Supplementary Material

Bio-refinery for combined production of jet fuel and ethanol from lipid-producing sugarcane: A techno-economic evaluation

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This supporting information consists of 5 figures and 1 table as follows:

Figure S1. Flowsheet of “feedstock handling” section of the process model of biorefinery developed in SuperPro.

Figure S2. Flowsheet of “oil and sugar separation” section of the process model of biorefinery developed in SuperPro.

Figure S3. Flowsheet of “ethanol production” section of the process model of biorefinery developed in SuperPro.

Figure S4. Flowsheet of “jet fuel production” section of the process model of biorefinery developed in SuperPro.

Figure S5. Flowsheet of “cogeneration” section of the process model of biorefinery developed in SuperPro.

Table S1. Properties and component flow rates of all streams of the process model of biorefinery producing ethanol and jet fuel using lipid-cane with 10% lipids
Fig. S1 Flowsheet of “feedstock handling” section of the process model of biorefinery developed in SuperPro.

Fig. S2 Flowsheet of “Oil and sugar separation” section of the process model of biorefinery developed in SuperPro.
Fig. S3 Flowsheet of “Ethanol production” section of the process model of biorefinery developed in SuperPro.
Fig. S4 Flowsheet of “jet fuel production” section of the process model of biorefinery developed in SuperPro.
Fig. S5 Flowsheet of “Cogeneration” section of the process model of biorefinery developed in SuperPro.
Table S1: Properties and component flow rates of all streams of the process model of biorefinery producing ethanol and jet fuel using lipid-cane with 10% lipids (Stream names corresponding to figure 2 in the main manuscript and figures S1-S5 in the supporting information)

| Stream Name | Air | S-192 | Lime Solution | S-115 |
|-------------|-----|-------|--------------|-------|
| Source      | INPUT | P-108 | INPUT | P-11 |
| Destination | P-108 | P-122 | P-11 | P-5 |

**Stream Properties**

|                | Temperature (°C) | Pressure (bar) | Total Enthalpy (kW-h) | Specific Enthalpy (kcal/kg) | Heat Capacity (kcal/kg°C) | Component Flowrates (kg/h) |
|----------------|------------------|----------------|-----------------------|-----------------------------|--------------------------|-----------------------------|
|                | 25.00            | 1.01           | 3660.52               | 6.24                        | 0.25                     | CaOxide 0.00 Oxygen 116441.06 Water 5000.00 TOTAL (kg/h) 505000.00 |
|                | 25.68            | 1.02           | 3759.60               | 6.41                        | 0.25                     | Nitrogen 383558.94 Oxygen 116441.06 Water 5000.00 TOTAL (kg/h) 505000.00 |
|                | 25.00            | 1.01           | 66.40                 | 22.55                       | 0.90                     | Water 5000.00 TOTAL (kg/h) 505000.00 |
|                | 25.00            | 1.01           | 66.42                 | 22.56                       | 0.90                     | TOTAL (kg/h) 2533.00 |

|                | Temperature (°C) | Pressure (bar) | Total Enthalpy (kW-h) | Specific Enthalpy (kcal/kg) | Heat Capacity (kcal/kg°C) | Component Flowrates (kg/h) |
|----------------|------------------|----------------|-----------------------|-----------------------------|--------------------------|-----------------------------|
|                | 25.00            | 1.01           | 3.57                  | 13.30                       | 0.53                     | Octane 0.00 Water 5000.00 TOTAL (kg/h) 5000.00 |
|                | 25.01            | 2.01           | 145.02                | 24.96                       | 1.00                     | Water 5000.00 TOTAL (kg/h) 5000.00 |
|                | 25.00            | 1.01           | 3.56                  | 13.29                       | 0.53                     | Water 5000.00 TOTAL (kg/h) 5000.00 |
|                | 25.00            | 1.01           | 3.56                  | 13.29                       | 0.53                     | Water 5000.00 TOTAL (kg/h) 5000.00 |

| Stream Name | S-134 | S-136 | S-170 | S-162 |
|-------------|-------|-------|-------|-------|
| Source      | INPUT | P-22  | INPUT | P-37  |
| Destination | P-22  | P-23  | P-37  | P-38  |

|                | Temperature (°C) | Pressure (bar) | Total Enthalpy (kW-h) | Specific Enthalpy (kcal/kg) | Heat Capacity (kcal/kg°C) | Component Flowrates (kg/h) |
|----------------|------------------|----------------|-----------------------|-----------------------------|--------------------------|-----------------------------|
|                | 25.00            | 1.01           | 145.02                | 24.96                       | 1.00                     | Octane 0.00 Water 5000.00 TOTAL (kg/h) 5000.00 |
|                | 25.01            | 2.01           | 145.08                | 24.97                       | 1.00                     | Water 5000.00 TOTAL (kg/h) 5000.00 |
|                | 25.00            | 1.01           | 3.56                  | 13.29                       | 0.53                     | Water 5000.00 TOTAL (kg/h) 5000.00 |
|                | 25.00            | 1.01           | 3.56                  | 13.29                       | 0.53                     | Water 5000.00 TOTAL (kg/h) 5000.00 |

| Stream Name | S-165 | Lipidcane | S-103 | S-189 |
|-------------|-------|-----------|-------|-------|
| Source      | P-38  | INPUT     | P-52  | P-47  |
| Destination | P-39  | P-52      | P-47  | P-43  |

|                | Temperature (°C) | Pressure (bar) | Total Enthalpy (kW-h) | Specific Enthalpy (kcal/kg) | Heat Capacity (kcal/kg°C) | Component Flowrates (kg/h) |
|----------------|------------------|----------------|-----------------------|-----------------------------|--------------------------|-----------------------------|
|                | 25.03            | 2.01           | 3.57                  | 13.30                       | 0.53                     | Octane 0.00 Water 5000.00 TOTAL (kg/h) 5000.00 |
|                | 25.00            | 1.01           | 7790.63               | 20.11                       | 0.80                     | Water 5000.00 TOTAL (kg/h) 5000.00 |
|                | 25.00            | 1.01           | 7790.63               | 20.11                       | 0.80                     | Water 5000.00 TOTAL (kg/h) 5000.00 |
|                | 25.00            | 1.01           | 7790.63               | 20.11                       | 0.80                     | Water 5000.00 TOTAL (kg/h) 5000.00 |

|                | Temperature (°C) | Pressure (bar) | Total Enthalpy (kW-h) | Specific Enthalpy (kcal/kg) | Heat Capacity (kcal/kg°C) | Component Flowrates (kg/h) |
|----------------|------------------|----------------|-----------------------|-----------------------------|--------------------------|-----------------------------|
|                | 25.00            | 1.01           | 13.30                 | 20.11                       | 0.80                     | Water 5000.00 TOTAL (kg/h) 5000.00 |
|                | 25.00            | 1.01           | 13.30                 | 20.11                       | 0.80                     | Water 5000.00 TOTAL (kg/h) 5000.00 |
|                | 25.00            | 1.01           | 13.30                 | 20.11                       | 0.80                     | Water 5000.00 TOTAL (kg/h) 5000.00 |
|                | 25.00            | 1.01           | 13.30                 | 20.11                       | 0.80                     | Water 5000.00 TOTAL (kg/h) 5000.00 |
| Component     | S-101   | Enzymes | S-102   | S-171   |
|---------------|---------|---------|---------|---------|
| Ash           | 0.00    | 3166.67 | 3166.67 | 3166.67 |
| Cellulose     | 0.00    | 26891.67| 26891.67| 26891.67|
| Glucose       | 0.00    | 2000.00 | 2000.00 | 2000.00 |
| Hemicellulose | 0.00    | 15866.67| 15866.67| 15866.67|
| Lignin        | 0.00    | 14408.33| 14408.33| 14408.33|
| Lipid         | 0.00    | 10000.00| 10000.00| 10000.00|
| Octane        | 230.69  | 0.00    | 0.00    | 0.00    |
| Other Solids  | 0.00    | 5000.00 | 5000.00 | 5000.00 |
| Sucrose       | 0.00    | 22666.67| 22666.67| 22666.67|
| Water         | 0.00    | 233333.33| 233333.33| 233333.33|
| TOTAL (kg/h)  | 230.69  | 333333.33| 333333.33| 333333.33|

Stream Name | S-107 | S-121 | S-113 | S-105 |
Source       | Crushing mill t | Crushing mill t | P-56  | P-56  |
Destination  | P-56  | P-58  | P-1   | P-21  |

| Component Flowrates (kg/h) |
|-----------------------------|
| Ash                         | 3166.67 | 0.00    | 3166.67 | 173.70 |
| Cellulose                   | 26891.67| 100.00  | 26991.67| 1480.56|
| Ethyl Alcohol               | 0.00    | 0.00    | 0.00    | 0.34   |
| Glucose                     | 2000.00 | 0.00    | 2000.00 | 257.95 |
| Hemicellulose               | 15866.67| 0.00    | 15866.67| 870.32 |
| Lignin                      | 14408.33| 0.00    | 14408.33| 790.33 |
| Lipid                       | 10000.00| 0.00    | 10000.00| 1225.86|
| Other Solids                | 5000.00 | 0.00    | 5000.00 | 0.00   |
| Sucrose                     | 22666.67| 0.00    | 22666.67| 2923.41|
| Water                       | 233333.33| 900.00  | 234233.33| 124040.16|
| TOTAL (kg/h)                | 333333.33| 1000.00 | 334333.33| 131762.63|

