

Renewable Energy and Efficiency

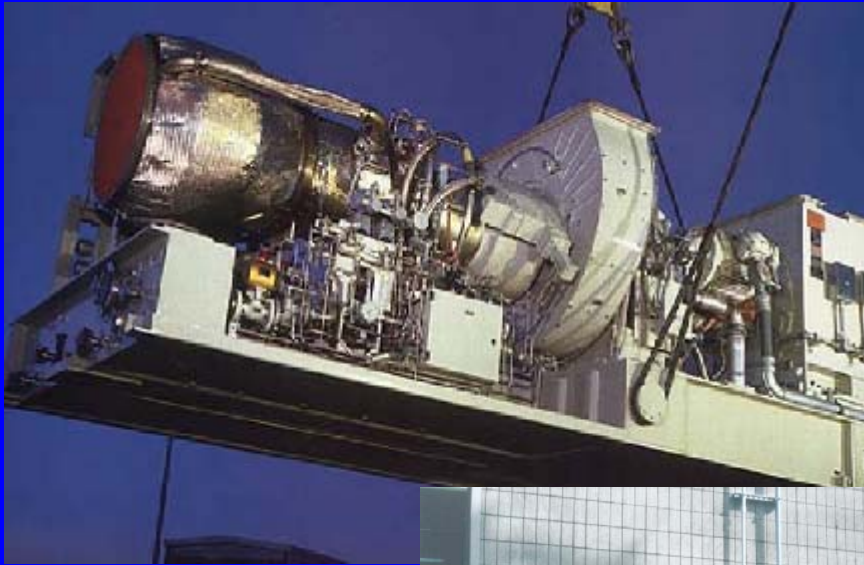
January 9, 2007

Steve Gilbert

Chugach Electric Association, Inc.

