2004 DOE Tribal Energy Program Review Meeting

The Right Idea … at the Right Time




2004 DOE Tribal Energy Program Review Meeting

- *We Are:*
  - Contractor to the Quinault Indian Nation

    Contract Number DE-FG36-04GO14023

- *Our Scope Is:*
  - Renewable Energy Resource Assessment, Analysis, Recommendations & Report

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Focus:

- *Quinault Beach Resort Hotel and Casino*
  - High Electrical Usage (avg. ~500 KW-Hrs/day)

- *Project Lead:*
  - Mark Pokryska -Manager, Systems Engineering

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- *WorldWater & Power Is:*
  - *Historically – Provider of solar powered water pumping systems up to 600Hp domestically and abroad. Variable Frequency Drive (VFD) motor control is unique in the industry.*
  - *Recently – Designer and integrator of large scale (2.25MW) utility interactive power system. WW&P began work in this area due to market demand.*
  - *WorldWater & Power is a publicly traded company (BB-WWAT) headquartered in Pennington, New Jersey.*

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Resource Area's of Interest:

- Energy Efficiency
  - Management
  - Conservation
- Ocean Wave
- Biomass Conversion
  - Distillation (Yes)
  - Digestion (?)
- Wind
- Solar
  - Photovoltaics
  - Thermal (# °F-Days/Year?)
- Micro Hydroelectric (?)
- Waste Gas Recovery (?)

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Resource Assessment Plan:

Energy Efficiency: "The low hanging fruit."

- High near-term savings & Return on Investment.
- Revisit heating/cooling load analysis plans and specs.
- Verify Architectural Considerations. (Design)
- Validate / Ensure Energy Management and Performance. (Inspection, Analysis, Test)

Support Contractor: Resco, Inc. Dayton, Ohio

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Resource Assessment Plan:

Ocean Wave Power Generation:

- Proven technology.
- Current projects under construction.
- Potential multi-megawatt generation source.

Support Contractor: Ocean Power Technologies, Inc. Pennington, NJ

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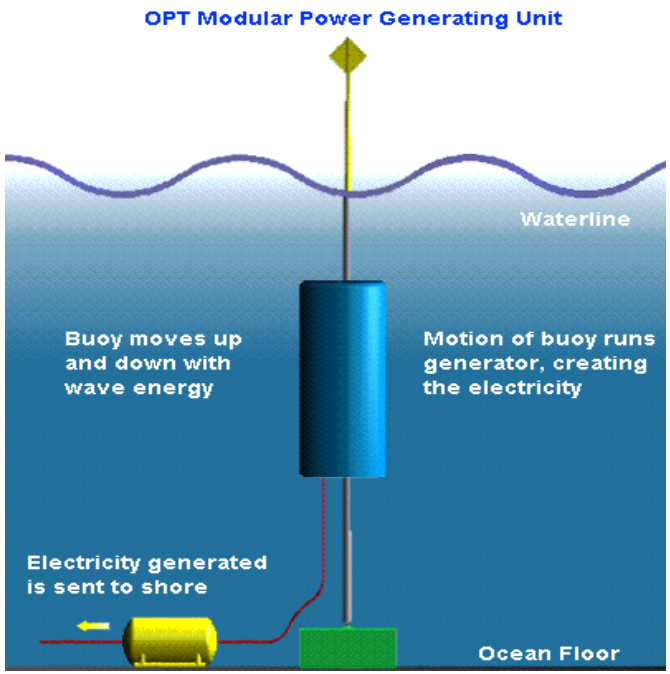
The PowerBuoy™

A Unique, Modular Generator Design



- The rise and fall of the waves moves the outer cylinder up and down, resulting in a mechanical action that drives the electric generator
- AC or DC power (depending on the application and distance from shore) is then transmitted ashore via underwater power cable
- Unique to the OPT technology, special sensors continuously monitor the frequency and height of the waves facilitating real-time optimization of the power generation. This innovative "smart" buoy concept ensures the most efficient conversion of the available wave energy to electricity
- The OPT system incorporates sophisticated techniques to automatically disconnect the system during periods of rough weather, with automatic reconnection when the waves return to normal regime

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Wave Energy — A Known & Reliable Source of Energy

Wave energy is the most concentrated form of renewable energy

2TW of energy, the equivalent of twice the world's electricity production, could be harvested from the world's oceans (World Energy Council)

- Enormous Market potential exist near major population centers along West Coast of N. America

- Predictable – Offering a high availability factor of 90% over Wind and Solar (20% - 30% Based on 8760 Hrs/Yr.)

