



Creating Jobs & Growth

The German Green Experience

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Introduction

In the face of climate change science and energy security considerations, governments around the world have recognized the need to take the lead in providing a framework that will mobilize the massive amounts of private investment required to move the world to a low-carbon economy. Such a framework must provide investors with transparency, certainty and longevity. Different policies can be used to achieve this in different regions. However, countries that fail to create those fundamental investment conditions will almost certainly fail to stimulate significant investment in climate change industries.

While frequently the focus is on the cost of these initiatives, the investment, growth and green jobs outcomes are a key societal benefit of these initiatives (See DB Climate Change Advisors whitepaper “Economic Stimulus: The Case for ‘Green’ Infrastructure, Energy Security and “Green” Jobs”), particularly from stimulus packages during the recent economic downturn.

The United States is currently deepening the policy debate around climate change, energy security, and “green investing” through the passage of the American Clean Energy and Security Act by the US House of Representatives in the summer of 2009. As a member of the Deutsche Bank Group, we have substantial experience with the German experience of “green” investments and have a decade of results to analyze. We present that experience here in the hope that it can serve as a useful case study in climate policy development.

Germany is a prime example of how governments can help lead the transition to a cleaner energy supply through a long-term and comprehensive policy framework, including a guaranteed connection to the power grid. As a result of the policy framework, the renewable energy sector in Germany has been characterized by steady growth rates over the past years, with a significant increase in capital investment across various clean technologies. Germany has saved 57 million tonnes of CO₂ directly through implementation of its Renewable Energy Sources Act of 2000. At the same time, Germany has created almost 300,000 jobs in renewable energy sectors, of which 60% in 2007 could be attributed to the Renewable Energy Sources Act.¹ Germany has also established a world-class position in some technologies.

The costs of Germany’s climate policies have been modest. The proportion of the residential electricity rate calculated to be attributable to the Renewable Energy Sources Act of 2000 (feed-in tariff) rose from around 3% to 4% between 2004 and 2006², a very reasonable cost for what has been achieved.

A snapshot of Germany’s renewable energy supply, its impact on job creation and investment and its legislative history is presented below.

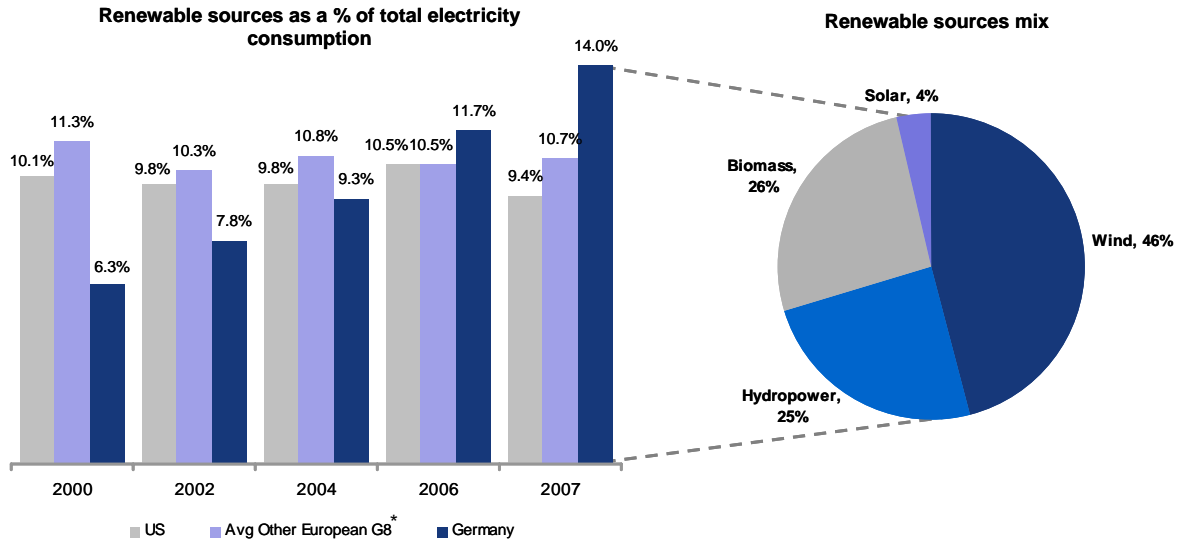
¹ German Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety, “New Thinking-New Energy,” 2009.

