

Pumps and Turbines

Breakout Session 1: State-of-the-
Art Technologies

Assumptions:

- Closed cycle leading contender for near term commercialization

References:

- Guam OTEC Feasibility Assessment
- Baseline Designs of Moored and Grazing 40-MW OTEC Pilot Plants
- Renewable Energy From the Ocean
- OTC Study

Components Addressed:

- Turbines
- Pumps
 - Cold Water Pump
 - Warm Water Pump
 - Working Fluid Feed Pumps
 - Vacuum Pump (Open/Hybrid Cycles)

Turbines

- Reviewed Operating Parameters for 30 year period and remained consistent
- Ammonia turbines are specialty items and require additional development time
- Optimization for ammonia working fluid is desirable
- Radial Flow for 10MW
 - 2 per plant
 - 7 - 8 MW gross each turbine
 - Commercially Available, multiple vendors
- Axial Flow for 100MW
 - Trade study recommended to optimize size for NH_3
- For all power levels multiple turbines are required for modularity, reliability, redundancy, operation and maintenance

Cold/Warm Water Pumps

- Axial Flow impeller design
- Submersible vs. non
- High efficiency pumps with high efficiency motors
- 87-92% efficiency possible in some configurations
- Commercially available
- Multiple vendors

Working Fluid Pumps

- Feed pumps
- Recycle pumps
- One of the lowest cost items in the system
- Commercially available
- Large Design database established

Vacuum Pumps

- Needed for Hybrid Cycle
- Commercially adaptable database
- Currently used in conventional sea water cooled nuclear and fossil plants for start-up
- Trade off studies need to be performed relative to the location of water production (onshore vs. offshore)