

# The employment implications of climate change and the shift towards a low-carbon economy

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## Opportunities and challenges for labour markets

- Policies to combat climate change must comprise three elements:
  - Making the polluter pay: pricing the greenhouse gas externality
  - Tackling the other market failures standing in the way, e.g.
    - Underinvestment in innovation
    - Inadequate information
    - Lack of credibility of the long-run policy regime
    - Financial dislocation
    - Natural monopolies
  - Making greenhouse gases an ethical issue
- Challenges for the labour market from the first, opportunities from the second

## Opportunities (and challenges) for labour markets

### EXHIBIT 2 THE CLEAN ENERGY ECONOMY—A DEFINITION

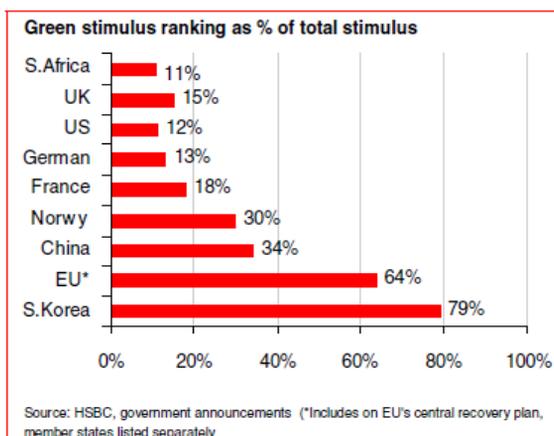
The clean energy economy generates jobs, businesses and investments while expanding clean energy production, increasing energy efficiency, reducing greenhouse gas emissions, waste and pollution, and conserving water and other natural resources.

The clean energy economy comprises five categories:



Source: 'The Clean Energy Economy' The Pew Charitable Trusts, June 2009

## Fiscal stimuli: 'green' content varies widely



Source: HSBC (2009) 'A global green recovery? Yes but in 2010' 6 August

## Not all measures equally employment-friendly

A GREEN RECOVERY: Impacts per billion dollars of government spending						
Green Programs	Approximate impact	Speed	Employment	Energy Savings	Energy Security	Climate Change
		How quickly the money gets spent	Job-years created	Long-term energy cost reductions	Reduction in U.S. oil imports	Direct emission reductions
Household Weatherization	Weatherize 377,000 homes	●	●	●	●	●
Federal Building Retrofits	Reduce Federal energy consumption by 8 trillion BTU	●	●	●	●	●
Green School Construction	Improve efficiency of all new schools by 33 percent	●	●	●	●	●
Production Tax Credit Extension	Incentivize 1,500 megawatts of additional wind generation capacity	●	●	●	●	●
Investment Tax Credit Increase	Incentivize 300 megawatts of additional solar power	●	●	●	●	●
Carbon Capture and Storage Demo Projects	Fund the CCS component of a 500 MW demonstration project	●	●	●	●	●
Cash for Clunkers	500,000 vehicles traded in	●	●	●	●	●
Hybrid Tax Credit	Incentivize the purchase of 190,000 hybrids	●	●	●	●	●
Battery Research & Dev.	FreedomCAR objectives met	●	●	●	●	●
Mass Transit	Decrease vehicle-miles travelled by 18 million per year	●	●	●	●	●
Smart Grid	Install smart meters on 4.4 million homes	●	●	●	●	●
<b>Other Programs</b>						
Tax Cuts	Increase consumer spending by \$333 million	●	●	—	—	—
Road Investment	Increase vehicle-miles travelled by 11 million per year	●	●	●	●	●

● High impact      ● Low impact  
 ● Moderate impact      ● Negative impact

Source: World Resources Institute, February 2009

## Renewable energy more labour-intensive (but expensive)

Energy Technology	Source of Estimate	Average Employment Over Life of Facility (jobs/MWa)		
		Construction, Manufacturing, Installation	O&M and fuel processing	Total Employment
PV 1	REPP, 2001	6.21	1.20	7.41
PV 2	Greenpeace, 2001	5.76	4.80	10.56
Wind 1	REPP, 2001	0.43	0.27	0.71
Wind 2	EWEA/Greenpeace, 2003	2.51	0.27	2.79
Biomass Ġ high estimate	REPP, 2001	0.40	2.44	2.84
Biomass Ġ low estimate	REPP, 2001	0.40	0.38	0.78
Coal	REPP, 2001	0.27	0.74	1.01
Gas	Kammen, from REPP, 2001; CALPIRG, 2003; BLS, 2004	0.25	0.70	0.95

