

The Joint Organization Data Initiative – Oil (JODI Oil) in APEC



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From November 2006, a monthly oil supply and demand database had become available to the public online. This database contains production (indigenous production and refinery output), imports, exports, trade and demand (refinery intake and consumption) of crude oil and petroleum products of 99 countries/economies, covering more than 90% of world supply and consumption. The database is called the JODI Oil World Database hosted by the International Energy Forum (IEF) based in Riyadh, Saudi Arabia. The database can be accessed free of charge at <http://www.jodidata.org/>.

The database was established to address the issue that lack of transparency is the reason for oil price volatility in the world market. The database is updated monthly with 1 and 1/2 month old data. This means that in about the 15th to 18th of this month, March 2012, oil production, trade, stocks and consumption data until the month of January 2012 would be available online.

History

The later half of 1990's was plagued by high oil prices. There were concerns why prices are very high when there is enough supply. The lack of transparent statistics and reliable data was identified as an aggravating factor for the volatility in oil prices in addition to factors such as political tensions and economic shocks².

International organizations collecting statistics therefore started discussions on how to improve oil data. Initial discussions were held in Ecuador in 1997, Paris in 1999 and Madrid in July 2000. In November 2000, six international organizations, recognizing that their individual data cannot be compared with the others, noted the need to resolve differences in reported oil statistics, identified the possible reasons of the differences and recognized that countries should be involved in the process. These international organizations are: the Asia Pacific Economic Cooperation (APEC) represented by The Institute of Energy Economics, Japan as coordinating agency of APEC Expert Group on Energy Data and Analysis, the Statistical Office of the European Union (EUROSTAT), the International Energy Agency (IEA), the Latin American Organization on Energy (OLADE), the Organization of Petroleum Exporting Countries (OPEC) and the United Nations Statistics Division (UNSD).

At the 7th International Energy Forum (IEF) on November 2000, the energy ministers of participating countries recognized that cooperation of relevant international organizations as well as participating countries is essential in improving oil transparency. This gave political support to the data transparency initiative.

¹ Any views or opinions presented in this article are solely those of the author and do not necessarily reflect those of IEEJ and the 7 international organizations cooperating in JODI.

² Garnier, Jean-Yves. 2006. *Powerpoint presentation to the 17th Meeting of the APEC Expert Group on Energy Data and Analysis: An Update on the Joint Oil Data Initiative (JODI)*. Lombok Island, Indonesia. February.

In April 2001, during the 1st International Meeting on Oil Data Transparency, the 6 pioneering international organizations decided to launch a 6-month data reporting exercise called as the Joint Oil Data Exercise or JODE³. JODE was later changed to Joint Oil Data Initiative (JODI).

The reporting exercise asked participating countries/economies to submit monthly oil supply and demand data to their respective organizations. From April 2001 to November 2001, 55 countries participated in the exercise. Six months later the number increased to 70 representing 90% of global oil supply and demand.

Having obtained the political support to reinforce the work, the 6 international organizations decided to make the exercise a permanent reporting mechanism during the 3rd Oil Statistics Conference in May 2002 (the 3rd JODI Conference). In the 8th and 9th IEF meetings in Osaka in September 2002 and in Amsterdam in May 2004, strong political support to the initiative was reaffirmed.

In October 2003, during the 4th JODI Conference, the international organizations focused on the quality of data and agreed to combine the databases in each of the 6 organizations into a JODI World Database. The database was consolidated at IEA but not yet available to the public.

In October 2004, at the 5th JODI Conference, which was attended by 120 participants from 45 countries and 15 oil companies, policy makers, statisticians, oil analysts, it was decided that the JODI World Database be opened to the public within 6 months. The number of participating countries to the initiative increased to more than 90. During this conference, the International Energy Forum (IEF) joined the initiative and was made as the coordinator of the activity. A review committee created after the conference evaluated the data and recommended that the database can be opened to the public but in view of the committee's concern for data quality it took 13 months before the launch of the database.

In November 2005, the database was launched and opened to the public in conjunction with the inauguration of the new IEF premises in Riyadh, Saudi Arabia by the country's King Abdullah. The database has been made available to the public from then and is updated every month to include the latest month's data.

