



The Outlook on Renewable Energy in America

American Council On Renewable Energy
(ACORE)



JANUARY 2007

www.acore.org





Table of Contents

Introduction	4
Executive Summary	6
Government and Institutional Outlook	
National Renewable Energy Laboratory (NREL)	12
Energy Information Administration (EIA)	15
Electric Power Research Institute (EPRI)	18
University of California, Berkeley	21
Western Governors' Association	25
Industry Outlook	
American Wind Energy Association	27
Solar Energy Industries Association	30
National Hydropower Association	33
Ocean Energy Council	36
Geothermal Energy Association	38
U.S. Combined Heat and Power Association	42
National Biodiesel Board	46
Renewable Fuels Association	49
Visions of Upside Potential	
Worldwatch Institute	51
Apollo Alliance	54
Union of Concerned Scientists	56
Energy Future Coalition 25 x'25	60



Introduction

The American Council On Renewable Energy (ACORE), in conjunction with the Energy Efficiency & Renewable Energy Caucuses of the US Senate and US House of Representatives, convened a national policy forum on November 30, 2006 in the Caucus Room of the Cannon House Office Building in Washington, DC entitled: "Phase II of Renewable Energy in America: Market Forecasts and Policy Requirements."

Phase II

ACORE has designated "Phase II" to be the period from 2000 to 2025, when the focus will be on putting the new technologies into use.

Phase I of renewable energy in America was the period 1975–2000, centered on Federally-funded research, development and demonstration (RD&D) programs that were successful. After 25 years of effort by our nation's best scientists and engineers, and approximately \$15 billion spent, the US has an array of new technologies in wind power, solar energy, hydropower, ocean energy, geothermal energy, biomass energy and biofuels. They are ready to be put into use.

Phase II policies began at the state level with the passage of Renewable Portfolio Standards and economic incentives. Now, it is time to instill the philosophies of Phase II into federal policy. There is a need to recognize the many significant public benefits of renewable energy for domestic energy supply, national security, economic growth, environmental protection, global warming, investment opportunities, and job creation. There is a pressing need for stability of policy so that companies have a reasoned basis for making long-term investments in factories and the financial community can have reasonable confidence making investments in new projects.

Phase II encompasses all of the policies needed to make renewable energy successful in America, including but not limited to regulations, mandates, incentives, tax policy, and program funding. Phase II places emphasis on market pull strategies while also calling for substantially increased RD&D funding to support the pipeline of new technologies to meet market needs. Phase II is a 25-year period to the mid-point on the S-Curve of renewable energy's growth.

The Conference

Keynote speeches were given by the world's leading authorities on all aspects of renewable energy. They include Alexander Karsner, US Assistant Secretary of Energy; Vivienne Cox, Managing Director of BP and CEO of BP Alternative Energy; Richard Kelly, Chairman, CEO and President of Xcel Energy; Hermann Scheer, member of the German Bundestag; Alan Waxman, Managing Director of Goldman Sachs & Co., Senator Byron Dorgan, and Thomas Friedman, columnist at the New York Times. This set the stage for a series of major presentations in three sessions:

- Government and Institutional Outlook
- Industry Outlook
- Upside Potential.

The key question that was addressed by the presenting organizations was how much will renewable energy contribute to US energy supply, by when, and what policy framework will be needed to achieve that outcome? This report is based on the conference presentations which represent the most up-to-date thinking and analysis on the state and potential of renewable energy in America.



Executive Summary

The Outlook on Renewable Energy in America

Renewable energy includes wind power, solar energy, hydropower, geothermal energy, biomass energy, and biofuels. This report presents a series of outlooks on the future of renewable energy in America, by a range of organizations that gave presentations to the Phase II policy conference on November 30, 2006 in Washington, DC. The papers are presented in three sections, corresponding to the sessions in the conference:

- Government and Institutional Outlook
- Industry Outlook
- Upside Potential

1. Government and Institutional Outlook

The first session encompassed the outlooks of government agencies and institutions in the renewable energy arena.