² German Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety, “Background information on the EEG Progress Report 2007”

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Scale has been achieved in renewable energy sectors in the last decade, as Germany has overtaken its peer group.

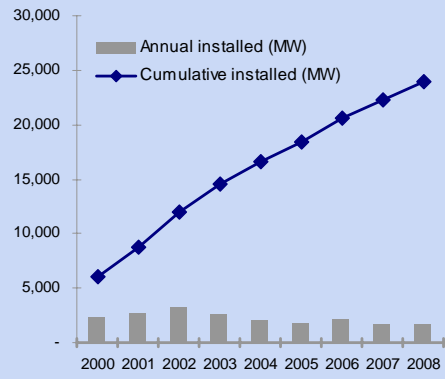
EX 1: Total power supply in Germany from renewable sources has more than doubled since 2000



*Average Other European G8 countries include France, Italy and the United Kingdom. Source: German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, April 2009. US data from US EIA; Average other European G8 data from Eurostat.

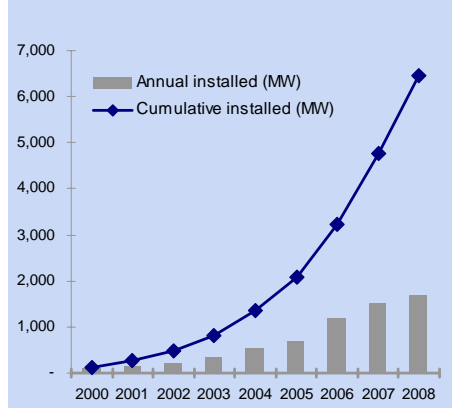
EX 2: Wind, solar and biogas have grown at significant rates

Germany remains Europe's largest wind market, growing at a 19% CAGR between 2000 and 2008



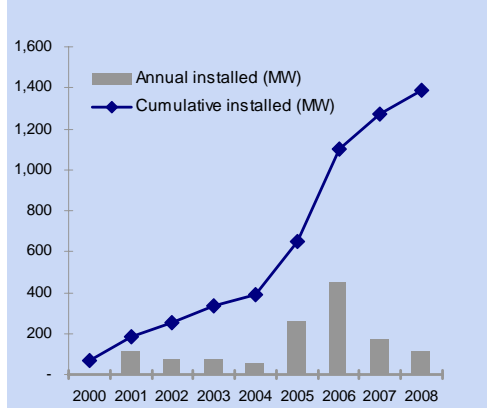
Source: Global Wind Energy Council, 2009.

Germany's solar market grew at a 66% CAGR between 2000 and 2008



Source: Lux Research, 2009.

Germany's biogas market grew at a 47% CAGR between 2000 and 2008

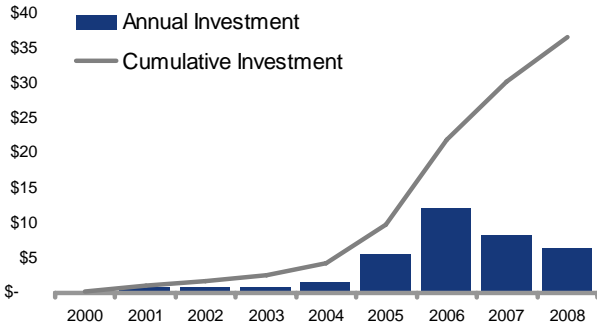


Source: New Energy Finance, 2009.

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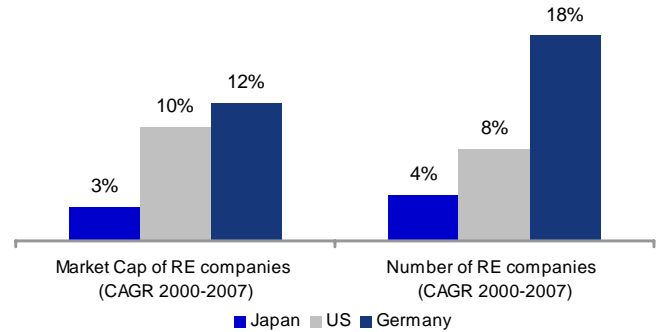
Renewable energy markets in Germany have developed into a robust industry, as indicated by the rate of growth in capital investment and public equity markets. Investment in Germany's clean energy sector as a percentage of its GDP is approximately 2-3 times greater than that in the US³.