**Table 1: Average employment for different energy technologies.** “MWa” refers to average installed megawatts de-rated by the capacity factor of the technology; thus, for a 1 MW solar facility operating on average 21% of the time, the power output would be 0.21 MWa. References in parentheses and sources refer to the studies reviewed in the text. The biomass energy studies are a proxy for jobs that could derive from an expansion of biofuels (e.g. ethanol use) in regional or the national energy mix.

Source: Kammen (2007): ‘Testimony to the US Senate Committee on Environment and Public Works

## Where are the new jobs going to be?

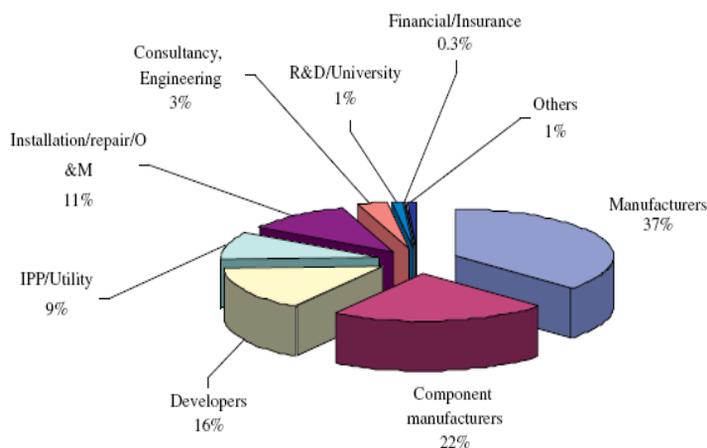
### Economic activity by energy-related sector

Figures are percentages of total jobs for each sector

Energy source	Extraction	Agriculture	Manufacturing	Construction	Utilities	Trade	Transport	Independent admin/ professional
<b>Fossil fuels</b>								
Oil and natural gas	14.6	0.4	13.9	2.4	11.3	6.6	13.1	37.5
Coal	41.6	0.3	13.1	0.9	7.8	5.9	6.8	23.6
<b>Energy efficiency</b>								
Building retrofits	0.5	1.4	13.6	61.5	0.1	7.9	2.5	12.4
Mass transit/freight rail	0.3	0.6	7.8	21.7	0.1	4.4	54.4	10.7
Smart grid	0.4	0.6	38.1	15.7	0.2	6.3	2.8	35.9
<b>Renewables</b>								
Wind	0.6	0.9	47.4	20.3	0.2	7.1	3.7	19.8
Solar	0.5	0.9	37.4	23.7	0.2	6.9	3.2	27.4
Biomass	1.3	60.4	20.6	0.4	0.2	3.8	2.8	10.5

Source: Pollin, Heintz and Garrett-Peltier (2009): 'The economic benefits of investing in clean energy' CAP/PERI, June

## Where are the new jobs going to be?



Source: Blanco and Rodrigues (2009): 'Direct employment in the wind energy sector: an EU study'

## More unskilled jobs?

### Breakdown of job creation through green investments versus fossil fuels by formal credential levels

Based on \$1 million of spending

	1) Green investments	2) Fossil fuels	3) Difference in job creation (= column 1-2)
Total job creation	16.7	5.3	11.4
High-credentialed jobs	3.9	1.5	2.4
• B.A. or above	(23.3% of green investment jobs)	(28.3% of fossil fuel jobs)	
• \$24.50 average wage			
Mid-credentialed jobs	4.8	1.6	3.2
• Some college but not B.A.	(28.7% of green investment jobs)	(30.2% of fossil fuel jobs)	
• \$14.60 average wage			
Low-credentialed jobs	8.0	2.2	5.8
• High school degree or less	(47.9% of green investment jobs)	(41.5% of fossil fuel jobs)	
• \$12.00 average wage			
Note: Low-credentialed jobs with decent earnings potential	4.8	0.7	4.1
• \$15.00 average wage	(28.7% of green investment jobs)	(13.2% of fossil fuel jobs)	

Note: Average wage is the median wage for all workers across all industries within each of the credential categories listed above.

