WIND POWER IN THE MEDIA

CONFESSIONS OF A REPORTER WHO WRITES ABOUT IT BUT DOESN'T ALWAYS GET IT

STEVE RAABE
THE DENVER POST

Voice of the Rocky Mountain Empire
THE DENVER POST

YOU: WIND EXPERTS

ME: WIND OBSERVER

NEWS COMPETITION ON THE NATURAL RESOURCES BEAT

- MINING
- AGRICULTURE
- ENERGY
  - OIL & GAS
  - COAL
  - RENEWABLES
    - SOLAR
    - HYDRO
    - HYDROGEN
    - WIND

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HOW WIND POWER IS COVERED IN THE DENVER POST

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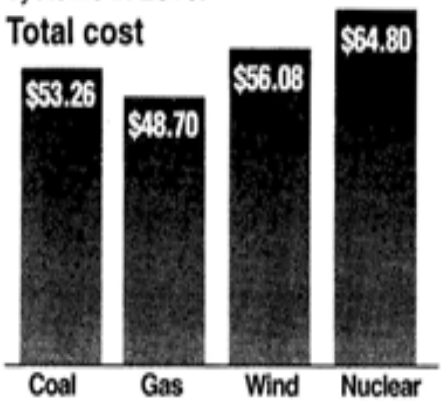
Electricity costs

(per megawatt hour)

A comparison of electricity generation costs for building and maintaining new systems in 2010.

Total cost



Cost breakdown

	Capital	O&M*	Fuel	Trans-mission
Coal	$35.08	$4.53	$10.37	$3.28
Gas	12.33	1.34	32.21	2.82
Wind	40.60	8.17	0	7.31
Nuclear	50.02	7.42	4.64	2.72

*Operation and maintenance

Source: Energy Information Administration

The Denver Post

WIND POWER THROUGH THE AGES

■ About 3200 B.C. — Ancient Egyptians invent the sail to propel boats with wind.

■ About 200 B.C. — The Chinese invent the windmill, most experts believe.

■ About A.D. 500-900 — Windmills spring up across Persia to automate grinding grain and pumping water.

■ 1000 — Vikings explore and raid the North Atlantic in ships powered by wind.

■ 1300 — The Dutch make widespread use of windmills to drain flooded fields. French farmers use windmills to move water for irrigation.

■ 1850s — Wind-powered water pumps appear on farms, ranches and mining operations across the United States.

■ 1935 — The New Deal creates the Rural Electric Administration, which strings power lines across the nation for grid-connected electricity, most often from new dams and coal-fired steam plants. Windmills fade from the American landscape.

■ 1940s — An estimated 6 million windmills are used in the United States to pump water or produce electricity for homes or farms.

■ 1941-1945 — A Vermont wind generator, called the Smith-Putnam machine, is the first to supply power to the local grid.

■ 1973 — OPEC oil embargo begins, and as oil and gas prices rise, interest grows in alternative energy sources.

■ 1974-1975 — The utility-grade MOD-0, a horizontal-axis wind turbine, is developed at the NASA Lewis Research Center in Cleveland.

■ 1978 — The federal Public Utilities Regulatory Policies Act offers private investors in wind turbines a 25 percent tax shelter.

■ 1981-1984 — California sees the addition of 6,870 turbines by wind-energy speculators.

■ 1992 — The federal Energy Policy Act offers power companies a 1.7-cent tax credit for each kilowatt hour of wind-generated electricity they produce and offer customers.

■ 1997 — The Aspen Ski Co. opens the state's first fully wind-powered ski lift, The Cirque, at Snowmass.

■ 1998-1999 — Government funding and unstable oil and gas prices prompt the installation of more than $1 billion in wind-power equipment in the United States and more than $2.5 billion worldwide.

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How a wind turbine works

A wind turbine is a machine designed to convert energy from moving air into electrical energy (despite its efficiency, some of that energy is lost to heat and sound). Here's a look inside a turbine designed to produce about 1.7 megawatts of electricity.

FACING THE WIND
Wind turbines are located in undeveloped areas with strong prevailing winds. They are situated atop towers 15 to 20 stories above the ground (where wind flows faster).

ROTOR BLADES
Glass- and carbon-fiber reinforced plastic blades can be more than 100 feet long and are designed like airplane wings, producing lift that causes the rotation. Blades rotate at 18 to 30 revolutions per minute.

