

**Energy Choices Revisited:  
An Examination of the Costs and Benefits of  
Maine's Energy Policy**

Submitted to

**Mainewatch Institute**

by

the Research Consortium of

**Economic Research Associates  
American Council for an Energy-Efficient Economy  
Tellus Institute**

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# 1.0 PROLOGUE AND SUMMARY

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## 1.1 INTRODUCTION

In May 1992, the Maine Commission on Comprehensive Energy Planning reiterated a series of targets for Maine's energy future. Among the stated objectives was the need to reduce the state's level of dependence on petroleum fuels as well as to increase the percentage of renewable energy sources, and to increase statewide energy efficiency. Also included in Maine's energy objectives was the need to stabilize long-term energy prices.<sup>1</sup>

In an era of lagging per capita incomes, the price of all consumer goods is becoming more of a concern for policy makers and the public alike. For that reason, a growing number of Mainers are now questioning the growth of renewable energy and energy efficiency programs within the electric utility supply mix. While they have tended to generate positive economic and environmental benefits, critics also point to these same programs as the causes of

*Many now question the growth of renewable energy and energy efficiency programs because of their rate impacts*

conservation "rate-shock," or higher short-term prices for electricity.

The issue of program rate-shock is not limited to the state of Maine alone. In Connecticut, for example, the Department of Public Utility Control expressed concern about short-term price increases from utility conservation programs. As a result, the Department ordered cuts in demand-side management programs as a means to strike "an appropriate balance" between short-term concerns over the state's economy and long-term

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1. See, *Final Report of the Commission on Comprehensive Energy Planning*, prepared on behalf of the Commission by the Economics and Energy Policy Division of the Maine State Planning Office, Augusta, ME, May 1992, page 1.

energy planning needs.<sup>2</sup> The Maine PUC recently rejected Bangor-Hydro Electric's "Payload" demand-side management program citing an adverse (i.e., upward) impact on utility rates. The concern was that even modestly higher consumer rate impacts may not be appropriate in a depressed regional economy.<sup>3</sup>

## 1.2 PROJECT BACKGROUND

Maine law has established a number of energy priorities with respect to electric utilities. In many ways, policies such as the State's "Small Power Production Facilities Act"

*That leadership role,  
however, comes at a price*

(MRSA 33, §3302) and the "Maine Energy Policy Act" (MRSA 35-A §3191) have lifted Maine into a national leadership role in the development of conservation and renewable energy resources.<sup>4</sup> That leadership role, however, comes at a price.

While renewable energy resources — largely biomass cogeneration facilities and conservation technologies — have met most of the new demand of electricity since 1980, a slowing economy has left "some Maine electric utilities . . . with an over-supply of capacity and energy."<sup>5</sup> Some have indicated that this circumstance may be partly responsible for the substantial increases in electric rates in the 1990s. Others believe that, plain and simple, the "higher prices of the newly purchased power and the costs of demand side management (DSM) programs forced [utility] rates up."<sup>6</sup>

To better understand the dynamic tension between the economic benefits which flow from a new energy investment strategy and the price impact which appears to have followed that investment, the Mainewatch Institute sought an independent review of the costs and benefits of existing energy policies. More specifically, the Mainewatch Board undertook

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2. "Wary of the Economy, Connecticut Orders New Cuts in DSM Programs," *Demand-Side Report*, McGraw-Hill, New York, NY, November 26, 1992, page 3.

3. "Bangor Hydro's 'Payload' Bid Program Rejected in Split Decision by Maine PUC," *Demand-Side Report*, McGraw-Hill, New York, NY, October 14, 1993, page 1.

4. *Report of the Commission on Comprehensive Planning, op. cit.*, page 7.

5. "Request for Proposals (RFP)," Energy Choices Revisited Project, Mainewatch, Hallowell, Maine, January 20, 1993, page 1.

6. "Next step on energy," a letter to the Editor by Robert R. Wagner, Chairman, Advisory Board, Maine Energy Coalition, to the *Maine Times*, May 21, 1993, page 10.

a study "designed to identify the economic and environmental tradeoffs which have resulted from Maine's electric policies of the 1980s."<sup>7</sup>

Responding to this initiative, a Research Consortium, led by a Virginia-based independent consulting firm, proposed a research methodology to provide this assessment on behalf of the Mainewatch Institute.<sup>8</sup> The details of the research methodology are described more fully in Chapter 2 of this report.

*Measured in constant dollars, Maine's electricity prices fell by 3 percent, while per capita use rose by 28 percent in the period from 1980 to 1992*

### 1.3 REPORT FINDINGS

Maine's current electricity prices are higher than the U.S. as a whole — 9.05 cents per kilowatt-hour (kWh) in 1992 compared to the national average of only 6.84 cents per kWh.<sup>9</sup> However, when measured in constant 1987 dollars, Maine's electricity rates fell slightly from 7.76 cents per kWh in 1980 to 7.49 cents in 1992 (a 3 percent drop in that period). At the same time, however, per capita consumption for all uses of electricity rose by 28 percent, from 7,256 kWh in 1980 to 9,287 kWh in 1992.

