The Extended JODI Oil Questionnaire

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JODI Training Workshops on Energy Statistics
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The JODI Oil Questionnaire
Oil Refining

What is produced?
Crude Oil, NGL and other Hydrocarbons

What is consumed?
Petroleum Products
- LPG
- Naphtha
- Gasoline
- Kerosene
- Gas/diesel Oil
- Fuel Oil
- Others

Refining

2-5%
20-35%
30-40%
25-75%
Oil Refining

Refinery intake
- Crude oil
- NGL
- Feedstocks
- Other

Refinery losses

Refinery fuel

Refinery output
- LPG
- Naphtha
- Motor and aviation gasoline
- Kerosenes
- Gas / diesel oil
- Etc.

Refinery intake - Refinery losses = Gross refinery output

Gross refinery output - Refinery fuel = Net refinery output
## Joint Organisations Data Initiative - Oil

### Country: [Insert Country Name]

### Month: [Insert Month]

<table>
<thead>
<tr>
<th></th>
<th>Crude Oil</th>
<th>Petroleum Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td></td>
<td>LPG, Gasoline, Kerosene, Gas/Diesel Oil, Fuel Oil, Total Oil</td>
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<tr>
<td>Imports</td>
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<td>Exports</td>
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<tr>
<td>Stocks</td>
<td>Closing, Change</td>
<td>Closing, Change</td>
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<tr>
<td>Refinery Intake</td>
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<td>Demand</td>
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</table>

### Unit: [Insert Unit]
## Extended JODI Oil Questionnaire

### Joint Organisations Data Initiative - Oil

**Country**  
[Blank]

**Month**  
[Blank]

**Unit:**  
[Blank]

### Petroleum Products

<table>
<thead>
<tr>
<th>Crude Oil</th>
<th>NGL</th>
<th>Other</th>
<th>Total (1)+(2)+(3)</th>
<th>LPG</th>
<th>Naphtha</th>
<th>Gasoline</th>
<th>Total Kerosene</th>
<th>Of which Jet Kerosene</th>
<th>Gas Diesel Oil</th>
<th>Fuel Oil</th>
<th>Other Products</th>
<th>Total Products (RHS) (+6)+(+10)+(+11)+(+12)</th>
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</thead>
<tbody>
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</tbody>
</table>

**Automatic Checks**

- Total sum
- Statistical Difference
- Stat. Diff. / Refinery intake
- Products Transferred
- Negative Products Transferred
- Blocked out cells
- Negative Stock Values
- Refinery Losses

**Automatic Checks Petroleum Products**

- Total products sum
- Statistical Difference
- Stat. Diff. / Demand
- Negative Products Transferred
- Interproduct transfers
- Jet Kerosene
- Negative Stock Values

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**Questionnaire Structure**

#### Primary Oil Products

- **Input**
- **Secondary Oil Products**

**Refinery**

<table>
<thead>
<tr>
<th>Petroleum Products</th>
<th>LPG</th>
<th>Naphtha</th>
<th>Gasoline</th>
<th>Total Kerosene</th>
<th>Gas/Diesel Oil</th>
<th>Fuel Oil</th>
<th>Other Products</th>
<th>Total Products</th>
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<table>
<thead>
<tr>
<th></th>
<th>Crude Oil</th>
<th>NGL</th>
<th>Other</th>
<th>Total (1)+(2)+(3)</th>
<th>+ Production</th>
<th>+ From Other sources</th>
<th>+ Imports</th>
<th>- Exports</th>
<th>+ Refinery Output</th>
<th>+ Receipts</th>
<th>+ Imports</th>
<th>- Products Transferred</th>
<th>- Stock Change</th>
<th>+ Interproduct Transfers</th>
<th>- Stock Change</th>
<th>- Statistical Difference</th>
<th>= Demand</th>
<th>Closing stocks</th>
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</thead>
</table>

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Timeliness

- **M-1**: one-month old data (Example: On 25 November 2018, submitted data is for October 2018)
  - Some countries are not able to collect all the required data from all data sources
  - Due to such limitations in the data collection system, these countries are allowed to report M-2

- **M-2**: two-month old data (Example: On 25 November 2018, submitted data is for September 2018)
  - M-2 data more complete and available
  - Submission of M-1 data is encouraged
  - Revision of M-2 and earlier data is encouraged
### Crude Oil

- Most important – but not the only – hydrocarbon from which oil products are manufactured
- Includes lease or field condensate recovered from associated and non-associated gas
- Excludes NGL

