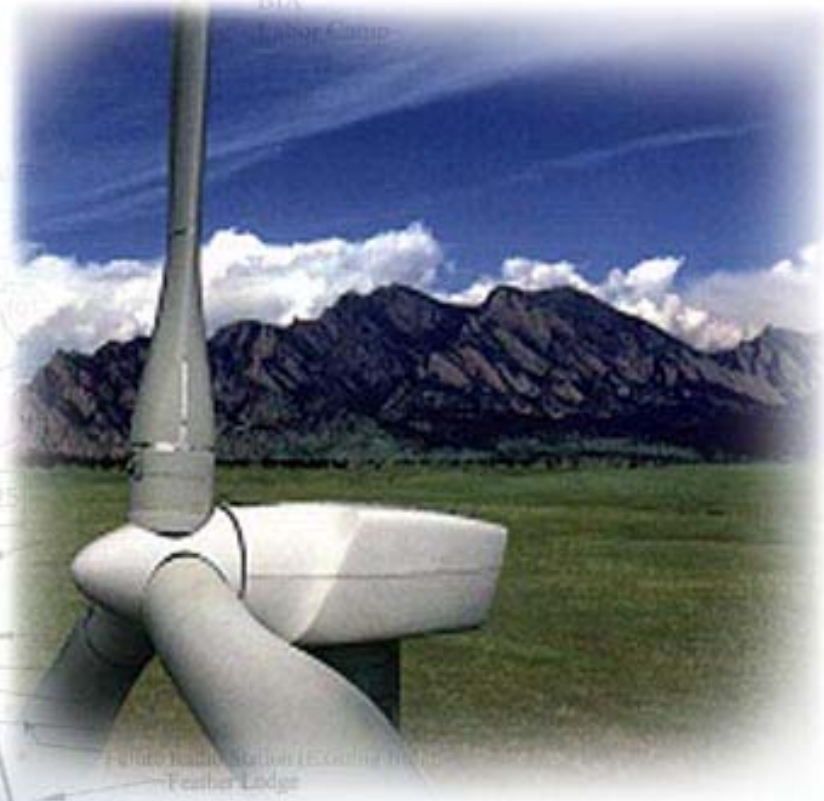
Feasibility Study of Sustainable Distributed Generation Technologies for the Duck Valley Reservation



Office of Energy Efficiency and Renewable Energy

TRIBAL ENERGY PROGRAM

FY2004 Program Review Meeting

Denver West Holiday Inn
Golden, Colorado

Shoshone-Paiute Tribes of the Duck Valley Reservation
CSHQA
New West Technologies
Idaho Department of Water Resources
INEEL

Introduction to Duck Valley

Idaho/Nevada Border

453 Square Miles

Thinly Populated

High Desert

5,400 ft. Elevation

Very Remote

Primary Industries
- **Agriculture**
- **Fishing and Hunting**

Introduction to Duck Valley

- **High Desert**
- **Very Remote**
- **Primary Industries**
  - Ranching
  - Fishing and Hunting
  - Agriculture
  - Tribal Government
  - Indian Health Services

Introduction to Duck Valley

- Approximately 1,100 Tribal Members
- 400 Non-Tribal Residents
- 400 Area Ranchers and residents around the reservation

Economic Drivers at Duck Valley

- **~40% unemployment**
- **Major Push to Build Reservation Infrastructure and Provide Adequate Power**
  - Completed Economic Development Strategic Plan
  - Conducted Duck Valley Energy Summit
  - Construction of New Juvenile Detention Center Completed
  - New Sho-Pai Trade & Travel Center is Under Construction
    - 10,000 sq. ft. Grocery Store
    - 3,600 sq. ft. Tenant Lease Space
    - R.V. Park
  - Construction of 12 Unit Crater View Apartments Completed