In November 2006, during the 6th JODI Conference, the international energy organizations discussed the extension of the JODI data collection to include more products and flows. The reporting format was revised to increase the numbers of data points collected from 42 to 113 data points. The number of products increased from 7 to 13 while the number of flows increased from 6 to 9. More than half of the participating countries/economies are already submitting data using the revised format. The release of the additional data is still being discussed by the JODI organizations.

In December 2010, JODI was renamed Joint Organizations Data Initiative – Oil or JODI Oil in view of the expansion of the data initiative to natural gas which was called JODI Gas.

³ Considered later as the 1st JODI Conference.

The JODI World Database

The JODI World Database contains the monthly oil data of 99 countries and economies from January 2002 although during the period January to June 2011, 12 countries have not submitted data⁴. The database is available online and contains the monthly data of 7 oil products and 6 flows. The 7 products are: Crude Oil which includes Lease Condensates, Liquefied Petroleum Gas (LPG), Gasoline which include Aviation Gasoline, Kerosene which comprises Jet Kerosene and Other Kerosene, Gas/Diesel Oil, Fuel Oil and Total Oil Products⁵. Since each of the 6 international organizations has their own definitions for each product, the JODI Oil definitions are harmonized as follows:

1. **Crude Oil:** Crude oil including lease condensates but excluding natural gas liquids (NGL)
2. **LPG:** Comprises butane and propane
3. **Gasoline:** Comprises motor gasoline and aviation gasoline
4. **Kerosene:** Comprises jet kerosene and other kerosene
5. **Gas/Diesel Oil:** For automotive and other purposes
6. **Heavy Fuel Oil:** Heavy residual oil / boiler oil, including bunker oil
7. **Total Oil Products:** Categories (2) to (6) and all other petroleum products (refinery gas, ethane, naphtha, petroleum coke, white spirit and SBP, paraffin waxes, bitumen, lubricants and others). Demand of Total Oil

The product flows included in the database are: Production, Imports/Exports, Closing Stock, Stock Changes, Refinery Intake, Refinery Output and Demand. The harmonized definitions for these flows are as follows:

1. **Production:** Marketed Production, after removal of impurities but including quantities consumed by the producer in the production process
2. **Imports/Exports:** Goods having physically crossed the international boundaries, excluding transit trade, international marine and aviation bunkers
3. **Closing Stock:** Represents the primary stocks level at the end of the month within national territories
4. **Stock Changes:** Closing minus opening level. Positive number corresponds to stock build; negative number corresponds to stock draw.
5. **Refinery Intake:** Observed refinery throughputs
6. **Refinery Output:** Gross output (including refinery fuel)
7. **Demand:** Deliveries or sales to the inland market (domestic consumption) plus refinery fuel plus international marine and aviation bunkers. Demand for Total Oil includes direct consumption of Crude Oil.

The database is different from any database as this database includes an indication of data quality by color codes. The data cells are colored blue, yellow or white. Blue indicates that the international organization covering the country/economy has high degree of confidence on the quality of the data. Yellow indicates that the data might not be reliable so it should be used with caution while white indicates that the data is not assessed.

⁴ International Energy Forum. Undated. *The JODI World Database*. www.jodidata.org. Riyadh, Saudi Arabia

⁵ JODI Organizations. Undated. *Original JODI Reporting Format MS Excel file*.

From the database, users can determine the supply and consumption of oil every month. Figure 1 shows a screenshot of the online JODI World Database showing the color-coded database.