<table>
<thead>
<tr>
<th>Crude Oil</th>
<th>NGL</th>
<th>Other</th>
<th>Total (1)+(2)+(3)</th>
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<tr>
<td>Production</td>
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<td>+ Receipts</td>
<td>+ Imports</td>
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<td>From Other sources</td>
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<td>Closing stocks</td>
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**Petroleum Products**

- LPG
- Naphtha
- Gasoline
- Total Kerosene
- Of which: Jet Kerosene
- Gas/Diesel Oil
- Fuel Oil
- Other Products
- Total Products (5)+(6)+(7)+(8)+(10)+(11)+(12)
Natural Gas Liquids (NGL)

- Mixture of ethane, propane, butane (normal and iso-), (iso) pentane and pentanes plus
- Produced in association with crude oil or natural gas and removed in field facilities or gas separation plants before sale of gas
JODI Oil Questionnaire – Product Definitions

Other Primary Products

- Refinery Feedstocks + Additives/oxygenates + Other Hydrocarbons
- Additives and oxygenates are non-hydrocarbon compounds added to or blended with a product to modify fuel properties (octane, cold properties, etc.)
- Biofuels that are blended into gasoline, diesel and jet kerosene
- Other hydrocarbons: non-conventional oils and hydrogen

<table>
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<tr>
<th>Crude Oil</th>
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<th>Other</th>
<th>Total (1)+(2)+(3)</th>
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<td>Other Products</td>
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<td>Total Products (5)+(6)+(7) + (8)+(10) + (11)+(12)</td>
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</tbody>
</table>

- Production
- From Other sources
- Imports
- Exports
- Products Transferred/Backflows
- Direct Use
- Stock Change
- Statistical Difference
- Refinery Inake
- Closing stocks

+ Refinery Output
+ Receipts
+ Imports
- Exports
- Products Transferred
- Stock Change
- Statistical Difference
= Demand
Closing stocks
**Liquefied Petroleum Gases (LPG)**

- The generic name for commercial propane and commercial butane
- Produced in natural gas processing plants, oil refineries and as a byproduct in natural gas liquefaction plants

<table>
<thead>
<tr>
<th>Petroleum Products</th>
<th>Total Products</th>
<th>Crude Oil</th>
<th>NGL</th>
<th>Other</th>
<th>Total (1)+(2)+(3)</th>
<th>LPG</th>
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<th>Fuel Oil</th>
<th>Other Products</th>
</tr>
</thead>
</table>
**Total Kerosene and Other Kerosene**

- Kerosene comprises of kerosene type jet fuel and other kerosene
- Other kerosene usually has lower quality specification than jet kerosene (used as domestic heating oil and for lighting)
- Jet kerosene needs to be reported separately
- Pure biofuels used directly in engines are not included
### Example: Reporting Kerosene

- Your country's refinery produces 60kt of kerosene in total, 40kt of which are jet kerosene.
- 30kt of kerosene are imported, all of which are jet kerosene.
- Demand: 20kt of other kerosene and 70kt of jet kerosene.

<table>
<thead>
<tr>
<th></th>
<th>Crude Oil</th>
<th>NGL</th>
<th>Other</th>
<th>Total (1)+(2)+(3)</th>
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<th>LPG</th>
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<td>(5)</td>
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</table>

- Refinery Output: 60kt
- Receipts: 0kt
- Imports: 30kt
- Exports: 0kt
- Products Transferred: 0kt
- Stock Change: 0kt
- Statistical Difference: 0kt

= Refinery Intake: 90kt

Closing stocks: 70kt
### Other Secondary Products

- “Other Products” includes refinery gas, ethane, jet fuel gasoline, petroleum coke, white spirit and SBP, paraffin waxes, bitumen, lubricants and others
- Double counting should be avoided (e.g. biofuels)
- Receipts and demand of “Other Products” include direct use of crude oil and receipts of NGL and other hydrocarbons

<table>
<thead>
<tr>
<th>Petroleum Products</th>
<th>LPG</th>
<th>Naphtha</th>
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**Note:**
- **Crude Oil**
- **NGL**
- **Other**
- **Total (1)+(2)+(3)**

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There are two columns to record the total primary products and total secondary products for each flow.

