Wind Energy Center

Offshore Wind Energy: University of Massachusetts History- A Look Back to Look Forward

Professor Jon McGowan
University of Massachusetts/ Amherst

UMassAmherst

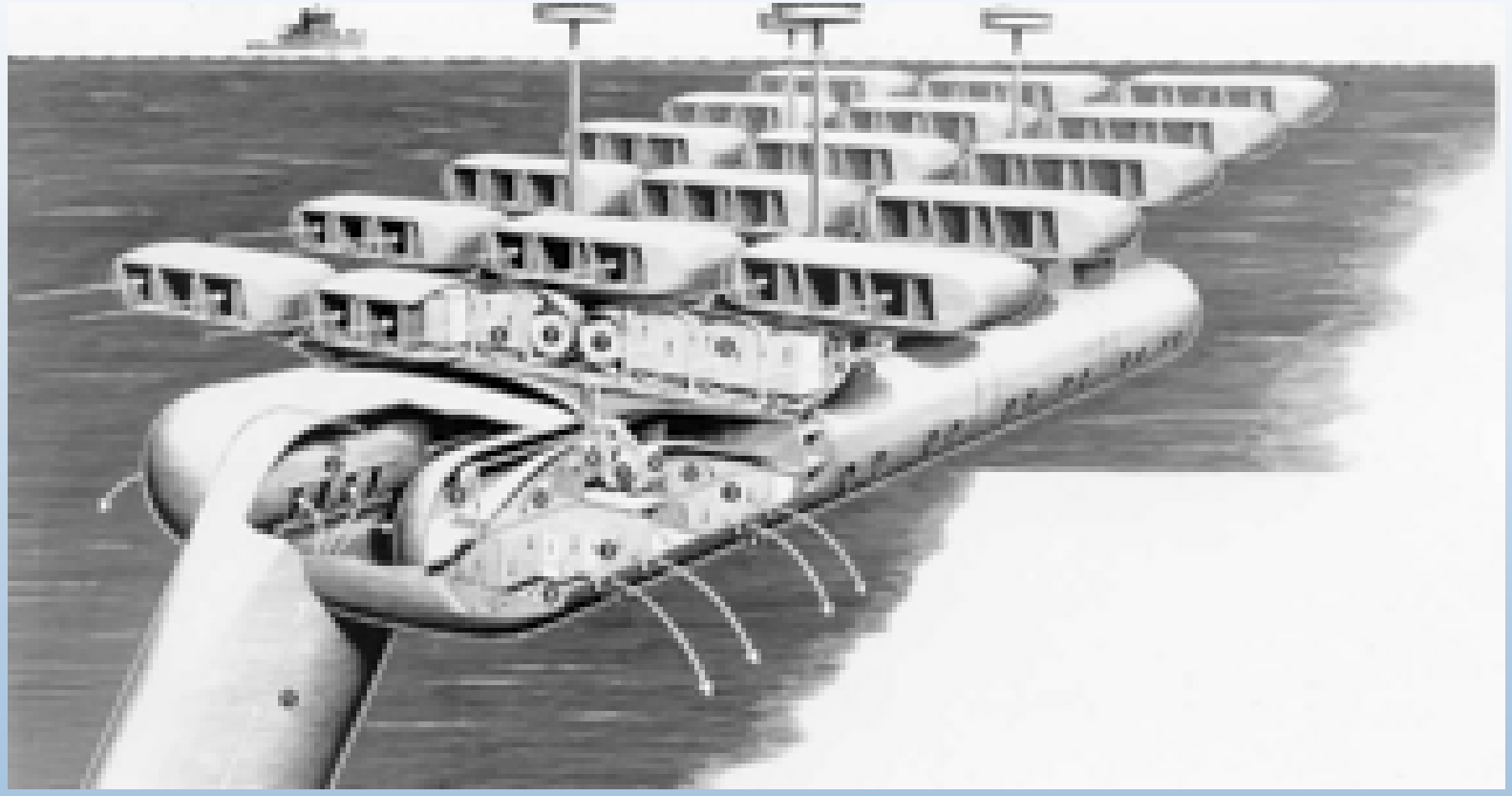
UMASS Offshore Wind History

- Design studies from the 1970's
- Offshore site identification, including Nantucket Sound
- Meteorological-oceanographic (metocean) investigations
- Layout optimization, and support structure analysis

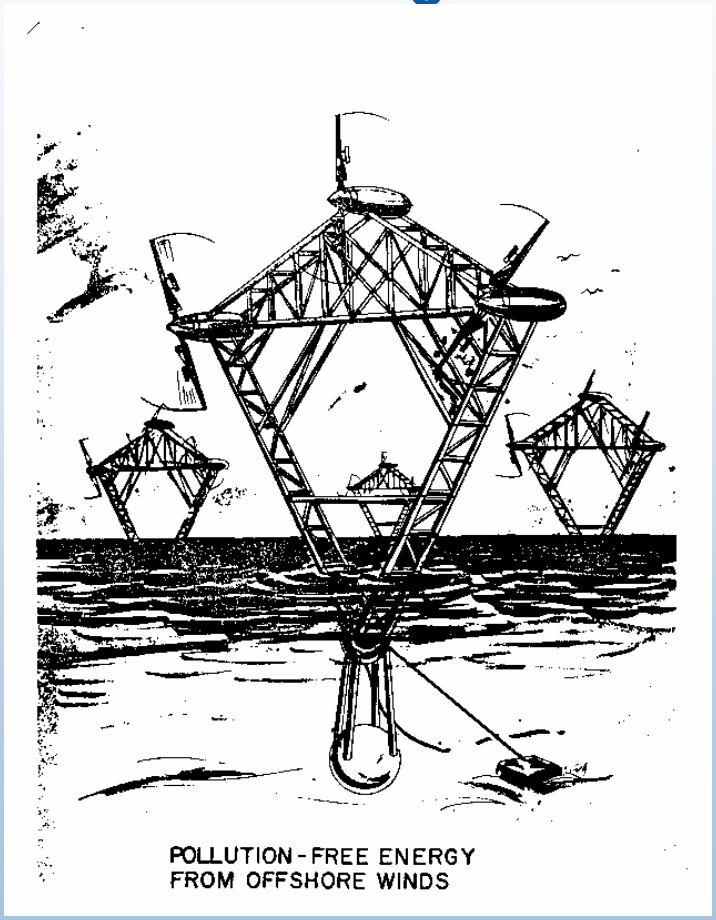
UMASS OFFSHORE WIND DESIGN STUDIES

- 1970: Power System for Eastern US Coast
- 1970's: Multiple Rotor Systems
- 1980's: Lake Ontario Power System
- 1990's-2000's: Ocean Wind Systems Designs