- 40 to 50 KW/m of Wave Front in Pacific NW

Wave Energy Levels (kW/m of Wave Front)

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Hawaii Wave Power Program

Marine Corps Base Hawaii - Site Off Runway

- Environmental Assessment complete
- Rock Bolt Tests complete
- First Buoy in manufacture in Hawaii by Pacific Shipyards Int'l
- Subsea cable & installation equipment are in Hawaii
- Awaiting Army Corps permits
- Installation Schedule
  - Land cable & infrastructure: May/June 2003
  - Subsea cable: 3Q2003
  - Anchor: 3Q2003
  - First buoy & canister: Late 2003
  - Second buoy: Early 2004

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Resource Assessment Plan:

Wind Energy:

- Excellent, recent data and location
- Proven technology
- Local utility experience
- Point of use operation

Support Contractor: 1St Rochdale Cooperative, New York, NY

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Resource Assessment Plan:

Solar Energy:

- Analysis of KW Hrs available verses load profile.
- Proven technology / Local utility experience.
- Evaluate BTU/Hr/FT^2 verses yearly heating load.
- Results may suggest use of new and improved technologies.

Support Contractor: WW&P and TBD*

(*Several associates under consideration)

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D.T. Locke Ranch
Firebaugh, CA

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Cerro Coso Community College
Ridgecrest, CA

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California Citrus Ranch
200 hp Irrigation Pump Solar Driven

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Commercial 4th Qtr -2004




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Resource Assessment Plan:

Biomass Conversion:

- Wood fuel available from QIN forestry operations
- Technology may yield 1KW-Hr Per 3.3 Lbs. of Biomass
- Excellent point of use operation
- Additional “soft” side benefits

Support Contractor: Community Power Corporation, Littleton, CO

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Resource Assessment Plan:

Micro Hydro Electric

- New technical advances warrant assessment.
- Weigh all aspects of source for development.

Waste Gas Conversion:

- Determine resource viability.
- Weigh all aspects of source development.