The higher electricity consumption meant that the per capita expenditures for electricity (measured in constant 1987 dollars) rose from \$563 in 1980 to \$695 in 1992. This is a 23 percent increase in average electricity expenditures which closely follows on the heels

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7. See the January 20, 1993 memo accompanying the Request for Proposals which initiated the Mainewatch Project "Energy Choices Revisited."

8. The Research Consortium consists of Economic Research Associates, an independent consulting firm with offices in Alexandria, VA and Eugene, OR; the Tellus Institute, a research and consulting firm based in Boston, MA; and the American Council for an Energy-Efficient Economy, a non-profit research organization in Washington, DC. The principal investigator for the project is Skip Laitner, an economist and principal in the firm of Economic Research Associates. Since the inception of the project, however, Mr. Laitner has accepted a position as a Senior Associate for ACE<sup>3</sup>. For more information on this project analysis, or on the research team as a whole, contact Mr. Laitner at the ACE<sup>3</sup> offices, (202) 429-8873.

9. *Statistical Yearbook of the Electric Utility Industry 1992* (Washington, DC: Edison Electric Institute, October 1993, Number 60), page 75.

of a 31 percent increase in per capita income that rose from \$11,457 in 1980 to \$14,976 in 1992.<sup>10</sup>

Per capita electricity expenditures in Maine rose at a faster rate from 1980 to 1992 than for the U.S. as a whole. While the per capita electric bill in Maine rose 23 percent during that period, it increased only 1.5 percent in the U.S. This increased per capita expenditure in the state appears to be fueled by slightly larger increases in personal income. In fact, as we shall see later in this study, it appears as if there is a strong correlation between the increase in personal income and Maine's electricity use.

In the decade of the 1980s the Maine economy grew stronger relative to that of the United States. In 1980, for instance, per capita incomes in Maine were only 83 percent of the national average. By 1990 that figure rose to 90 percent of the U.S. average. In response to the strengthened per capita income, Maine's homes, schools and businesses played a bit of "catch-up" in their use of electricity.

*The greater demand for electricity in the 1980s drove per capita expenditures to a record high in the state*

The greater demand for electricity usage drove per capita expenditures for electricity to a record level compared to the nation as a whole — despite the modest overall decline in real electricity prices since 1980. Moreover, Maine has a smaller per capita income as noted earlier, earning only \$14,976 per resident

(measured in constant 1987 dollars) compared to the average U.S. income level of \$16,637 per person. As a result, the state now spends more for electricity as a percent of personal income than does the U.S. as a whole. Electricity expenditures claim about 4.6 percent of personal income for the state, compared to only 3.7 percent for the United States.

State per capita income peaked in 1989. From 1989 through 1992, however, income levels fell by about 0.8 percent.<sup>11</sup> The decline in income coincides with a 16 percent

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10. The sources for these data include the *State Energy Price and Expenditure Report 1991*, Energy Information Administration, U.S. Department of Energy, DOE/EIA-0376(90) Washington, DC, September 1993, Table 13; and state personal income data from the U.S. Bureau of Economic Analysis (Washington, DC: U.S. Department of Commerce, 1993), with data in an electronic file format. Similar trends are shown for the years 1980 through 1989 in the *Final Report of the Commission on Comprehensive Energy Planning*, previously cited. See tables 2, 6 and 10 in that report, for example.

11. See, U.S. Department of Commerce data files on state personal income for 1989-1992, downloaded from the Economic Bulletin Board System (BBS) maintained by the Bureau of Economic Analysis. For more information, contact Paul Christy, BBS Manager, at (202) 482-1986.

increase in the real price of electricity in the same three-year period. These two things added together — especially the sharp drop in income levels — suggest that the electricity prices have taken on more importance for Mainers than might otherwise be expected.

As an example, in 1984 it was thought that statewide sales of electricity would grow at an annual rate of 2.9 percent annually through the year 2000.<sup>12</sup> Plans for future power plant expansion were geared to this level of growth.

In fact, actual sales from 1984 through 1990 grew 3.0 percent annually. With the onset of the economic depression in 1989, electricity sales *fell* one percent annually in the period 1990 to 1992. The average growth rate in the period 1984 through 1992 was, therefore, only 2.0 percent rather than the 2.9 percent as originally forecasted. In effect, the lower growth rate stranded a significant amount of utility investment which tended to increase the overall cost of electric generation.

*The lower growth rate stranded a significant amount of utility investment*

At the same time, the 1984 price from new power plants was forecast to be in excess of 9.00 cents per kWh.<sup>13</sup> Looking from the perspective of forecasts prepared in 1984, this made a large number of alternative energy strategies appear economically attractive. But a combination of oil prices that were dramatically lower than expected, a change in the mix of power plants actually brought on-line, and a lower than expected growth in electricity sales brought the price of new power plants down to a range that was closer to 6-8 cents per kilowatt-hour.<sup>14</sup>

How much has the change in economic circumstance affected Maine's overall price of electricity? Materials prepared by Central Maine Power Company have suggested that the state's energy policies are responsible for about two-thirds of the rate increases since

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12. See, for example, Central Maine Power Company's *Power Supply Issues and Options*, February 1987, Section II entitled "Demand for Electricity."