Anchorage, Alaska

Distributed Generation



Microturbine Test Program



1 MW Fuel Cell Test Program



Residential Sized Fuel Cell



Renewable Energy

Generally recognized renewables

Biomass

Solar

Wave and Tidal

Geothermal

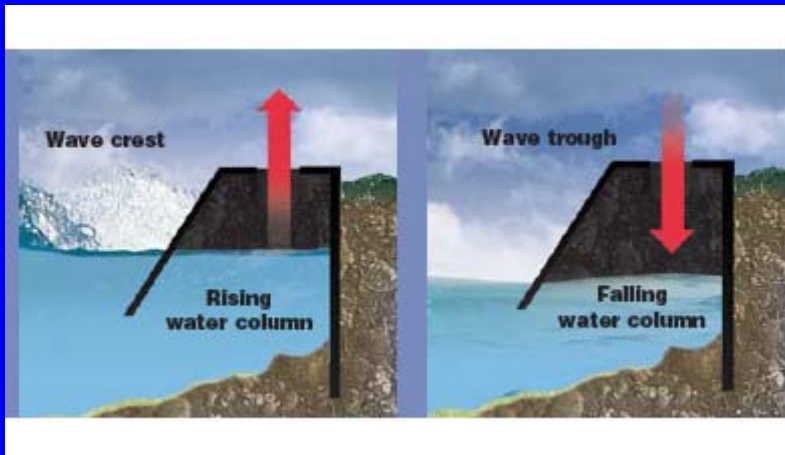
Wind

Solar Technology Examples

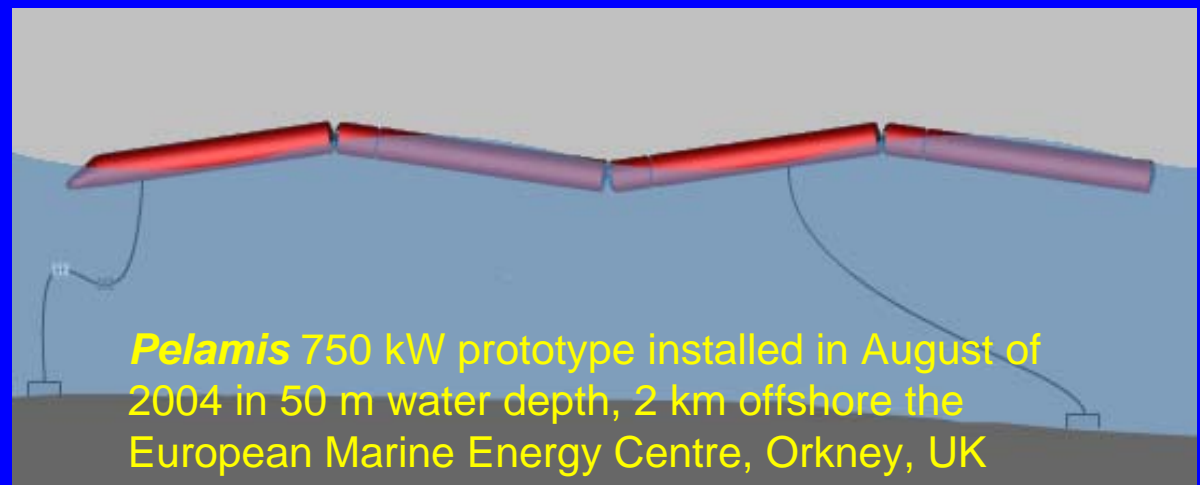


Photos courtesy National Renewable Energy Laboratory www.nrel.gov

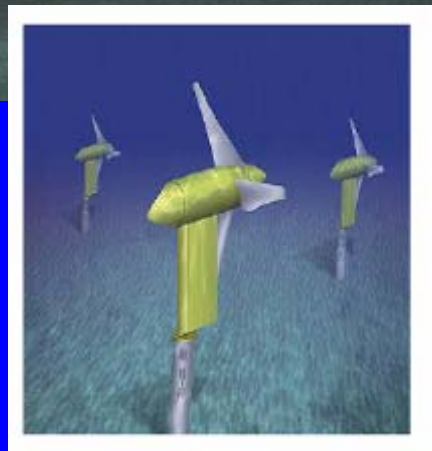
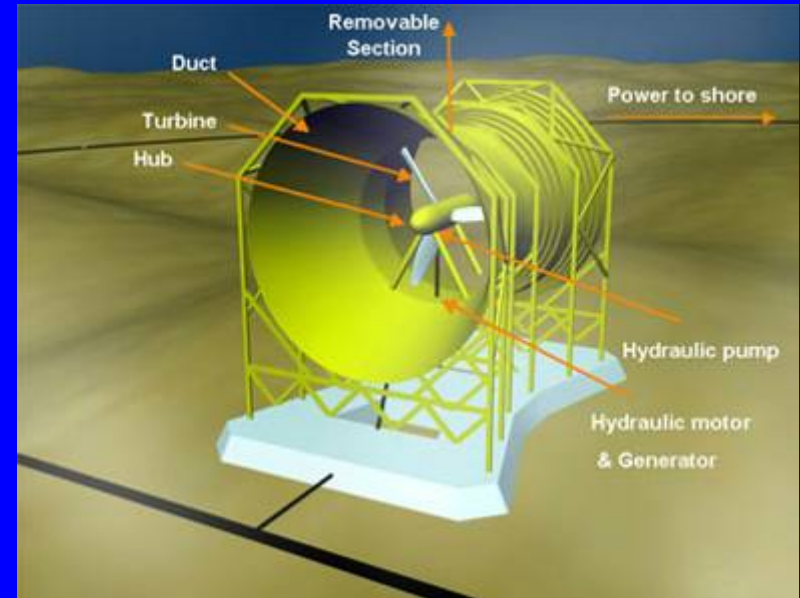
Wave Technology Examples



Photos courtesy of
Wave Energy Center



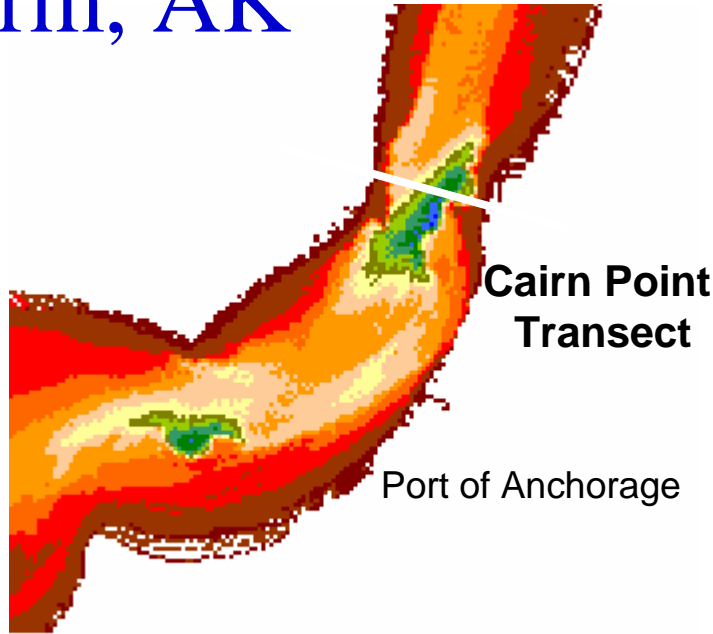
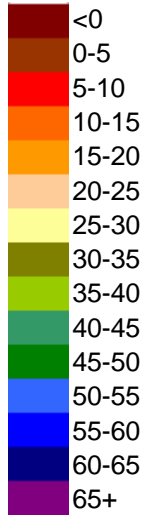
Tidal Technologies



Photos courtesy
Electric Power
Research
Institute

Knik Arm, AK

MLLW Depth (m)



Source: NOAA Coastal Survey

Site Potential

Power Density (Depth Averaged)	3.4 kW/m ²
Avg. Power Available	182 MW
Avg. Power Extractable	27 MW

Source: NOAA Tidal Current Predictions
Stations NW of Cairn Pt (2005)

Cairn Point Snapshot

Width	2,370 m
Average Depth (from MLLW)	23 m
Cross-sectional area	54,200 m
Seabed Composition	Mud
Grid Interconnection	12KV / 115KV