EX 3: Capital investment in German clean energy (\$bn)



Source: New Energy Finance, includes PE/VC, AF, Public Markets. NOTE: Data includes the following sectors: Biofuels; Biomass & Waste; Carbon Capture & Sequestration; Carbon Markets; Efficiency: Digital Energy; Efficiency: Green Buildings; Efficiency: Industry; Efficiency: Supply Side; Efficiency: Transportation; Fuel Cells; General Financial and Legal; Geothermal; Hydrogen; Marine; Power Storage; Services & Support; Solar; Wind.

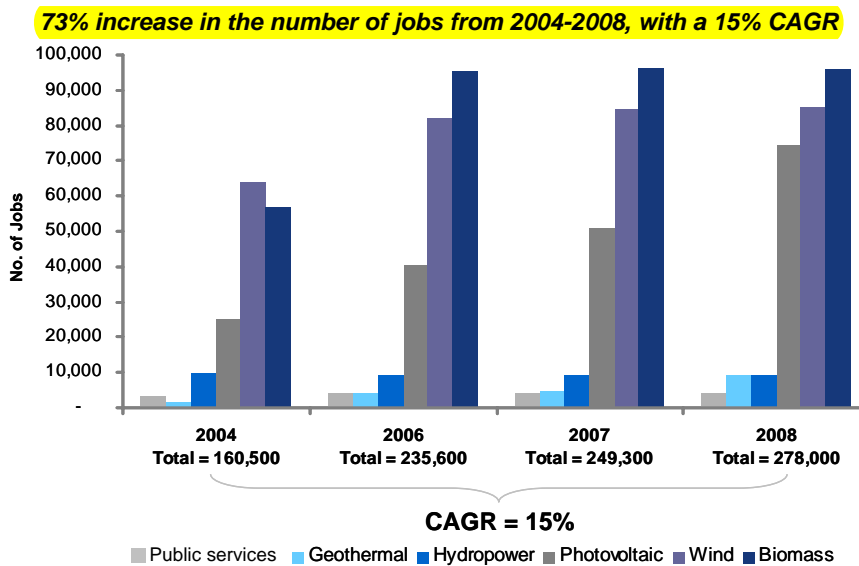
EX 4: Germany has seen rapid growth in their clean energy businesses (CAGR from 2000 – 2007)



Note: Figure is based on public market data only. Public companies identified by New Energy Finance database. NOTE: Market capitalization data include all quoted companies tracked by New Energy Finance with an exposure of greater than 10% to the following sectors. These sectors are: Biofuels; Biomass & Waste; Carbon Capture & Sequestration; Carbon Markets; Efficiency: Digital Energy; Efficiency: Green Buildings; Efficiency: Industry; Efficiency: Supply Side; Efficiency: Transportation; Fuel Cells; General Financial and Legal; Geothermal; Hydrogen; Marine; Power Storage; Services & Support; Solar; Wind. Market cap data sourced by Bloomberg Finance LP.

This robust industry growth has in turn led to an increase in jobs. Germany is a global leader in wind and solar job creation, as indicated by Exhibits 5 and 6, and in fact, according to data released by the United Nations Environment Program in 2006, Germany had 8 times as many wind and solar jobs on a per-capita basis when compared to the US⁴.

EX 5: Germany has seen an increase in renewable power jobs



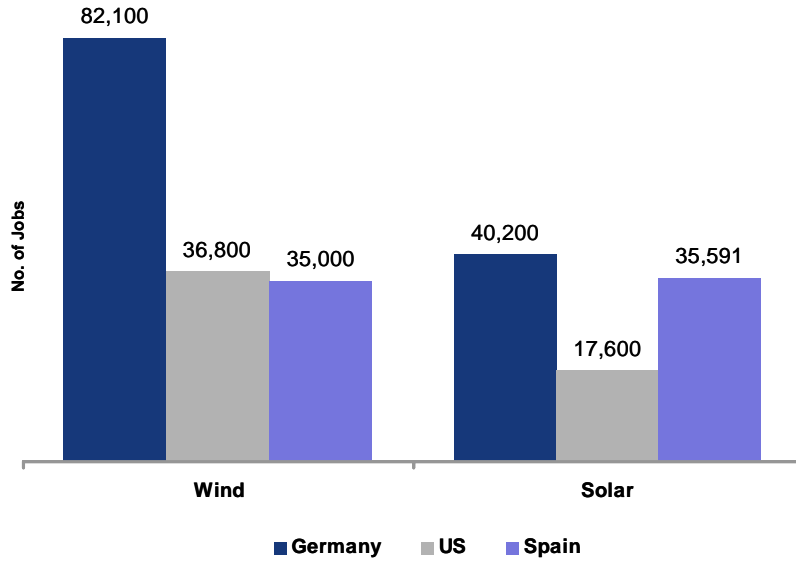
Source: German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, April 2009. Note: 2005 data not available. Public services includes: research, public relations and promotion such as public service. Jobs data includes employment from manufacturing (including export) and employment from operations & maintenance.