SERVICE HATCH

ROTOR

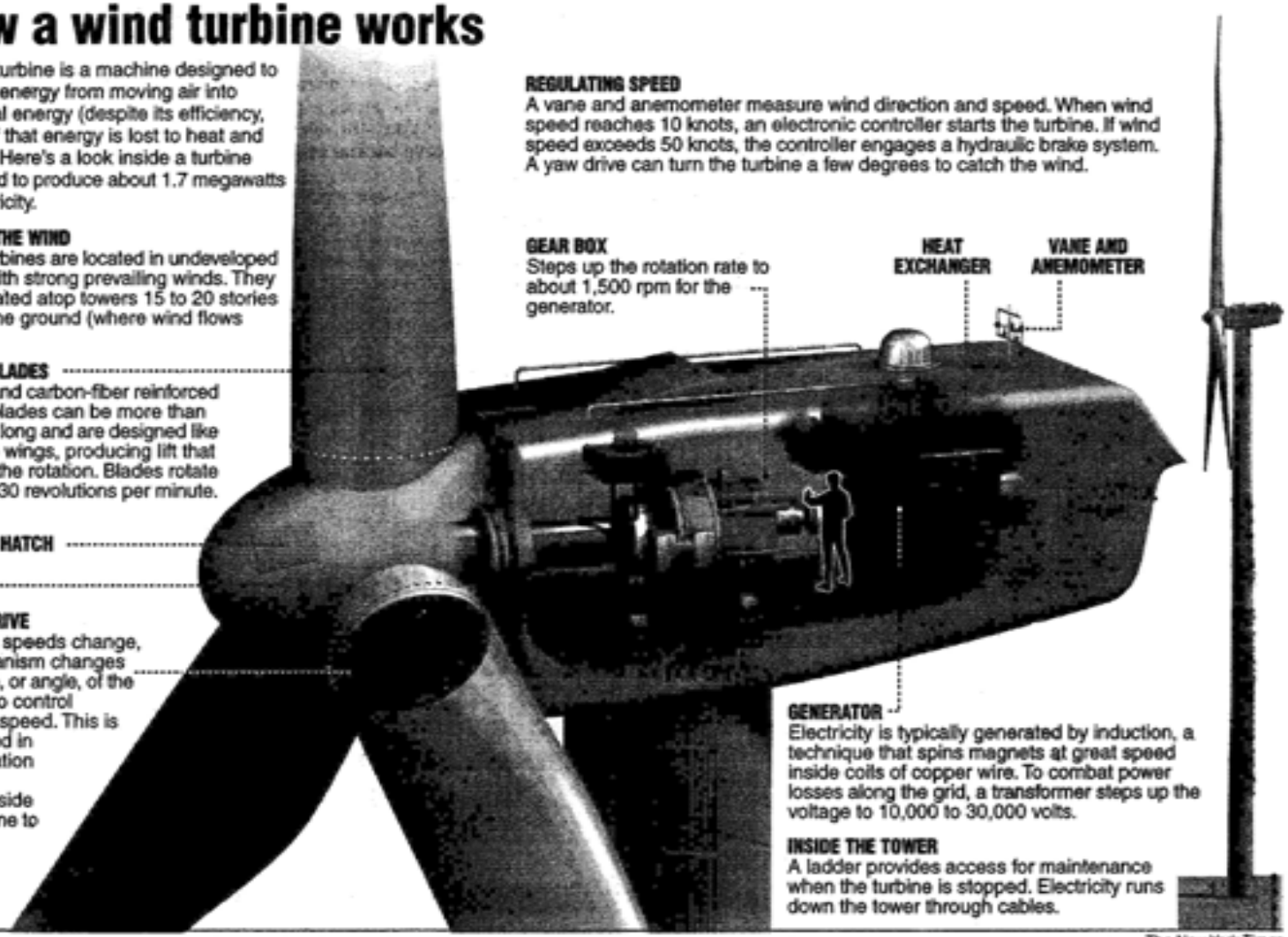
PITCH DRIVE
As wind speeds change, a mechanism changes the pitch, or angle, of the blades to control rotation speed. This is also used in combination with the brake inside the turbine to stop the rotor.

REGULATING SPEED
A vane and anemometer measure wind direction and speed. When wind speed reaches 10 knots, an electronic controller starts the turbine. If wind speed exceeds 50 knots, the controller engages a hydraulic brake system. A yaw drive can turn the turbine a few degrees to catch the wind.