Figure 1 – Screenshot of the JODI World Database

Other:	Unit - Thousand Barrels per day (kb/d)												Product - Total Products		BALANCE - Refinery intake/Demand				
TIME	Oct2010	Nov2010	Dec2010	Jan2011	Feb2011	Mar2011	Apr2011	May2011	Jun2011	Jul2011	Aug2011	Sep2011	Oct2011	Nov2011	Dec2011				
Country	↑↓	↑↓	↑↓	↑↓	↑↓	↑↓	↑↓	↑↓	↑↓	↑↓	↑↓	↑↓	↑↓	↑↓	↑↓				
Australia	892	951	901	825	952	923	893	932	936	916	921	933	901	991	928				
Belgium	623	636	632	608	687	610	586	579	606	595	620	655	593	584	588				
Brazil	2,347	2,419	2,437	1,579	2,358	2,460	2,198	2,244	2,239	2,225	2,141	2,423	2,337	1,805	1,808				
Canada	2,062	2,107	2,153	1,994	2,091	2,160	1,939	1,981	2,160	2,123	2,235	2,154	2,023	2,097	2,085				
China	9,050	10,232	9,787	9,146	9,354	8,723	9,042	9,002	8,702	8,599	9,030	9,267	9,326	9,852	0				
Chinese Taipei	950	893	1,061	1,044	1,074	1,007	991	944	923	943	818	861	873	938	942				
Egypt (Arab Rep.)	744	776	703	736	785	674	732	660	745	686	730	701	691	749	670				
France	1,734	1,765	1,920	1,749	1,905	1,790	1,750	1,741	1,793	1,804	1,803	1,930	1,771	1,718	1,713				
Germany	2,628	2,598	2,330	2,230	2,431	2,388	2,246	2,384	2,244	2,397	2,634	2,543	2,475	2,446	2,307				
India	2,834	2,920	3,132	2,959	3,171	3,151	3,050	3,037	2,919	2,740	2,585	2,694	2,837	3,090	3,035				
Indonesia	1,204	1,167	1,271	1,196	1,222	1,269	1,325	1,273	1,306	1,343	1,300	1,312	1,333	1,580	1,332				
Iran (Islamic Rep.)	1,502	1,500	1,507	1,503	1,500	1,501	1,480	1,457	1,444	1,443	0	1,450	1,452	1,444	0				
Iraq	543	534	572	517	520	480	502	534	577	586	600	618	595	625	623				
Italy	1,493	1,512	1,556	1,309	1,451	1,397	1,427	1,395	1,484	1,456	1,374	1,509	1,440	1,375	1,377				
Japan	4,106	4,684	5,084	4,967	5,139	4,641	4,079	3,794	3,995	4,306	4,535	4,377	4,484	4,711	5,451				
Korea	2,274	2,415	2,509	2,478	2,394	2,344	2,049	2,055	2,159	2,224	2,271	2,308	2,272	2,324	2,511				
Malaysia	637	677	700	620	624	650	499	447	499	458	632	651	720	1,070	0				
Mexico	1,797	1,857	1,886	1,735	1,896	1,908	1,907	1,881	1,992	1,929	1,982	1,880	1,828	1,880	2,044				
Netherlands	1,085	1,109	1,024	1,038	1,053	1,051	1,035	1,089	1,129	1,079	1,083	1,114	1,134	1,033	1,026				
Poland	645	589	539	495	536	537	547	577	577	580	623	632	625	603	527				
Russian Federation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Saudi Arabia	2,089	1,638	1,802	1,783	1,786	1,670	1,903	2,241	2,205	2,419	2,289	2,385	1,994	2,112	1,874				
Singapore	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
South Africa	469	448	428	395	440	472	491	468	478	506	496	495	493	417	403				
Spain	1,425	1,463	1,427	1,364	1,462	1,442	1,377	1,326	1,392	1,428	1,347	1,380	1,331	1,355	1,321				
Thailand	861	905	911	935	963	965	966	933	945	915	921	918	869	833	930				
Turkey	634	633	552	496	532	544	593	631	701	772	724	704	644	626	624				
United Kingdom	1,586	1,554	1,434	1,509	1,560	1,545	1,520	1,466	1,586	1,476	1,525	1,583	1,493	1,510	1,514				
United States of America	18,974	18,977	19,722	19,120	18,870	19,248	18,612	18,364	19,278	18,556	19,154	18,798	18,564	18,734	18,507				
Venezuela	642	635	623	608	658	606	624	609	677	638	694	688	662	666	670				
Total Top 30 Demand	65,831	67,592	68,599	64,937	67,412	66,156	64,360	64,043	65,690	65,144	65,069	66,964	65,760	67,168	54,809				

JODI Oil in APEC

As the coordinating agency for APEC, one of the 6 original international organizations participating in the initiative, IEEJ collects the monthly oil data from the 21 member economies⁶. Data collection started for the month of January 2001 on which 5 economies submitted their data. By December 2001, 19 of the 21 member economies have participated in the initiative.

⁶ The APEC member economies are: Australia; Brunei Darussalam; Canada; Chile; People's Republic of China; Hong Kong, China; Indonesia; Japan; Republic of Korea; Malaysia; Mexico; New Zealand; Papua New Guinea; Peru; Philippines; Russia; Singapore; Chinese Taipei; Thailand; United States of America and Viet Nam.