Economic Drivers at Duck Valley

- **Electric Delivery System is Unreliable and Antiquated**
  - Reservation Served by a Single 69 KV Transmission Line/ "Dead End" Radial 34.5 KV Distribution Line
- **New 138 KV Line Proposed to Northern Border of Reservation (improved electric service; electricity export?)**
- **Sustainable Energy (Including Off-Reservation Sales) Viewed As a Key Element of Economic Sustainability**
- **Provide adequate power for Sustainable Economic Development on the Reservation.**

Exploring Sustainable Energy Options

Audits completed July, 2004

- **Energy Efficiency (lighting efficiency focus, etc.)**
- **Collected Data: Room by Room & Bldg. by Bldg.**
- **Sample of Buildings**
  - School
  - Institutional Buildings
    - Tribal Government
    - BIA Facilities
    - IHS Facilities
    - Housing
  - Commercial/Agricultural (e.g. water pumping)
  - Wildlife & Parks
  - Food Distribution
  - Senior Center
  - Owyhee Cafe

Owyhee High School

Shoshone-Paiute Tribal Headquarters

H.D.C.

Tools For Discovery

Anemometer's Located on Three Sites

Miller Creek Elevation 6,591 ft.

Antelope Springs Elevation 5,500 sq. ft.

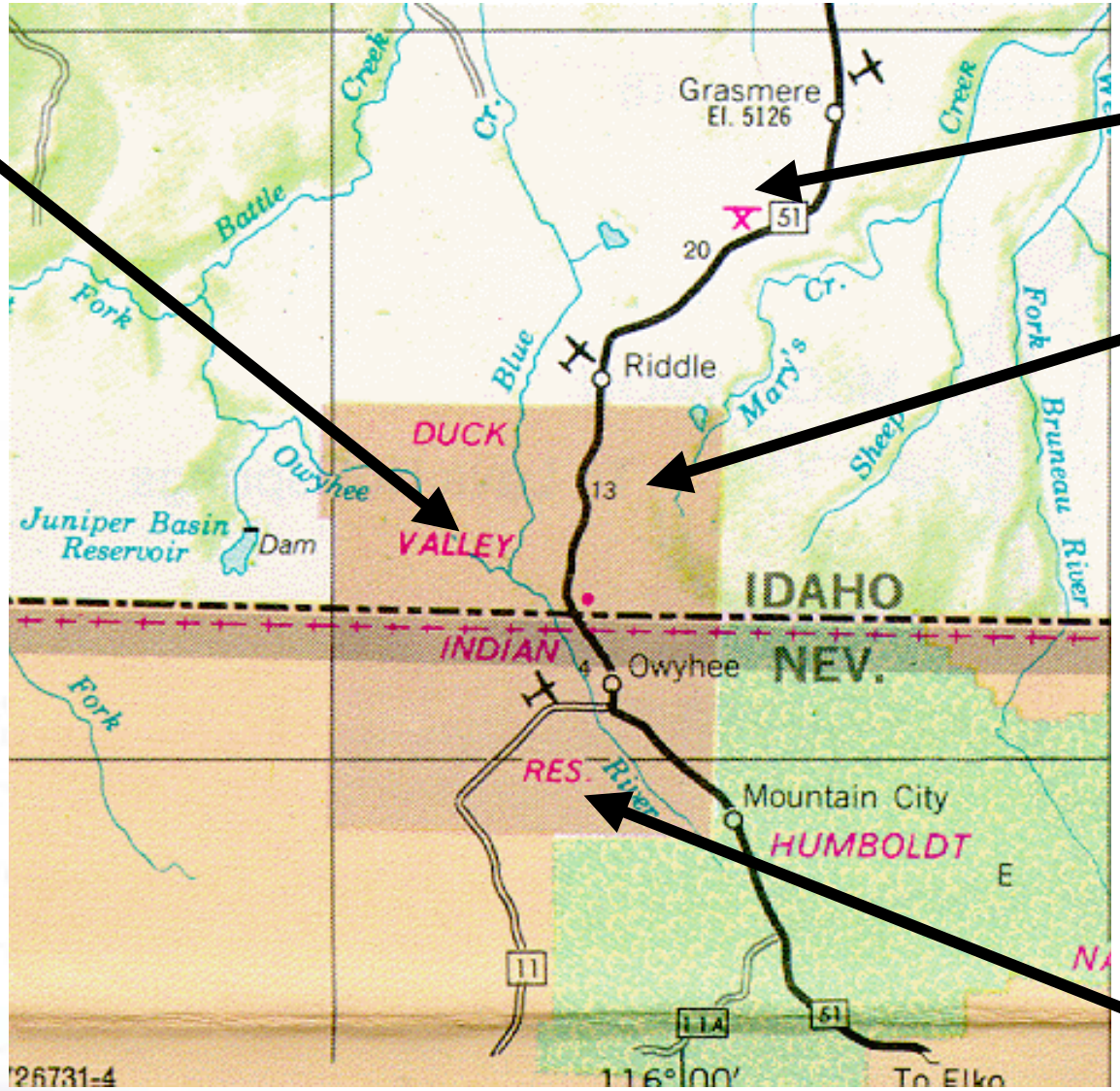
Sugar Loaf Elevation 7,180 sq. ft. (Previous Site)

