

Waves: An Alternative Energy Source

Answers Key

Equations

LIMPET System

$$J = 0.5 * (H_s)^2 * T_p$$

$$\text{LIMPET Amount} = J * 20 \text{ m}$$

Pelamis System

$$T_{\text{pow}} = 0.857 * T_{\text{peak}}$$

Use [Matrix](#) to find Pelamis Power Yield

LIMPET System Electricity Potential

Site	Wave Height (m)	Dominant Wave Period or T_p (s)	Site Depth (m)	Energy Flux or J (kW/m)	LIMPET Amount (kW)
Cobscook Bay, ME	0.03	3.6	35	0.00162	0.0324
Ocean Crest Pier, NC	0.46	9.8	7	1.04	20.8
Diablo Canyon, CA	1.49	11	23	12.21	244.2

Pelamis System Electricity Potential

Site	Wave Height (m)	Dominant Wave Period or T_{peak} (s)	Site Depth (m)	Power Period or T_{pow} (s)	Pelamis Power Yield (kW)
Gulf of Maine	2.01	10.7	225	9.17	~138
Atlantic Ocean, NC	1.10	6	4426.8	5.14	idle (0)
Pacific Ocean, CA	2.80	13	87.8	11.14	~146
Lake Michigan	1.19	5	164.6	4.29	idle (0)

Conversions

$$1 \text{ foot} = 0.3048 \text{ meters}$$

$$1 \text{ meter} = 3.2808 \text{ feet}$$

$$1 \text{ year} = 8,760 \text{ hours}$$

$$1 \text{ Gigawatt hour (GWh)}$$

$$= 1,000 \text{ Megawatt hours (MWh)}$$

$$= 1,000,000 \text{ kilowatt hours (kWh)}$$

- 2003 U.S. consumption: 3,488,192 GWh (gigawatt hours) (U.S. Department of Energy Quick facts)
- 2003 Average residential monthly consumption: 906 kWh (U.S. Department of Energy Quick facts)
- New York City peak electrical demand: ~11,000 MW (New York City Government)