| Component Flowrates (kg/h) |
|-----------------------------|
| Ash                         | 3166.67 | 0.00    | 3166.67 | 173.70 |
| Cellulose                   | 26891.67| 100.00  | 26991.67| 1480.56|
| Ethyl Alcohol               | 0.00    | 0.00    | 0.00    | 0.34   |
| Glucose                     | 2000.00 | 0.00    | 2000.00 | 257.95 |
| Hemicellulose               | 15866.67| 0.00    | 15866.67| 870.32 |
| Lignin                      | 14408.33| 0.00    | 14408.33| 790.33 |
| Lipid                       | 10000.00| 0.00    | 10000.00| 1225.86|
| Other Solids                | 5000.00 | 0.00    | 5000.00 | 0.00   |
| Sucrose                     | 22666.67| 0.00    | 22666.67| 2923.41|
| Water                       | 233333.33| 900.00  | 234233.33| 124040.16|
| TOTAL (kg/h)                | 333333.33| 1000.00 | 334333.33| 131762.63|
| Component         | S-112 | S-108 | Phosphoric Acid | S-109 |
|-------------------|-------|-------|----------------|-------|
| Ash               | 267.23| 3073.14| 93.53          | 173.70|
| Cellulose         | 2277.78| 26194.44| 797.22         | 1480.56|
| Ethyl Alcohol     | 0.00  | 0.34  | 0.00           | 0.00  |
| Glucose           | 2167.63| 90.32  | 1909.68        | 257.95|
| Hemicellulose     | 1338.96| 15398.03| 468.64         | 870.32|
| Lignin            | 1215.89| 13982.77| 425.56         | 790.33|
| Lipid             | 10215.54| 1010.33| 8989.67        | 1225.86|
| Other Solids      | 0.00  | 5000.00| 0.00           | 0.00  |
| Sucrose           | 24566.47| 1023.60| 21643.06       | 2923.41|
| Water             | 293784.27| 64489.23| 256767.45      | 37016.82|
| TOTAL (kg/h)      | 335833.77| 130262.20| 291094.82      | 44738.95|

| Stream Name | S-112 | S-108 | Phosphoric Acid | S-109 |
|-------------|-------|-------|----------------|-------|
| Source      | P-1   | P-3   | INPUT          | P-9   |
| Destination | P-3   | P-9   | P-9            | P-2   |

Stream Properties

| Temperature (°C) | 53.70 | 70.00 | 25.00 | 70.00 |
| Pressure (bar)   | 0.07  | 0.07  | 1.01  | 0.07  |
| Total Enthalpy (kW-h) | 16515.02 | 21527.97 | 1.14 | 21529.11 |
| Specific Enthalpy (kcal/kg) | 48.82 | 63.63 | 11.26 | 63.62 |
| Heat Capacity (kcal/kg°C) | 0.91 | 0.91 | 0.45 | 0.91 |

Component Flowrates (kg/h)

| Component        | S-112 | S-108 | Phosphoric Acid | S-109 |
|------------------|-------|-------|----------------|-------|
| Ash              | 93.53 | 93.53 | 0.00           | 93.53 |
| Cellulose        | 797.22| 797.22| 0.00           | 797.22|
| Glucose          | 1909.68| 1909.68| 0.00           | 1909.68|
| Hemicellulose    | 468.64| 468.64| 0.00           | 468.64|
| Lignin           | 425.56| 425.56| 0.00           | 425.56|
| Lipid            | 8989.67| 8989.67| 0.00           | 8989.67|
| Phosphoric Acid  | 0.00  | 0.00  | 74.23          | 74.23 |
| Sucrose          | 21643.06| 21643.06| 0.00           | 21643.06|
| Water            | 256767.45| 256767.45| 13.10          | 256780.55|
| TOTAL (kg/h)     | 291094.82| 291094.82| 87.33          | 291182.15|

| Stream Name | S-120 | S-114 | S-117 | S-118 |
|-------------|-------|-------|-------|-------|
| Source      | P-2   | P-6   | P-5   | P-13  |
| Destination | P-6   | P-5   | P-13  | P-4   |

Stream Properties

| Temperature (°C) | 70.10 | 70.11 | 69.80 | 69.81 |
| Pressure (bar)   | 0.07  | 1.07  | 1.01  | 2.01  |
| Total Enthalpy (kW-h) | 21548.40 | 21565.37| 21651.23 | 21658.50 |
| Specific Enthalpy (kcal/kg) | 63.67 | 63.72 | 63.43 | 63.45 |
| Heat Capacity (kcal/kg°C) | 0.91 | 0.91 | 0.91 | 0.91 |

Component Flowrates (kg/h)

| Component | S-120 | S-114 | S-117 | S-118 |
|-----------|-------|-------|-------|-------|
| Ash       | 93.53 | 93.53 | 93.53 | 93.53 |
| Component   | S-116 | S-122 | S-110 | TOTAL (kg/h) |
|-------------|-------|-------|-------|--------------|
| CaOxide     | 0.00  | 0.00  | 333.00| 333.00       |
| Cellulose   | 797.22| 797.22| 797.22| 797.22       |
| Glucose     | 1909.68| 1909.68| 1909.68| 1909.68     |
| Hemicellulose| 468.64| 468.64| 468.64| 468.64       |
| Lignin      | 425.56| 425.56| 425.56| 425.56       |
| Lipid       | 8989.67| 8989.67| 8989.67| 8989.67     |
| Phosphoric Acid| 74.23 | 74.23 | 74.23 | 74.23       |
| Sucrose     | 21643.06| 21643.06| 21643.06| 21643.06|
| Water       | 258980.55| 258980.55| 258980.55| 258980.55|

| Stream Name | S-116 | S-122 | S-110 | Vapour |
|-------------|-------|-------|-------|--------|
| Source      | P-14  | P-4   | P-7   | P-8    |
| Destination | P-4   | P-7   | P-8   | OUTPUT |

| Stream Properties | |
|-------------------|---|
| Temperature (°C)  | 98.40 | 83.80 | 99.99 | 99.00 |
| Pressure (bar)    | 1.01  | 1.01  | 1.01  | 1.01  |
| Total Enthalpy (kW-h) | 29159.45 | 50817.95 | 60651.91 | 40.94 |
| Specific Enthalpy (kcal/kg) | 0.94 | 0.93 | 0.93 | 0.43 |

| Component Flowrates (kg/h) | |
|-----------------------------|---|
| Ash                         | 16.50  | 110.03 | 110.03 | 0.01  |
| CaOxide                     | 58.76  | 391.76 | 391.76 | 0.04  |
| Cellulose                   | 140.67 | 937.89 | 937.89 | 0.09  |
| Flucculant poly             | 0.76   | 0.76   | 0.76   | 0.00  |
| Glucose                     | 1713.29| 3622.98| 3622.98| 0.36  |
| Hemicellulose               | 82.69  | 551.33 | 551.33 | 0.06  |
| Lignin                      | 75.09  | 500.65 | 500.65 | 0.05  |
| Lipid                       | 183.44 | 9173.12| 9173.12| 0.92  |
| Phosphoric Acid             | 67.88  | 142.11 | 142.11 | 0.01  |
| Sucrose                     | 19417.32| 40160.39| 40160.39| 4.11  |
| Water                       | 248615.54| 507596.09| 507596.09| 50.76 |
| TOTAL (kg/h)                | 270371.95| 564087.10| 564087.10| 56.41 |

| Stream Name | S-167 | Flocculant Polymer | S-111 | S-123 |
|-------------|-------|-------------------|-------|-------|
| Source      | P-8   | INPUT             | P-68  | P-12  |
| Destination | P-68  | P-68              | P-12  | P-10  |

| Stream Properties | |
|-------------------|---|
| Temperature (°C)  | 99.00 | 25.00 | 99.00 | 99.00 |
| Pressure (bar)    | 1.01  | 1.01  | 1.01  | 1.01  |
| Total Enthalpy (kW-h) | 60045.40 | 0.02 | 60045.42 | 31311.91 |
| Specific Enthalpy (kcal/kg) | 0.93 | 1.00 | 0.93 | 0.92 |
### Component Flowrates (kg/h)

| Component         | S-104     | S-126     | S-163     | S-125     |
|-------------------|-----------|-----------|-----------|-----------|
| Ash               | 110.02    | 0.00      | 110.02    | 0.00      |
| CaOxide           | 391.72    | 0.00      | 391.72    | 0.00      |
| Cellulose         | 937.80    | 0.00      | 937.80    | 0.00      |
| Flucculant poly   | 0.76      | 0.83      | 1.59      | 0.83      |
| Glucose           | 3622.61   | 0.00      | 3622.61   | 1892.01   |
| Hemicellulose     | 551.27    | 0.00      | 551.27    | 0.00      |
| Lignin            | 500.60    | 0.00      | 500.60    | 0.00      |
| Lipid             | 9172.20   | 0.00      | 9172.20   | 8988.75   |
| Phosphoric Acid   | 142.10    | 0.00      | 142.10    | 74.21     |
| Sucrose           | 41056.28  | 0.00      | 41056.28  | 21442.82  |
| Water             | 507545.33 | 0.00      | 507545.33 | 265080.14 |
| **TOTAL (kg/h)**  | 564030.69 | 0.83      | 564031.52 | 297478.78 |

### Stream Name

| Stream Name | S-104 | S-126 | S-163 | S-125 |
|-------------|-------|-------|-------|-------|
| Source      | P-12  | P-10  | P-10  | P-50  |
| Destination | P-14  | P-49  | P-50  | P-16  |

### Stream Properties

| Property                  | Value     |
|---------------------------|-----------|
| Temperature (°C)          | 99.00     |
| Pressure (bar)            | 1.01      |
| Total Enthalpy (kW-h)     | 28733.58  |
| Specific Enthalpy (kcal/kg)| 92.75   |
| Heat Capacity (kcal/kg-°C)| 0.94     |

