



DEMO PROJECT 5

OFFSHORE HUB & MoS LINKAGES

Edinburgh, 02 March 2011

FCSTT CASH FLOW ANALYSIS

(FCSTT – Floating Container Storage & Transhipment Terminal)



The Interreg IVB
North Sea Region
Programme



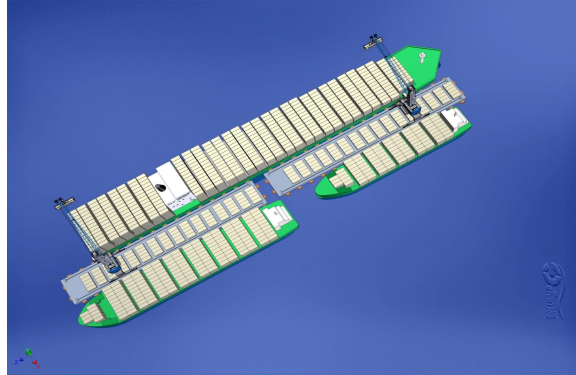
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- 2-crane and 4-crane FCSTT design options
- Throughput and required FCSTT capacity
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- Summary

Design – Key Assumptions

- Option 1: 2 x crane barges with holds, each with 1 crane, rail mounted
- Option 2: converted Panamax ship fitted with 4 fixed cranes
- Other FCSTT options not evaluated here:
 - 2 x feeder-size ships each fitted with cranes
 - 1 or 2 drydocks fitted with cranes
- Converted ships could have accommodation structure and engines removed to provide more storage space

