

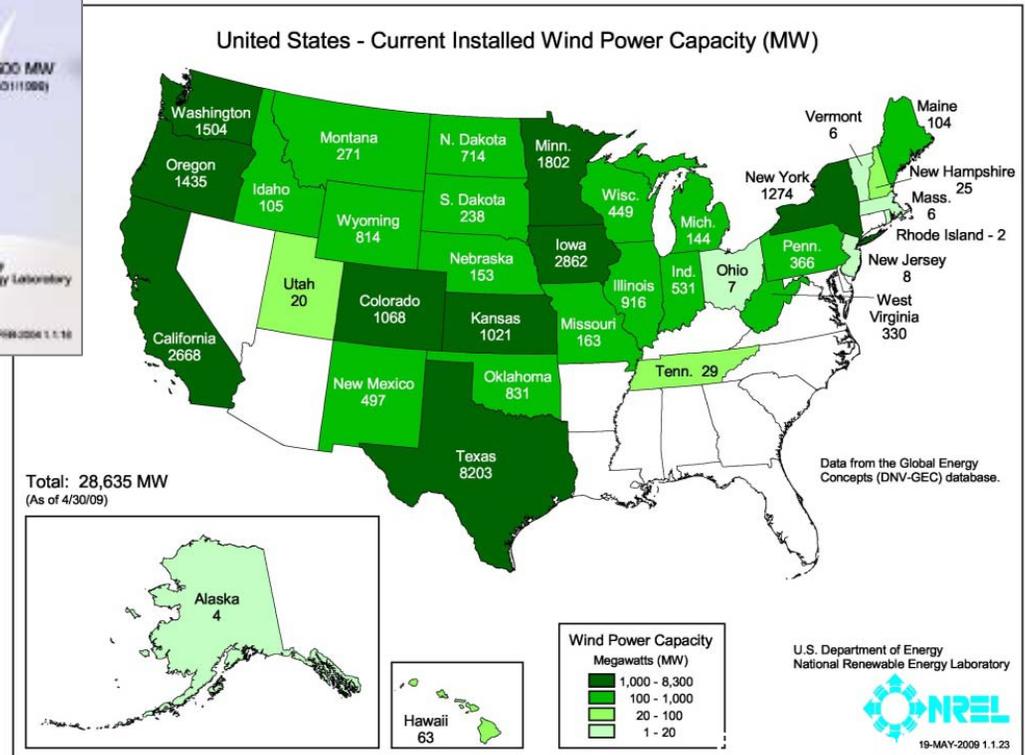
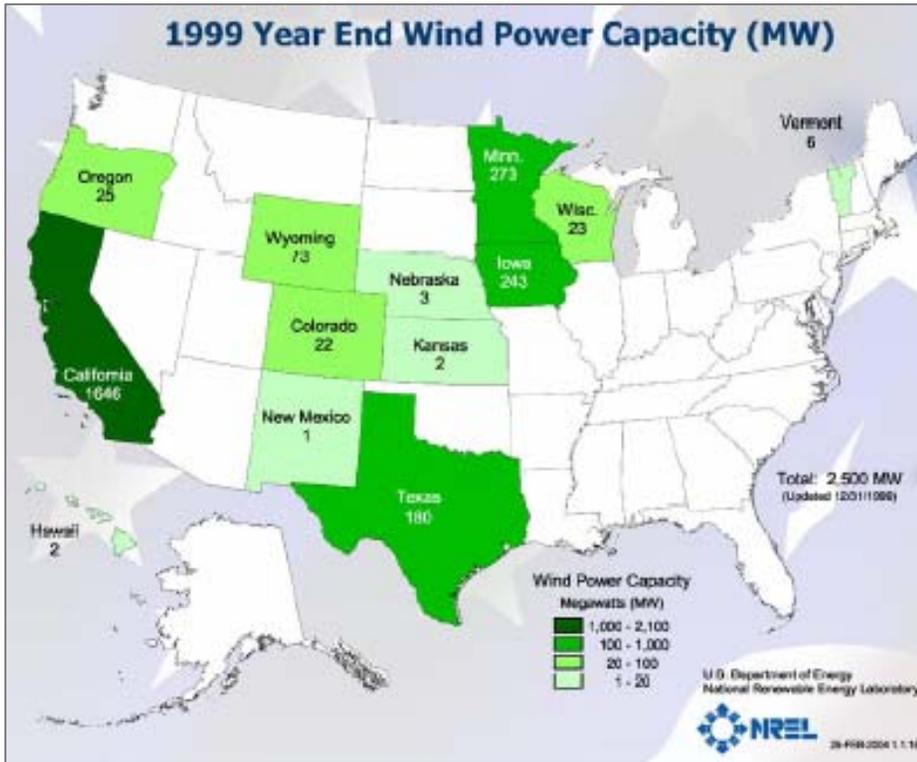


# Wind Energy Update



Larry Flowers  
National Renewable Energy Laboratory  
South Carolina - July 13, 2009

