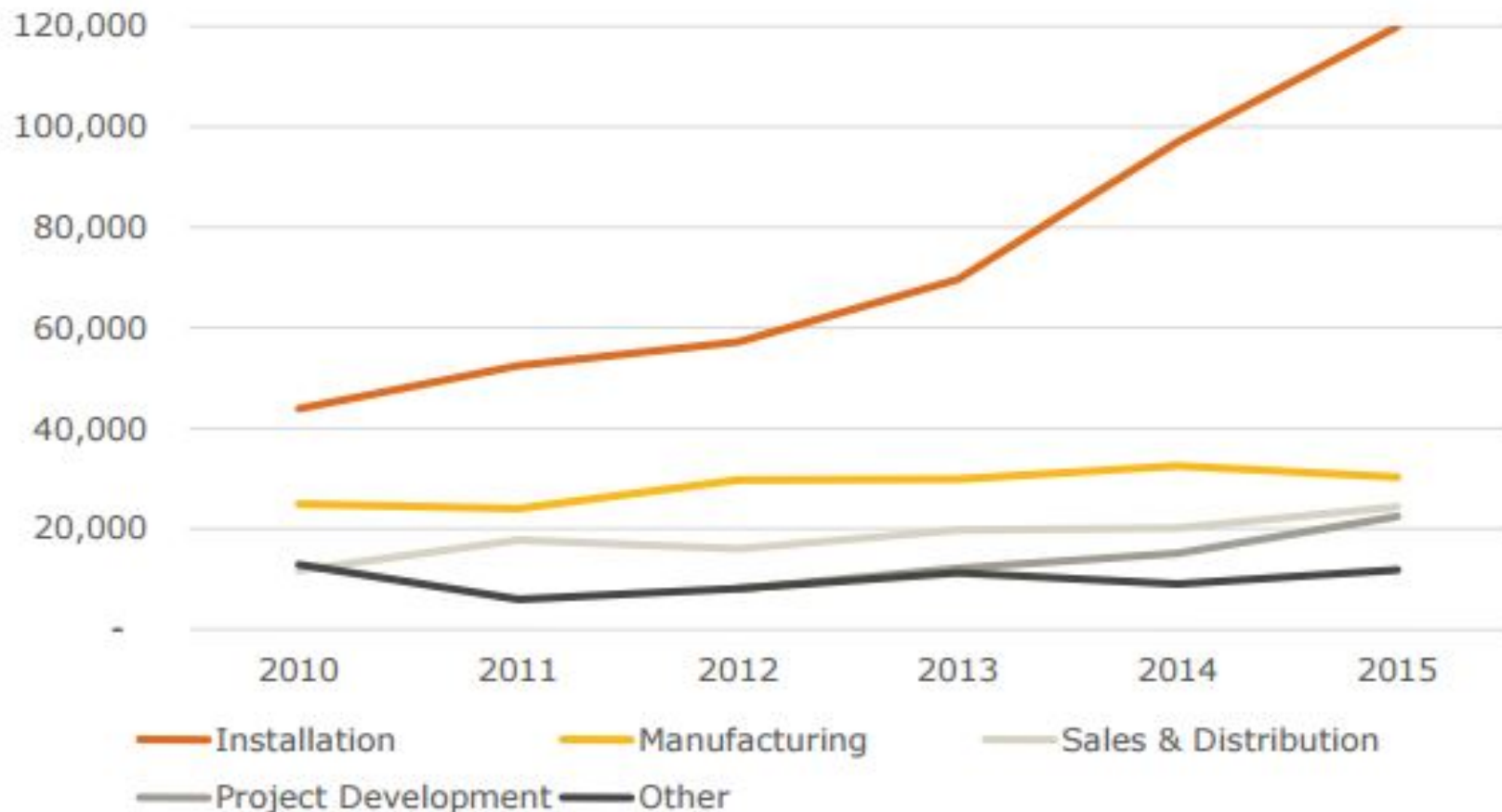
## FOSSIL FUEL



## CLEAN ENERGY



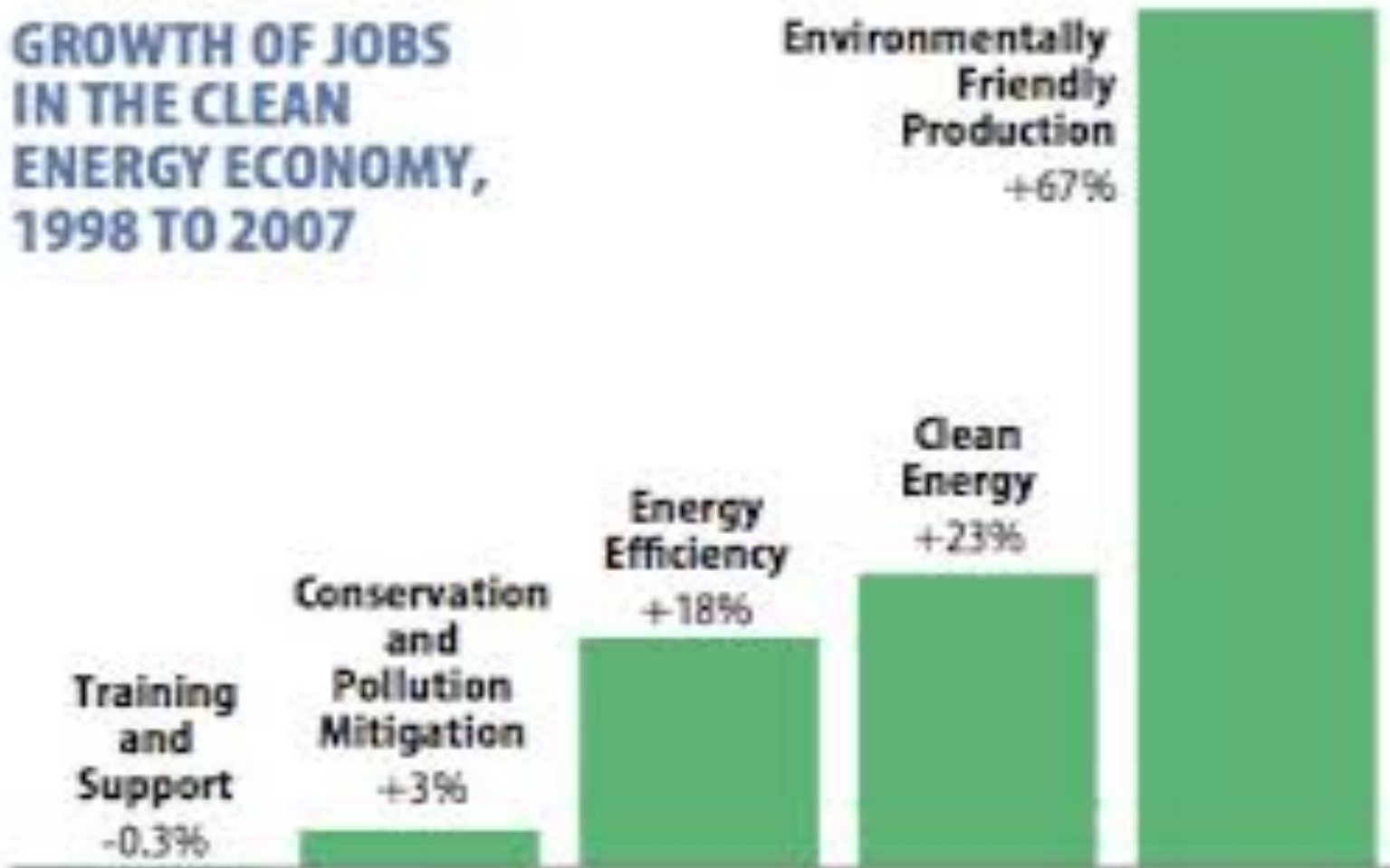
# Solar Industry Job Growth -US





# Jobs in The Energy Infrastructure

## GROWTH OF JOBS IN THE CLEAN ENERGY ECONOMY, 1998 TO 2007



# People matter!



- + The plan for transition MUST include a plan for taking care of the workers
- + Protecting pensions and benefits
- + Meaningful re-training
- + Community re-investment

# A Time to Choose...within our control – for another 10,000 years



# A New System of Governance

- + **Public trust** doctrine for natural resource management
- + **Prevent** the Tragedy of the Commons on a global scale
- + **Manage critical common resources for the long term benefit of all**





