



COMPASS
INTERNATIONAL INC.

SAMPLE

2024
INTERNATIONAL
CONSTRUCTION
BENCHMARK
YEARBOOK



V	PREFACE
VI	ACKNOWLEDGEMENTS

A

01	SECTION A: What is Benchmarking & how can it help you with your future estimating / budgeting efforts
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B

07	SECTION B: Refineries, Petro-Chemical Facilities, LNG, Ethylene Facilities & Other Process related facilities
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C

51	SECTION C: Power Plants, Pipelines & Onshore / Offshore Wind facilities
----	---

D

79	SECTION D: Modules, Offshore FPSO's & other SPM type facilities
----	---

E

95	SECTION E: Pharmaceutical, Biologics, Manufacturing, Food & Beverage facilities
----	---

F

135	SECTION F: Infrastructure Facilities (Airports, Railroad & Highways)
-----	--

	G	
149	SECTION G:	
	Mines & Metals facilities	
	H	
161	SECTION H:	
	General Buildings & Facilities	
	(Offices, Logistic Centers, Hotels & Public Buildings)	
	I	
177	SECTION I:	
	Location Factors, Cost Adjust Factors & Productivity Values	
	J	
187	SECTION J:	
	Architectural, Engineering, Construction Management Benchmark Costs	
	K	
195	SECTION K:	
	Labor Production Benchmarks	
	L	
207	SECTION L:	
	Additional Miscellaneous Benchmark Data	
239	ABOUT THE FIRM	

#	DIRECT CONSTRUCTION	TYPICAL % OF EQPT	% LABOR	% BULK MATERIAL	% TOTAL	TOTAL \$ COST MILLIONS	REMARKS
CONTINUED							
19	Missing Scope / Contingency / Mgmt. Reserve used (7.5%)					33.31	5 - 10% of TDC
20	TOTAL COST (EPC)					602.03	
21	TOTAL COST MULTIPLIER					3.82	
22	TYPICAL LOW RANGE MULTIPLIER					2.5 - 3.1	
23	TYPICAL HIGH RANGE MULTIPLIER					3.5 - 4.1	
EXCLUDES							
Owner Engineering & Front End FEED Study Costs							

Cost / Man-hour Model (2)

SOLAR PHOTOVOLTAIC 70 MW (PV) POWER PLANT 2018 USA COST BASIS:

#	DESCRIPTION	\$ COST (MILLIONS)
1	Site Works / Civil / Structural / Solar Panels / Inverters / Assemblies / Electrical Scope / BOP Material Supply & Install	152.98
2	Field In directs 15%	22.95
3	CONSTRUCTION S/T	175.93
4	Detailed Design / CM & Fees 20%	35.19
5	TOTAL EPC	211.11
6	Permits / Front End Studies / Owners Engineering & Field Rep, Costs	5.45
7	Contingency 15%	32.48
8	TOTAL EPC + CONTINGENCY	249.05
9	\$ Cost per MW	3.56
10	Low Range \$ Cost	2.67
11	High Range \$ Cost	4.27
12	% SPLIT SOLAR (PV) POWER COMPONENTS	
13	Site works	5% - 10%
14	Assemblies	40% - 50%
15	Structures	20% - 25%
16	Inverters	5% - 10%
17	Balance of Plant (BOP)	5% - 15%
18	Field In-Directs	7.5% to 17.5%
19	Detailed Design	5% - 9%
20	Construction Management	2.75% - 5%
21	Fees	4% - 7%

Cost / Man-hour Model (16)

OVERLAND PIPELINE: MIDDLE-EAST 2018 COST MODEL 211 MILES 24" DIA.