EPRI

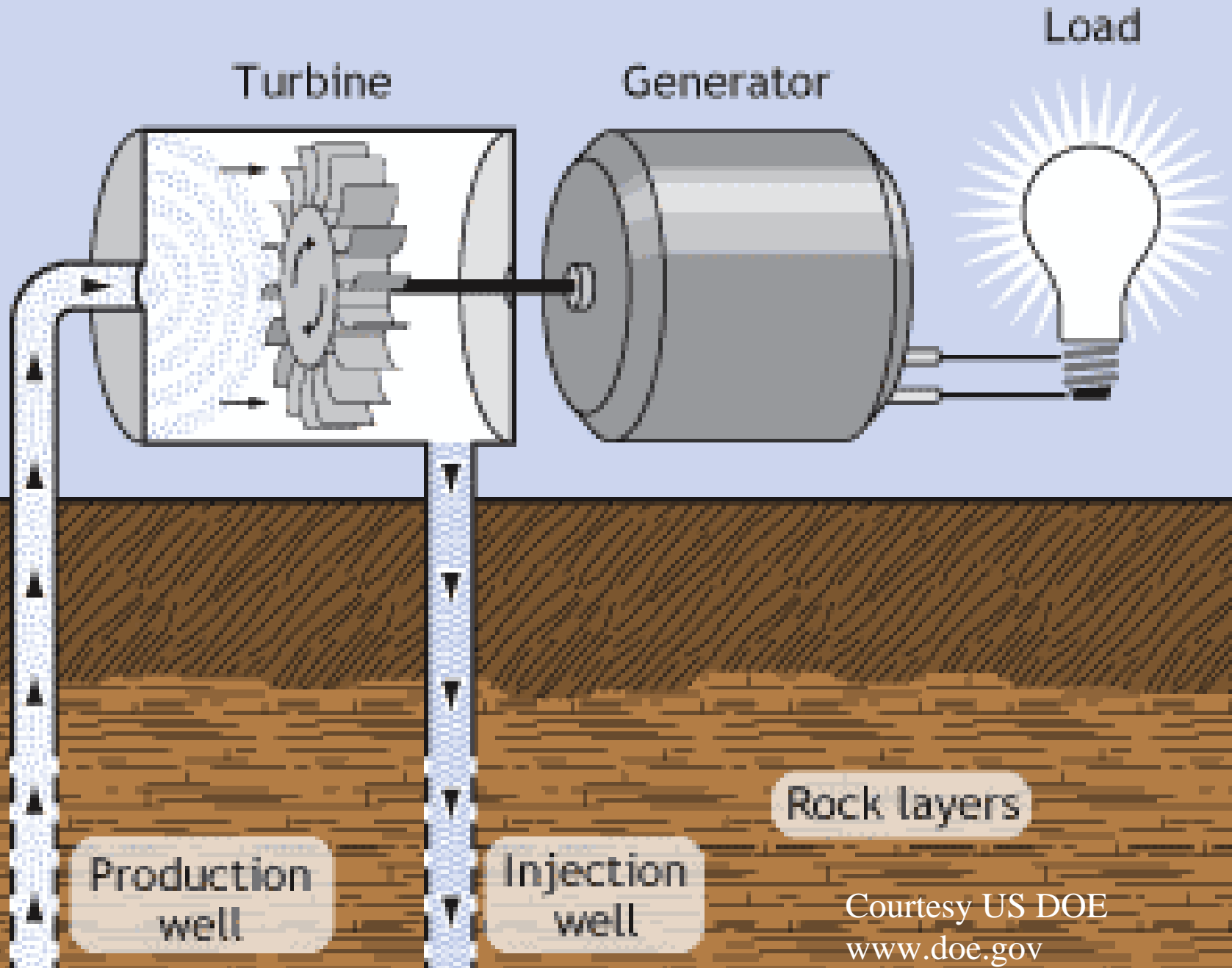
Slide courtesy of the Electric Power Research Institute

