

e7 San Cristobal – Galapagos Wind Power Project and Solar Power Training Program

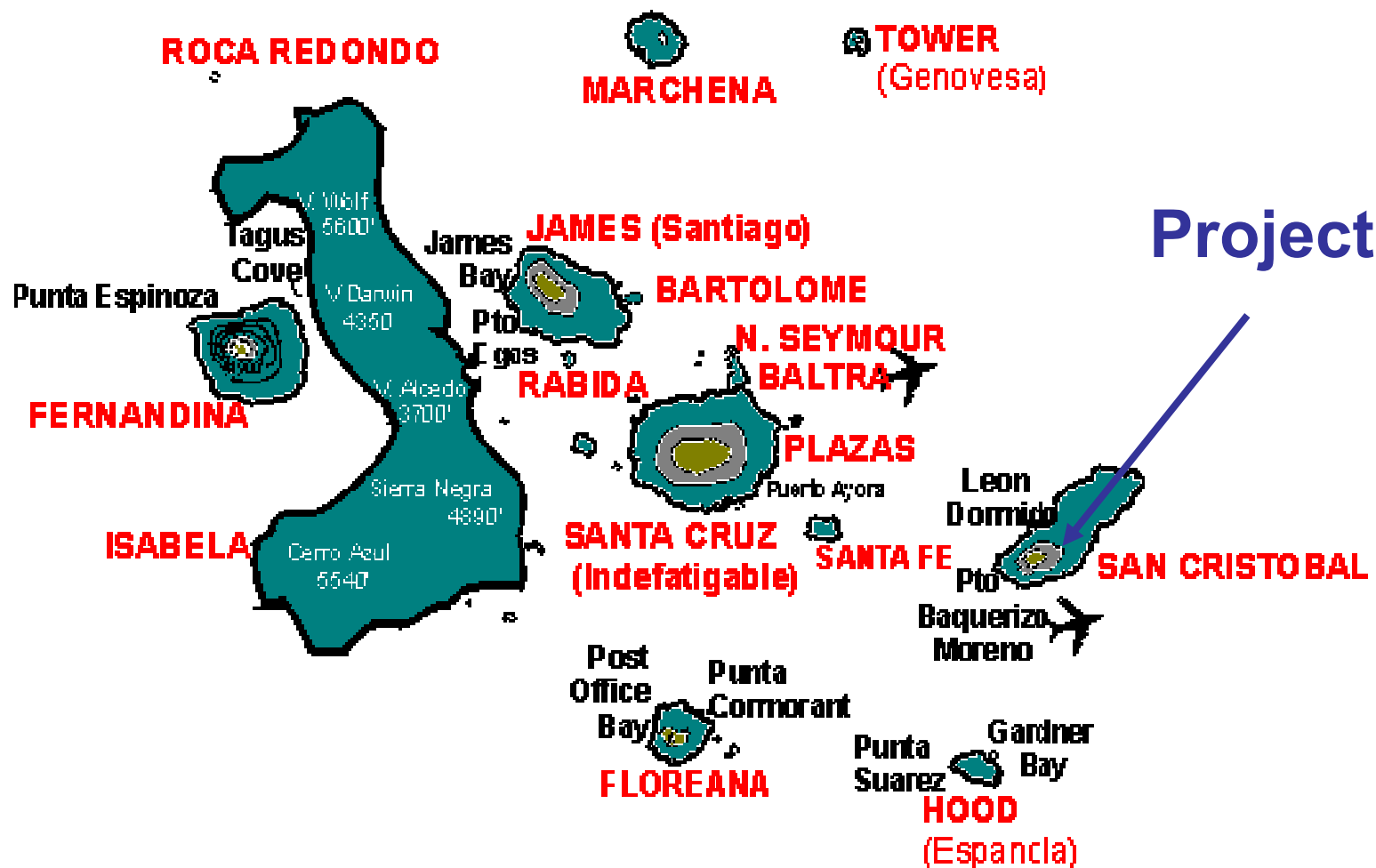


Dennis E. Welch

e7 Sherpa from American Electric Power



Galapagos Islands – San Cristobal



Wind Power Project Definition

- Island population of 6,000
- 2.4 MW wind turbine fleet
- 52% displacement of diesel generation
- Reduce oil spill risk; Reduce CO₂ emissions by approximately 2,800 tons/year
- 12 km transmission line (portion buried)
- New 'Commercial Trust' formed by e7–Ecuador partner to build, train, operate and maintain
- Start-up Q4 2006

