7th Regional JODI Training Workshop
8-10 October 2012, Rabat, Morocco

# Hands-on exercise using sample data

**Presented by Ms. Liliana Suchodolska (IEA)**

# Exercises

- Around 100 countries submits monthly JODI
- It is important that the quality of data is checked before submission
- The following exercises are based on actual submissions, where we hide the country and mask the numbers (multiplying by a constant)

# Setting an example in the JODI Extended questionnaire:

JOINT OIL DATA INITIATIVE - Maxi-JODI

*Country* _____

*Month* _____

*Unit: Thousand Metric Tons*

| | Crude Oil | NGL | Other | Total (1)+(2)+(3) | | 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) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) |
| + Production | 235 | | 116 | 351 | + Refinery Output | 243 | 687 | 1810 | 439 | 440 | 3533 | 568 | 1153 | 8433 |
| + From Other sources | | | 296 | 296 | + Receipts | 5 | 45 | 302 | 0 | 0 | 20 | 29 | 104 | 505 |
| + Imports | 6305 | | | 6305 | + Imports | 71 | 733 | 219 | 401 | 400 | 964 | 254 | 205 | 3247 |
| - Exports | | | | 0 | - Exports | 33 | 57 | 337 | 53 | 53 | 733 | 194 | 281 | 1688 |
| + Products Transferred | | | 745 | 745 | - Products Transferred | 4 | 21 | 122 | 0 | 0 | 31 | 107 | 240 | 525 |
| - Direct Use | | | 155 | 155 | + Interproduct Transfer | 0 | 186 | -185 | 0 | 0 | 0 | 0 | 0 | 1 |
| - Stock Change | -123 | | | -123 | - Stock Change | -4 | 11 | 24 | 3 | 3 | -362 | 0 | -37 | -365 |
| - Statistical Differen | 396 | 0 | 157 | 553 | - Statistical Difference | -64 | 22 | 138 | 22 | 24 | 81 | -102 | 88 | 91 |
| = Refinery Intake | 6267 | | 845 | 7112 | = Demand | 350 | 1540 | 1801 | 762 | 760 | 4034 | 652 | 890 | 10029 |
| Closing stocks | 19912 | | | 19912 | Closing stocks | 73 | 417 | 3383 | 1297 | 1293 | 10741 | -102 | 1082 | 16891 |

Total is not sum of t

Total should be zero

1663

*Automatic Checks*

| | |
|---|---|
| *Total sum* | OK |
| *Statistical Difference* | OK |
| *Stat. Diff./Refinery Intake* | Statistical Difference above 10% of Refinery Intake, please investigate |
| *Products Transferred* | OK |
| *Negative Products Transferre* | OK |
| *Blocked out cells* | OK |
| *Negative Stock Values* | OK |
| *Refinery Losses* | -1,321 Reported figures imply a refinery gain. Losses should not be negative |

*Automatic Checks Petroleum Products*

| | |
|---|---|
| *Total Products sum* | Total Products column is not the sum of the elements |
| *Statistical Difference* | Statistical Difference not calculated correctly |
| *Stat. Diff. /Demand* | Statistical Difference above 10% of Demand, please investigate |
| *Negative Products Transfer.* | OK |
| *Interproduct transfers* | Total Products Interproduct Transfers should be zero |
| *Jet Kerosene* | Jet Kerosene should be smaller than Total Kerosene |
| *Negative Stock Values* | Negative stock value |

*More product detail requested including a column for other products.*

*Automatic checks to more quickly see potential discrepancies.*

# 1) Take 5 minutes to analyze the submission below and take notes.

- Discuss with your colleagues
- Does everything seem consistent?

| | Crude Oil | NGL | Other | Total (1)+(2)+(3) |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| + Production | 1798 | | 91 | 314 |
| + From Other sources | | | 299 | 299 |
| + Imports | | | | |
| - Exports | 1819 | | | 1819 |
| + Products Transferred /Backflows | | | 992 | 992 |
| - Direct Use | | | 462 | 492 |
| - Stock Change | -44 | | | -44 |
| - Statistical Difference | -66 | 0 | 30 | -66 |
| = Refinery Intake | 53534 | | 890 | 54424 |
| Closing stocks | 19920 | -89 | | 19831 |