Support contractors: To be determined

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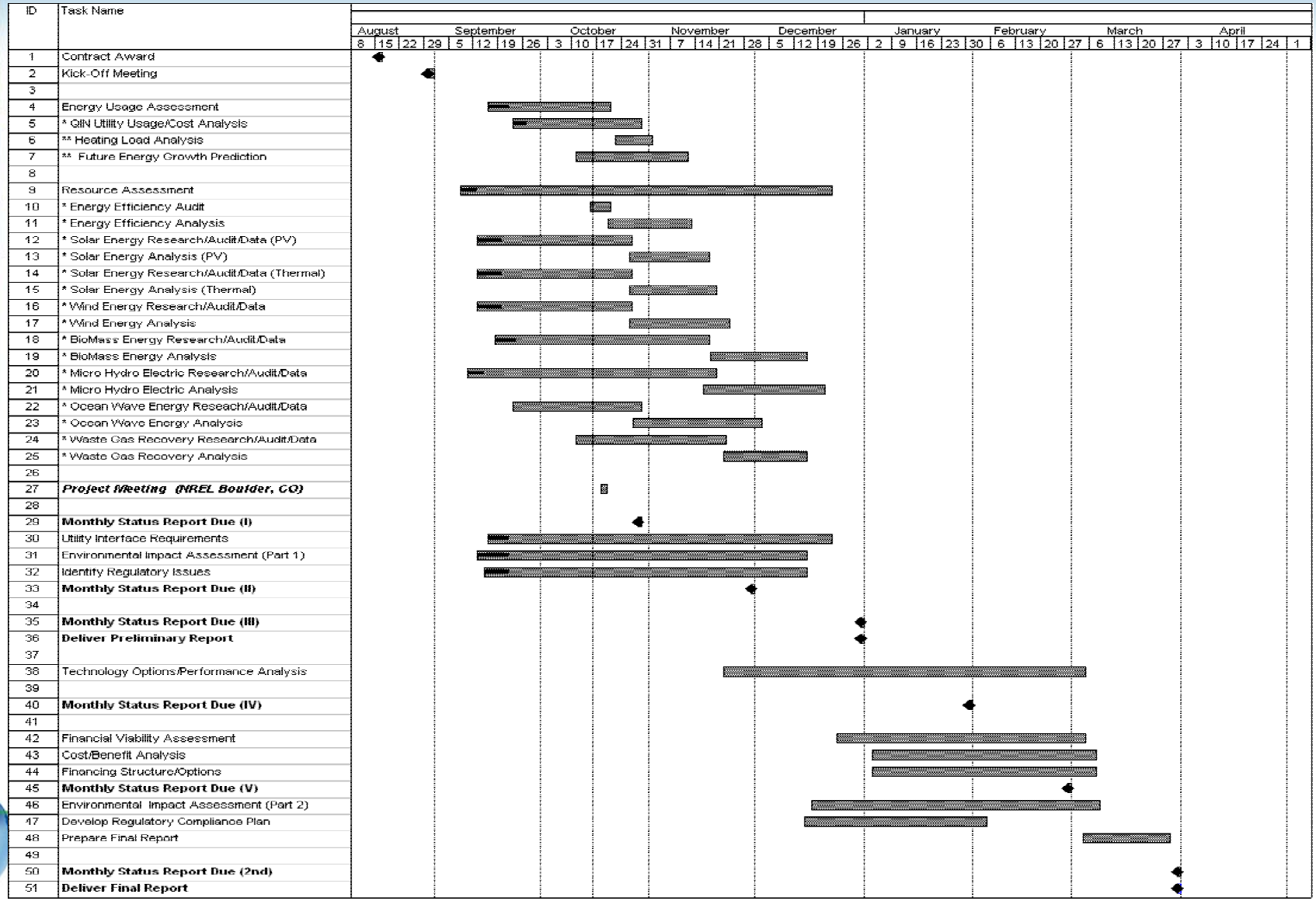
Schedule

ID	Task Name
1	Contract Award
2	Kick-Off Meeting
3	
4	Energy Usage Assessment
5	* QIN Utility Usage/Cost Analysis
6	** Heating Load Analysis
7	** Future Energy Growth Prediction
8	
9	Resource Assessment
10	* Energy Efficiency Audit
11	* Energy Efficiency Analysis
12	* Solar Energy Research/Audit/Data (PV)
13	* Solar Energy Analysis (PV)
14	* Solar Energy Research/Audit/Data (Thermal)
15	* Solar Energy Analysis (Thermal)
16	* Wind Energy Research/Audit/Data
17	* Wind Energy Analysis
18	* BioMass Energy Research/Audit/Data
19	* BioMass Energy Analysis
20	* Micro Hydro Electric Research/Audit/Data
21	* Micro Hydro Electric Analysis
22	* Ocean Wave Energy Reseach/Audit/Data
23	* Ocean Wave Energy Analysis
24	* Waste Gas Recovery Research/Audit/Data
25	* Waste Gas Recovery Analysis
26	
27	***Project Meeting (NREL Boulder, CO)***
28	
29	**Monthly Status Report Due (I)**
30	Utility Interface Requirements
31	Environmental Impact Assessment (Part 1)
32	Identify Regulatory Issues
33	**Monthly Status Report Due (II)**
34	
35	**Monthly Status Report Due (III)**
36	**Deliver Preliminary Report**
37	
38	Technology Options/Performance Analysis
39	
40	**Monthly Status Report Due (IV)**
41	
42	Financial Viability Assessment
43	Cost/Benefit Analysis
44	Financing Structure/Options
45	**Monthly Status Report Due (V)**
46	Environmental Impact Assessment (Part 2)
47	Develop Regulatory Compliance Plan
48	Prepare Final Report
49	
50	**Monthly Status Report Due (2nd)**
51	**Deliver Final Report**



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