UMASS 1970's: OCEAN THERMAL ENERGY CONVERSION SYSTEMS



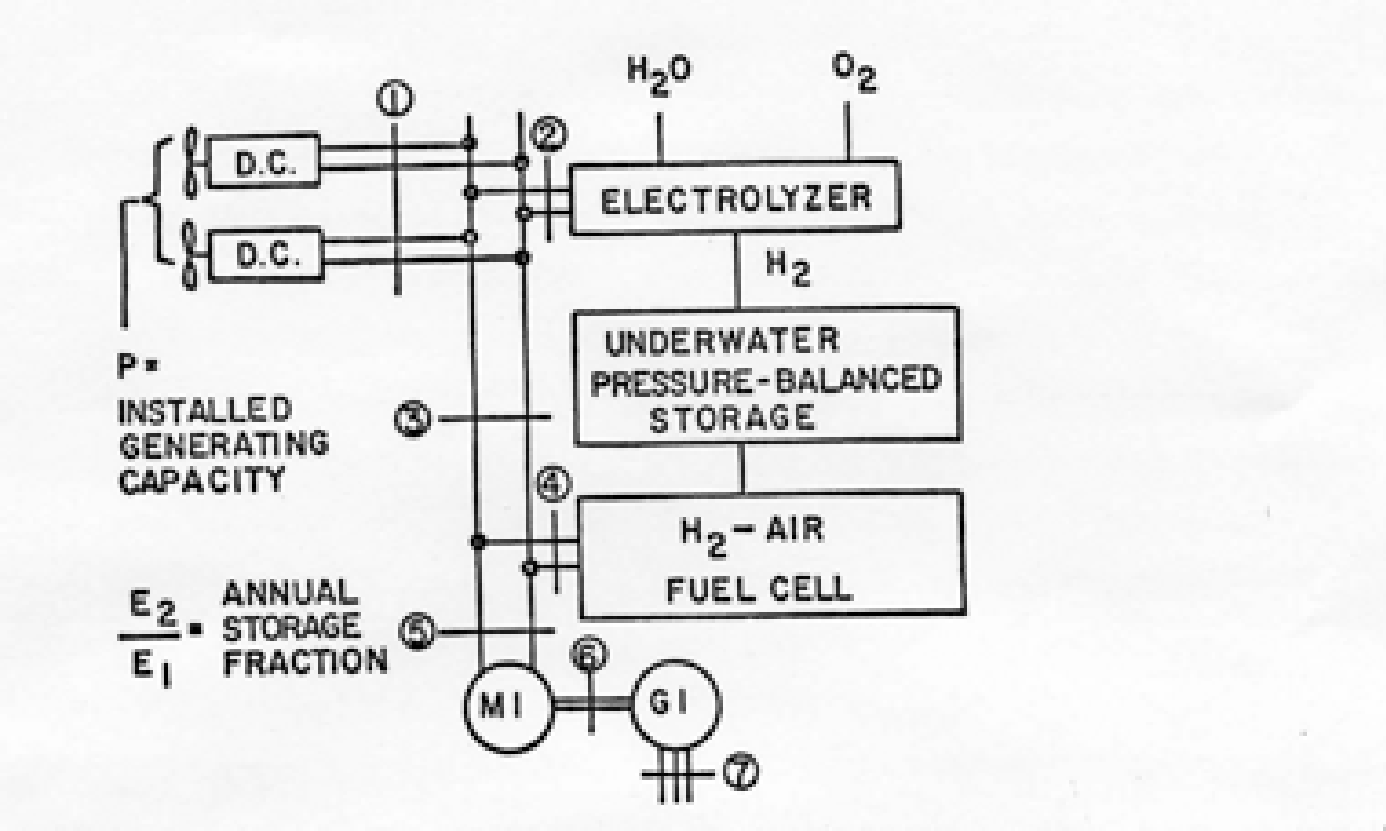
UMass HISTORY 1970s
Early Conceptual Designs for Offshore Wind in New England



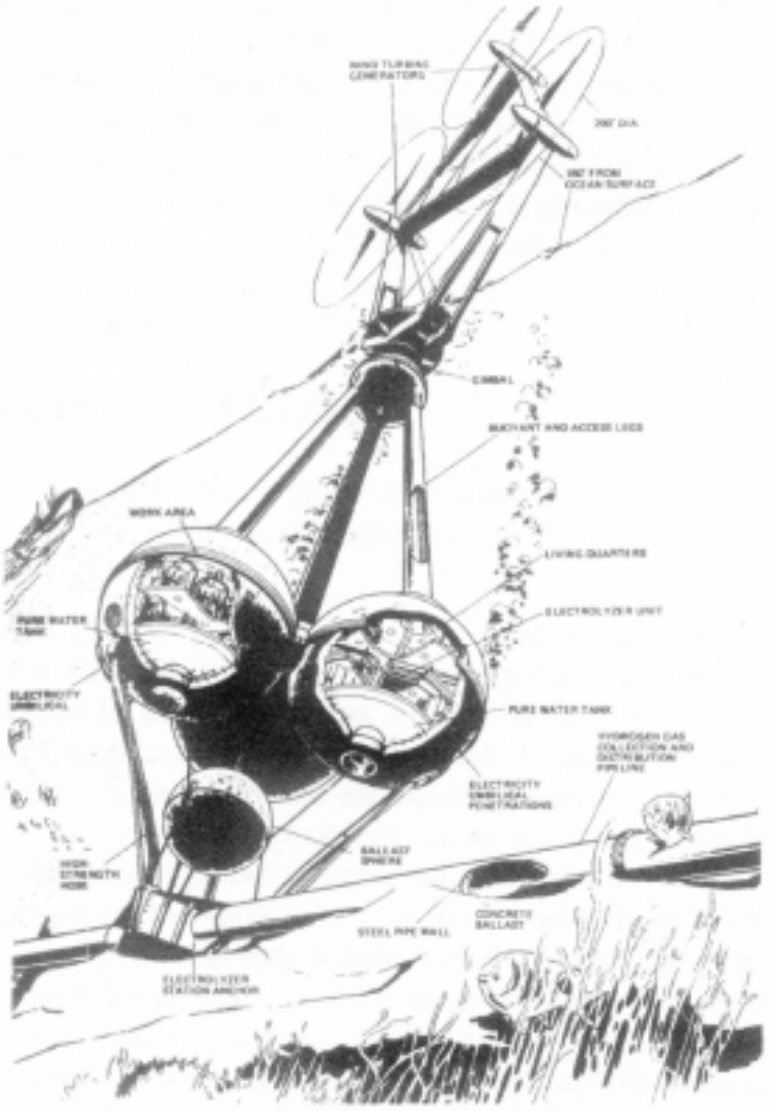
Wind Turbine/ Spar Buoy; Multi Rotor Systems

(Heronemus, UMass, 1973)