13. See, for example, Table III on levelized long-term rates, found in the *Decision and Order* of the Maine Public Utilities Commission, Docket No. 82-174, January 9, 1984, page 63.

14. *Energy Resource Planning Issues and Options*, a public discussion document published by Central Maine Power Company, August 24, 1990, page 40. See also the discussion on costs of new plants in chapter 5.

1988.<sup>15</sup> On the other hand, an analysis by a Maine engineering consultant suggests that it is more appropriate to compare today's prices with those *that would have existed* had CMP continued its business-as-usual policies of the early 1980s. In that case, the analysis suggests that ratepayers would have ended up by paying five million dollars more than the current level of expenditures.<sup>16</sup>

The period from 1987 to 1992 is the critical stretch in the development of renewable energy and energy efficiency technologies in Maine. To test the economic impacts of this development, the Research Consortium identified three different scenarios of how Maine's electric generating capacity might have otherwise evolved in the absence of the state's current energy policies. The costs of these three scenarios were then compared to the actual costs paid by Maine ratepayers in that period.

Based upon an analysis of these three alternative scenarios, it appears that Maine's overall electricity prices are 4-12 percent higher than they might otherwise be as a result of the state's energy policies.<sup>17</sup> At the same time, electricity rates rose by almost 36 percent in that same period. This suggests that the higher rates are more attributable to Maine's current economic conditions and other decisions regarding energy supply than to the over-investment in conservation and renewable energy technologies *per se*. This is all the more so since the full benefits of the energy investments will begin to materialize in the period 1994 through 1998.

*The Gross State Product has increased by \$120 to \$220 million as a result of existing energy policies*

Yet, there is good news in all of this for the Maine economy. The policies begun in the 1980s have spawned a new energy service industry anchored by energy efficiency and renewable energy technologies. This new industry directly and indirectly supports about 6,000 jobs in the state. Despite the economic

downturn since 1989, the state has gained a net increase of about 1,800 to 3,300 jobs — even when the higher electricity prices are included in the job impact analysis. As discussed in chapter 6 of the report, this is the equivalent to the jobs supported by the relocation to Maine of 14-26 small manufacturing plants.

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15. Central Maine Power Company, Table entitled, "Components of Revenue Changes Implemented from January 1988 through July 1993 Considering Estimated Impact of DSM Related Lost Revenues and Fuel Cost Savings," provided by Public Advocate Stephen Ward, November 15, 1993.

16. See "Comparison of the Cost of QF purchases with the Capacity Expansion Plan Recommended by Central Maine Power Company," an analysis by Richard Darling for the period 1982 through 1992.

17. For a more complete discussion on this point, see chapter 5 of this report.

The net economic benefit shows perhaps more strongly when measured in terms of the Gross State Product (GSP). Current energy policies appear to have increased Maine's GSP by \$120 to \$220 million in 1992 compared to strategies that might have otherwise been pursued by the state's utilities. On the other hand, without Maine's apparently successful energy policies, the overall economic activity of the state would have been weaker than is now the case.

Maine's current energy policies have also produced significant environmental benefits, lowering air emissions between 2-6 million tons annually. In economic terms, the current path of electricity production and consumption has reduced air pollution costs by \$57 to \$202 million annually.<sup>18</sup> The biggest gain is the significantly reduced carbon dioxide emissions. Adding the economic benefits and subtracting the environmental costs of the alternative scenarios reviewed in this study indicates that Maine's energy policy has produced a net benefit of \$209 to \$424 million in 1992.<sup>19</sup>

*Current policies have reduced air pollution costs by \$57 to \$202 million annually*

Perhaps even better news for Maine is that even a modest economic rebound will strengthen the benefits of current energy policies. Projections by Central Maine Power and the U.S. Department of Energy, for example, indicate that growth in economic activity and real personal income will lead to an increase of electricity sales through 1995 and beyond.<sup>20</sup>

As this materializes, Maine will be well-positioned to provide the new supplies of needed electricity — at less cost than might otherwise be the case. These changes will tend to reduce the cost of providing electricity, strengthen the state's employment base, and improve environmental quality when compared to current levels.

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18. There is a wide range of values associated with the reduction of air emissions. The total impacts identified in this study are generally based upon 1992 values published by the Massachusetts Department of Public Utilities. For more discussion on this point, see chapter 7.

19. See the discussion on this point in chapter 8.

20. See, for example, *1993 KWh Forecast Update*, Economic & Load Forecasting Department, Central Maine Power Company, February 1993. See also, *Short-Term Energy Outlook*, Energy Information Administration, Washington, DC, Fourth Quarter, 1993.