Energy Information Administration

The Energy Information Administration (EIA) presented the base case, assuming “all current standards, laws, and regulations remain as currently enacted.” Under this scenario, total US primary energy consumption is expected to increase from 100 quadrillion Btu (quads) in 2005 to 131 quads in 2030. However, the share of renewable electricity generation remains at 9 percent, while coal increases its share from 50% in 2005 to 57% in 2030. Ethanol use is expected to increase from 4 billion gallons in 2005 to 14.6 billion gallons in 2030, about 8 percent of total gasoline consumption by volume.

National Renewable Energy Laboratory

The National Renewable Energy Laboratory (NREL) reported that it and the Department of Energy are working together with industry and university partners to ensure that technologies are ready to dramatically expand the contribution of renewable energy to the nation’s energy supply. NREL and DOE have set specific cost reduction goals for windpower, solar energy, and biofuels over the next 20 years.

Electric Power Research Institute

The Electric Power Research Institute (EPRI) is focusing on the challenge of future carbon constraints. Renewable generation, excluding large hydropower, currently contributes about 2% to the nation’s electricity supply. With current energy policies and considering the adoption of renewable portfolio standards in 23 states, EPRI estimates new renewable energy’s contribution to be 3–4% of the total electric energy that will be needed in 2020. However, EPRI’s recent modeling results, assuming high-natural gas and high-CO₂ costs, show significant growth in renewable energy. These resources, primarily hydro, wind and biomass, could contribute 13% of electricity by 2020 and as much as 33% by 2050. This represents a 10 fold increase in non-hydro renewable generating capacity, from 36 GW in 2010 to 360 GW by 2050.



John Geesman,
Phase II Conference Co-Chair



Dan Reicher,
Phase II Conference Co-Chair



Rob Pratt,
Phase II Conference Co-Chair

Western Governor's Association

The Western Governor's Association (WGA) formed the Clean and Diversified Energy Initiative to look into these areas, involving more than 250 experts in seven task forces, assessing what is feasible by 2020. WGA concluded that "48,000 MW of energy efficiency is achievable through broad adoption of best practices." WGA concluded that renewable energy can contribute "upwards of 68,000 MW, depending on transmission availability."

University of California at Berkeley

The Energy Research Group (ERG) at the University of California at Berkeley has developed the analytics behind a range of new proposals for programs like WGA's and California's initiatives, concluding that, to make real progress, we will need to (1) make energy and environment the core area of education in the US; (2) establish a set of energy challenges worthy of federal action; (3) make the nation the driver for clean vehicle deployment; (4) expand international collaboration that benefits developing nations; (5) recognize the value of energy investment in the economy including job creation; and (6) begin a serious discussion of market based mechanisms to make the price of carbon emissions reflect its social cost.



Pat Wood,
Phase II Conference Co-Chair

2. Industry Outlook

The second session encompassed the outlooks of the trade associations for wind power, solar energy, hydro and ocean power, geothermal energy, biomass power, biodiesel fuel, and ethanol fuel.

American Wind Energy Association

Wind power markets are increasing capacity around the world. The American Wind Energy Association (AWEA) concludes that "to supply 20% of the nation's electricity by 2030, we would need to increase wind capacity from 10.5 GW in operation today to 350 GW." AWEA's preliminary assessment indicates this is feasible and affordable. However, significant new transmission will be needed to access this wind resource. There would be widespread benefits, with 42 states having 100 MW or more, and creation of 3 million jobs.

Solar Energy Industries Association

The Solar Electric Industries Association (SEIA) estimates that, under robust growth scenarios, "solar can provide 110 GW of new annual power needs by 2016." This includes solar PV, concentrating solar power for utilities, and solar water heating. This would be enough electricity to power 28 million homes, create 260,000 jobs, and save consumers over \$100 billion in energy costs.

National Hydropower Association and Ocean Energy Council

This original source of renewable energy on the grid contributes approximately 75,000 MW of capacity today, representing 9% of the nation's electrical capacity. More can be added. According to the National Hydropower Association (NHA), over 23,000 MW of identified potential can be developed immediately. Ocean energy—tidal, current and thermal conversion—could hold the potential to supply a large share of US electricity requirements, according to NHA and the Ocean Energy Council.