Geothermal Potential

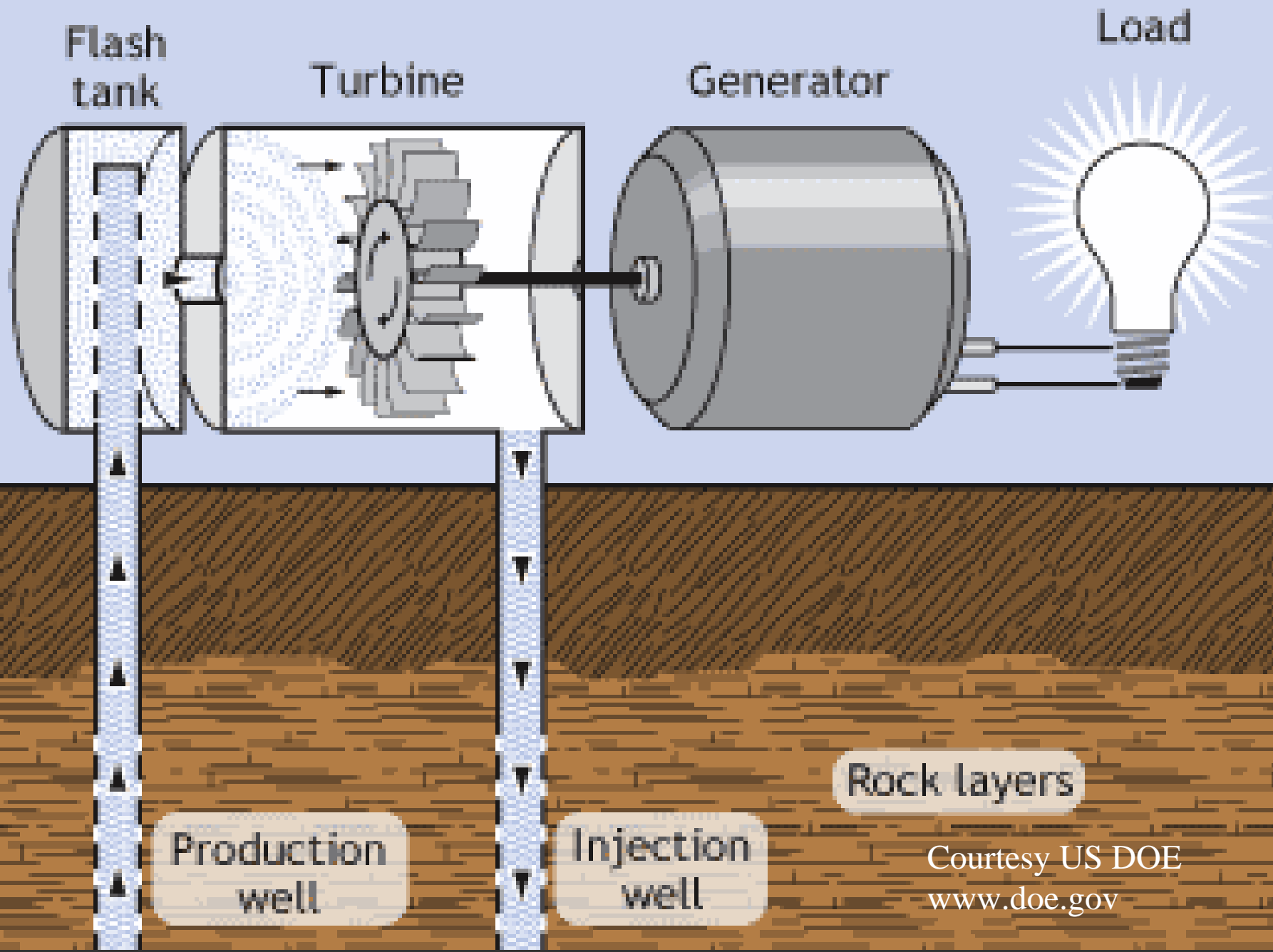


Mount Spurr 1992

Dry Steam Power Plant

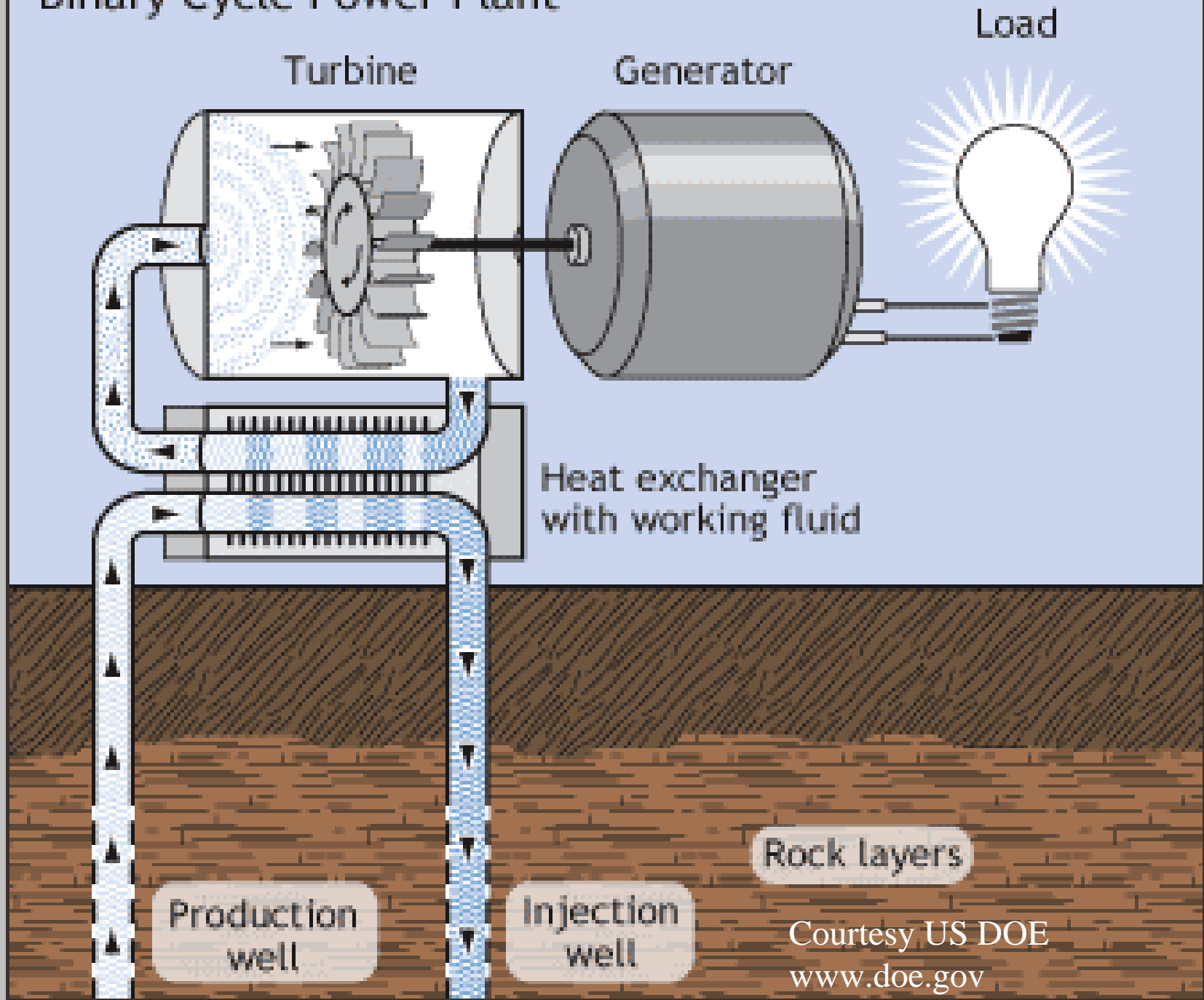


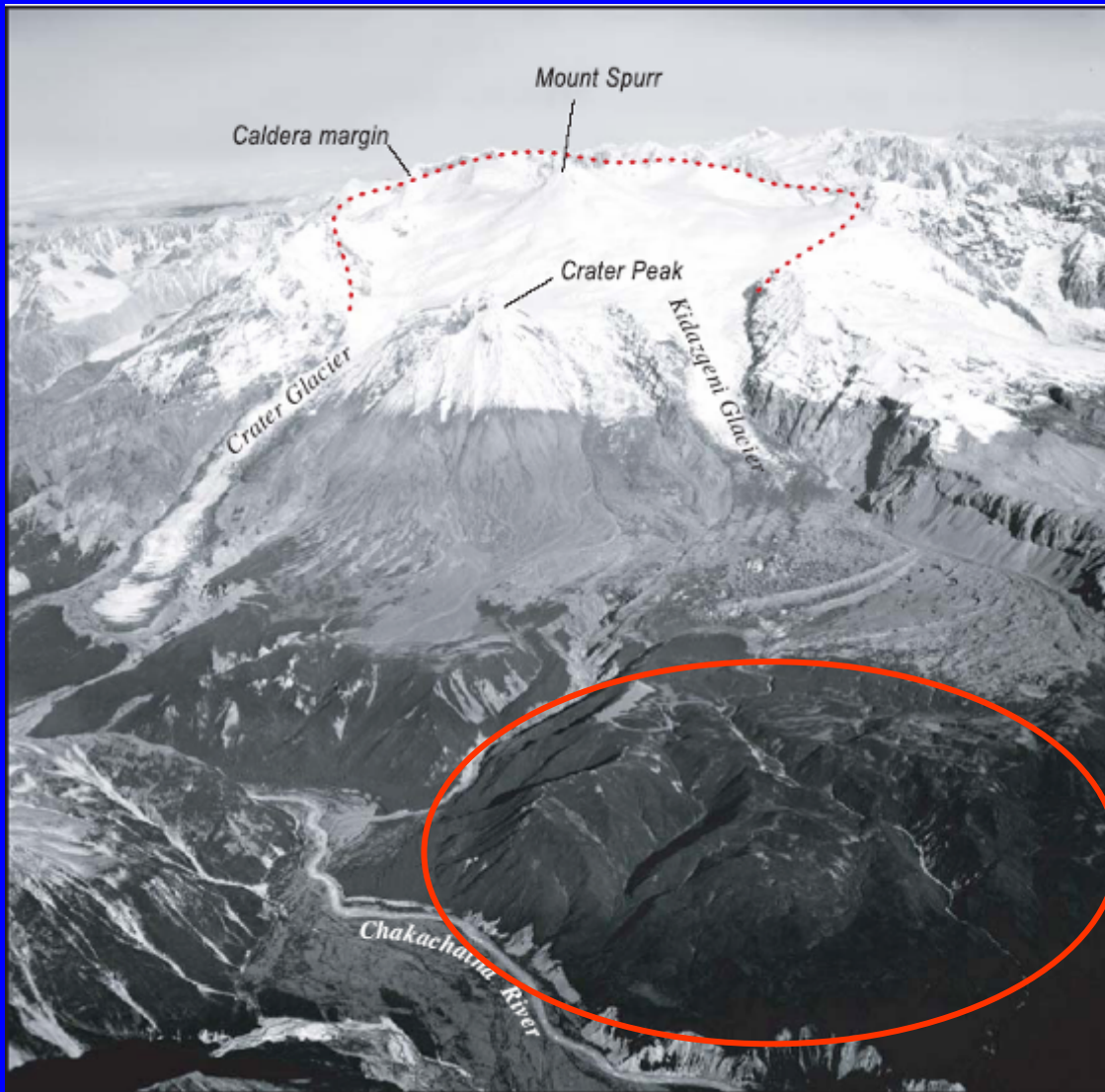
Flash Steam Power Plant



Courtesy US DOE
www.doe.gov

Binary Cycle Power Plant





1985 Reconnaissance

- Discovered thermal springs along Chakachatna River
- Data collected on the shelf below the glacier field detected large anomalies and extensive zones of low resistivity
- Numerous soil gas anomalies were observed

Waythomas, C.F, and Nye, C.J., 2002. *Preliminary Volcano-Hazard Assessment for Mount Spurr Volcano, Alaska*, U.S. GEOLOGICAL SURVEY, Alaska Volcano Observatory, Open-File Report 01 482, 46p.