### Component Flowrates (kg/h)

| Component         | S-104     | S-126     | S-163     | S-125     |
|-------------------|-----------|-----------|-----------|-----------|
| Ash               | 110.02    | 0.00      | 0.00      | 0.00      |
| CaOxide           | 391.72    | 0.00      | 0.00      | 0.00      |
| Cellulose         | 937.80    | 0.00      | 0.00      | 0.00      |
| Flucculant poly   | 0.76      | 0.83      | 0.83      | 0.00      |
| Glucose           | 1730.60   | 0.00      | 1892.01   | 1888.23   |
| Hemicellulose     | 551.27    | 0.00      | 0.00      | 0.00      |
| Lignin            | 500.60    | 0.00      | 0.00      | 0.00      |
| Lipid             | 183.44    | 8988.75   | 0.00      | 0.00      |
| Phosphoric Acid   | 67.88     | 0.00      | 74.21     | 74.21     |
| Sucrose           | 19613.46  | 0.00      | 21442.82  | 21399.94  |
| Water             | 242465.18 | 26.51     | 265053.63 | 264523.53 |
| **TOTAL (kg/h)**  | 266552.74 | 9015.26   | 288463.52 | 287885.91 |

### Stream Name

| Stream Name | Waste fiber fines | S-131 | S-129 | S-141 |
|-------------|-------------------|-------|-------|-------|
| Source      | P-50              | P-16  | P-16  | P-15  |
| Destination | OUTPUT            | P-17  | P-15  | P-27  |

### Stream Properties

| Property                  | Value     |
|---------------------------|-----------|
| Temperature (°C)          | 99.00     |
| Pressure (bar)            | 1.01      |
| **TOTAL (kg/h)**          | 266552.74 | 9015.26 | 288463.52 | 287885.91 |
| Total Enthalpy (kW-h) | 62.66 | 8274.68 | 22950.52 | 50234.79 |
|----------------------|-------|---------|-----------|-----------|
| Specific Enthalpy (kcal/kg) | 93.35 | 93.32 | 93.32 | 656.10 |
| Heat Capacity (kcal/kg-°C) | 0.94 | 0.94 | 0.94 | 0.45 |
| **Component Flowrates (kg/h)** | | | | |
| Flucculant poly | 0.83 | 0.00 | 0.00 | 0.00 |
| Glucose | 3.78 | 500.38 | 1387.85 | 0.00 |
| Phosphoric Acid | 0.00 | 19.67 | 54.55 | 0.00 |
| Sucrose | 42.89 | 5670.98 | 15728.95 | 0.00 |
| Water | 530.11 | 70098.73 | 194424.79 | 65878.59 |
| **TOTAL (kg/h)** | 577.61 | 76289.77 | 211596.14 | 65878.59 |
| **Stream Name** | S-142 | S-130 | S-160 | S-139 |
| Source | P-15 | P-15 | P-27 | P-17 |
| Destination | P-27 | P-17 | P-35 | P-51 |
| **Stream Properties** | | | | |
| Temperature (°C) | 79.76 | 40.00 | 100.00 | 89.00 |
| Pressure (bar) | 0.47 | 0.07 | 0.07 | 0.07 |
| Total Enthalpy (kW-h) | 11039.26 | 679.27 | 61274.06 | 8953.95 |
| Specific Enthalpy (kcal/kg) | 79.61 | 22.13 | 284.70 | 75.02 |
| Heat Capacity (kcal/kg-°C) | 1.00 | 0.55 | 0.83 | 0.84 |
| **Component Flowrates (kg/h)** | | | | |
| Glucose | 0.00 | 1387.85 | 0.00 | 1888.23 |
| Phosphoric Acid | 0.00 | 54.55 | 0.00 | 74.21 |
| Sucrose | 0.00 | 15728.95 | 0.00 | 21399.94 |
| Water | 119306.78 | 9239.42 | 185185.37 | 79338.16 |
| **TOTAL (kg/h)** | 119306.78 | 26410.77 | 185185.37 | 102700.54 |
| **Stream Name** | S-143 | S-144 | S-133 | S-132 |
| Source | P-51 | INPUT | P-24 | P-24 |
| Destination | P-24 | P-24 | OUTPUT | P-19 |
| **Stream Properties** | | | | |
| Temperature (°C) | 36.00 | 25.00 | 20.00 | 32.00 |
| Pressure (bar) | 0.07 | 1.01 | 1.01 | 1.01 |
| Total Enthalpy (kW-h) | 3620.32 | 762.53 | 727.39 | 4165.32 |
| Specific Enthalpy (kcal/kg) | 30.33 | 18.25 | 58.30 | 28.02 |
| Heat Capacity (kcal/kg-°C) | 0.84 | 0.73 | 0.20 | 0.88 |
| **Component Flowrates (kg/h)** | | | | |
| Carb. Dioxide | 0.00 | 0.00 | 10735.41 | 0.00 |
| Ethyl Alcohol | 0.00 | 955.00 | 0.00 | 12192.91 |
| Glucose | 1888.23 | 0.00 | 0.00 | 2197.33 |
| Phosphoric Acid | 74.21 | 0.00 | 0.00 | 74.21 |
| Sucrose | 21399.94 | 0.00 | 0.00 | 0.00 |
| Water | 79338.16 | 24700.00 | 0.00 | 102911.89 |
| Yeast Dry Matte | 0.00 | 10300.00 | 0.00 | 10544.15 |
| Stream Name | S-135 | S-137 | S-147 | S-148 |
|-------------|-------|-------|-------|-------|
| Source      | P-19  | P-19  | P-23  | P-26  |
| Destination | P-23  | P-20  | P-32  | P-32  |
| Stream Properties |       |       |       |       |
| Temperature (°C) | 32.50 | 32.50 | 32.20 | 100.04 |
| Pressure (bar)  | 1.01  | 1.01  | 1.01  | 4.46  |
| Total Enthalpy (kW-h) | 4013.68 | 216.14 | 4158.75 | 75959.22 |
| Specific Enthalpy (kcal/kg) | 30.73 | 11.97 | 30.48 | 667.69 |
| Heat Capacity (kcal/kg°C) | 0.95  | 0.37  | 0.95  | 0.45  |

| Component Flowrates (kg/h) |       |       |       |       |
| Ethyl Alcohol | 11217.48 | 975.43 | 11217.48 | 16.83 |
| Glucose       | 2197.11  | 0.22   | 2197.11  | 2197.11 |
| Phosphoric Acid | 74.21 | 0.01   | 74.21    | 74.21  |
| Water         | 98795.42 | 4116.48 | 103795.42 | 95491.78 |
| Yeast Dry Matte | 105.44 | 10438.71 | 105.44  | 105.44 |
| TOTAL (kg/h)  | 112389.66 | 15530.84 | 117389.66 | 97885.37 |

| Stream Name | S-146 | Stillage | S-140 | S-127 |
|-------------|-------|----------|-------|-------|
| Source      | P-32  | P-32     | P-18  | P-25  |
| Destination | P-18  | OUTPUT   | P-25  | P-28  |
| Stream Properties |       |       |       |       |
| Temperature (°C) | 95.00 | 100.00 | 95.01 | 92.49 |
| Pressure (bar)  | 1.01  | 4.46    | 2.01  | 1.01  |
| Total Enthalpy (kW-h) | 14979.63 | 65138.35 | 14980.98 | 1596.81 |
| Specific Enthalpy (kcal/kg) | 109.79 | 572.57 | 109.80 | 70.44 |
| Heat Capacity (kcal/kg°C) | 0.93  | 0.54    | 0.93  | 0.76  |

| Component Flowrates (kg/h) |       |       |       |       |
| Ethyl Alcohol | 11217.48 | 16.83 | 11217.48 | 11200.65 |
| Glucose       | 2197.11  | 2197.11 | 2197.11 | 0.00  |
| Phosphoric Acid | 74.21 | 74.21  | 74.21   | 0.00  |
| Water         | 103795.42 | 95491.78 | 103795.42 | 8303.63 |
| Yeast Dry Matte | 105.44 | 105.44 | 105.44 | 0.00  |
| TOTAL (kg/h)  | 117389.66 | 97885.37 | 117389.66 | 19504.29 |

| Stream Name | S-145 | S-159 | S-153 | S-150 |
|-------------|-------|-------|-------|-------|
| Source      | P-25  | P-62  | P-30  | P-28  |
| Destination | P-26  | P-28  | P-28  | P-29  |
| Stream Properties |       |       |       |       |
| Temperature (°C) | 100.00 | 95.00 | 99.42 | 78.25 |
| Pressure (bar)  | 1.01  | 6.01  | 1.01  | 1.01  |
| Total Enthalpy (kW-h) | 11204.90 | 801.33 | 127.46 | 2525.60 |
| Specific Enthalpy (kcal/kg) | 98.49 | 200.13 | 96.55 | 90.22 |
| Heat Capacity (kcal/kg·°C) | 0.99 | 0.62 | 0.97 | 0.74 |
|----------------------------|------|------|------|------|

| Component Flowrates (kg/h) | | | | |
|----------------------------|--|--|--|--|
| Ethyl Alcohol | 16.83 | 2165.14 | 74.51 | 13440.30 |
| Glucose | 2197.11 | 0.00 | 0.00 | 0.00 |
| Phosphoric Acid | 74.21 | 0.00 | 0.00 | 0.00 |
| Water | 95491.78 | 1280.06 | 1061.33 | 10645.03 |
| Yeast Dry Matte | 105.44 | 0.00 | 0.00 | 0.00 |
| TOTAL (kg/h) | 97885.37 | 3445.20 | 1135.84 | 24085.33 |

| Stream Name | S-156 | S-151 | S-155 | S-158 |
|-------------|-------|-------|-------|-------|
| Source | P-29 | P-29 | P-34 | P-33 |
| Destination | P-34 | P-31 | P-33 | P-62 |