UMASS OFFSHORE WIND: SYSTEM DESIGN



Heronemus/ UMass Design for Offshore Wind Systems: 3- 2MW Turbines



UNDERWATER VIEW OF HYDROGEN WINDSHIP, C 1974

HISTORY 1970s
UMass Offshore Wind Farm: Hydrogen Production

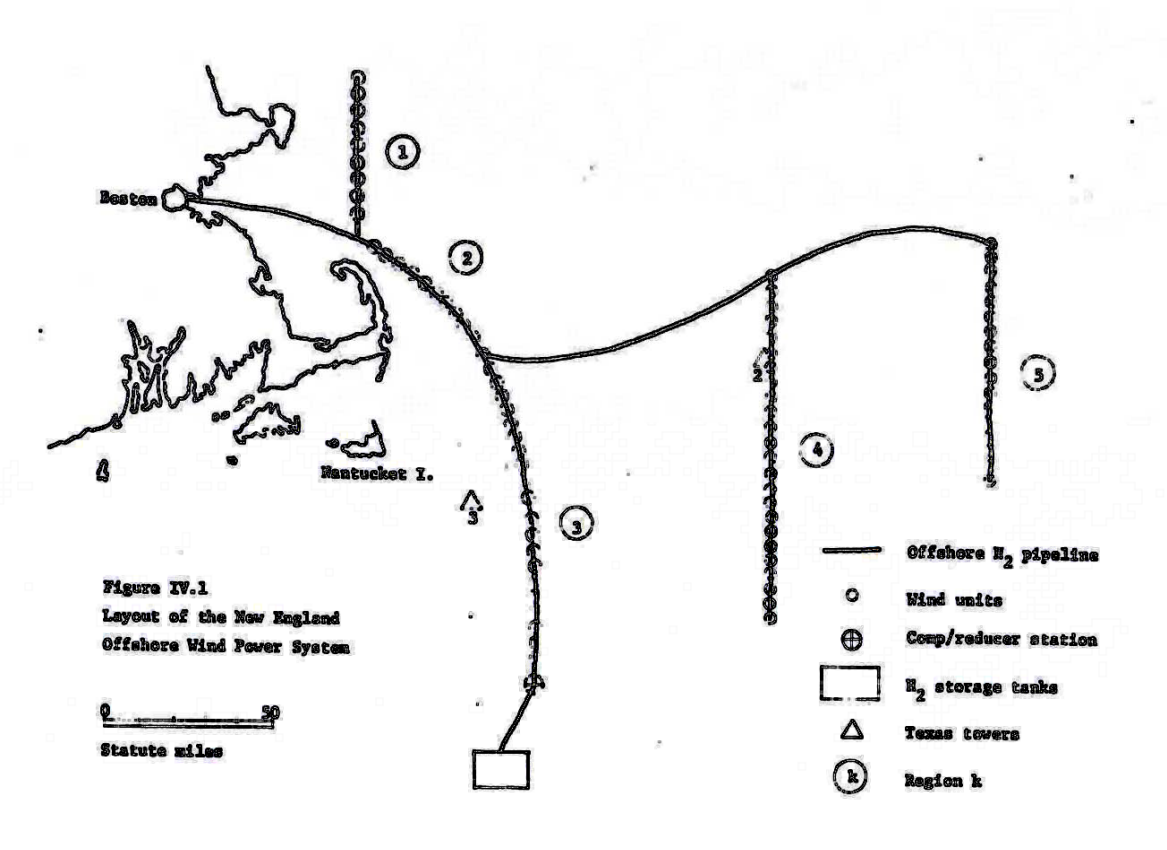
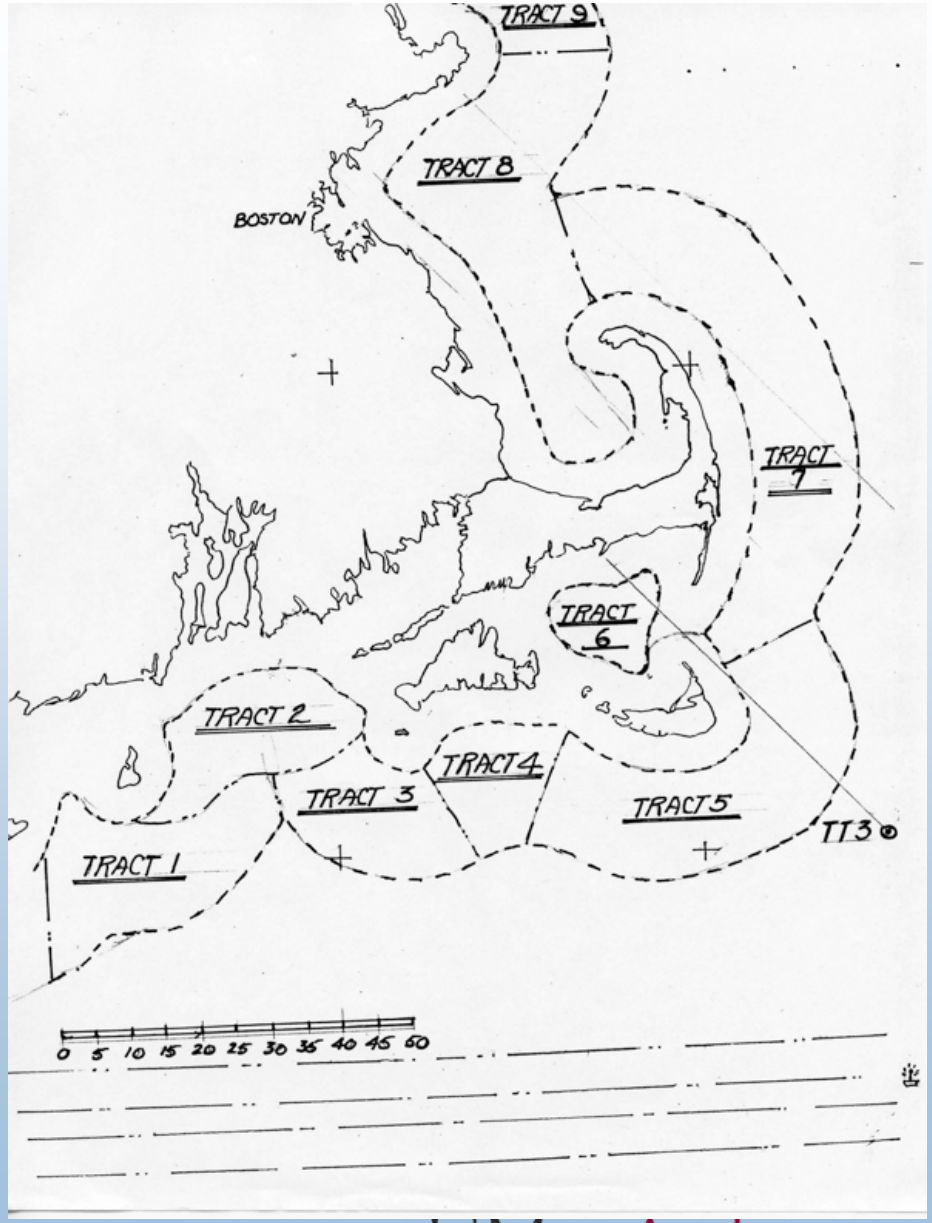


