



ECONOMICS
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Annotated Bibliography: Jobs and the Environment

The relationship between environmental protection and jobs is well studied in economics and related fields. In the early years of this literature, research was largely concerned with the impacts of environmental regulations on employment and productivity. This emphasis reflected growing concerns in the 1990s about the competitiveness of U.S. industries in an increasingly globalized economy. The literature during this period is fairly conclusive, finding little evidence that more stringent environmental standards have contributed to significant job losses in even the most heavily regulated industries. The Porter Hypothesis, first posited in 1995, suggests that regulation could even improve firm competitiveness over the long term. This seminal article portends the shift in the literature over the next decade toward documenting potential employment gains from investments in environmental improvements. The global recession that began in 2007, coupled with growing urgency to address climate change through energy efficiency improvements and investments in alternative energies, gave rise to new analyses by think tanks, government agencies, non-governmental agencies, and academic researchers of the potential to create “green jobs.”

What follows is an annotated list of the seminal publications that reflects the evolution of understanding and interest in the relationship between jobs and the environment, culminating in the most recent reports and analyses of green jobs.

1995: Academic Journal Article

Jaffe, Adam B.; Steven R. Peterson; Paul R. Portney; and Robert N. Stavins. 1995 "Environmental Regulation and the Competitiveness of U.S. Manufacturing: What Does the Evidence Tell Us?" *Journal of Economic Literature* 33 (1): 132–163.

This article surveys the academic literature surrounding the Porter Hypothesis, but focuses specifically on the changes in the competitiveness of manufacturing firms under environmental regulation and the resulting effects on investment, plant location, net exports, trade balances, and employment. The authors find that "there is relatively little evidence to support the hypothesis that environmental regulations have had a large adverse effect on competitiveness" and note that changes in employment are small and insignificant. The effects of regulation on competitiveness are small because for all but the most heavily regulated industries, the costs of complying with environmental regulation make up only a very small portion (less than 2%) of total production costs. The authors conclude that although there is little evidence to support the conventional view that regulation reduces competitiveness, there is also little evidence that regulation improves competitiveness.

1995: Academic Journal Article

Palmer, Karen; Wallace E. Oates; and Paul R. Portney. 1995. "Tightening Environmental Standards: The Benefit-Cost or the No-Cost Paradigm?" *Journal of Economic Perspectives* 9(4): 119–132.

Immediately following the publication of Porter and van der Linde (1995), this article criticizes the Porter Hypothesis. The authors agree with Porter and van der Linde on a several points concerning firm dynamics, the need for incentive-based regulation, and the potential for regulation-induced innovations. But they emphasize the opportunity costs of environmental regulation, pointing out that even if firms do realize profit after regulation, firms would always be better off under a business-as-usual scenario. The authors emphasize the importance of proper cost-benefit analysis and stress that the Porter Hypothesis is simply a "false premise of cost-free controls." Although this article makes no explicit inference to employment effects of environmental regulation, it is a classic example of how some economists reason that environmental regulation can hurt firms.

1995: Academic Journal Article

Porter, Michael E., and Claas van der Linde. 1995. "Toward a New Conception of the Environment-Competitiveness Relationship." *Journal of Economic Perspectives* 9(4): 97–118.

This article introduces the Porter Hypothesis, named after Michael Porter, Harvard Business School professor of economics, which argues that "firms can actually benefit from properly crafted environmental regulations that are more stringent." Porter and van der Linde contend that firms are not always operating at optimal levels as most static economic models assume. Regulation can induce innovations that can improve economic efficiency, resulting in better performance, enhanced global competitiveness, increased profits, and greater social welfare. The Porter Hypothesis has been widely debated in economics, as regulation was conventionally assumed to only hurt firms by raising their production costs. Though the article does not address employment effects explicitly, it initiates alternative economic perspectives regarding the positive economic benefits from environmental regulation.

1999: Book

Goodstein, Eban S. 1999. *The Trade Off Myth: Fact and Fiction about Jobs and the Environment*. Washington, DC: Island Press.

Economist Eban Goodstein takes a deep, critical look at the widely held view that environmental regulation equals job-killing regulation. He attributes this “jobs versus the environment” myth to relatively few, high-profile industry-sponsored studies that have been engineered to induce the public’s fear and opposition to environmental regulations. The book provides a broad literature review to demonstrate that jobs-environment conflicts are rare in both absolute and relative terms, and that few jobs have ever been lost due to environmental regulation. While acknowledging that employment could be lost due to increased regulation in some industries such as coal or timber, Goodstein demonstrates how shifting from dirty to clean production methods can actually alleviate local unemployment, and how providing adjustment assistance can protect even the most vulnerable workers. Finally, he examines the role such regulation can play in climate change action plans.