#	DESCRIPTION	\$ MILLIONS	%	COMMENTS
1	ROW / Survey / Clearing / Excavation Permanent Control Office	49.61	13.2%	Generally flat sandy land
2	Materials Pipe / Stone / Concrete	147.25	39.1%	
3	Valves Fittings	8.70	2.3%	
4	Labor (\$33.25 hour)	73.28	19.5%	2.203 Million man-hours split 70% Direct & 30% In-Direct
5	Construction Equipment	13.51	3.6%	
6	Temporary Camps / Logistic Areas	6.21	1.6%	(5) Locations
7	Road Crossings (12)	5.50	1.5%	
8	Compressor Pumping Stations (4) 2,500 to 5,500 HP	32.75	8.7%	
9	Miscellaneous Items / SCADA / Communications	5.92	1.6%	
10	Add on to existing Tank Farm 1,500,000 barrels	24.27	6.4%	
11	Pig Launching Station	2.83	0.8%	
12	Jetty Modifications / Loading Equipment	6.89	1.8%	
13	S/T	376.72	100.0%	
14	Detailed Design / Project Mgmt. - Control	18.8	5.0%	Average \$95 / hour
15	Construction Management / Inspection	6.8	1.8%	Average \$105 / hour
16	Fees / Profit	12.70	3.4%	
17	TOTAL COST	415.02		
18	COST PER MILE	1.95		
19	TYPICAL RANGE (LOW) -15%	1.66		
20	TYPICAL RANGE (HIGH) +20%	2.34		

Cost / Man-hour Model (17)

WEST AFRICAN ONSHORE & OFFSHORE PIPELINE 2015 \$ COST BENCHMARKS:
INCLUDES ALL ENGINEERING, PROCUREMENT AND CONSTRUCTION COST ITEMS.

#	PIPELINE DIAMETER	RANGE MILLION \$ COST PER KM	MILLION \$ COST PER MILE
1	18" dia Onshore Pipeline Low Cost Range	0.83	1.34
2	18" dia Onshore Pipeline High Cost Range	1.25	2.02
3	24" dia Onshore Pipeline Low Cost Range	1.04	1.68
4	24" dia Onshore Pipeline High Cost Range	1.57	2.52
5	24" dia Offshore Pipeline Low Cost Range	1.28	2.06
6	24" dia Offshore Pipeline High Cost Range	1.92	3.08
7	36" dia Offshore Pipeline Low Cost Range	1.72	2.78
8	36" dia Offshore Pipeline High Cost Range	2.59	4.16

#	DESCRIPTION	M2	SF	\$ / SF UNIT	\$ TOTAL	% OF TPC	REMARKS
CONTINUED							
29	Detailed Design	4,015	43,200	11.94	515,808	8.08%	
30	Construction Management	4,015	43,200	6.88	297,216	4.66%	
31	Front End Studies	4,015	43,200	1.46	63,072	0.99%	
32	Owner Support / Engineering	4,015	43,200	1.82	78,624	1.23%	
33	EPCM Fees / minor costs	4,015	43,200	4.88	210,816	3.30%	
34	TOTAL PROJECT COST PER SF		43,200	147.72	6,381,504	100%	
35	TOTAL PROJECT COST PER M2	4,015		EURO 132			

EXCLUDES

- Initial material flow / logistics report Euro 78,500
- Land Purchase (Part of an existing production facility)
- Employee Parking area & lighting (parking for 12 vehicles)
- Truck Parking Area & Lighting (parking for 20 trucks)
- Security Gatehouse & Gate Entrance
- Outdoor patio / smoking area
- Landscaping & irrigation system
- External Signs c/w with lighting

Cost / Man-hour Model (4)

VACCINE / BIOLOGICALS MANUFACTURING BUILDING PHASE 2 - EXPANSION & MODIFICATIONS TO EXISTING BUILDING: 22,400 SF / 2,082 M2 ADD ON TO EXISTING FACILITY IN IRELAND
2016 COST BASIS: MAY, 2016 EURO EXCHANGE RATE = 0.88 EURO TO US DOLLAR (\$1.13)

#	DESCRIPTION	SQUARE FEET	M2	EURO / SF	EURO / M2	TOTAL EURO / M2	% OF TOTAL
1	General Conditions / Preliminaries includes field survey	22,400	2,082	11.67	125.57	261,435	2.88%
2	Contractors Resident Site Construction Manager / Field Superintendent & Field Q.S.	22,400	2,082	10.45	112.44	234,104	2.58%
3	Contractors Field Engineers / Purchasing Staff	22,400	2,082	9.76	105.02	218,647	2.41%
4	Other Field Staff (Safety)	22,400	2,082	1.52	16.36	34,052	0.38%
5	Toilets / Porta John's	22,400	2,082	0.3	3.23	6,721	0.07%
6	Trailers / Porta Cabins	22,400	2,082	0.71	7.64	15,906	0.18%
7	Temporary Warehouse	22,400	2,082	0.66	7.10	14,786	0.16%
8	Scaffolding	22,400	2,082	0.17	1.83	3,808	0.04%
9	Construction Equipment / Cranes	22,400	2,082	1.36	14.63	30,467	0.34%
10	Safety Equipment	22,400	2,082	0.37	3.98	8,289	0.09%
11	Field Testing Services	22,400	2,082	0.42	4.52	9,409	0.10%
12	Field office supplies / computers	22,400	2,082	1.1	11.84	24,643	0.27%
13	Ongoing / Final Clean up	22,400	2,082	0.66	7.10	14,786	0.16%