| Stream Properties | | | | |
|-------------------|--|--|--|--|
| Temperature (°C) | 82.80 | 99.93 | 115.00 | 115.00 |
| Pressure (bar) | 1.01 | 1.01 | 1.01 | 1.01 |
| Total Enthalpy (kW-h) | 886.95 | 1078.81 | 5311.15 | 1707.14 |
| Specific Enthalpy (kcal/kg) | 51.74 | 99.42 | 309.84 | 426.35 |
| Heat Capacity (kcal/kg·°C) | 0.63 | 1.00 | 0.42 | 0.43 |

| Component Flowrates (kg/h) | | | | |
|----------------------------|--|--|--|--|
| Ethyl Alcohol | 13365.04 | 75.27 | 13365.04 | 2165.14 |
| Water | 1383.85 | 9261.17 | 1383.85 | 1280.06 |
| TOTAL (kg/h) | 14748.89 | 9336.44 | 14748.89 | 3445.20 |

| Stream Name | S-157 | S-152 | S-154 | S-161 |
|-------------|-------|-------|-------|-------|
| Source | P-33 | P-31 | P-30 | P-35 |
| Destination | P-41 | P-30 | P-35 | P-44 |

| Stream Properties | | | | |
|-------------------|--|--|--|--|
| Temperature (°C) | 115.00 | 99.94 | 100.00 | 65.00 |
| Pressure (bar) | 1.01 | 2.01 | 1.01 | 0.07 |
| Total Enthalpy (kW-h) | 3604.01 | 1096.93 | 951.34 | 14583.09 |
| Specific Enthalpy (kcal/kg) | 274.33 | 101.09 | 99.82 | 64.88 |
| Heat Capacity (kcal/kg·°C) | 0.41 | 0.99 | 1.00 | 1.00 |

| Component Flowrates (kg/h) | | | | |
|----------------------------|--|--|--|--|
| Ethyl Alcohol | 11199.90 | 75.27 | 0.75 | 0.75 |
| Water | 103.79 | 9261.17 | 8199.84 | 193385.21 |
| TOTAL (kg/h) | 11303.69 | 9336.44 | 8200.60 | 193385.97 |

| Stream Name | S-119 | S-172 | Wash Water | S-124 |
|-------------|-------|-------|------------|-------|
| Source | P-44 | P-44 | INPUT | P-14 |
| Destination | P-21 | OUTPUT | P-14 | P-46 |

| Stream Properties | | | | |
|-------------------|--|--|--|--|
| Temperature (°C) | 65.00 | 65.00 | 90.00 | 98.40 |
| Pressure (bar) | 0.07 | 0.07 | 1.01 | 1.01 |
| Total Enthalpy (kW-h) | 6562.39 | 8020.70 | 1751.01 | 1314.41 |
| Component Flowrates (kg/h) |         |         |         | 93.52  |
|-----------------------------|---------|---------|---------|--------|
| Ash                         | 0.00    | 0.00    | 0.00    | 93.52  |
| CaOxide                     | 0.00    | 0.00    | 0.00    | 332.96 |
| Cellulose                   | 0.00    | 0.00    | 0.00    | 797.13 |
| Ethyl Alcohol               | 0.34    | 0.41    | 0.00    | 0.00   |
| Glucose                     | 0.00    | 0.00    | 0.00    | 17.31  |
| Hemicellulose               | 0.00    | 0.00    | 0.00    | 468.58 |
| Lignin                      | 0.00    | 0.00    | 0.00    | 425.51 |
| Sucrose                     | 0.00    | 0.00    | 0.00    | 196.13 |
| Water                       | 87023.35| 106361.87| 16770.00| 10619.65|
| TOTAL (kg/h)                | 87023.68| 106362.28| 16770.00| 12950.79|

| Stream Name                  | Sulphuric Acid | Water_2 | S-138 | Recycled Yeast |
|------------------------------|----------------|---------|-------|----------------|
| Source                       | INPUT          | INPUT   | P-20  | P-42           |
| Destination                  | P-20           | P-20    | P-42  | OUTPUT         |

| Component Flowrates (kg/h)   |         |         |       |               |
| Ethyl Alcohol                | 0.00    | 0.00    | 975.43| 975.43        |
| Glucose                      | 0.00    | 0.00    | 0.22  | 0.22          |
| Phosphoric Acid              | 0.00    | 0.00    | 0.01  | 0.01          |
| Sulfuric Acid                | 1.82    | 1.82    | 1.82  | 1.82          |
| Water                        | 0.00    | 20410.00| 24526.48| 24526.48   |
| Yeast Dry Matte              | 0.00    | 0.00    | 10438.71| 10438.71   |
| TOTAL (kg/h)                 | 1.82    | 20410.00| 35942.66| 35942.66   |
| Component     | S-260   | S-261   | S-264   | Boiler Water Excess |
|---------------|---------|---------|---------|---------------------|
| Cellulose     | 0.00    | 797.13  | 26194.44| 0.00                |
| Ethyl Alcohol | 0.00    | 0.00    | 0.34    | 0.00                |
| Glucose       | 0.00    | 17.31   | 90.32   | 0.00                |
| Hemicellulose | 0.00    | 468.58  | 15398.03| 0.00                |
| Lignin        | 0.00    | 425.51  | 13982.77| 0.00                |
| Lipid         | 0.00    | 0.00    | 1010.33 | 0.00                |
| Other Solids  | 0.00    | 0.00    | 5000.00 | 0.00                |
| Sucrose       | 0.00    | 196.13  | 1023.60 | 0.00                |
| Water         | 0.00    | 10619.65| 64489.23| 12907.85           |
| TOTAL (kg/h)  | 1.00    | 12951.79| 130262.20| 12907.85            |

| Stream Name   | S-260   | S-261   | S-264   | Boiler Water Excess |
|---------------|---------|---------|---------|---------------------|
| Source        | P-116   | P-117   | P-117   | P-118               |
| Destination   | P-117   | P-118   | P-110   | OUTPUT              |

**Stream Properties**

- **Temperature (°C)**: 75.94, 107.10, 76.44, 107.10
- **Pressure (bar)**: 61.71, 61.71, 13.00, 61.71
- **Total Enthalpy (kW-h)**: 22936.27, 32341.73, 1144.66, 272.00
- **Specific Enthalpy (kcal/kg)**: 75.80, 106.89, 76.30, 106.89
- **Heat Capacity (kcal/kg-°C)**: 1.00, 1.00, 1.00, 1.00

**Component Flowrates (kg/h)**

- **Water**: 260346.65, 260346.65, 12907.85, 2189.60
- **TOTAL (kg/h)**: 260346.65, 260346.65, 12907.85, 2189.60

| Stream Name   | S-249   | S-244   | S-238   | S-248   |
|---------------|---------|---------|---------|---------|
| Source        | P-118   | P-109   | P-106   | P-106   |
| Destination   | P-106   | P-106   | P-122   | P-107   |

**Stream Properties**

- **Temperature (°C)**: 107.10, 100.00, 278.00, 454.00
- **Pressure (bar)**: 61.71, 1.02, 1.01, 65.70
- **Total Enthalpy (kW-h)**: 32069.73, 13853.68, 46590.30, 236957.60
- **Specific Enthalpy (kcal/kg)**: 106.89, 24.99, 80.56, 789.76
- **Heat Capacity (kcal/kg-°C)**: 1.00, 0.25, 0.25, 0.50

**Component Flowrates (kg/h)**

- **Carb. Dioxide**: 0.00, 0.00, 117030.02, 0.00
- **Nitrogen**: 0.00, 362239.40, 362239.40, 0.00
- **Oxygen**: 0.00, 109968.86, 18328.14, 0.00
- **Water**: 258157.05, 4722.08, 0.00, 258157.05
- **TOTAL (kg/h)**: 258157.05, 476930.34, 497597.56, 258157.05

| Stream Name   | S-253   | S-236   | S-246   | S-247   |
|---------------|---------|---------|---------|---------|
| Source        | P-106   | P-122   | P-122   | P-109   |
| Destination   | OUTPUT  | P-109   | OUTPUT  | OUTPUT  |
| Stream Properties |         |         |         |         |
|-------------------|---------|---------|---------|---------|
| Temperature (°C)  | 25.00   | 100.00  | 202.70  | 100.00  |
| Pressure (bar)    | 1.01    | 1.02    | 1.01    | 1.02    |
| Total Enthalpy (kW-h) | 144.99 | 14669.03 | 35680.87 | 815.36 |
| Specific Enthalpy (kcal/kg) | 16.00 | 24.99 | 61.70 | 24.99 |
| Heat Capacity (kcal/kg-°C) | 0.64 | 0.25 | 0.25 | 0.25 |

| Component Flowrates (kg/h) |         |         |         |         |
|-----------------------------|---------|---------|---------|---------|
| Ash                         | 3073.14 | 0.00    | 0.00    | 0.00    |
| Carb. Dioxide               | 0.00    | 0.00    | 117030.02 | 0.00   |
| Nitrogen                    | 0.00    | 383558.94 | 18328.14 | 6472.20 |
| Oxygen                      | 4722.08 | 5000.00  | 277.92  | 277.92  |
| TOTAL (kg/h)                | 7795.22 | 505000.00 | 497597.56 | 28069.66 |

| Stream Name | S-177 | S-250 | S-183 | S-196 |
|-------------|-------|-------|-------|-------|
| Source      | P-107 | P-107 | P-48  | P-110 |
| Destination | P-48  | P-110 | P-110 | P-111 |

| Stream Properties |         |         |         |         |
|-------------------|---------|---------|---------|---------|
| Temperature (°C)  | 152.11  | 46.00   | 100.00  | 75.90   |
| Pressure (bar)    | 4.43    | 0.10    | 4.43    | 0.10    |
| Total Enthalpy (kW-h) | 103678.43 | 5870.65 | 15723.72 | 22739.02 |
| Specific Enthalpy (kcal/kg) | 658.20 | 46.04 | 99.82 | 75.79 |
| Heat Capacity (kcal/kg-°C) | 0.46 | 1.00 | 1.00 | 1.00 |