Antelope Springs

Grasmere Site

Miller Creek

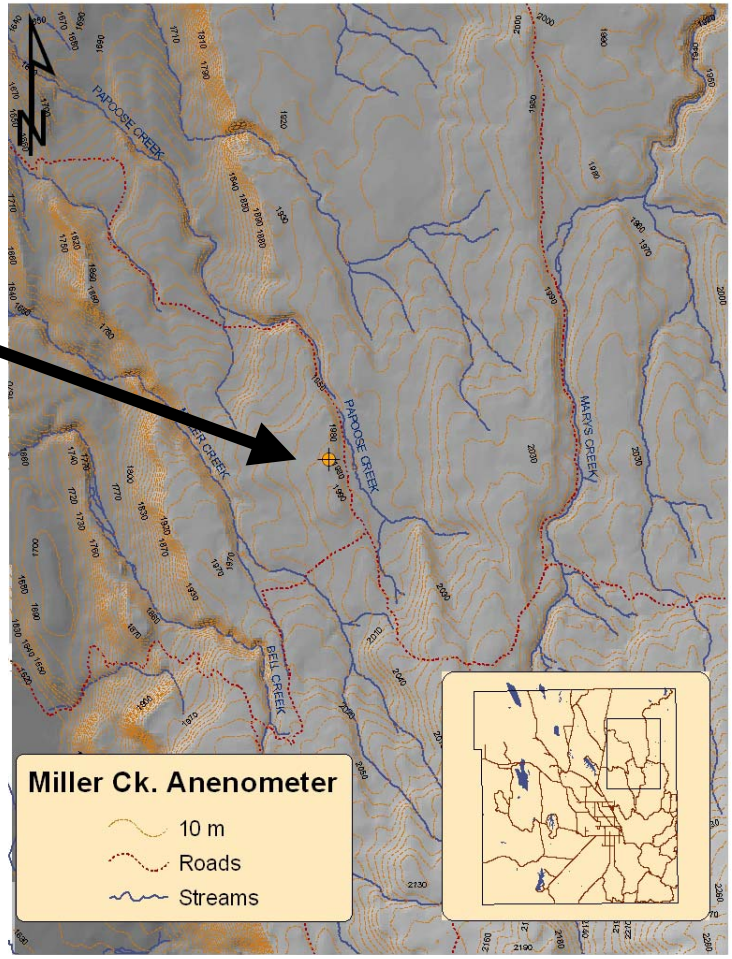
Sugar Loaf



Miller Creek Site
No. 0131

Date Range10-14-2003
To 03-07-2004

Elevation 6591 Ft.