# Installed Wind Capacities (‘99 – ‘09)

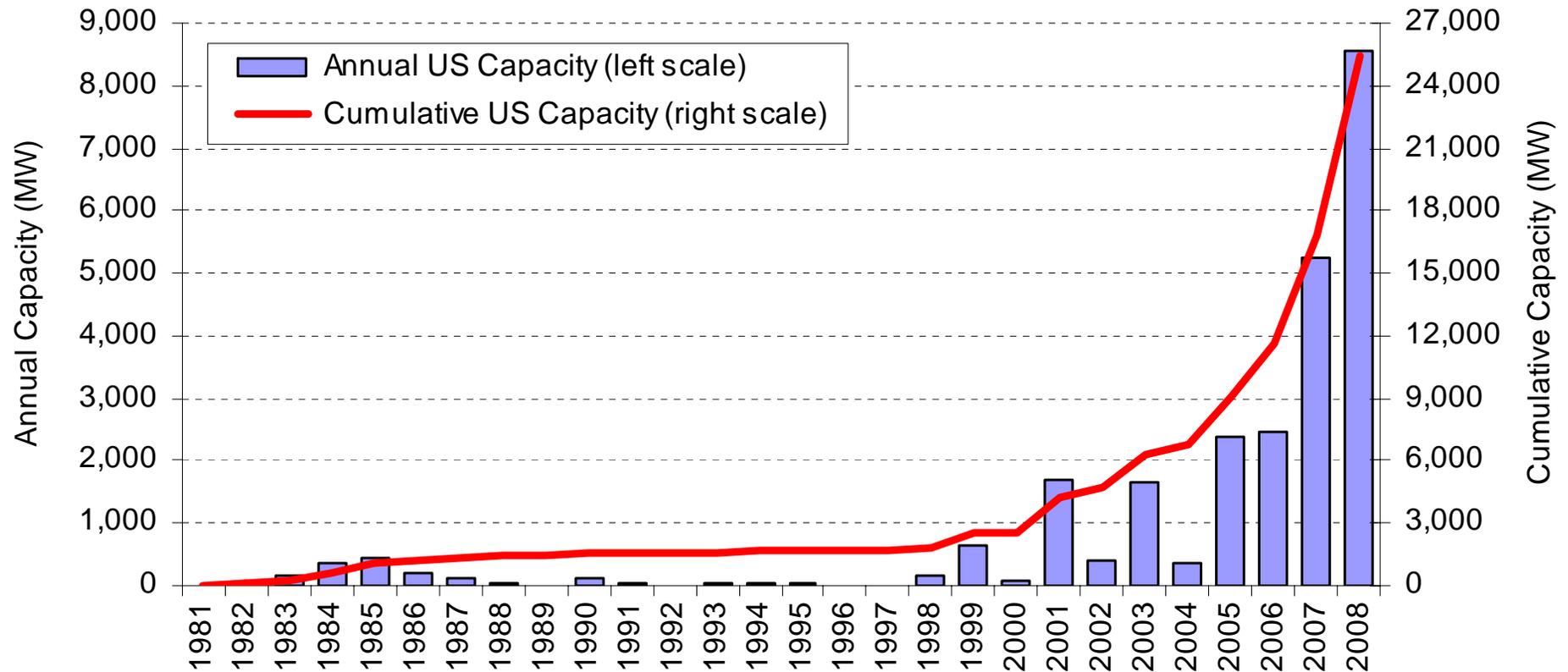




# Four Years of Strong Growth:

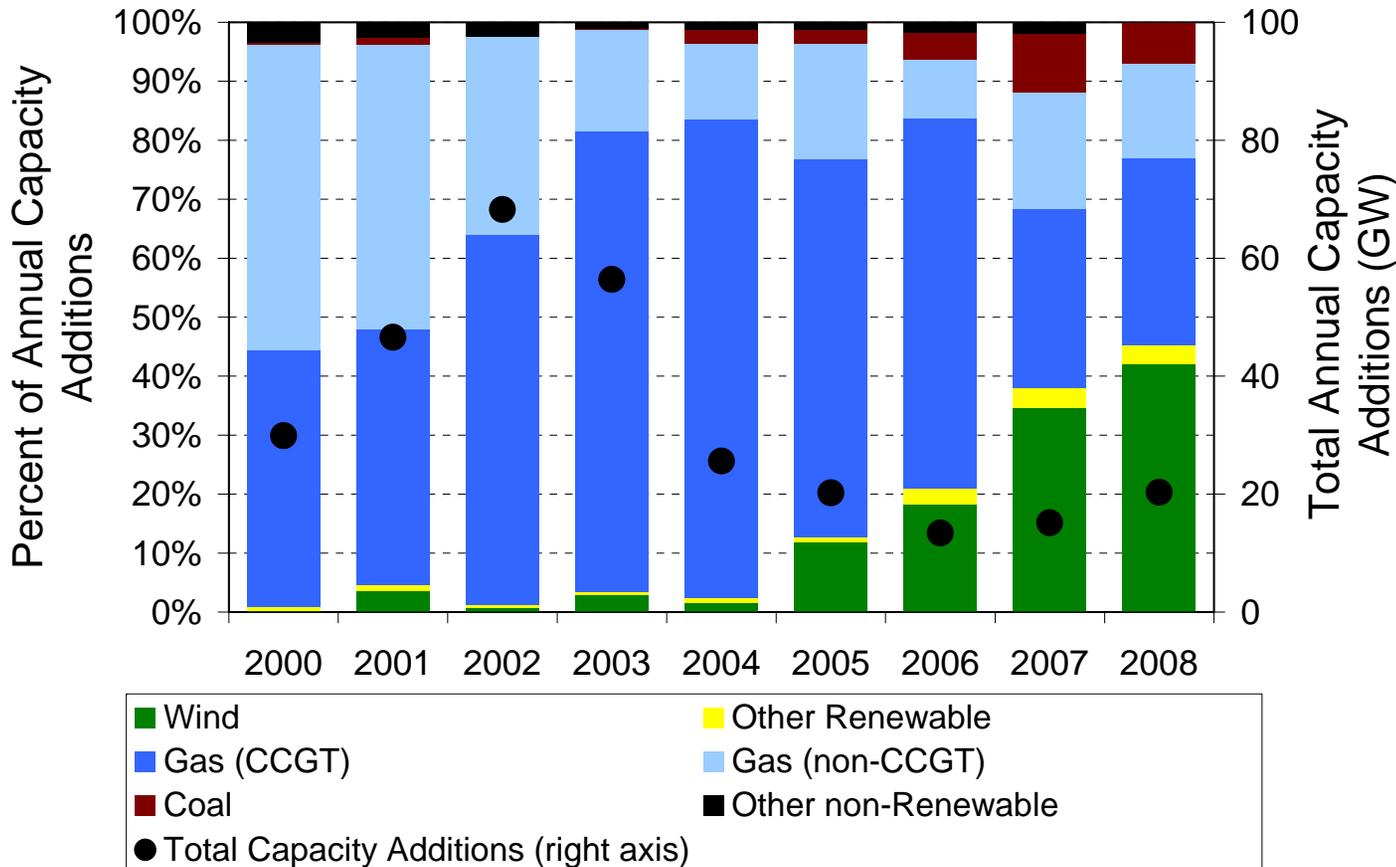


## 2008: 8,558 MW Added; \$16 billion Investment





# Wind Is a Major Source of New Generation Capacity Additions



2008: 42%  
2007: 35%  
2006: 18%  
2005: 12%  
2000-04: <5%

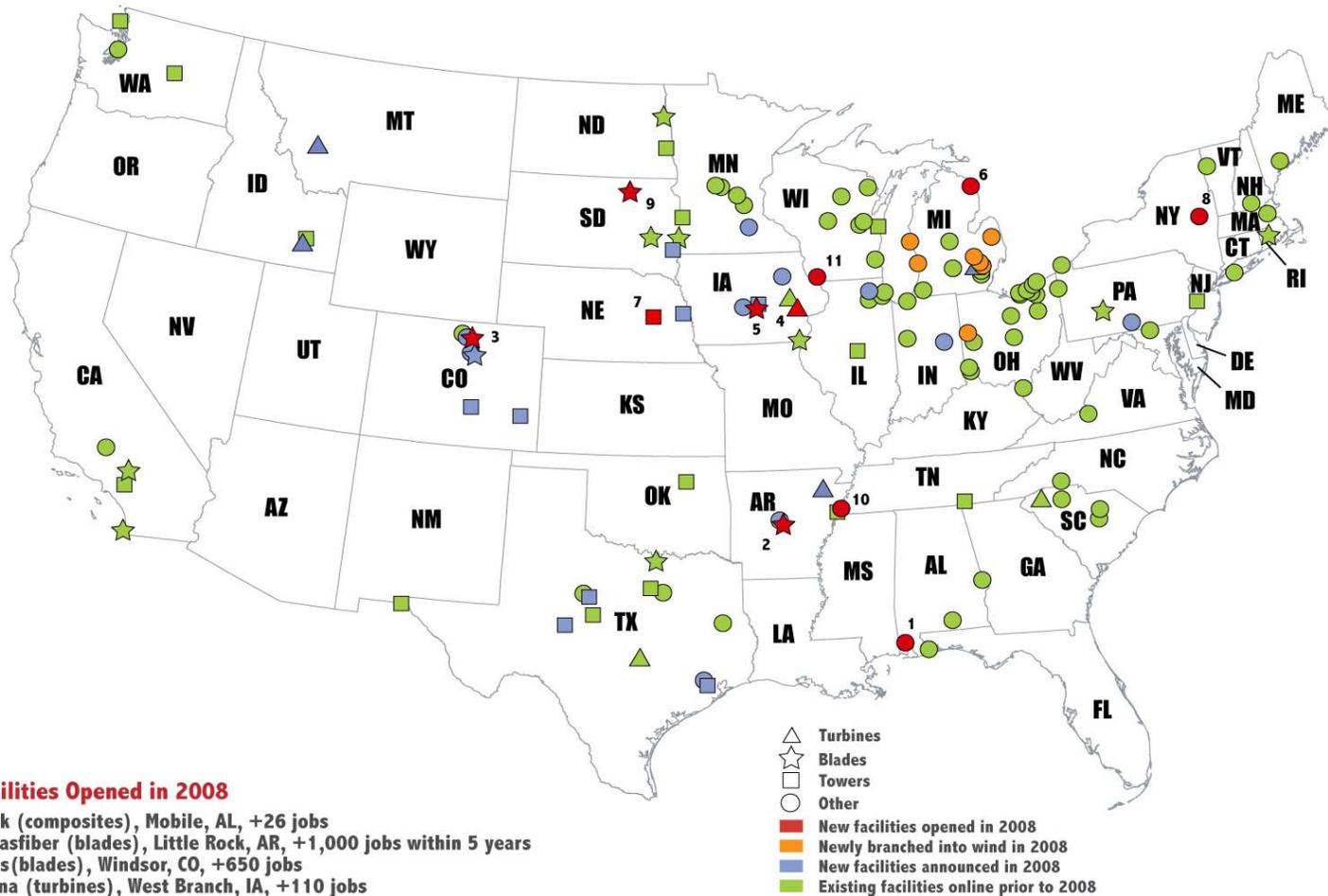
Source: EIA, Ventyx, AWEA, IREC, Berkeley Lab

# Drivers for Wind Power

- Declining Wind Costs
- Fuel Price Uncertainty
- Federal and State Policies
- Economic Development
- Public Support
- Green Power
- Energy Security
- Carbon Risk



# Soaring Demand Spurs Expansion of U.S. Wind Turbine Manufacturing



## New Facilities Opened in 2008

1. Evonik (composites), Mobile, AL, +26 jobs
2. LM Glasfiber (blades), Little Rock, AR, +1,000 jobs within 5 years
3. Vestas (blades), Windsor, CO, +650 jobs
4. Acciona (turbines), West Branch, IA, +110 jobs
5. TPI Composites (blades), Newton, IA, +140 jobs
6. ATI Casting Services (casting and foundry), Alpena, MI, +20 jobs
7. Katana Summit (towers), Columbus, NE
8. GE (parts fulfillment center), Schenectady, NY
9. Molded Fiberglass (blades), Aberdeen, SD, +up to 750 jobs
10. GE (parts operation center), Memphis, TN
11. Wausaukee Composites (housings), Cuba City, WI, +61 jobs

Figure includes wind turbine and component manufacturing facilities, as well as other supply chain facilities, but excludes corporate headquarters and service-oriented facilities. The facilities shown here are not intended to be exhaustive. Those facilities designated as "Turbines" may include turbine assembly and/or turbine component manufacturing, in some cases also including towers and blades.

