Genesis 1:26 (King James Version)

And God said, Let us make man in our image, after our likeness: and let them have dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing that creepeth upon the earth.
Carbondale, Colo. football, 1911 ("Potato Day") "Welcome"
The size of each territory shows the relative proportion of the world's population living there.
Territory size shows the proportion of carbon dioxide emissions in 2000 that were directly from there.
A logging steam locomotive in Tillamook County in circa 1919. (Department of Forestry Records, Miscellaneous Photographs, 97A-008, box 2, Walker Retirement)
Empty World

Full World

S = solar energy  H = heat  M = matter  E = energy

natural capital

man-made capital
Temperature and CO₂ concentration in the atmosphere over the past 400 000 years (from the Vostok ice core)

Carbon Dioxide Variations

The Industrial Revolution Has Caused A Dramatic Rise in CO₂
Emissions, concentrations, and temperature changes corresponding to different stabilization levels for CO₂ concentrations

(a) CO₂ emissions (Gt C)

(b) CO₂ concentration (ppm)

(c) Global mean temperature change (°C)

WRE profiles
- WRE 1000
- WRE 750
- WRE 650
- WRE 550
- WRE 450

S profiles

SRES scenarios
**Empty World**

- **S** = solar energy
- **H** = heat
- **M** = matter
- **E** = energy

- **natural capital**

**Full World**

- **S** = solar energy
- **H** = heat
- **M** = matter
- **E** = energy

- **man-made capital**

**ecosystem**
“The essence of dramatic tragedy is not unhappiness. It resides in the solemnity of the remorseless working of things.”

A.N. Whitehead, as quoted by Garrett Hardin in “The Tragedy of the Commons” Science, 162(1968):1242-1248
Reductions in energy-related CO₂ emissions in the climate-policy scenarios

While technological progress is required to achieve some emissions reductions, increased deployment of existing low-carbon technologies accounts for most of the CO₂ savings.
Energy-related CO₂ emissions in the Reference Scenario

97% of the projected increase in emissions between now & 2030 comes from non-OECD countries – three-quarters from China, India & the Middle East alone.
Why a Carbondale Energy Plan?

- Jobs and Economic Benefits
- Energy Independence and Energy Security
- Local Solutions to Global Warming
- Enhanced Quality of Life and Livability
- Solutions to the Impacts of Energy Development
Energy & Climate Protection Plan

1. Lead by example.
2. Change the rules that influence energy use.
3. Create programs to overcome barriers to wiser energy use.
4. Increase local renewable energy supplies.
5. Cultivate clean energy jobs and businesses.
Energy & Climate Protection Plan

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Hybrid-Biodiesel Buses: The New Breed
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NOTE:
Please read the CEB Guidelines prior to completing the Checklist.
The CEB Guidelines serve as the official code document for this program.

<table>
<thead>
<tr>
<th>QUANTITY</th>
<th>CHECK</th>
<th>SCORE</th>
<th>POSSIBLE</th>
<th>POINTS</th>
<th>CODE SECTION</th>
</tr>
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### 4.0 IMPROVED INDOOR AIR QUALITY

#### Chemical Reduction

- **4.1** Formaldehyde-free or low-toxic insulation for ≥ 50% of all insulation. D-3
- **4.2** Low VOC or zero VOC and/or low-toxic interior paint. D-5
- **4.3** Water based lacquers and water based finishes on woodwork. D-5
- **4.4** Use low VOC adhesives. D-5
- **4.5** Low toxic Oriented Strand Board (OSB) for at least 50% of OSB used. D-2
- **4.6** Low or non toxic floor coverings. D-5
- **4.7** Elimination of all particleboard inside envelope of house. 4
- **4.8** Ducts sealed off during construction. 3

#### Mechanical Systems

- **4.9** No attached garage or exhaust fan to exterior on automatic timer in attached garage. 2
- **4.10** Reduce point source pollution - exhaust range hood & bathroom fans to exterior. 2
- **4.11** Energy Star® quiet exhaust fans, less than 1.5 Sones. (1 point per fan) 5
- **4.12** Carbon monoxide detector - hard wired outside sleeping areas. 5
- **4.13** High Efficiency Particulate Air (HEPA) filter in air handler or HEPA - Carbon filter system. 5
- **4.14** Rough-in for radon mitigation passive vented system. 2
- **4.15** Sealed mechanical room - No free exchange of air between house and boiler room. 5
- **4.16** Sealed combustion gas boiler/ furnace(s). 5
- **4.17** Sealed combustion gas hot water heater(s). 5
- **4.18** Mechanical Ventilation for fresh air supply for zones required see code document. 5