Wind Power Project Significance

- **Achieved goals established by the United Nations and the Government of Ecuador**
- **Project located on a World Heritage Site**
- **First power project in Ecuador to undergo environmental permitting process for a protected area**
- **Innovative Project funding:**
 - **First time income tax designation process applied to a power project**
 - **Matching grant from United Nations Foundation**
- **Project approved with an endangered bird and plant on the project site**

Engineering Accomplishments

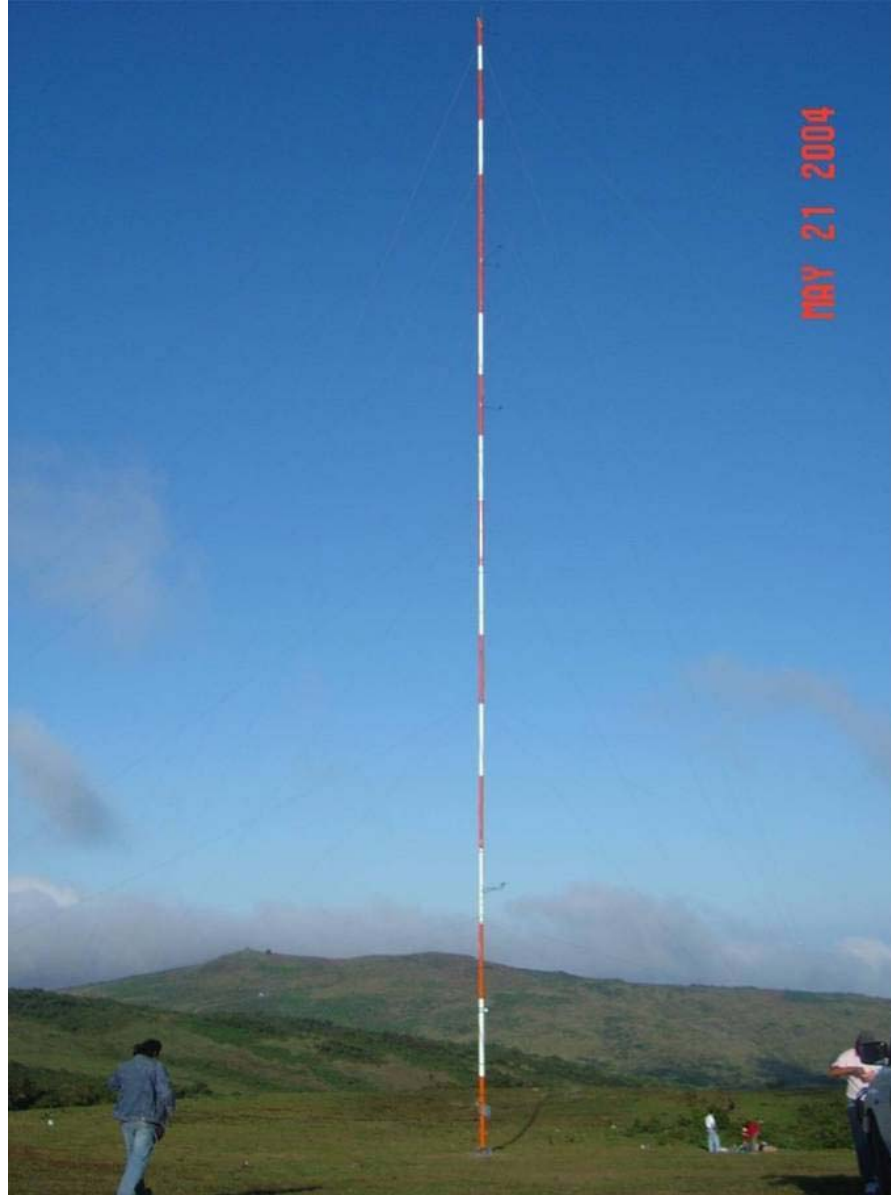
- **Engineering plans approved by Government of Ecuador**
- **Construction tender package issued and bidder site visit held in May 2005**
- **Contracts:**
 - **Santos CMI of Ecuador**– a large well respected Constructor with extensive power experience
 - **MADE of Spain** – established wind turbine manufacturer owned by **GAMESA**