<table>
<thead>
<tr>
<th></th>
<th>Crude Oil</th>
<th>NGL</th>
<th>Other</th>
<th>Total (1)+(2)+(3)</th>
<th>LPG</th>
<th>Naphtha</th>
<th>Gasoline</th>
<th>Total Kerosene</th>
<th>Of which: Jet Kerosene</th>
<th>Gas/Diesel Oil</th>
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<th>Other Product</th>
<th>Total Products (5)+(6)+(7)+(8)+(10)+(11)+(12)</th>
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</table>
**Production**

- All production within national boundaries including offshore production
- Such production should include crude oil, NGL, condensates and oil from shale or oil sands, as well as additives/oxygenates
- Distinction between wellhead production and marketable production

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<table>
<thead>
<tr>
<th></th>
<th>Crude Oil</th>
<th>NGL</th>
<th>Other</th>
<th>Total (1)+(2)+(3)</th>
<th>LPG</th>
<th>Naphtha</th>
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Example: Crude Oil Production

Wellhead Production

- Onshore oil well
- Offshore oil well

Gathering centre
(Gas & water separation facilities / Gas processing plants)

Marketable Production

- Refinery
- Storage tank (at shipment terminal)
- Direct use

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### From Other Sources

- Supplies of additives, biofuels and other hydrocarbons that are produced from non-oil sources

<table>
<thead>
<tr>
<th>Petroleum Products</th>
<th>Crude Oil</th>
<th>NGL</th>
<th>Other</th>
<th>Total (1)+(2)+(3)</th>
<th>LPG</th>
<th>Naphtha</th>
<th>Gasoline</th>
<th>Total Kerosene</th>
<th>Of which: Jet Kerosene</th>
<th>Gas/Diesel Oil</th>
<th>Fuel Oil</th>
<th>Other Products</th>
<th>Total Products (5)+(6)+(7)+ (8)+(9)+(10) +(11)+(12)</th>
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<td>Closing stocks</td>
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</table>

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**Imports and Exports**

- Quantities that physically cross international boundaries, whether or not customs clearance has taken place
- Excludes transit and amounts for international bunkers
- Amounts of pure biofuels not reported

<table>
<thead>
<tr>
<th>Crude Oil</th>
<th>NGL</th>
<th>Other</th>
<th>Total</th>
<th>LPG</th>
<th>Naphtha</th>
<th>Gasoline</th>
<th>Total Kerosene</th>
<th>Of which: Jet Kerosene</th>
<th>Gas/Diesel Oil</th>
<th>Fuel Oil</th>
<th>Other Products</th>
<th>Total Products</th>
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</tbody>
</table>

- Production
- From Other Sources
- Imports
- Exports
- Products Transferred/Backflows
- Direct Use
- Stock Change
- Statistical Difference
- Refinery Intake

= Demand
Closing stocks
**Products Transferred and Backflows**

- **Products Transferred**: Usually imported petroleum products reclassified as feedstocks for further processing, without delivery to final consumers. E.g. naphtha imported for upgrading.

- **Backflows**: finished or semi-finished products returned from final consumers to refineries for processing, blending or sale (usually by-products of the petrochemical industry).

<table>
<thead>
<tr>
<th></th>
<th>Crude Oil</th>
<th>NGL</th>
<th>Other</th>
<th>Total (1)+(2)+(3)</th>
<th>LPG</th>
<th>Naphtha</th>
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<th>Fuel Oil</th>
<th>Other Products</th>
<th>Total Products (5)+(6)+(7)+(8)+(10)+(11)+(12)</th>
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Example: Products Transferred

- Your country imported 150kt of Naphtha
- The naphtha was then reclassified as feedstocks for further processing at the refinery

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<table>
<thead>
<tr>
<th>Petroleum Products</th>
<th>LPG</th>
<th>Naphtha</th>
<th>Gasoline</th>
<th>Total Kerosene</th>
<th>Of which: Jet Kerosene</th>
<th>Gas/Diesel Oil</th>
<th>Fuel Oil</th>
<th>Other Products</th>
<th>Total Products</th>
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</table>

**Crude Oil** | **NGL** | **Other** | **Total** (1)+(2)+(3) | **LPG** | **Naphtha** | **Gasoline** | **Total Kerosene** | **Of which: Jet Kerosene** | **Gas/Diesel Oil** | **Fuel Oil** | **Other Products** | **Total Products** |
---|---|---|---|---|---|---|---|---|---|---|---|---|
(1) |     |     |         |     |     |     |     |     |     |     |     |     |
(2) |     |     |         |     |     |     |     |     |     |     |     |     |
(3) |     |     |         |     |     |     |     |     |     |     |     |     |
(4) |     |     |         |     |     |     |     |     |     |     |     |     |
(5) |     |     |         |     |     |     |     |     |     |     |     |     |
(6) |     |     |         |     |     |     |     |     |     |     |     |     |
(7) |     |     |         |     |     |     |     |     |     |     |     |     |
(8) |     |     |         |     |     |     |     |     |     |     |     |     |
(9) |     |     |         |     |     |     |     |     |     |     |     |     |
(10) |     |     |         |     |     |     |     |     |     |     |     |     |
(11) |     |     |         |     |     |     |     |     |     |     |     |     |
(12) |     |     |         |     |     |     |     |     |     |     |     |     |
(13) |     |     |         |     |     |     |     |     |     |     |     |     |