Figure IV.1
Layout of the New England
Offshore Wind Power System

Wind Energy Center

UMASS OFFSHORE 1970s STUDIES: POTENTIAL SITES



UMassAmherst

1970's: Other Offshore Wind Power Systems: Atlantic Coast Sites

A) Wind System to power UMass/ Boston

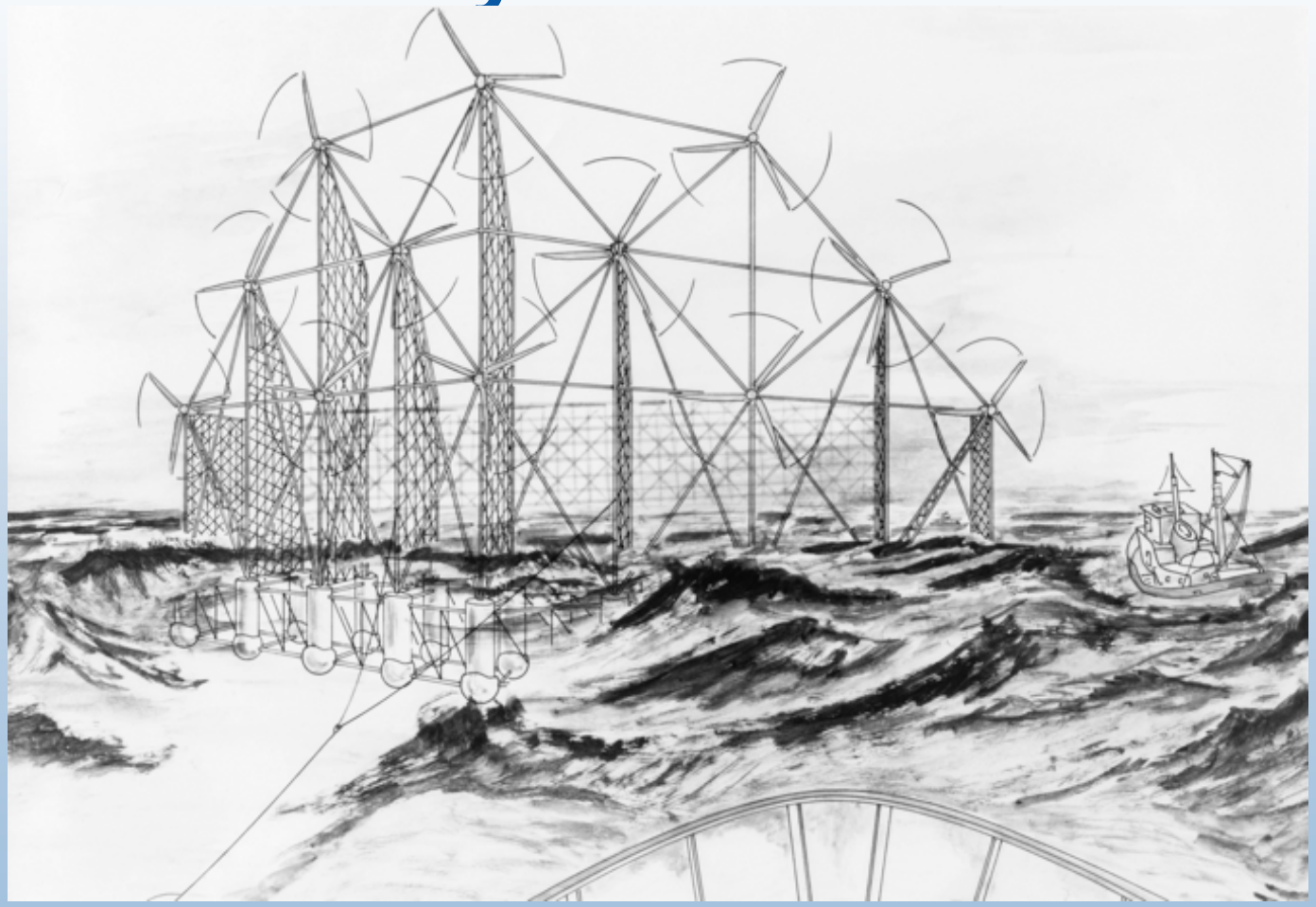
B) Different Sized Floating Wind Stations