ESTIMATED ENERGY PRODUCTION

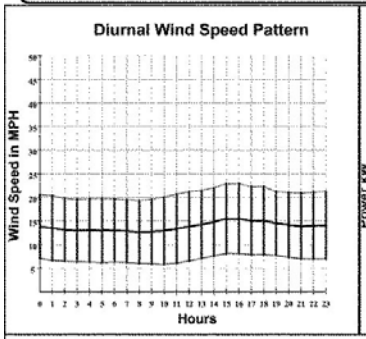
Date Range
2003-10-15 TO 2004-09-17

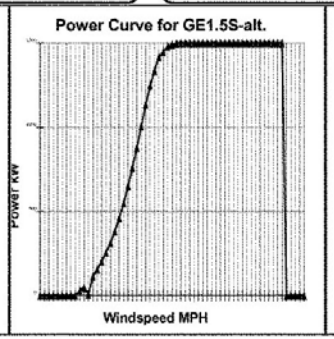
SITE 0131

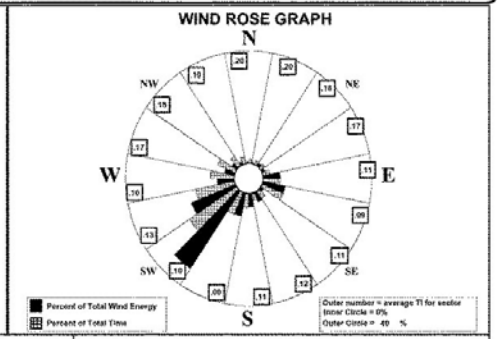
Site Information

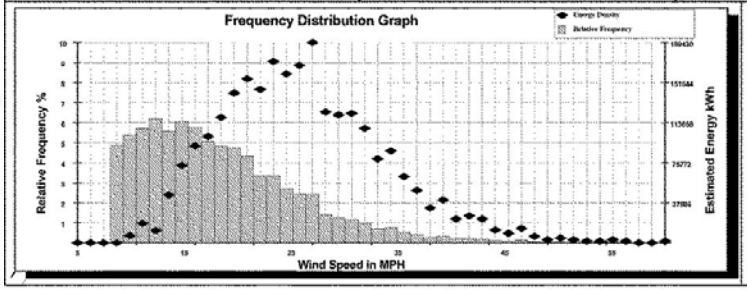
Project:	Duck Valley, NV
Location:	Miller Creek area, Duck Valley
Site Elevation:	6591FT
Averaging Time:	10 min

Sensor 1 Information		*Sensor 2 Information*	
Channel:	1	Channel:	2
Type:	Anemometer	Type:	Direction Vane
Scale:	1.711000000	Scale:	1.000000000
Offset:	0.7800	Offset:	0.0000
Description:	Anemometer	Description:	Direction Vane
Height:	66FT	Height:	66FT









Statistics

Estimated Energy Output	2554509 KWH
Calculated Air Density	0.999 kg/m3
(temperature data and pressure based on elevation)	
Average Wind Speed	13.8 MPH
Average Turbulence Intensity	0.14
Mean Energy Wind Direction	SW
Mean Wind Direction	SW
Capacity Factor	0.22
Average Temperature	0.0 F
Turbine Manufacturer	GE Wind
Turbine Model	GE1.5S-alt.
Turbine Rating	1500 kW
Number of Turbines	1
Estimated Annual Production	2835825 KWH/Year

Total hours = 8136 Total hours used in Calculations = 7891 Percent Data used = 96.9