# Answer:

| | Crude Oil | NGL | Other | Total (1)+(2)+(3) |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| + Production | 1798 | | 91 | 314 |
| + From Other sources | | | 299 | 299 |
| + Imports | | | | |
| - Exports | 1819 | | | 1819 |
| + Products Transferred /Backflows | | | 992 | 992 |
| - Direct Use | | | 462 | 492 |
| - Stock Change | -44 | | | -44 |
| - Statistical Difference | -66 | 0 | 30 | -66 |
| = Refinery Intake | 53534 | | 890 | 54424 |
| Closing stocks | 19920 | -89 | | 19831 |

Calculated
Crude Oil and NGL
Refinery Intake =
Production
+ Imports
– Exports
– Direct Use
– Stock Change

Note that for Other Primary Products you need to add From Other Sources and Product Transferred/ Backflows

- The Statistical Difference for Crude Oil is not calculated correctly :

Calculated Refinery Intake = 1798 – 1819 – (– 44) = 23

Observed Refinery Intake = 53534

**Statistical Difference = Calculated Refinery Intake – Observed Refinery Intake**

**23 – 53534 = – 53511** Missing imports? Underreported production? Wrong units?

- NGL: negative closing stocks, no other flows reported.
- The column "Total" is not equal to its components for Production, Direct Use and Statistical Difference.

# 1) Take 15 minutes to analyze the submission below and take notes. Discuss with your colleagues what is wrong in the following cells;

| | | Petroleum Products | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| ...tal ...(2)+(3) | | 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) |
| (4) | | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) |
| 351 | + Refinery Output | 243 | 687 | 1810 | 439 | 440 | 3533 | 568 | 1153 | **8433** |
| 296 | + Receipts | 5 | 45 | 302 | 0 | 0 | 20 | 29 | 104 | **505** |
| 305 | + Imports | 71 | 733 | 219 | 401 | 400 | 964 | 254 | 205 | **3247** |
| 0 | - Exports | 33 | 57 | 337 | 53 | 53 | 733 | 194 | 281 | **1688** |
| 745 | - Products Transferred | 4 | 21 | 122 | 0 | 0 | 31 | 107 | 240 | **525** |
| 155 | + Interproduct Transfers | 0 | 186 | -185 | 0 | 0 | 0 | 0 | 0 | **1** |
| -123 | - Stock Change | -4 | 11 | 24 | 3 | 3 | -362 | 0 | -37 | **-365** |
| 553 | - Statistical Difference | -64 | 22 | -138 | 22 | 24 | 81 | -102 | 88 | **-91** |
| 7112 | = Demand | 350 | 1540 | 1801 | 762 | 760 | 4034 | 652 | 890 | **10029** |
| 19912 | Closing stocks | 73 | 417 | 3383 | 1297 | 1293 | 10741 | -102 | 1082 | **16891** |

# Balance Check:

Calculated Supply =
Refinery Output + Receipts + Imports – Exports – Product Transferred + Interproduct Transfers - Stock changes

- *Of which Jet Kerosene* is greater than Total Kerosene;
- Negative stocks of Fuel Oil;
- LPG and Fuel Oil Statistical Difference above 10% of Demand;
- The sum of imported products is too high (3247). The "of which item" should not be counted, therefore it should be 3247 – 400 (Jet Kerosene) = 2847;
- Example of a correct balance calculation:

***Calculated Gasoline supply***

| | |
|---|---|
| **Production** | **1818** |
| **+ Receipts** | **302** |
| **+ Imports** | **219** |
| **– Exports** | **337** |
| **– Product Transferred** | **122** |
| **+ Interproduct Transfer** | **-85** |
| **– Stock changes** | **24** |
| | **1663** |

**Demand = 1801**
**Therefore statistical difference**
**= 1663 – 1801 = – 138**

# For Example, Fuel Oil

- Some closing stocks are negative!
- However, it seems that what is reported as "stock closing" actually refers to "stock change", as the calculated supply …

Calculated Supply =
Refinery Output + Receipts + Imports – Exports – Product Transferred + Interproduct Transfers - Stock changes

… would match perfectly the demand if we replaced "stock change" by "<u>stock closing</u>".