The countries'/economies' participation to the initiative is assessed according to three criteria. These are sustainability, timeliness and completeness. The three criteria would indicate whether the initiative is really contributing to the transparency of the oil market. Sustainability would indicate that an economy can provide data on a monthly basis. Timeliness and completeness of submitted data will ensure that the initiative can provide complete information on a timely manner to the oil market.

Sustainability

Sustainability is the measure of how a country/economy is able to continuously participate in the initiative. The country's/economy's performance is assessed by the number of monthly questionnaires it can submit every semester. Submission of 6 questionnaires gets a rating of "good" or a smiley face (☺), 4-5 questionnaires is given a rating of "fair" or a neutral face (☹) while submission of 3 questionnaires and less is given a "poor" rating or a frowning face (☹).⁷

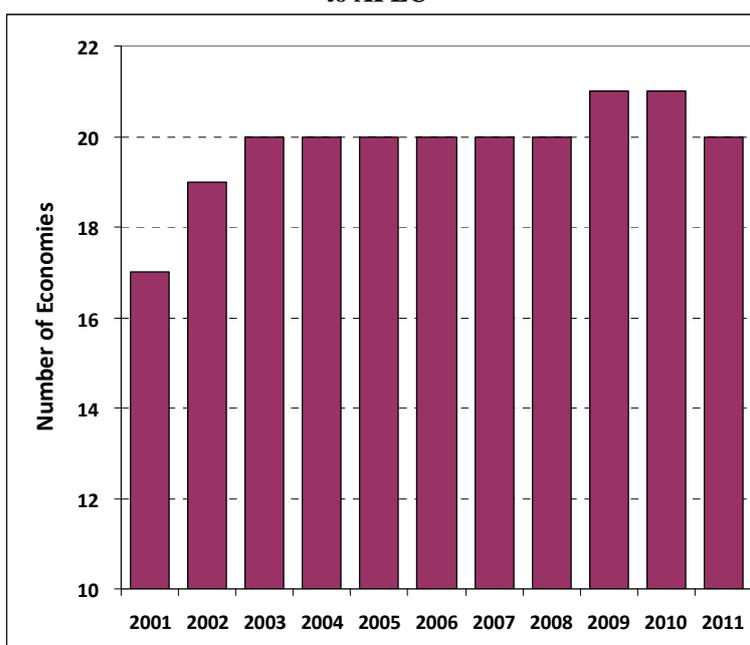
In APEC, not all economies are able to participate at the onset of the initiative in January 2001. Only 5 economies were able to submit data during that month which gradually increased to 17 by the end of the year (19 economies submitted in some months). It was also noted that economies are not able to sustain continuous submission.

From 2003 to 2008, a maximum of 20 economies submitted data to IEEJ. Of the 21 economies, Indonesia was the one that was not submitting as it decided to

submit to OPEC on which it was also a member country. Indonesia started submitting to IEEJ in 2009 after it had left OPEC membership. All the 21 APEC economies submitted data to IEEJ in 2009 and 2010. However, in October 2010, Viet Nam stopped. From 21, the number of participating economies returned to 20.

This is one the issues that needs to be addressed in APEC. It seems that the participation to the initiative of Viet Nam is due to the close relationship of IEEJ with the official involved in international relations in the country. When the official retired, his replacement did not continue what he has started. It seems that the data collection and submission to the initiative

Figure 2 – Number of Economies that Submitted JODI Oil Data to APEC



⁷ International Energy Forum. Undated. *The JODI World Database*. <http://www.jodidata.org/participants/participation-assessment.aspx>.

was not institutionalised. This matter has been extensively discussed by IEEJ with Viet Nam ever since the country stopped submitting data with no success. Hopefully Viet Nam will be able to start the institutionalisation of data collection and submission soon.

Timeliness

Timeliness is how early an economy can submit its monthly data. Ideally, an economy should be able to submit the data at one month after the end of the month or month minus 1 (M-1). But in APEC, non-OECD economies can submit the data two months after the end of the month or month minus 2 (M-2). The economies are also given a grace period of 10 days after the end of the month. Thus, a submission 10 days after the deadline is still considered M-1.