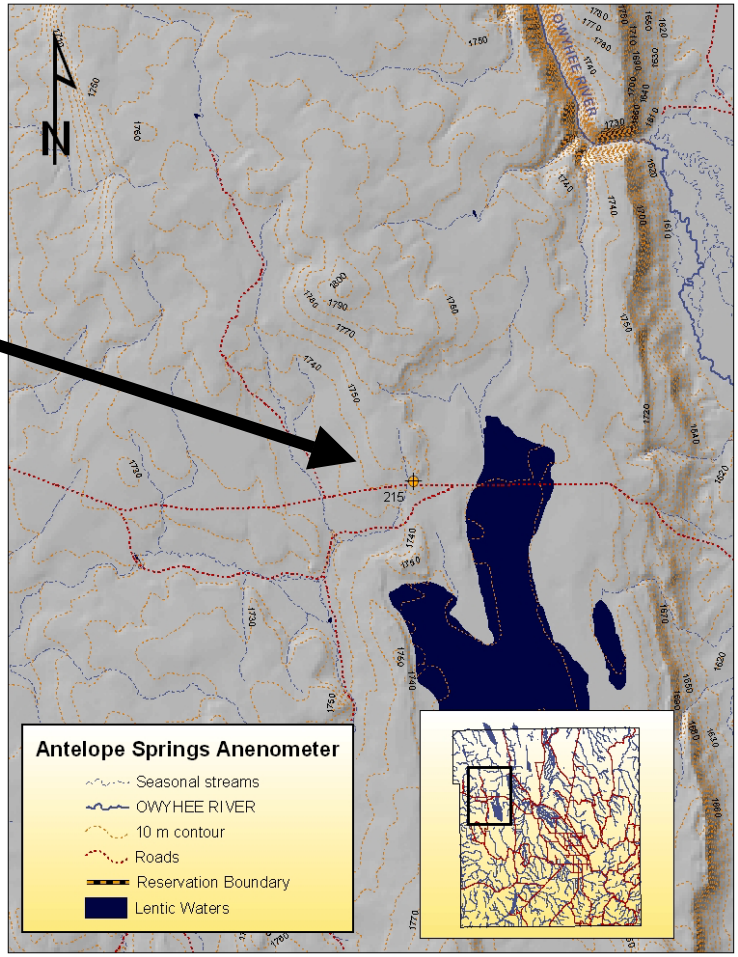
Printed October 7, 2004

NRG Systems MicroSite Version 3.01

Antelope Springs
No. 0215

Date Range10-14-2003
To 09-17-2004

Elevation 5727 Ft.



ESTIMATED ENERGY PRODUCTION

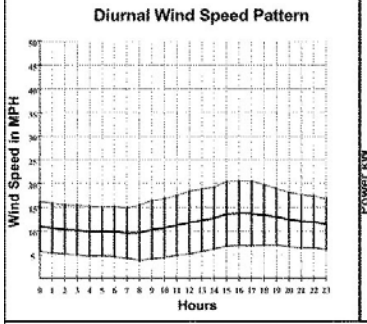
Date Range
2003-10-14 TO 2004-09-17

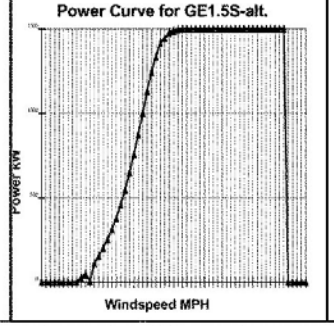
SITE 0215

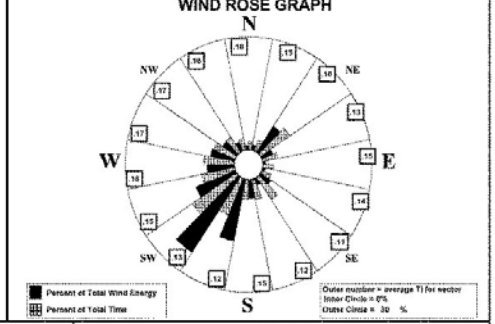
Site Information

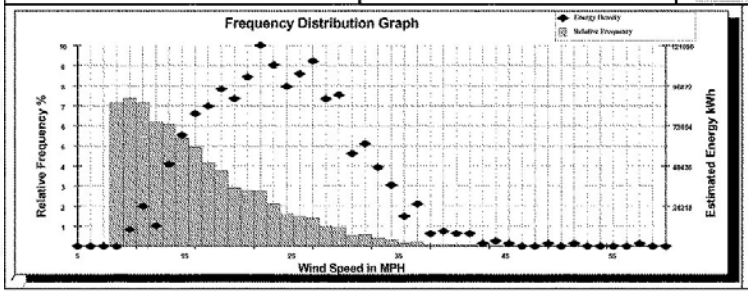
Project:	Duck Valley, NV
Location:	Anetlope Springs area, Duck Valley
Site Elevation:	5727FT
Averaging Time:	10 min