2002: Academic Journal Article

Morgenstern, Richard D.; William A. Pizer; and Jhih-Shyang Shih. 2002. “Jobs versus the Environment: An Industry-Level Perspective.” *Journal of Environmental Economics and Management* 43(3): 412–436.

This oft-cited article investigates the employment effects of environmental regulations for four heavily polluting industries: pulp and paper mills, plastic manufacturers, petroleum refiners, and iron and steel mills. The authors examine three potential ways regulation can impact employment: rising production costs, shifting to either more or less labor-intensive forms of production, and changing the quantity of output demanded. Their research finds that increased environmental spending generally does not cause a significant change in industry-level employment. Rather, because environmental spending is typically more labor-intensive and demand is relatively inelastic, environmental spending can lead to employment gains in these industries. They found a net gain of 1.5 jobs per \$1 million in additional environmental spending on average across all four industries.

2004: RAEL Report

Kammen, Daniel M.; Kamal Kapadia; and Matthias Fripp. 2004. *Putting Renewables to Work: How Many Jobs Can the Clean Energy Industry Generate?* RAEL Report. Berkeley: University of California. Available from http://www.unep.org/civil_society/GCSF9/pdfs/karmen-energy-jobs.pdf

Kammen is director of the Renewable and Appropriate Energy Laboratory (RAEL) at the University of California, Berkeley, and testified for the U.S. Congress in September 2007 for a hearing on “Green Jobs Created by Global Warming Initiatives.” The majority of his testimony was based on this report, which reviews and synthesizes findings of studies on green job creation and also examines scenarios where 20 percent of electricity generation capacity nationwide is required to come from renewables by 2020. The authors find that, overall, the renewable energy sector generates more jobs than the fossil fuel sector, which has been steadily declining, and makes policy recommendations to ameliorate those losses. The authors also note that less reliance on fossil fuels, in addition to ensuring environmental benefits and adding employment, increases national security and international stability. This report, and Kammen’s testimony, were cited in a United Nations report on green jobs (*Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World*), which can be found below and in the Case Studies section of this portal.

2007: ILO Report

International Labour Organization. 2007. *Decent Work for Sustainable Development – The Challenge of Climate Change*. Geneva, Switzerland: International Labour Office. Available from http://www.ilo.org/wcmsp5/groups/public/---ed_norm/---relconf/documents/meetingdocument/wcms_084890.pdf

The International Labour Organization (ILO) is a specialized agency of the United Nations that deals exclusively with labor issues. This report presents the early ILO position toward the Green Jobs Initiative, a joint initiative by the United Nations Environment Programme (UNEP), the ILO, the International Employers Organization, and the International Trade Union Confederation. Launched to access, analyze, and promote the creation of jobs from necessary environmental policies, this initiative supports a global effort to promote green economies. The preliminary formative document to the more extensive UNEP report cited below (Renner, Sweeney, and Kubit 2008), this short brief presents a climate research summary, development implications, and suggested policy conclusions.

2008: Academic Journal Article

Bezdek, Roger H.; Robert M. Wendling; and Paula DiPerna. 2008. "Environmental Protection, the Economy, and Jobs: National and Regional Analyses." *Journal of Environmental Management* 86(1): 63–79.

This article addresses the relationship between environmental protection and employment through a literature review and an extensive analysis of the Jobs and the Environment Initiative, a research project funded by nonprofit foundations to quantify the impacts of environmental protection on jobs and the economy. The authors find that "contrary to conventional wisdom, environmental protection, economic growth, and jobs creation are complementary and compatible: investments in environmental protection create jobs and displace jobs, but the net effect on employment is positive." Since the late 1960s, environmental protection has rapidly grown to become a major profit-making, job-creating industry, responsible for creating nearly 5 million jobs in 2003. The article also finds that states with the strongest environmental records also offer the best job opportunities and climate for long-term economic development. Environmental spending generates employment in virtually all occupations; the majority of positions, in fact, are not inherently related to the environment.

2008: Book

Jones, Van, with Adrian Conrad. 2008. *The Green-Collar Economy: How One Solution Can Fix Our Two Biggest Problems*. New York: Harper Collins.

