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Democratic Socialist Republic of Sri Lanka: National Port Master Plan

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The National Port Directions – Volume 1 (Part 3)

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3.3 Port of Colombo

General

Colombo is located on the West coast of Sri Lanka and is country's principal city and port. The port handles containerized cargoes, liquid bulk (crude oil and refined products), dry bulk (mostly grain and cement), general cargoes (mainly steel products, timber and RoRo) and cruise passengers. It is located near the main East West shipping routes and has become a major port for gateway cargo and transhipment of containers. The port covers three large containers terminals and has another one under development. Transhipment of containers accounts for approximately 75% of Colombo's total container traffic; the remaining 25% comprises local containerized cargo, driven mainly by exports of garment, tea, and rubber, and imports of consumer products, industrial and agricultural equipment. Whilst there is almost no effective competition for domestic cargo, Colombo competes with several major hub ports for transhipment traffic. In this segment, the port has benefitted from its strategic location, both close to the main east-west trade and close to the large and strongly growing Indian market.

The port handled 81.8 million tons in 2016 including 5.7 million TEU of containers. In 2016 the port had about 4,405 ships arrivals and was ranked as 23rd largest container port in the world. The port handles the largest container vessels in the world having dimensions of 400m in length and a capacity of 21,500 TEU due to quays with ample water depths of CD -18m and state of the art terminals.

The port was developed along the natural bay at the city and the old basin covers about 201.5 ha. A major expansion program has resulted in the development of South Harbour which came into operation by 2013. The new port basin consists of one state of the art terminal container terminal (58ha) and another container terminal that soon will be launched. The basin has space for a third container terminal and a liquid terminal.

Additionally, to handling imports, exports and transhipment, the Port of Colombo offers non-cargo services including harbour master services, pilotage and tugging, bunkering, ship repair, warehousing, water supply, weighing and scanning services, firefighting, hospital services, financial services and ship chandlery. Also, the navy is situated within the port limits. To the north of the port a maritime training institute is situated.

The port of Colombo is important for the nation and facilitates the majority of the import and exports trades today. The city is under large developments with the erection of many new hotels and resident flats and rehabilitation of historic buildings. Further, a new city port development, south of the existing port, including hotels, conference centres, residential flats, shops and marinas is under development. The new port city will be connected through an elevated highway which also creates additional port access. The western region has several plans for city and urban developments and improvements. Combined, the western region developments and the city of Colombo generate high demands for the port of Colombo. This translates to required port improvements, a new cruise terminal, enlarged connectivity and major future port planning both for containers as well as for liquid bulk and multipurpose. Additional demand for warehousing and logistics needs to be captured in future planning as well.

Figure 3-1 Map of Colombo

	UCT	JCT	CICT	SAGT	PVQ	South Jetty	New North Pier	Colombo Dockyard	Slipway	JCT Feeder Berth	New Feeder Berth	Coastal Berths	Bandaranaike Quay	Sydney/Melbourne	Passenger Berth	Water Supply	Canal Berth	ECT	Dolphin Tanker Berth	Cement Storage	Warehouses	Weighing &	Hospital	Fire Brigade	Training Centre	Tug & Pilot Station
Number on Map	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*Not Indicated on Map*					
Containers	■	■	■	■						■	■							■								
Ro-Ro	■																									
Dry Bulk					■															■						
Liquid Bulk						■													■							
Gen. Cargo					■		■						■													
Passengers															■											
Ship Repair								■	■																	
Navy												■														
Auxiliary														■		■	■				■	■	■	■	■	■

Hinterland Connectivity

The port is characterised by an internal road network of four lanes (two lanes in both directions), leading to the main exit gate to the north. The port has a total of eight gates of which three are used for cargo. The maximum allowable height is limited (4.2m) by a bridge near the main administration building or 4.5m near main exit gate. Over-height cargoes are moved outside the port through customized route-solutions. A new elevated highway is planned on top of the existing port access road. The port will be connected to the highway with dedicated ramps.

The only rail connection with the port is a single track to Bandaranaike East Quay (13 on map). The rail connection is only used for the import of rail wagons into the country but currently this rail is not operational. The port has no rail connection to the Colombo South Port.

Marine Traffic

Table 3-4: Marine Traffic Port of Colombo

Ship type, no of ships	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Container	3,628	3,666	3,304	3,076	3187	3,092	3,142	3,239	3,643	3,804
Conventional	173	205	140	56	68	52	38	28	45	40
Other cargo	421	458	474	616	680	591	354	366	388	436
Ships for repairs	44	49	48	47	30	35	36	38	43	46
Ships-bunkering	12	21	106	68	65	51	50	25	30	29
Other ships	48	25	42	47	94	49	47	46	48	50
Total Ships Arrived	**4,326**	**4,424**	**4,114**	**3,910**	**4,124**	**3,870**	**3,667**	**3,742**	**4,197**	**4,405**

Cargo Traffic

The port of Colombo is the largest port in Sri Lanka with about 8 million tons handled per annum excluding containers. Between 2005 and 2015 the CAGR on "non-containerised cargo" was 1.1% per annum. Over the last ten years the dry bulk grew by 1.6%, and the liquid bulk by 1.3%. The non-containerised general cargo declined by 0.2%. The 2015 share of break bulk was 14%, the dry bulk represented 29% and the liquid bulk 57%. Imports of Ro-Ro and transhipment of Ro-Ro cargo in Colombo has been phased out towards Hambantota as the latter port has ample space available for this type of commodity.

Table 3-5: Throughput Bulk Colombo 2007-2016

Tons '000	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Non-containerised General Cargo	1,048	838	649	627	722	618	364	601	1,113	879
Dry Bulk	2,257	2,565	2,097	2,556	2,620	2,709	2,657	2,444	2,344	2,572
Liquid Bulk	4,264	4,068	4,026	4,159	4,565	4,839	4,265	4,420	4,579	4,746
Total	**7,568**	**7,471**	**6,772**	**7,341**	**7,906**	**8,165**	**7,286**	**7,465**	**8,036**	**8,197**

Table 3-6: Throughput RoRo Colombo 2007-2016

Vehicles in units	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Domestic	30,047	21,875	6,732	45,779	90,824	38,886	6,651	21,296	71,738	31,888
Transhipment	10,065	2,154	4,973	2,455	993	183	466	-	13	778
Total	**40,112**	**24,029**	**11,705**	**48,234**	**91,817**	**39,069**	**7,117**	**21,296**	**71,751**	**32,666**

Containers are dominantly handled at Colombo port with so far only sporadic exemptions at other ports. Containers are the main cargo at the Port of Colombo in terms of volumes handled. In 2016 about 5.7 million TEU was handled. A large part of this volume is transhipment (about 75%) which means that these boxes are transferred between ships to reach their destination. The gateway containers amounted to 25% or 1.3 million TEU which consists of imports and exports. About 82% of all containers handled are laden containers. The remainder 18% are empty containers handled. In the past decade, the gateway throughput grew with 4.9% and transhipment throughput with 5.8 % (CAGR 2007 – 2016).

Table 3-7: Throughput Containers Colombo 2007-2016[10]

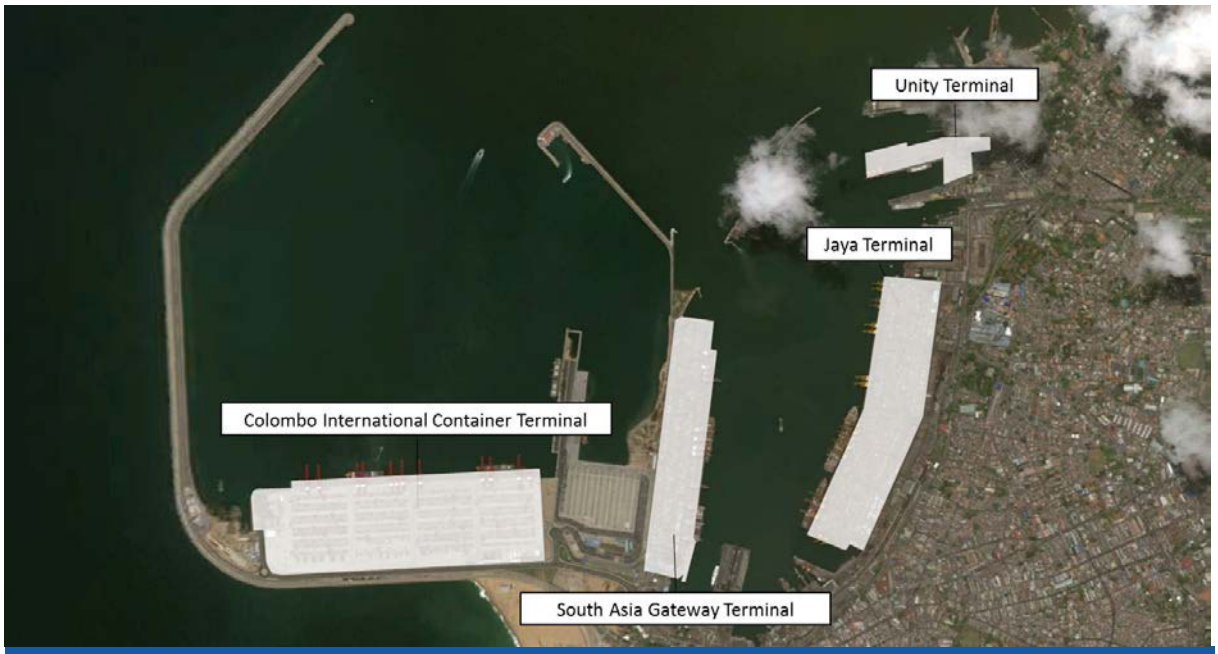
TEU '000	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Import Laden	*355*	*359*	*318*	*415*	*488*	*467*	*477*	*519*	*574*	*631*
Import Empty	*46*	*48*	*56*	*46*	*36*	*41*	*39*	*49*	*35*	*21*
Export Laden	*238*	*229*	*223*	*244*	*260*	*265*	*256*	*270*	*263*	*271*
Export Empty	*163*	*177*	*155*	*226*	*263*	*247*	*259*	*289*	*346*	*377*
Gateway	**803**	**813**	**752**	**932**	**1,047**	**1,020**	**1,032**	**1,127**	**1,218**	**1,300**
Transhipment	**2,469**	**2,785**	**2,633**	**3,096**	**3,124**	**3,065**	**3,208**	**3,700**	**3,888**	**4,355**
Total	**3,272**	**3,599**	**3,385**	**4,028**	**4,171**	**4,085**	**4,240**	**4,827**	**5,106**	**5,655**
Tonnage Handled (million tons)	**35.9**	**40.5**	**39.6**	**51.4**	**54.1**	**53.5**	**56.2**	**63.3**	**65.7**	**73.7**

Container Terminals

To accommodate container demand, the port currently has 4 container terminals: the Jaya Container Terminal (JCT); the Unity Container Terminal (UCT); the South Asia Gateway Terminal (SAGT); and the Colombo International Container Terminal (CICT). The terminals' combined capacity has reached approximately 7.5 M TEU p.a., since CICT operations commenced in 2013. The UCT and the JCT, both the oldest terminals in the port are operated by SLPA whereas the CICT and SAGT are privately operated terminals. In Colombo South Port a new container terminal ECT is ready to be commissioned. The terminals are further elaborated on in the sections below.

