

**Green Job Creation in the Emerging Economy**  
**4th Annual Unifour Air Quality Conference**

**Hickory, NC | May 25, 2010**

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# CERPA

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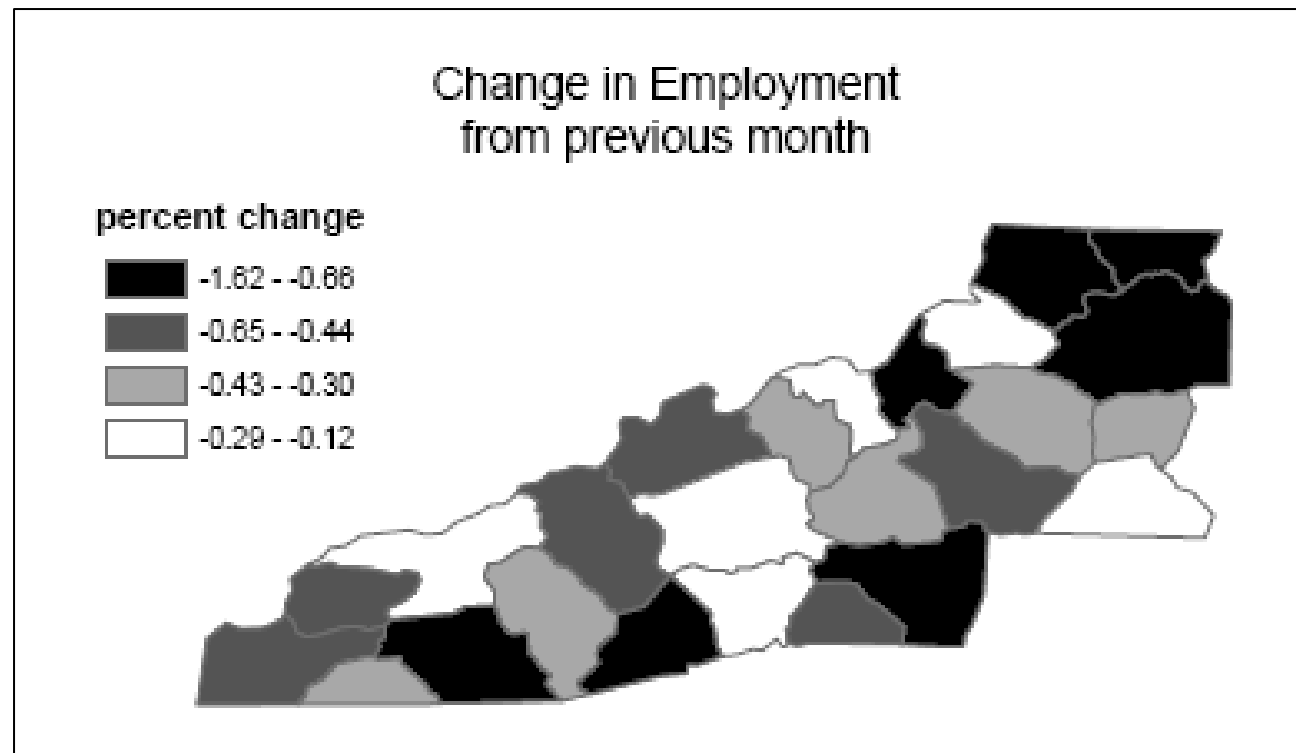
# Outline

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- Green Jobs
  - Western North Carolina Index
  - What is a green job?
  - CBO Study
- Community Megawatt Initiative
  - Economic impact
  - Benefit-cost analysis

# Western NC Economic Index

- Tracks the level of economic activity in 25 counties





# Western NC Economic Index

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- Economic activity:
  - Increased at an annual rate of 6.0 percent in the fourth quarter of 2009.
  - The national economy grew at a 5.7 percent rate during the same period.
- Seasonally adjusted employment for WNC continued to fall in December, decreasing 0.37 percent.
- The region lost nearly 4,700 jobs in the fourth quarter of 2009.

# WNC Index: a decade in review

- ❑ WNC employment declined 8.9 percent over the decade; a net loss of 50,000 jobs.
- ❑ WNC region fared worse than NC and the US.
- ❑ Asheville outperformed the region, state and nation.
- ❑ Hickory-Morganton-Lenoir experienced a decade-long recession, losing 1 in 5 jobs over the decade.

**CENTER FOR ECONOMIC RESEARCH & POLICY ANALYSIS**

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**Overview**

**WNC employment declined 8.9 percent over the decade; a net loss of 50,000 jobs.**

Over the decade, the WNC region fared worse than NC and the US. Asheville outperformed the region, state and nation. Hickory-Morganton-Lenoir experienced a decade-long recession, losing 1 in 5 jobs over the decade. Rural WNC counties, as rural counties throughout the state and nation, were hit particularly hard by both recessions and continue to lag urban areas.

**The WNC Economy: A Decade in Review, 2000-2009**

by John W. Dawson and Todd L. Cherry, Appalachian State University.

Regional economic development policy requires an understanding of the absolute and relative conditions of the local and regional economies. With 2009 in the record books, it is a good time to assess the Western North Carolina economy by reviewing the region's economic performance over the past decade—a decade which witnessed two recessions and ended in the midst of the longest and deepest recession since the Great Depression.

**Two Recessions**

We begin by summarizing the impact of the two recessions (2001 and 2007-09) on employment levels in the region and its sub-regions. Table 1 provides state and national numbers to illustrate how the region fared relative to the state and national experiences. During the 2001 recession, regional employment declined 3.4 percent, which was more severe than the 1.2 and 1.1 percent declines experienced at the state and national levels.