COST / MAN-HOUR MODEL (22)

- 2020 Pharmaceutical / Biological Facility Cleanroom Cost Data Benchmarks
- ISO 6-Class 1,000, ISO 7-Class 10,000, ISO 8-Class 100,000 Cleanrooms & Wall Systems for Modularized and Stick-Built (Built on Site) applications: Costs are based on US applications:
- Appropriate for Pharmaceutical & Bio Facilities, R&D Laboratories & Buildings, Computer Chip

Manufacturing, Medical Device / Packaging Facilities, Nano Production Facilities & Hi-Tech Type Facilities.

- Clean rooms costs as a rule range between \$200 and \$550 per Square Foot (footprint). Typically the larger the room size the lower the square foot cost is. Note costs are based on 10' floor to ceiling height.

Cost / Man-hour Model (22)

2020 PHARMACEUTICAL / BIOLOGICAL FACILITY CLEANROOM COST DATA BENCHMARKS

CLASSIFICATION	COST PER SQ FT RANGE FOR SMALL APPLICATIONS LESS THAN 500 SF (ROOM 25' X 20' X 10' HIGH)	COST PER SQ FT RANGE FOR LARGER APPLICATIONS OVER 2,500 SF (ROOM 50' X 50' X 10' HIGH)
MODULARIZED / PRE-ASSEMBLED & INSTALLED AT SITE		
ISO 6 - Class 1,000	\$300 - \$400	\$200 - \$300
ISO 7 - Class 10,000	\$250 - \$350	\$150 - \$200
ISO 8 - Class 100,000	\$200 - \$250	\$100 - \$150
STICK BUILT (BUILT ON SITE)		
ISO 6 - Class 1,000	\$400 - \$550	\$300 - \$450
ISO 7 - Class 10,000	\$350 - \$500	\$250 - \$400
ISO 8 - Class 100,000	\$300 - \$450	\$200 - \$350

Square Foot (footprint) costs include: Washable wall vinyl covered gypsum components, c/w doors, windows, steel / aluminum framework, heavy duty vinyl floor finishes, suspended ceilings, mechanical & electrical elements & painting. Costs excludes terrazzo flooring, fume hoods, air showers, fire protection / alarms, pass thru's, bio-safety cabinets, process / utility piping, production equipment, pedestal pads & i/c monitoring equipment. To convert above values to metric values multiply above SF unit costs by 10.76:

#	DESCRIPTION	U OF M	QTY	\$ LOW COST RANGE	\$ HIGH COST RANGE	\$ LOW SF COST RANGE BASED ON 473,000 SF FOOTPRINT	\$ HIGH SF COST RANGE BASED ON 473,000 SF FOOTPRINT
CONTINUED							
23	Mechanical / HVAC / Heat Exchangers - Chilled water piping systems, Insulation, Cages, Raised floor, HEPA filters, Racks - 50U - 52U, high density server cabinets & all necessary mechanical scope	SF	415,000			110	140
24	Electrical, Control Systems, UPS, cable conduit / racks & Power Generation Equipment	SF	415,000			220	380
25	Fire Protection Systems	SF	415,000			10	20
26	Furniture & Misc. Fixtures & minor equipment	SF	415,000			5	10
27	TOTAL DATA CENTER FACILITY 415,000 SF FOOTPRINT					510	830
28	TOTAL CONSTRUCTION COST SITE WORK, BUILDING SHELL & DATA - COLOCATION CENTER					545	882
29	A/E Design Cost & Fees 12%					65	106
30	Construction Management & Fees 7.8%					42	69
31	Contingency / Mgmt reserve					50	100
32	TOTAL FACILITY COST PER SF					703	1,157
33	USE FOR SF 2023 BUDGETING					700	1,150
34	USE FOR 2023 M2 BUDGETING					7,532	12,374

