Tribal Energy Program
Summer Internship

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Heat Management for Energy Conversion

- Heat to electricity: thermoelectrics

![Image of Seiko Thermic watch and BMW car diagram](image1.jpg)

**Fig. 5.** Seiko Thermic, a wristwatch powered by body heat using a thermoelectric generator; (a) the watch, (b) cross-sectional diagram. Copyright by Seiko Instruments Incorporated, reproduced with permission.

**Fig. 2.** Conceptual design of thermoelectric generator producing electricity from waste heat in the engine exhaust. Copyright BMW, reprinted by permission.

- Sunlight to electricity: concentrated PV

![Image of increased light gathering area and concentrator photovoltaic modules](image2.jpg)

Cost-Effective Concentrator Photovoltaic (CPV) Arrays for Solar Power Applications

Sandia National Laboratories
Solar/Wind hybrid - Kayenta, AZ with NTUA

Systems power rural areas
Wind Potential – Aubrey Cliffs, AZ with NTUA

Met towers test wind potential
Sustainable Building Materials in Peach Springs, AZ

- Earthship
- Recyclable materials
- flexcrete
- light tube
Grand Canyon South Rim

Renewable energy powers tourism

Hualapai Tribe
Ecotourism - Ramona, CA

Developing off-grid reservation
PV Theory & Hands-on Workshop, Hotevilla, AZ

- Inverter
- Solar panels
- Teamwork
- Electrical connections