# For Example, Fuel Oil

- ***Calculated Fuel Oil supply***

| | | |
|---|---|---|
| Production | 568 | |
| + Receipts | 29 | |
| + Imports | 254 | |
| – Exports | 194 | |
| – Product Transferred | 107 | |
| +Interproduct Transfer | 0 | |
| – Stock changes* | -102 | *Closing stock (-102) |
| | 652 | Demand is also 652 |

- What is reported in "stock change", then, if it can be negative?
- But this is guesswork and it should be avoided:
  - By quality checks before submission
  - Or, after submission, by contacting back the data providers for clarification

# Balance Check:

Please also pay attention to the balance between the Primary and Secondary Products and to the checks below the 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 (5)+(6)+(7)+(8)+(10)+(11)+(12) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) |
| + Production | 235 | | 116 | 351 | + Refinery Output | 243 | 687 | 1810 | 439 | 439 | 3533 | 568 | 1153 | 8433 |
| + From Other sources | | | 296 | 296 | + Receipts | 5 | 45 | 302 | 0 | 0 | 20 | 29 | 104 | 505 |
| + Imports | 6305 | | | 6305 | + Imports | 71 | 733 | 219 | 401 | 400 | 964 | 254 | 205 | 2847 |
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| + Products Transferred | | | 745 | 745 | - Products Transferred | 4 | 21 | 122 | 0 | 0 | 31 | 107 | 240 | 525 |
| - Direct Use | | | 155 | 155 | + Interproduct Transfe | 0 | 186 | -185 | 0 | 0 | 0 | 0 | 0 | 1 |
| - Stock Change | -123 | | | -123 | - Stock Change | -4 | 11 | 24 | 3 | 3 | -362 | -102 | -37 | -467 |
| - Statistical Differen | 396 | 0 | 167 | 563 | - Statistical Difference | -64 | 22 | -138 | 22 | 23 | 81 | 117 | 88 | 128 |
| = Refinery Intake | 6267 | | 845 | 7112 | = Demand | 350 | 1540 | 1801 | 762 | 760 | 4034 | 535 | 890 | 9912 |
| Closing stocks | 19912 | | | 19912 | Closing stocks | 73 | 417 | 3383 | 1297 | 1293 | 10741 | 345 | 1082 | 17338 |

*Automatic Checks*

| | |
|---|---|
| *Total sum* | OK |
| *Statistical Difference* | OK |
| *Stat. Diff./Refinery Intake* | Statistical Difference above 10% of Refinery Intake |
| *Products Transferred* | OK |
| *Negative Products Transferre* | OK |
| *Blocked out cells* | OK |
| *Negative Stock Values* | OK |
| *Refinery Losses* | -1,321 Reported figures imply a refinery gain. Losses should not be negative |

*Automatic Checks Petroleum Products*

| | |
|---|---|
| *Total Products sum* | OK |
| *Statistical Difference* | OK |
| *Stat. Diff. /Demand* | Statistical Difference above 10% of Demand |
| *Negative Products Transfer* | OK |
| *Interproduct transfers* | Total Products Interproduct Transfers should be zero |
| *Jet Kerosene* | OK |
| *Negative Stock Values* | OK |

# Balance:

The refinery losses are negative = refinery gain (should be avoided).

Refinery output 18% higher than refinery input

8433 / 7112 = 118%

**Refinery Losses** = Refinery Intake of Total Products – Refinery Output of Total Products

## Other inconsistencies:

**Interproduct transfer** of Total Products should be equal to 0

- Interproduct transfer different from 0;