**Sub Total:** 43

### 5.0 ENERGY MEASURES

#### Energy Performance

- **R 5.1** Submit REScheck report with "Pass" compliance for Residential ICC 2003 with permit application & attach copy of REScheck report to on-site permit for the inspector. PC
- **R 5.2** HERS rating of 100 or less (E-Star Colorado rating or equivalent). PC-5
- **R 5.3** Prescriptive code from International Residential Code 2003 - better conforms compliance. PC-5

#### Performance Better Than Code

- **1-10** REScheck report, (1 point per 1% improvement) PC
- **10.5** Energy Star® 5 or HERS rating of 70 or less. PC-8
- **10.6** Energy Star® 5 or HERS rating of 70 or less. PC-8
- **5.7** Blower door test - must show ACH 0.35 or less. 5

#### Efficient Envelope - Insulation Measures

- **2.5** Insulated headers, R-10 min., installed on all exterior walls. 2
- **4.9** Raised Heat Trusses (1-36 minimum and 12 inch minimum head). 2
- **5.10** Roof insulation, (1 point per 1% improvement) PC
- **5.11** Wall insulation, (1 point per 1% improvement) PC
- **5.12** Continuous insulation on exterior walls, R-3.5 or more. 3
- **5.13** Crayola space, basement walls, exterior perimeter insulation value (R-10 to R-15; 2 points, R-19+ 4 points) 3
- **5.14** Heated slab insulation, R-5 or more. (R-10 = 2 points & R-15 = 3 points) 3
- **5.15** All hot water pipes to all locations wrapped with R-2 insulation. 3
- **5.16** R-6 insulation on hot water pipes in unconditioned spaces. (R-4 is minimum for code) 4
- **5.17** Blown or spray insulation for ≥ 50% of all insulation. 3
- **5.18** Water heater wrapped with R-6 insulation. 5
- **5.19** R-5 insulated Exterior Doors. 5
- **5.20** No recessed lights in cathedral ceilings exposed to outside air. D-4

#### Mechanical Equipment - Efficiency Measures

- **1.21** Mechanical equipment centrally located. PC
- **5.22** ACCA Manual J 8th edition (or most current) used for sizing mechanical equipment. PC
- **5.23** Thermostats in each habitable room, except bathrooms. 5
- **5.24** Programmable thermostats, except for radiant systems. (1 point for each) 5
- **5.25** 88% (min.) efficient boiler or furnace (88% to 91.9% efficiency = 5 points ≥ 92% efficiency = 10 points) 5
- **5.26** Radiant floor and/or hydronic for ≥50% of the spaces. 5
- **5.27** Side arm hot water heater or tankless hot water heater. 5
- **5.28** Air to air heat exchanger HVAC or ERV. 5
Energy & Climate Protection Plan

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Awareness

Technical Know-How

Financing

Motivation
Energy & Climate Protection Plan

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In Carbondale, voters approved a measure allowing the town to issue up to $1.8 million of municipal bonds to build and operate two large-scale solar systems. This measure passed by a landslide: 81% to 19%.
A solar panel that is part of a “solar farm” on the campus of the Colorado Rocky Mountain School sits ready to begin harnessing the energy of the sun. CRMS will hold an official ribbon-cutting on Tuesday, July 1, that features dignitaries such as Gov. Bill Ritter and U.S. Senator Ken Salazar.

Chad Spangler Post Independent
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Energy & Climate Protection Plan Goals

• Reduce emissions directly attributable to Town facilities and operations by 25% by 2010.

• Reduce community-wide CO2 emissions by 25% below 2004 base year by 2012.

• Turn emissions reduction efforts into an economic advantage.
  • Leverage community investments.

• Obtain at least 30% of our energy for heating and electricity from renewable sources by 2015.
  • Further develop our resource-efficient building ethic.
TOWN OF CARBONDALE
ENERGY & CLIMATE PROTECTION PLAN

Creating a Strong Carbondale Economy with Clean Energy

Town of Carbondale, Colorado
www.carbondalegov.org