C) Different Offshore Wind Energy Storage Systems

D) Offshore Wind Systems Moored (and Wind Ships) along the Atlantic Shelf-edge

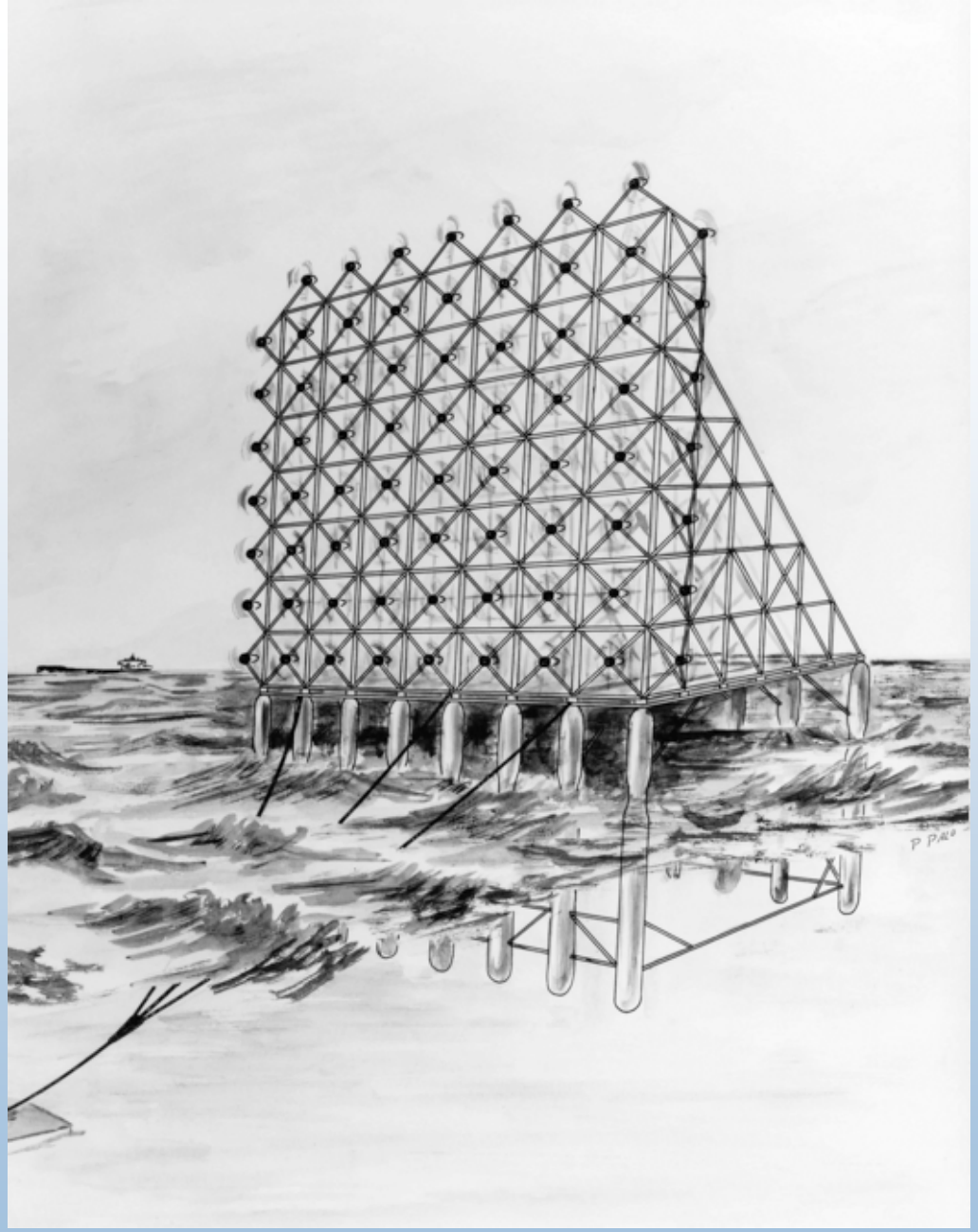
1) Electricity for Heating and Cooling
2) Electricity, Firm Power- On Demand
3) Electricity, Peaking Power
4) Providing Hydrogen for Aircraft and other Transportation Systems
5) Nitrogenous Fertilizer Offshore System
6) Ocean Sited "Clean Coal" Power Plants

UMASS 1970's: Multirotor Systems



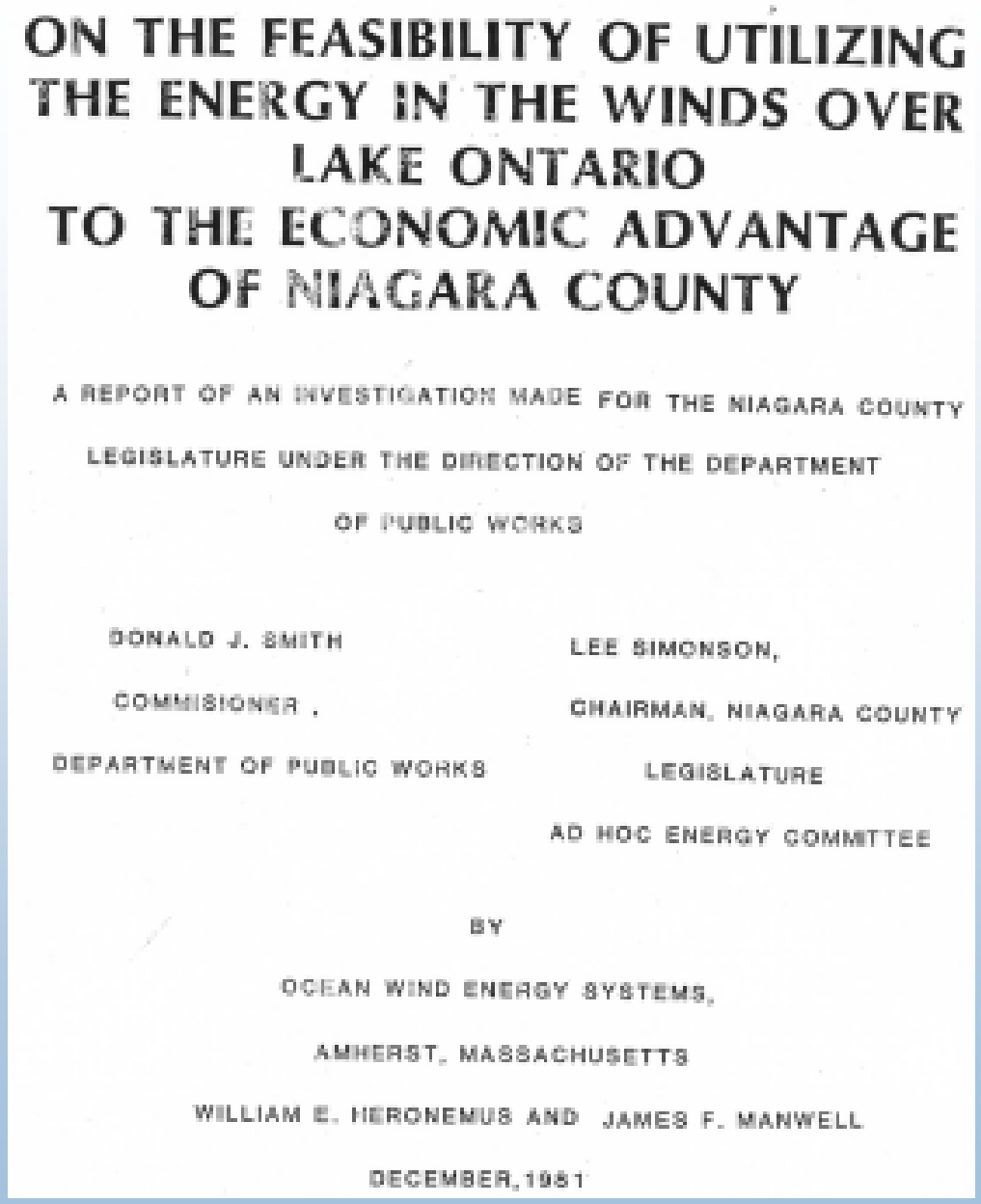
Wind Energy Center

UMASS 1970's: Multirotor Systems



UMassAmherst

UMASS 1980s: Lake Ontario Offshore Wind Energy Study



ON THE FEASIBILITY OF UTILIZING THE ENERGY IN THE WINDS OVER LAKE ONTARIO TO THE ECONOMIC ADVANTAGE OF NIAGARA COUNTY

A REPORT OF AN INVESTIGATION MADE FOR THE NIAGARA COUNTY LEGISLATURE UNDER THE DIRECTION OF THE DEPARTMENT OF PUBLIC WORKS