Timeliness is rated as follows:

- Good if an economy is able to submit 6 M-1 or M-2 in a semester. The economy gets a smiley face rating (☺).
- Fair or ☹ if an economy is able to submit 4 or 5 M-1 or M-2 submissions.
- Poor or ☹ if an economy is able to submit only 3 or less M-1 or M-2 submissions⁸.

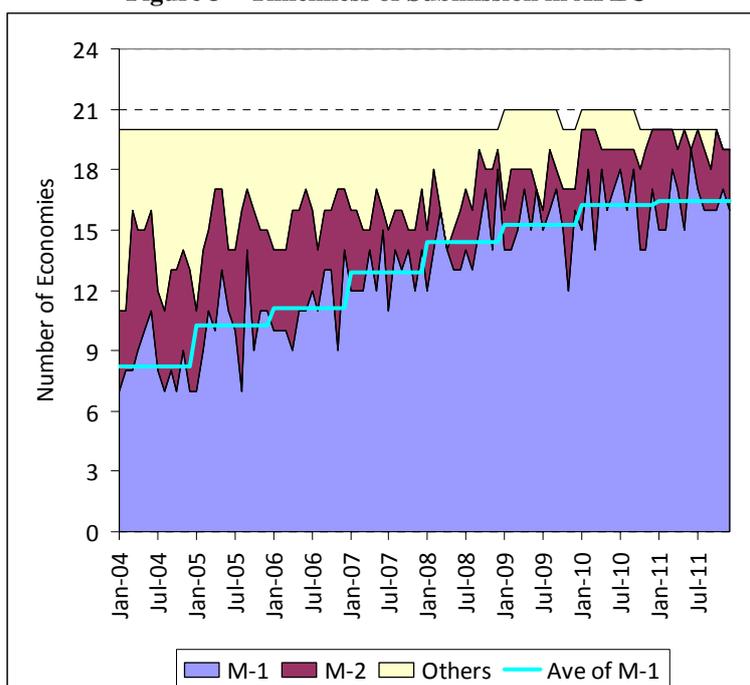
In APEC, only few economies are able to submit at M-1 in the early years of the initiative. In fact, even in 2004 and 2005, there were times that only 7 of the 21 economies are able to submit M-1 data.

In recent years, however, timeliness of submission has improved. In 2004, only an average of 8.2 economies is submitting M-1 data every month. This average gradually increased to 10.2 economies in 2005, 11.1 in 2006, 12.9 in 2007, 14.4 in 2008, 15.2 in 2009, 16.2 in 2010 and 16.4 economies in 2011. This improvement, which is shown in Figure 3,

is due to the constant effort of IEEJ to encourage economies to improve on their timeliness.

However, there are still a lot of things that need to be done on the part of the economies to submit at M-1. Foremost of which is how to collect information from the oil market players in their respective economies on time. In some economies, the huge number of players in both the upstream and downstream sectors of the market makes data collection difficult.

Figure 3 – Timeliness of Submission in APEC



⁸ Ibid.

Completeness

Another measure of country's or economy's participation to JODI is completeness which indicates the ability of the country or economy to submit all the required data in the questionnaire. It is not possible for all economies to submit complete data due to some reasons.

One is confidentiality. Some countries or economies do not want their stock data to be known and would not want to share the information. Others are only willing to provide the changes in the stocks. One economy was only reporting imports and exports data. It claims that due to the small number of players in the market, it is not prudent to release monthly data as the competitors would be able to estimate the shares of each other even if aggregated data is released.