Courtesy National
Renewable Energy
Lab Photos for Kids

www.nrel.gov



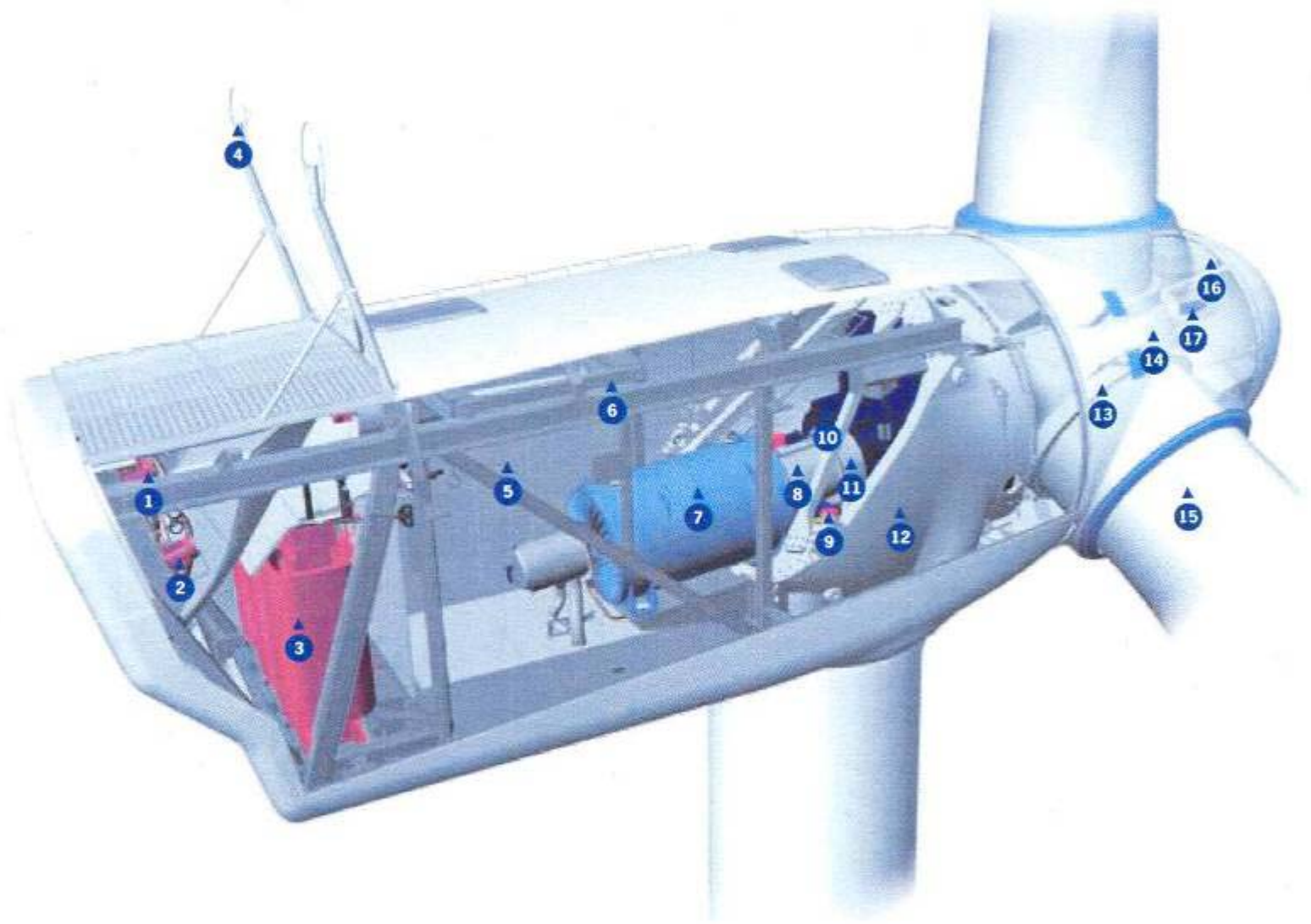
202 Megawatt Project in New Mexico

Relatively Slow Speed

18-21 RPM



Nacelle of a 3 MW Vestas Wind Turbine



MET Projects

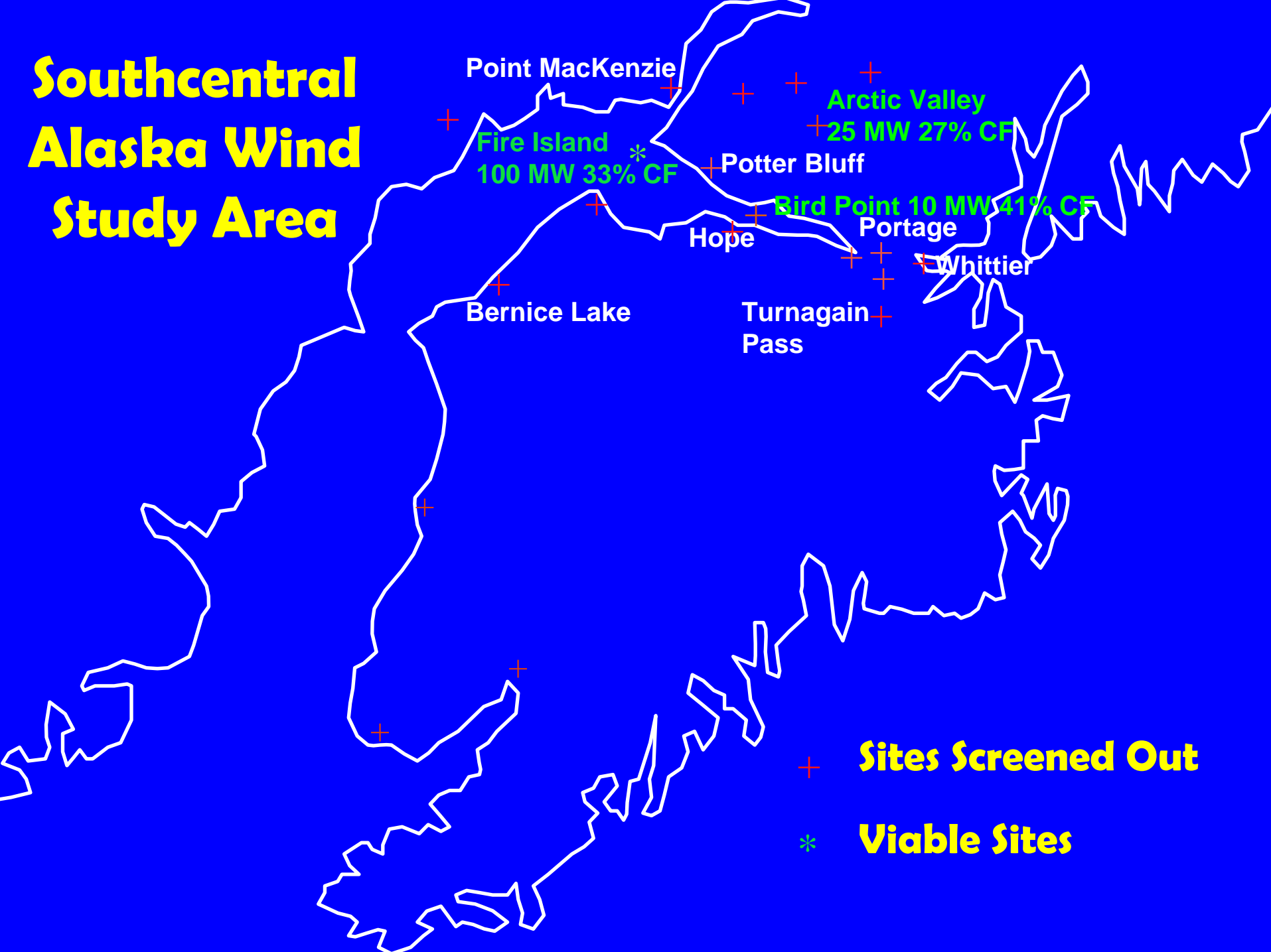
- Portage Valley, Potter Bluff, Arctic Valley Road Site, Bird Point, Fire Island,
- Temporary 33' mast or 132' - 165' tower depending on location
- Instrumentation measures wind speed, direction and temperature