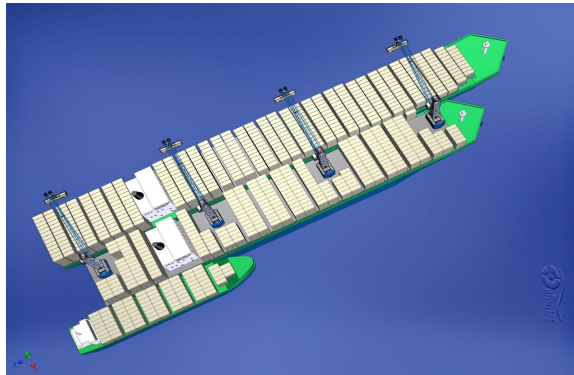
Some FCSTT design options



Crane-Barges



Feeder ship(s) conversion



Panamax ship conversion

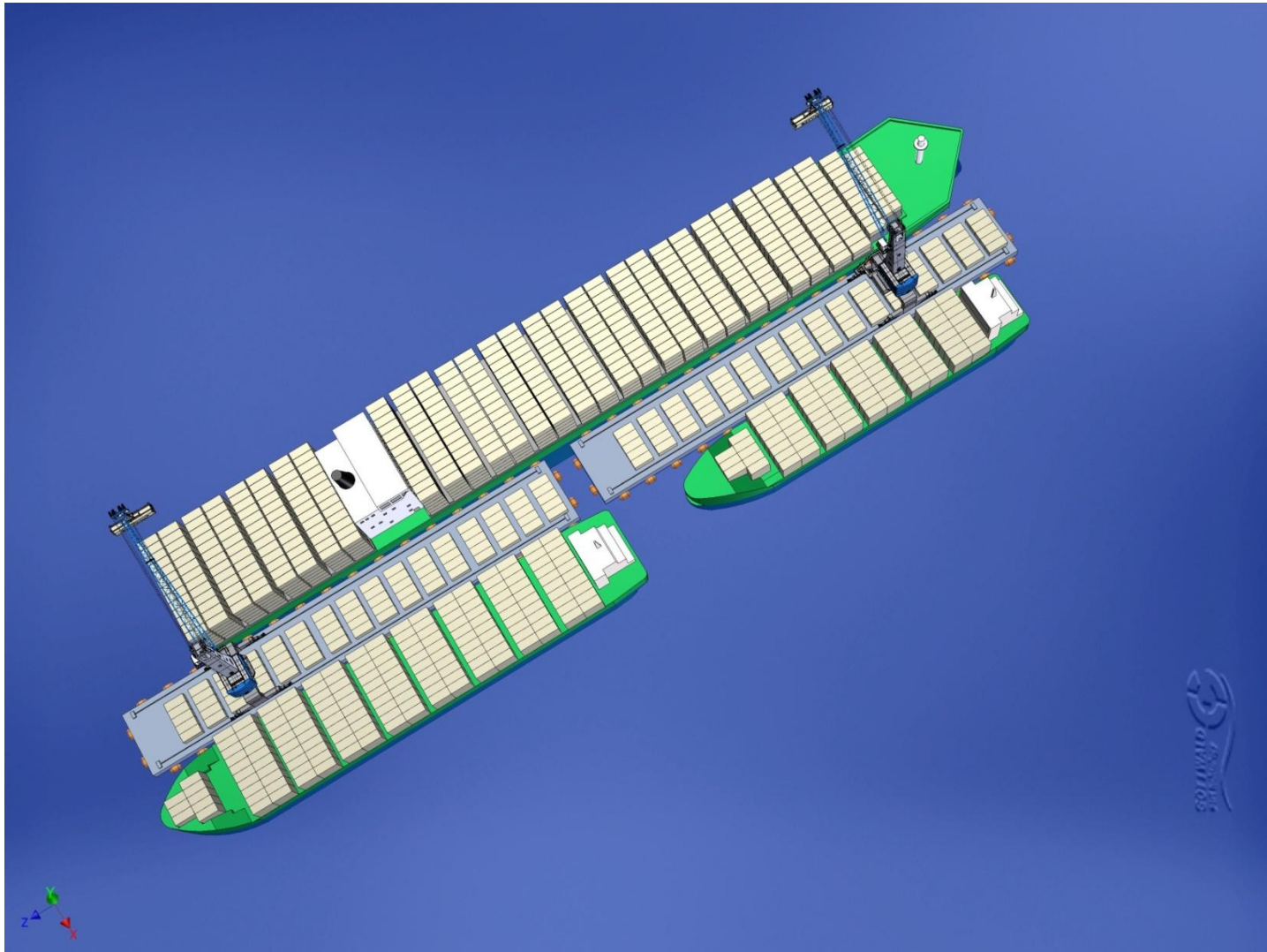


Drydock(s) conversion

Throughput – Key Assumptions

- 2 cranes or 4 cranes FCSTT
- 20 lifts per crane/hour
- Container split:
 - 70% - 40'
 - 30% - 20'
- Average container dwell 2.5 days
- 7% downtime