# South Carolina – Economic Impacts

from 1000 MW of new wind development

*Wind energy's economic "ripple effect"*

## Direct Impacts

### Payments to Landowners:

- \$2.7 million/year

### Local Property Tax Revenue:

- \$8.7 million/year

### Construction Phase:

- 1629 new jobs
- \$188.5 M to local economies

### Operational Phase:

- 250 new long-term jobs
- \$21.2 M/yr to local economies



## Indirect & Induced Impacts

### Construction Phase:

- 1413 new jobs
- \$122.5 M to local economies

### Operational Phase:

- 208 local jobs
- \$19.1 M/yr to local economies

## Totals

(construction + 20yrs)

**Total economic benefit = \$1.12 billion**

**New local jobs during construction = 3042**

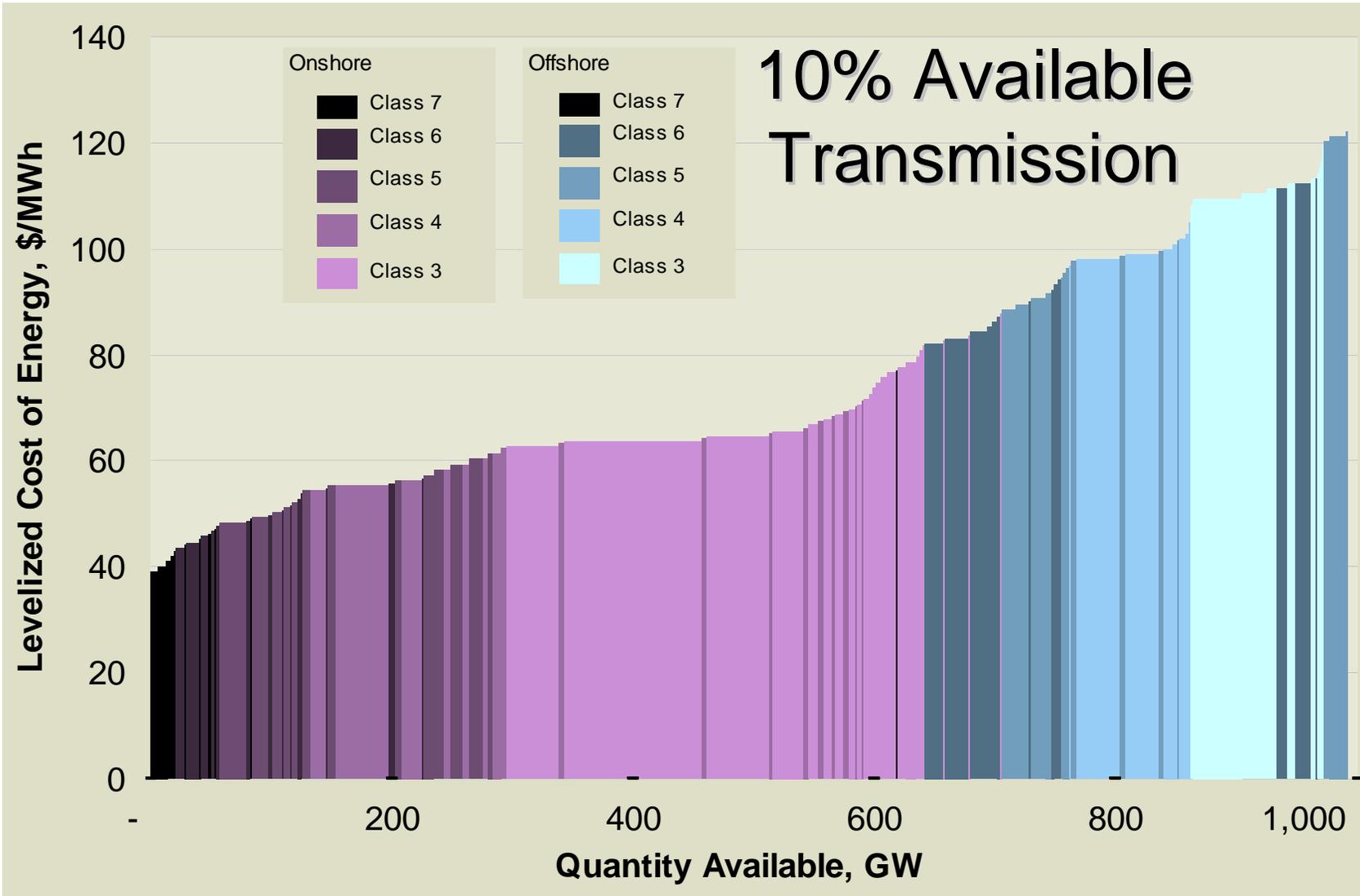