This *New York Times* best seller by Van Jones, former Special Advisor for Green Jobs, Enterprise, and Innovation to the Obama administration, is a widely read and influential treatise on the potential for green jobs. Jones, who is not an economist, promotes a wholly integrated view of environmentalism that addresses class and race. His view of "social-uplift environmentalism" as offering equal protection for all people, equal opportunity for all people, and reverence for all creation is one of the first major attempts to convince a largely skeptical public that environmental protection is not exclusively a white, upper-middle-class concern. The book describes a strategy to alleviate the dual problems of increased environmental degradation and poverty by revamping national energy distribution, consumption, and efficiency while providing millions of jobs at all skill levels. Although criticized by some for focusing too heavily on racial injustice surrounding Hurricane Katrina,

the book's vision and arguments have influenced proposals to stimulate the economy and may continue to help shape energy reform in the years to come.

2008: CAP/PERI Report

Pollin, Robert; Heidi Garrett-Peltier; James Heintz; and Helen Scharber. 2008. *Green Recovery: A Program to Create Good Jobs and Start Building a Low-Carbon Economy*. Washington, DC: Center for American Progress, and Amherst, MA: Political Economy Research Institute. Available from http://www.americanprogress.org/issues/2008/09/pdf/green_recovery.pdf

This report outlines a short-term \$100 billion green economic recovery program that could create roughly 2 million new jobs within the U.S. economy over two years. Focusing on investments in building retrofits, mass transit, smart energy grids, and expanding renewable energy production, this program would “help jumpstart a wide range of new investment initiatives that can effectively fight global warming and build a clean energy economy in the United States.” The results are impressive, especially when compared with similar spending geared toward the fossil fuel industry or increased household consumption. As the authors conclude, “We can be certain that the green economic recovery program will serve as a strong counterforce against pressures that currently are pushing unemployment up as well as more broadly increasing economic disparities.”

2008: UNEP Report

Renner, Michael; Sean Sweeney; and Jill Kubit. 2008. *Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World*. Geneva, Switzerland: UNEP/ILO/IOE/ITUC. Available from http://www.unep.org/labour_environment/PDFs/Greenjobs/UNEP-Green-Jobs-Report.pdf

This United Nations Environment Programme (UNEP) report details the multi-agency-supported Green Jobs Initiative. The authors provide estimates of current green employment in key countries and world regions and evaluate the future potential for growth in green employment in the renewable energy, buildings and construction, transportation, basic industry, agriculture, and forestry sectors. The report finds that the transition to a low-carbon and sustainable economy is an engine for growth with the potential to create, as well as transform, eliminate, and substitute, jobs in the global economy. The authors caution that not all green employment is equally green and call for the creation of decent jobs that respect labor rights and pay fairly. Finally, the report calls for government support for the transition from fossil fuels and examines potential policies such as subsidies, carbon markets, tax reform, targets and mandates, energy alternatives, eco-labeling, research and development, and international aid.

2008: USCM Report

The United States Conference of Mayors. 2008. *U.S. Metro Economies: Current and Potential Green Jobs in the U.S. Economy*. Lexington, MA: Global Insight. Available from <http://www.usmayors.org/pressreleases/uploads/greenjobsreport.pdf>

This report for the United States Conference of Mayors (USCM) and the Mayors Climate Protection Center estimates current green jobs in the U.S. economy and forecasts potential future growth. The report finds that the majority of green jobs in the United States are located in metropolitan areas and that more than half involve engineering, legal, research, and consulting positions. Key sectors to drive future growth of green jobs include renewable power generation, energy efficiency, and renewable transport fuels, and forecasts are based on scenarios of these assumptions. Ethanol production and refinement are considered as positive impacts toward a sustainable economy although the truth of this is debatable. The analysis predicts the creation of 4.2

million green jobs by 2038, largely located in cities and metropolitan areas currently the most attractive for investment. The report concludes that “the potential growth in Green Jobs is significant in that it could be the fastest growing segment of the US economy over the next several decades and dramatically increase its share of total employment.”

2008: CWS/WA/AA Report

White, Sarah, and Jason Walsh. 2008. *Greener Pathways: Jobs and Workforce Development in the Clean Energy Economy*. Madison, WI: Center on Wisconsin Strategy, The Workforce Alliance, and The Apollo Alliance. Available from <http://www.cows.org/pdf/rp-greenerpathways.pdf>

Greener Pathways provides information to help states craft clean energy strategies that meet emerging industry demands while creating green jobs. The authors describe current economic and workforce development in industries related to energy efficiency, wind, and biofuels, noting that much of the potential for growth and new jobs will occur through transformation of existing industries and positions. Twelve key policies and practices recommended for policymakers “should underpin state efforts to secure the better environment/better economy/better opportunity promise.” This report is very comprehensive and includes several detailed figures, maps, and graphs as well as a list of additional resources.

