

# Green Economics: The Future of Health and Wealth in America



Moderated by Tom Soto, Craton Equity Partners

Panelists: Mary Anne Sullivan, Hogan & Hartson

Carolyn Green, EnerGreen Capital

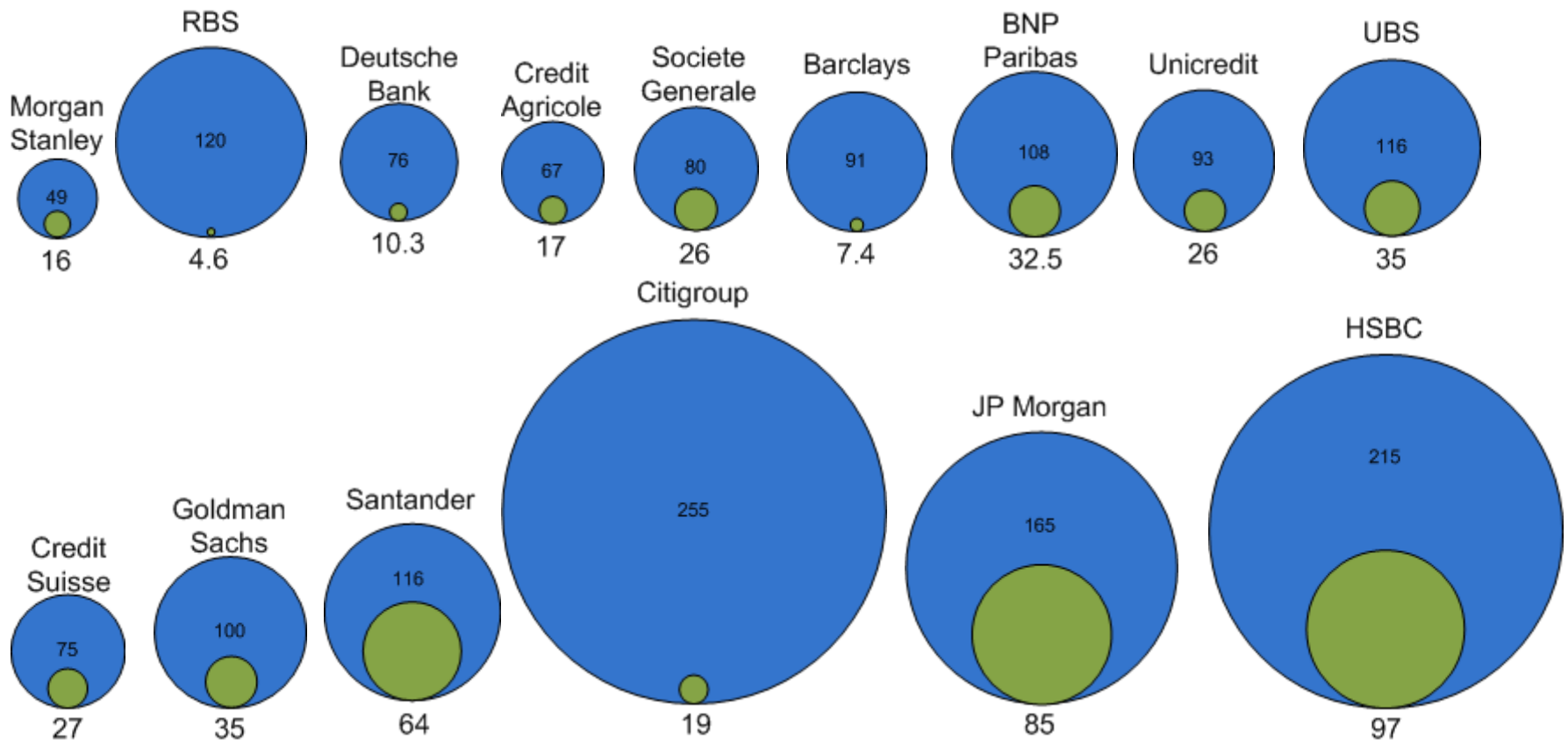
Ryan Smith, Credit Suisse

Matthew B. Arnold, PricewaterhouseCoopers

# Banks By Market Cap

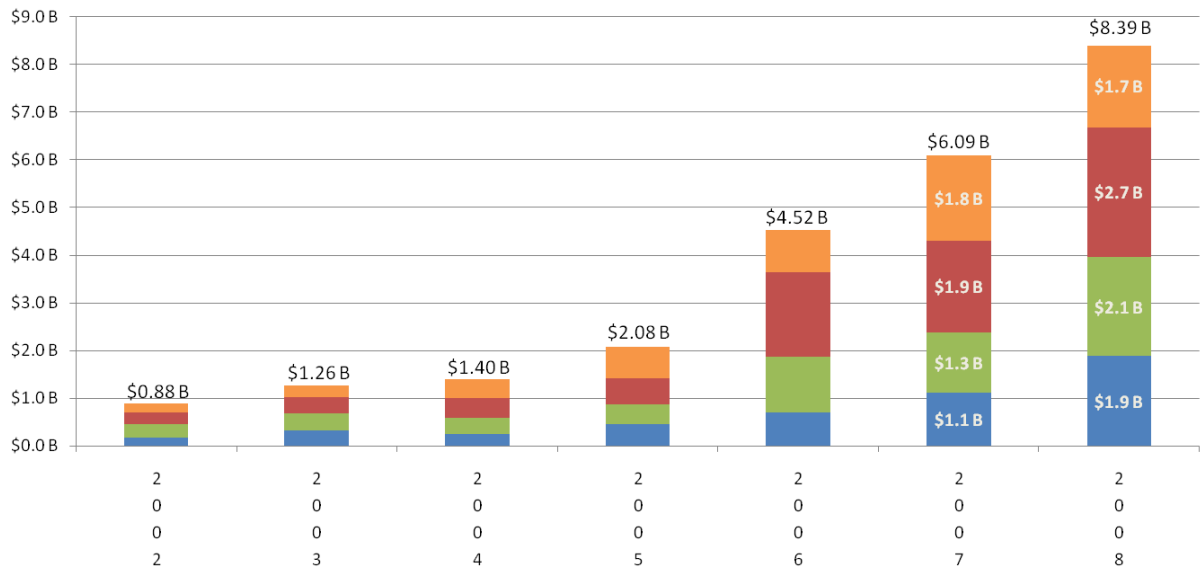
● Market Value as of January 20<sup>th</sup> 2009, \$Bn

● Market Value as of Q2 2007, \$Bn



# Cleantech Investing Continues to Show Strong Growth

Quarterly Cleantech Investment Tracked by Cleantech Group



**CAGR of 60% from 2005 to 2008**

- Dramatic increase in investment activity preceded and coincided with recession