**New local long-term jobs = 458**

**Construction Phase = 1-2 years**  
**Operational Phase = 20+ years**



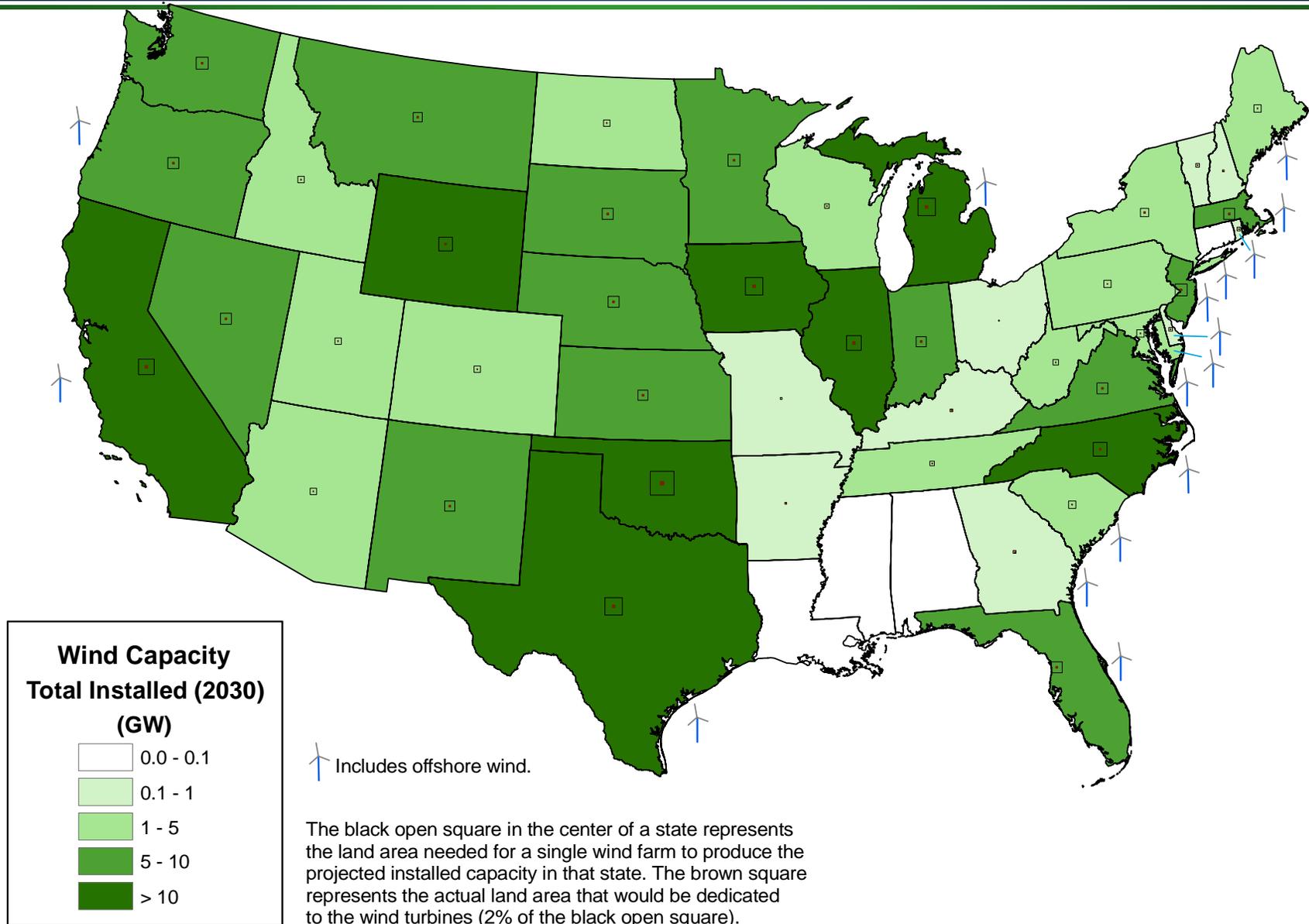
**20% Wind Energy by 2030**  
Increasing Wind Energy's Contribution to  
U.S. Electricity Supply

“The future ain’t  
what it used to be.”  
- Yogi Berra



2010 Costs w/ PTC, \$1,600/MW-mile, w/o Integration costs

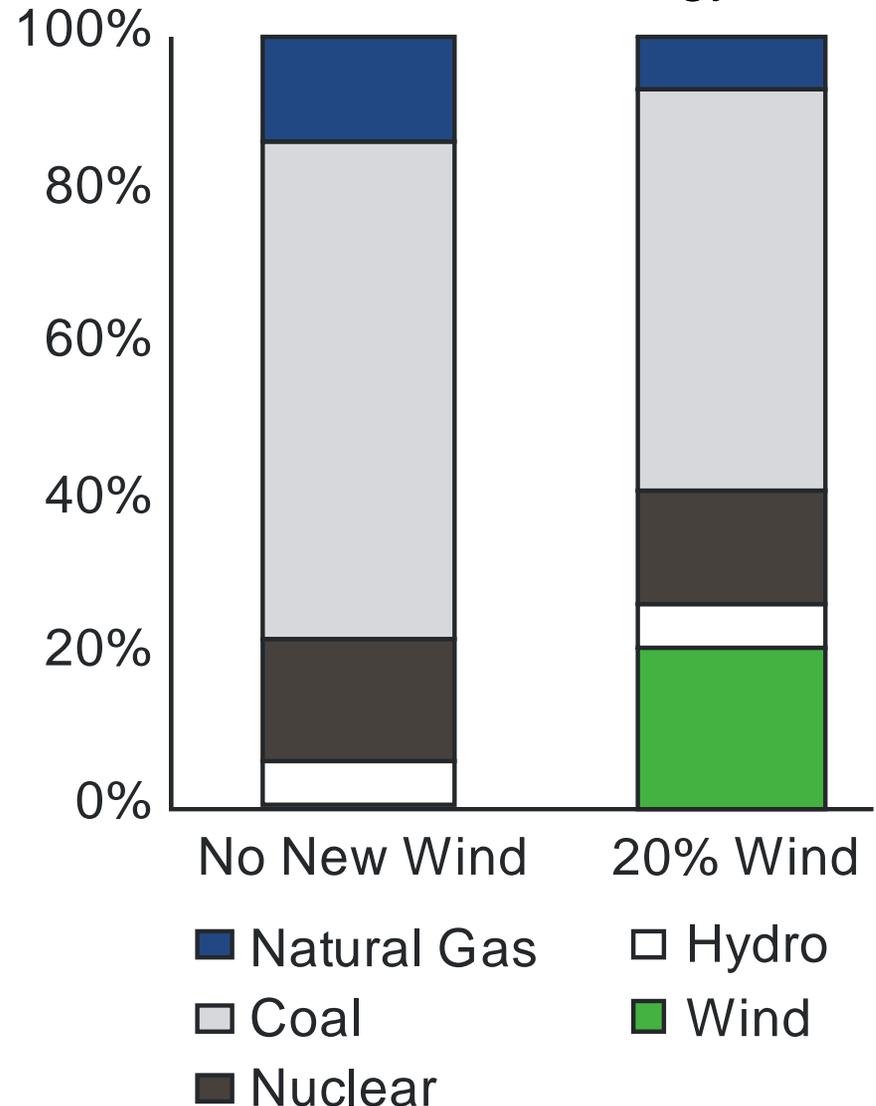
# 46 States Would Have Substantial Wind Development by 2030



# 20% Wind Scenario Impact on Generation Mix in 2030

- Reduces electric utility natural gas consumption by 50%
- Reduces total natural gas consumption by 11%
- Natural gas consumer benefits: \$86-214 billion\*
- Reduces electric utility coal consumption by 18%
- Avoids construction of 80 GW of new coal power plants