[10] Data is excluding re-stowage

Figure 3-2: Colombo Container Terminals



Terminal	Quay Length (m)	Depth (m)	Berths (#)	Design Capacity (M TEU)	Area (ha)
UCT	590	-9 to -11	2	-	1.5
JCT	1240	-13 to -15	4	2.7	45.5
SAGT	940	-15	3	1.8	20
CICT	1200	-18	3	2.8	58

Dry Bulk Handling

Dry bulk is mainly handled in the north-eastern corner of Colombo port at the Prince Vijaya Quay (PVQ) and new north pier. Mainly grain, cement and fertilisers are handled. At the PVQ berths, Prima Flour operates the Grain Elevators facility with a capacity of 40,000 tons of wheat and 20,000 tons of milling capacity per month. It is equipped with four truck loading bays to load bagged flour whilst it also can load truck in bulk. The Private cement companies have storage silos connected by pipelines to the New North Pier. The silos have loading facilities for cement trucks. Figure 3-3 presents an overview of the terminals available

Figure 3-3: PVQ & North Pier

Terminal	Commodity handled	Operators	Quay	Quay length (m)	Depth (m)
Animal Feed & Grain Elevator	Wheat / Maize / Corn	Prima Group / Serendib	PVQ New North Pier	330 200	-9.45 -11.0
Cement Silos	Cement	Tokyo Cement Group & INSEE Cement Group	New North Pier	200	-11.0
No dedicated Terminal	Fertilisers	Various	New North Pier & BQ	200	-11.0

Liquid Bulk Handling

The liquid bulk handling consists mainly of imports of crude oil for the refinery and imports of refined fuels for storage and distribution facilities. Also bunkering of marine fuel, gas and diesel oils are available by barge. The liquid bulk at Colombo is handled through the following facilities:

- SBM1 – located offshore. Mainly used for import of crude oil pumped into Sapugaskanda refinery, Orugodawatta tank farm
- SBM2 – located offshore. Mainly used for import of refined oils pumped into Muthurajawela tank farm or Kollonnawa tank farm
- Dolphin jetty at mid-breakwater of the old port basin. – Mainly used for import of refined products (Fuel Oil, Diesel Petrol and lube oil). Most crude oil is handled at the SBMs. Lube oil is connected to Kollonnawa tank farm and Muthurajawela tank farm and the Bloemendhal Lanka Marine Service depot. Bunkering at the Dolphin jetty is also possible.
- South jetty – located near UCT pier is used for bunkering of ships.

Figure 3-4: Oil Supply Chain Overview

Facility	Capacity
Crude Oils	
SBM 1 Jetty	• Pump capacity: minimum 1,406 tons/hr • 180,000 DWT • LOA 298m, beam 43m • Draughts 18.9m
Sapugaskanda Refinery	• 2.5 M tons / annum distilling capacity • 0.54 M tons' crude storage capacity
Orugodawatta Tank Farm	• 0.16 M tons' storage capacity
Refined Oils	
Dolphin Jetty	• Pump capacity: minimum 278 tons/hr • 40,000 DWT • LOA 210m • Draught 11.8
SBM 2 Jetty	• Pump capacity: minimum 2500 tons/hr • 60,000 DWT • LOA 210m • Draught 11.8m
Sapugaskanda Refinery	• 60,000 tons' storage capacity
Kollonnawa Tank Farm	• 248,000 tons' storage capacity
Muthurajawela Tank Farm	• 205,000 storage capacity
Gas	
Shell LPG CBM	• LOA 165m • Draught 7.0m • Gas capacity 20,000m^3

Source: Ceylon Petroleum Company

General Cargo / RoRo Handling

Currently, there is no dedicated general cargo terminal. Most of the general cargo is handled at the Bandaranaike Quay (BQ) but general cargo ships can also be moored at UCT, New North pier or guide pier. RoRo is mostly handled at Unity container terminal (UCT) where storage is possible for vehicles as container operations have diminished. The ECT berths are temporarily used for project cargoes up till the terminal is utilized for containers.

Figure 3-5: General Cargo and RoRo Handling

3.4 Port of Trincomalee

General

The port of Trincomalee comprises several scattered facilities in China Bay, a natural deep-water bay (up to 20m) on the North-Eastern side of the country. The port was originally used as a naval base. Additionally, the port comprised the country's main tea export facility (tea was handled at the Tea Traders Association (TTA) facility, as indicated on the map), after the institutional setting of Colombo port changed with the establishment of the Port Cargo Corporation (prior to the introduction of this port authority, the port was operated as a tool port). In the Northwest corner of China Bay a common fish port is located. Finally, the Mud Cove facility acted as a regional maintenance and repair facility, providing a slipway and workshops.

The naval base is operational and the SLPA managed TTA facility and Ashroff Jetty are currently used for imports of coal, clinker, and gypsum and general cargo, most of which are destined for a cement plant. Sometimes the Ashroff quay is also used a Cruise berth.

Besides SLPA managed facilities, the China Bay comprises several private waterfront facilities. The three main private waterfront facilities comprise:

- Tokyo Cement Milling Facility – a cement mill with a jetty that is used to import clinker to produce cement.
- Prima Flour Milling Complex – a flour milling complex with a production capacity of 3,600 metric tonnes per day, and a storage capacity of 200,000 tonnes.
- Lanka IOC Facility – Lanka IOC is the Sri Lankan subsidiary of Indian Oil Corporation (IOC), the Indian petroleum company. This facility includes several storage tanks west of the Flour mill and many unused oil tanks Northeast of the airport.

Table 3-8: Functions Port Facilities Trincomalee

Facility Name	Containers	Ro-Ro	Break Bulk	Dry Bulk	Liquid Bulk	General cargo	Passengers	Ship repair	Navy	Auxiliary
Tokyo Cement				X						
Mud Cove								X		X
Ashroff Quay				X		X	X			
TTA			X							
Lanka IOC					X					
Prima Flour				X						
Navy facilities									X	

Figure 3-6: Trincomalee Facilities

Item	Value	Unit
Harbour Basin	2,000	ha
Ashroff Jetty – Main Berth Length	250	m
Ashroff Jetty – Side Berth 1 Length	90	m
Ashroff Jetty – Side Berth 2 Length	90	m
TTA Quay – Berth Length	190	m
Ceylon Quay – Berth Length	50	m
Mud Cove Jetty – Main Berth Length	50	m
Mud Cove Jetty – Side Berth Length	40	m
Prima Flour – Jetty Length	150	
Tokyo Cement – Jetty Length	240	m

Hinterland Connectivity

The existing railway line currently reaches the private facilities of Prima Flour and Tokyo Cement heading west. The future expansion of the railway to Ashroff Jetty is essential for smooth operations at the jetty. The port is connected by road to the east coast of Sri Lanka through the A15 and heart of the country in the direction of Colombo through the A6. Currently, the area west of the port lacks sufficient connection for it to be developed. A road connection along the rail connecting it with the A15 and the A6 is proposed in case of further development of the area.

Non-Containerised Cargo

The dry bulk import covers majority of the throughput in Trincomalee. The throughput amounted to 3.2 M tons in 2016, which is less than half of the throughput in Colombo.

Dry bulk imports account for most of the throughput in Trincomalee. Below the table shows the Trincomalee Port throughput. The throughput is bundled per activity and commodity. The cargo on the Ashroff jetty is mostly destined for the Siam Cement facility in Puttalam and consists mainly of coal and clinker. There is a mid-stream operation to load clinker to vessels destined for Galle.

Table 3-9: Trincomalee Non-Container Throughput 2013-2016 per Operation

	Commodity	2013	2014	2015	2016
		('000) Tons	('000) Tons	('000) Tons	('000) Tons
Ashroff Jetty	Coal, Clinker, Gypsum, Slag	160	170	220	430
Mid-Stream	Clinker	-	-	270	535
Prima Jetty	Flour	820	950	1,030	860
Tokyo Jetty	Gypsum / Clinker	1,290	1,460	1,320	1,444
Oil Jetty	Gas Oil	170	170	180	280
Total		**2,440**	**2,750**	**3,020**	**3,549**

Source: SLPA

Below the table outlines the throughput per commodity. The main driver for growth in cargo handled can be attributed to the increased demand in clinker for both the Tokyo Cement facility and the Siam Cement facility in Galle (through mid-stream operations).

Table 3-10: Trincomalee Throughput 2010-2016 per Commodity

'000 Tons	2010	2011	2012	2013	2014	2015	2016
Discharged							
Wheat in bulk	911	1,090	901	676	825	868	714
Clinker in bulk	738	985	1,369	1,244	1,383	1,419	1,593
Gypsum in bulk	12	43	107	80	114	86	112
Coal in bulk	106	105	89	99	113	93	103
Other(slag)	-	-	-	10	14	-	22
Liquid bulk (fuel)	191	113	179	166	173	182	281
Total Discharged	**1,960**	**2,337**	**2,646**	**2,276**	**2,621**	**2,649**	**2,825**
Loaded							
Wheat bran pallets	-	-	-	140	127	162	153
Other (clinker)	-	-	-	-	-	217	536
Total Loaded	**194**	**237**	**213**	**159**	**127**	**379**	**689**
Cargo Handled	**2,154**	**2,574**	**2,859**	**2,435**	**2,748**	**3,027**	**3,514**

Source: SLPA

Cargo ships remain the main category of ships calling at Trincomalee port. Although the port today is limitedly called for repair or bunkering, the number of vessels is increasing, supported by higher throughputs and more lay-up/service vessels.

Table 3-11: Marine Traffic Port of Trincomalee 2010-2016

	2010	2011	2012	2013	2014	2015	2016
Cargo ships	0	0	0	113	120	158	207
Ships for repairs	0	0	0	3	1	1	1
Ships-bunkering	0	0	0	6	1	2	4
Other ships	0	0	0	12	5	3	4
Total ships arrived	**109**	**126**	**161**	**134**	**127**	**164**	**216**

Source: SLPA

3.5 Port of Hambantota

General

Hambantota port is situated just east of the southern tip of the country, approximately 10 nautical miles from the main east-west maritime trade lanes passing Sri Lanka. The port opened in 2011 and has a general cargo / RoRo quay (600m) operational. Further the port has a 315m liquid berth for bunkering and LPG. A container quay (835m), a feeder quay (470m), a (break) bulk quay (835m) to be delivered to the port operator in 2017. The port handled in 2016 0.35 million tons of cargo mainly consisting of vehicles and break bulk cargoes. It handled 281 vessels in 2016 of which 267 car carriers. The port is subject to a government agreement with port operator CMPort part of China Merchants Holdings International (CMHI). The concession contract with CMPort to operate and develop the port under a 99-years port management contract was finalised in July 2017. This deal would fit within the Chinese philosophy of building a maritime silk road with strategic nodal points along the route. Especially the available port areas (6070 ha) for industrial development in connection with the port makes the location ideal for large industries.

The port project was initially proposed in 2006, to accommodate expected demand growth fuelled by economic growth in the Asian continent. For this capacity expansion project, the following 2 factors led to Hambantota being preferred over Colombo:

- Proximity to the main maritime trade routes – Hambantota is more conveniently situated, as vessels on the main trade routes only require a minimal deviation to call at the port.
- Available land – Due to the port-city interface in Colombo, the port of Colombo had limited expansion potential. Conversely, there was ample land available in Hambantota.

Currently, the first phase of the Hambantota port project, which was developed by China Harbour Engineering Company (CHEC), is operational. This first phase consists of the following facilities:

- Two Ro-Ro berths of in total 600m for transhipment/imports – in 2012, the entire Ro-Ro operations were relocated from Colombo port to Hambantota port, due to the available space in Hambantota. The Ro-Ro operation covers approximately 11 ha and mainly comprises transhipment of vehicles and vehicle parts to East Africa and the Gulf region. The RoRo berth is equipped with two post panamax STS cranes.
- A small craft berth with a length of 205m.
- Bunkering berth of 315m and a LPG mooring location. –. The facility is connected to a tank farm which includes 8 tanks for marine fuel, 3 tanks containing aviation fuel and 3 for Liquid Petroleum Gas (LPG). The total storage capacity is approximately 70,000 tons, located approximately 1.2 km east of the oil terminal. Bunkering operations commenced in 2014; however, bunkering operations were halted shortly after, in February of 2015. It is envisioned that bunkering operations will recommence once a suitable operator has been selected.