Within the region, the job losses during the 2001 recession were concentrated in the Hickory-Morganton-Lenoir metro area, which lost 6.9 percent of employment. The 2007-09 recession was more severe across the board. WNC regional employment fell 10.7 percent—about three times larger than during the 2001 recession. Hickory-Morganton-Lenoir lost 13.7 percent of jobs—about twice as much as the 2001 recession. Asheville avoided the worst of the 2001 recession, outperforming the region, state and national experiences. In the recent recession, Asheville still outperformed the region but fared worse than the state and nation.

More generally, the numbers indicate the region exhibited larger swings in employment during both recessions relative to the state and nation. Asheville tends to perform relatively better than the region as a whole and sometimes better than state and national performance. Hickory-Morganton-Lenoir was hit especially hard in both recessions, which was magnified by the metro's lack of any significant recovery between the two recessions.



# What is a green job?

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- “It has to pay decent wages and benefits that can support a family. It has to be part of a real career path, with upward mobility. And it needs to reduce waste and pollution and benefit the environment.”
  - Phil Angelides  
Chair, Apollo Alliance
  - Source: What is a Green-Collar Job, Exactly? Time magazine, May 26, 2008



# Green jobs

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- Include those in the wind and solar industries
- May also include anything related to cleaner energy (e.g., public transportation, energy efficiency)
- "You don't want to greenwash," says Angelides. "You don't want to call something a green-collar job that doesn't have the wages or background to support it."



# CBO Study

- “CBO has analyzed the research on the effects that policies to reduce green house gases would have on employment and concluded that total employment during the next few decades would be slightly lower than would be the case in the absence of such policies.”

- Source:  
<http://cboblog.cbo.gov/?p=806>  
May 5, 2010

ECONOMIC AND BUDGET ISSUE BRIEF  
CBO  
*A series of issue summaries from  
the Congressional Budget Office*  
MAY 5, 2010

## How Policies to Reduce Greenhouse Gas Emissions Could Affect Employment

**Summary and Introduction**  
Human activities around the world are producing increasingly large quantities of greenhouse gases, particularly carbon dioxide resulting from the use of fossil fuels and from deforestation. Because of concerns that the accumulation of such gases in the atmosphere will result in a variety of environmental changes over time that would have serious and costly effects, policies to reduce these emissions are being considered. Such policies would impose costs on the U.S. economy and affect patterns of employment throughout the country.

Adopting policies aimed at reducing emissions of greenhouse gases would shift the demand for goods and services away from fossil fuels and products that require substantial amounts of those fuels to make or to use and toward alternative forms of energy and products that require lesser amounts of fossil fuels. Employment patterns would shift to mirror these changes in demand. Changes in employment in specific industries would reflect the amounts of greenhouse gases they emit (through production and use of their output) and the difficulty of reducing their emissions of those gases.

The Congressional Budget Office (CBO) has analyzed the research on the effects that policies to reduce greenhouse gases would have on employment and concluded that total employment during the next few decades would be slightly lower than would be the case in the absence of such policies. In particular, job losses in the industries that emit the most greenhouse gases would exceed job gains in other industries that would increase employment, thereby raising the overall unemployment rate. Eventually, however, most workers who lost jobs would find new ones. In the absence of policies to reduce emissions of greenhouse gases, changes to the climate also might affect employment; however, this brief does not address such changes because their effect would probably arise after the next few decades, and it has not been studied as carefully by researchers.

Various industries would be affected differently by policies to reduce greenhouse gas emissions:

- Coal mining would probably see the largest percentage decline in employment. Among fossil fuels—coal, petroleum, and natural gas—coal, when it is burned, produces more greenhouse gases per unit of energy than do the others. Moreover, coal is widely used to generate electricity, and electric utilities have some ability to substitute other sources of energy for coal. A mitigating factor for the coal mining industry could be the development of technologies to capture and store emissions of coal-fired power plants.
- Employment in oil and gas extraction and natural gas utilities would also be expected to decline as those fuels became more expensive and the demand for them declined. In percentage terms, the decline would be smaller than that in coal mining, though. Because oil is widely traded on international markets, continued demand for it in other countries that did not implement emission-reduction policies would lessen some of the effects of the decline in domestic demand. Because the use of natural gas to generate electricity produces smaller quantities of greenhouse gases than does the use of coal, demand would probably shift from coal to natural gas in some instances, offsetting some or all of the reduction in demand for natural gas that would otherwise occur.
- Mining for materials other than coal, construction, and the industries that produce metals, nonmetallic mineral products (such as glass), chemicals, and transportation services—all of which use relatively large amounts of energy directly or indirectly—would probably also experience reductions in employment, although the percentage declines would be relatively small.