The right kind of wind

- 9 mph - turbine “cuts in”
- 30 mph - full output reached
- 59 mph - “cut out” occurs
- Looking for 30% capacity factor
- Capacity Factor = Amount of power produced over time
Amount of power produced if turbine ran
100% of the time at full power

Southcentral Alaska Wind Study Area



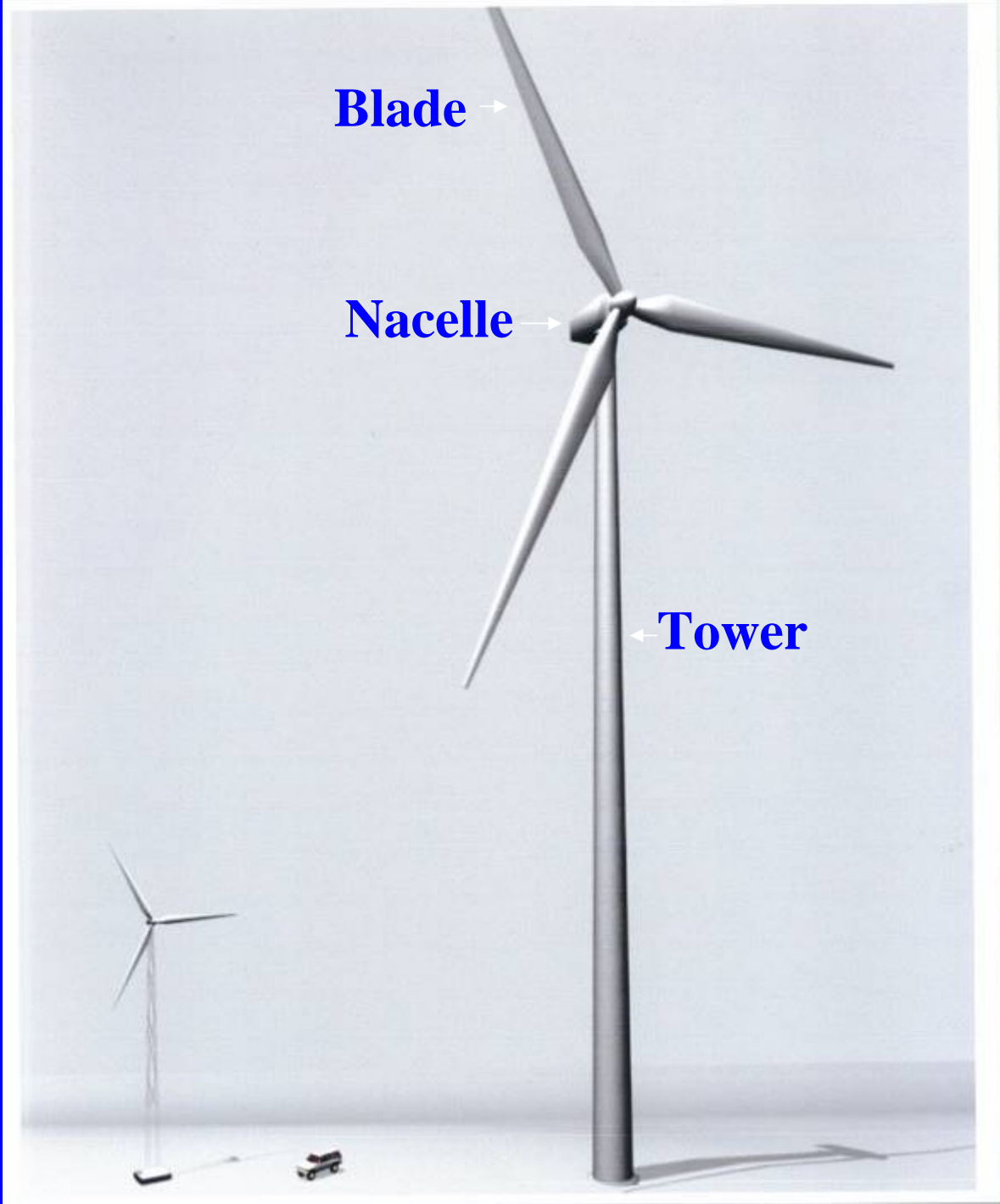
-  **Sites Screened Out**
-  **Viable Sites**

FIRE ISLAND WIND GENERATION CONCEPT PLAN SEPTEMBER 2006



BARGE LANDING AREA (OPTION 1)
WHARF YARD
PREFERRED ROUTE
LOCATION WITH UTILITY CONSIDER





Blade →

Nacelle →

← **Tower**

**Far right:
1,500 kW
turbine
needed for
Railbelt**

**Far left: 55
kW turbine
used in
Kotzebue**

**Center: Ford
Explorer**



3 MW Vestas V-90 on
Panhandle of Texas

Transmission line in
foreground

Truck and car next to
turbine tower



38.5 meter blade for a GE 1.5 MW wind turbine
(127 feet)