Phase II consists of:

- A 15-floor administrative complex which has been constructed.
- A (break-) bulk cargo terminal is under construction with 835 m of quay and water depth of 17 m.
- A container terminal with two main line berths (835m quay in total) and two feeder berths (470 m of quay) with water depths of 17m are under construction.
- 15,000 acres for a special economic zone for industry and logistics
- An island constructed at the western breakwater provides space for real estate and marina developments

Phase II was due for finalisation by mid-2017.

Entrance and Breakwaters

The mouth of the natural harbour at Hambantota has a 22m depth. When completed, the port has a 1.5 km long breakwater, with a minimum basin depth of 17m. This is compared to the 15.5m depth of the Port of Colombo in the old port and CD -18 m in South Harbour. The turning basin inside the port is 600m. A dam will also be built to prevent flooding in nearby areas, and a seawall made of interlocking concrete blocks will protect the port from high seas.

A USD 550 million tax-free port zone was set up outside the port consisting of 15,000 acre SEZ project. The land area was sourced from several communities including 5,000 acres from Hambantota and the rest from Monaragala, Ambilipitiya and Matara. The finished project is expected to provide indirect employment to over 50,000 people. Recently, the Board of Investments (BOI) indicated that additionally a new refinery, a sugar plant and grain terminal are projected.

Figure 3-7: Hambantota Facilities

Item	Berth Length	Water Depth	Cargo / Purpose
Multi-purpose quay	600m	CD -17.0m	RoRo
Oil berth	315m	CD -17.0m	100,000 DWT Oil Vessels
Small Craft Jetty	205m	CD -17.0m	Small crafts
(Break-) Bulk	835m	CD -17.0m	Under construction
Container berths	835m	CD -17.0m	Under construction

Container feeder berths	470m	CD -17.0m	Under construction

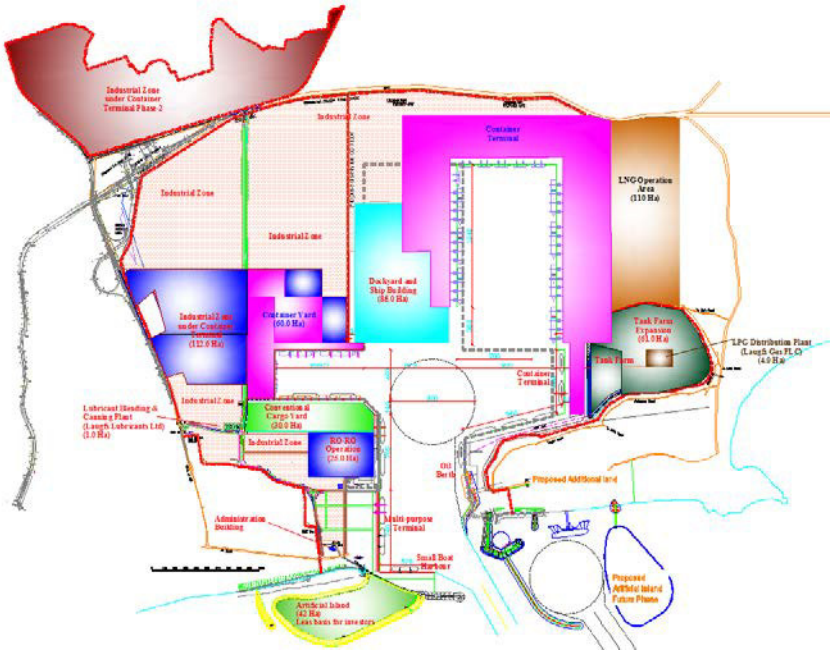
Table 3-12: Function Port Facilities Hambantota

Facility Name	Containers	Ro-Ro	Break Bulk	Dry Bulk	Liquid Bulk	General cargo	Passengers	Ship repair	Navy	Auxiliary
Multi-Purpose Terminal			X	X						
Container terminal	X									
Oil Terminal					X					
Tank Farm										X

Further Expansion

Phase 3 and 4 for the Hambantota port expansion are planned until 2030 subject to demand growth. The exact details of the plan might change due to negotiations taking place by government and Chinese investors.

Figure 3-8: Development Phase II & IV



Hinterland Connectivity

Hambantota is connected to coastal roads to Colombo and to the east of the country. The hinterland roads are congested during the day and not suited for heavy and frequent Container transport. Mattala airport has been constructed to the north of Hambantota. It is envisioned to be an international airport which makes the port ideal for an air-sea combination.

The port of Hambantota is not linked with the national Expressway but construction is planned. The distance to the expressway is approx. 96 km. The port has no railway line connection. Internal port roads are available and constructed based on two lanes.

Non-Containerised Cargo

Table 3-13: Throughput Non-Containerized Hambantota 2011-2016

Tons '000	2011	2012	2013	2014	2015	2016
Break Bulk	15	20	119	305	280	330
Dry Bulk	-	-	-	-	-	-
Liquid Bulk	-	-	-	169	12	25
Total	**15**	**20**	**119**	**474**	**293**	**355**

Table 3-14: Throughput RoRo Hambantota 2011-2016

Vehicles	2011	2012	2013	2014	2015	2016
Domestic	-	6,411	26,458	37,923	69,195	31,519
Transhipment	-	4,338	38,064	160,502	116,257	150,143
Total	**-**	**10,749**	**64,522**	**198,425**	**185,452**	**181,662**

Table 3-15: Marine Traffic Port of Hambantota 2010-2016

	2010	2011	2012	2013	2014	2015	2016
Cargo ships	0	0	34	136	269	278	273
Ships for repairs	0	0	0	1		2	1
Ships-bunkering	0	0	0		63	7	0
Other ships	0	0	0	2	3	8	7
Total ships arrived	**0**	**0**	**34**	**139**	**335**	**295**	**281**

Source: SLPA

3.6 Port of Galle

General

Galle port is Sri Lanka's oldest port, situated near the southern tip of the island. Galle has a strong position in services to main line vessels on the East-West trade route, due to its convenient location near the maritime trade lane. However, the port has limited draft and is not able to handle large vessels. In 2016 Galle had a throughput of 0.77 million tons and handled about 96 vessels in 2016 of which 83 cargo vessels the remainder arriving for repairs, bunkering or other activities. The port handles import of rice, flour, fertilisers, cement and clinkers. The cement related imports are typically transhipped by small bulk vessels, as the larger mother vessels are unable to enter the port of Galle. Additionally, Galle is the only Sri Lankan port that offers dedicated facilities for pleasure yachts, since the completion of a marina complex in 2015. The port also receives cruise vessels during the cruise season and it is a port in which often crew changes on main line vessels are organised with fast passenger vessels. Finally, the port houses navy vessels (these vessels often occupy SLPA berths as the dedicated navy berths provide insufficient space). and the port is used for cement related imports.

Figure 3-9 Port of Galle

Berth	Berth Length	Water Depth
Closenburg Jetty 1	130m	CD -9.0m
Closenburg Jetty 2	130m	CD -9.0m
New Jetty 1	160m	CD -9.0m
New Jetty 2	86m	CD -9.0m

Table 3-16: Functions Port Facilities Galle

Facility Name	Containers	Ro-Ro	Break Bulk	Dry Bulk	Liquid Bulk	General cargo	Passengers	Ship repair	Navy	Auxiliary
Closenburg Jetty				X			X			
New Jetty			X							
OPL & crew services										X
Marina										X
Fishery Berths										X

Hinterland Connectivity

Currently, Galle is accessible by a two-lane coastal road and inland roads making it accessible for minimum amounts of traffic. Port of Galle is located at 5.8 km from the Expressway E01.

Non-Containerised Cargo

Galle currently handles break bulk and dry bulk cargo (mainly clinker for the cement power plant). The port also receives cruise vessels albeit the quays and water depths at the existing port are limited. The ancient city has a large attraction to tourism and future cruise demand can be expected. Further, the port provides crew and other services to shipping lines through fast service boats. Ships pass Galle on their East-West Voyage and crew, stores and or spares can be brought to the ships without having them to stop sailing and call at a port. The port of Galle also has a yacht marina. The cement manufacturer has expansion plans at its facility at the port. When this development has reached approval from the authorities, the annual bulk volumes would increase to 1.5 million ton of which 95% would consist of clinker and 5% of gypsum. It should be noted that both commodities require additional attention with respect to dust and quay/water pollution during operations. Through suction systems dust and pollution can be controlled effectively.

The cargo details below concern cargo discharged as there is no cargo loaded in Galle.

Table 3-17: Galle Non-Container Throughput 2007-2015

Tons ('000) Discharged	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Cement in Bags	-	-	-	-	-	2	3	-	2	-
Clinker in bulk	324	310	162	284	392	322	144	356	486	719
Gypsum in bulk	19	19	-	10	9	14	36	29	35	40
Slag in bulk	-	-	-	-	-	-	-	-	8	-
Cement in bulk	277	124	-	24	63	82	17	8	9	12
Total	**620**	**452**	**162**	**318**	**463**	**421**	**200**	**393**	**540**	**771**

Source: SLPA

3.7 Kankesanthurai (KKS)

Kankesanthurai and Point Pedro are the small ports which provide a sea entrance to the populated northern strip of Sri Lanka. Cargo operations in both ports are limited to 26 thousand tons of break bulk cargo in 2016 for the local market. In 2016 about 25 vessels were handled. The ports also have fishery berthing at shallow drafts and a navy facility. Kankesanthurai was closed during the civil war years in until, in 2011 Indian parties financed ship wreck removal and dredging to 8 m to ensure smooth operations. It is also home to an old cement factory which was shut down in 1991.

Figure 3-10: Facilities KKS

Item	Berth Length	Water Depth
General Cargo	100 m	CD - 7.3 m
Fishery Berth	2 x 60m	-
Navy Berths	-	-

SLPA has formulated three objectives to develop KKS port:

4. To operate a commercial berth
5. To operate a passenger terminal
6. To initiate port related businesses (including navy) to strengthen the region

To do this several projects have been identified to strengthen the port infrastructure:

- Constructing a new 1,400 m breakwater
- Constructing multi-purpose berth to accommodate passenger vessels and imports and exports to India.
- Connecting the port with KKS railway station 1.2 km to the east of the port.
- A possible economic zone for food related industries.

The throughput statistics for KKS show a significant demand in 2009 followed by years of differing throughputs of break bulk / general cargo.

Table 3-18: KKS Non-Container Throughput 2007-2016

Tons ('000) Discharged	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Containerized	-	-	15	-	-	-	-	-	-	-
Break bulk	-	-	166	11	28	60	49	21	32	27
Dry bulk	-	-	-	-	-	-	-	-	-	-
Liquid bulk	-	-	59	-	-	-	-	-	-	-
Total	**-**	**-**	**240**	**11**	**28**	**60**	**49**	**21**	**32**	**27**

Source: SLPA

3.8 Oluvil

Oluvil is a small port with a 4 hectares' general cargo yard having a 330m quay with a depth of 8 m. No throughput data has been reported. The port is mainly used for fishery which SLPA sees as its prime development goal along with the development of food related industries. The detailed plans for Oluvil include:

- Inorganic Fertilizer & Agro Chemical Packing/ Storage Facilities
- Organic Fertilizer Manufacturing, Packing and Storage Facilities
- Dedicated Economic Centre
- Livestock Sector
- Milk Related Value Adding

In stage two of the commercial port development, SLPA plans to construct a general cargo berth with a length of 360 m and a depth of 11m to handle 16,000 DWT vessels.