GEAR BOX
Steps up the rotation rate to about 1,500 rpm for the generator.

HEAT EXCHANGER

VANE AND ANEMOMETER



GENERATOR
Electricity is typically generated by induction, a technique that spins magnets at great speed inside coils of copper wire. To combat power losses along the grid, a transformer steps up the voltage to 10,000 to 30,000 volts.

INSIDE THE TOWER
A ladder provides access for maintenance when the turbine is stopped. Electricity runs down the tower through cables.

The New York Times

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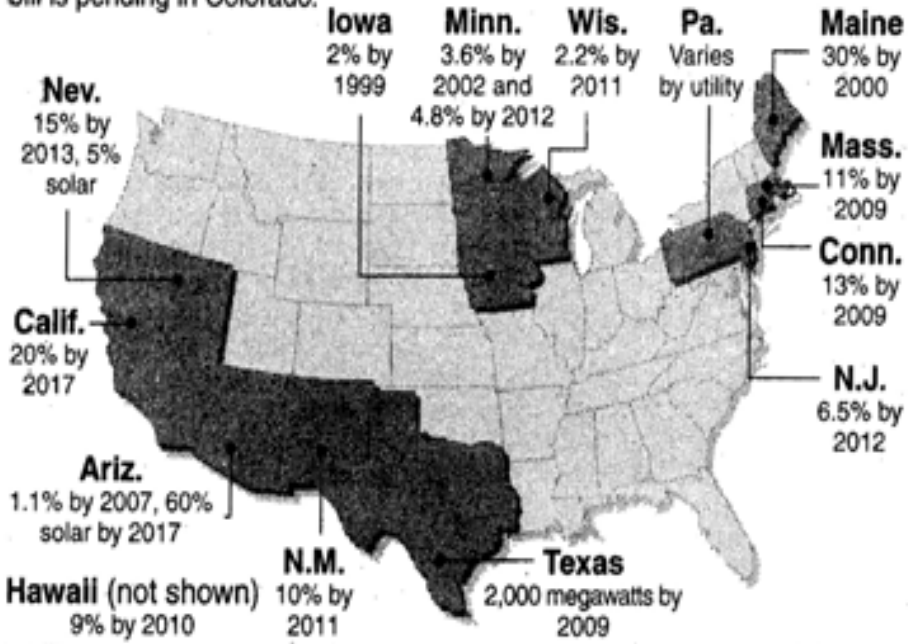
Renewable-energy mandates

Fourteen states have passed laws requiring utilities to generate a portion of their power from renewable sources such as wind, sun and water. A similar bill is pending in Colorado.



Source: Database of State Incentives for Renewable Energy The Denver Post

Wind-power bill before Senate panel

WIND from Page 1C

"Our biggest objection is that it's mandatory," said Stan Lewandowski, general manager of the Intermountain Rural Electric Association. "We're not opposed to renewables as such."

Supporters say a renewable mandate would help provide clean energy, eliminate fuel costs and provide jobs and property-tax revenues to rural Colorado.

"The benefits are numerous," said Craig Cox of Interwest Energy Alliance, a trade group of wind-energy developers and advocates. "Wind is free, it's clean, and it provides the benefits of economic development and affordable energy."

Most renewable projects in Colorado — with or without a legislative mandate — are expected to be wind farms. Energy experts view solar and hydropower generation as small compared to wind.

Fort Collins last month became the first Colorado city to pass a renewable-energy standard. The policy calls for 17 percent of the city's energy to come from renewable sources, plus a 15 percent increase in energy efficiency.

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The answer, my friend …

Colorado to be home to fifth-largest wind farm in nation

By Joey Bunch
Denver Post Environment Writer

The most promising source of electricity in the new millennium is as old as civilization, born more than 5,000 years ago when ancient Egyptians figured out that wind could fill a sail and propel a boat across water.

When the West was settled, windmills dotted the landscape, pumping water to gold mines and farms.

"We've used windmills on ranches for hundreds of years," said John Stulp, a farmer, rancher and Prowers County commissioner who is the chief political backer of a wind farm near Lamar.

Many scientists, politicians and businessmen see wind power as an important supplement to Colorado's electrical supply.

Colorado House Speaker Lola Spradley goes further, calling it "a part of the vision for Colorado's future."

As futuristic as it seems to be in the quest to loosen the grip of oil and gas on modern life, the science of wind power has changed very little since the first windmills sprang up centuries ago.