DONALD J. SMITH
COMMISIONER ,
DEPARTMENT OF PUBLIC WORKS

LEE SIMONSON,
CHAIRMAN, NIAGARA COUNTY
LEGISLATURE
AD HOC ENERGY COMMITTEE

BY

OCEAN WIND ENERGY SYSTEMS,
AMHERST, MASSACHUSETTS

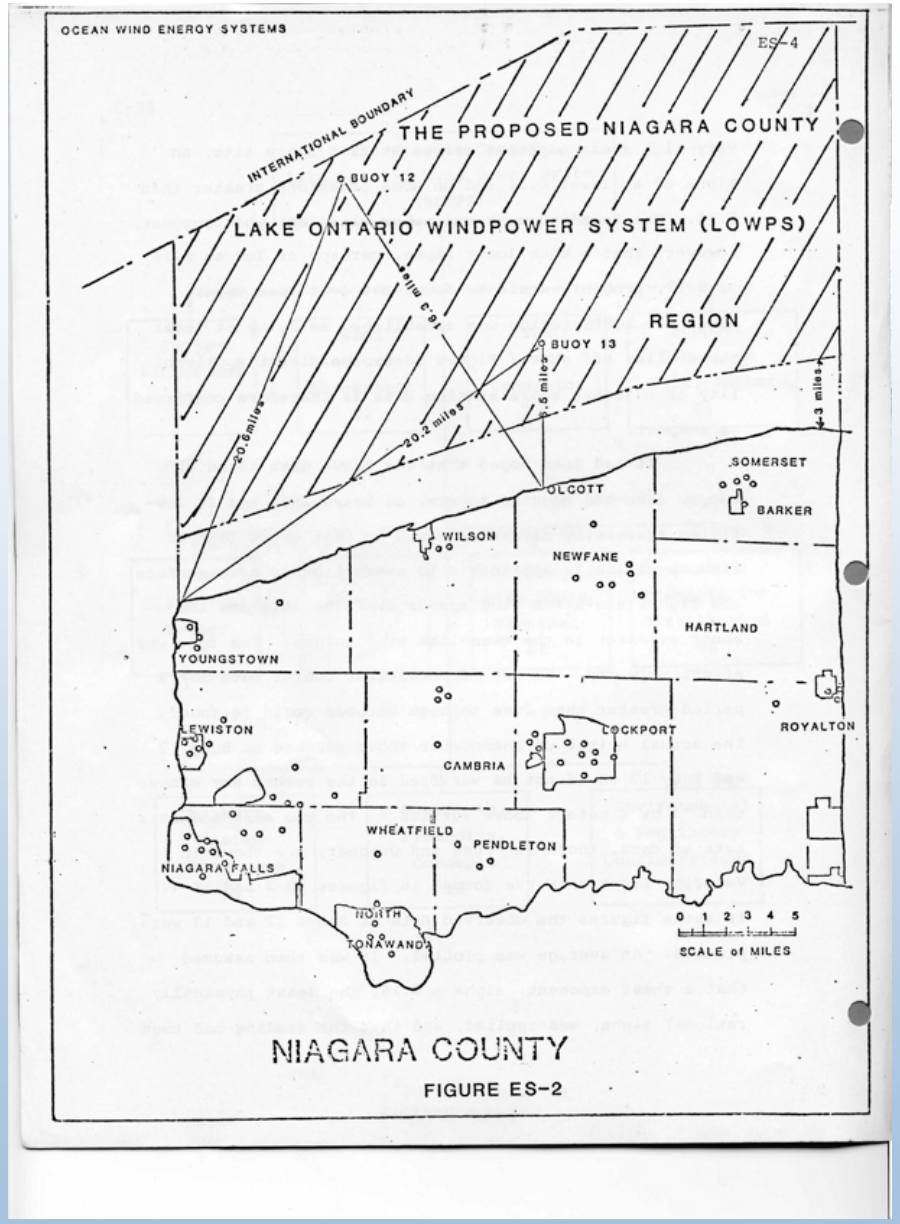
WILLIAM E. HERONEMUS AND JAMES F. MANWELL

DECEMBER, 1981

Wind Energy Center

UMASS 1980s: Lake Ontario Offshore Wind Energy Study:

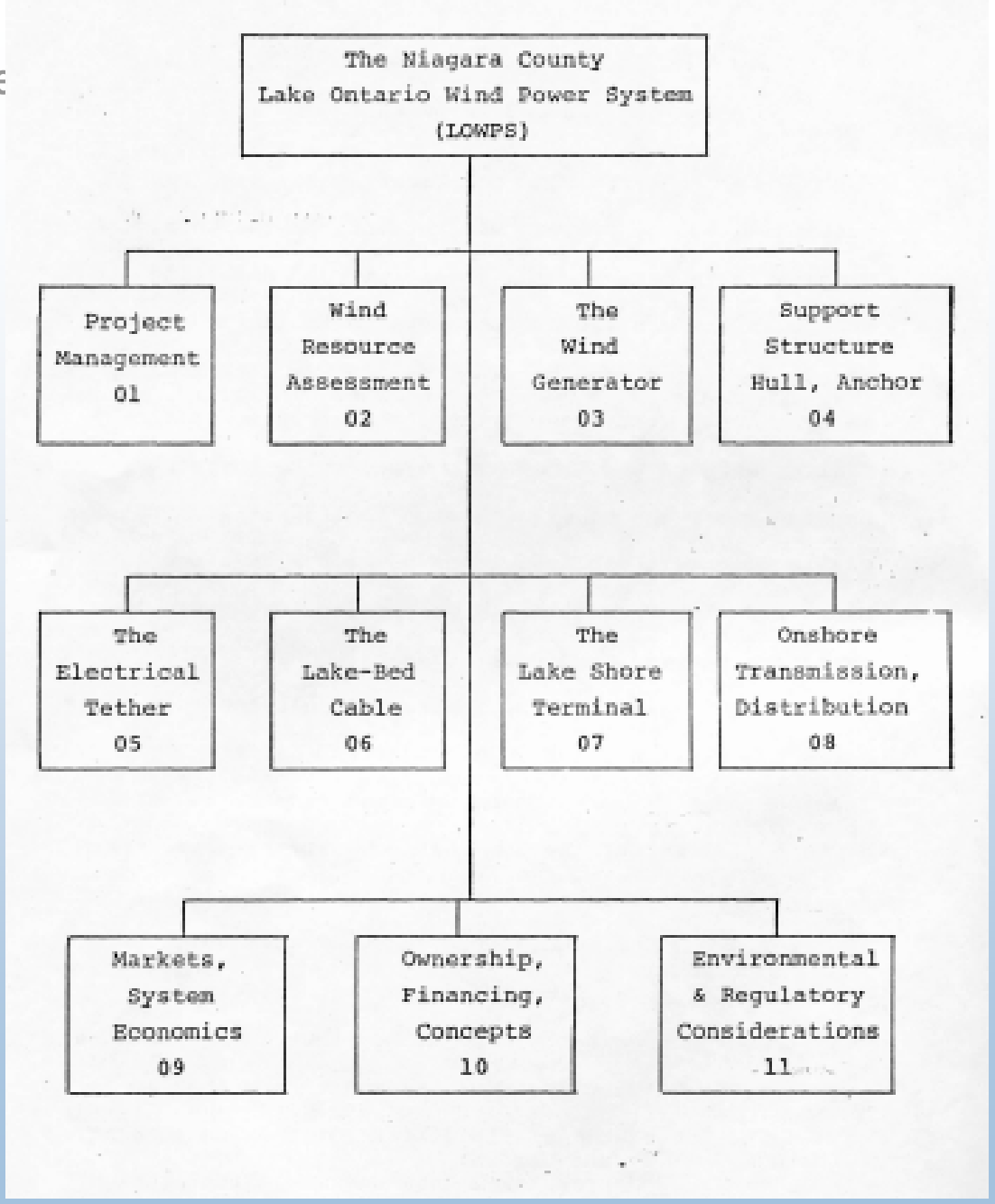
RESOURCE ASSESSMENT



UMassAmherst

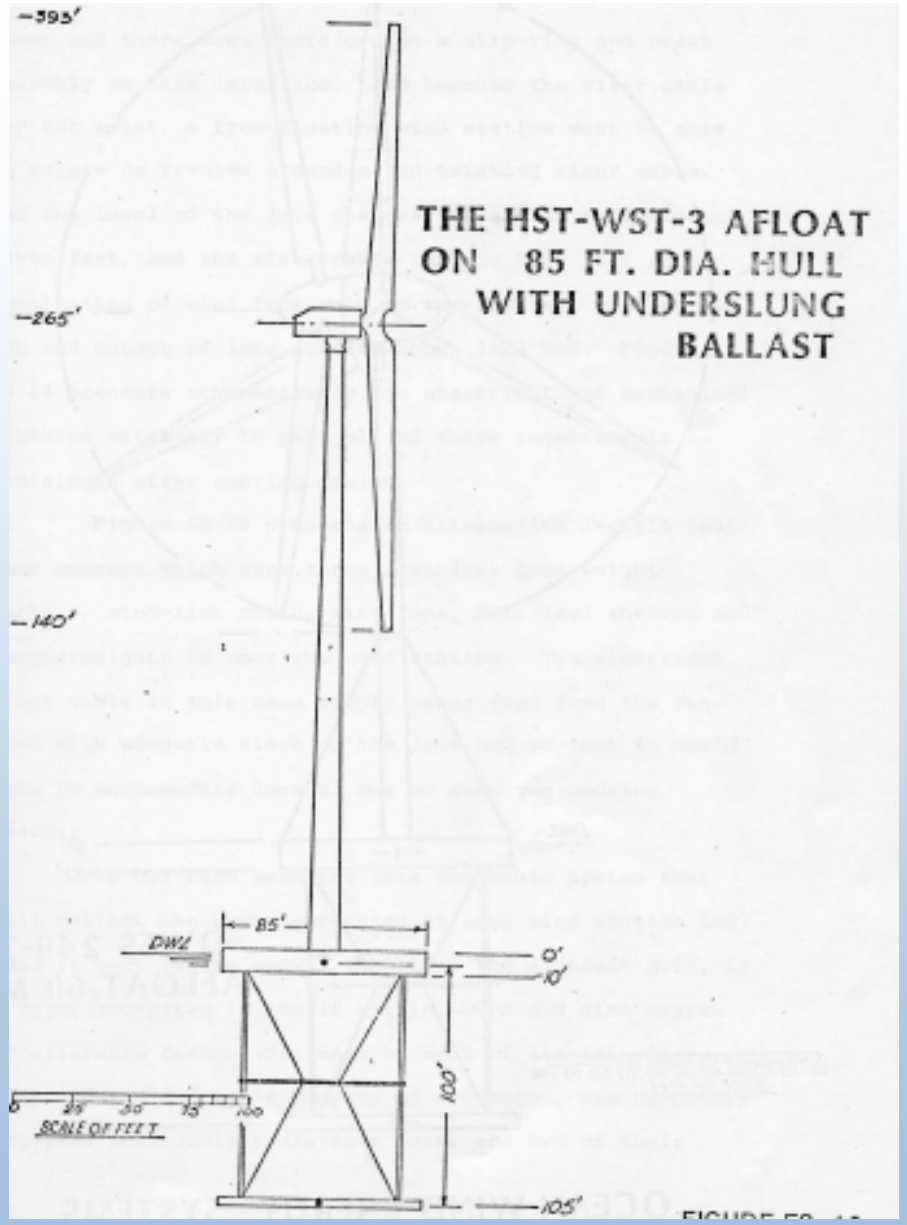
UMASS 1980s: Lake Ontario Offshore Wind Energy Study