| Component Flowrates (kg/h) |         |         |         |         |
|-----------------------------|---------|---------|---------|---------|
| Water                       | 135532.45 | 109716.75 | 135532.45 | 258157.05 |
| TOTAL (kg/h)                | 135532.45 | 109716.75 | 135532.45 | 258157.05 |

| Stream Name | S-205 | S-210 | Water | S-256 |
|-------------|-------|-------|-------|-------|
| Source      | P-111 | P-112 | INPUT | P-114 |
| Destination | P-112 | P-114 | P-114 | P-113 |

| Stream Properties |         |         |         |         |
|-------------------|---------|---------|---------|---------|
| Temperature (°C)  | 75.92   | 75.92   | 60.00   | 75.30   |
| Pressure (bar)    | 3.10    | 3.10    | 1.01    | 1.01    |
| Total Enthalpy (kW-h) | 22739.35 | 22739.35 | 696.09 | 23435.44 |
| Specific Enthalpy (kcal/kg) | 75.79 | 75.79 | 59.89 | 75.20 |
| Heat Capacity (kcal/kg-°C) | 1.00 | 1.00 | 1.00 | 1.00 |

| Component Flowrates (kg/h) |         |         |         |         |
|-----------------------------|---------|---------|---------|---------|
| Water                       | 258157.05 | 258157.05 | 10000.00 | 268157.05 |
| TOTAL (kg/h)                | 258157.05 | 258157.05 | 10000.00 | 268157.05 |

| Stream Name | S-257 | S-258 | Blowdown water | S-149 |
|-------------|-------|-------|----------------|-------|
| Source      | P-113 | P-115 | P-116          | P-41  |
| Destination | P-115 | P-116 | OUTPUT         | P-36  |
### Stream Properties

|                        | S-164 | S-169 | S-166 | S-168 |
|------------------------|-------|-------|-------|-------|
| Temperature (°C)       | 75.30 | 75.94 | 75.94 | 40.00 |
| Pressure (bar)         | 1.01  | 61.71 | 61.71 | 1.01  |
| Total Enthalpy (kW-h)  | 23435.44 | 23624.36 | 688.09 | 310.05 |
| Specific Enthalpy (kcal/kg) | 75.20 | 75.80 | 75.80 | 23.60 |
| Heat Capacity (kcal/kg·°C) | 1.00  | 1.00  | 1.00  | 0.59  |

### Component Flowrates (kg/h)

| Component          | S-164 | S-169 | S-166 | S-168 |
|--------------------|-------|-------|-------|-------|
| Ethyl Alcohol      | 0.00  | 0.00  | 0.00  | 11199.90 |
| Water              | 268157.05 | 268157.05 | 7810.40 | 103.79 |
| TOTAL (kg/h)       | 268157.05 | 268157.05 | 7810.40 | 11303.69 |

### Stream Name

| Stream Name       | S-164 | S-169 | S-166 | S-168 |
|-------------------|-------|-------|-------|-------|
| Source            | P-36  | P-40  | P-39  | P-66  |
| Destination       | P-40  | P-39  | P-66  | P-67  |

### Stream Properties

|                        | S-164 | S-169 | S-166 | S-168 |
|------------------------|-------|-------|-------|-------|
| Temperature (°C)       | 40.00 | 40.08 | 39.80 | 39.80 |
| Pressure (bar)         | 1.01  | 4.46  | 2.01  | 2.01  |
| Total Enthalpy (kW-h)  | 310.05 | 310.65 | 314.22 | 314.22 |
| Specific Enthalpy (kcal/kg) | 23.60 | 23.65 | 23.44 | 23.44 |
| Heat Capacity (kcal/kg·°C) | 0.59  | 0.59  | 0.59  | 0.59  |

### Component Flowrates (kg/h)

| Component       | S-164 | S-169 | S-166 | S-168 |
|-----------------|-------|-------|-------|-------|
| Ethyl Alcohol   | 11199.90 | 11199.90 | 11199.90 | 11199.90 |
| Octane          | 0.00  | 8988.75 | 8898.87 | 89.89  |
| Water           | 230.69 | 0.00  | 0.00  | 0.00   |
| TOTAL (kg/h)    | 11303.69 | 11303.69 | 11534.38 | 11534.38 |

### Stream Name

| Stream Name       | Ethanol Product | S-178 | S-181 | S-182 |
|-------------------|-----------------|-------|-------|-------|
| Source            | P-67            | P-49  | P-78  | P-78  |
| Destination       | OUTPUT          | P-78  | P-75  | OUTPUT |

### Stream Properties

|                        | S-178 | S-181 | S-182 |
|------------------------|-------|-------|-------|
| Temperature (°C)       | 39.84 | 70.00 | 82.84 |
| Pressure (bar)         | 3.74  | 1.01  | 1.01  |
| Total Enthalpy (kW-h)  | 314.48 | 17.00 | 19.92 |
| Specific Enthalpy (kcal/kg) | 23.46 | 1.62  | 1.92  |
| Heat Capacity (kcal/kg·°C) | 0.59  | 0.02  | 0.02  |

### Component Flowrates (kg/h)

| Component       | S-178 | S-181 | S-182 |
|-----------------|-------|-------|-------|
| Ethyl Alcohol   | 11199.90 | 0.00  | 0.00  |
| Lipid           | 0.00  | 8988.75 | 8898.87 |
| Octane          | 230.69 | 0.00  | 0.00  |
| Water           | 103.79 | 26.51 | 26.24 |
| TOTAL (kg/h)    | 11534.38 | 9015.26 | 8925.11 |

### Stream Name

| Stream Name      | Distilled Water | S-186 | S-187 | S-188 |
|------------------|-----------------|-------|-------|-------|
| Source           | INPUT           | P-75  | P-76  | P-76  |
### Stream Properties

| Destination | P-75 | P-76 | P-69 | OUTPUT |
|-------------|------|------|------|--------|
| **Temperature (°C)** | 85.00 | 85.20 | 87.03 | 87.03 |
| **Pressure (bar)** | 1.01 | 1.01 | 1.01 | 1.01 |
| **Total Enthalpy (kW-h)** | 133.13 | 153.93 | 19.58 | 137.66 |
| **Specific Enthalpy (kcal/kg)** | 84.85 | 12.89 | 1.90 | 84.19 |
| **Heat Capacity (kcal/kg°C)** | 1.00 | 0.15 | 0.02 | 0.97 |

### Component Flowrates (kg/h)

| Component | P-75 | P-76 | P-69 | OUTPUT |
|-----------|------|------|------|--------|
| Lipid     | 0.00 | 8898.87 | 8854.37 | 44.49 |
| Water     | 1350.00 | 1376.24 | 13.76 | 1362.48 |
| TOTAL (kg/h) | 1350.00 | 10275.11 | 8868.14 | 1406.97 |

### Stream Name

| Stream Name | S-195 | S-173 | S-106 | S-190 |
|-------------|-------|-------|-------|-------|
| **Component Flowrates (kg/h)** |

### Stream Properties

| Stream Name | S-259 | S-191 | S-194 | S-175 |
|-------------|-------|-------|-------|-------|
| **Component Flowrates (kg/h)** |

### Stream Properties

| Temperature (°C) | 74.00 | 74.00 | 85.15 | 103.77 |
| Pressure (bar) | 0.02 | 0.02 | 0.02 | 35.02 |
| **Total Enthalpy (kW-h)** | 10.77 | 15.47 | 18.06 | 22.01 |
| **Specific Enthalpy (kcal/kg)** | 633.50 | 1.50 | 1.76 | 2.14 |
| **Heat Capacity (kcal/kg°C)** | 0.42 | 0.02 | 0.02 | 0.02 |

### Component Flowrates (kg/h)

| Component | S-259 | S-191 | S-194 | S-175 |
|-----------|-------|-------|-------|-------|
| C16:0     | 0.00 | 0.00 | 936.70 | 936.70 |
| C18:0     | 0.00 | 0.00 | 421.43 | 421.43 |
| C18:1     | 0.00 | 0.00 | 1993.81 | 1993.81 |
| C18:2     | 0.00 | 0.00 | 4776.46 | 4776.46 |
| C18:3     | 0.00 | 0.00 | 725.10 | 725.10 |
| Lipid     | 0.89 | 8853.49 | 0.00 | 0.00 |
| Water     | 13.75 | 0.01 | 0.01 | 0.01 |
| TOTAL (kg/h) | 14.63 | 8853.50 | 8853.50 | 8853.50 |

### Stream Properties

| Stream Name | S-259 | S-191 | S-194 | S-175 |
|-------------|-------|-------|-------|-------|
| **Component Flowrates (kg/h)** |

| Temperature (°C) | 415.70 | 300.00 | 414.90 | 350.00 |
| Pressure (bar) | 35.00 | 35.02 | 35.00 | 35.02 |
| **Total Enthalpy (kW-h)** | 20763.87 | 63.63 | 20722.25 | 74.24 |
| **Specific Enthalpy (kcal/kg)** | 368.42 | 6.18 | 367.68 | 7.21 |
| **Heat Capacity (kcal/kg°C)** | 0.88 | 0.02 | 0.88 | 0.02 |