Figure 3-11: Oluvil Port

Item	Berth Length	Water Depth
General Cargo	330 m	CD - 8.0 m
Fishery Berth	200 m	CD - 3.0 m

3.9 Puttalam Coal Jetty

Puttalam Coal jetty is a small landings jetty for the 900-megawatt (MW) coal power station located near the coast called Norochcholai Power Station or the Puttalam Coal Plant in the Puttalam District of the North-western Province in Sri Lanka. The annual coal requirement for the plant is around 1.4 million tons. Due to the monsoon period about 2.2 million tons is imported during the period mid-September to mid-May. The power station has a coal stock yard of 19.7 ha. The jetty has a total length of 590m but barges can only berth at the outer end of about 230m on each side of the jetty at water depth of CD -4.0m. The jetty is equipped with four coal discharge cranes to discharge coal from seven available barges (LOA 65m). The mother vessels are discharged at open sea through vessel gear into barges which sails to the jetty. Ceylon Shipping Corporation Ltd (CSC) organises the coal transportation from various countries to the outer anchorage of Puttalam with the MV Ceylon Breeze and MV Princess (63,000 DWT LOA 200m, Beam 32.2m and draught at 13.3m) and other chartered vessels.

Figure 3-12: Puttalam Coal jetty

Item	Berth Length	Water Depth
Jetty	230m berth on one side (total length jetty 590m) Berthing 65m barges on both sides	CD - 4.0 m

The supply of coal is cumbersome as coal needs to be transferred from main ship (mother vessels) to small barges at open sea. Due to monsoon periods the ship-to ship operation in open sea is postponed leading to higher stock pile requirements then normal. The plant has no additional investment planned for the coal transfer.

PART B: Demand Analysis & Port Development Directions

4 Demand analysis for the Port Sector

4.1 Introduction

This chapter introduces the demand analysis for the port sector. First the national trade and production is highlighted, Thereafter the forecasts on commodities and scenarios are presented. Thereafter the allocation and the required capacity is analysed providing the port development needs for each of the ports.

The following approach has been used for this chapter:

- Paragraph 4.2 provides the national trade and production review;
- Paragraph 4.3 provides the forecasts on each of the commodities;
- Paragraph 4.4 shows the commodity level allocation; and
- Paragraph 4.5 provides capacity development needs per commodity.

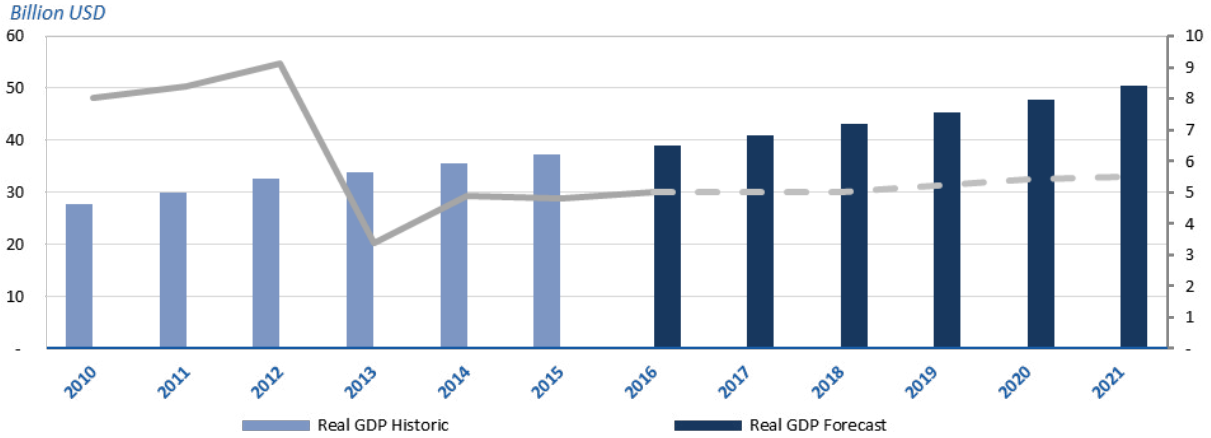
4.2 National trade and production

4.2.1 Macro-Economic Overview

GDP Development

Sri Lanka can be considered a 21st century economic success story, with more and more people relieved from poverty every day through an impressive macro-economic development, which is leading to higher employment rates. With the end of the civil war in 2009, the country embarked on a new phase of stable development. Consequently, GDP growth reached an average rate of 6.0% p.a. over the past 5 years.

Figure 4-1: GDP Constant Prices Development 2010-2021 (Base year = 2002)



Source: IMF 2016

General Overview

With a positive macro-economic outlook, the country does face several major challenges in the years to come. The significant trade deficit causes an outflow of international monetary funds, leading to lower exchange rates. Government finances are negatively impacted by this development; as external debt is in foreign currency.

The population of Sri Lanka has been relatively stagnant over the past decade. The last census, which was carried out in 2011, revealed a population of approximately 20.5 M people, and forecasted a population of 22

M for 2021. Additionally, the population is aging: The country's working age population reached its peak in 2006, while the number of people aged 60+ is expected to double in 2041, as compared to the last census in 2011. (World Bank, 2016)

Foreign direct investments (FDI) in Sri Lanka have been low despite several fiscal measures, as can be seen in table 1.1. These investments are a good measure of a country's ability to sustain a favourable investment climate.

Table 4-1: Macro Indicators 2005-2015

Indicator	Unit	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
GDP	Current Billion USD	28.27	32.37	40.72	42.04	49.55	59.16	59.38	67.34	74.92	81.25
GDP per Capita	Current USD	1,430	1,624	2,027	2,077	2,429	2,880	2,874	3,234	3,574	3,849
Inflation consumer prices	%	10.0	15.8	22.6	3.5	6.2	6.7	7.5	6.9	3.3	3.3
Government Debt	% / GDP	87.9	85.0	81.4	86.1	81.9	78.5	79.2	78.3	75.5	76.0
FDI inflow	Million USD	479.7	603.0	752.2	404.0	477.6	955.9	941.1	932.6	893.6	681.2
FDI inflow	% / GDP	1.7	1.9	1.8	1.0	0.8	1.5	1.4	1.3	1.1	0.8
Population	Millions	19.8	19.9	20.1	20.2	20.4	20.5	20.7	20.8	21.0	21.1
Labour Force	Millions	8.4	8.3	8.3	8.3	8.3	8.3	8.4	8.5	8.6	NA
Unemployment rate	%	6.6	6.2	6	5.9	5	4.1	4	4	4	4
Urbanisation rate	%	18.4	18.4	18.3	18.3	18.3	18.3	18.3	18.3	18.3	18.3

Source: IMF 2016 and World Bank 2016

Overview Local

The western province, which includes Colombo, has the biggest share of GDP development (41.6% in 2014) and the biggest population (28.6%) as can be seen in the tables below. The population distribution has apparently flat lined in between 2009 and 2014, but in the GDP development one can note a slight increase in the shares of other provinces other than Colombo.

Table 4-2: GDP Shares Development per Region 2009-2014 (percentages)

Date	Western	Central	Southern	Northern	Eastern	North Western	North Central	Uva	Sabaragamuwa	Total
2009	45.8	9.8	10.5	3.2	5.8	9.6	4.6	4.5	6.1	100
2010	44.8	10	10.7	3.4	6	9.5	4.8	4.5	6.3	100
2011	44.2	9.8	11	3.7	5.8	10	4.7	4.5	6.2	100
2012	42.8	10.2	11	3.7	6.3	10	5	4.8	6.2	100
2013	42.5	10.5	10.4	3.5	5.9	10.5	5	4.9	6.8	100
2014	41.6	10.4	10.9	3.6	6	10.7	5.1	5	6.7	100

Source: Sri Lanka National Bank, 2016

Table 4-3: Population Development per Region 2009-2014 (percentages)

Date	Western	Central	Southern	Northern	Eastern	North Western	North Central	Uva	Sabaragamuwa	Total
2009	28.53	13.03	12.06	5.59	7.52	11.39	5.98	6.43	9.47	100
2010	28.49	13.04	12.07	5.56	7.55	11.38	5.99	6.45	9.48	100
2011	28.36	13.03	12.07	5.76	7.59	11.34	6.01	6.43	9.40	100
2012	28.72	12.64	12.17	5.21	7.64	11.70	6.22	6.22	9.47	100
2013	28.65	12.65	12.18	5.21	7.65	11.69	6.23	6.24	9.48	100
2014	28.58	12.67	12.19	5.22	7.67	11.67	6.25	6.26	9.48	100

Source: Sri Lanka National Bank, 2016

4.2.2 Trade & Production

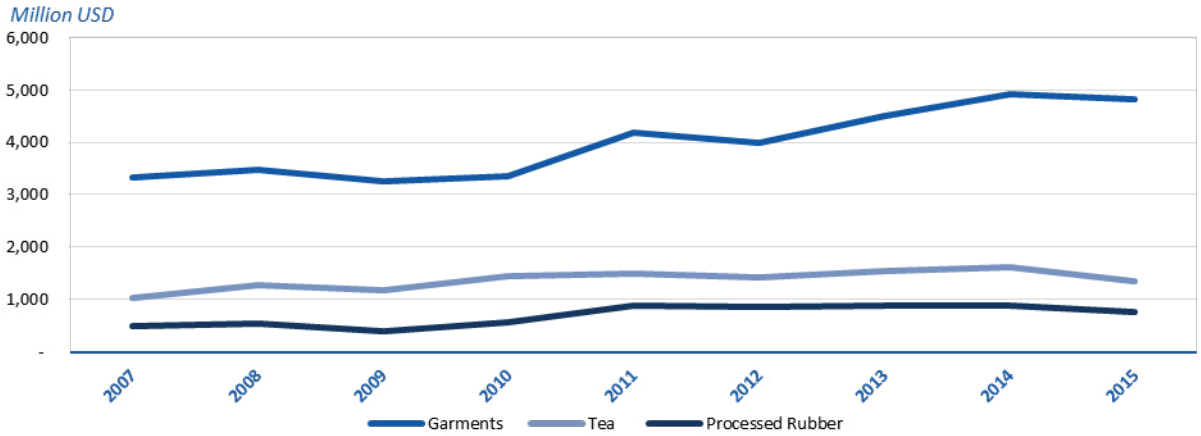
The Sri Lanka exports are reliant on garments, tea and rubber, which are relatively low in value. The focus on exports of low value commodities results in a structural trade deficit, which is hurting the economy. Additionally, whereas rubber can be sustained as a competitive commodity, tea and garments face international competition from low-wage countries. Hence, the country should invest in manufacturing and diversification of its economy to maintain its strong economic growth. The shift to a more open economy will facilitate growth of manufacturing and industrial demand.

The development of value-added downstream activities in the manufacturing and industrial sectors will boost imports of raw materials and exports of end products.

Tea and Rubber Industry

Garment, tea and rubber together formed more than half of the USD 10,500 M export value in 2015. The export values seem to have flat lined, as can be noted from Figure 4-2. The tea and garment industry have low income competitors on a global scale (Haussmann, 2016). Sri Lanka is responsible for 28.0% of the global tea exports, facing also competition from countries like Kenya and India, that have a lower GDP per capita. The lower GDP per capita implies lower labour costs and consequently lower wages. This same analysis holds for the garment industry in which Sri Lanka may further develop itself focussing on quality whilst low cost competition is provided by countries like Cambodia and Bangladesh. The rubber exports show a different trend where the global main competitors like China and Thailand have a higher GDP per capita than Sri Lanka, thus the country is in a better position to compete in this industry.

Figure 4-2: Garment, Tea and Rubber Exports 2007-2015



Source: Sri Lanka Central Bank 2016

Garment Industry

Sri Lanka's garment export industry experienced substantial growth during the 1980's, as an alternative to the Indian garment exports. Currently, Sri Lanka's garment export industry is one of the nation's main GDP contributors, accounting for over 40% of total exports, with a value of USD 4.8 B in 2016. Additionally, the sector is a substantial social contributor, providing for approximately a third of the total manufacturing employment. The Government of Sri Lanka envisages further developing the garment industry, to position Sri Lanka among the top 10 high quality garment exporting countries in the world by 2020.

