

HYDROCARBON MANAGEMENT

Fall in global crude oil voyage losses

The latest analysis of the 2019 data on global marine crude oil voyage losses, presented by Paul Harrison, Consultant to the EI's HMC-4A Marine Oil Transportation Database Committee, shows a fall in losses over the past year.

The Energy Institute's (EI) HMC-4A Marine Oil Transportation Database Committee has been collecting and analysing worldwide oil shipping data for over 25 years and meets twice a year. The 2019 autumn meeting was held in Houston in November 2019, hosted by ExxonMobil, while the spring 2020 meeting was held online due to the COVID-19 pandemic.

Committee members submit their voyage measurement data annually and receive a global analysis and confidential individual company reports.

The following member companies submitted data for 2019: Bazan, BP Oil International, CEPESA, Chevron, Chinese Petroleum Corporation, Equinor, Essar Oil UK, ExxonMobil, Marathon Petroleum, Mercuria, Monroe Energy, Petrobras, Petrolgal (GALP Energia), PetroIneos, Phillips 66, PREEM, Repsol, Saras, Shell and Total. Additional members are always welcome.

The main findings from the global analysis are presented below. US inland barge movements are analysed separately but are not included.

Database development

The total number of ship voyages reported for 2019 increased, as did loaded volume, with reported bill of lading (BOL) volume totalling 5.71bn barrels. However, the volume of crude with complete voyage data fell slightly to 4.15bn barrels, as shown in Figure 1.

Comparison with the BP Statistical Review of World Energy indicates that the 2019 database includes approximately 38% of the global shipped volume at BOL and contains complete load and discharge data for around 28% of estimated global seaborne movements.

Global losses

Losses fell steadily after 2001 to a net standard volume (NSV) loss of

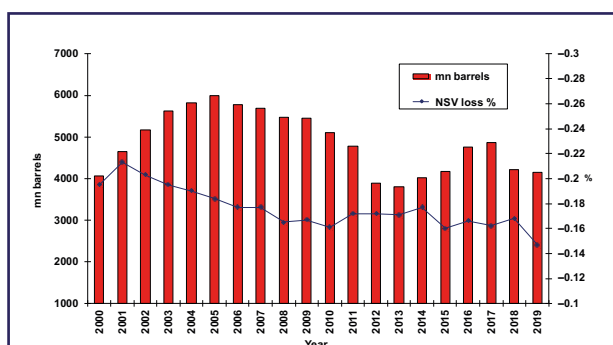


Figure 1: Database volume and average recorded net loss of crude oil, 2000–2019
Source: HMC-4A

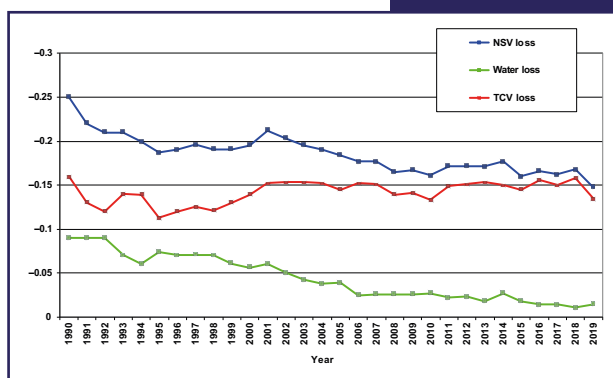
–0.161% in 2010 (by convention losses are given as negative). The 2011 figures showed an increased loss of –0.172%, with losses then remaining fairly steady until 2015, which saw a significant fall to –0.160%. The fall in 2019 from –0.168% to –0.147% is the first significant change since 2015.

It must be noted that losses include apparent as well as physical losses. Apparent losses result from the combination of fixed and random errors in the measurement systems used at load and discharge.

In recent years, changes in NSV loss have been largely driven by gross or total calculated volume (TCV) loss. This was the case for the change seen in 2019, with TCV loss falling from –0.16% to –0.13%. Water loss increased slightly, as shown in Figure 2.

TCV loss comprises any real

Figure 2: NSV, water and TCV losses, 1990–2019
Source: HMC-4A



losses due to evaporation plus any apparent losses due to systematic measurement differences. Water loss represents any additional water reported at discharge compared with that reported at load, ie an accounting loss in terms of oil quantity but not a real loss of either oil or water.

Analysis indicates that the reduced TCV loss in 2019 was due to reduced losses seen for a number of high volume grades/ports, rather than any major shift in trading patterns. This may have been coincidental and it will be interesting to note if the reduced losses are maintained in 2020.

Loss comparison for individual crude oils

Table 1 (pp36–37) gives mean NSV loss and standard deviation for shipments of the most popular crudes in the database (20 or more voyages with full data). The mean of the reported API gravity is also given, together with the overall percentage loss based on reported total barrels shipped. For comparison, figures for NSV loss calculated by voyage are given for 2019 and 2018.