  - Infusion of stimulus money boosts industries hampered by credit market tightening
- Cleantech private equity investments in 2008 were up 38% from 2007
- Continuing a trend that began last year, 2009 investments are increasingly flowing toward technologies that boost energy efficiency or energy storage, a less capital intensive option for many private investors compared to large solar and wind projects

Sources: Cleantech Group; Wall Street Journal, May 11, 2009

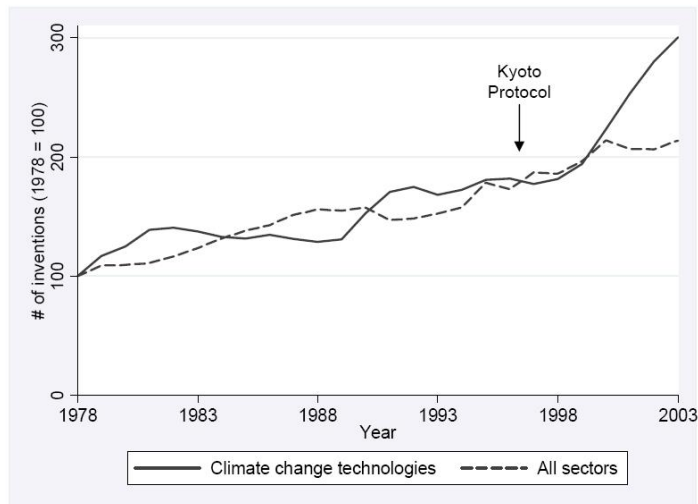
“Embedding cleantech into everything we design and manufacture is a way to revive America as a manufacturing power.”  
 – Thomas Friedman

