Agribusiness generates a significant portion of the wastewater streams in California. Low salinity wastewater streams are potentially reusable through desalination. High salinity streams often require evaporators to reduce the wastewater volume and disposal costs.

These evaporators require large amounts of thermal energy. This energy has traditionally been supplied by fossil fuels or low grade steam. This makes it problematic to expand the use of evaporators in the large agribusiness industry, as natural gas releases CO₂ and low grade steam is not available in most locations.

To solve this problem, evaporators can instead be powered by solar thermal collector arrays, helping reduce waste streams without exhausting CO₂.

### Problem

Agribusiness generates a significant portion of the wastewater streams in California. Low salinity wastewater streams are potentially reusable through desalination. High salinity streams often require evaporators to reduce the wastewater volume and disposal costs.

### Components

- Small scale solar thermal collector array (~100 kW) with an operating temperature around 150 °C.
- Evaporator configured to run on thermal fluid. Many systems that accept steam can use thermal fluid without modification.
- Optional filter press to convert the salt slurry into salt ‘cakes’. Dry salts may be disposed of cheaply or may have a small value.

### Example Application

- Incoming brine with Total Dissolved Solids (TDS) around 18,000 ppm enters the evaporator.
- The solar thermal array provides 150 °C thermal fluid to power the evaporator.
- The evaporator* removes 90% of the water, leaving the salt slurry with a TDS around 175,000 ppm.
- The filter press removes the salt solids, returning some concentrated brine to the evaporator.
- Dry salts are collected and cheaply disposed or sold for a small profit.

* Water normally needs 2.4 kWh/gal of energy to phase change into steam. Large evaporators have multiple effects, which lowers the energy required to evaporate water. This reduction in energy is defined as the Coefficient of Performance (COP).

### Conclusion

- 90% reduction in wastewater volume is achievable with evaporators.
- Evaporators lower the cost of wastewater disposal (because disposal costs are on a per gallon basis).
- Evaporators can be powered by clean and economical solar thermal collectors.
- A filter press can optionally be added to generate salt solids from the wastewater stream.

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