2 x barges/cranes FCSTT



Throughput – 2 crane FCSTT

Table 1: Container barge terminal throughput estimate

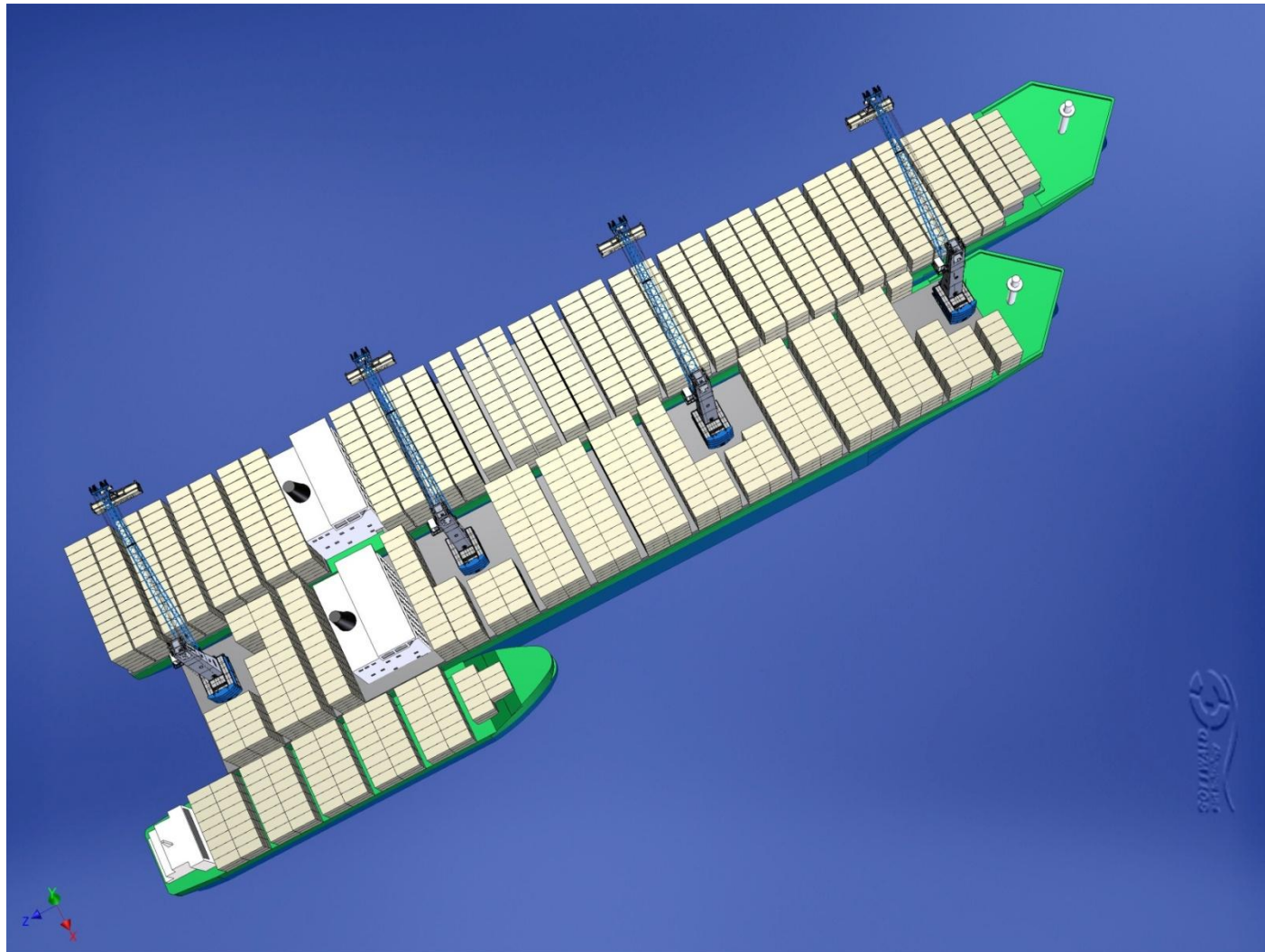
Container Cranes	Lifts per Hour	Oper hrs per Day	Moves per Day	Moves per Year	TEU per Year	Capacity %
2	20	4	149	54,312	92,330	17%
2	20	8	298	108,624	184,661	33%
2	20	12	446	162,936	276,991	50%
2	20	16	595	217,248	369,322	67%
2	20	20	744	271,560	461,652	83%

Barge Capacity – 2 crane FCSTT

Table 2: Barge Capacity (TEU), based on throughput

	Days (Average)	TEU per Year	Barge Cap (TEU)
Dwell time	2.5	92,330	632
		184,661	1265
		276,991	1897
		369,322	2530
		461,652	3162
		553,982	3794

4-cranes FCSTT



Throughput – 4 crane FCSTT

Table 1: Container barge terminal throughput estimate

Container Cranes	Lifts per Hour	Oper hrs per Day	Moves per Day	Moves per Year	TEU per Year	Capacity %
4	20	4	298	108,624	184,661	17%
4	20	8	595	217,248	369,322	33%
4	20	12	893	325,872	553,982	50%
4	20	16	1190	434,496	738,643	67%
4	20	20	1488	543,120	923,304	83%

Capacity – 4 crane FCSTT

Table 2: Barge Capacity (TEU), based on throughput

	Days (Average)	TEU per Year	Barge Cap (TEU)
Dwell time	2.5	184,661	1265
		369,322	2530
		553,982	3794
		738,643	5059
		923,304	6324
		1,107,965	7589

Capital Cost - 2 crane FCSTT

Table 3: Estimated infrastructure and superstructure fixed capital costs (EU€)