# Sector Highlights

- **Government backing.** Stimulus plans filling financing gap in cash-starved, capital-intensive, renewable energy and smart grid projects; rapid delivery crucial to ease credit squeeze
  - Democrats already drafting second phase of energy legislation before December Copenhagen climate change talks; possible push for national Renewable Portfolio Standard and cap-and-trade
- **Extended investor visibility.** Longer-term energy policy encourages widening the tax-equity investor pool and spurring venture capital, public investment and business combinations
- **Greenhouse gas, energy supply solutions.** Modernized and efficient energy infrastructure dovetails with greenhouse gas reduction goals, and long-term energy supply needs
- **Multiple industry players lead to diversified economic impact.** Cleantech investment drives economic and job growth across a spectrum of industries—from IT, automotive, manufacturing and biotech to agriculture
  - Cleantech industries are poised to benefit as an infrastructure play and job-growth driver in President Obama’s push for a new energy economy, boosting opportunities for cleantech investors, producers and adopters

# Historical Context for the Cleantech Sector

- The 1970's and 1980's experienced significant energy problems, but the right technologies were not available to respond in meaningful ways
- The end of the Cold War unleashed a new generation of technologies to the private sector such as the Internet, GPS, low weight carbon fibers, engine technologies, etc.
- Global patent filings for clean technologies have grown much faster than other technologies since the signing of the Kyoto protocol in 1997\*



\*Source: CERNA, "Invention and Transfer of Climate Change Mitigation Technologies on a Global Scale," December 2008

# After 30 Years, Cleantech Investing Has Come of Age

- In California alone, energy efficiency policies have created 1.5 million jobs and \$35 billion for downstream industries since 1977\*
  - During this time, Californians have reduced per capita energy consumption to a level that is 40% below the national average, making them the leanest energy users in the country
- California's AB 32 is expected to create 100,000 new jobs\*
- Public agencies authorized by voter-approved bonds from school districts, state correctional facilities and water districts are defining the sector
- The Obama administration has estimated that 5 million jobs could be created across the US by a \$150 billion investment in cleantech over 10 years

***“In the face of rising unemployment, renewable energy has become a crucial source of good jobs, particularly for laid-off Rust Belt workers.”***

– New York Times, Nov. 2, 2008



\*Source: California Environmental Protection Agency

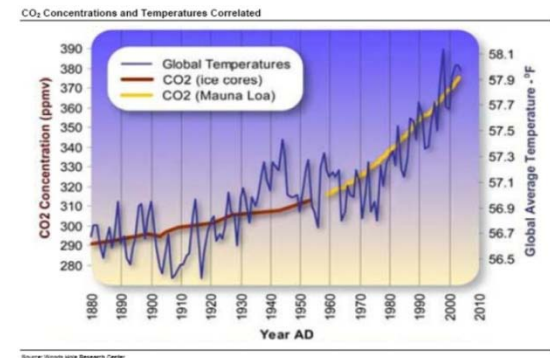
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**“This is the chief moral obligation in the 21st century -- to build a green economy strong enough to lift people out of poverty.” – Van Jones**

# Climate Change a Formidable Global Financial Risk

- The atmospheric concentration of CO<sub>2</sub> and CH<sub>4</sub> in 2005 exceeded by far the natural range of the last 650,000 years
  - CO<sub>2</sub> concentrations are currently at 430 ppm, rising at 2.5 ppm per annum and this rate is increasing
- According to the UN, an increase of just 2° C will sharply increase the risk of a climate tipping-point that could lead to “intolerable impacts on human well-being”
  - Humans now control the mechanisms for global climate change, for better or worse
  - Future climate changes include: more extremes and storms, wetter in high latitudes, drier in subtropics
- California policy makers understand the true ROI for sustainable investments
  - “California regulators cracked down on diesel air pollution Friday, adopting the nation's toughest rules on heavy-duty trucks...The state Air Resources Board voted unanimously for the measure that requires truckers to retrofit or replace older rigs, starting in 2011. **The board declared that the health benefits far outweighed the financial pain.**”



Sources: IPCC Assessment Report, 2007<sup>1</sup>; UN report on climate change, Feb. 2007; Los Angeles Times, Dec. 13, 2008

“We're borrowing money from China to buy oil from the Persian Gulf to burn it in ways that destroy the planet. Every bit of that's got to change.” – Al Gore