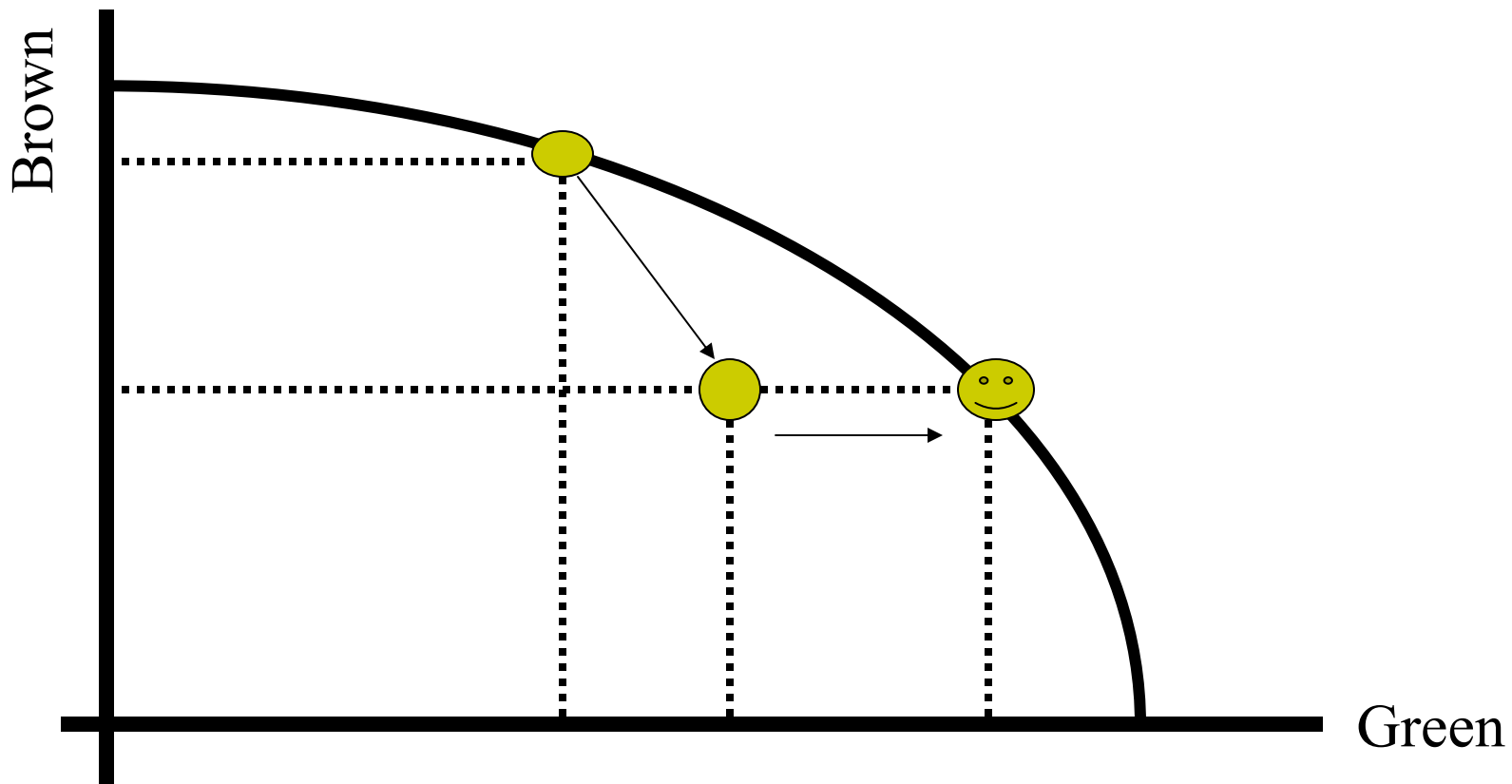


# Net effect: negative

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- ❑ Job losses in the industries that shrink would lower employment more than job gains in other industries would increase employment.
- ❑ Raising the overall unemployment rate.
- ❑ Eventually most workers who lost jobs would find new ones.

# Some economic theory





# Losers

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- ❑ Coal mining, oil and gas extraction and natural gas utilities would decline as those fuels became more expensive and the demand for them declined.
- ❑ Employment would increase in industries and sectors whose products are less emission-intensive to produce and result in fewer emissions when used.

# Winners

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- ❑ Employment would increase in industries that manufacture equipment for the production of energy using low-emission technologies
  - Nuclear
  - Solar
  - Wind

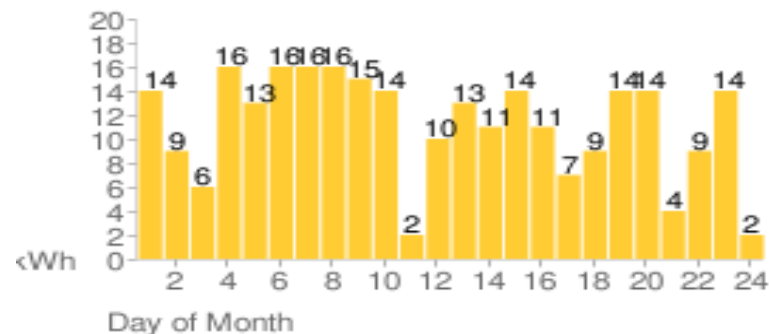


# AIRE | <http://aire-nc.org>

- Reduce dependence on nonrenewable energy
- Create economically and environmentally sustainable livelihoods.
- Promote local and regional economic development.
- Support community-scale energy projects.



Electricity Production in kilowatt/hours (kWh) for May 2010



# Economic Analysis of the Community Megawatt Initiative

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- ECO 4660 and ECO 4810
  - Dominique Deshommes, Ryan Emerson, Tyler Froelich
- Goals of the CMI:
  - Make solar energy accessible and affordable
  - Increase public participation
  - Install 1MW of new solar power by 2012
  - (21 buildings with an average of 50 KW systems per building; 1 MW = 1000 KW)

# Online Survey

- Pretested with convenience sample
  - Banff Film Festival sponsors: n = 40
  - Online (Survey Monkey): n=88
- Random online sample this summer

[SURVEY PREVIEW MODE] Appalachian Institute for Renewable Energy: 2010...

File Edit View History Bookmarks Tools Help

http://www.surveymonkey.com/s.aspx?PREVIEW\_MODE=DO\_NOT\_USE\_THIS\_LINK\_FOR\_COLLECTION&

**AIRE**  
Appalachian Institute  
for Renewable Energy

Exit this survey...