Sensor 1 Information		*Sensor 2 Information*	
Channel:	1	Channel:	2
Type:	Anemometer	Type:	Direction Vane
Scale:	1.711000000	Scale:	1.000000000
Offset:	0.7800	Offset:	0.0000
Description:	Anemometer	Description:	Direction Vane
Height:	66FT	Height:	66FT









Statistics

Estimated Energy Output	1621277 KWH
Calculated Air Density	1.026 kg/m3
(temperature data and pressure based on elevation)	
Average Wind Speed	11.4 MPH
Average Turbulence Intensity	0.14
Mean Energy Wind Direction	SW
Mean Wind Direction	SW
Capacity Factor	0.13
Average Temperature	0.0 F
Turbine Manufacturer	GE Wind
Turbine Model	GE1.5S-alt.
Turbine Rating	1500 kW
Number of Turbines	1
Estimated Annual Production	1766686 KWH/Year

Total hours = 8160 Total hours used in Calculations = 8039 Percent Data used = 98.5

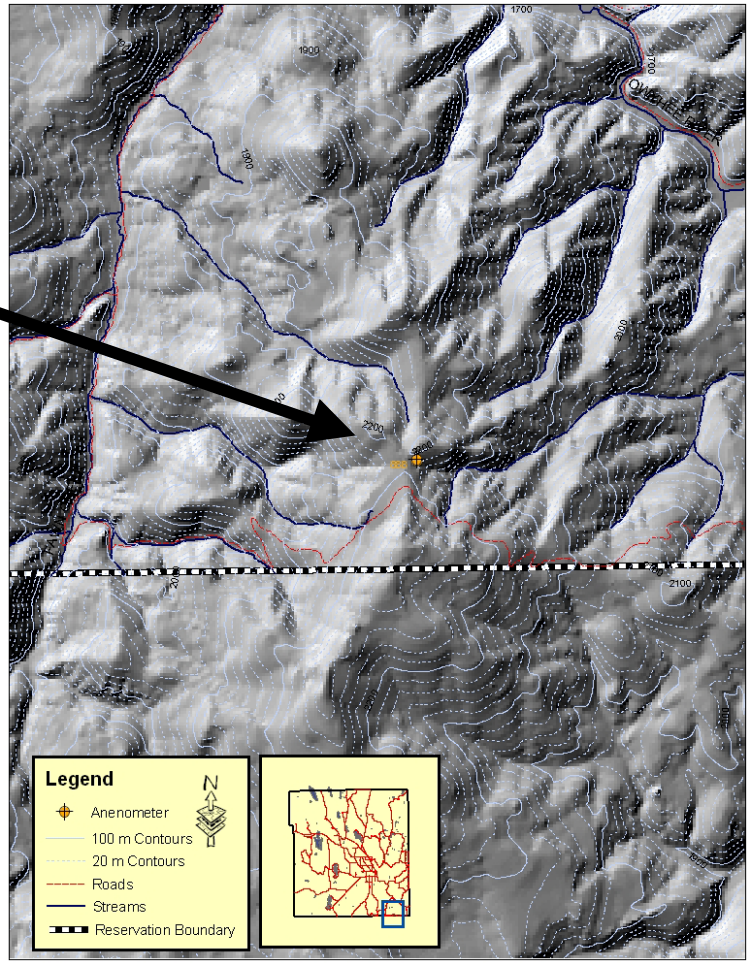
Printed October 7, 2004

NRG Systems MicroSite Version 3.01

Sugar Loaf No. 3246

Date Range 06-21-2003 To 07-03-2002

Elevation 7180 Ft.