Currently, the EU and the US are the primary destinations for Sri Lanka's exports; the table below presents the value of exports towards the EU and US for the years 2015, 2016, and 2017. Sri Lanka's garment exports towards the EU experienced strong growth after receiving the GSP+ status in 2005; however, the growth rate decelerated when the GSP+ status was revoked in 2010. However, Sri Lanka regained GSP+ status on the 19th of May 2017, resulting in better access to the EU market for Sri Lankan exports. This could have a substantial positive impact on the garment industry, as it accounted for over 60% of total exports to the EU in 2016.

Table 4-4 Sri Lankan Garment Exports to EU and US

	Unit	2015	2016	2017
EU	M USD	181.1	202.8	155.0
US	M USD	171.6	186.4	170.0

Source: Sri Lanka Apparel Exports Association

Origin Destination Analysis and Developments

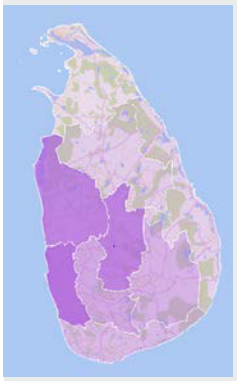
An estimation of destinations of container cargo can be made by looking at regional GDP of Sri Lanka in lack of accurate data as displayed in the table below. Cargo origin data is available from a survey conducted for the ADB multimodal transport study in 2012 and from export board data. The difference in origin between these two can be attributed to the fact that the export data details cargo origin in the region, and the multimodal survey focussed on the origin of the containers, which is mostly stuffed in the Western province.

Figure 4-3: Destination Data

Province	GDP - Division 2014 (%)	TEU Imports Destination Division 2014	GDP- Division 2014
Central	10.4%	65,627	
Eastern	6.0%	37,862	
North Central	5.1%	32,183	
North Western	10.7%	67,520	
Northern	3.6%	22,717	
Sabaragamuwa	6.7%	42,279	
Southern	10.9%	68,782	
Uva	5.0%	31,552	
Western	41.6%	262,509	
Total	**100.0%**	**631,032 TEU**	

Source: Sri Lanka National Bank Statistics

Figure 4-4: Origin Data

Province	Export Board Data 2011	Multimodal Study Export Boxes	TEU Export Origin based on Export Board Data 2011	Export Board Data origins (picture)
Central	21.1%	0.5%	57,088	
Eastern	1.6%	14.2%	4,329	
North Central	2.6%	-	7,035	
North Western	21.0%	5.6%	56,818	
Northern	1.2%	-	3,247	
Sabaragamuwa	11.5%	0.9%	31,115	
Southern	7.3%	1.4%	19,751	
Uva	9.0%	0.1%	24,350	
Western	24.9%	77.3%	67,370	
Total	**100.0%**	**100.0%**	**271,102 TEU**	

Sources: ADB – Export Board

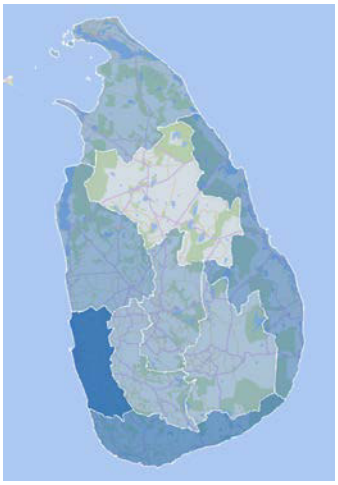
Currently, Sri Lanka has an underdeveloped industry and manufacturing sector. However, it is expected that these sectors will be substantially developed. Specifically, the following broad developments can be noted:

- Overall, manufacturing and industrial activities will increase substantially.
- Medium manufacturing and industrial activities will be forced out of densely populated areas.
- Light manufacturing and industrial activities will be concentrated in and near the main metropolitan areas.
- Manufacturing and industrial areas will develop in central Sri Lanka, in line with currently proposed industrial estates.

- Manufacturing and industrial activities will develop in southern Sri Lanka, due to the establishment of a large FTZ in Hambantota.

The development of manufacturing in Sri Lanka has several effects on the origin and destination of goods. The agricultural exports from the hinterland still form a basis of export, but the growth in export (containers) will come from manufacturing closer to consumption areas of Sri Lanka. Thus, the gravity of the exports will shift from the agricultural to the consumption areas. The following forecast is an example of this shift with expected boxes for 2050.

Table 4-5: Forecast 2050 per District (Origin and Destination)

Province	Forecast 2050 - Im/Ex	Forecast TEU	Forecast Origin & Destination (Picture)
Central	6.0%	223,772	
Eastern	13.0%	484,840	
North Central	4.0%	149,181	
North Western	10.0%	372,954	
Northern	7.0%	261,068	
Sabaragamuwa	6.0%	223,772	
Southern	19.0%	708,612	
Uva	5.0%	186,477	
Western	30.0%	1,118,861	
Total	**100.0%**	**3,729,537 ***	

4.2.3 Tourism & Cruise

The tourism sector is an area of focus for the government as it is underdeveloped and has a lot of potential to bring foreign currency and foreign exposure to the country of Sri Lanka. The tourism sector is increasing in size and revenues. Port-related tourism is expected to grow substantially over the short to medium period, as general and port-specific Cruise facilities are further improved and created.

The government of Sri Lanka made tourism development a key focus point by instating the Sri Lanka Tourism Development Authority in 2005. The authority identifies special tourism zones where investments and coordination can take place to attract people to the country. Table 4-6 demonstrates that tourist arrivals, employment and receipts have been picking up for the past years, and this trend is expected to continue due low current foreign tourist expenditure per capita.

Sri Lanka's tourism sector has grown substantially over recent years, as tourist arrivals increased from 0.56 M in 2006 to 1.80 M in 2015. The Sri Lanka Tourism Development Authority intends to foster further rapid growth, to increase the annual number of tourists to 2.20 M by 2016, and 4.00 M by 2020.

Table 4-6: Tourism Overview 2006-2015

Item	Unit	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Tourist Arrivals	1000 People	559.6	494.0	438.5	447.9	654.5	856.0	1,005.6	1,274.6	1,527.2	1,798.4
Total Employment	1000 People	133.6	145.2	123.1	125.0	132.1	138.7	162.9	270.2	299.9	319.4
Direct Employment	1000 People	55.6	60.5	51.3	52.1	55.0	57.8	67.9	112.6	129.8	135.9
Indirect Employment	1000 People	77.9	84.7	71.8	72.9	77.0	80.9	95.0	157.6	170.1	183.5
Gross Tourist Receipts	USD M	410	385	342	350	575	830	1,039	1,715	2,431	2,981

Source: Sri Lanka Central Bank, 2016

Sri Lanka has several touristic features all available in one island with limited distances from major cruise ports and airports. The cruise touristic values of the nation are:

- Sri Lankan social and cultural heritage
- Flora and Fauna
- Beaches
- Friendly people

Cruise industry shall also increase especially due to:

- Global interests in cruises due to widening of target groups.
- Cruise in Asia is new and fast-growing market.
- Vessels must travel between seasonal cruise markets (Caribbean/Europe/Asia) and Colombo is strategically located in the middle with ample tourism features.

The cruise industry gains a lot of attention by the Ministry which aims to create sustainable tourism development in Sri Lanka by:

- Focus on Colombo, Galle/Hambantota and Trincomalee
- Economics (gain revenues)
- Socially (integrate society, peace/ harmony)
- Environmental friendly (do not damage the environment)
- Above translates to the following needs assessments in ports:
- More common cruise berths near the city (walking distance)
- Marketing strategy needed
- Terminal building for the main cruise port of Colombo
- Develop home port concept (attract cruise passengers who start the cruise by flying-in)
- The cruise terminal focus on safe transit and shopping

4.3 Forecast on Commodities

4.3.1 Introduction to forecasts

This chapter details the forecasting methodology used per commodity including the key assumptions. Some general trends of economic development, population development and energy sector developments are described in Appendix IV to state the external environment affecting the forecasts. The table below summarises the forecasts.

Table 4-7: Summary Forecasts and Growth

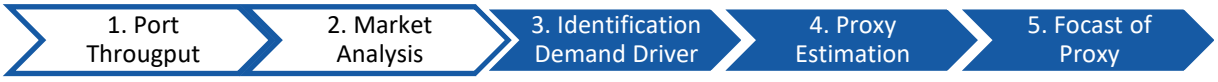
Commodity	Demand 2016	Demand 2025	Demand 2030	Demand 2050	Difference 2016 -2050	CAGR
Containers ('000 TEU)						
Gateway	1,300	2,197	2,630	3,737	2,437	3.15%
Transhipment	4,355	5,873	6,433	12,671	8,316	3.19%
Total	5,655	8,070	9,063	16,408	10,753	3.18%
Dry Bulk ('000 Tons)						
Coal	1,932	2,400	2,400	2,400	468	0.64%
Wheat / Maize / Corn	1,057	1,714	2,012	2,279	1,222	2.29%
Cement / Clinker / Gypsum	3,890	5,742	6,399	7,782	3,891	2.06%
Fertilizer	314	1,536	1,536	1,536	1,222	4.78%
Biomass	-	325	500	500	500	-
Ilmenite	-	700	700	700	700	
Total	*5,364*	*12,317*	*13,447*	*15,097*	*9,733*	*3.09%*
Liquid Bulk ('000 Tons)						
Crude Oil	1,685	2,512	7,512	7,512	5,826	4.49%
Refined Oil	3,059	5,322	1,691	4,527	1,468	1.16%
LNG	-	1,561	1,991	3,988	3,988	
Total	*4,744*	*9,395*	*11,193*	*16,027*	*11,282*	*3.65%*
Break Bulk ('000 Tons)						
General Cargo	1,287	1,743	1,834	2,547	1,261	2.03%
RoRo ('000 Vehicles)						
Domestic	63	131	145	236	172	3.94%
Transhipment	151	100	113	222	71	1.14%
Total	*214*	*231*	*258*	*458*	*243*	*2.26%*

4.3.2 Methodology in Identifying Demand Drivers and Proxies

The Analysis Process

The goal of this chapter is to describe the main trades taking place and the auxiliary functions performed at the ports of Sri Lanka. Ports are an important node in supply chains, especially in large island economies like Sri Lanka where all international trade takes place through its ports. Of course, cargo flowing through the port is part of a larger international supply chain and understanding those is key in developing a forecast model. Thus, this chapter serves as the descriptive steps 1 and 2 in the forecasting methodology of the consultant highlighted in Figure 4-5 .

Figure 4-5: Forecasting Process Step 1 and 2



Commodities

To accurately go through step 1 and 2 of the forecasting process several commodities are identified in this chapter based on their relative share of current port throughput. Table 4-8 summarises the main information per commodity which are elaborated on in this chapter.