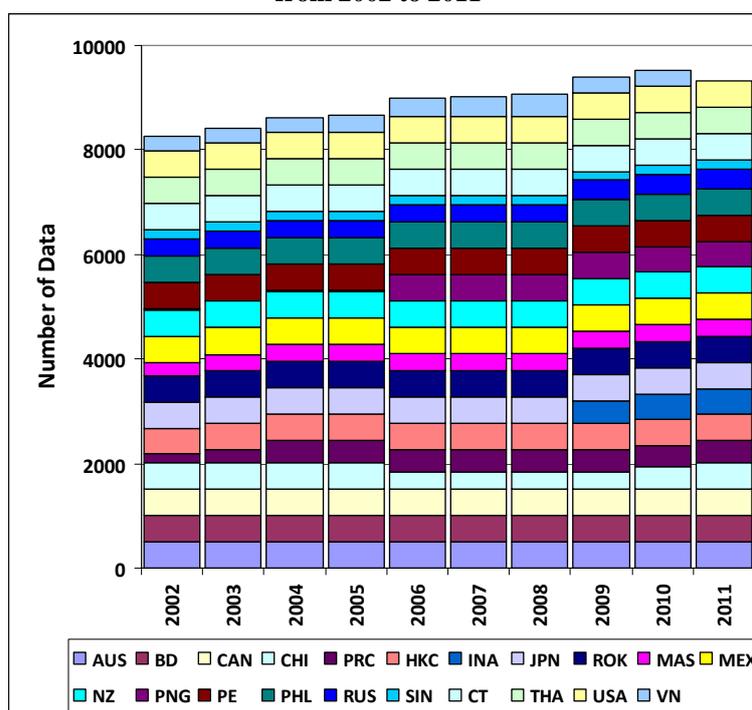
Another reason is that data are just not available as the country/economy is not collecting the information. Some economies only established monthly data collection in their countries due to the request of international organizations promoting JODI.

Likewise, in the early years of the initiative, many countries do not release monthly oil data. In view of this, there is no system for making the data available.

Although, the government is collecting monthly data from various oil market players, the purpose of the data collection is for other purposes like audits to ensure that companies are paying the correct amount of royalties or taxes to the government or to ensure that there is enough stock of oil in preparation for possible supply disruptions.

In APEC, not all economies are able to submit complete data. An economy has to submit a total of 504 data points in one year (42 data points multiplied by 12 months) to achieve 100% completeness. If all the 21 member economies submit complete data in one year there would be 10,584 data points in APEC per year. Figure 4 shows that in 2002, APEC economies are only able to submit 8,256 data points or 78% of the total. There are two reasons for this. One is that only 20 economies submitted data during the year and only 13 submitted complete data. One of the economies that submit incomplete data provided only 24 data points – crude oil production and exports for 12 months.

Figure 4 – Total Number of Data Submitted by APEC Economies from 2002 to 2011



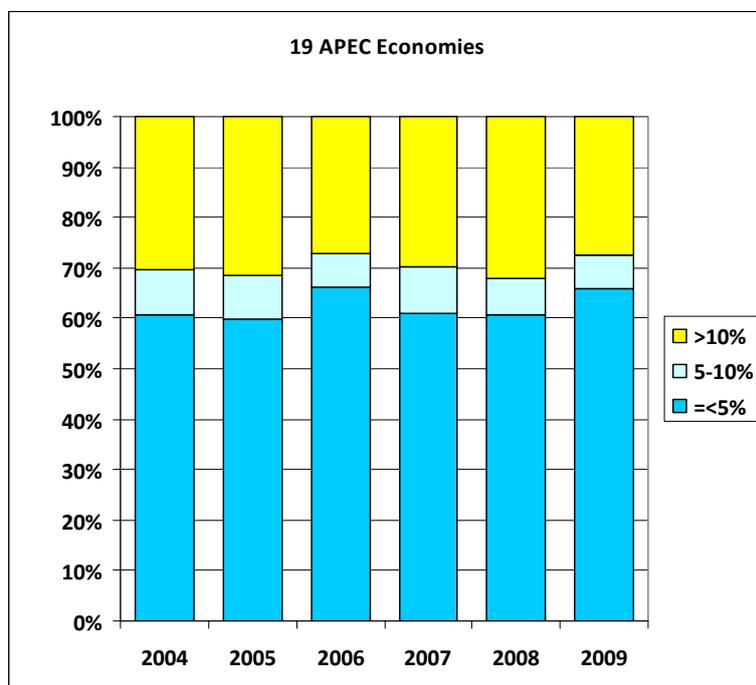
The number of submitted data peaked in 2010 at 9,514 data points or 90% of the total. The data of 14 economies were complete while one submitted only 33% of the required data. In 2011, the total data submission declined to 88% due to the non-submission of Vietnam from October 2010. However, generally, we could say that completeness of JODI data in the APEC region has significantly increased since 2002.

Data Accuracy

For the JODI World Database to be useful, the countries/economies participating in JODI should submit complete and timely data. However, the data should be as accurate as possible as well. Inaccurate data would lead to inaccurate understanding of the market.