MADE AE59 800kW Wind Turbine

- **59-meter diameter blade**
- **51.5-meter hub height**
- **Variable speed synchronous generator**
- **3 x 800 kW 'low wind' turbine design avoids use of batteries**



View of Project Site (El Cerro Tropezon)



View from Project Site to North

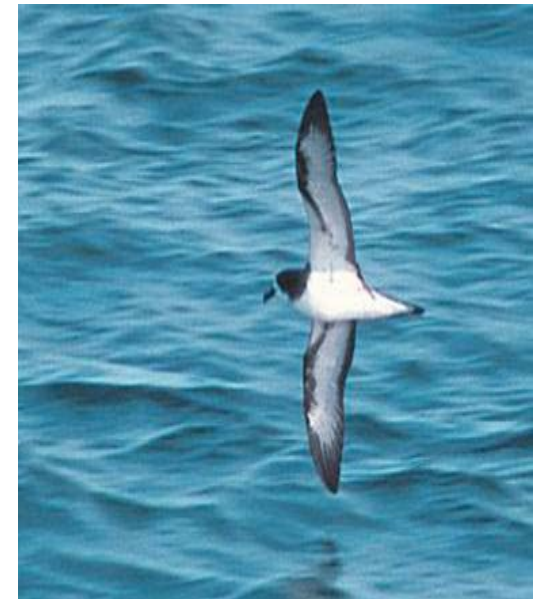


View from Project Site to West



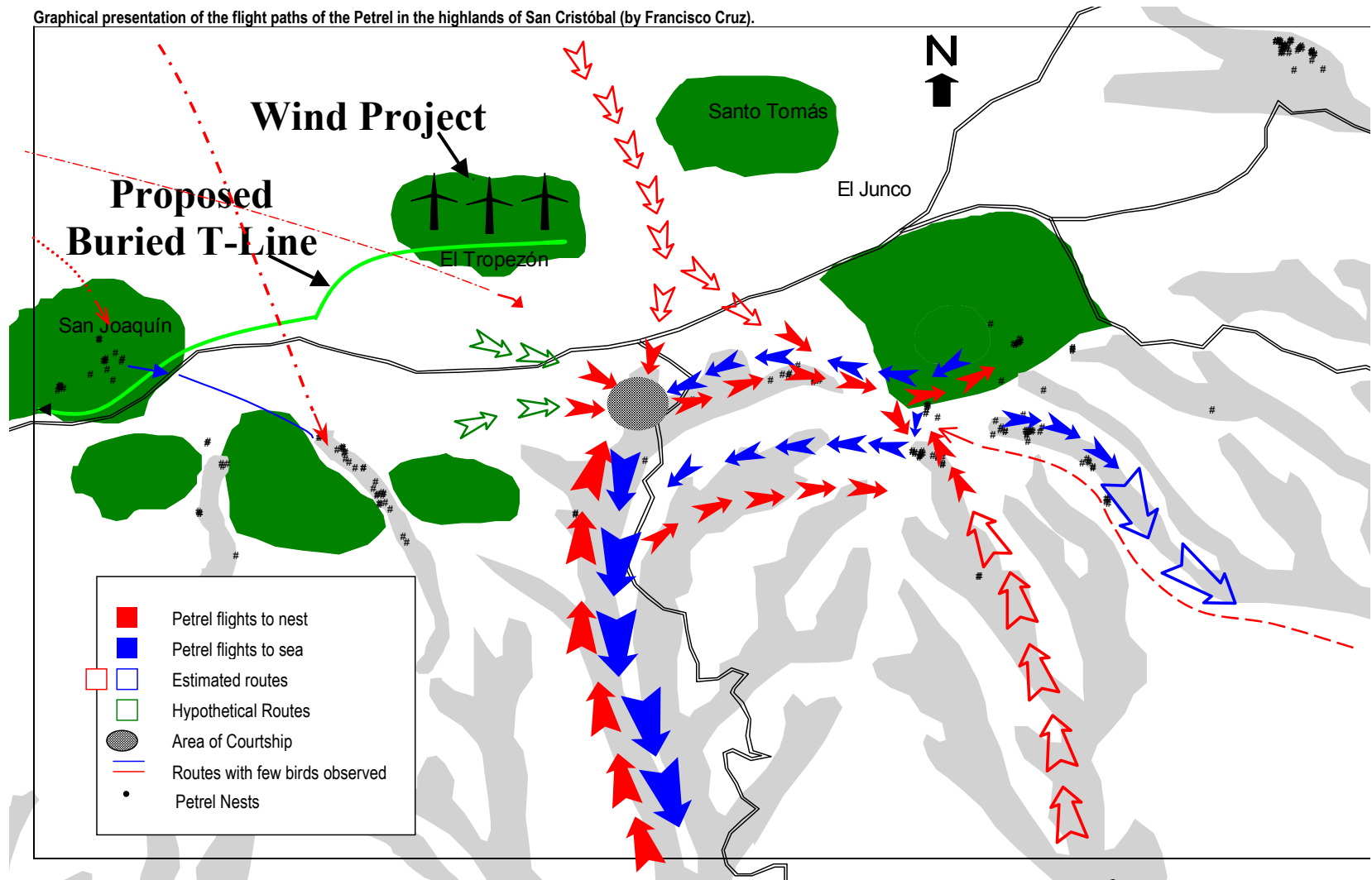
Environmental Issues & Accomplishments

- **e7 with National Park and NGOs monitoring petrel nesting and flight patterns since 2002**
- **150 eggs laid annually, about 5 birds survive to 5 years and return to breed**
- **Threats to petrels:**
 - Rats eat chicks in underground nests
 - Livestock graze in nest habitat
 - Flight paths risk collision with transmission line
- **Project includes 20 year program with mitigation and enhancement measures to support petrel population**



Project Site is out of Flight Paths and Nesting Areas

Graphical presentation of the flight paths of the Petrel in the highlands of San Cristóbal (by Francisco Cruz).



Environmental Accomplishments (cont.)

Fuel Savings to Reduce Oil Spill Risk

- **The Project will save more than 950,000 liters of diesel fuel each year, approx. 48% of fuel consumed by diesel-only generation**
- **With growing grid demand, over project life, the project will save well over 20 MM liters**

Environmental Accomplishments (cont.)

Carbon Emission Reduction Credits (CERS)

- **Estimate that 19,100 CERS could be created with market value of approximately US \$95,000**
 - **Registration cost estimated at over \$100,000**
 - **At this point, registration may not be practical, but project will investigate further**