³ Investment data from New Energy Finance. GDP data from OECD Statistics.

⁴ Jobs data from UNEP, "Green Jobs: Towards decent work in a sustainable, low-carbon world"; Population data from CIA World Factbook.

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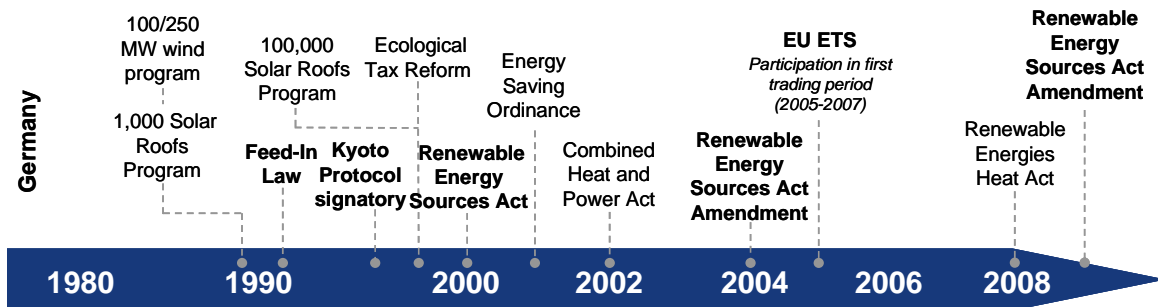
EX 6: Germany dominates wind and solar jobs among peers (2006)



Source: UNEP, "Green Jobs: Towards decent work in a sustainable, low-carbon world"; Data is for 2006.

In Germany's case, the main policy driver behind its renewable energy sector has been the feed-in tariff⁵, which provides certainty of long-term cash flow to projects. The first version of Germany's feed-in tariff was passed through the Feed-In Law in 1990, with further enhancements made through the Renewable Energy Sources Act of 2000 and Amendment in 2004. Furthermore, the Amendment in 2004 obliged local grid operators to provide grid access to plants which exclusively produce electricity from renewable energy and to transmit electricity fed into these grids on a priority basis. In addition, Germany enacted the Ecological Tax Reform in 1999 which increased the taxes on motor fuels, fuel oils, and natural gas, and also levied an electricity tax across all sectors. In 1998, Germany signed the Kyoto Protocol, pledging to reduce GHGs by 21% from 1990 levels by the period 2008-2012 under EU burden sharing agreements. The EU Emissions Trading Scheme became a central mechanism in implementing Germany's efforts in reducing GHGs, and under this scheme, the total amount of allowances allocated in Germany amounted to 495 million tones of CO₂ for the period 2005-2007.

EX 7: Germany has developed comprehensive "green" legislation over the years



Source: DBCCA analysis, 2009.

⁵ **Definition of feed-in tariff:** Feed-in tariffs set a premium price for the production of renewable electricity. Generators are paid a premium rate for each kWh of power fed onto the grid. Feed-in tariffs can be structured either by setting a fixed price for power generated by eligible sources and fed onto the grid, or by setting a fixed premium rate, which is paid on top of the market price, for power generated by eligible sources and fed onto the grid.

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Where will Germany be in 2020? Roadmap for Climate, Energy and Growth

The German government has set some key targets for enhancing energy efficiency and expanding renewable energy sources as a means to achieve climate protection, reduce its dependence on energy imports and provide a boost to the economy and green jobs.

1. Reduce GHGs by 40% from 1990 levels by 2020.
2. Energy productivity must grow by 3% per annum, meaning that in 2020, Germany must be twice as energy efficient as it was in 1990.
3. The proportion of renewable energy must steadily increase:
 - to 50% of primary energy consumption by 2050;
 - from about 9% of final energy consumption today to 18% by 2020;
 - from about 15% of gross power consumption now to at least 30% by 2020;
 - from about 7% of today's thermal energy requirement to 14% by 2020.
4. The contribution made by biofuels is to increase by 2020 so as to permit a 7% reduction in greenhouse gas emissions compared to using fossil fuels.
5. The contribution of Combined Heat & Power (CHP) to power generation is to double to 25% by 2020.