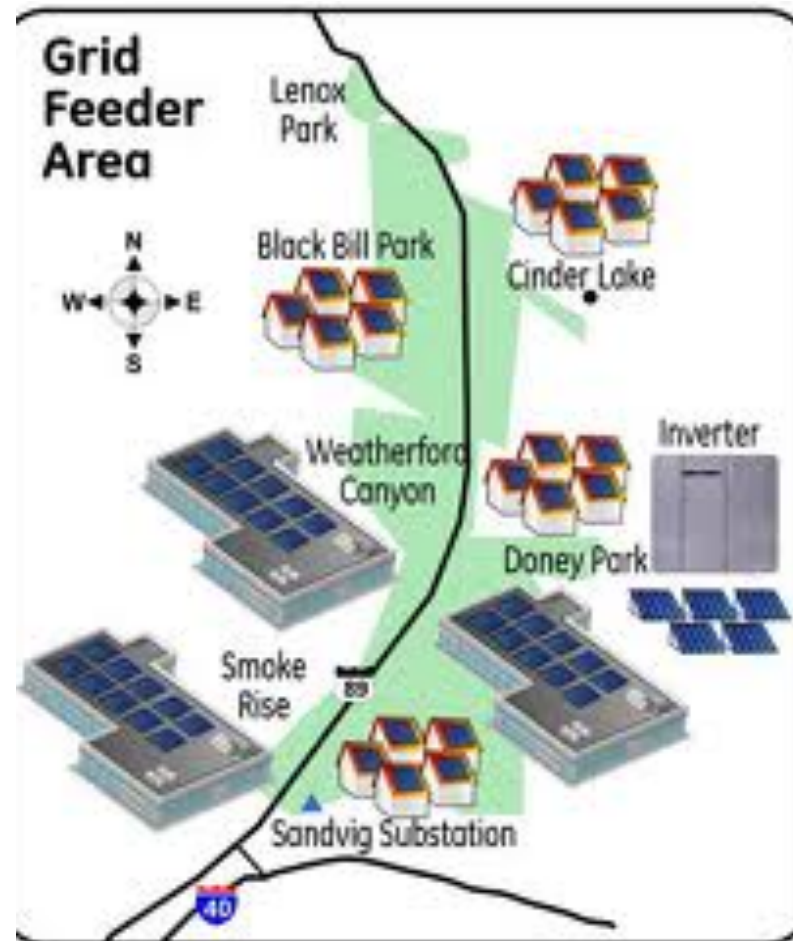
# A New System of Economics

- + Replace the linear GDP concept with
- + A Dynamic Equilibrium
- + A system more aligned to natural cycles of resource use, recovery and re-use Rather than extraction and waste



# Where it is working already:

- + Utility-owned distributed generation on customer rooftops, such as the Arizona Public Service Community Power Project
- + Requires Net metering tariff and Investment Tax Credit



# Net Zero Energy Buildings



Deerfield Illinois Zero Net Energy retail operation

# Passive solar living building



- Phipps Conservatory illustrates green roofs
- Passive solar design
- Active solar collectors
- Water conservation
- Earth tubes
- Fuel cell back up system



# Net Zero Campus



Chatham University Eden Hall Campus

January 27, 2016

# Sustainable Communities



Eco-Village- Ithaca, New York



# Obstacles to change

- Limited consensus on climate as a critical issue
- Fragmented jurisdictions
- No focus on SYSTEM SOLUTIONS



# Consumers do not see the consequences or the costs

- + Environmental damage to land and ecosystems
- + Waste disposal
- + Air pollution





# Replace **Fear** With >>>>>>



# A Plan for a Renewable Powered Economy – Care for the Earth





## “Pathways to Our Sustainable Future”

University of Pittsburgh Press

## “The Power of One Voice: A 50 Year Perspective on the Life of Rachel Carson”

With Mark Dixon, Blue Lens, LLC.

*Thanks to: Steeltown Entertainment*

## “Sustainability Pioneers”

Short video stories With Kirsi Jansa

+ “Just Transitions –Labor, Environment and Health” on The Union Edge- Labor’s Talk Radio

770 AM in Pittsburgh

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