Table 4-8: Summary Commodities

Commodity	Origin / Destination	Throughput 2016	Port(s) of Entry / Exit
Containerised Cargo			
Gateway Containers	Export from Lanka Hinterland Import mainly South-East Asia	• 1.3 M TEU	• Colombo
Transhipment Containers	• Transhipment to East-India, Bangladesh, Myanmar, Maldives • Relay West-India, Pakistan, Middle-East • Relay on East-West Trades	• 4.4 M TEU	• Colombo
Dry Bulk			
Coal	• Indonesia and Russia to energy and cement industry	• 0.1 M Tons Trincomalee • 1.9 M Tons Puttalam	• Trincomalee • Private Jetty Puttalam
Wheat / Maze / Corn	• Imports mainly Canada and US to flour mills Colombo & Trincomalee • Exports pellets to Western Europe	• 0.9 M Tons Cereal Import • 0.2 M Tons grain pellets export	• Colombo • Trincomalee
Cement / Clinker / Gypsum	• Indian cement to Colombo bagging plant • Japanese clinker to grinding facility Trincomalee & Galle	• 2.2 M Tons Cement • 1.6 M Tons Clinker • 0.1 M Tons Gypsum	• Colombo • Trincomalee • Galle
Fertilisers	• China & UAE	• 0.3 M tons	• Colombo
Liquid Bulk			
Crude Oils	UAE & Oman to refinery Sapugaskanda	• 1.7 M Tons	• Colombo
Refined (white) Oils	Mainly SEA countries and UAE to storage facilities & energy industry	• 2.8 M Tons	• Colombo
General Cargo			

Commodity	Origin / Destination	Throughput 2016	Port(s) of Entry / Exit
Non-containerised General cargo	• Iron / Steel Various worldwide for construction industry • Other break bulk from various origins and destinations	• 0.65 M Tons	• Colombo • Hambantota • Galle • Trincomalee • KKS
RoRo			
Vehicles for Domestic Market	• Mainly Asian brands to domestic car dealers	63,407 Vehicles	• Colombo • Hambantota
Transhipment Vehicles	India to African & South American markets • Japanese used cars to Africa	150,921 Vehicles	• Hambantota
Cruise			
Cruise vessels	• Shorter cruises tour India, Sri Lanka & Maldives and originate from Singapore • Longer cruises originate from Europe and US	• 28 Vessels	• Colombo • Hambantota • Galle • Trincomalee

Source: MIT Commodity Database / SLPA

For each of these commodities the following elements will be highlighted and presented in this chapter:

- Available throughput figures going back 10 years if available.
- The description of the specific supply chain including origin and destination.
- The import and export split; and
- The port(s) at which the cargo flows.

Port demand is always a derived transport demand from economic activities. Ports have a role to play in facilitating a smooth turnover of goods from ship to shore and vice versa. Ultimately, a collection of individual commodity supply chains run through the port. These supply chains can have vastly different markets, which all have their unique market dynamics and characteristics. To predict cargo flows to ports, firstly the demand drivers need to be identified. For example, of a demand driver for passenger cars is a combination of consumer, purchasing power, preference supply of vehicles and market prices.

Demand drivers can be hard to identify simply because the data is not available or too complex to estimate. Container transport is the clearest example of this phenomenon: data on the number of containers is available, but data on the contents of these containers and ultimate destination of cargo is not available. Luckily, reliable proxies for demand exist to estimate it. The proxy used for container transport for example is the GDP per capita combined with specific industrial demand.

This chapter will explore and explain the port demand drivers for Sri Lanka through a five-step process as displayed below. Firstly, cargo data provided by SLPA indicates which commodity streams are currently the largest. Future commodities, not yet handled by the ports, like LNG or Biomass are also incorporated in the analysis. For the target commodities, a market analysis will identify demand drivers. The available data will govern which proxy to select. Sanity checks through comparisons of data with other countries will be a red line through the analysis.

Figure 4-6: Figure Demand Drivers

Commodity	Demand Driver	Proxy Used for Forecast
Containers		
Gateway	Domestic consumption & Production	GDP / Capita development
Transhipment	Geographical position, feeder markets demand growth and port limitations	Geographic position and distances to feeder markets, shipping lines network logics
Dry Bulk		
Wheat / Maize / Corn	Domestic food consumption	Kg / capita demand
Cement / Clinker / Gypsum	Domestic construction activity	Cement / capita demand
Coal	Energy & General industries	Energy generation
Fertiliser	Domestic consumption	Total arable land
Ilmenite & Biomass	Export demand	Private initiatives
Liquid Bulk		
Crude & Refined Oil	Domestic consumption	
LNG	Energy industry	Energy generation
RoRo		
Domestic	Domestic consumption	GDP / Capita
Transhipment	Shipping market	Indian car exports
Cruise		
Vessels	Number of cruise calls	Tourism expectation and cruise schedules

4.3.3 Container Forecast Results

The container forecast for Sri Lanka is presented in the Base Case and in the High Case. Under the Base case the total volume is expected to grow from 5.6 M TEU in 2016 to 16.4 M TEU in 2050. Under the High Case the traffic is expected to increase to 25.5 M TEU by 2050.

Table 4-9 Base Case Container Forecast

Base Case		2016	2020	2025	2030	2050
Gateway Demand	'000 TEU	1,300	1,660	2,197	2,630	3,737
TS Demand	'000 TEU	4,355	5,775	5,873	6,433	12,671
Total	'000 TEU	5,655	7,435	8,070	9,063	16,408

Table 4-10 High Case Container Forecast

High Case		2016	2020	2025	2030	2050
Gateway Demand	'000 TEU	1,300	1,660	2,252	2,855	4,549
TS Demand	'000 TEU	4,355	6,304	7,311	8,473	20,996
Total	'000 TEU	5,655	7,964	9,563	11,328	25,545

4.3.4 Gateway Container

Forecast Results

The forecasts show a strong growth prediction until 2025 after which the scenarios diverge more. This has to do with the GDP per capita development, as differences in the first 5 years are smaller. The growth does flatten after 2040 due to a decrease in industrialisation speed and a stagnant population.

Figure 4-7: National Gateway Throughput Forecasts

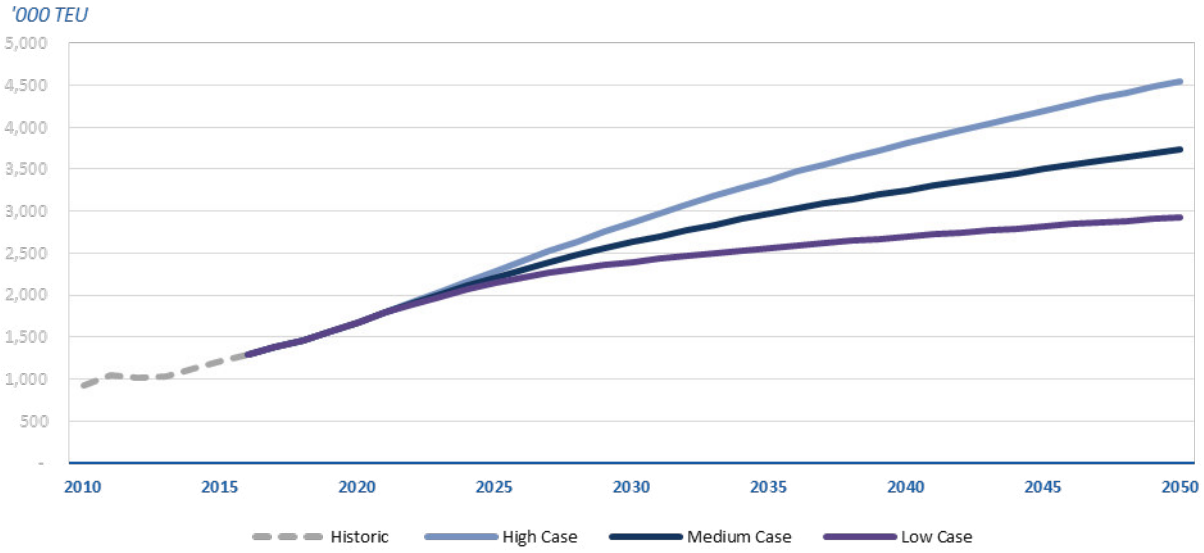


Table 4-11: National Gateway Throughput Forecasts Data Table

'000 TEU	2015	2020	2025	2030	2035	2040	2045	2050
High	1,218	1,660	2,252	2,855	3,368	3,802	4,192	4,549
5yr - CAGR		6.39%	6.29%	4.86%	3.36%	2.45%	1.97%	1.65%
Medium	1,218	1,660	2,197	2,630	2,969	3,254	3,508	3,737
5yr - CAGR		6.39%	5.77%	3.66%	2.46%	1.85%	1.51%	1.28%
Low	1,218	1,660	2,141	2,404	2,572	2,711	2,832	2,938
5yr - CAGR		6.39%	5.22%	2.34%	1.36%	1.06%	0.88%	0.74%

The breakdown for the medium scenario is displayed below. The division of export and import containers does not change over time, but the laden-empty split does.

Figure 4-8: National Gateway Throughput Base Scenario Forecast

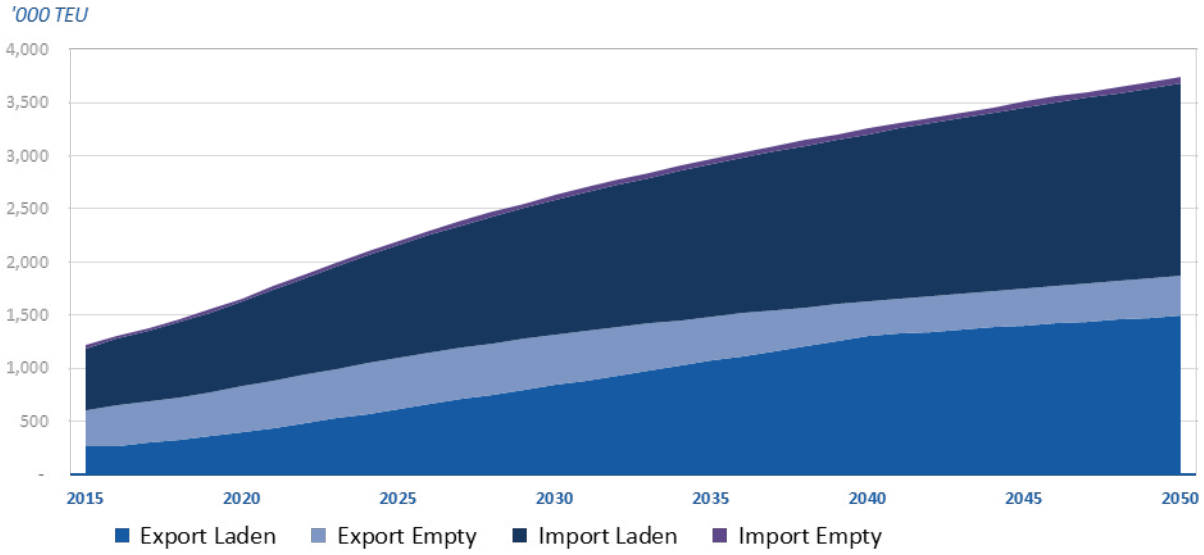


Table 4-12: National Gateway Throughput Base Scenario Data Table

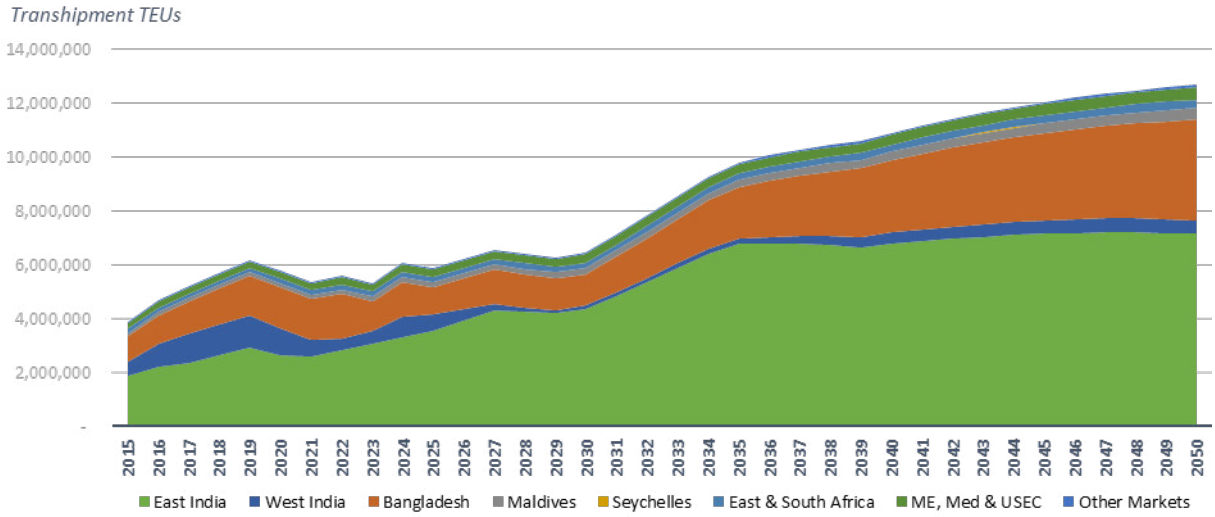
'000 TEU	2015	2020	2025	2030	2035	2040	2045	2050
Export Laden	263	399	616	842	1,069	1,302	1,403	1,495
Export Empty	346	430	482	472	415	325	351	374
Import Laden	574	803	1,063	1,273	1,437	1,575	1,698	1,809
Import Empty	35	27	35	42	48	52	56	60
Total Gateway	**1,218**	**1,660**	**2,197**	**2,630**	**2,969**	**3,254**	**3,508**	**3,737**
5yr - CAGR		6.39%	5.77%	3.66%	2.46%	1.85%	1.51%	1.28%

