

# Tidal Energy

## A. Introduction

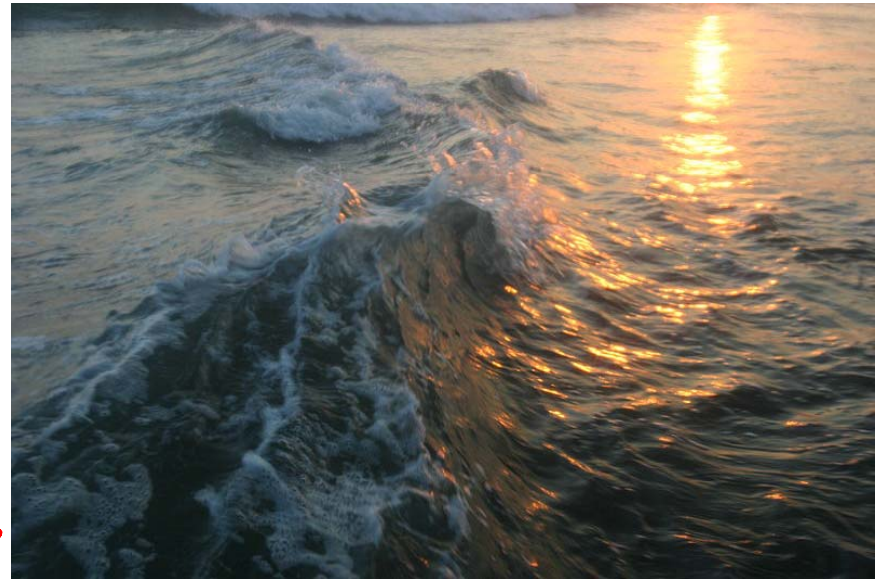
THE OCEAN CONTAINS A VAST  
AMOUNT OF ENERGY

KINETIC ENERGY → WAVES  
→ CURRENTS

POTENTIAL ENERGY → ELEVATION CHANGES  
DUE TO TIDES

SENSIBLE HEAT → GRADIENTS IN TEMPERATURES WITH DEPTH

QUESTION: HOW DO WE TAKE ADVANTAGE OF THESE  
ENERGY SOURCES?



# Tidal Energy

## A. Introduction

### 1. Wave Energy

ENERGY IN WAVES IS LARGE

MOST ATTRACTIVE WAVES

LONG PERIOD ( $\sim 10s$ )

LARGE AMPLITUDE ( $\sim 2m$ )

Typical Power is

$50 - 70 \text{ kW/m}$

Power in a wave is proportional

$P \sim (\text{AMPLITUDE})^2$

$\sim (\text{PERIOD})$



# Tidal Energy

## A. Introduction

### 1. Wave Energy

#### ADVANTAGES

LARGE ENERGY FLUX  
PREDICTABLE

RESERVE NEAR COASTAL LOAD CENTERS

#### CHALLENGES

IRREGULAR IN AMPLITUDE, PHASE & DIRECTION  
STORM WAVES, 10X AVERAGE, 100X POWER  
BEST RESOURCES ARE FAR OFFSHORE

WAVE FREQUENCIES & ELECTRICITY GENERATION FREQUENCIES  
500X DIFFERENT

SUSTAINED R&D HAS BEEN LACKING

SMALL LOCAL INSTALLATIONS THIS MAKE SENSE