	Number of Units Required	Cost per Unit (€)	Total Cost	%
Terminal-vessel/barges			12,000,000	40%
Mobile Cranes	2	4,000,000	8,000,000	27%
Vessel modifications			4,000,000	13%
Mooring equipment/anchors			1,000,000	3%
IT system			500,000	2%
Crew tenders	2	400,000	800,000	3%
Buildings/offices			300,000	1%
Miscellaneous			300,000	1%
Startup costs			750,000	3%
Contingencies			2,073,750	7%
Total Equipment and Infrastructure costs			29,723,750	100%

Capital Cost - 4 crane FCSTT

Table 3: Estimated

	Number of Units Required	Cost per Unit (€)	Total Cost	%
Terminal-vessel/barges			12,000,000	31%
Mobile Cranes	4	4,000,000	16,000,000	42%
Vessel modifications			4,000,000	10%
Mooring equipment/anchors			1,000,000	3%
IT system			500,000	1%
Crew tenders	2	400,000	800,000	2%
Buildings/offices			300,000	1%
Miscellaneous			300,000	1%
Startup costs			750,000	2%
Contingencies			2,673,750	7%
Total Equipment and Infrastructure costs			38,323,750	100%

Operating Cost - 2 crane FCSTT



Table 4: Estimated

Unit	Operator/ Shift	Number of Shift	Gross Salary/ Month	Number of Cranes	Annual Cost	%
I-Annual Manning Costs						
Mobile Cranes	3	2	4,000	2	576,000	
Barge/tender staff	8	2	3,500		672,000	
Total					1,248,000	25%
II- Annual Fuel Costs						
Unit	Cost/unit/hr	Fuel/ltr/hr	Hours	No. of Units		
Mobile Crane*	0.60	55	4,380	2	289,080	
Reefer plugs	0.60	1.1	4,380	200	578,160	
Crew tenders#	0.60	75	2,190		98,550	
Total					965,790	19%
III- Annual Maintenance Costs						
Unit	Spare Parts	Labour		No. of Units		
Mobile Cranes	200,000	50,000		2	500,000	
Terminal	400,000	100,000		1	500,000	
Crew tenders	100,000	50,000		2	300,000	
Total					1,300,000	26%
IV- Annual Administration and other Costs						
Item						
Administration/management					500,000	
Anchorage fees (port authority fee & leases)					500,000	
Misc					500,000	
Total					1,500,000	30%
Total Annual Operating Costs					5,013,790	100%

* assumes 12 hrs operations/day on average



Operating Cost - 4 crane FCSTT



Table 4: Estimated

Unit	Operator/ Shift	Number of Shift	Gross Salary/ Month	Number of Cranes	Annual Cost	%
I-Annual Manning Costs						
Mobile Cranes	3	2	4,000	4	1,152,000	
Barge/tender staff	8	2	3,500		672,000	
Total					1,824,000	29%
II- Annual Fuel Costs						
Unit	Cost/unit/hr	Fuel/lt/hr	Hours	No. of Units		
Mobile Crane*	0.60	55	4,380	4	578,160	
Reefer plugs	0.60	1.1	4,380	200	578,160	
Crew tenders#	0.60	75	2,190		98,550	
Total					1,254,870	20%
III- Annual Maintenance Costs						
Unit	Spare Parts	Labour		No. of Units		
Mobile Cranes	200,000	50,000		4	1,000,000	
Terminal	400,000	100,000		1	500,000	
Crew tenders	100,000	50,000		2	300,000	
Total					1,800,000	28%
IV- Annual Administration and other Costs						
Item						
Administration/management					500,000	
Anchorage fees (port authority fee & leases)					500,000	
Misc					500,000	
Total					1,500,000	24%
Total Annual Operating Costs					6,378,870	100%



Revenues - Assumptions

- Throughput: 70% - 40' / 30% - 20'
- 25% empty units
- Handling rates:
 - €130 per 40' or 20' full
 - €110 per 40' or 20' empty
- Throughput escalation:
 - Year 1 (2 cranes) starts at 54,312 moves (92,330 TEU)
 - Year 1 (4 cranes) starts at 108,624 moves (184,661 TEU)
 - Years 2-5 - +25% per annum
 - Years 2-10 - +10% per annum
- Price escalation - +2% per annum
- Cost escalation - +5% per annum