Appalachian Institute for Renewable Energy: 2010 Survey

**6. Would you participate in and support the Community Megawatt Initiative?**

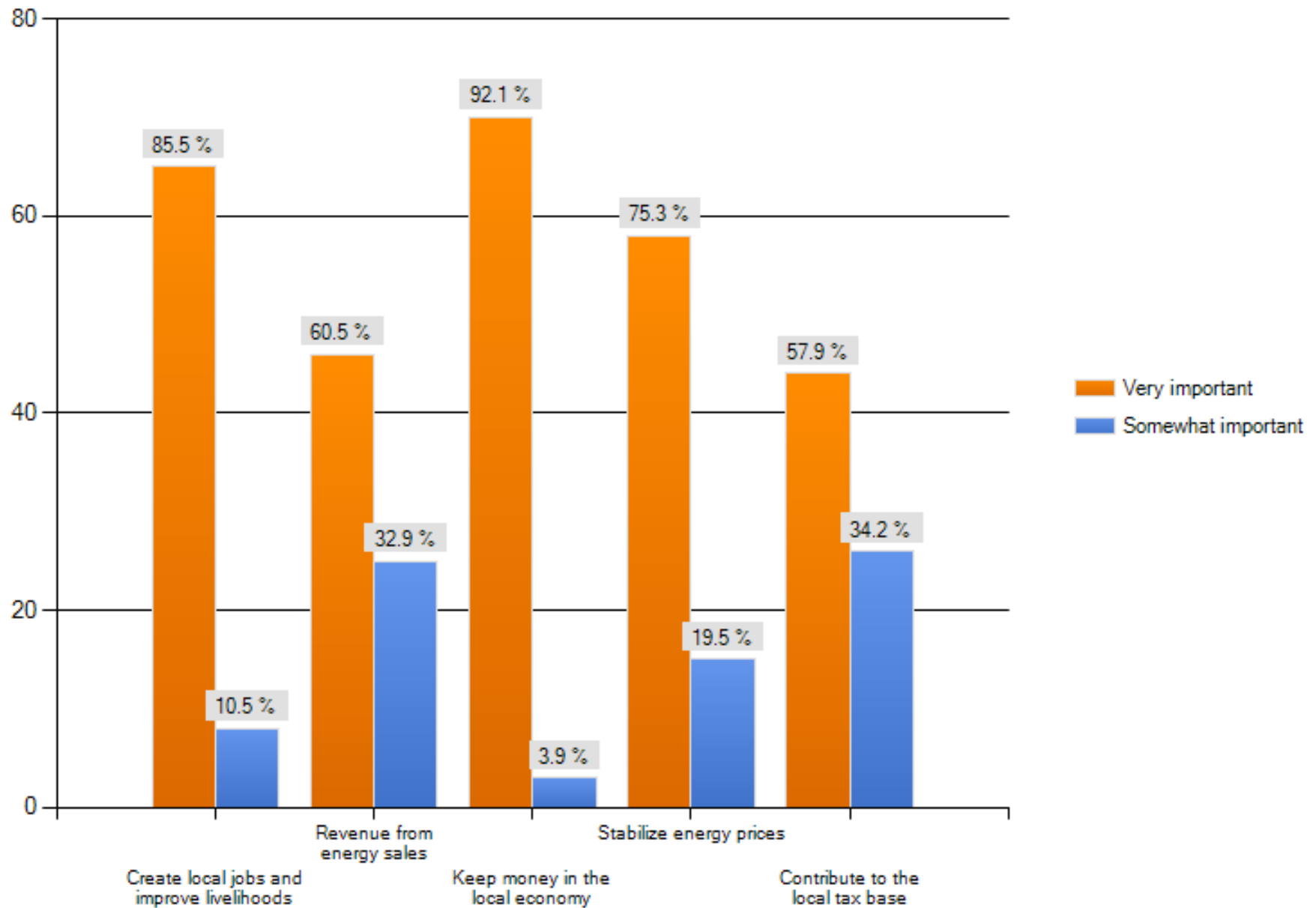
Consider the following hypothetical situation. Suppose that AIRE made it possible for you to participate in and support the Community Megawatt Initiative. Your monetary contribution would go directly to community solar projects and you would be able to take a charitable deduction on your tax return.

**1. How likely is it that you would support the Community Megawatt Initiative with a contribution of the following amounts in 2010?**

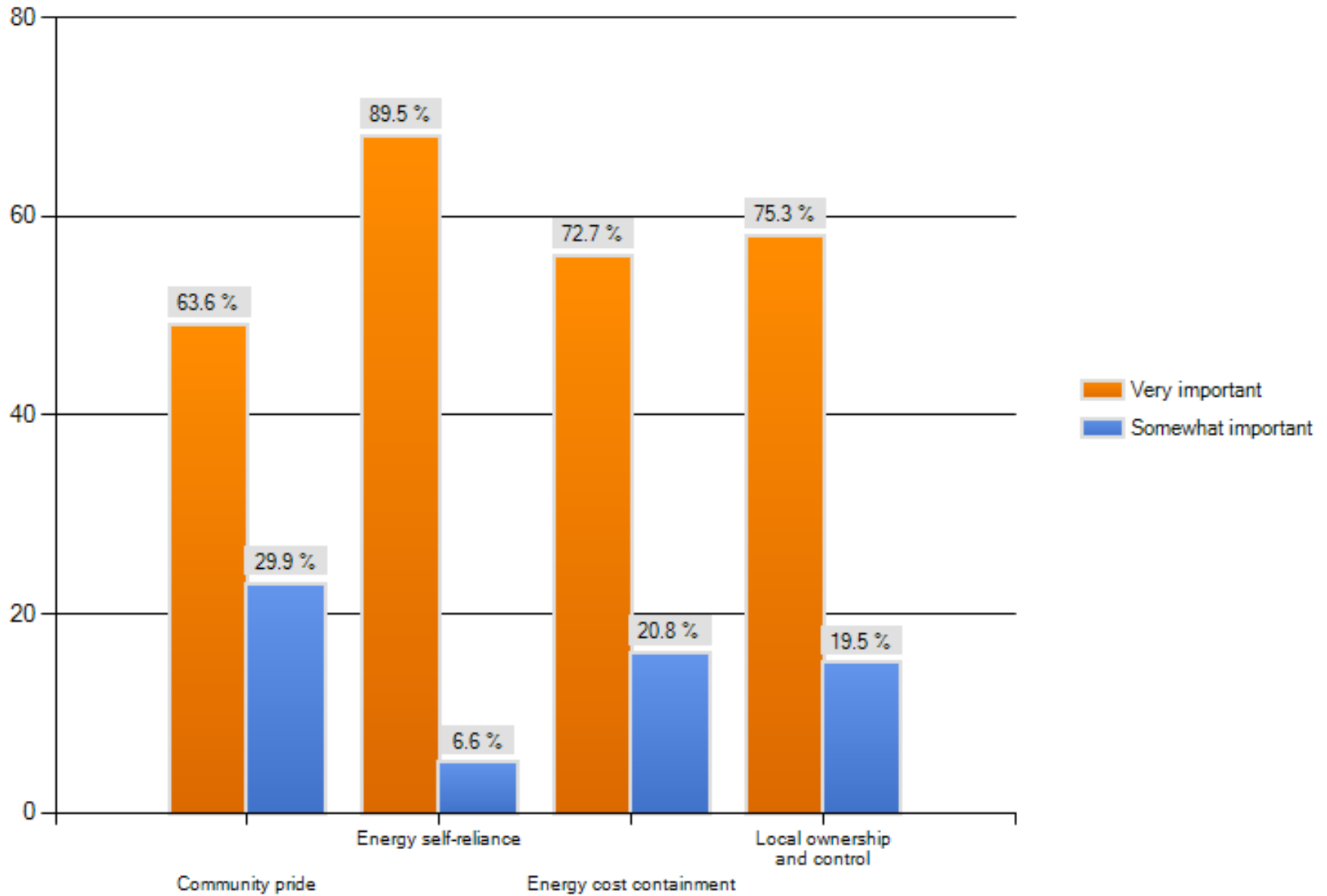
|       | Very likely           | Somewhat likely       | Somewhat unlikely     | Very unlikely         | I don't know          |
|-------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| \$10  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| \$25  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| \$50  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| \$100 | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| \$250 | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |



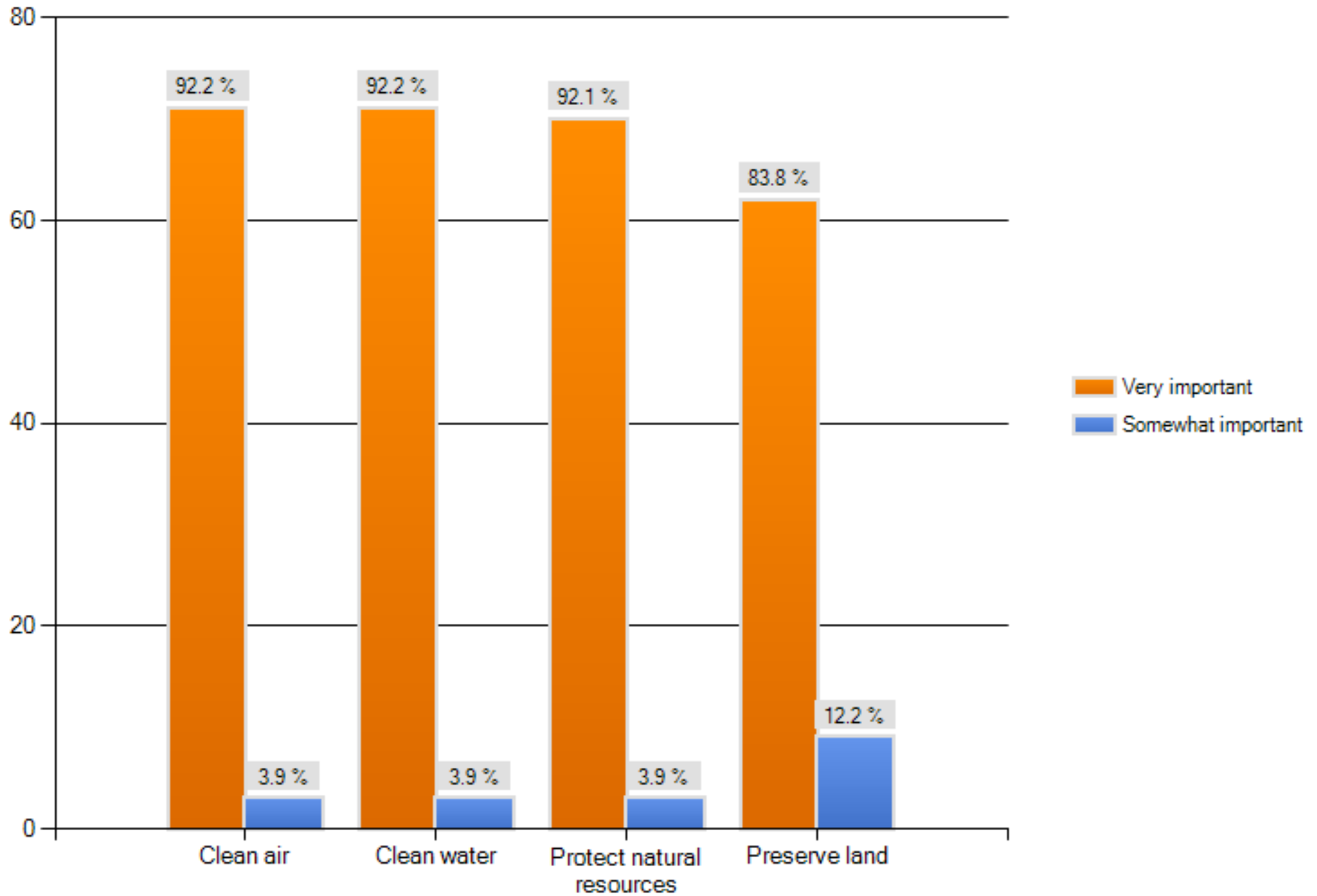
## How important are the following economic benefits of community-owned renewable energy to you?