# International and Local Policy Drivers

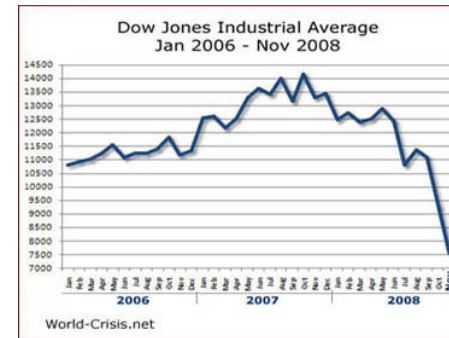
- As of February 2009, 181 countries had signed and ratified the Kyoto Protocol
  - 39 US states and more than 300 US cities have passed initiatives supporting the treaty
- 73 countries have renewable energy policy targets in 2009, up from 66 at the end of 2007
- Copenhagen climate summit, December 2009
  - Environment officials will meet to work out global approach to climate change, including greenhouse gas emissions requirements
  - US legislators targeting passage of climate-change legislation prior to Copenhagen in order to assume credible leadership role
- Waxman-Markey climate and energy bill, currently in House, a positive, long-term driver of diverse cleantech industries
  - Paradigm-shifting pillars of the bill include
    1. National renewable portfolio standard
    2. Energy-efficiency requirement standards
    3. Green building requirements
    4. Carbon cap-and-trade
- Cap-and-trade system is expected in the US in the next few years, which will increase the value of cleantech companies by allowing them to monetize their contributions with reducing carbon emissions





# Cleantech Investing in an Era of Uncertainty

- **Emergency Economic Stabilization Act (EESA)** passed on October 3, 2008, authorizing U.S. Treasury to buy up to \$700 billion worth of mortgage-backed securities
  - Same amount that the U.S. spends each year to import oil from around the world
- **The EESA provides long-term price signals to the cleantech sector** with the inclusion of key tax credits for renewable energy
  - An 8-year extension of the investment and production tax credits for solar power and a 1-year extension for wind power
  - New 2-year investment and production tax credits for geothermal energy, bringing geothermal heat pump technology to parity with other sources of clean energy generation and efficiency
  - A 2-year extension of the production tax credit for closed and open-loop biomass production, landfill gas, hydropower and waste-to-energy facilities
  - \$2.6 billion directed toward clean fuels and vehicles, including plug-in hybrid technology



# Key Appointments Ensure Cleantech's Continued Demand



Hilda L. Solis, Secretary of Labor

- Member of the House of Representatives since 2000
- Job creation through green investing



Ken Salazar, Secretary of the Interior

- US Senator since 2004
- Sponsored geothermal heat pump credit in the 2009 ESSA



Carol M. Browner, White House Office on Climate Change

- EPA Administrator from 1992 to 2000
- Cleantech advocate



Nancy Sutley, Chair of the Council on Environmental Quality

- Los Angeles Deputy Mayor for Energy and Environment since 2005
- Funding and cleantech



Lisa Jackson, Administrator of the Environmental Protection Agency

- Commissioner of the New Jersey Department of Environmental Protection
- Former EPA administrator for 16 years

Source: NY Times

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Recent estimates of global sea-level rise are 3 to 4 feet in this century, with higher relative sea-level rise in areas where the land is subsiding , including most of the US Atlantic Coast and Gulf Coast.