In determining the accuracy of the data, two approaches are used by the international organizations. These are checking for internal balance and time series consistency as well as comparability checks with other data collected in a different period like monthly oil statistics of IEA which is collected two months after the end of the month and the annual data which is collected about one year after the end of the year. In APEC, data are also compared to quarterly data which are collected 4 months after the end of the quarter. Data are also compared with data from other sources. Other sources are other organizations or companies that monitor the oil market on a monthly basis. These organizations and companies publish their data and these data can be used to check the comparability of data submitted by member economies.

Figure 5 – Percentage of JODI Data and their Differences with Annual Data



However, the last approach which is comparing data with data from other sources seems to be a questionable approach. One reason is that JODI data, which can be considered official data, are being compared with unofficial ones. The international organization seems to be giving more weight to the data collected by other sources than those submitted by member economies. In view of this, APEC compares the data with annual data that are also submitted by member economies. This way, official JODI data is being compared with official annual data.

In comparing JODI data with annual data, the sum of the monthly data are compared with the annual data. For example, the sum of crude oil production from January to December 2004 is compared with the 2004 annual crude oil production. The harmonized JODI definitions are carefully taken into account to ensure accurate comparison. The percentage differences between the monthly and

annual data are then calculated. The data are then grouped according to the differences such as: less than 5%, 5-10% and greater than 10%

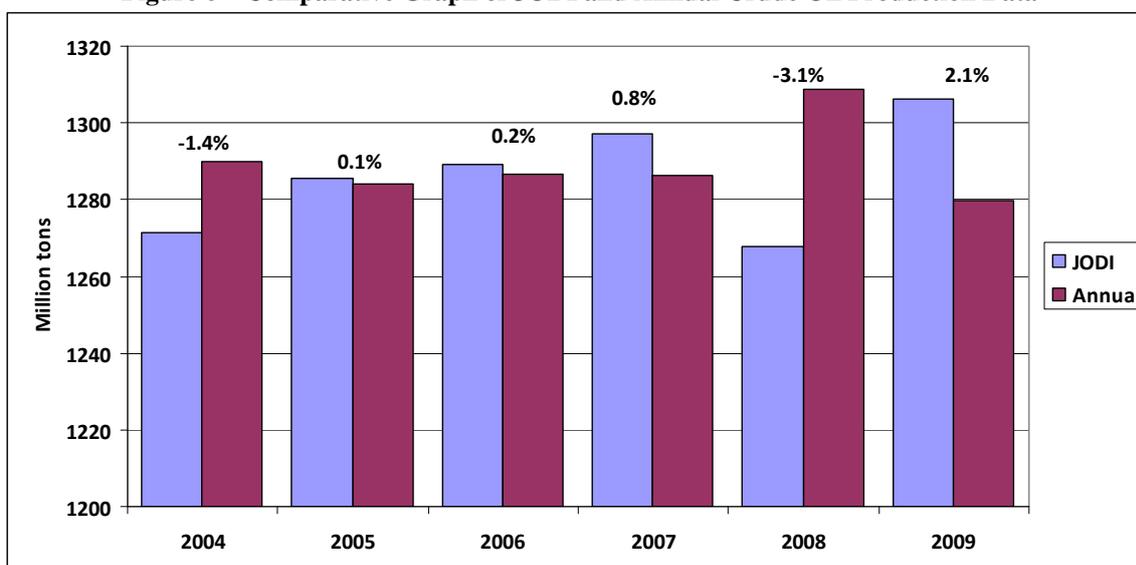
Figure 5 shows the result of the comparison of JODI data with annual data from 2004 to 2009. From the graph, it could be seen that at least 60% of the data have less than 5% difference with the annual data. Around 70% have differences of not higher than 10% and around 30% of the data have differences of more than 10%.

By flow, refinery intake and indigenous production are the most comparable with the annual data followed by refinery output. The least comparable is Stock Change, which represents 32% of the data that have more than 5% deviation with the annual data.

One of the interesting result of the comparison of the is the small observed difference between the total APEC JODI and annual data shown in Figure 6 and figure 7. Figure 6 shows the comparison of indigenous production data of crude oil reported to JODI and the annual data. The highest difference was in 2008 at -3.1%, that is, JODI data is less by 3.1% than the annual data. On the other hand, in 2009, JODI data is bigger than the annual data by 2.1%. In the other years, the differences are: -1.4% (2004), 0.1% (2005), 0.2% (2006) and 0.8% (2007).