U.S. electrical energy mix





# National (U.S.) – Economic Impacts



Cumulative impacts from 2007-2030

From the 20% Scenario- 300 GW new Onshore and Offshore development

*Wind energy's economic "ripple effect"*

## Direct Impacts

### Payments to Landowners:

- \$782 M

### Local Property Tax Revenue:

- \$1,877 M

### Construction Phase:

- 1.75 M FTE jobs
- \$ 293 B to the US economy

### Operations:

- 1.16 M FTE jobs
- \$122 B to the US economy



## Indirect & Induced Impacts

### Construction Phase:

- 4.46 M FTE jobs
- \$651 B to the US economy

### Operations:

- 2.15 M FTE jobs
- \$293 B to the US economy

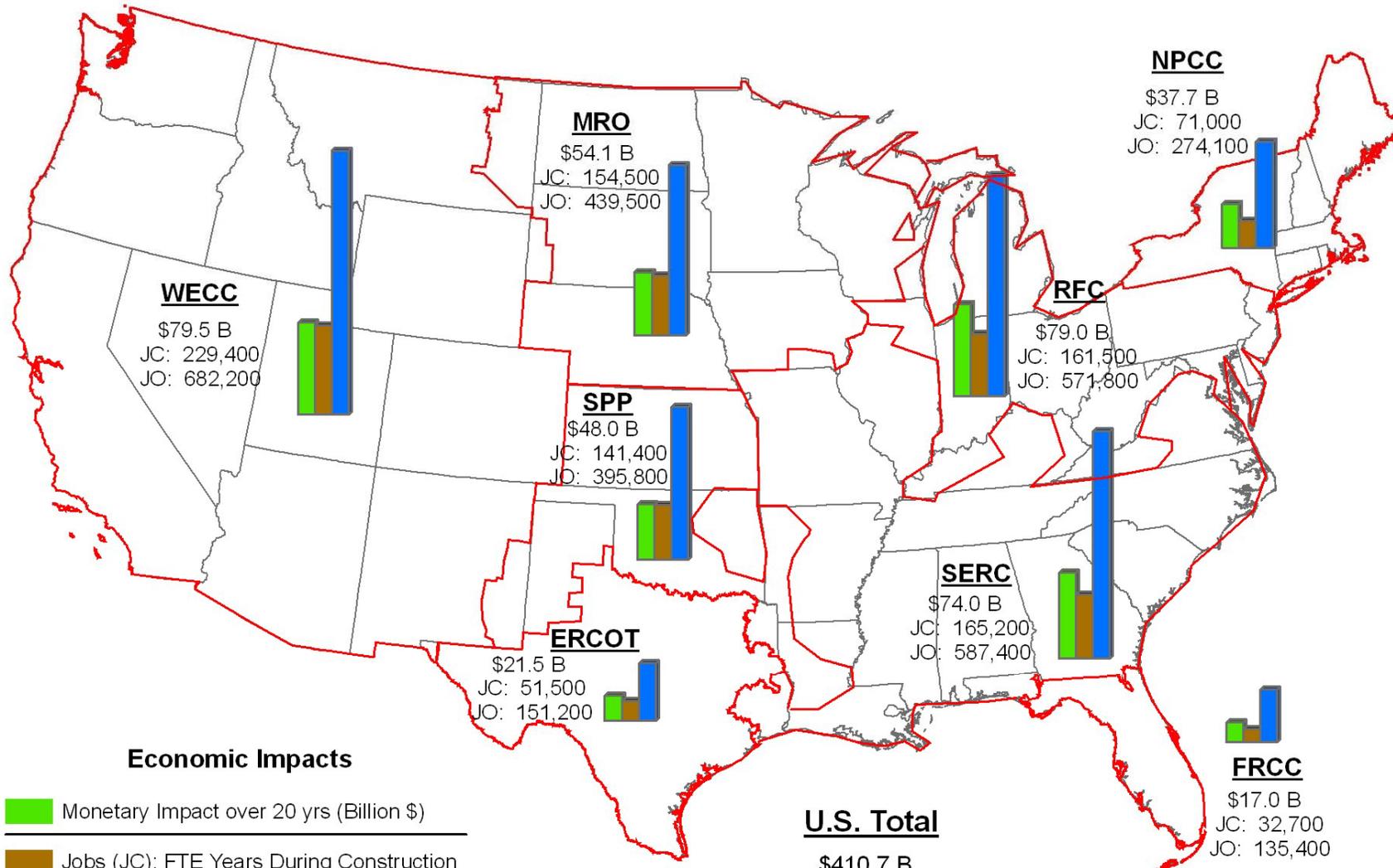
## Totals

(construction + 20yrs)

- **Total economic benefit**  
= \$1,359 billion
- **New jobs during construction**  
= 6.2 M FTE jobs
- **New operations jobs**  
= 3.3 M FTE jobs

All monetary values are in 2006 dollars.  
Construction Phase = 1-2 years

# 20% Wind Electricity by 2030 - Economic Impacts by NERC Region



## Economic Impacts

- Monetary Impact over 20 yrs (Billion \$)
- Jobs (JC): FTE Years During Construction
- Jobs (JO): FTE Years over 20 yrs Operation

Wind Vision case = 304 GW of wind capacity.  
All job values rounded to the nearest 100.

U.S. Department of Energy  
National Renewable Energy Laboratory





# South Carolina – Economic Impacts



From the 20% Scenario

327 MW of new Onshore and 3,126 MW new Offshore development

*Wind energy's economic "ripple effect"*

## Direct Impacts

### Payments to Landowners:

- \$872 thousand/yr

### Local Property Tax Revenue:

- \$2.8 M/yr

### Construction Phase:

- 8,309 new jobs
- \$962 M to local economies

### Operational Phase:

- 1,995 new long-term jobs
- \$184 M/yr to local economies



## Indirect & Induced Impacts

### Construction Phase:

- 7,208 new jobs
- \$625 M to local economies

### Operational Phase:

- 1,227 local jobs
- \$112 M/yr to local economies

## Totals

(construction + 20yrs)