2009: EPI Policy Brief

Bivens, Josh; Josh S. Irons; and Ethan Pollack. 2009. *Green Investments and the Labor Market: How Many Jobs Could be Generated and What Type?* EPI Policy Brief #253. Washington, DC: Economic Policy Institute. Available from <http://www.epi.org/publications/entry/ib253/>

This report estimates the labor market impact of the green investments proposed under the Obama administration’s proposed budget in March 2009. The authors’ main finding is that \$100 billion in annual public investments results in approximately \$160 billion in additional economic output and 1.1 million net new jobs. They draw special attention to the positive impacts of such investments on national wage equality, a problem much older than the recession that began in 2007. Individuals with high school educations or less stand to gain a large share of the new employment opportunities afforded by green investments. However, potential exists to increase the gender wage gap, which policy design should consider and aim to prevent. The authors argue that investing in infrastructure, including green investments, stimulates economic activity more than comparable measures aimed at reducing taxes, because such investments can be made quickly and are labor-intensive.

2009: PIK/GRI LSE Report

Edenhofer, Ottmar; Nicholas Stern; Nico Bauer; et al. 2009. *Towards a Global Green Recovery: Recommendations for Immediate G20 Action*. Potsdam, Germany: Potsdam Institute for Climate Impact Research, and London, UK: The Grantham Research Institute on Climate Change and the Environment. Available from http://www.pik-potsdam.de/members/edenh/publications-1/global-green-recovery_pik_lse

This report is coauthored by two very prominent economists, Ottmar Edenhofer, chair of the United Nations Intergovernmental Panel on Climate Change, and Lord Nicholas Stern, author of the widely influential Stern Review of the Economics of Climate Change for the U.K. government. Submitted in advance of the London Group of 20 (G20) Summit in 2009, the report recommends how to engineer national stimulus packages that work collectively toward fostering a global green economy—the G20 countries accounting for roughly three-quarters of global energy consumption and carbon emissions. The authors examine seven strategic measures

for their speed of influence, multiplier effects, and expected long-term benefits: energy efficiency, infrastructure, clean technology markets, flagship projects, international research and development, low-carbon investment, and coordination of G20 efforts to enhance the effectiveness of all other measures. The report recommends that overall at least one-fifth of stimulus investments be directed toward green measures. Although the G20 did not take heed of many of the suggestions presented here, this report is one of the first and most comprehensive analyses on global stimulus packages.

2009: ACEEE Report

Laitner, John A. 2009. *Climate Change Policy as an Economic Redevelopment Opportunity: The Role of Productive Investments in Mitigating Greenhouse Gas Emissions*. Washington, DC: American Council for an Energy-Efficient Economy. Available from http://www.peri.umass.edu/fileadmin/pdf/conference_papers/Surdna/ACEEE_Laitner_Climate_Policy_as_Economic_Redevelopment_Oct_2009.pdf

In this report, the American Council for an Energy-Efficient Economy (ACEEE), a nonprofit institute dedicated to energy efficiency research, examines the long-term economic impacts of cap and trade legislation using the DEEPER energy policy model. ACEEE findings imply that the greater the level of energy-saving investments, the greater the economic benefits for Americans. The author contends that alternative models producing opposite results are based largely on faulty assumptions, namely that the economy is operating optimally with all resources fully employed, characterizing expenditures on energy efficiency as economic costs rather than investments, and minimizing the adaptability of human behavior. Negative results are unsurprising in models such as these that are “all about cost containment rather than a smart redirection of investments toward the more productive use of technologies and people.” Instead, this report attests that ongoing productive investment can achieve cost-effective emissions reductions while enhancing the economy and providing jobs.

2009: PERI and Center for American Progress Report

Pollin, Robert; James Heintz; and Heidi Garrett-Peltier. *The Economic Benefits of Investing in Clean Energy: How the Economic Stimulus Program and New Legislation Can Boost U.S. Economic Growth and Employment*. Amherst, MA: Political Economy Research Institute, and Washington, DC: Center for American Progress. Available from http://www.peri.umass.edu/fileadmin/pdf/other_publication_types/green_economics/economic_benefits/economic_benefits.PDF

The Political Economy Research Institute (PERI) is renowned for producing high-quality economic research reports addressing human and ecological well-being. This report thoroughly examines the macroeconomic impacts of the energy components of the American Reinvestment and Recovery Act and the American Clean Energy and Security Act, specifically evaluating impacts on economic growth, income, and employment. The authors find that “clean-energy investments generate roughly three times more jobs than an equivalent amount of money spent on carbon-based fuels” and that the combined investment (totaling \$150 billion) would decrease unemployment rates by one full percentage point. The report scrutinizes a multitude of completed energy policy impact forecasts, and finds that even the most pessimistic estimates of the impacts of a cap-and-trade system on the growth of U.S. gross domestic product are negligible.

