BACKGROUND

Section 633(b) of the Energy Independence and Security Act (EISA) of 2007 calls for the U.S. Department of Energy (DOE) to prepare a Report to Congress to address the following issues relating to marine and hydrokinetic energy:

- Potential environmental impacts of marine and hydrokinetic energy projects
- Options to prevent adverse impacts
- Potential roles for environmental monitoring and adaptive management in mitigating impacts
- Necessary components in adaptive management

For the purposes of this report, the term "marine and hydrokinetic renewable energy" refers to electrical energy that comes from these sources:

- Waves, tides, and currents in oceans, estuaries, and tidal areas
- Free flowing water in rivers, lakes, and streams
- Free flowing water in man-made channels
- Differentials in ocean temperature (ocean thermal energy conversion)

This term *does not* include energy from any source that uses a dam, diversionary structure, or impoundment for electric power purposes.

RELEVANT TECHNOLOGIES

There is great variety among the technologies that have been proposed for capturing energy from moving water, both in marine and freshwater environments. These will be reviewed and evaluated for their potential effects in the EISA Report. One of the more important distinctions among these technologies is whether they capture energy from horizontal water movement (currents in oceans, estuaries, or rivers) or from the vertical or oscillatory movement of the water (waves).

EXAMPLES

Wave conversion concepts – point absorbers, attenuators, terminators

Current conversion concepts – horizontal axis reaction turbines, cross-flow turbines, ducted or open-center turbines

POTENTIAL ENVIRONMENTAL IMPACTS

Few of the newly proposed marine and hydrokinetic designs have been tested at full-scale to determine performance, costs, and impacts. The potential environmental impacts associated with these projects have been the subject of previous DOE Hydropower Program workshops and reports (e.g.,Cada et al., Fisheries 32(4), April 2007).

The EISA Report will consider environmental impacts that have been identified to date:

- Habitat alteration from altered water flow patterns, mooring cables, etc.
- Water quality degradation from suspended sediments and/or toxic chemicals released into the environment
- Strike mortality/injury to fish and wildlife from contact with moving blades
- Impingement on screens
- Electromagnetic fields around cables and equipment
- Noise effects on behavior of fish/wildlife
- Cumulative effects of arrays of multiple units
- Conflicts with recreational or commercial fishing and boating

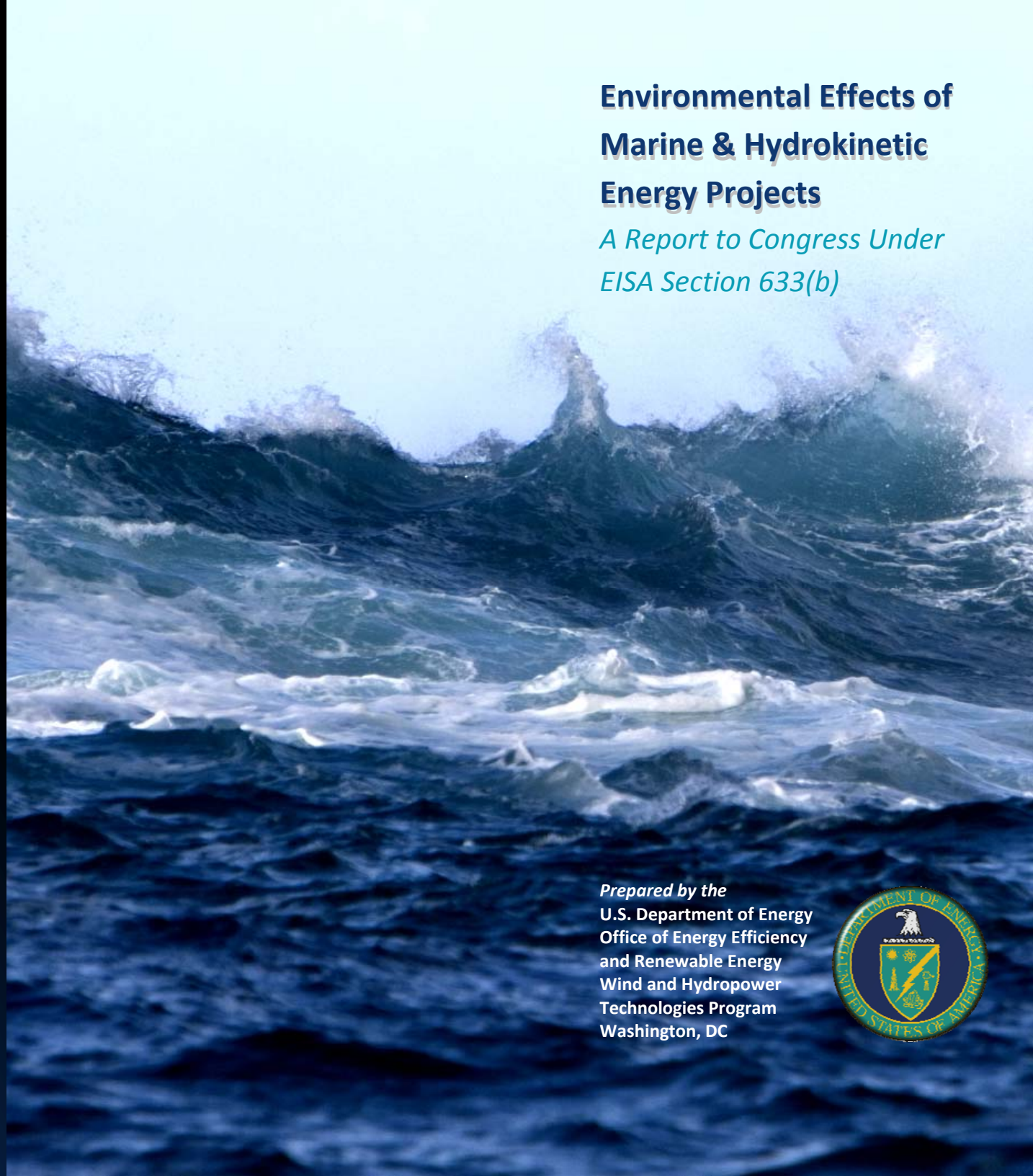
APPROACH

DOE is developing this Report to Congress in conjunction with the Secretary of Commerce (acting through the Undersecretary of Commerce for Oceans and Atmosphere) and the Secretary of the Interior. The Report will be prepared by Oak Ridge National Laboratory in two steps: a draft report that will be available for review in November 2008 and a final report that will be delivered to Congress in June 2009.

Report to Congress
Table of Contents

Schedule

Draft posted for comment – mid-November, 2008
Draft report webinar – November 25, 2008
Closing date for comments – December 9, 2008
Interagency review/approval – February, 2009
Final report to Congress – June 2009



Environmental Effects of Marine & Hydrokinetic Energy Projects

A Report to Congress Under EISA Section 633(b)

Prepared by the
U.S. Department of Energy
Office of Energy Efficiency and Renewable Energy
Wind and Hydropower Technologies Program
Washington, DC