- **\$10.8 MM project cost/ 19,100 CERS = \$565 / CER**
- **Not helpful under Clean Development Mechanism**

Ensuring Financial Sustainability

- **US \$10.8 MM cost**
- **\$4,500/KW - typical for this size wind-diesel system**
- **Reference: \$1,500/KW for large scale US wind fleet**
- **e7 donated \$6.5 MM**
- **Ecuador and the United Nations Foundation contributed \$4.3 MM**

Ensuring Financial Sustainability (cont.)

- **Tariff increased**
- **New Ecuadorian regulation with capital subsidy formula for Galapagos**
- **Campaign for directed income tax payments yielded \$240,000 net donation to the project in 2005**
- **Additional directed income tax payment commitments expected in 2006**
- **\$1 MM United Nations Foundation grant and complementary UNDP Project Document providing duty / tax exemption.**

Partnerships Were Effective

- **Exemplifies Private-Public model promoted at World Summit for Sustainable Development**
- **Facilitated project development and permitting**
- **Financial underwriting by both partners**
- **New public policies will attract investment in commercial scale electrification projects**

e7 San Cristobal Solar Power Training Program

- **Funding for training and donation of 12 kW of Solar Flat Plate Photovoltaic (PV) panels**
 - **Trains local utility partner staff in installation, operation and maintenance (O&M) of utility grade solar PV systems**
 - **Provides remote energy monitoring capability for educational purposes and internet access**
 - **Involves local community and school to promote careful use of electricity**
- **Complements UNDP initiatives**

**Please follow e7's activities on
San Cristobal by visiting....**

www.galapagoswind.org