The process starts with wind — how hard it blows, how often and how it greets the blades of the turbine.

Wind is the product of sunlight heating the surface of the Earth unevenly. Warmer air rises and cooler air tumbles in to replace it, causing the dance behind everything from gentle breezes to raging tornadoes.

Turbines harness the power in the air. As the breeze sweeps over a turbine's blade, pressure forms on the downwind side, thrusting it upward like a propeller, and much the same way wind over an airplane's wing lifts the aircraft off the ground.

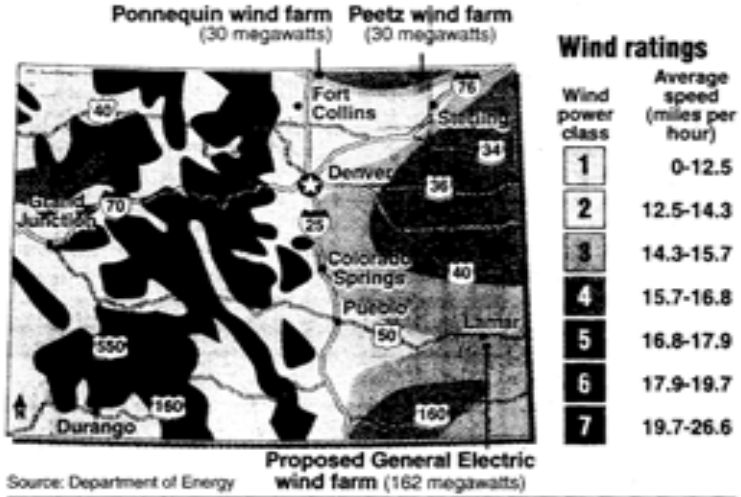
For most modern commercial turbines, blades are attached horizontally on a skinny pole, 100 feet tall or more.

The third part of the turbine — the gearbox behind the blades, called the nacelle — is

SEE **WIND** ON 4K

Blowing in the wind

Colorado has large areas of land with wind ratings of four and six. A rating of four or above indicates that the area is very suitable for wind-generated power. The Ponnequin and Peetz wind farms are in the zone rated four. The proposed General Electric wind farm near Lamar is located in zone three.



Source: Department of Energy

The Denver Post

Project a winner, advocates say

By Steve Raabe and Joey Bunch
Denver Post Staff Writers

Cast aside the do-good, feel-good environmental aspects, and wind energy still wins in a breeze.

That's the pitch of wind-energy advocates who say they're convinced by the economics of generating electricity from wind.

Even after a renewable-energy mandate was defeated for the third time in the Colorado legislature last week, proponents say wind power is progressing from environmental novelty to mainstream reality.

"On a cost basis, wind energy really makes a lot of sense," said Rick Gilliam, senior policy adviser at the Boulder-based Land and Water Fund of the Rockies, an energy and environmental research group.

Gilliam said technological improvements in wind turbines have brought generation prices down to levels that make wind competitive with other fuel sources such as nat-

SEE **ENERGY** ON 5K

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QUESTIONS SEEKING ANSWERS

- IS WIND TRULY COST COMPETITIVE?
- IS WIND RELIABLE?
- DOES WIND REQUIRE BACKUP POWER?
- COSTS OF BUILDING TRANSMISSION?
- REALITY OF ECONOMIC IMPACT?
- FUTURE OF SOLAR PV & FUEL CELLS?

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BEING PROACTIVE

- It’s gotta be newsworthy

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BEING PROACTIVE

- It’s gotta be newsworthy
- Send us something to look at

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BEING PROACTIVE

- It’s gotta be newsworthy
- Send us something to look at
- Follow up

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BEING PROACTIVE

- It’s gotta be newsworthy
- Send us something to look at
- Follow up
- Don’t flog a dead idea

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BEING PROACTIVE

- It’s gotta be newsworthy
- Send us something to look at
- Follow up
- Don’t flog a dead idea
- No payola

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BEING REACTIVE

- Be responsive

BEING REACTIVE

- Be responsive
- Establish ground rules

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BEING REACTIVE

- Be responsive
- Establish ground rules
- Call time out

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BEING REACTIVE

- Be responsive
- Establish ground rules
- Call time out
- Assert your rights

BEING REACTIVE

- Be responsive
- Establish ground rules
- Call time out
- Assert your rights
- Speak up if it's wrong

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