# Global Policy: Cleantech Stimulus Allocations for the G20

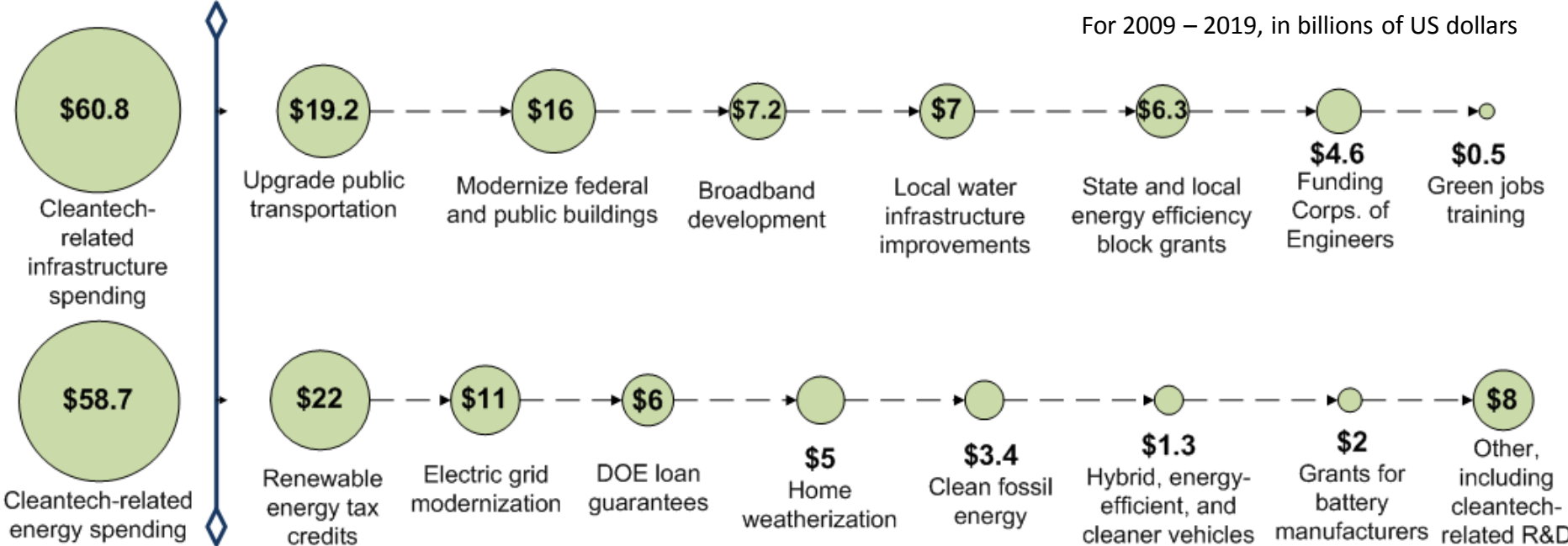
	TOTAL FUND		GREEN FUND TOTAL		FUND AS SHARE OF 2008 GDP		GREEN SHARE IN TOTAL STIMULUS		RENEWABLE POWER		CCS/OTHER		BUILDING EE		LOC VEHICLES		RAIL		GRID		WATER/WASTE		PERIOD (YEARS)
	2008 US\$ bn		%	%	%	2008 US\$ bn																	
ARGENTINA	3.7	0.0	1.1	0.0	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2009
AUSTRALIA	26.7	2.5	2.5	9.3	0.2	-	-	2.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2009-2012
CANADA	31.8	2.6	2.0	8.3	0.2	-	1.1	0.2	-	0.4	0.8	0.1	-	-	-	-	-	-	-	-	-	-	2009-2013
CHINA	586.1	200.8	13.9	34.3	4.8	-	-	-	1.5	98.7	70.0	30.7	-	-	-	-	-	-	-	-	-	-	2009-2010
FRANCE	33.7	7.1	1.1	21.2	0.2	0.9	-	0.8	-	1.3	4.1	-	-	-	-	-	-	-	-	-	-	-	2009-2010
GERMANY	104.8	13.8	2.7	13.2	0.4	-	-	10.4	0.7	2.8	-	-	-	-	-	-	-	-	-	-	-	-	2009-2010
INDIA	13.7	0.0	1.1	0.0	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2009
INDONESIA	5.9	0.1	1.2	1.6	0.0	0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2009
ITALY	103.5	1.3	4.3	1.3	0.1	-	-	-	-	1.3	-	-	-	-	-	-	-	-	-	-	-	-	2009 onwards
JAPAN	485.9	12.4	10.0	2.6	0.3	-	-	12.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2009 onwards
MEXICO	7.7	0.8	0.7	9.7	0.1	-	-	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2009
SAUDI-ARABIA	126.8	9.5	24.0	7.5	1.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.5	-	2009
SOUTH KOREA	38.1	30.7	4.0	80.5	3.2	1.8	-	6.2	1.8	7.0	-	13.9	-	-	-	-	-	-	-	-	-	-	2009-2012
UNITED KINGDOM	30.4	2.1	1.1	6.9	0.1	-	-	0.3	1.4	0.4	-	-	-	-	-	-	-	-	-	-	-	-	2009-2012
UNITED STATES	972.0	112.2	6.8	11.5	0.8	32.8	6.6	30.7	4.8	9.9	11.9	15.6	-	-	-	-	-	-	-	-	-	-	10 Years
EUROPEAN UNION	38.8	22.8	0.2	58.7	0.1	0.6	12.5	2.8	1.9	-	4.9	-	-	-	-	-	-	-	-	-	-	-	2009-2010
<b>G20 (EXCL. EU)</b>	<b>2.609.6</b>	<b>396.0</b>	<b>5.5</b>	<b>15.2</b>	<b>0.8</b>	<b>35.5</b>	<b>7.6</b>	<b>64.3</b>	<b>10.1</b>	<b>121.8</b>	<b>86.8</b>	<b>69.8</b>	-	-	-	-	-	-	-	-	-	-	-