### Component Flowrates (kg/h)

| Component | S-259 | S-191 | S-194 | S-175 |
|-----------|-------|-------|-------|-------|
| C16:0     | 171.64 | 936.70 | 171.64 | 936.70 |
| C18:0     | 77.30 | 421.43 | 77.30 | 421.43 |
| C18:1     | 365.69 | 1993.81 | 365.69 | 1993.81 |
| Compound      | S-176 | S-180 | S-193 | S-202 |
|--------------|-------|-------|-------|-------|
| C16:0        | 515.18| 421.51| 171.64| 8.80  |
| C18:0        | 231.78| 189.64| 77.30 | 0.00  |
| C18:1        | 1096.59| 897.21| 365.69| 0.00  |
| C18:2        | 2627.05| 2149.41| 876.07| 0.00  |
| C18:3        | 398.81 | 326.30| 132.99| 0.00  |
| C3           | 0.00  | 0.00  | 382.20| 349.05|
| Carb. Dioxide| 0.00  | 0.00  | 875.76| 853.17|
| Heptadecane  | 0.00  | 0.00  | 26731.30| 0.00  |
| Hexadecane   | 0.00  | 0.00  | 976.45| 0.10  |
| Hydrogen     | 0.00  | 0.00  | 6087.19| 6080.50|
| Octadecane   | 0.00  | 0.00  | 8567.91| 0.00  |
| Pentadecane  | 0.00  | 0.00  | 3024.14| 0.00  |
| Water        | 0.01  | 0.01  | 224.05| 0.00  |
| TOTAL (kg/h) | 4869.43| 3984.08| 48492.70| 7291.62|

| Stream Name               | S-199 | Hydrogen 3 | S-197 | S-231 |
|---------------------------|-------|------------|-------|-------|
| Source                    | P-70  | INPUT      | P-71  | P-72  |
| Destination               | P-71  | P-71       | P-72  | P-99  |
| Temperature (°C)          | 100.00| 350.00     | 235.90| 300.90|
| Pressure (bar)            | 35.00 | 35.00      | 35.00 | 35.00 |
| Total Enthalpy (kW-h)     | 2459.37| 10552.16   | 13011.53| 15071.68|
| Component Flowrates (kg/h) | C16:0 | 162.84 | 0.00 | 162.84 | 171.64 |
|---------------------------|-------|--------|------|--------|--------|
| C18:0                     | 77.30 | 0.00   | 77.30| 77.30  |        |
| C18:1                     | 365.69| 0.00   | 365.69| 365.69|        |
| C18:2                     | 876.07| 0.00   | 876.07| 876.07|        |
| C18:3                     | 132.99| 0.00   | 132.99| 132.99|        |
| C3                        | 33.15 | 0.00   | 33.15| 382.20|        |
| Carb. Dioxide             | 22.59 | 0.00   | 22.59| 875.76|        |
| Heptadecane               | 26731.30| 0.00   | 26731.30| 26731.30|        |
| Hexadecane                | 976.35 | 0.00   | 976.35| 976.45|        |
| Hydrogen                  | 6.70  | 7500.00| 7506.70| 6087.19|        |
| Octadecane                | 8567.91 | 0.00   | 8567.91| 8567.91|        |
| Pentadecane               | 3024.14| 0.00   | 3024.14| 3024.14|        |
| Water                     | 224.05| 0.00   | 224.05| 224.05|        |
| TOTAL (kg/h)              | 41201.08| 7500.00| 48701.08| 48492.70|        |

| Stream Name | S-200 | S-201 | S-204 | SMR Hydrogen |
|-------------|-------|-------|-------|--------------|
| Source      | P-72  | P-73  | P-74  | INPUT        |
| Destination | P-73  | P-74  | P-77  | P-77         |

| Stream Properties | Temperature (°C) | 327.30 | 350.00 | 358.00 | 37.00 |
|-------------------|-----------------|--------|--------|--------|-------|
| | Pressure (bar)   | 35.00 | 35.00 | 35.00 | 13.79 |
| | Total Enthalpy (kW-h) | 18297.23 | 19250.86 | 19935.83 | 216.27 |
| | Specific Enthalpy (kcal/kg) | 323.26 | 340.11 | 352.21 | 126.59 |
| | Heat Capacity (kcal/kg-°C) | 0.51 | 3.49 | 0.97 | 0.88 |

| Component Flowrates (kg/h) | C16:0 | 162.84 | 162.84 | 40.79 | 0.00 |
|---------------------------|-------|--------|--------|------|------|
| C18:0                     | 77.30 | 77.30  | 19.36  | 0.00 |     |
| C18:1                     | 365.69| 365.69 | 91.60  | 0.00 |     |
| C18:2                     | 876.07| 876.07 | 219.45 | 0.00 |     |
| C18:3                     | 132.99| 132.99 | 33.31  | 0.00 |     |
| C3                        | 33.15 | 33.15  | 94.29  | 0.00 |     |
| Carb. Dioxide             | 22.59 | 22.59  | 166.20 | 0.00 |     |
| Heptadecane               | 26731.30| 26731.30| 27430.47| 216.27|     |
| Hexadecane                | 976.35 | 976.35 | 998.49 | 0.00 |     |
| Hydrogen                  | 7506.70| 7506.70| 7479.91| 1470.00|     |
| Octadecane                | 8567.91| 8567.91| 8771.15| 1470.00|     |
| Pentadecane               | 3024.14| 3024.14| 3099.72| 1470.00|     |
| Water                     | 224.05| 224.05 | 256.35 | 0.00 |     |
| TOTAL (kg/h)              | 48701.08| 48701.08| 48701.08| 1470.00|     |

| Stream Name | S-203 | S-206 | S-228 | S-234 |
|-------------|-------|-------|-------|-------|
| Source | P-77 | P-77 | P-79 | P-100 |
|--------|------|------|------|-------|
| Destination | P-79 | P-80 | P-98 | P-98 |

### Stream Properties

| Temperature (°C) | 302.25 | 302.25 | 220.10 | 128.11 |
| Pressure (bar)   | 13.79  | 35.00  | 13.79  | 35.00  |
| Total Enthalpy (kW-h) | 11131.14 | 7876.59 | 13685.09 | 8119.45 |
| Specific Enthalpy (kcal/kg) | 1013.07 | 166.45 | 703.17 | 445.60 |
| Heat Capacity (kcal/kg-°C) | 3.32 | 0.54 | 3.15 | 3.10 |

### Component Flowrates (kg/h)

| Component | C16:0 | C18:0 | C18:1 | C18:2 | C18:3 | C3 | Carb. Dioxide | Heptadecane | Hexadecane | Hydrogen | Octadecane | Pentadecane | Water | TOTAL (kg/h) |
|-----------|-------|-------|-------|-------|-------|----|---------------|-------------|------------|----------|------------|-------------|---------|-------------|
| Value     | 0.00  | 40.79 | 8.80  | 0.00  | 0.00  | 94.19 | 166.04       | 0.00        | 0.00       | 8942.43  | 8771.15    | 0.00        | 251.22  | 15677.94    |

### Stream Name

| Stream Name | S-229 | S-230 | S-223 | MDEA |
|-------------|-------|-------|-------|------|
| Source      | P-98  | P-98  | P-81  | INPUT |
| Destination | P-81  | P-99  | P-95  | P-95 |

### Stream Properties

| Temperature (°C) | 181.30 | 170.10 | 54.00 | 49.10 |
| Pressure (bar)   | 13.79  | 35.00  | 13.79 | 35.00 |
| Total Enthalpy (kW-h) | 11312.29 | 9744.59 | 3379.17 | 7784.44 |
| Specific Enthalpy (kcal/kg) | 581.25 | 534.79 | 173.63 | 47.12 |
| Heat Capacity (kcal/kg-°C) | 3.14 | 3.15 | 3.12 | 0.96 |

### Component Flowrates (kg/h)

| Component | C16:0 | C3 | Carb. Dioxide | Diethanolamine | Hexadecane | Hydrogen | Water | TOTAL (kg/h) |
|-----------|-------|----|---------------|----------------|------------|----------|-------|-------------|
| Value     | 8.80  | 443.25 | 1019.21       | 0.00          | 0.10      | 15022.93 | 251.22 | 16745.51    |

| Component | C18:0 | C18:1 | C18:2 | C18:3 | C16:0 | C3 | Carb. Dioxide | Heptadecane | Hexadecane | Hydrogen | Octadecane | Pentadecane | Water | TOTAL (kg/h) |
|-----------|-------|-------|-------|-------|-------|----|---------------|-------------|------------|----------|------------|-------------|-------|-------------|
| Value     | 0.00  | 40.79 | 8.80  | 0.00  | 0.00  | 94.19 | 166.04       | 0.00        | 0.00       | 8942.43  | 8771.15    | 0.00        | 251.22  | 15677.94    |

| Component | C16:0 | C3 | Carb. Dioxide | Diethanolamine | Hexadecane | Hydrogen | Water | TOTAL (kg/h) |
|-----------|-------|----|---------------|----------------|------------|----------|-------|-------------|
| Value     | 8.80  | 443.25 | 1019.21       | 0.00          | 0.10      | 15022.93 | 251.22 | 16745.51    |
| Stream Name | Hydrogen recycle | S-263 | S-233 | S-226 |
|-------------|------------------|-------|-------|-------|
| Source      | P-95             | P-95  | P-96  | P-96  |
| Destination | P-96             | P-121 | P-100 | P-97  |
| Stream Properties |           |       |       |       |
| Temperature (°C) | 50.50 | 50.50 | 50.50 | 50.50 |
| Pressure (bar)   | 13.79 | 13.79 | 13.79 | 13.79 |
| Total Enthalpy (kW-h) | 3172.62 | 8000.49 | 2918.81 | 253.81 |
| Specific Enthalpy (kcal/kg) | 160.19 | 48.53 | 160.19 | 160.19 |
| Heat Capacity (kcal/kg-°C) | 3.12  | 0.96  | 3.12  | 3.12  |
| Component Flowrates (kg/h) |       |       |       |       |
| C16:0        | 0.00             | 8.80  | 0.00  | 0.00  |
| C3           | 443.25           | 0.00  | 407.79| 35.46 |
| Carb. Dioxide | 293.12           | 726.08| 269.67| 23.45 |
| Diethanolamine| 0.00            | 14217.21 | 0.00      |       |
| Hexadecane   | 0.10             | 0.00  | 0.09  | 0.01  |
| Hydrogen     | 15022.93         | 0.00  | 13821.10 | 1201.83 |
| Water        | 1281.84          | 126902.17 | 1179.29   | 102.55 |
| TOTAL (kg/h) | 17041.24         | 141854.26 | 15677.94  | 1363.30 |