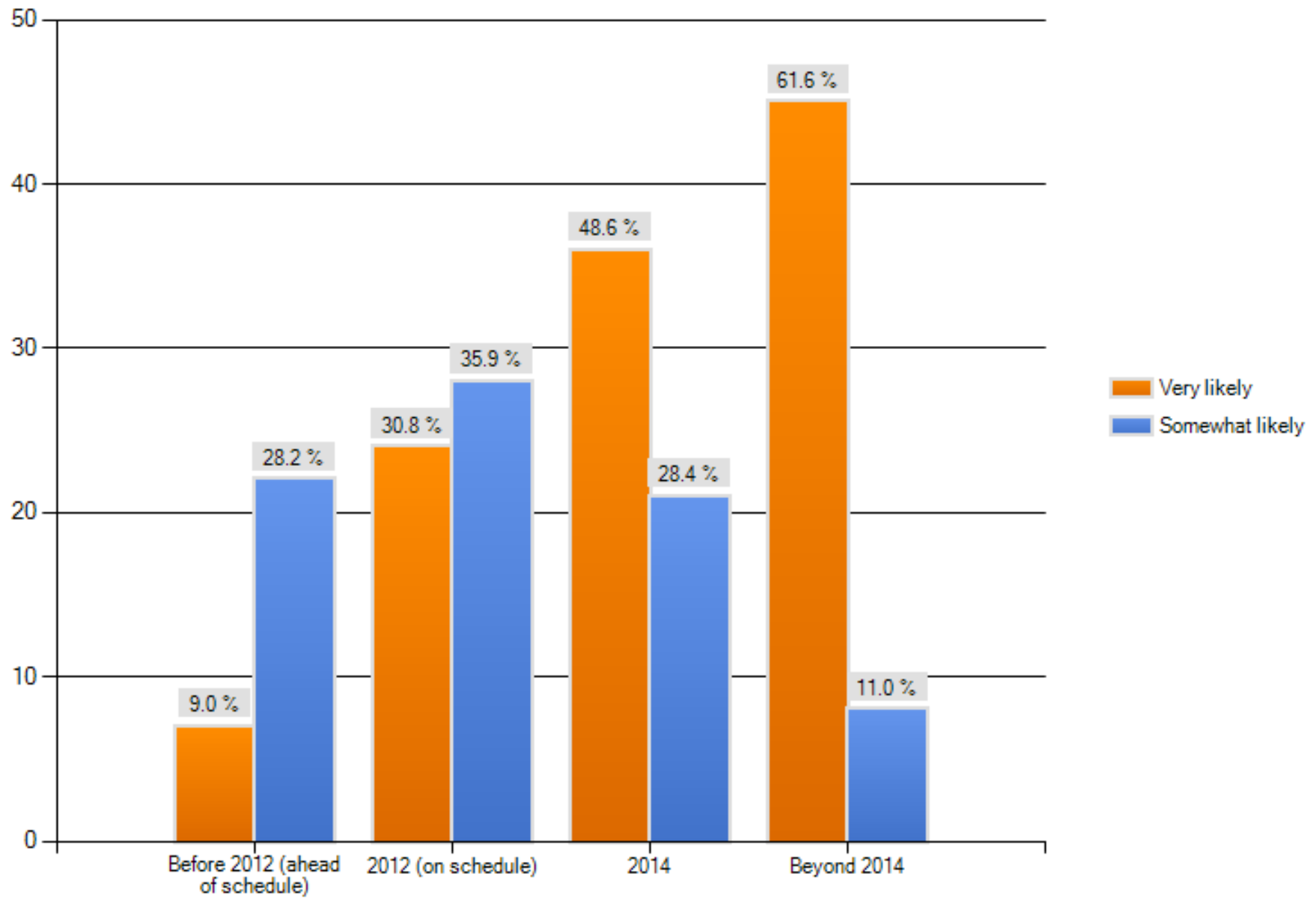
### How important are the following social benefits of community-owned renewable energy to you?



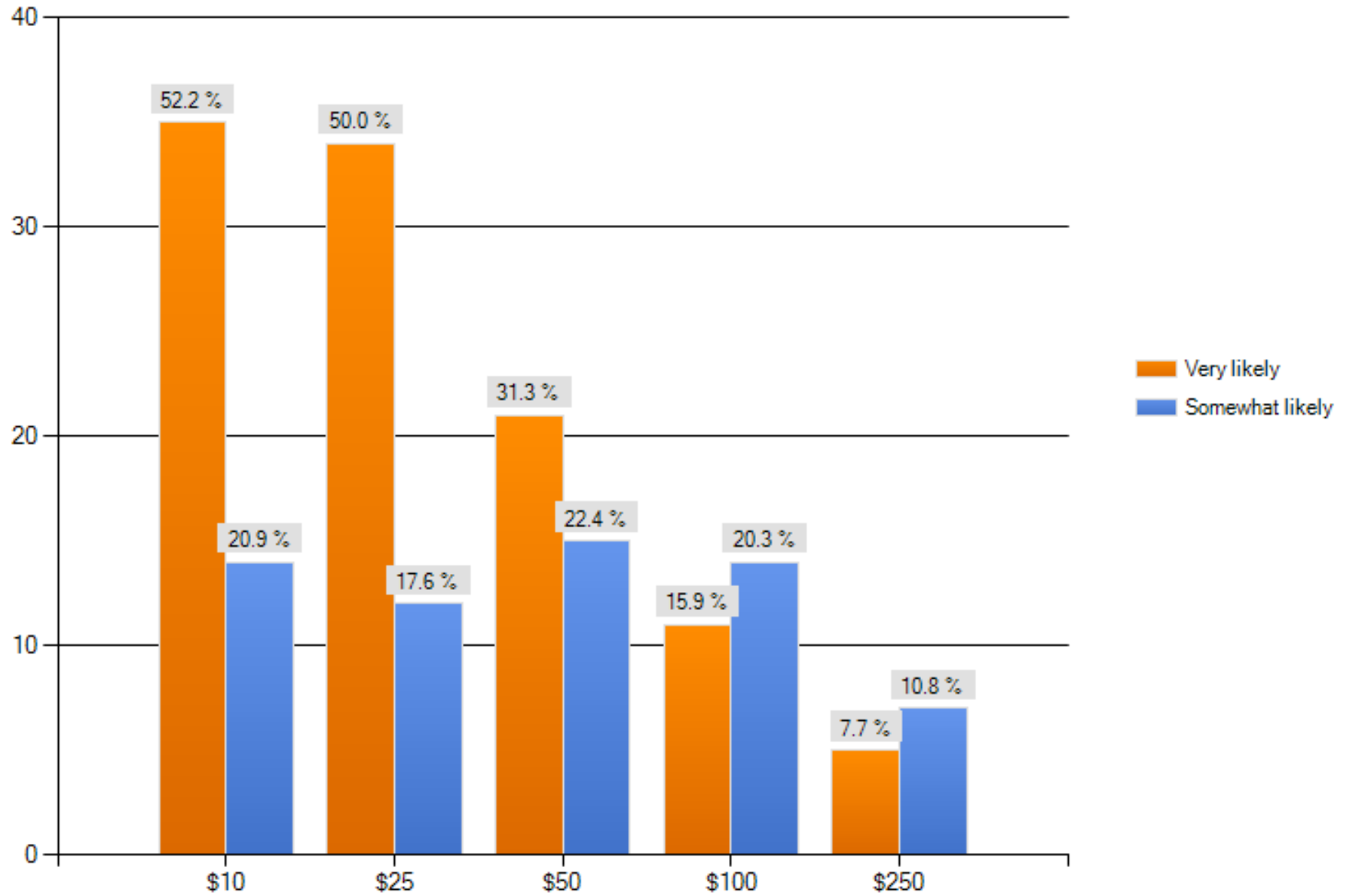
### How important are the following environmental benefits of community-owned renewable energy to you?