Conclusion

It has been clear for some time that any significant improvement in mean NSV loss would depend on reducing TCV loss and it seems that this has been the case in 2019. Significant loss differences for individual ports remain and the detailed work of the Committee helps to highlight where improvements might be made. Offshore loadings are particularly susceptible to large swings in gross measurement and water determination and the Committee has recently developed new guidance aimed at improving measurement for cargoes loaded offshore – HM 86: *Guidelines for measurement of crude oil loaded at offshore installations*, which should be published shortly.

The HMC-4 Committee also analyses US crude oil barge movements and has also developed product loss benchmarks which were reviewed in 2019. New members are always welcome to join and expand the database and any companies with data to submit should contact Kishan Kansara at the Energy Institute, kkansara@energyinst.org

The EI as a body is neither responsible for the statements or opinions presented in this article nor does it necessarily endorse the technical views expressed.

Crude Type	API gravity	Overall volumes (NSV)			Calculation by voyage					
		Total barrels	Barrels loss	Barrels loss %	2019 NSV loss %			2018 NSV loss %		
					Mean	St. Dev.	No.	Mean	St. Dev.	No.
Al Shaheen	29.8	31,542,331	-103,836	-0.33	-0.33	0.20	47	-0.32	0.13	57
Alaskan North Slope	32.6	78,833,915	-61,761	-0.08	-0.06	0.17	107	-0.10	0.16	94
Alvheim	33.6	24,051,612	-20,385	-0.08	-0.09	0.15	30	-0.13	0.19	34
Amenam Blend	39.2	23,719,671	-51,693	-0.22	-0.22	0.17	25	-0.26	0.23	25
Amna	37.7	12,378,249	-23,924	-0.19	-0.20	0.28	22	-	-	-
Arabian Extra Light	39.6	55,092,319	-139,824	-0.25	-0.26	0.39	112	-0.22	0.27	168
Arabian Heavy	27.4	45,966,920	-54,986	-0.12	-0.14	0.32	86	-0.19	0.39	55
Arabian Light	33.1	208,583,239	-376,245	-0.18	-0.17	0.31	310	-0.22	0.32	407
Arabian Medium	30.7	11,764,860	-35,467	-0.30	-0.21	0.71	24	-0.14	0.40	56
Arctic Oil	23.7	19,048,987	-34,190	-0.18	-0.18	0.10	27	-0.16	0.10	30
Asgard	52.0	26,521,622	-29,147	-0.11	-0.11	0.23	32	-0.16	0.14	31
Azeri	37.8	81,142,815	-100,087	-0.12	-0.11	0.14	104	-0.14	0.12	183
Bakken	43.6	24,463,941	-34,612	-0.14	-0.14	0.21	47	-0.10	0.21	42
Basrah Heavy	23.7	52,707,776	-100,567	-0.19	-0.22	0.34	53	-0.12	0.27	80
Basrah Light	28.9	137,417,070	-317,591	-0.23	-0.20	0.38	154	-0.18	0.37	142
Bonga	27.9	33,357,092	-51,682	-0.15	-0.17	0.39	38	-0.06	0.21	48
Bonny Light	34.3	17,907,491	-24,654	-0.14	-0.14	0.27	21	-0.49	0.29	48
Bu Attifel	41.0	13,795,357	-3,309	-0.02	0.06	0.88	25	-0.32	0.51	27
Buzios	28.8	33,838,048	-56,012	-0.17	-0.16	0.22	37	-	-	-
Castilla Blend	17.9	39,279,422	-57,854	-0.15	-0.16	0.33	59	-0.10	0.21	61
Catcher	27.3	18,970,944	37,723	0.20	0.21	0.29	37	-	-	-
Clair	23.5	22,139,953	10,233	0.05	0.04	0.26	37	-	-	-
Clov	31.9	18,126,129	-39,144	-0.22	-0.21	0.19	22	-0.31	0.13	23
CPC Blend	46.6	179,175,684	-447,562	-0.25	-0.26	0.16	229	-0.26	0.15	267
Eagle Ford	44.4	44,294,544	-73,296	-0.17	-0.17	0.28	98	-0.19	0.26	30
Egina	27.5	34,905,891	-15,974	-0.05	-0.04	0.16	38	-	-	-
Ekofisk	38.8	38,643,511	-5,339	-0.01	-0.01	0.11	63	-0.02	0.13	71
El Sharara	42.5	22,983,668	3,011	0.01	0.01	0.14	35	0.01	0.16	45
Es Sider	36.1	37,320,831	-92,069	-0.25	-0.26	0.23	54	-0.28	0.18	66
Escravos	31.7	32,533,268	-28,397	-0.09	-0.08	0.13	37	-	-	-
Espo	35.6	18,711,564	212	0.00	-0.00	0.24	29	-0.17	0.25	21
Export Blend	30.0	41,977,538	-69,733	-0.17	-0.18	0.23	59	-0.14	0.32	32
Flotta Gold	36.2	13,270,902	-41,228	-0.31	-0.31	0.11	21	-0.28	0.13	21
Forcados Blend	32.4	34,880,932	-113,077	-0.32	-0.29	0.38	43	-0.22	0.25	60
Gina Krog	39.5	16,583,133	-20,276	-0.12	-0.12	0.23	28	-	-	-
Grane	29.0	75,774,006	-9,485	-0.01	-0.01	0.11	119	0.02	0.17	96
Gudrun Blend	52.7	15,111,596	-6,892	-0.05	-0.05	0.10	24	-0.06	0.18	23
Gullfaks	39.4	62,355,823	-91,374	-0.15	-0.15	0.20	80	-0.16	0.19	64
Hebron	21.1	26,967,404	-833	-0.00	-0.01	0.20	53	-	-	-
Hebron (Offshore)	20.7	18,411,830	36,226	0.20	0.19	0.16	28	-	-	-
Heidrun	24.4	24,481,321	36,563	0.15	0.15	0.16	39	0.14	0.22	28
Hibernia	33.3	26,417,695	-6,573	-0.02	-0.03	0.15	41	-0.07	0.13	31
Iracema	32.1	36,971,432	-43,148	-0.12	-0.09	0.26	41	-0.13	0.18	43
Kimanis	36.6	14,034,376	8,645	0.06	0.08	0.36	35	-0.06	0.16	49
Kuwait Export	30.3	71,806,821	-224,786	-0.31	-0.33	0.32	74	-0.31	0.27	99
Lula	30.0	119,201,192	-91,142	-0.08	-0.07	0.21	118	-0.08	0.24	138
Maya	21.9	182,342,990	-101,481	-0.06	-0.07	0.39	303	-0.11	0.40	356
Mellitah	42.7	17,957,221	-19,155	-0.11	-0.10	0.13	26	-	-	-
Midland Sweet	42.8	197,764,164	-457,771	-0.23	-0.21	0.29	239	-0.12	0.36	50

