# Alma, CO

## Alternative Energy Study

The Center provided research, analysis, and cost estimates for alternative energy use on all town buildings in Alma with either solar panels or wind energy.

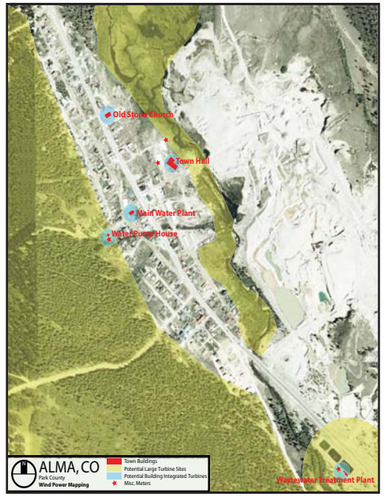
Solar & Wind Power

- Work was completed by CCCD staff and students.
- Agency Under Contract: City of Alma
- Project Contacts: Nancy Comer, Clerk
- Project Manager: Judith Bergquist
- Student Intern: Michael McQuillan
- Project Started - Completed: May 2008 - August 2008
- Funding: City of Alma and DOLA Project Funds

## Wind Power Potential in Alma

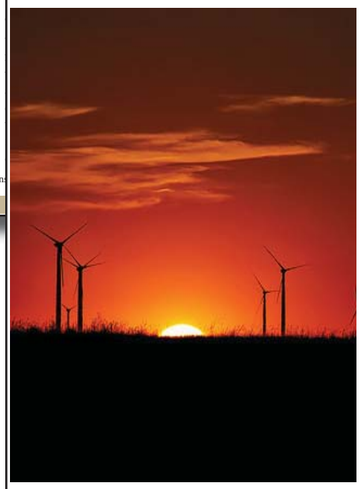
A Windside turbine mounted on a San Francisco residential roof

A series of small-scale roof-mounted turbines




*All local and state ordinances relating to the in ance prior to start of project.

## Small Wind Turbine Costs*



All small wind sizing and cost information found on this page is based upon the American Wind Energy Association's recommended calculations. All numbers used are as follows:

Cost: $3,000-5,000/kW

All calculations were run using straight numbers with no consideration to the time value of money, interest rates, etc. The purpose of these calculations is to provide the town of Alma, CO with realistic, if not 100% accurate numbers as far as costs and sizing. These numbers can then be used to determine the feasibility of employing wind turbines throughout the town.

| kW | W | Cost - Low ($3K/kW) | Cost - High ($5K/kW) |
|---|---|---|---|
| 2.00 | 2,000 | $6,000.00 | $10,000.00 |
| 4.00 | 4,000 | $12,000.00 | $20,000.00 |
| 6.00 | 6,000 | $18,000.00 | $30,000.00 |
| 8.00 | 8,000 | $24,000.00 | $40,000.00 |
| 10.00 | 10,000 | $30,000.00 | $50,000.00 |
| 12.00 | 12,000 | $36,000.00 | $60,000.00 |
| 14.00 | 14,000 | $42,000.00 | $70,000.00 |
| 16.00 | 16,000 | $48,000.00 | $80,000.00 |
| 18.00 | 18,000 | $54,000.00 | $90,000.00 |
| 20.00 | 20,000 | $60,000.00 | $100,000.00 |
| 100.00 | 100,000 | $300,000.00 | $500,000.00 |

*All small wind sizing and cost information in this document is based on the American Wind Energy Association's recommended numbers. (www.awea.org)



## Solar Potential in Alma


Old Stone Church

Town Hall

Main Water Plant

As seen in the solar map on page 4, Co utilize solar power, especially in the mi in the middle swath of the map on page 5,500-6,000 Whr/sqm/day.