### How likely do you think it is that the "Community Megawatt Initiative" goal can be achieved by the year ...?

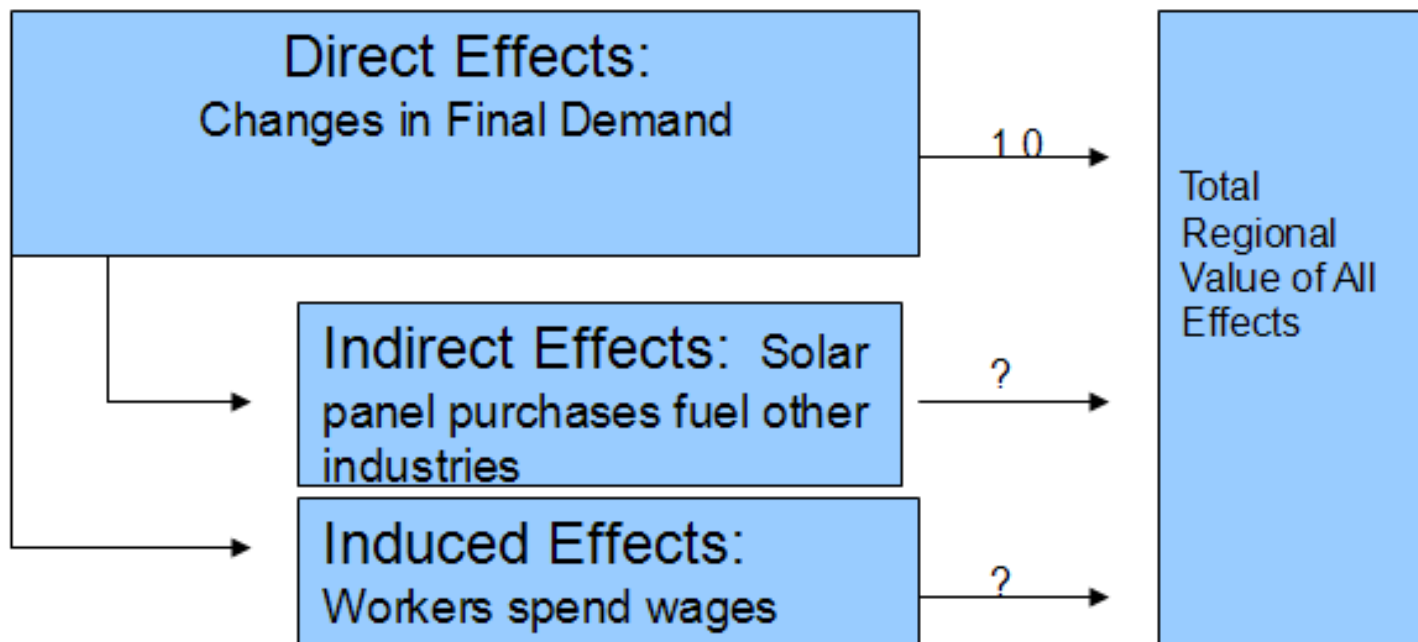


**How likely is it that you would support the Community Megawatt Initiative with a contribution of the following amounts each year for the next five years (2011 to 2015)?**



# Economic Impact Analysis

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# National Renewable Energy Laboratory

## □ Jobs & Economic Development Impact Model

### Project Descriptive Data

|  |                |
|--|----------------|
| Project Location                                       | NORTH CAROLINA |
| Population (only required for County/Region analysis)  |                |
| Solar Direct Normal Resource (kWh/m <sup>2</sup> /day) |                |
| Year of Construction                                   | 2012           |
| Project Size - Nameplate Capacity (MW)                 | 1              |
| Solar Field Aperture Area (square meters)              | 9,631          |
| Plant Capacity Factor                                  | 15.8%          |
| Construction Cost (\$/KW)                              | \$7,742        |
| Annual Operations and Maintenance Cost (\$/kW)         | \$432.90       |
| Money Value - Current or Constant (Dollar Year)        | 2006           |



# Construction Costs (\$ millions)

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|              |        |
|--------------|--------|
| Construction | \$1.30 |
| Equipment    | \$4.84 |
| Other        | \$1.22 |
| Sales tax    | \$0.38 |
| Total        | \$7.74 |