**\$396 billion in stimulus funding going to 'green' investments announced by G20 countries**

Source: "Towards a Global Green Recovery: Recommendations for Immediate G20 Action," Lord Nicholas Stern.

Energy efficiency programs in the US could save the country 236 billion kilowatt hours – the equivalent of 14 New York Cities – by 2030 if they're kept up, says the Electric Power Research Institute.

# US Policy: The \$120 Billion Cleantech Stimulus Package



- Non-cleantech related investments and tax-cuts: \$667.5 billion
  - Major spending areas:
    - State and local fiscal relief \$144 billion
    - “Protecting the vulnerable” \$81 billion
    - Other infrastructure and science \$64.5 billion
    - Healthcare \$59 billion
    - Education and training \$53 billion

Source: Committee on Appropriations and Recovery.com, March 12, 2009

"The blackout that hit New York and the Northeast five years ago was a wake-up call that it was time to change course and fast. The good news is that investment in transmission lines is up." — New York Mayor Michael Bloomberg

# The Cleantech Sector As a Driver in a Post-Stimulus World

- **\$150 billion over 10 years for cleantech is included in the federal budget**, ensuring an extended time horizon for deployment and continual advancement of renewable energy and energy-efficiency industries in US
  - Building on Recovery Act foundation, pending comprehensive climate and energy legislation with three pillars:
    1. Overhaul of electricity distribution system, a.k.a. investment in a “smart grid”
    2. Clean power generation and energy-efficiency projects
    3. National cap-and-trade system
- Obama administrations budget proposes:
  - 10 year commitment to make the Research and Experimentation Tax Credit permanent
    - This tax credit returns \$2 to the economy for every dollar spent
  - Provision to reduce to zero the capital gains tax for investments in small or startup businesses
    - Small businesses generate 13X more patents per employee than big companies
- The cleantech sector, including energy efficiency and renewable energy generation, is being recognized as a vital part of **national security** and energy independence

Source: “Investing in our Clean Energy Future,” speech by President Obama, March 23, 2009

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“I believe in free markets. But I think that, to a certain extent, we worship false idols over time. There has been no such thing, in all the businesses we do, as one in which the government hasn’t played some role.” – Jeffrey Immelt

# The Permanence of Cleantech as an Investment Sector

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*The last frontier of the environmental movement has become the private sector, with waves of investors occupying this space. The single greatest determining factor could be a reduction in carbon, cleaner water or a cap and trade market... but none of these will have the effect that superior returns on investment will have. A singularly focused investment strategy with superior returns, will be, beyond anything else, why cleantech will remain near the center of our country's pending economic recovery.*”

# Economic Benefits from the ACESA

- The Congressional Budget Office has determined that implementing the ACESA will raise federal revenues by \$846 billion over ten years and result in a net \$24 billion reduction in the federal budget deficit while meeting PAYGO requirements.
- Households in the lowest 20% income bracket would see an average net benefit of \$40 in 2020.
- The American Council for an Energy-Efficient Economy issued an analysis that the ACESA could save American consumers about \$750 per household by 2020 and \$3,900 per household by 2030.
- Consumer spending on utility bills would be about 7% lower in 2020 as a result of energy efficiency measures.
- The nation's GDP would grow from \$13 trillion in 2008 to over \$22 trillion in 2030 while deploying clean energy technology and reducing global warming pollution.
- The American Recovery and Reinvestment Act (ARRA) working together with the ACESA are estimated to generate \$150 billion per year in new clean technology investments in the US over the next decade.