- Approx. cost per Megawatt for Data - Colocation Center \$150,000 to \$250,000 per Megawatt (average \$200,000)
- A 25 Megawatt facility would order of magnitude cost x \$200,000 = \$5 million +/- 25% dependent on location
- Above costs exclude Owner Front End Engineering, Concept Studies, Oversight & Inspection Costs & Land purchase:

#	DESCRIPTION	U OF M	\$ LOW	\$ HIGH	REMARKS
CONTINUED					
12	Scarify and resurfacing (2" asphalt / tarmac) SF	SF	5	10	(To determine a square meter value multiply \$ value by 10.76).
13	New concrete hard standings 4" thick reinforced concrete on 6" imported stone / hardcore base.	SF	10	15	Construction costs include 6" to 12" of excavation, imported engineered fill, 95% compaction of fill and necessary grading, lighting, signs and marking, complete with associated drainage systems. (To determine a square meter value multiply \$ value by 10.76).
14	Scarify and resurfacing concrete hard standings 4" thick reinforced concrete on 6" imported stone / hardcore base.	SF	5	10	Construction costs include 6" to 12" of excavation, imported engineered fill, 95% compaction of fill and necessary grading, lighting, signs and marking, complete with associated drainage systems. (To determine a square meter value multiply \$ value by 10.76).
15	Demolish and remove 4" thick slab on grade reinforced with mesh	SF	2.75	3.75	(To determine a square meter value multiply \$ value by 10.76).
16	Demolish and remove 6" thick slab on grade reinforced with mesh	SF	3.15	4.15	(To determine a square meter value multiply \$ value by 10.76).
17	Concrete cleaning using sandblasting equipment	SF	2.35	2.85	(To determine a square meter value multiply \$ value by 10.76).
18	Tarmac cleaning using sandblasting equipment	SF	2.15	2.65	(To determine a square meter value multiply \$ value by 10.76).
19	New Terminal Building (2 story building 70,000 SF to 140,000 SF)	SF	190	240	(To determine a square meter value multiply \$ value by 10.76).
20	Revamp Terminal Building Minimal upgrade – New Flooring / Carpet, Painting, Upgrade MEP Systems / New Ceilings & Signage.	SF	25	50	(To determine a square meter value multiply \$ value by 10.76).
21	Revamp Terminal Building Medium upgrade – New Flooring / Carpet, Painting, Upgrade MEP Systems / New Ceilings & Signage.	SF	50	100	(To determine a square meter value multiply \$ value by 10.76).
22	Revamp Terminal Building Major upgrade – New Flooring / Carpet, Re-Configure internal walls, Painting, New MEP Systems / New Bathrooms, F/P, New Ceilings & Signage.	SF	75	150	(To determine a square meter value multiply \$ value by 10.76).
23	Baggage Carousel c/w with electrical work	EACH	375,000	850,000	Cost range.
24	Escalator 30' – 60' length	EACH	175,000	470,000	\$5,850 to \$7,833 per LF
25	Moving Walkway 100' – 250' length	EACH	125,000	375,000	\$1,250 to \$1,750 per LF
26	Elevator 10 passenger (2 stops)	EACH	75,000	175,000	Cost range.
27	New Jet Bridge	EACH	610,000	960,000	Cost range.

Cost / Man-hour Model (4)

OPEN CAST MINE PROJECT

MOLYBDEUM 20,000 TON PER DAY NW USA

14 YEAR PRODUCTION LIFE: TOTAL PRODUCTION 75 - 85 MILLION TONS

DETAILED DESIGN (DD) 14 MONTHS: CONSTRUCTION EFFORT 22 MONTHS (CONSTRUCTION SITE WORK COMMENCED 4 MONTHS AFTER START OF DD