Crude Type	API gravity	Overall volumes (NSV)			Calculation by voyage					
		Total barrels	Barrels loss	Barrels loss %	2019 NSV loss %			2018 NSV loss %		
					Mean	St. Dev.	No.	Mean	St. Dev.	No.
Murban	40.4	48,905,674	-119,823	-0.25	-0.24	0.20	91	-0.28	0.21	110
Novy Port	35.4	34,373,679	-60,986	-0.18	-0.18	0.13	45	-0.17	0.11	42
NWS Condensate	60.7	13,452,269	-18,589	-0.14	-0.15	0.16	23	-	-	-
Oseberg	38.9	17,078,816	-19,226	-0.11	-0.12	0.22	25	-0.22	0.22	27
Patos Marinza	9.4	3,716,654	10,328	0.28	0.26	0.64	30	-0.02	0.15	26
Peregrino	13.7	19,833,125	-10,966	-0.06	-0.07	0.37	36	-0.19	0.50	23
Qatar Marine	32.0	14,053,950	-40,306	-0.29	-0.32	0.33	22	-	-	-
Qua Iboe	37.4	35,552,807	-63,325	-0.18	-0.18	0.36	40	-0.19	0.13	26
Russian Export Blend	30.4	182,430,384	-331,377	-0.18	-0.18	0.22	272	-0.19	0.17	313
Saharan Blend	44.9	94,934,696	-63,887	-0.07	-0.05	0.18	131	-0.07	0.16	111
Sapinhoa	30.0	24,297,341	-26,641	-0.11	-0.12	0.31	26	-0.10	0.29	30
Schiehallion	25.6	24,032,789	-45,848	-0.19	-0.19	0.40	41	-0.00	0.66	48
Sokol	34.7	19,434,119	-24,616	-0.13	-0.12	0.22	31	-0.13	0.55	41
Statfjord	38.9	31,368,452	-61,325	-0.20	-0.20	0.20	40	-0.17	0.34	48
Stones	28.9	11,115,466	-26,780	-0.24	-0.24	0.20	38	-0.11	0.17	26
Troll	34.6	15,944,440	-6,041	-0.04	-0.03	0.16	26	-	-	-
Upper Zakum	33.8	73,731,859	-232,266	-0.32	-0.31	0.30	84	-0.30	0.43	71
Varandey	36.7	44,443,048	-61,057	-0.14	-0.14	0.19	55	-0.27	0.22	47
Vasconia	23.5	57,338,297	8,612	0.02	0.01	0.14	93	-0.08	0.31	104
West Texas Intermediate	42.7	46,217,356	-52,801	-0.11	-0.10	0.19	75	-0.17	0.19	119
West Texas Intermediate Light	46.6	10,458,214	-32,379	-0.31	-0.25	0.45	27	-	-	-
Western Desert	41.4	21,235,652	-44,170	-0.21	-0.21	0.23	42	-0.29	0.29	51

Table 1: Analysis by crude oil type, 2018 and 2019

Source: HMC-4A

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