BAB XII
KESIMPULAN

XII.1 Diskusi dan Kesimpulan

XII.1.1 Diskusi

Pendirian pabrik *Cyrene* dari ampas tebu didasarkan pada kebutuhan akan bahan kimia yang lebih ramah lingkungan guna mendukung target Indonesia mencapai *Net Zero Emission* pada tahun 2060. *Cyrene* merupakan pelarut hijau berbasis biomassa yang berpotensi menggantikan pelarut konvensional berbasis minyak bumi yang selama ini banyak digunakan di berbagai sektor industri. Penggunaan pelarut berbasis petrokimia tidak hanya bergantung pada sumber daya fosil yang tidak terbarukan, tetapi juga berkontribusi terhadap peningkatan emisi gas rumah kaca sepanjang siklus hidup produksinya.

Pemanfaatan ampas tebu sebagai bahan baku produksi *Cyrene* memberikan keuntungan ganda, yaitu mengurangi limbah agroindustri sekaligus menghasilkan produk bernilai tambah dari sumber daya terbarukan. Penggunaan *Cyrene* sebagai alternatif pelarut berbasis minyak bumi diharapkan dapat menurunkan jejak karbon industri, mengurangi ketergantungan terhadap bahan baku fosil, serta mendukung penerapan prinsip ekonomi sirkular dan industri hijau di Indonesia. Selain memberikan manfaat lingkungan, pendirian pabrik ini juga berpotensi mendorong pengembangan industri kimia berbasis biomassa, menciptakan lapangan kerja baru, serta meningkatkan daya saing industri nasional dalam menghadapi transisi menuju ekonomi rendah karbon. Kelayakan pabrik *Cyrene* dari metanol dan asam akrilat dapat ditinjau dari beberapa faktor berikut:

a. Segi Bahan Baku

   Bahan baku pembuatan *Cyrene* merupakan ampas tebu yang pada umumnya digunakan untuk bahan bakar boiler untuk memenuhi kebutuhan energi pabrik gula, sehingga nilai tambah yang dihasilkan relatif rendah. Ampas tebu tersebut memiliki jumlah produksi yang besar di kota Lampung sehingga memudahkan dalam transportasi bahan baku. Bahan baku ampas tebu dapat dipenuhi oleh PT. Gunung Madu Plantation yang belokasi di Kota Lampung Tengah.

b. Segi Proses dan Produk yang dihasilkan

Cyrene yang dihasilkan berasal dari proses pirolisis selulosa menjadi LGO dengan bantuan katalis DES dan dihidrogenasi dengan bantuan katalis Pd/ZrO_2 menjadi *Cyrene* yang dimana dapat menghasilkan produk *Cyrene* dengan puritas 98,93%. Pabrik ini juga menghasilkan *Bio-oil* dan juga *biochar* dimana produk *Bio-oil* didapat hasil pirolisis yang kemudian dimurnikan dengan 3 tahap yakni dipisahkan dengan gas *non-condensable* dengan menggunakan air pada absorber dan juga pada tahap selanjutnya pemisahan air yang terkandung pada *Bio-oil* dengan menggunakan MIBK, dimana pada tahap berikutnya pemisahan MIBK dengan kandungan *Bio-oil* sehingga didapat puritas *Bio-oil* dengan puritas 77,21%.

Dari segi produk utama yang dihasilkan *Cyrene* dapat digunakan di berbagai industri farmasi, petrokimia, coatings, polimer dan material maju, elektronik, dan energi. Sedangkan untuk produk samping berupa *Bio-oil* dapat digunakan sebagai bahan baku resin maupun dapat digunakan pada industri bio*fuel* maupun bio*refinery*, untuk *biochar* dapat digunakan sebagai pertanian dan juga industri energi.

c. Segi Lokasi

Pabrik *Cyrene* dari ampas tebu ini didirikan di Kota Lampung Tengah, dengan pertimbangan berbagai faktor, seperti ketersediaan bahan baku, daerah pemasaran, ketersediaan energi dan suplai air, iklim, fasilitas transportasi, pembuangan limbah, ketersediaan tenaga kerja, pajak dan peraturan, karakteristik lokasi, faktor komunitas, letak geografis, dan pengembangan area pabrik yang telah dijabarkan pada Bab VI.

d. Segi Ekonomi

Kelayakan pabrik *Cyrene* dari ampas tebu dalam segi ekonomi ditinjau dari beberapa aspek yang didasarkan dari hasil analisa ekonomi degnan metode *discounted cash Flow*. Hasil analisa ekonomi tersebut menunjukkan:

- Laju Pengembalian Modal Investasi (ROI) sesudah pajak memiliki nilai sebesar 27,63% yang mana lebih besar dari MARR yaitu 16-24%.
- Laju Pengembalian Modal Ekuitas (ROE) sesudah pajak memiliki nilai sebesar 34,32% yang mana lebih besar dari MARR yaitu 16-24%.

- Waktu Pengembalian Modal (POT) sesudah pajak diperkirakan dapat terjadi selama 5 tahun 1 bulan 28 hari yang mana lebih kecil dari umur pabrik yaitu 10 tahun.
- Titik Impas (BEP) memiliki nilai sebesar 53,47% yang mana masuk pada rentang BEP ideal yaitu 40-60%.

XII.1.2 Kesimpulan

Prarencana pabrik *Cyrene* dari ampas tebu memiliki rincian sebagai berikut:

Nama Perusahaan	: PT. Canergy Indonesia		
Produk Utama	: *Cyrene* 98,93%		
Kapasitas	: 10.000 ton/tahun		
Bahan Baku Utama	: Ampas Tebu		
Tipe Operasi	: Kontinyu		
Utilitas	: - Air	: Air Sanitasi	= 6,50 m^3/hari
		Air Proses	= 2.078,46 m^3/hari
		Air Pendingin	= 9.638,89 m^3/hari
		Air Umpan Boiler	= 1.039,49 m^3/hari
	- *Saturated steam*	: Suhu 225^{o}C	= 766.194,81 kg/hari
	- Listrik	: 1.236,33 kW	
	- Bahan Bakar	: IDO	= 1.798,03 m^3/tahun

Jumlah Tenaga kerja : 480 orang

Lokasi Pabrik : Kecamatan Terusan Nunyai, Kabupaten Lampung Tengah.

Dari segi Analisa ekonomi yang telah dilakukan, didapatkan:

- Fixed Capital Investment (FCI) = $ 78.021.938,41
- Working Capital Investment (WCI) = $ 59.554.340,55
- Total Production Cost (TPC) = $ 103.636.762,91
- Penjualan per tahun = $ 157.548.643,97

Analisa ekonomi dengan metode *discounted cash Flow*, didapatkan:

- ROI setelah pajak = 28,28%
- ROI sebelum pajak = 37,33%
- ROE setelah pajak = 42,35%

- ROE sebelum pajak = 57,12%
- POT setelah pajak = 5 tahun 22 hari
- POT sebelum pajak = 4 tahun 2 bulan 19 hari
- BEP = 53,32%

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