2020 COST BASIS:

#	DIRECT CONSTRUCTION	\$ BULK MATERIAL / EQUIPMENT	\$ LABOR	\$ SUB-CONTRACTS / OTHER	\$ TOTAL	% SPLIT OF DC
1	Temporay / Site Access Road including maintenance & removal	1,315,769	661,697	247,304	2,224,770	1.11%
2	Preliminary Site Strip - Site Clearance	6,630,204	3,348,470	6,959,549	16,938,222	8.42%
3	Cut / Pre-Strip Main Mine Area A, B & C	1,530,421	3,512,591	5,721,638	10,764,649	5.35%
4	Mining Operating / Production Equipment (Drills, Compressors, Pan Scrapers, D8 Dozers, Front End Loaders, Water Trucks, Rollers, Portable Lights, Hoppers, Backhoes, Haul Trucks)	16,184,054	1,210,191	548,593	17,942,838	8.92%
5	Crushing / Hammermills Plant / Grinding Area Modules	28,081,779	3,765,576	540,333	32,387,688	16.10%
6	Conveyors, Structural Steel & Foundations	3,511,871	244,625	875,160	4,631,655	2.30%
7	Concentrator Pre-Assemblies & Modules	41,063,358	329,923	5,813,164	47,206,445	23.46%
8	Field Erected Tanks (5) & well manifold	1,639,065	98,485	562,756	2,300,306	1.14%
9	Tailings / Structures & Ponds	11,304,451	8,433,163	6,384,763	26,122,377	12.98%
10	Buildings (Admin Offices, W. Houses, Maintenance Shop, Operators Area, Gatehouse, Security)	3,673,638	2,999,297		6,672,935	3.32%
11	Permanent Utilities (Electricity, Water, Wind Mill, Fuel Storage & Internet)	5,406,578	2,946,164	49,694	8,402,435	4.18%
12	Rail Spur / Rail Yard / Rail Equipment - Truck Loading Station	7,204,683	156,327	2,284,004	9,645,015	4.79%
13	Miscl Mine Equipment / Maintenance Shop Equipment / Fire Trucks / Site Vans & Bus	4,461,222	188,623	156,196	4,806,041	2.39%
14	Ponds / River Intake Structure / Pump House / Pumps / Potable Water / Piping / Skids	7,547,608	3,112,023	42,142	10,701,774	5.32%
15	Painting & Insulation	65,444	9,554	17,665	92,663	0.05%
16	Site Communications / Office equipment	35,665	8,652	9,655	53,972	0.03%
17	Miscl items, fencing, first aid trailer, parking area, helicopter pad	137,548	45,287	101,886	284,721	0.14%
18	DIRECT CONSTRUCTION TOTAL (DC)	139,793,357	31,070,647	30,314,503	201,178,507	100.00%

COST / MAN-HOUR MODEL (3)

(Washington D.C. – 30 - 40 mile radius = 1.00)

USA Productivity Factors (versus Gulf Coast):
The normal approach of comparing “process / refinery / manufacturing” construction productivity is to compare various locations around the USA to a known basis or benchmark of 1.00 or 100 for Texas Gulf Coast (open shop labor working from say Mo-

bile, AL in the north and south to say Corpus Christi, TX, - because there is so much historical cost data that has been collected over the last 20 – 30 years, the term Gulf Coast productivity is well known and understood term in the engineering / construction industry):

Cost / Man-hour Model (3)

USA PRODUCTIVITY FACTORS (VERSUS GULF COAST):

STATE	OPEN SHOP / NON-UNION	UNION
Alabama	1.00	1.10 - 1.15
Alaska	1.10 – 1.15	1.25 – 1.35
Arizona (Phoenix / Tucson)	1.00	1.10 - 1.15
Arizona	1.00	1.10
Arkansas	1.00	1.15
California (LA / Long Beach / SF / SD / SJ)	1.10	1.20 – 1.30
California	1.05	1.10 - 1.20
Colorado (Denver)	1.00 - 1.10	1.10 - 1.15
Colorado	1.00	1.05 - 1.10
Connecticut	1.15	1.20 - 1.30
Delaware	1.10	1.20
Florida (Jacksonville / Miami / Orlando / St P)	1.00 – 1.10	1.15 - 1.20
Florida	1.00	1.10
Georgia (Atlanta)	1.00 - 1.10	1.10 - 1.20
Georgia	1.00	1.10
Hawaii	1.10 - 1.15	1.30
Idaho	1.05	1.25
Illinois (Chicago)	1.00 - 1.15	1.20 – 1.30
Illinois	1.05	1.10 - 1.15
Indiana	1.05	1.10 - 1.15
Iowa	1.05	1.10 - 1.15
Kansas	1.05	1.10 - 1.15
Kentucky	1.05	1.10 – 1.15
Louisiana	1.00	1.10 – 1.15
Maine	1.05 - 1.15	1.10 - 1.25
Maryland (Baltimore)	1.05 – 1.10	1.10 - 1.25
Maryland	1.00 – 1.05	1.10 – 1.15
Massachusetts (Boston)	1.10 - 1.15	1.20 – 1.30
Massachusetts	1.00 – 1.10	1.10 – 1.15
Michigan (Detroit)	1.05 - 1.10	1.20 - 1.30
Michigan	1.05	1.10 - 1.20
Minnesota (Minneapolis –St Paul)	1.05 - 1.10	1.10 - 1.20

