



GMREC RD&D



(Research, Development and Demonstration)

Roger Bedard

April 29, 2011

Plan for Session

- Moderator Overview – Roger Bedard, DOE Consultant, EPRI Retired,
 - 2008 MHK RD&D Needs Workshop
 - 2010 MHK Technology Roadmap
- Panelist Presentations
 - Henry Jeffrey, University of Edinburgh
 - Jochen Bard, Fraunhofer Institute for Wind Energy and Energy System Technology , Germany
 - Tom Davey, University of Edinburgh
 - Robert Rawlinson-Smith, Garrad Hassan
 - Jessica Morey, Clean Energy Group
- Panelist Response to Moderator Question
- Audience Questions

MHK RD&D Needs - Summary

- October 2008 EPRI facilitated workshop Included a broad set of participants
- Eighteen (18) RD&D topical areas encompassed 5 MHK Energy Types
 - Wave Energy
 - Tidal In-stream or Current Energy
 - Ocean In-stream or Current Energy
 - River In-stream or Current Energy
 - Ocean Thermal Energy Conversion
- The three highest prioritized topical areas were
 - Testing
 - Environmental
 - Standards
- Identified a need for technology road mapping

RDD&D Needs - The Starting Point

- Twelve (12) topics identified in the UK Roadmap
 - Resource Modeling
 - Testing
 - Electrical
 - Engineering Design
 - Installation, O&M
 - Standards
 - Device modeling
 - Moorings & Sea bed Attach' ts
 - Power Take Off and Control
 - Lifecycle & Manufacturing
 - Environmental
 - System Simulation
- Six (6) other topics were subsequently added
 - Materials – low cost
 - System Evaluations
 - Master Gen/Trans Planning
 - Storage
 - Vision and Roadmap
 - Education

Briefings and OREC and NHA Member Participation

- MHK Technology Needs Briefings were presented by experts at the workshop
- The Ocean Renewable Energy Coalition surveyed their MHK members prior to the workshop. Fourteen (14) members responded.
- The National Hydropower Association (NHA) surveyed their MHK members prior to the workshop. Thirteen (13) members responded.
- Results of these surveys were input into the workshop
- The RD&D Needs Workshops Results are available at the EPRI Ocean Energy web site http://oceanenergy.epri.com/attachments/ocean/reports/Final_MHK_Prioritized_RDD_Needs_Report_123108.pdf

MHK Technology Roadmap Summary

- Roadmap Facilitator: Robert Thresher, PhD, PE NREL Research Fellow
- Roadmap to be used to facilitate the development of marine renewable energy technologies
- Roadmap focused primarily on the scientific and technical steps necessary to overcome the barriers to the wide-spread use of these renewable energy technologies
- Roadmap has been transitioned to OREC

Roadmap Scope

- Roadmap addresses the full spectrum of issues that need to be overcome for marine renewable technologies to be developed and deployed in significant quantities, including:
 - Siting and permitting barriers
 - Environmental research needs
 - Technical R&D issues
 - Policy issues
 - Market development barriers
 - Economics and financial issues
 - Grid integration barriers.

Roadmap Conclusions

- The roadmap has established a vision for the marine hydrokinetic industry in the United States and an accompanying deployment scenario together with a commercial strategy and a technical strategy.
- The scientific and technical components of the roadmap have been described in sufficient depth and detail to allow the MHK stakeholders to understand their various roles in the bigger picture.
- Available at www.oceanrenewable.com/wp.../1st-draft-roadmap-rwt-8april10.pdf

Back Up Slides

Roadmap Elements

- Vision Statement
- Deployment Scenario
- Commercial Strategy
- Technical Strategy

MHK Technology Needs Briefings

EPRI Overview and Roadmapping	Roger Bedard, EPRI
Resource Assessments: Wave Energy	Roger Bedard, EPRI on behalf of George Hagerman, Virginia Tech
Resource Assessments: Tidal Current	Brian Polagye, University of Washington
Resource Assessments: River Current	Mirko Previsic, Re-Vision
Resource Assessments: Ocean Current	Sue Skemp, Florida Atlantic University
Resource Assessments: Ocean Thermal	Richard Meyers, Ocean Energy Council
Hawaii Specific R&D Needs	Rick Rocheleau, University of Hawaii
Device Modeling and System Simulation	Bob Thresher, NREL
Experimental and System Testing	Bob Paasch, Oregon State University (OSU)
Moorings and Sea Bed Attachments	Tom Hudon, PCCI Inc.
Electrical Infrastructure	Tom Key, EPRI
Power Take Off and Control	Bob Paasch, OSU
Engineering Design*	Mirko Previsic, Re-Vision
Life Cycle and Manufacturing	Chris Retzler, Pelamis Wavepower
Installation and O&M	Chris Retzler, Pelamis Wavepower
Standards	Walt Musial, NREL
Ocean Renewable Energy Coalition Perspectives	Sean O'Neill, Ocean Renewable Energy Coalition
National Hydropower Association Perspectives	Mike Murphy, NHA
Alaska Specific R&D Needs	Roger Bedard on behalf of David Lockard, Alaska Energy Authority
Environmental	Glenn Cada, ORNL
Storage	Patrick Sullivan, NREL
System Configuration	Mirko Previsic, Re-Vision

Voting Results of Full MHK Workshop

Voting (40 Participants)

Participants Voted
either High, Medium
or Low

Installation and O&M

An example of low
consensus