Est. Revenues - 2 crane FCSTT

Table 5: Revenues generated from the project (EU€)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Throughput (TEUs)	92,330	115,413	144,266	180,333	225,416	247,958	272,753	300,029	330,032	363,035
Full 40' lifts	28,514	35,642	44,553	55,691	69,614	76,575	84,233	92,656	101,922	112,114
Full 20' lifts	12,220	15,275	19,094	23,868	29,834	32,818	36,100	39,710	43,681	48,049
Empty 40' lifts	9,505	11,881	14,851	18,564	23,205	25,525	28,078	30,885	33,974	37,371
Empty 20' lifts	4,073	5,092	6,365	7,956	9,945	10,939	12,033	13,237	14,560	16,016
<i>Total Units lifted</i>	<i>54,312</i>	<i>67,890</i>	<i>84,863</i>	<i>106,078</i>	<i>132,598</i>	<i>145,857</i>	<i>160,443</i>	<i>176,487</i>	<i>194,136</i>	<i>213,550</i>
Terminal Handling Charge, on and off (THC), consolidated rate (EUR€) (i.e. For 2 lifts)										
Full 40'	130.00	132.60	135.25	137.96	140.72	143.53	146.40	149.33	152.32	155.36
Full 20'	130.00	132.60	135.25	137.96	140.72	143.53	146.40	149.33	152.32	155.36
Empty 40'	110.00	112.20	114.44	116.73	119.07	121.45	123.88	126.36	128.88	131.46
Empty 20'	110.00	112.20	114.44	116.73	119.07	121.45	123.88	126.36	128.88	131.46
Revenues (EU€)										
Full 40'	1,853,397	2,363,081	3,012,928	3,841,484	4,897,892	5,495,435	6,165,878	6,918,115	7,762,125	8,709,104
Full 20'	794,313	1,012,749	1,291,255	1,646,350	2,099,097	2,355,186	2,642,519	2,964,906	3,326,625	3,732,473
Empty 40'	522,753	666,510	849,800	1,083,495	1,381,457	1,549,994	1,739,094	1,951,263	2,189,317	2,456,414
Empty 20'	224,037	285,647	364,200	464,355	592,053	664,283	745,326	836,256	938,279	1,052,749
Income from services*	509,175	649,198	827,728	1,055,353	1,345,575	1,509,735	1,693,922	1,900,581	2,132,452	2,392,611
15%										
Total Revenue	3,903,675	4,977,186	6,345,912	8,091,037	10,316,073	11,574,634	12,986,739	14,571,121	16,348,798	18,343,351

Note:



Est. Revenues - 4 crane FCSTT

Table 5: Revenues generated from the project (EU€)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Throughput (TEUs)	184,661	230,826	288,533	360,666	450,832	495,915	545,507	600,057	660,063	726,069
Full 40' lifts	57,028	71,285	89,106	111,382	139,228	153,150	168,465	185,312	203,843	224,227
Full 20' lifts	24,440	30,551	38,188	47,735	59,669	65,636	72,199	79,419	87,361	96,097
Empty 40' lifts	19,009	23,762	29,702	37,127	46,409	51,050	56,155	61,771	67,948	74,742
Empty 20' lifts	8,147	10,184	12,729	15,912	19,890	21,879	24,066	26,473	29,120	32,032
<i>Total Units lifted</i>	<i>108,624</i>	<i>135,780</i>	<i>169,725</i>	<i>212,156</i>	<i>265,195</i>	<i>291,715</i>	<i>320,886</i>	<i>352,975</i>	<i>388,272</i>	<i>427,100</i>
Terminal Handling Charge, on and off (THC), consolidated rate (EUR€) (i.e. For 2 lifts)										
Full 40'	130.00	132.60	135.25	137.96	140.72	143.53	146.40	149.33	152.32	155.36
Full 20'	130.00	132.60	135.25	137.96	140.72	143.53	146.40	149.33	152.32	155.36
Empty 40'	110.00	112.20	114.44	116.73	119.07	121.45	123.88	126.36	128.88	131.46
Empty 20'	110.00	112.20	114.44	116.73	119.07	121.45	123.88	126.36	128.88	131.46
Revenues (EU€)										
Full 40'	3,706,794	4,726,162	6,025,857	7,682,968	9,795,784	10,990,869	12,331,755	13,836,230	15,524,250	17,418,208
Full 20'	1,588,626	2,025,498	2,582,510	3,292,700	4,198,193	4,710,373	5,285,038	5,929,813	6,653,250	7,464,946
Empty 40'	1,045,506	1,333,020	1,699,601	2,166,991	2,762,913	3,099,989	3,478,187	3,902,526	4,378,635	4,912,828
Empty 20'	448,074	571,294	728,400	928,710	1,184,106	1,328,567	1,490,652	1,672,511	1,876,558	2,105,498
Income from services*	1,018,350	1,298,396	1,655,455	2,110,705	2,691,149	3,019,470	3,387,845	3,801,162	4,264,904	4,785,222
15%										
Total Revenue	7,807,350	9,954,371	12,691,823	16,182,075	20,632,145	23,149,267	25,973,478	29,142,242	32,697,595	36,686,702