**Total economic benefit = \$7.5 billion**

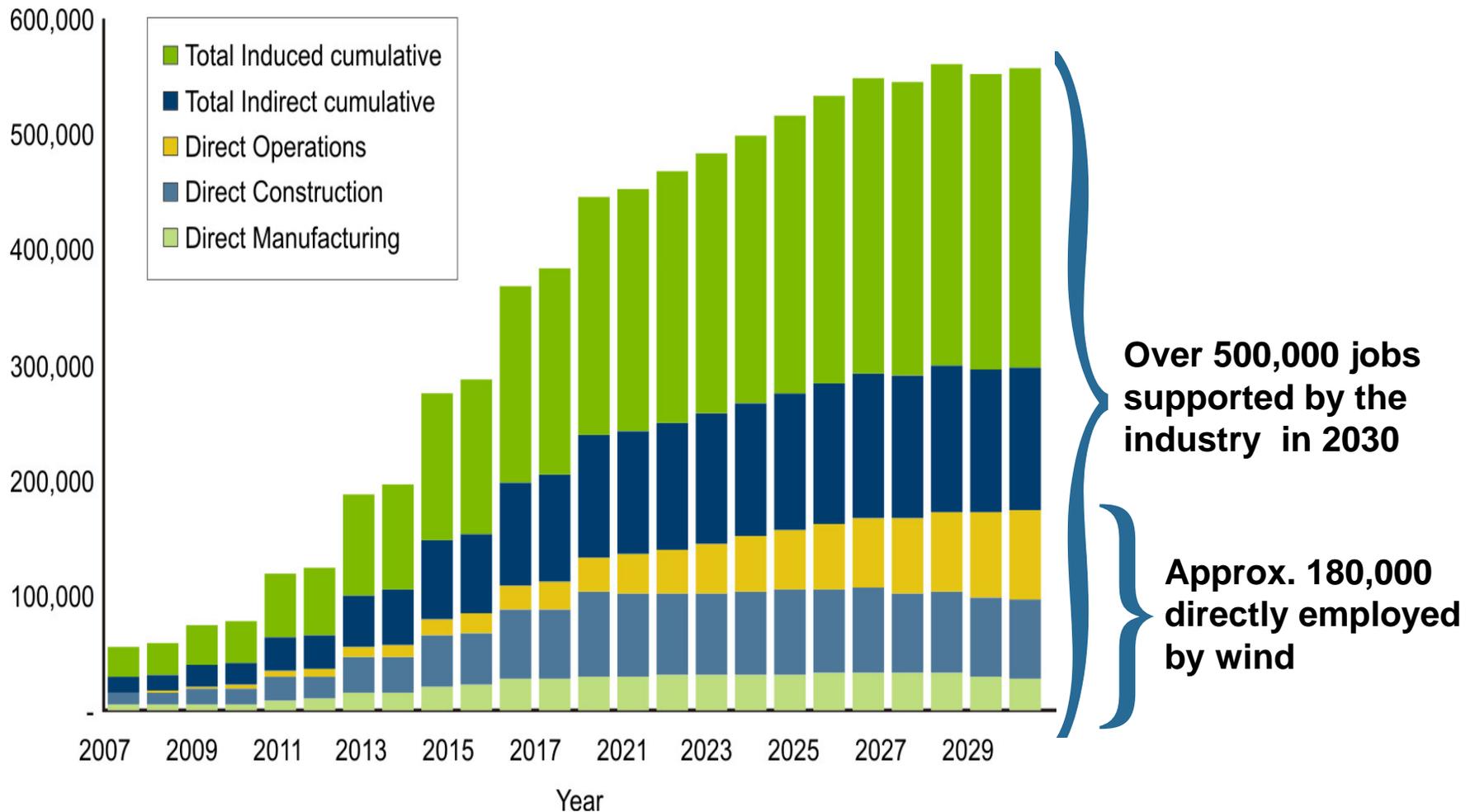
**New local jobs during construction = 15,517**

**New local long-term jobs = 3,222**

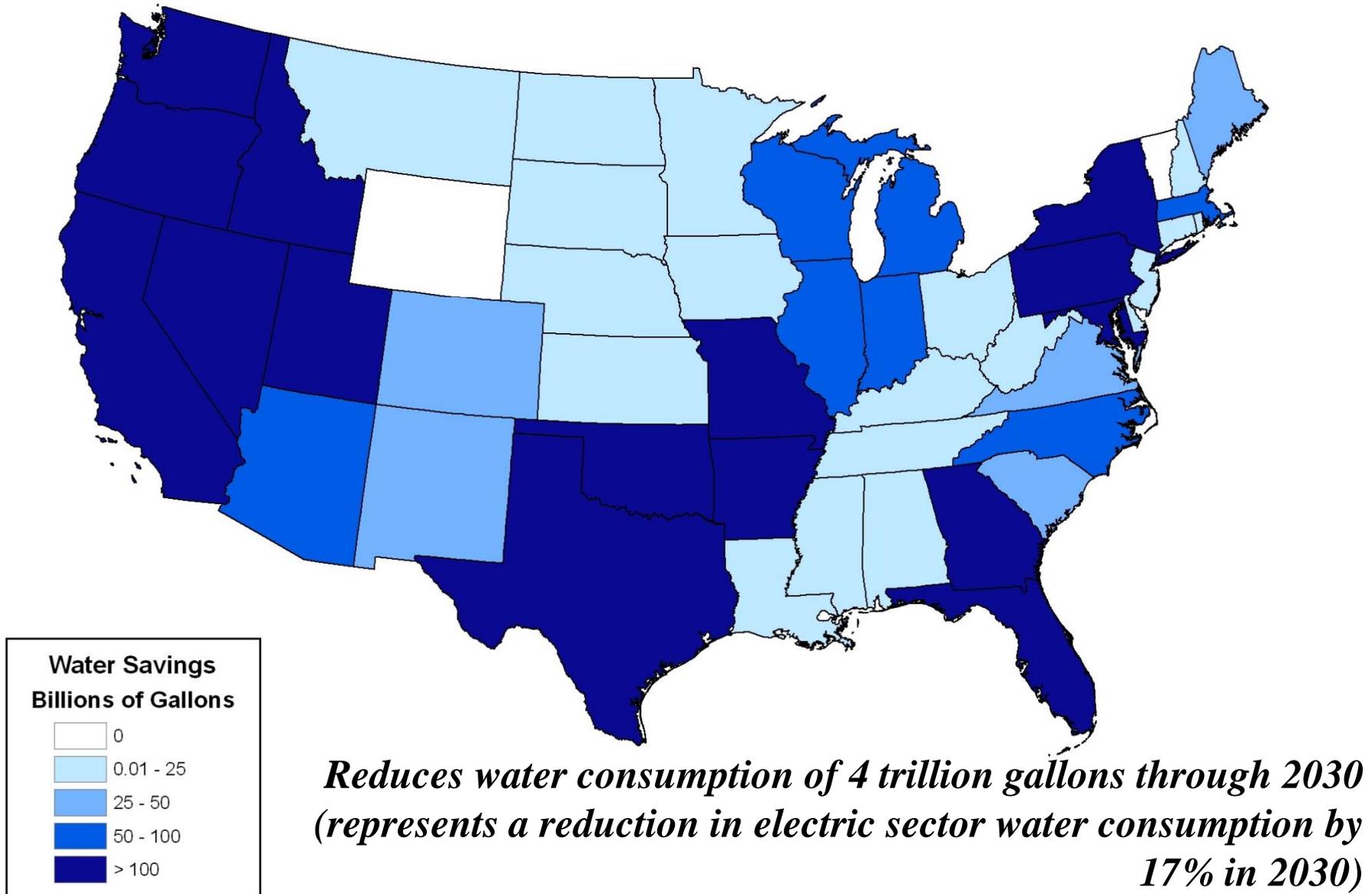
**Construction Phase = 1-2 years**  
**Operational Phase = 20+ years**