# Operating Costs (\$ thousands)

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|                        |       |
|------------------------|-------|
| Personnel              | \$195 |
| Materials and Services | \$238 |
| Total                  | \$432 |

# Impacts (\$ thousands)

|                        |          |        |
|------------------------|----------|--------|
| Local spending         | One-time | \$3360 |
| Local sales tax        |          | \$0.38 |
| Local spending         | Annual   | \$350  |
| Property and sales tax |          | \$93   |

# Construction Jobs and Earnings

|                            |    |        |
|----------------------------|----|--------|
| Construction               | 15 | \$1.45 |
| Equipment and supply chain | 11 | \$0.51 |
| Induced                    | 12 | \$0.38 |
| Total                      | 39 | \$2.34 |

# Operation Jobs and Earnings

|              |   |        |
|--------------|---|--------|
| Onsite       | 3 | \$0.18 |
| Supply chain | 2 | \$0.07 |
| Induced      | 2 | \$0.05 |
| Total        | 7 | \$0.31 |

# Benefit-cost analysis

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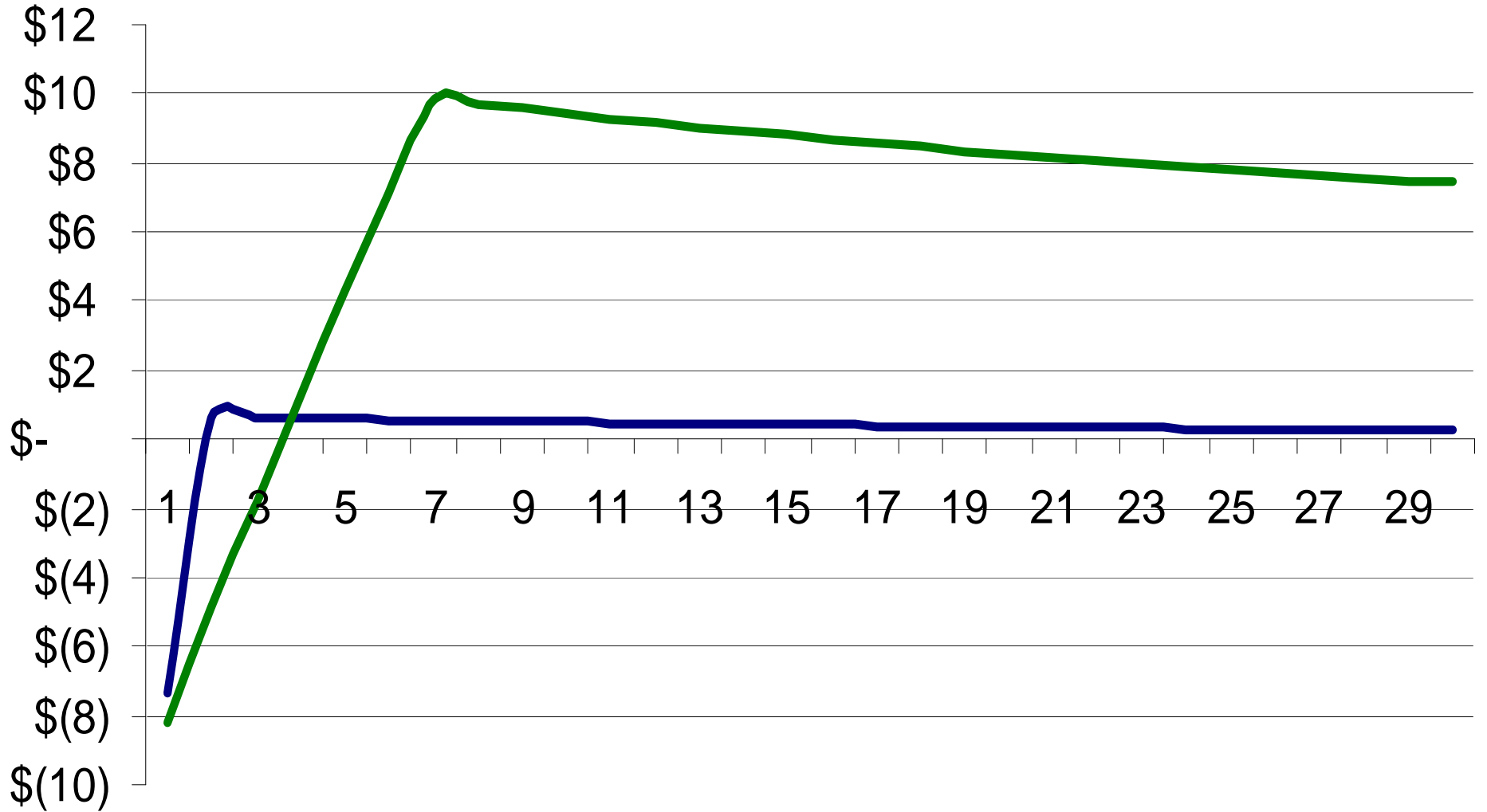
- $NPV = \sum(B-C)/(1+r)^t$
- $BCR = \{\sum B/(1+r)^t\} / \{\sum C/(1+r)^t\}$ 
  - $t = 30$
  - $r = 3.5\%$
  - One time construction cost = \$7.74m
  - Annual cost = \$432t

# Benefits

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- Annual revenue = \$240t
- Non-market benefits =  $H \times WTP \times \theta$
- $H$  = households in 25 county region
  - 1.26m
- $WTP$  = willingness-to-pay
  - Lower tail of 95% confidence interval
  - \$86 - 1.96\*\$15 (s.e.)
- $\theta = 5\%$

# Net Present Value



— Annual — Cumulative



# Results

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- NPV = \$7.4 million | BCR = 1.47
- *Based on preliminary data*, the Community Megawatt Initiative is determined to be an efficient policy
  - Needs: sensitivity and uncertainty analysis
  - Note: This analysis does not include cost-shifting from federal and state tax incentives



# Questions?

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