Est. Cash Flows - 2 crane FCSTT

Table 6: Estimated cash flows (EU€), Pay Back Period and Internal Rate of Return

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Terminal investment cost	29,723,750										
Throughput (TEU's)		92,330	115,413	144,266	180,333	225,416	247,958	272,753	300,029	330,032	363,035
Revenues		3,903,675	4,977,186	6,345,912	8,091,037	10,316,073	11,574,634	12,986,739	14,571,121	16,348,798	18,343,351
Operating cost p.a.		5,013,790	5,264,480	5,527,703	5,804,089	6,094,293	6,399,008	6,718,958	7,054,906	7,407,651	7,778,034
Net cashflows	-29,723,750	-1,110,115	-287,294	818,208	2,286,949	4,221,780	5,175,626	6,267,781	7,516,215	8,941,146	10,565,317
Cumulative Cash Flows	-29,723,750	-30,833,865	-31,121,159	-30,302,951	-28,016,002	-23,794,222	-18,618,597	-12,350,816	-4,834,601	4,106,545	14,671,863

IRR 5.2%

Operating cost escalation: 5.0% per annum

Note: Operating costs based on average 12 hours/day crane operations – need adjusted upwards after yr 7

Est. Cash Flows - 4 crane FCSTT

Table 6: Estimated cash flows (EU€), Pay Back Period and Internal Rate of Return

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Terminal investment cost	38,323,750										
Throughput (TEU's)		184,661	230,826	288,533	360,666	450,832	495,915	545,507	600,057	660,063	726,069
Revenues		7,807,350	9,954,371	12,691,823	16,182,075	20,632,145	23,149,267	25,973,478	29,142,242	32,697,595	36,686,702
Operating cost p.a.		6,378,870	6,697,814	7,032,704	7,384,339	7,753,556	8,141,234	8,548,296	8,975,711	9,424,496	9,895,721
Net cashflows	-38,323,750	1,428,480	3,256,558	5,659,119	8,797,735	12,878,589	15,008,033	17,425,182	20,166,531	23,273,099	26,790,981
Cumulative Cash Flows	-38,323,750	-36,895,270	-33,638,712	-27,979,593	-19,181,858	-6,303,269	8,704,764	26,129,946	46,296,477	69,569,576	96,360,557

IRR 20.6%

Operating cost escalation: 5.0% per annum

Note: Operating costs based on average 12 hours/day crane operations – need adjusted upwards after yr 7

Summary

- Importance of low dwell time for FCSTT capacity
- Different options for storage facility (e.g. Bespoke barges, converted containerships, drydocks)
- 2 cranes = max approx 400,000 TEU cap/year
- 4 cranes = max approx 750,000 TEU cap/year
- Estimated capex of €30-40m (about one third the cost of a concrete terminal)
- Low operating costs
- 4 cranes appears best option: Faster ship turnaround; Higher financial return; Higher volumes; Lower opcost/TEU