# Jobs Supported by the 20% Scenario

**Over 500,000 jobs would be supported between 2007 and 2030**



# Cumulative Water Savings from 20% Scenario

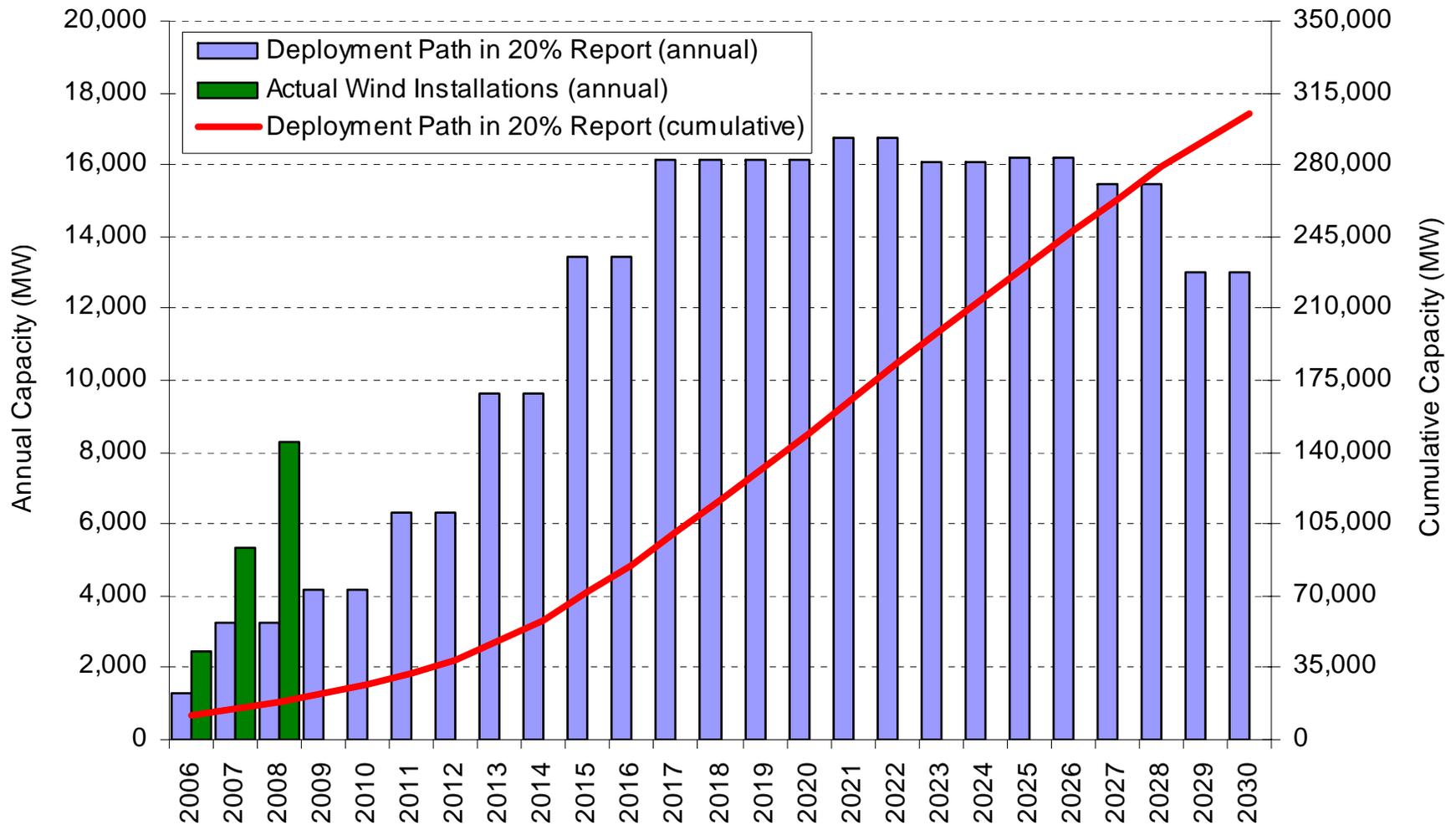




## Results: **Costs** & **Benefits**

Incremental direct cost to society	<b>\$43 billion</b>
Reductions in emissions of greenhouse gasses and other atmospheric pollutants	825 M tons (2030) <b>\$98 billion</b>
Reductions in water consumption	8% total electric 17% in 2030
Jobs created and other economic benefits	140,000 direct \$450 billion total
Reductions in natural gas use and price pressure	11% <b>\$150 billion</b>
<b>Net Benefits: \$205B + Water savings</b>	

# Progress Toward 20% Wind



2008 Wind Market Report; LBL



# *Carpe Ventem*



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