STATE	LOCATION FACTOR
MISSISSIPPI (CONTINUED)	
Biloxi	.88
Canton	.86
Hattiesburg	.85
Jackson	.86
Tupelo	.86
MISSOURI	
Bowling Green	.92
Columbia	.92
Hannibal	.91
Kansas City	.94
Springfield	.91
St. Louis	.95
MONTANA	
Billings	.86
Butte	.86
Missoula	.86
NEBRASKA	
Grand Island	.86
McCook	.86
Omaha	.87
NEVADA	
Elko	.94
Las Vegas	.97
Reno	.95
NEW HAMPSHIRE	
Berlin	.90
Concord	.94
Manchester	.93
Nashua	.90
NEW JERSEY	
Atlantic City	.95
Burlington	.97
Cranbury	.97
Elizabeth	1.04
Ewing	.97
Flemington	.95
Hightstown	.97
Jersey City	1.03
Medford	.96
Newark	1.07
New Brunswick	1.05
Pennington	.95
Princeton	1.04
Trenton	1.02
NEW MEXICO	
Albuquerque	.87
Las Cruces	.86

STATE	LOCATION FACTOR
NEW MEXICO (CONTINUED)	
Santa Fe	.88
NEW YORK	
Albany	1.01
Buffalo	1.01
Lake George	.96
New York City	1.20
Rochester	1.05
Saratoga Springs	.98
Schenectady	1.03
Staten Island	1.14
Syracuse	1.02
Utica	1.00
NORTH CAROLINA	
Asheville	.89
Charlotte	.89
Greensboro	.91
Kingston	.89
Raleigh / RTP	.94
Wilmington	.92
NORTH DAKOTA	
Bismarck	.95
Crosby	.94
Fortuna	.94
Fargo	.95
Minot	.95
OHIO	
Akron	.91
Canton	.91
Cincinnati	.93
Cleveland	.94
Columbus	.95
Dayton	.89
Lima	.91
Toledo	.91
Youngstown	.91
Zanesville	.90
OKLAHOMA	
Oklahoma City	.87
Ponca City	.85
Tulsa	.85
OREGON	
Eugene	.94
Portland	.93
PENNSYLVANIA	
Conshohocken	.99
Erie	.95
Newtown	.98

#	COUNTRY	NUMBER OF DAYS TO SHIP TO COUNTRY FROM EAST COAST USA PORT	\$ M3 FROM EAST COAST PORT	\$ CUBIC FOOT FROM EAST COAST PORT
CONTINUED				
14	Ivory Coast	30	467	13.19
15	Mexico	11	325	9.19
16	Nigeria	29	494	13.97
17	New Zealand	33	530	14.97
18	Pakistan	30	358	10.12
19	Philippines	27	367	10.36
20	Russia	31	526	14.88
21	Saudi Arabia	30	284	8.03
22	South Korea	20	228	6.44
23	Switzerland	23	270	7.62
24	UK (Liverpool)	12	222	6.29
#	COUNTRY	NUMBER OF DAYS TO SHIP TO COUNTRY FROM WEST COAST USA PORT	\$ M3 FROM WEST COAST PORT	\$ CUBIC FOOT FROM WEST COAST PORT
25	Australia	25	312	8.83
26	China	22	247	6.98
27	Hong Kong	23	264	7.46
28	India	28	339	9.60
29	Indonesia	24	341	9.65
30	Japan	23	276	7.79
31	New Zealand	25	337	9.53
32	Pakistan	28	328	9.27
33	Saudi Arabia	31	321	9.08
34	South Korea	22	239	6.74
35	Thailand	22	253	7.15