Source: Pollin, Heintz and Garrett-Peltier (2009): 'The economic benefits of investing in clean energy' CAP/PERI, June

## Where are the new jobs going to be? Not necessarily where expected



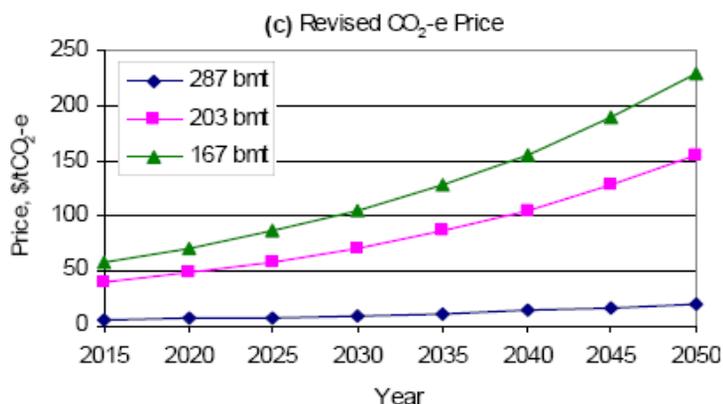
Source: Goettle and Fawcett (2009): 'The structural effects of cap-and-trade climate policy'

## ‘Green’ jobs: some caution required

- What is a ‘green’ job?
- Are climate-change related market failures being tackled?
  - Skill shortages
  - Finance, information, infrastructure, innovation
- More jobs in the short run than long run?
  - Bringing in a new policy framework
  - Exit strategy for fiscal stimulus packages
- Labour productivity reduced?
- Crowding out other jobs?
  - Structural change
  - Low employment multiplier per \$

## (Opportunities and) challenges for labour markets

**US carbon price  
(0%, 50%, 80% reductions from 2008 level by 2050)**



Source: Paltsev et al (2009)

## (Opportunities and) challenges for labour markets

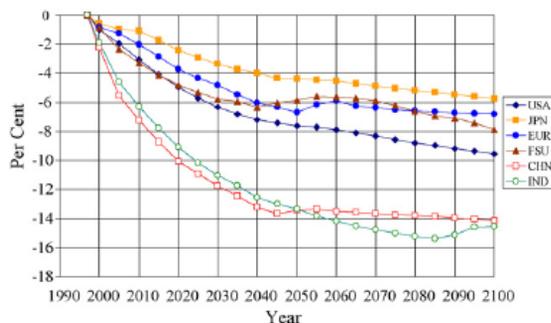


Fig. 7 – Differences in GDP with emissions restrictions policy in solutions with sector-specific labor and rigid wages compared to solutions with flexible labor and flexible wages.

Source: Babiker and Eckaus (2007): 'Unemployment effects of climate policy'

## But don't forget the bottom line....

- “Climate change is the greatest collective challenge that we have ever faced. It is destroying our only planet at an accelerating pace.”
- “The window of opportunity is limited. We must put the right instruments in place quickly!”

(Angel Gurría, OECD Secretary-General, 18 September)

## Some questions

- Current fiscal stimulus packages
  - Do they have enough employment ‘bang for the buck’?
  - Are they building the foundations for ‘green’ jobs sustainable in the long run?
- Labour market policies
  - How to reduce skill shortages, especially in (energy) R&D, project management, energy capital goods manufacturing?
  - How to prepare for structural changes across industries and promote flexibility?
  - How to ‘manage down’ fossil fuel production?
  - Can emissions quota auctions be used to reduce taxes on workers and promote acquisition of skills?
- Social policies
  - How to cushion the impact of carbon pricing on low-income families?

## The employment implications of climate change and the shift towards a low-carbon economy

You can find out more about the work of the Grantham Research Institute on Climate Change and the Environment at:

<http://www.lse.ac.uk/collections/granthamInstitute/>