Issues

- Noise
- Birds
- Viewshed





Simulation

View from top of Kincaid Park Visitor Center

Visual Simulation

Benefits

- Level Priced Power
- Diversification of Resources
- Reduced Emissions



Renewable Technology

<u>TECHNOLOGY</u>	<u>Status</u>
Biomass	Pilot Projects
Solar	Ready
Tidal and Wave	Pilot Projects
Geothermal	Ready
Wind	Ready

What's Ahead

- Final decision to proceed or not to proceed
- Determine number of turbines
- Permit site(s)
- Construction and interconnection

Discussion



www.chugachelectric.com

Funding Requirements

MOU partners Chugach, ML&P, GVEA and Homer Electric are exploring funding mechanisms for the infrastructure.

(Transmission line, substation,
barge landing and roads)

Infrastructure Cost Estimates

October '06 Estimates

	Estimate	With 25% Contingency
Civil - Roads / Camp	9.3	11.6
Barge Landing (Plan 1)	4.2	5.3
Electrical (Alt B)	29.8	37.3
Total	43.3	54.2

February '05 Estimates

	Estimate	With 25% Contingency
Civil - Roads / Camp	6.28	7.82
Barge Landing (Plan 1)	2.6	3.2
Electrical (Alt B)	24.5	30.64
Total	33.38	41.66

Additional Resources

American Wind Energy Assoc.

www.awea.org

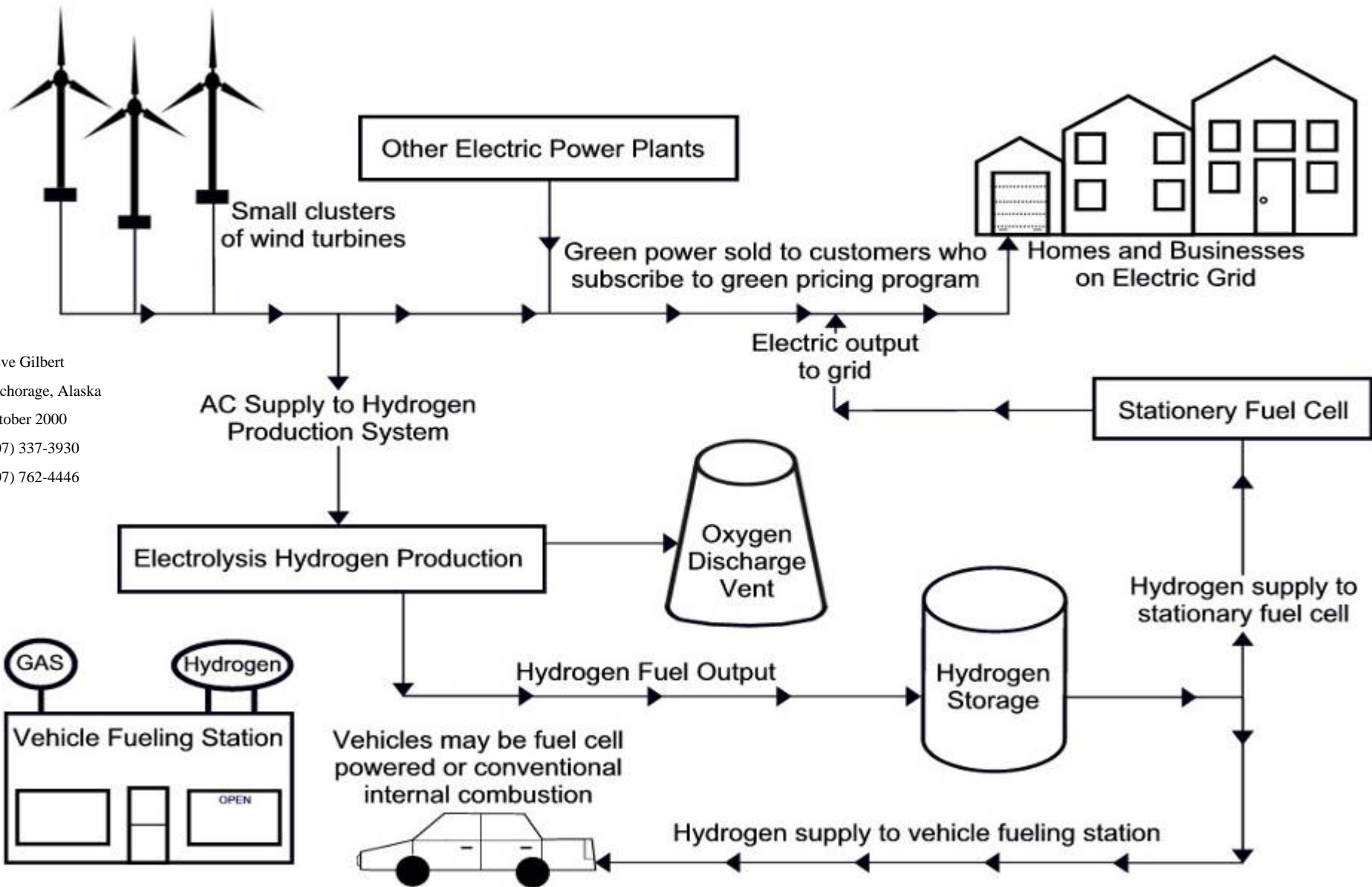
www.cogreenpower.org

10 reasons to buy green

www.windpower.dk

wind power for kids

Hybrid Energy Supply Couples Renewable Wind Power With Hydrogen Production



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