The above map shows a satellite image town-owned buildings have been locate meters that are a part of this project. Po number of trees is shown by the large a Hwy. 9. However, throughout the main eastern side of Hwy. 9 seems to have m the sun throughout the day. Also locate more than enough open ground for grou

## Photovoltaic System Costs*

All photovoltaic sizing, rebate and cost information found on this page is based upon Xcel Energy's recommended calculations. Figures used are as follows:

Sizing: 120 SF/kW

Cost: $8-10/W

Rebates: $2/W

Renewable Energy Credits: $2.5/W

All calculations were run using straight numbers with no consideration to the time value of money, interest rates, etc. The purpose of these calculations is to provide the town of Alma, CO with realistic, if not 100% accurate numbers as far as costs and sizing. These numbers can then be used to determine the feasibility of employing solar power throughout the town.

REC - Renewable Energy Credit

| kW | W | Size (120 SF/kW) | Cost - Low ($8/W) | Cost - High ($10/W) |
|---|---|---|---|---|
| 0.25 | 250 | 30 | $2,000.00 | $2,500.00 |
| 0.50 | 500 | 60 | $4,000.00 | $5,000.00 |
| 0.75 | 750 | 90 | $6,000.00 | $7,500.00 |
| 1.00 | 1,000 | 120 | $8,000.00 | $10,000.00 |
| 2.00 | 2,000 | 240 | $16,000.00 | $20,000.00 |
| 4.00 | 4,000 | 480 | $32,000.00 | $40,000.00 |
| 6.00 | 6,000 | 720 | $48,000.00 | $60,000.00 |
| 8.00 | 8,000 | 960 | $64,000.00 | $80,000.00 |
| 10.00 | 10,000 | 1200 | $80,000.00 | $100,000.00 |
| 12.00 | 12,000 | 1440 | $84,000.00 | $120,000.00 |
| 14.00 | 14,000 | 1680 | $112,000.00 | $140,000.00 |
| 16.00 | 16,000 | 1920 | $128,000.00 | $160,000.00 |
| 18.00 | 18,000 | 2160 | $144,000.00 | $180,000.00 |
| 20.00 | 20,000 | 2400 | $160,000.00 | $200,000.00 |

| kW | W | Rebate ($2/W) | REC ($2.5/W) | Rebate + REC | Total [Low-(Rebate+REC)] | Total [High-(Rebate+REC)] |
|---|---|---|---|---|---|---|
| 0.25 | 250 | $500.00 | $625.00 | $1,125.00 | $875.00 | $1,375.00 |
| 0.50 | 500 | $1,000.00 | $1,250.00 | $2,250.00 | $1,750.00 | $2,750.00 |
| 0.75 | 750 | $1,500.00 | $1,875.00 | $3,375.00 | $2,625.00 | $4,125.00 |
| 1.00 | 1,000 | $2,000.00 | $2,500.00 | $4,500.00 | $3,500.00 | $5,500.00 |
| 2.00 | 2,000 | $4,000.00 | $5,000.00 | $9,000.00 | $7,000.00 | $11,000.00 |
| 4.00 | 4,000 | $8,000.00 | $10,000.00 | $18,000.00 | $14,000.00 | $22,000.00 |
| 6.00 | 6,000 | $12,000.00 | $15,000.00 | $27,000.00 | $21,000.00 | $33,000.00 |
| 8.00 | 8,000 | $16,000.00 | $20,000.00 | $36,000.00 | $28,000.00 | $44,000.00 |
| 10.00 | 10,000 | $20,000.00 | $25,000.00 | $45,000.00 | $35,000.00 | $55,000.00 |
| 12.00 | 12,000 | $24,000.00 | $30,000.00 | $54,000.00 | $42,000.00 | $66,000.00 |
| 14.00 | 14,000 | $28,000.00 | $35,000.00 | $63,000.00 | $49,000.00 | $77,000.00 |
| 16.00 | 16,000 | $32,000.00 | $40,000.00 | $72,000.00 | $56,000.00 | $88,000.00 |
| 18.00 | 18,000 | $36,000.00 | $45,000.00 | $81,000.00 | $63,000.00 | $99,000.00 |
| 20.00 | 20,000 | $40,000.00 | $50,000.00 | $90,000.00 | $70,000.00 | $110,000.00 |

*All sizing, rebate and cost information in this document is based on Xcel Energy's recommended numbers. (www.xcelenergy.com)