ESTIMATED ENERGY PRODUCTION

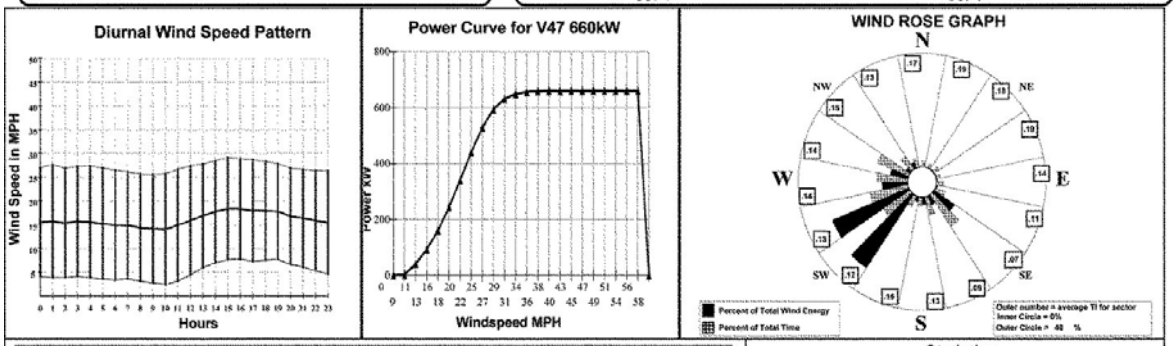
Date Range
2001-06-21 TO 2002-03-07

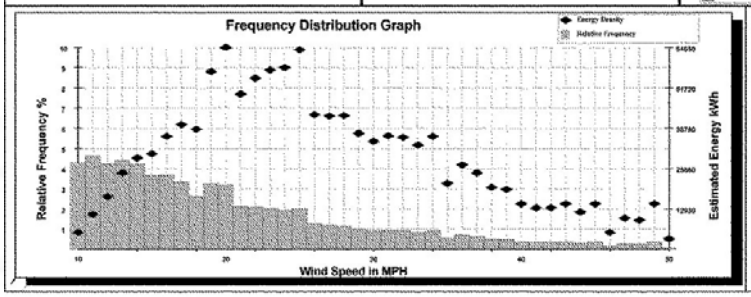
SITE 3246

Site Information

Project:	Duck Valley, NV
Location:	Duck Valley, NV
Site Elevation:	7180FT
Averaging Time:	10 min

Sensor 1 Information		*Sensor 2 Information*	
Channel:	1	Channel:	2
Type:	Anemometer	Type:	Direction Vane
Scale:	1.711000000	Scale:	1.000000000
Offset:	0.7800	Offset:	0.0000
Description:	Anemometer	Description:	Direction Vane
Height:	66FT	Height:	66FT





Statistics

Estimated Energy Output	1215067 KWH
Calculated Air Density	0.979 kg/m3
(temperature data and pressure based on elevation)	
Average Wind Speed	16.1 MPH
Average Turbulence Intensity	0.14
Mean Energy Wind Direction	SW
Mean Wind Direction	WSW
Capacity Factor	0.31
Average Temperature	0.0 F
Turbine Manufacturer	Vestas
Turbine Model	V47 660kW
Turbine Rating	660.0 kW
Number of Turbines	1
Estimated Annual Production	1754407 KWH/Year

Total hours = 6240 Total hours used in Calculations = 6067 Percent Data used = 97.2

Printed April 21, 2003

NRG Systems MicroSite Version 3.01

Wind As A Sustainable Resource

- Data Collected From Sugar Loaf Site Indicates Wind Potential As A Renewable Resource
- Additional Sites, Miller Creek & The Off Reservation Site, Grasmere Support the Possibility of Wind Development
- Upon Completion Of Data Collection Seek Funds For Next Level of Wind Prospecting