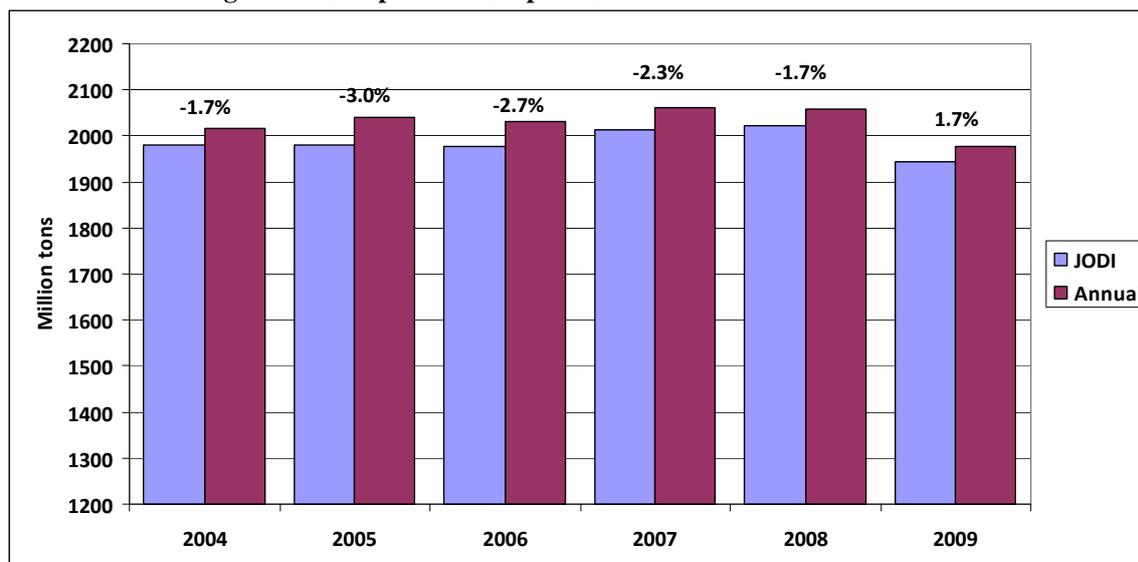
In energy statistics, a statistical difference of 5% is already acceptable. This means that the differences observed from 2004 to 2009 are within highly acceptable levels.

Figure 6 – Comparative Graph of JODI and Annual Crude Oil Production Data



Comparison of Demand data also yielded good results. Figure 7 shows comparison of total APEC Demand data not including Russia and Vietnam due to absence of JODI demand data for these countries. While annual data have bigger demand values than JODI data, the difference is only as high 3.0%. This further indicates that JODI data in APEC is really useful in determining oil supply and demand.

Figure 7 – Comparative Graph of JODI and Annual Demand Data



Way Forward

A lot has been accomplished during the last 10 years of JODI. It has been said during the JODI Oil Conferences after 2005 that less transparency is no longer being blamed for the volatility in the oil prices. Geopolitical reason and burgeoning demand of emerging economies are the reasons for the volatile oil market. It can be said that JODI has led to oil market transparency. JODI should therefore be continued so that the market would continue to be transparent.

While JODI may have made the oil market more transparent, a lot more needs to be done. The JODI organizations have lined up several courses of action in the short term. These are as follows:

1. The JODI organizations are planning to release the data collected using the extended format. However, the decisions on which products and flows will be released initially are not yet decided. The date of the release is also not decided yet.
2. As JODI has been extended to JODI Gas, which is the collection of monthly natural gas supply and consumption data, the release of natural gas database is also being discussed by the JODI organizations. However, no definite date for the release has been agreed on.
3. JODI has also been extended to collect current reserves and future production and export/import capacities. These will also be released in the future but when it will happen has not yet been discussed.
4. Several IEF member countries have also been pushing for the extension of JODI to collect monthly coal data. However, this is not yet tabled by the JODI organizations.

Aside from the above, the more urgent matters that need to be addressed are improving timeliness, completeness and accuracy of the JODI Oil data. This author thinks that JODI organizations are unanimous on this. Thus, it could be expected that JODI Oil will further improve and will become more useful as time goes by. IEEJ therefore will continue to encourage APEC member economies to improve their participation in terms of sustainability, timeliness, completeness and data accuracy.