| Stream Name | S-224 | S-232 | S-207 | S-208 |
|-------------|------|------|------|------|
| Source      | P-99 | P-99 | P-80 | P-80 |
| Destination | P-124 | P-65 | P-60 | P-82 |
| Stream Properties |       |       |       |       |
| Temperature (°C) | 257.80 | 185.10 | 302.25 | 302.25 |
| Pressure (bar)   | 35.00 | 35.00 | 35.00 | 35.00 |
| Total Enthalpy (kW-h) | 15466.62 | 9349.65 | 6151.64 | 1417.79 |
| Specific Enthalpy (kcal/kg) | 848.82 | 165.89 | 158.53 | 166.45 |
| Heat Capacity (kcal/kg-°C) | 3.12  | 0.88  | 0.52  | 0.54  |
| Component Flowrates (kg/h) |       |       |       |       |
| C16:0        | 0.00             | 171.64| 33.45 | 7.34  |
| C18:0        | 0.00             | 77.30 | 15.88 | 3.49  |
| C18:1        | 0.00             | 365.69| 75.12 | 16.49 |
| C18:2        | 0.00             | 876.07| 179.95| 39.50 |
| C18:3        | 0.00             | 132.99| 27.32 | 6.00  |
| C3           | 407.79           | 382.20| 0.08  | 0.02  |
| Carb. Dioxide | 269.67           | 875.76| 0.14  | 0.03  |
| Heptadecane  | 0.00             | 26731.30| 22492.98 | 4937.48 |
| Hexadecane   | 0.09             | 976.45 | 818.76 | 179.73 |
| Hydrogen     | 13821.10         | 6087.19| 6.13  | 1.35  |
| Octadecane   | 0.00             | 8567.91| 7192.34 | 1578.81 |
| Pentadecane  | 0.00             | 3024.14| 2541.77 | 557.95 |
| Water        | 1179.29          | 224.05| 4.20  | 0.92  |
| TOTAL (kg/h) | 15677.94         | 48492.70| 33388.11| 7329.10 |
| Stream Name | Hydrogen 1 | S-179 | S-184 | S-174 |
|-------------|------------|-------|-------|-------|
| Source      | INPUT      | P-60  | P-94  | P-61  |
| Destination | P-60       | P-94  | P-61  | P-59  |
| Stream Properties |
| Temperature (°C) | 350.00 | 321.70 | 350.00 | 387.40 |
| Pressure (bar)   | 35.00  | 35.00  | 35.00  | 35.00  |
| Total Enthalpy (kW-h) | 4827.26 | 11019.73 | 11991.10 | 14078.65 |
| Specific Enthalpy (kcal/kg) | 1210.57 | 227.44 | 247.49 | 290.57 |
| Heat Capacity (kcal/kg-°C) | 3.49   | 0.71   | 0.71   | 0.75   |
| Component Flowrates (kg/h) |
| C16:0       | 0.00     | 548.63 | 548.63 | 161.52 |
| C18:0       | 0.00     | 247.66 | 247.66 | 72.91  |
| C18:1       | 0.00     | 1171.71| 1171.71| 344.95 |
| C18:2       | 0.00     | 2807.00| 2807.00| 826.38 |
| C18:3       | 0.00     | 426.12 | 426.12 | 125.45 |
| C3          | 0.00     | 0.08   | 0.08   | 185.54 |
| Carb. Dioxide| 0.00   | 0.14   | 0.14   | 425.11 |
| Heptadecane | 0.00     | 22492.98| 22492.98| 24550.29 |
| Hexadecane  | 0.00     | 818.76 | 818.76 | 895.21 |
| Hydrogen     | 3431.00  | 3437.13| 3437.13| 3354.65 |
| Octadecane  | 0.00     | 7192.34| 7192.34| 7860.05 |
| Pentadecane | 0.00     | 2541.77| 2541.77| 2775.62 |
| Water       | 0.00     | 4.21   | 4.21   | 110.91 |
| TOTAL (kg/h) | 3431.00 | 41688.54| 41688.54| 41688.58 |

| Stream Name | Hydrogen 2 | S-185 | S-209 | Hydrogen 4 |
|-------------|------------|-------|-------|------------|
| Source      | INPUT      | P-59  | P-82  | INPUT      |
| Destination | P-59       | P-63  | P-83  | P-83       |
| Stream Properties |
| Temperature (°C) | 350.00 | 378.40 | 302.70 | 135.00 |
| Pressure (bar)   | 35.00  | 35.00  | 52.70  | 52.70   |
| Total Enthalpy (kW-h) | 3967.61 | 18079.67| 1857.33 | 636.31 |
| Specific Enthalpy (kcal/kg) | 1210.57 | 320.79 | 218.05 | 463.98 |
| Heat Capacity (kcal/kg-°C) | 3.49   | 0.85   | 0.62   | 3.46    |
| Component Flowrates (kg/h) |
| C16:0       | 0.00     | 583.03 | 7.34  | 0.00     |
| C18:0       | 0.00     | 262.55 | 3.49  | 0.00     |
| C18:1       | 0.00     | 1242.16| 16.49 | 0.00     |
| C18:2       | 0.00     | 2975.79| 39.50 | 0.00     |
| C18:3       | 0.00     | 451.75 | 6.00  | 0.00     |
| C3          | 0.00     | 185.54 | 0.02  | 0.00     |
| Carb. Dioxide| 0.00   | 425.11 | 0.03  | 0.00     |
| Heptadecane | 0.00     | 24550.29| 4937.48| 0.00     |
| Component          | S-212 | S-211 | S-213 | S-215 |
|--------------------|-------|-------|-------|-------|
| Avocado            | 0.00  | 4239.00 | 0.00  | 4239.00 |
| C16:0              | 7.34  | 0.00   | 7.34  | 0.00   |
| C18:0              | 3.49  | 0.00   | 3.49  | 0.00   |
| C18:1              | 16.49 | 0.00   | 16.49 | 0.00   |
| C18:2              | 39.50 | 0.00   | 39.50 | 0.00   |
| C18:3              | 6.00  | 0.00   | 6.00  | 0.00   |
| C3                 | 0.02  | 0.00   | 0.02  | 0.00   |
| Carb. Dioxide      | 0.03  | 0.03   | 0.03  | 0.03   |
| Diesel             | 0.00  | 637.47 | 0.00  | 637.47 |
| Heptadecane        | 4937.48 | 0.00 | 4937.48 | 0.00 |
| Hexadecane         | 179.73 | 0.00 | 179.73 | 0.00 |
| Hydrogen           | 1181.35 | 0.00 | 1181.35 | 0.00 |
| Lights             | 0.00  | 1343.65 | 0.00 | 1343.65 |
| Naphtha            | 0.00  | 2288.02 | 0.00 | 2288.02 |
| Octadecane         | 1578.81 | 0.00 | 1578.81 | 0.00 |
| Pentadecane        | 557.95 | 0.00 | 557.95 | 0.00 |
| Water              | 0.92  | 0.92   | 0.92  | 0.92   |
| TOTAL (kg/h)       | 8509.10 | 8509.10 | 8509.10 | 8509.10 |

| Component          | S-214 | S-251 | S-216 | Lights |
|--------------------|-------|-------|-------|--------|
| Source             | P-84  | P-126 | P-87  | P-88   |
| Destination        | P-126 | P-85  | P-88  | OUTPUT |

| Component          | Temperature (°C) | Pressure (bar) | Total Enthalpy (kW·h) | Specific Enthalpy (kcal/kg) | Heat Capacity (kcal/kg·°C) |
|--------------------|------------------|----------------|-----------------------|----------------------------|---------------------------|
| Aviation Fuel      | 271.00           | 52.70          | 2493.64               | 252.15                     | 0.93                      |
| Hydrogen           | 330.00           | 52.70          | 5216.67               | 527.50                     | 1.37                      |
| Lights             | 304.40           | 52.70          | 3308.20               | 334.52                     | 1.02                      |
| Output             | 272.00           | 52.70          | 4402.11               | 445.13                     | 1.27                      |
| Heat Capacity (kcal/kg·°C) | 1.06 | 0.93 | 1.12 | 3.80 |
|---------------------------|------|------|------|------|
| **Component Flowrates (kg/h)** | | | | |
| Aviation Fuel | 0.00 | 0.00 | 4239.00 | 0.00 |
| C16:0 | 7.34 | 7.34 | 0.00 | 0.00 |
| C18:0 | 3.49 | 3.49 | 0.00 | 0.00 |
| C18:1 | 16.49 | 16.49 | 0.00 | 0.00 |
| C18:2 | 39.50 | 39.50 | 0.00 | 0.00 |
| C18:3 | 6.00 | 6.00 | 0.00 | 0.00 |
| C3 | 0.02 | 0.02 | 0.00 | 0.00 |
| Carb. Dioxide | 0.03 | 0.03 | 0.03 | 0.03 |
| Diesel | 0.00 | 0.00 | 637.47 | 0.00 |
| Heptadecane | 4937.48 | 4937.48 | 0.00 | 0.00 |
| Hexadecane | 179.73 | 179.73 | 0.00 | 0.00 |
| Hydrogen | 1181.35 | 1181.35 | 0.00 | 0.00 |
| Lights | 0.00 | 0.00 | 1343.65 | 1343.65 |
| Naptha | 0.00 | 0.00 | 2288.02 | 0.00 |
| Octadecane | 1578.81 | 1578.81 | 0.00 | 0.00 |
| Pentadecane | 557.95 | 557.95 | 0.00 | 0.00 |
| Water | 0.92 | 0.92 | 0.92 | 0.92 |
| TOTAL (kg/h) | 8509.10 | 8509.10 | 8509.10 | 1344.60 |