Source: German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

The opportunity for US policy makers

For an investor, we look for regulatory regimes that have transparency, certainty and longevity embedded in them.

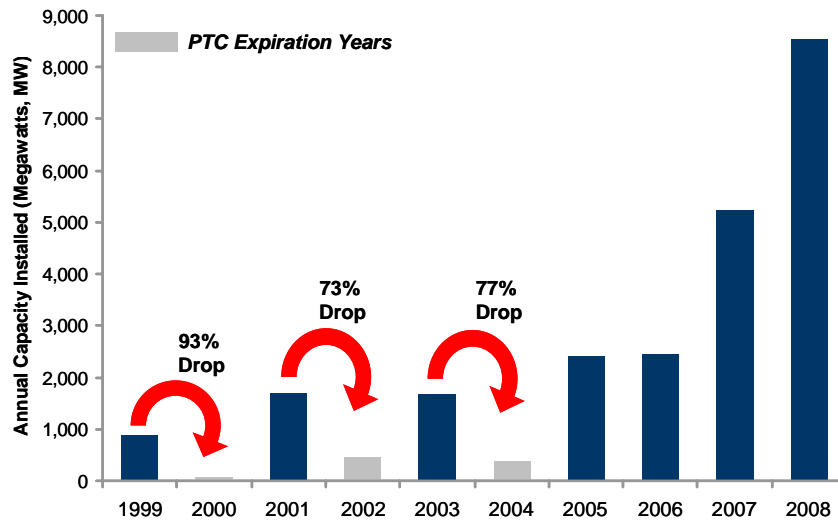
Germany has achieved much of this and has benefited in terms of carbon reduction, scaled renewable energy industries and connectivity to the grid. **In the US, the policy framework has evolved less quickly, at the federal level, where time horizons have been shorter-term.** The US currently has a scheme of tax credits, loan guarantees, state-level RPS, and limited feed-in tariff proposals in place. However, as the US develops its policy framework further, there is a great opportunity to create economic growth, jobs and green industries while reducing carbon emissions and increasing energy security.

At a carbon emissions level, the new US Administration has expressed support for the 83% reduction in GHG emissions from 2005 levels by 2050 through the American Clean Energy and Security Act, as passed by the US House of Representatives. Federal policies to encourage renewable energy sources such as the Investment Tax Credit (ITC) and Production Tax Credit (PTC) have been used, but have only recently become longer-term, with the PTC extended for another three years and the ITC extended for another eight years. In the past, these have relied on tax equity markets. **Following the onset of the economic downturn, tax equity became scarce so the American Recovery and Reinvestment Act of 2009 allowed renewable energy projects to be eligible for direct cash grants in lieu of the PTC or ITC; however, this expires in 2011. How this area of policies evolves is of great interest to investors.** The US Energy Independence and Security Act of 2007 also extensively covers Renewable Fuel Standards.

The uncertainty engendered by short-term policy frameworks has led to repeated fall-offs in renewable capacity additions in the US as support measures have neared expiration, as illustrated in Exhibit 8.

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EX 8: Historic Impact of US PTC Expiration on Annual Wind Installation



Source: AWEA, 2009.

The US Department of Energy (DoE) loan guarantees were introduced for non-commercial technologies in 2005 (Section 1703), and were extended by the current administration along with loan guarantees for commercial technologies (Section 1705). However, most of these policies sunset in 2011. **The proposal in the American Clean Energy and Security Act and in the Senate is to roll these into a Clean Energy Development Administration (CEDA) in some way, but the details have yet to be agreed upon.**

In many ways, the US relies more on a state-level approach through Renewable Portfolio Standards (RPS) for generating an increase in renewable energies. In some states such as California and New Jersey, there is a rigorous framework that is leading to scale-up, while in others, a lack of incentives leaves this outlook uncertain. **Some states such as California, Minnesota, Michigan and Illinois have introduced limited feed-in tariff legislation.**

The establishment of a cap-and-trade system at the federal level would be an example of a longer-term price signal being put in place that would encourage investment. Markets are currently watching the progress of the American Clean Energy and Security Act.

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