**Table 1.** The projected expenditures (US$/L biodiesel) for biodiesel processing in 3 studies selected from a review of 12 studies.[a] Total cost is the sum of feedstock, capital, operation and chemicals, minus the credits for glycerin and meal.

| Scale of Facility | Authority[b] | Capacity (million litre/yr)[c] | Process | Feedstock | | | | Real annual capital[e] | Operation | Chemicals[f] | Glycerin credit[g] | Meal | | | Total[h] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Type | Amount[d] kg/L | Price US$/kg | Cost | | | | | Amount (t/L) | Price (US$/t) | Credit | |
| Community | W | 2 | continuous | soybeans | 8.7 | 0.20 | 1.74 | 0.19 | 0.28 | 0.02 | 0.06 | 0.0078 | 240 | 1.87 | 0.30 |
| | | | | canola | 3.7 | 0.17 | 0.63 | 0.15 | 0.16 | 0.02 | 0.06 | 0.0024 | 210 | 0.50 | 0.40 |
| | | | | sunflowers | 3.0 | 0.24 | 0.72 | 0.15 | 0.16 | 0.02 | 0.06 | 0.0024 | 150 | 0.36 | 0.63 |
| | | | | animal fats | 1.0 | 0.26 | 0.26 | 0.13 | 0.09 | 0.02 | 0.06 | none | | | 0.44 |
| Industrial | N &W | 7.5 | batch | rapeseed | 2.4 | 0.29 | 0.70 | 0.09 | 0.19 | 0.08 | 0.10 | 0.0016 | 170 | 0.27 | 0.69 |
| | N&S | 12 | continuous | animal fats | 0.9 | 0.29 | 0.26 | 0.06 | 0.09 | 0.02 | 0.06 | none | | | 0.37 |
| Large industrial | N &S | 115 | continuous | animal fats | 0.9 | 0.29 | 0.26 | 0.03 | 0.07 | 0.02 | 0.06 | none | | | 0.32 |

a) Drown et al. 1995; Gavett 1995; Gavett & Van Dyne 1992; Hassett & Uhlir 1988; Korus et al. 1993; Lumbroso et al. 1993; Nelson & Schrock 1993; Noordam & Withers 1996; Reed 1993; Reining & Tyner 1983; University of Idaho 1993; and Weber 1993.

b) These authorities provided plausible costs for capital and operation: W = Weber 1993; N&W = Noordam & Withers 1996; and N&S = Nelson & Schrock 1993. The other studies did not sufficiently dissaggregate costs or had costs that were clearly atypical.

c) The assumed annual days of operation were: W, press, 300 and esterification, 333; N&W, 300; N&S, 333.

d) Per litre of biodiesel. The efficiencies for esterification are (in %): W, 97; N&W, 98.3; and N&S, 98. The efficiencies for extraction, which reflect oilseed type and press scale, are (in %): W, soybeans, 50; W, sunflowers, 68; W, canola, 68; and N&W, rapeseed, 91.

e) The 3 studies assumed that the crushing and/or esterification facility was added onto an appropriate existing grain or tallow facility with excess capacity, such as a feed mill, grain elevator or rendering plant. The dollar cost of capital equipment per litre of annual capacity for the seven examples in this table are respectively: 0.85, 0.70, 0.70, 0.61, 0.40, 0.26 and 0.13. The real annual capital costs are these numbers multiplied by a fixed charge rate of 0.22 for a 15-year book life, nonregulated firm (30% equity, 10% debt) and no tax preferences (JAYCOR 1987, which used the Argonne National Laboratory Biomass Cost Estimation Guide).

f) The value of US$0.02 is for the continuous flow process with methanol at US$0.145/L and NaOH at US$0.66/kg. Because ethanol has a greater molecular weight than methanol, ethanol instead of methanol at the same price would result in a value of US$0.03 for the chemical cost. The value of US$0.08 is for the batch process with methanol at US$0.38/L and KOH at US$1.54/kg and assumes 60% recovery of the excess alcohol. At the prices for methanol and catalyst given in the example for the continuous flow process, this value would have been US$0.03.

g) With crude glycerin at US$0.66/kg, the 0.092 kg obtained for every litre of biodiesel is worth US$0.06. If 75% of the glycerin is recoverable in a refined state, then this would yield US$0.10/L biodiesel with technical grade glycerin at US$1.47/kg.

**Table 2.** The income, expenses and government subsidies for farmers from the production of canola and its processing into biodiesel, based on a seed yield of 3,000 kg/ha.[a]

| | US$/ha | US$/L biodiesel |
|---|---|---|
| Revenue | | |
| Income from 333 L biodiesel/t canola (1,000 L/ha; US$0.74/L) | 740 | 0.74 |
| Income from 0.667 t meal cake/t canola (2,000 kg/ha; US$220/t) | 440 | 0.44 |
| Government subsidy for putting set-aside land in canola | 530 | 0.53 |
| Government subsidy for weight of canola produced | 800 | 0.80 |
| Expenses | | |
| operating costs | 930 | 0.93 |
| processing fee charged by co-operative | 410 | 0.41 |
| Income exclusive of ownership costs | | |
| without income from biodiesel and meal cake | -10 | -0.01 |
| with income from biodiesel and meal cake | 1170 | 1.17 |

[a] All figures are based on Parrer (1991) for members of the farmers' biodiesel cooperative near Vienna, Austria during 1990, and 1990 monetary values were translated on the basis of 1.00 US$ = 11.33 Austrian schillings (US Bureau of the Census 1995). The by-product glycerin, which contains potassium hydroxide catalyst, was not cleaned for sale, but was simply spread as fertilizer on fields of members with potassium-deficient soil (Adamsak 1992).