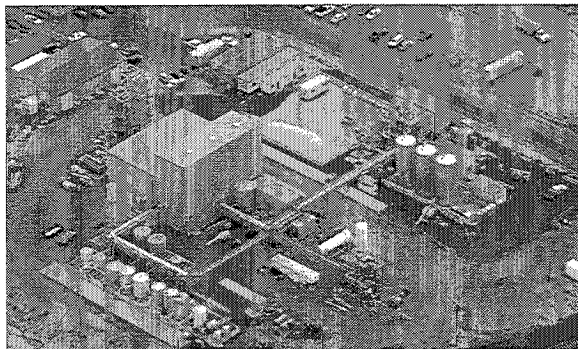
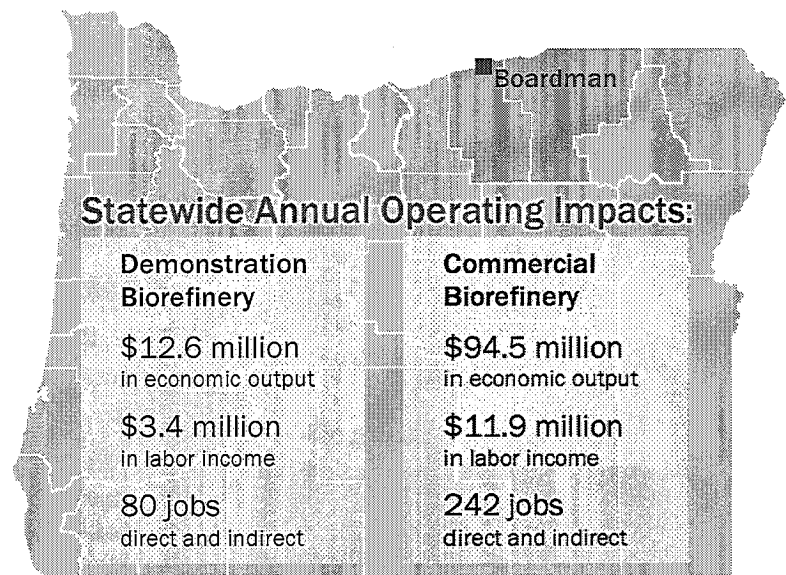


## The Economic Impacts of ZeaChem's Biorefineries in Boardman, Oregon

March 2013

ZeaChem, Inc. produces advanced biofuels and bio-based chemicals using proprietary, cellulose-based biorefining techniques. The company currently operates a demonstration biorefinery in Boardman, Oregon, which is located in Morrow County. ZeaChem plans to develop a large-scale, commercial biorefinery at the same location.

ECONorthwest calculated the economic impacts of construction and operations at ZeaChem's demonstration and commercial biorefineries for two geographic areas: Morrow and Umatilla Counties together, and Oregon as a whole.



Its location at the Port of Morrow in Boardman, Oregon allows ZeaChem's demonstration biorefinery to use feedstock delivered by road, rail, or water. Oregon-based GreenWood Resources supplies sustainably harvested hybrid poplar trees to the biorefinery.

### Existing Demonstration Biorefinery

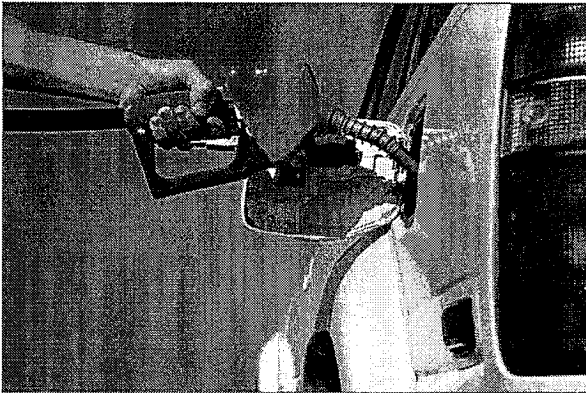
ZeaChem finished construction of its demonstration biorefinery October 2012 and began production first quarter 2013. Each year, the plant will produce up to 250,000 gallons of ethanol and other organic chemicals.

#### Construction Impacts

- \$21.9 million in output throughout Oregon
- 107 jobs related directly to construction, generating \$4.6 million in labor income
- 174 total jobs throughout the Oregon, generating \$7.2 million in labor income

#### Operating Impacts

- \$12.6 million in output in Oregon each year, mostly in Morrow and Umatilla Counties
- \$3.4 million in labor income each year throughout Oregon
- 80 jobs each year, including 40 full-time jobs at the biorefinery, and another 40 full- and part-time jobs at other businesses (18 in Morrow and Umatilla Counties and 22 in other Oregon counties)




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### About Biorefining

ZeaChem produces biofuels and bio-based chemicals using a range of cellulosic plant material, such as hybrid poplar and wheat straw. Cellulosic material grows abundantly throughout the world and replenishes quickly and easily in poor quality soil.

At its biorefineries, ZeaChem converts the plant material into various organic chemicals and fuels using highly efficient biochemical and thermochemical processing. The resulting products include:

- Acetic Acid
- Ethyl Acetate
- Ethanol
- Ethylene
- Propionic Acid
- Propylene

## Planned Commercial Biorefinery

ZeaChem plans to build a commercial-scale biorefinery adjacent to the existing demonstration facility, increasing production capacity by 100 times. When completed, the biorefinery will have the capacity to produce 25 million gallons or more of ethanol and other products each year. ZeaChem expects construction to take 18 months.

### Construction Impacts

- \$24.7 million in total construction spending in Oregon for local contractors, professional services, and per diem allowances for non-local workers over 18 months
- \$11.7 million in output in other sectors of the economy, for a total of \$36.4 million in economic output over 18 months
- 113 on-site construction jobs, on average, over the 18-month construction period, generating \$7.4 million in labor income

### Operating Impacts

- \$94.5 million in output each year in Oregon, \$76.7 million of which would occur in Morrow and Umatilla counties
- \$11.9 million in labor income in Oregon each year
- 65 full-time jobs at the biorefinery each year, and 177 full- and part-time jobs at other businesses in the state, for a total of 242 jobs statewide

### ECONorthwest's Method

ECONorthwest calculated the economic impacts of each biorefinery using an input-output method and IMPLAN® economic impact analysis software. ZeaChem provided ECONorthwest with forecasts of plant construction and operating costs, as well as staffing projections. ECONorthwest used these data to calculate the overall economic impacts of each biorefinery, excluding goods and services procured from outside of Oregon and indirect impacts occurring outside the state.

### About ECONorthwest

ECONorthwest provides professional economics, planning, and financial consulting services and expert testimony for a wide variety of private and public sector clients throughout the United States. ECONorthwest has conducted hundreds of economic impact analyses using an input-output method and IMPLAN® software.