4.3.5 Transhipment Container Forecast

The graph below shows Sri Lanka's total forecast transhipment container throughput, divided by transhipment market. The following observations can be made:

- Annual transhipment volumes are estimated to increase from 3.89 M TEU in 2015 to 12.69 M TEU in 2050.
- A dip in volumes can be observed towards 2030, due to the expected implementation of several competitive projects within the South Asia Hub (mainly Vizhinjam and Colachel) and South East Asia Hub (mainly Singapore, Tanjung Pelepas and Port Klang).
- East India, West India and Bangladesh will remain Sri Lanka's key markets for transhipment containers, accounting for an estimated 89.9% of throughput in 2050.
- Due to increasing direct trade shares and increasing pressure from competing transhipment hub groups, growth of transhipment volumes is expected to decelerate after 2035.

Figure 4-9: Transhipment Forecast



4.3.5.1 Base Case and High Case Scenario for Container Transhipment

As one of the major cargo segments, the forecast of transhipment container volumes is critical for port development planning. Given the footloose nature of the transhipment business, and the uncertainties concerning the development of transhipment markets, two scenarios have been developed:

- The *Base Case*, where transhipment market experience moderate growth in transhipment demand and Colombo's market share growth decelerates over time, due to pressure from other hub ports.
- The *High Case*, where transhipment demand in Colombo's main transhipment markets grows more rapidly and Colombo is able to retain its dominant position in the region.

As such, the Base Case and High Case scenarios are aimed at reflecting the impact of variations in external factors on transhipment demand, as the container transhipment business is strongly dependent on such external factors. This is in contrast to the economic Low Case, Base Case, and High Case scenarios, as introduced in the previous chapter, which focus mainly on Sri Lanka's internal (economic) development. The table and figures below present the estimated transhipment volumes for both the base and High Case scenarios.

The Base Case volumes, graphics and breakdown are illustrated in next tables. Under the Base Case scenario the following assumptions are assumed:

- The Indian ports additional capacity do reduce the transhipment at Sri Lanka due to more direct trades and local transhipment.
- The main markets of East India and Bangladesh show more moderate growth than in the High Case and generates markets shares for Sri Lanka by 2050 (resp. 56.4 % and 29.4%)
- The West India market has only limited market share (4%) by 2050 due to direct trades and transhipment performed with India.
- The transhipment at nearby competing ports (Vishinjam and Colachel) for India is stronger than in the High Case.
- The relay growth (2%) is more moderate than in the High Case.

Table 4-13 Base Case Container Transhipment Forecast

		2016	2020	2025	2030	2050
Base Case TS Demand	'000 TEU	4,355	5,775	5,873	6,433	12,671

Figure 4-10 Base Case Container Transhipment Forecast

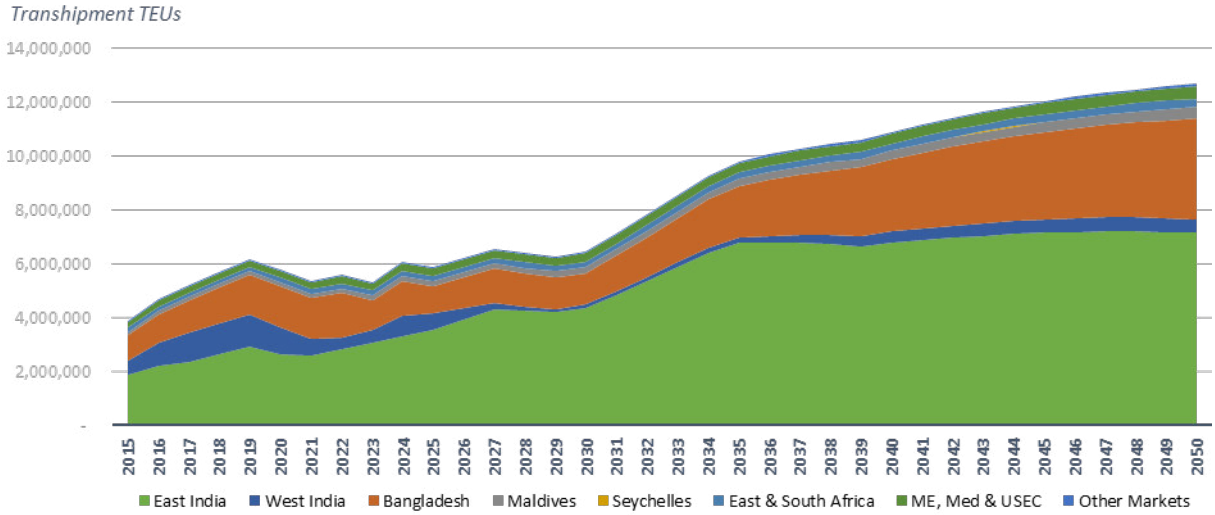


Table 4-14 Base Case Container Transhipment Forecast Breakdown

'000 TEU	2015	2020	2025	2030	2035	2040	2045	2050	CAGR	Share 2015 (%)	Share 2050 (%)
East India	1,876	2,619	3,557	4,353	6,777	6,778	7,151	7,142	3.89%	48.24%	56.37%
West India	524	1,045	627	130	173	418	500	521	-0.01%	13.46%	4.11%
Bangladesh	943	1,492	983	1,149	1,947	2,683	3,234	3,725	4.00%	24.24%	29.40%
Maldives	119	147	183	225	269	315	366	424	3.69%	3.06%	3.35%
Seychelles	4	5	6	7	8	9	11	12	3.28%	0.10%	0.10%
East & South Africa	157	174	192	212	234	258	285	314	2.00%	4.04%	2.48%
ME, MED & USEC	226	250	276	304	336	371	410	452	2.00%	5.82%	3.57%
Other Markets	40	44	49	54	59	66	72	80	2.00%	1.03%	0.63%
Total TS Forecast	**3,888**	**5,775**	**5,873**	**6,433**	**9,804**	**10,899**	**12,028**	**12,671**	**3.43%**	**100.00 %**	**100.00 %**

The High Case volumes, graphics and breakdown are illustrated in next tables. Under the High Case scenario the following assumptions are assumed:

- The Indian ports additional capacity does not threat the transhipment at Sri Lanka;
- The main markets of East India and Bangladesh remain strong and generates large markets shares for Sri Lanka (resp. 54.0 % and 24.8%);
- The West India market remains at a larger market share (13.4%) by 2050 than in the Base Case as Colombo hub remains competitive;

- The transhipment at nearby competing ports (Vishinjam and Colachel) is more moderate than in the Base Case; and
- The relay growth (3%) is stronger than in the Base Case.

Table 4-15 High Case Container Transhipment Forecast

		2016	2020	2025	2030	2050
High Case TS Demand	'000 TEU	4,355	6,304	7,311	8,473	20,996

Figure 4-11 High Case Container Transhipment Forecast

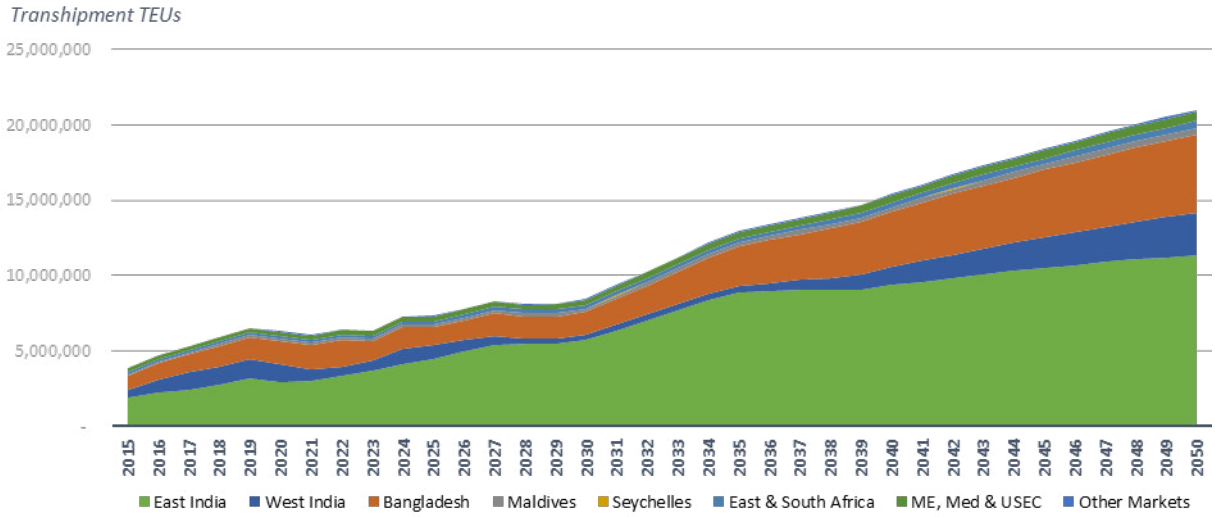


Table 4-16 High Case Container Transhipment Forecast Breakdown

'000 TEU	2015	2020	2025	2030	2035	2040	2045	2050	CAGR	Share 2015 (%)	Share 2050 (%)
East India	1,876	2,944	4,482	5,750	8,862	9,355	10,504	11,337	5.27%	48.24%	54.00%
West India	524	1,172	945	332	466	1,214	2,039	2,818	4.93%	13.46%	13.42%
Bangladesh	943	1,546	1,126	1,500	2,590	3,642	4,459	5,213	5.01%	24.24%	24.83%
Maldives	119	147	183	225	269	315	366	424	3.69%	3.06%	2.02%
Seychelles	4	5	6	7	8	9	11	12	3.28%	0.10%	0.06%
East & South Africa	157	182	211	245	284	329	382	442	3.00%	4.04%	2.11%
ME, MED & USEC	226	262	304	352	408	474	549	636	3.00%	5.82%	3.03%
Other Markets	40	46	54	62	72	84	97	112	3.00%	1.03%	0.54%
Total TS Forecast	**3,888**	**6,304**	**7,311**	**8,473**	**12,960**	**15,422**	**18,405**	**20,996**	**4.94%**	**100.00 %**	**100.00 %**

Opportunities and Threats

Transhipment cargo is known as footloose cargo, this means that shipping regard the activity as non-captive for the port and are able to transfer the cargo activity to other ports along the service routes depending on cost, geographical position to end-feeder markets, quality of port service and available quay and stack spaces and sufficient water depths.

The table below summarizes key identified opportunities and threats that may impact Sri Lanka's ability to attract transhipment cargo.