OVERALL PROJECT SCOPE



UMASS 1980s: Lake Ontario Offshore Wind Energy Study

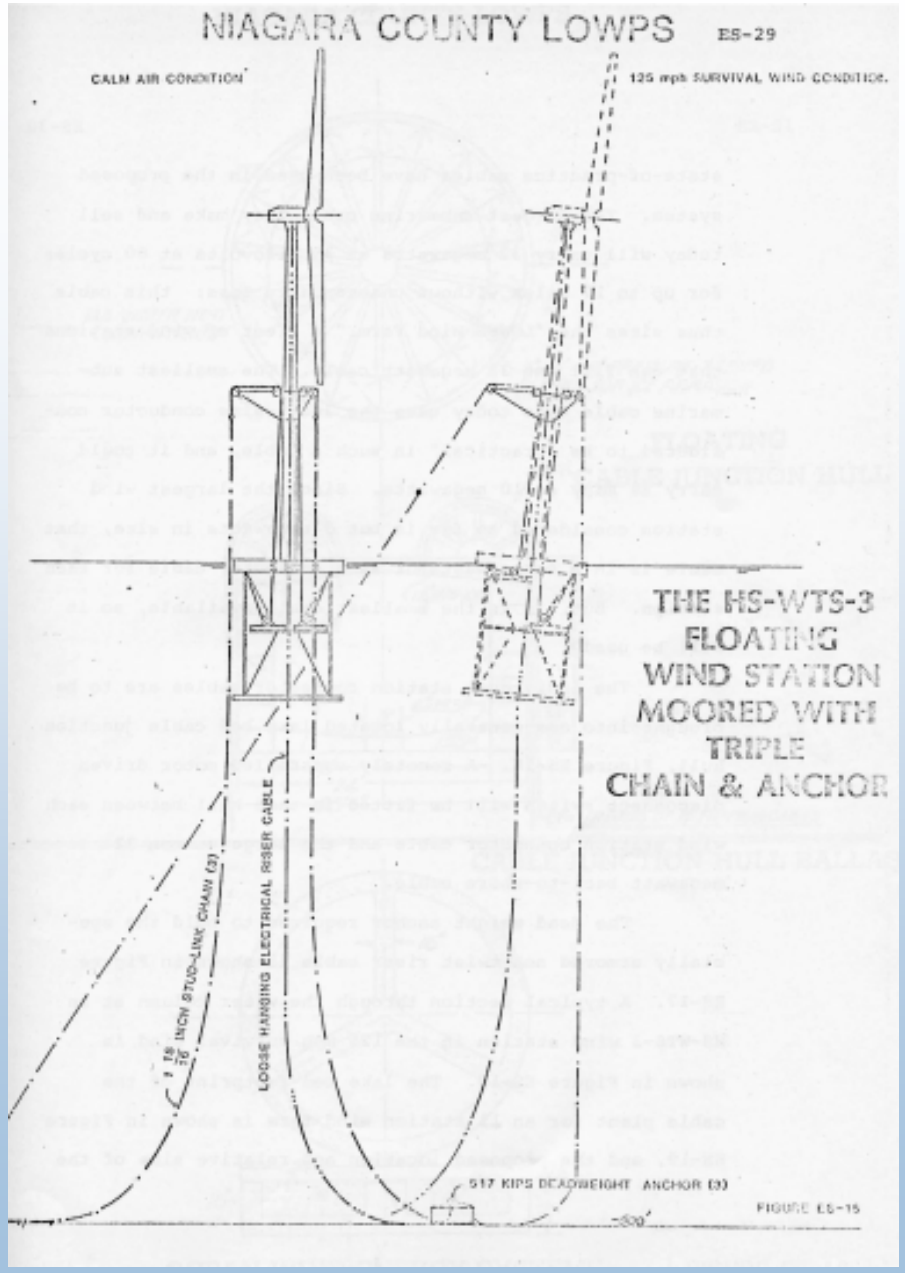
CANDIDATE WIND STATIONS



Wind Energy Center

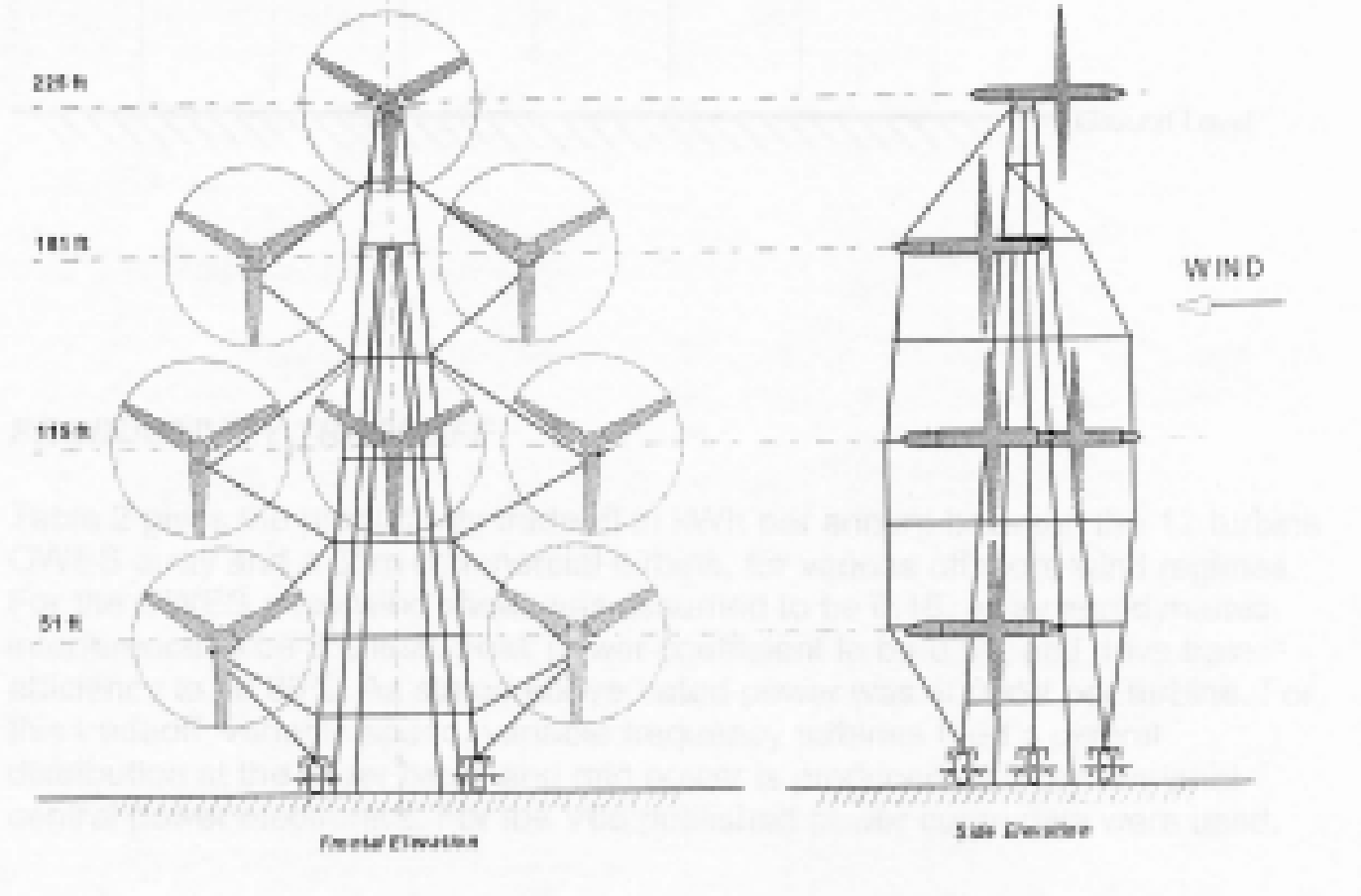
UMASS 1980s: Lake Ontario Offshore Wind Energy Study

WIND TURBINE MOORING SYSTEM



UMassAmherst

Heronemus 1990's-2000's
New Multiple System Array



WORDS FROM THE PAST- UMASS OFFSHORE WORK

A major problem with the critics is that they don't think big enough. When the US does something really important to the economy, like building 7 million new automobiles per year, it thinks about a "26 thousand mile long line of automobiles per year" Wind systems of significance are not for the faint hearted or the small thinkers who get upset at the thoughts of tens of thousands of windmills. We don't want 1300 miles of wind stations offshore: we want perhaps 30,000 miles- many parallel rows at one mile intervals.

Here's to you Captain Bill!!!