Source: Congressional Budget Office Cost Estimate for H.R. 2454, June 5, 2009; EPA Economic Analysis of the ACESA June 23, 2009; "The Economic Benefits of Investing in Clean Energy," Political Economy Research Institute at the University of Massachusetts Amherst, June 2009

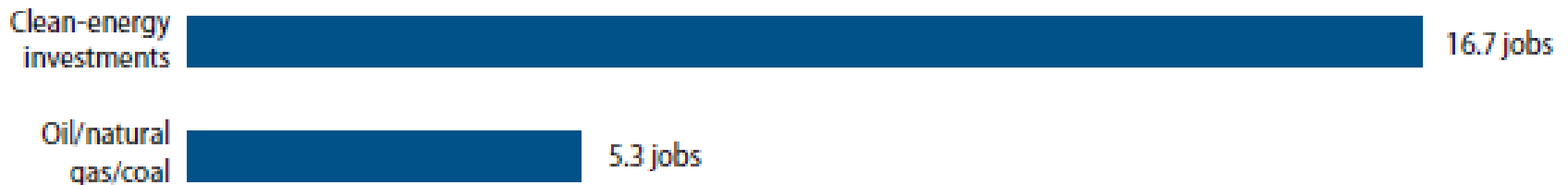
# Job Creation from the ACESA

- Investing \$1 million in clean energy investment areas generates 3.2 times the number of jobs within the US as does spending the same amount within the fossil fuel sectors.

## Job creation through \$1 million in spending

Green investments vs. fossil fuels

Number of jobs created



Source: "The Economic Benefits of Investing in Clean Energy," Political Economy Research Institute at the University of Massachusetts Amherst, June 2009

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# Job Creation from the ACESA (cont.)

- 1.7 million net jobs would be created through a shift to clean energy.

## Impact of \$150 billion in clean-energy investments on U.S. labor market

A) Overall employment expansion through \$150 billion shift from fossil fuels to clean energy	
1) Job creation through \$150 billion spending on clean energy.	2.5 million jobs
2) Job creation through \$150 billion spending on fossil fuels.	795,000 jobs
3) Net job creation through shift to clean energy (row 1–2).	1.7 million jobs
B) Impact of clean energy job expansion on 2008 U.S. labor market	
1) Overall labor force.	154.3 million
2) Total employed before clean-energy investments.	145.4 million
3) Total unemployed before clean-energy investments.	8.9 million
4) Unemployment rate before clean-energy investments (= rows 3/1).	5.8% (=8.9 million/154.3 million)
5) Impact on total employment of shift from fossil fuels to clean energy.	Employment rises by 1.7 million jobs: 1.2% increase to 147.1million
6) Impact on unemployment rate of shift from fossil fuels to clean energy (= rows (3–5)/1)).	Unemployment falls from 5.8% to 4.7% (=7.2 million/154.3 million)

Source: U.S. Bureau of Labor Statistics and IMPLAN.

Source: “The Economic Benefits of Investing in Clean Energy,” Political Economy Research Institute at the University of Massachusetts Amherst, June 2009

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# A Pressing Need for Job Creation

- States with the highest unemployment rates benefit from clean energy investments.

## State-by-state net job effects of \$150 billion clean-energy investment program

	Net change in employment from \$150-billion shift from fossil fuels to clean-energy investments	Actual unemployment rate in state for 2008	Unemployment rate in 2008 with \$150-billion shift from fossil fuels to clean-energy investments
Michigan	+ 53,816	8.4%	7.3%
Rhode Island	+ 4,540	7.8%	7.0%
California	+ 174,927	7.2%	6.3%
DC	+ 5,514	7.0%	5.3%
Mississippi	+ 19,007	6.9%	5.4%
South Carolina	+ 24,757	6.9%	5.8%
Alaska	+ 3,730	6.7%	5.6%
Nevada	+ 10,553	6.7%	5.9%
Illinois	+ 69,624	6.5%	5.4%
Ohio	+ 67,356	6.5%	5.4%

Source: "The Economic Benefits of Investing in Clean Energy," Political Economy Research Institute at the University of Massachusetts Amherst, June 2009