2009: PERI Report

Pollin, Robert; Jeannette Wicks-Lim; and Heidi Garrett-Peltier. 2009. *Green Prosperity: How Clean-Energy Policies Can Fight Poverty and Raise Living Standards in the United States*. Amherst, MA: Political Economy

Research Institute. Available from

http://www.peri.umass.edu/fileadmin/pdf/other_publication_types/green_economics/green_prosperity/Green_Pro Prosperity.pdf

Published directly after the 2009 Political Economy Research Institute (PERI) report titled *The Economic Benefits of Investing Clean Energy* this report focuses explicitly on employment and income effects for those below the poverty line. Working off the predicted \$150 billion in clean-energy investments from an economic stimulus package and energy legislation, the report shows that “with effective policies in place, investing in clean energy can provide significant new opportunities at all levels of the U.S. economy, and especially for families who are poor or near-poor.” A net increase of 1.7 million jobs is projected in comparison to a comparable investment in fossil fuels; this is equivalent to a one percentage point fall in the unemployment rate and a 2 percent increase in earnings for low-income workers. The report also finds that clean investments can create 3.2 times more jobs overall than fossil-fuel investments, 3.6 times more jobs requiring high school degrees or less, 2.6 times more jobs requiring college degrees or postgraduate education, and 3.0 times more jobs requiring some college education.

2010: CBO Report

Arnold, Bruce. 2010. *Economic and Budget Issue Brief: How Policies to Reduce Greenhouse Gas Emissions Could Affect Employment*. Washington, DC: Congressional Budget Office. Available from http://www.cbo.gov/ftpdocs/105xx/doc10564/05-05-CapAndTrade_Brief.pdf

This report, by the Congressional Budget Office (CBO), examines and amalgamates three policy-modeling studies to examine the impacts of steadily rising carbon prices on employment. Overall the report predicts “that total employment during the next few decades would be slightly lower than would be the case in the absence of such policies.” The studies included in this report generally did not model particular proposed climate policies, ignored the possibility of technological breakthroughs, did not account for the effects of reducing the national trade deficit, disregarded cost savings afforded by efficiency gains, and excluded the benefits of avoided damages from climate change. Had the models included these factors, the predicted net impact on employment would likely have been lower, or slightly positive.

2010: CCS Report

Johns Hopkins University and the Center for Climate Strategies. 2010. *Impacts of Comprehensive Climate and Energy Policy Options on the U.S. Economy*. Washington, DC: Author.

This national-level macroeconomic analysis examines twenty-three key stakeholder-based climate and energy strategies and their application nationwide. These strategies were derived from sixteen state planning efforts in conjunction with climate policy proposals from Senators Kerry and Lieberman. Overall the report finds that “the combination of the twenty three options has a net present value of increasing GDP by about \$407 billion and increasing employment by 2.52 million full-time-equivalent jobs by the year 2020.” Also expected are large economic savings, emissions reductions, and consumer energy price reductions. Strategies include targeted funding support, tax incentives, price incentives, reform of codes and standards, technical assistance, information and education, reporting and disclosure, and voluntary or negotiated agreements. The report stresses the importance of integrating local, state, and federal actions as well as policy instruments to minimize costs and maximize co-benefits and discusses impacts of included carbon caps or taxes. This useful report provides comprehensive analysis on the national state of carbon reductions and green investments.

2010: Academic Journal Article

Pollin, Robert, and Dean Baker. 2010. "Reindustrializing America: A Proposal for Reviving U.S. Manufacturing and Creating Millions of Good Jobs." *New Labor Forum* 19(2):17–34.

In a post–Hurricane Katrina and financial-crisis world, Pollin and Baker argue that public investment may be more beneficial than previously thought, especially if targeted away from the military and fossil fuel sectors. Such arguments directly contrast with the “free-market” –based approach that has largely dominated the economic and policy discourse in the United States in recent decades.. The authors present evidence that large-scale commitments to well-designed and implemented public investment projects promote healthy long-term growth of private investment, in addition to higher social welfare. Focusing particularly on auto companies and other large manufacturers, the article notes that these sectors have been regular beneficiaries of U.S. industrial policies in the past. Arguing that the United States will likely be the largest consumer of manufactured renewable energy products in the world, the report urges policy makers to embrace this historic opportunity to revive the domestic manufacturing sector with focused and consistent public investments and create millions of jobs.