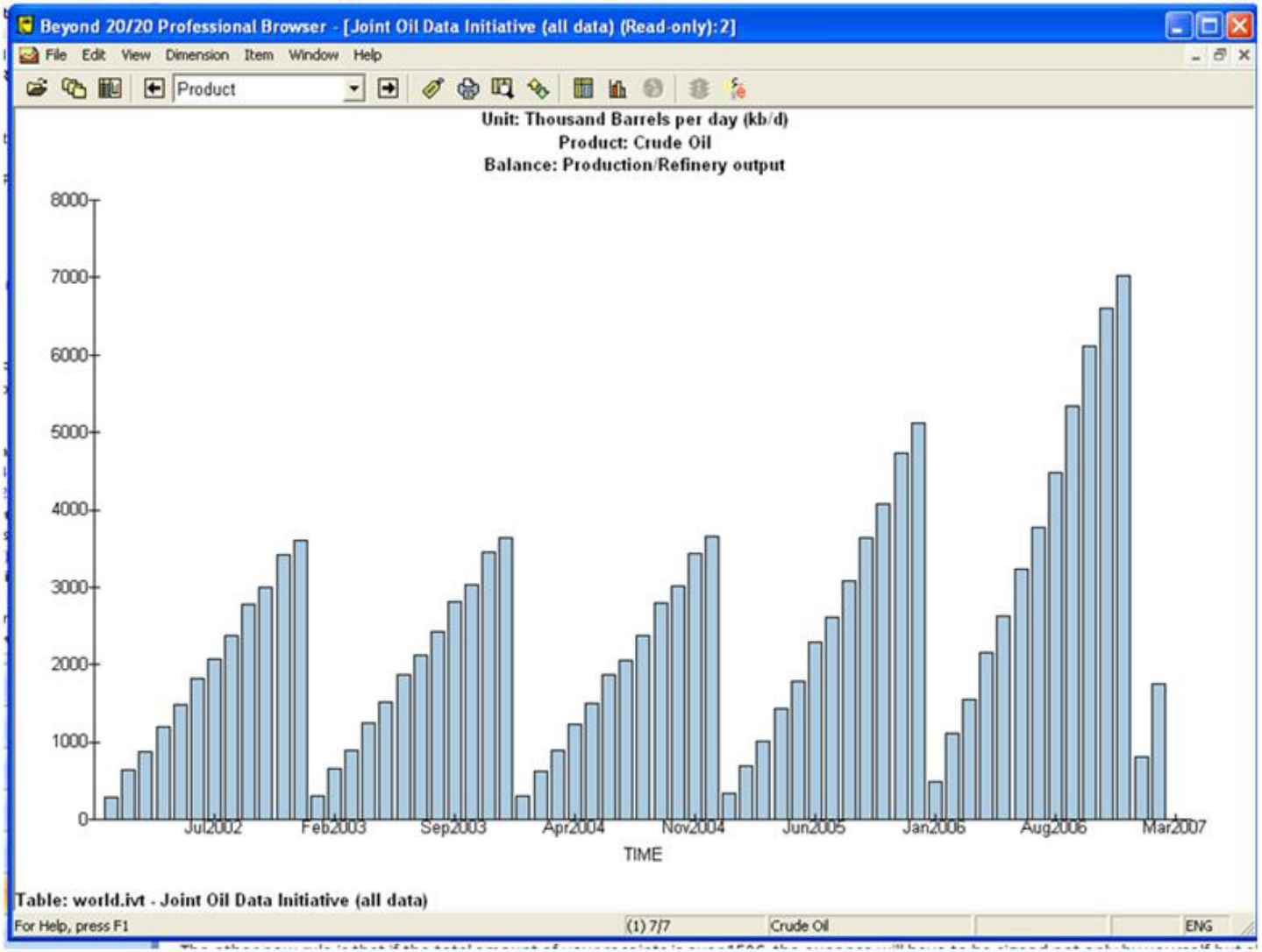
- Statistical Difference above 10% of Refinery Intake for Other primary products.

For LPG and Fuel Oil Statistical Difference above 10% of Demand.