Additional Sustainability Options For Consideration

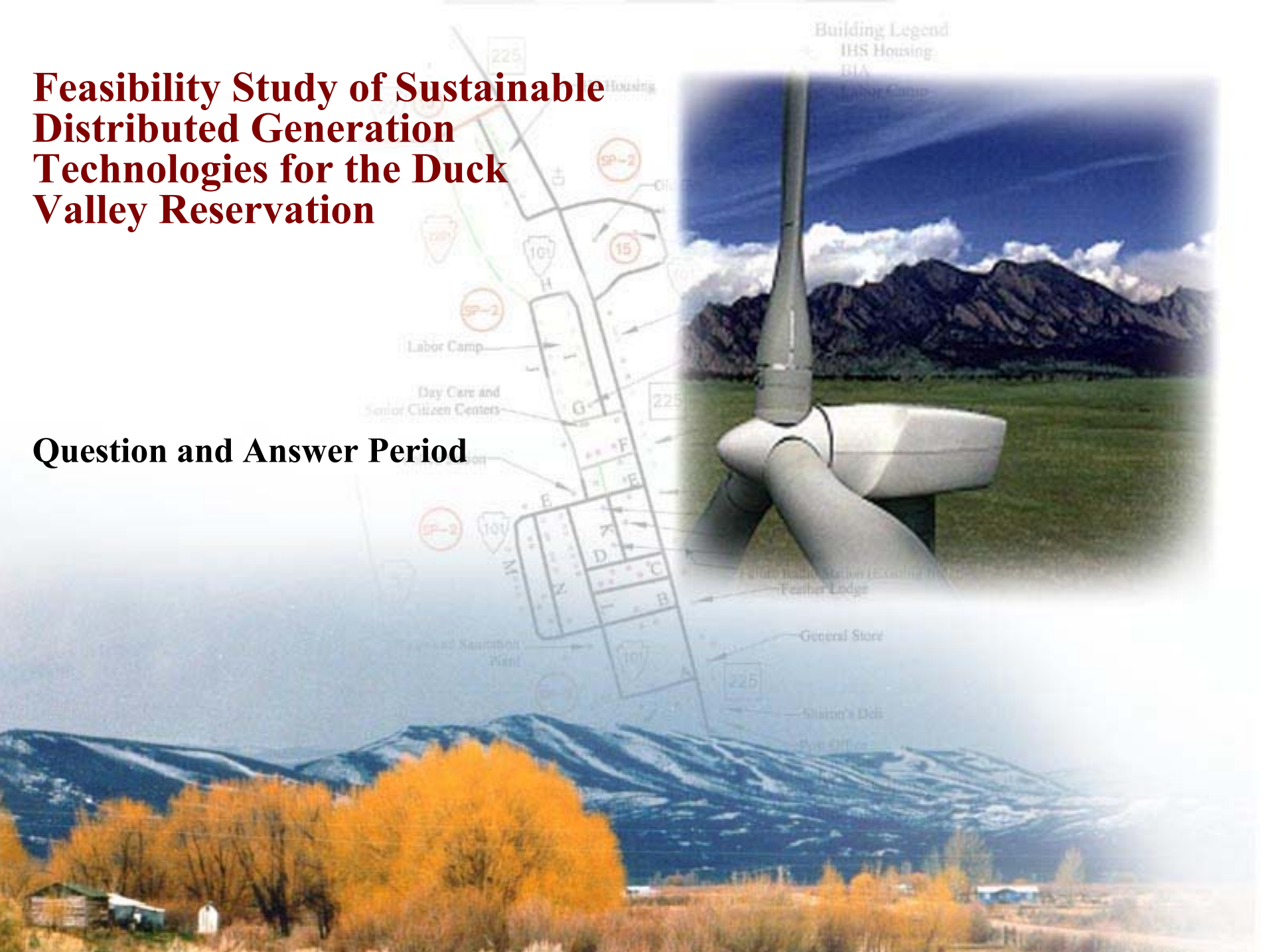
- **Seek Funding for Short Term Deployment of SODAR**

- **Solar Electric (PV)**
  - 90% Sunshine (summer) 70% sunshine (winter)
  - Remote electric loads (e.g. water pumping)

- **Low-Flow Hydro Potential**
  - 50 years of flow data being analyzed
  - Considering bottled water facility using spring water, power facility from wind and Low-Flow Hydro

- **Identify Potential Economic Development**
  - Projects that can utilize Renewable Energy as a Business Development Resource.

Feasibility Study of Sustainable Distributed Generation Technologies for the Duck Valley Reservation



Question and Answer Period