### Stream Name

| S-218 | S-219 | S-220 | S-222 |
|-------|-------|-------|-------|
| Source | P-88 | P-89 | P-90 |
| Destination | P-89 | P-90 | P-92 |

### Stream Properties

| Temperature (°C) | 200.00 | 200.00 | 200.00 | 200.00 |
| Pressure (bar) | 15.00 | 1.01 | 1.01 | 1.01 |
| Total Enthalpy (kW-h) | 1006.25 | 1263.52 | 608.11 | 80.55 |
| Specific Enthalpy (kcal/kg) | 120.85 | 151.74 | 228.68 | 108.72 |
| Heat Capacity (kcal/kg·°C) | 0.60 | 0.62 | 0.71 | 0.54 |

### Component Flowrates (kg/h)

| Aviation Fuel | 4239.00 | 4239.00 | 0.00 | 0.00 |
| Diesel | 637.47 | 637.47 | 0.00 | 637.47 |
| Naptha | 2288.02 | 2288.02 | 2288.02 | 0.00 |
| TOTAL (kg/h) | 7164.50 | 7164.50 | 2288.02 | 637.47 |

### Stream Name

| S-221 | Jet Fuel | S-227 | S-262 |
|-------|----------|-------|-------|
| Source | P-90 | P-91 | P-119 |
| Destination | P-91 | OUTPUT | P-120 | P-120 |

### Stream Properties

| Temperature (°C) | 200.00 | 30.00 | 915.00 | 38.00 |
| Pressure (bar) | 1.01 | 1.01 | 1.01 | 1.01 |
| Total Enthalpy (kW-h) | 574.86 | 86.23 | 567.20 | 66.66 |
| Specific Enthalpy (kcal/kg) | 116.68 | 17.50 | 765.57 | 25.07 |
| Heat Capacity (kcal/kg·°C) | 0.58 | 0.58 | 0.99 | 0.66 |
|---------------------------|------|------|------|------|
| **Component Flowrates (kg/h)** |     |      |      |      |
| Aviation Fuel             | 4239.00 | 4239.00 | 0.00 | 0.00 |
| Diesel                    | 0.00   | 0.00  | 637.47 | 0.00 |
| Naptha                    | 0.00   | 0.00  | 0.00  | 2288.02 |
| TOTAL (kg/h)              | 4239.00 | 4239.00 | 637.47 | 2288.02 |
| **Stream Name**           | Diesel | Naptha | Recycle | S-237 |
| Source                    | P-120  | P-120  | P-97   | P-101  |
| Destination               | OUTPUT | OUTPUT | OUTPUT | P-102  |
| **Stream Properties**     |      |      |      |      |
| Temperature (°C)          | 275.10 | 120.00 | 135.00 | 96.00  |
| Pressure (bar)            | 1.01   | 1.01  | 52.79  | 13.79  |
| Total Enthalpy (kW-h)     | 166.50 | 467.36 | 739.86 | 15196.61 |
| Specific Enthalpy (kcal/kg)| 224.73 | 175.75 | 466.95 | 92.02  |
| Heat Capacity (kcal/kg·°C)| 0.65   | 0.61  | 3.10  | 0.96   |
| **Component Flowrates (kg/h)** |     |      |      |      |
| C16:0                     | 0.00   | 0.00  | 0.00  | 8.80   |
| C3                        | 0.00   | 0.00  | 35.46 | 0.00   |
| Carb. Dioxide             | 0.00   | 0.00  | 23.45 | 726.59 |
| Diesel                    | 637.47 | 0.00  | 0.00  | 0.00   |
| Diethanolamine            | 0.00   | 0.00  | 0.00  | 14217.21 |
| Hexadecane                | 0.00   | 0.00  | 0.01  | 0.00   |
| Hydrogen                  | 0.00   | 0.00  | 1201.83 | 0.00 |
| Naptha                    | 0.00   | 2288.02 | 0.00 | 0.00 |
| Water                     | 0.00   | 0.00  | 102.55 | 127141.58 |
| TOTAL (kg/h)              | 637.47 | 2288.02 | 1363.30 | 142094.18 |
| **Stream Name**           | S-239  | S-128  | S-240  | CO2    |
| Source                    | P-102  | P-102  | P-103  | P-104  |
| Destination               | P-103  | P-45   | P-104  | OUTPUT |
| **Stream Properties**     |      |      |      |      |
| Temperature (°C)          | 96.00  | 96.00  | 40.50  | 40.50  |
| Pressure (bar)            | 13.79  | 13.79  | 13.79  | 1.80   |
| Total Enthalpy (kW-h)     | 264.04 | 15103.67 | 64.69 | 64.06  |
| Specific Enthalpy (kcal/kg)| 231.61 | 92.09  | 56.75  | 74.38  |
| Heat Capacity (kcal/kg·°C)| 0.28   | 0.96  | 0.41   | 0.21   |
| **Component Flowrates (kg/h)** |     |      |      |      |
| C16:0                     | 0.00   | 8.80  | 0.00  | 0.00   |
| Carb. Dioxide             | 726.59 | 0.00  | 726.59 | 726.08 |
| Diethanolamine            | 0.00   | 14217.21 | 0.00 | 0.00 |
| Water                     | 254.28 | 126887.29 | 254.28 | 14.88 |
| TOTAL (kg/h)              | 980.87 | 141113.31 | 980.87 | 740.96 |
| Stream Name          | S-242 | S-243 | S-235 | S-265 |
|----------------------|-------|-------|-------|-------|
| Source               | P-104 | P-105 | P-45  | P-121 |
| Destination          | P-105 | P-101 | P-121 | P-101 |
| **Stream Properties**|       |       |       |       |
| Temperature (°C)     | 40.50 | 40.62 | 122.30| 96.11 |
| Pressure (bar)       | 1.80  | 13.80 | 13.79 | 13.79 |
| Total Enthalpy (kW-h)| 11.28 | 11.32 | 19236.33| 15185.29|
| Specific Enthalpy (kcal/kg)| 40.44 | 40.60 | 117.29 | 92.11 |
| Heat Capacity (kcal/kg-°C) | 1.00 | 1.00 | 0.96 | 0.96 |

**Component Flowrates (kg/h)**

| Component     | S-242 | S-243 | S-235 | S-265 |
|---------------|-------|-------|-------|-------|
| C16:0         | 0.00  | 0.00  | 8.80  | 8.80  |
| Carb. Dioxide | 0.51  | 0.51  | 0.00  | 726.08|
| Diethanolamine| 0.00  | 0.00  | 14217.21| 14217.21|
| Water         | 239.41| 239.41| 126887.29| 126902.17|
| TOTAL (kg/h)  | 239.92| 239.92| 141113.31| 141854.26|

| Stream Name          | S-241   | Recycle MDEA | S-225 | Recycle hydrogen 1 |
|----------------------|---------|--------------|-------|--------------------|
| Source               | P-121   | P-123        | P-124 | P-125              |
| Destination          | P-123   | OUTPUT       | P-125 | OUTPUT             |
| **Stream Properties**|         |              |       |                    |
| Temperature (°C)     | 76.60   | 76.74        | 350.00| 350.00             |
| Pressure (bar)       | 13.79   | 26.59        | 35.00 | 35.00              |
| Total Enthalpy (kW-h)| 12051.53| 12073.33     | 20720.50| 5387.33          |
| Specific Enthalpy (kcal/kg)| 73.48 | 73.62 | 1137.16 | 1137.16 |
| Heat Capacity (kcal/kg-°C) | 0.96 | 0.96 | 3.13 | 3.13 |

**Component Flowrates (kg/h)**

| Component     | S-241 | Recycle MDEA | S-225 | Recycle hydrogen 1 |
|---------------|-------|--------------|-------|--------------------|
| C16:0         | 8.80  | 8.80         | 0.00  | 0.00               |
| C3            | 0.00  | 0.00         | 407.79| 106.03             |
| Carb. Dioxide | 0.00  | 0.00         | 269.67| 70.12              |
| Diethanolamine| 14217.21| 14217.21    | 0.00  | 0.00               |
| Hexadecane    | 0.00  | 0.00         | 0.09  | 0.02               |
| Hydrogen      | 0.00  | 0.00         | 13821.10| 3593.49          |
| Water         | 126887.29| 126887.29   | 1179.29| 306.62            |
| TOTAL (kg/h)  | 141113.31| 141113.31   | 15677.94| 4076.27          |

| Stream Name          | Recycle hydrogen 2 | S-266 | S-198 |
|----------------------|--------------------|-------|-------|
| Source               | P-125              | P-125 | P-93  |
| Destination          | OUTPUT             | OUTPUT| OUTPUT|
| **Stream Properties**|                    |       |       |
| Temperature (°C)     | 350.00             | 350.00| 74.00 |
| Pressure (bar)       | 35.00              | 35.00 | 0.02  |
|                          |     |     |     |
|--------------------------|-----|-----|-----|
| Total Enthalpy (kW-h)    | 4351.31 | 10981.87 | 1.18 |
| Specific Enthalpy (kcal/kg) | 1137.16 | 1137.16 | 69.49 |
| Heat Capacity (kcal/kg-°C) | 3.13  | 3.13  | 0.94 |

**Component Flowrates (kg/h)**

| Component      |     |     |     |
|----------------|-----|-----|-----|
| C3             | 85.64 | 216.13 | 0.00 |
| Carb. Dioxide   | 56.63 | 142.93 | 0.00 |
| Hexadecane     | 0.02  | 0.05  | 0.00 |
| Hydrogen       | 2902.43 | 7325.18 | 0.00 |
| Lipid          | 0.00  | 0.00  | 0.89 |
| Water          | 247.65 | 625.03 | 13.75 |
| **TOTAL (kg/h)**| 3292.37 | 8309.31 | 14.63 |