# Possible Causes of Imbalance and Inconsistencies

- Missing data ≠ 0?
- Hidden confidential data?
- Different units?
- Does a negative output represent an input to the refineries?
- Different time spans?
- Inaccuracy (wrong data)?
- In any way, if data is close to accurate, a considerable amount of metadata is missing

# 3) Take 5 minutes to analyze the chart below from the Beyond 2020 table and take notes. Discuss with your colleagues.



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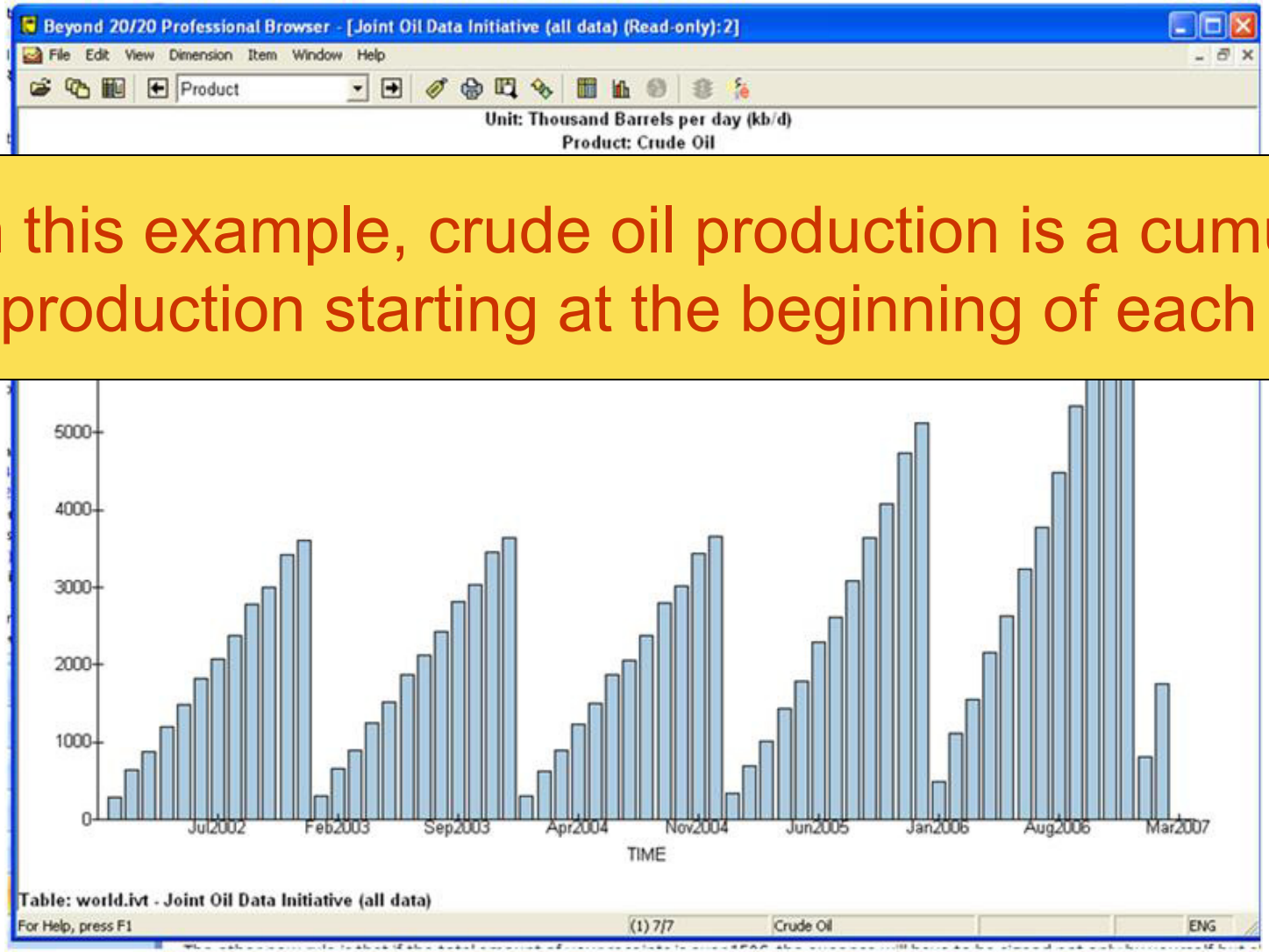


In this example, crude oil production is a cumulative production starting at the beginning of each year

# Thank You

For more information at

**www.jodidata.org**