**Production** + Production
**From Other sources** + From Other sources
**Imports** + Imports
**Exports** + Exports

**Products Transferred** + Products Transferred

**Refinery Intake** = Refinery Intake

**Closing stocks** = Closing stocks
**Direct Use**

- Crude oil, NGL and other hydrocarbons which are used directly without being processed in oil refineries
- Example: Crude oil burned for electricity generation
### Example: Crude oil used for electricity generation

- Your country produces 100kt of crude oil.
- The crude oil is used directly for producing electricity.

<table>
<thead>
<tr>
<th></th>
<th>Crude Oil</th>
<th>NGL</th>
<th>Other</th>
<th>Total (1)+(2)+(3)</th>
<th>LPG</th>
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</table>
Stock Change and Closing Stocks

- Definition of stocks is based on geographical location, except for OPEC where definition is based on ownership.
- Closing Stocks: primary stock level at the end of the month on national territory. This includes stocks held by companies, stock holding organizations and governments.

<table>
<thead>
<tr>
<th>Direct Use</th>
<th>Crude Oil</th>
<th>NGL</th>
<th>Other</th>
<th>Total (1)+(2)+(3)</th>
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<td>Closing stocks</td>
<td>Closing stocks</td>
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</table>
## Refinery Intake

- Observed inputs of crude oil, NGL, feedstocks, additives, biofuels and other hydrocarbons entering the refinery process.
- Difference between inputs and deliveries to the refinery reflected in stocks changes at the refinery.

### Table: Flow Definitions

<table>
<thead>
<tr>
<th>Petroleum Products</th>
<th>Crude Oil</th>
<th>NGL</th>
<th>Other</th>
<th>Total (1)+(2)+(3)</th>
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<th>Total Products (5)+(6)+(7)+(8)+(10)+(11)+(12)</th>
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### Statistical Difference

- For primary products:
  \[
  \text{Statistical Difference} = \text{Calculated Refinery Intake} - \text{Observed Refinery Intake}
  \]

- For secondary products:
  \[
  \text{Statistical Difference} = \text{Calculated Demand} - \text{Observed Demand}
  \]

#### JODI Oil Questionnaire – Flow Definitions

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<thead>
<tr>
<th>Crude Oil</th>
<th>NGL</th>
<th>Other</th>
<th>Total (1)+(2)+(3)</th>
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<th>Naphtha</th>
<th>Gasoline</th>
<th>Total Kerosene</th>
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<th>Total Products (5)+(6)+(7)+(8)+(10)+(11)+(12)</th>
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- Production
- From Other sources
- Imports
- Exports
- Products Transferred/Backflows
- Direct Use
- Stock Change

- Statistical Difference
- Refinery intake
- Closing stocks

© OECD/IEA 2018
**Refinery Output**

- Production of finished petroleum products at a refinery. Gross output should be reported, including refinery fuel.
- Avoid double-counting: Double-counting may occur when handling intermediate or semi-finished products.
### Receipts

- **Primary product receipts**
  - Primary products used directly without being processed at a refinery
  - Backflows from the petrochemical industry used directly (not going back to refinery)

- **Recycled products**
  - Finished products passing through the marketing network a second time after having been delivered to final consumers (e.g., Oil lubricants which are cleaned for reuse)

### Table: Petroleum Products Flow Definitions

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<th>Crude Oil</th>
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</table>
Interproduct Transfers

- Reclassification of products due to change in specification or blending
- Total interproduct transfers are zero as individual transfers net out
- Example: Jet kerosene which has deteriorated or has been spoiled may be reclassified as other kerosene

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</table>
How LPG is reported if it comes from a refinery or a gas plant
**LPG produced in a refinery**

- 10kt of LPG are produced in a refinery

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<tr>
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<th>Crude Oil</th>
<th>NGL</th>
<th>Other</th>
<th>Total (1)+(2)+(3)</th>
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10kt of LPG are produced in a refinery.
**LPG produced in a natural gas plant**

- 50kt of LPG are produced in a natural gas plant

NGL is included in "Other Products"
## JODI Oil Questionnaire – Flow Definitions

### Demand
- Final consumers
- Energy transformation
- Energy producers
- International navigation and aviation
- Includes direct use of crude oil, NGL and other hydrocarbons

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<th>Other</th>
<th>Crude Oil + NGL + Other</th>
<th>Total</th>
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</table>
JODI Oil Questionnaire – Flow Definitions

Demand

=

- Refinery fuel
- International bunkers
- Direct use
- Inland deliveries

Crude oil, NGL

Power generation, Other energy, Industry, Transport, Residential, Commercial, Agricultural
Useful Information – Reporting Unit

• Preferred reporting unit: thousand metric tons

• Volumetric units also accepted (barrels, cubic meters)

• National Administrations are asked to provide the specific densities for each product for conversion
Useful Information – Conversion Factors

• Conversion from volume to mass: specific density is different for each product

• Conversion factor for “Total Oil” should be the weighted average of all included products
Useful Information – Conversion Factors

Typical densities, conversion factors and calorific values for crude oil and petroleum products

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<tr>
<th>Product</th>
<th>Density kg/m3</th>
<th>Litres per metric ton</th>
<th>Barrel per metric ton</th>
<th>Gross Calorific Value (GJ/t)</th>
<th>Net Calorific value (GJ/t)</th>
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<td>Aviation gasoline</td>
<td>707</td>
<td>1414</td>
<td>8.90</td>
<td>47.40</td>
<td>45.03</td>
</tr>
<tr>
<td>Motor gasoline (¹)</td>
<td>741</td>
<td>1350</td>
<td>8.49</td>
<td>47.10</td>
<td>44.75</td>
</tr>
<tr>
<td>Jet Kerosene</td>
<td>803</td>
<td>1246</td>
<td>7.84</td>
<td>46.93</td>
<td>44.58</td>
</tr>
<tr>
<td>Other Kerosene</td>
<td>810</td>
<td>1235</td>
<td>7.76</td>
<td>46.05</td>
<td>43.75</td>
</tr>
<tr>
<td>Gas/Diesel oil</td>
<td>844</td>
<td>1186</td>
<td>7.46</td>
<td>45.66</td>
<td>43.38</td>
</tr>
<tr>
<td>Fuel oil low sulphur</td>
<td>925</td>
<td>1081</td>
<td>6.80</td>
<td>43.75</td>
<td>41.56</td>
</tr>
<tr>
<td>Fuel oil high sulphur</td>
<td>975</td>
<td>1026</td>
<td>6.45</td>
<td>42.00</td>
<td>39.90</td>
</tr>
<tr>
<td>Bunker Fuel oil</td>
<td>975</td>
<td>1026</td>
<td>6.45</td>
<td>42.60</td>
<td>40.47</td>
</tr>
<tr>
<td>Fuel Oil (Avg)</td>
<td>944</td>
<td>1059</td>
<td>6.66</td>
<td>42.82</td>
<td>40.68</td>
</tr>
<tr>
<td>White Spirit</td>
<td>743</td>
<td>1346</td>
<td>8.46</td>
<td>46.32</td>
<td>44.00</td>
</tr>
<tr>
<td>Paraffin Waxes</td>
<td>801</td>
<td>1248</td>
<td>7.85</td>
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<td>39.90</td>
</tr>
<tr>
<td>Lubricants</td>
<td>887</td>
<td>1127</td>
<td>7.09</td>
<td>44.00</td>
<td>41.80</td>
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<tr>
<td>Bitumen</td>
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<td>966</td>
<td>6.08</td>
<td>42.10</td>
<td>40.00</td>
</tr>
<tr>
<td>Petroleum Coke</td>
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<td>870</td>
<td>5.47</td>
<td>34.80</td>
<td>33.06</td>
</tr>
<tr>
<td>Other Products</td>
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<td>1273</td>
<td>8.00</td>
<td>42.90</td>
<td>40.19</td>
</tr>
</tbody>
</table>

(¹) Assumes a mixture of 60% propane and 40% butane by mass.
(²) An average for motor gasolines with RON between 91 and 95.
(³) For Naphtha and heavier oils the net calorific value is assumed to be 95% of gross.
Useful Information – Conversion Factors

Converting volume into mass

• Converting 100,000 barrels of motor gasoline into metric tons
• Density of motor gasoline for conversion from volume to mass
• Density of motor gasoline: 8.49bbl/t

• Calculation: \[ \frac{100,000 \text{ bbl}}{8.49 \text{ bbl/t}} = 11.78 \text{ kt} \]
Overview of the Extended JODI Questionnaire

Definitions of products and flows

Data verification methods

Examples of practices from countries

Database overview

Available in English