Opportunities	Threats
Maritime Hub concept route boosts industrial productivity in Sri Lanka	China developing a more internal focussed economy, resulting in less exports
Geographical position of Port of Colombo serves shipping lines network enlargements developments	A focus on land based silk route developments instead of the maritime silk routes, resulting in decreased maritime trade growth
	Development of the northern passage through the artic[11]
	India market to develop it ports faster, resulting in a more rapid decrease in dependency on transhipment
	Indian market becoming a real export market, which directly serves global markets
	War risks in the region, due to conflicts between nations.
	Liberalised cabotage regulations in India make cabotage more favourable, resulting in more competition from Indian ports.

4.3.6 Coal

Forecast Results

Due to changes in governmental energy policy, the coal imports related to power generation are limited to the maximum input capacity of the Puttalam coal power plant. There is no change in a high, medium or low scenario in energy consumption, as it is assumed that the power plant will operate at maximum capacity, irrespective of the economic conditions. The remainder of the nation's coal demand, which is used as an input by the cement plants, enters the country through Trincomalee and is limited to approximately 120,000 tons a year with potential additional volumes after the envisaged Ashroff jetty expansion.

[11] Exprerimental voyages with liquid bulk have been made by Russian flagged ships. In 2018 the first containership (Venta Maersk 3600 TEU ice-class) was sent through the artic route. The sailing distance is reduced by approx. one or two weeks compared with the suez route depending on the destionations. The route is nowadays three months per year open but with climate change this period is expected to become longer.

Figure 4-12: National SLPA Coal Imports Forecast

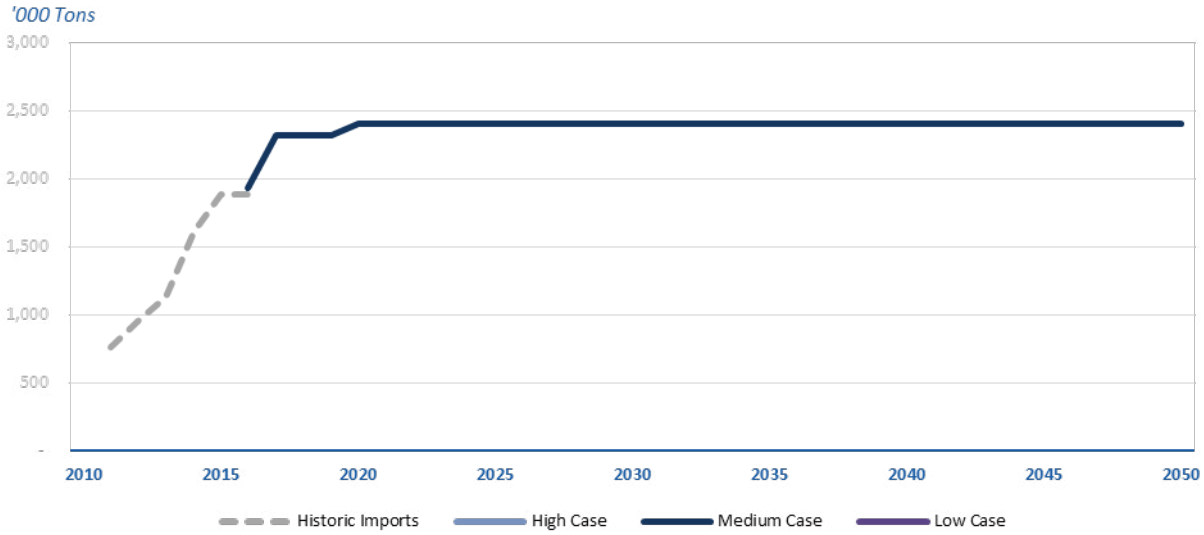


Table 4-17: National SLPA Coal Imports Forecast

'000 Tons	2015	2020	2025	2030	2035	2040	2045	2050
Medium	1,955	2,400	2,400	2,400	2,400	2,400	2,400	2,400
5yr - CAGR		4.2%	-	-	-	-	-	-

4.3.7 Wheat / Maize / Corn

Forecast Results

The three scenarios do no differ until 2025, when the consumption level 70 kg per capita per annum is reached. The stagnation in 2040 presented in all three scenarios is related to shrinking population. The below forecast does include possible transhipment at Sri Lankan ports for foreign flour mills or industrial demands reaching 20% of normal demand in 2027. An example is that economies of scale can be reached for shipping lines when wheat is transported from the US and Ukraine/Russia for consumption regions in South East Asia in large panamax/mini cape vessels and redistributed in handysize vessels. Additional options are the soybean trade to produce bio-ethanol.

Figure 4-13: National Wheats Import Forecast

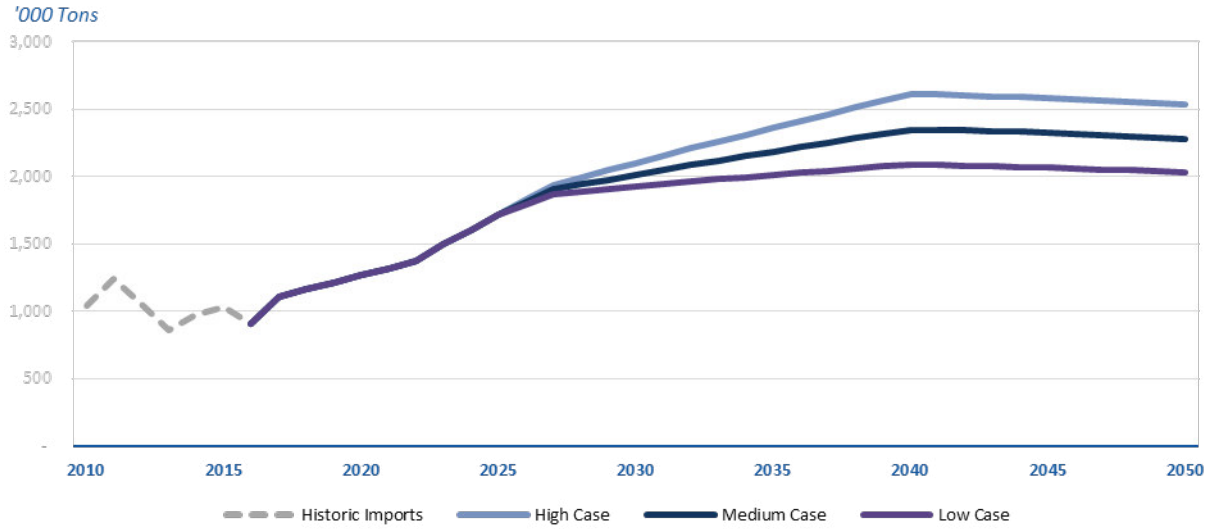


Table 4-18: National Wheats Import Forecast

'000 Tons	2015	2020	2025	2030	2035	2040	2045	2050
High	1,025	1,265	1,714	2,099	2,360	2,609	2,582	2,532
5yr - CAGR		4.3%	6.3%	4.1%	2.4%	2.0%	-0.2%	-0.4%
Medium	1,025	1,265	1,714	2,012	2,185	2,348	2,324	2,279
5yr - CAGR		4.3%	6.3%	3.3%	1.7%	1.4%	-0.2%	-0.4%
Low	1,025	1,265	1,714	1,924	2,010	2,087	2,065	2,026
5yr - CAGR		4.3%	6.3%	2.3%	0.9%	0.8%	-0.2%	-0.4%

4.3.8 Cement / Clinker / Gypsum

Forecast Results

The import forecast is shown below. Acceleration of imports is expected in the short term (2018-2025) because of construction projects. The trend continues upwards until 2040 where the cement demand per capita is maximized, but the marginally shrinking population causes the imports to remain relatively stagnant.

Figure 4-14: National Cement Import Forecast

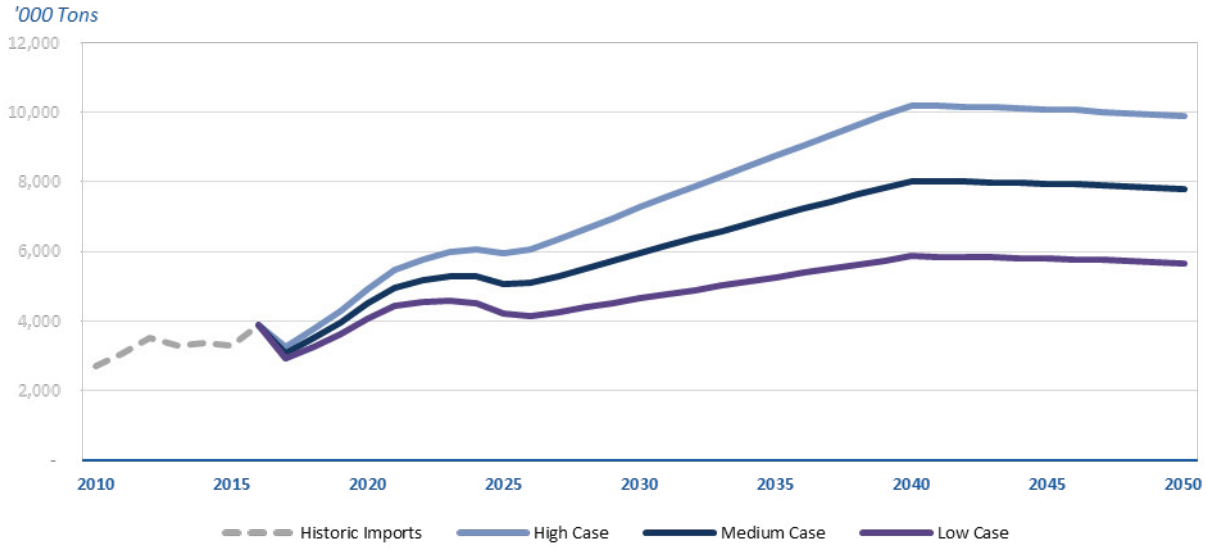


Table 4-19: National Cement Import Forecast

'000 Tons	2015	2020	2025	2030	2035	2040	2045	2050
High	3,300	4,932	5,951	7,268	8,763	10,209	10,097	9,892
5yr - CAGR		8.4%	*3.8%*	*4.1%*	*3.8%*	*3.1%*	*-0.2%*	*-0.4%*
Medium	3,300	4,502	5,080	5,956	7,015	8,035	7,946	7,782
5yr - CAGR		6.4%	*2.4%*	*3.2%*	*3.3%*	*2.8%*	*-0.2%*	*-0.4%*
Low	3,300	4,072	4,210	4,644	5,267	5,861	5,794	5,671
5yr - CAGR		4.3%	*0.7%*	*2.0%*	*2.6%*	*2.2%*	*-0.2%*	*-0.4%*

4.3.9 Fertiliser

Forecast Results

The forecast is based on a private initiative to produce SSP fertiliser in Sri Lanka which includes the imports of sulfuric acid and exports of residual production for the international (mainly Indian) market. Sri Lanka has large pockets of phosphate rock, which can be used for production.

Table 4-20: Overview National Fertiliser and Sulfuric Acid Forecast

'000 Tons	2015	2020	2025	2030	2035	2040	2045	2050
Fertiliser Imports	599	-	-	-	-	-	-	-
Fertiliser Demand	336	336	336	336	336	336	336	336
Fertiliser Production	-	480	1,440	1,440	1,440	1,440	1,440	1,440
Fertiliser Exports	-	144	1,104	1,104	1,104	1,104	1,104	1,104
Sulfuric Acid Imports	-	144	432	432	432	432	432	432

4.3.10 Crude & Refined Oil

Forecast Results

This figure clearly shows the relationship between crude imports and refined oil imports. Crude imports are defined by the refining capacity of the nation. Currently, the Sapugaskanda refinery has a capacity of 50,000 bbl/day. It is expected that additional capacity of 100,000 bbl/day will be added in Hambantota starting 2026 and at maximum capacity in 2030.

As crude imports increase, the demand for refined oil products drops, which can be observed from the imports figures. Adding to the refining capacity of Sri Lanka will reduce costly petroleum imports, for example.

Figure 4-15: National Crude & Refined Forecasts

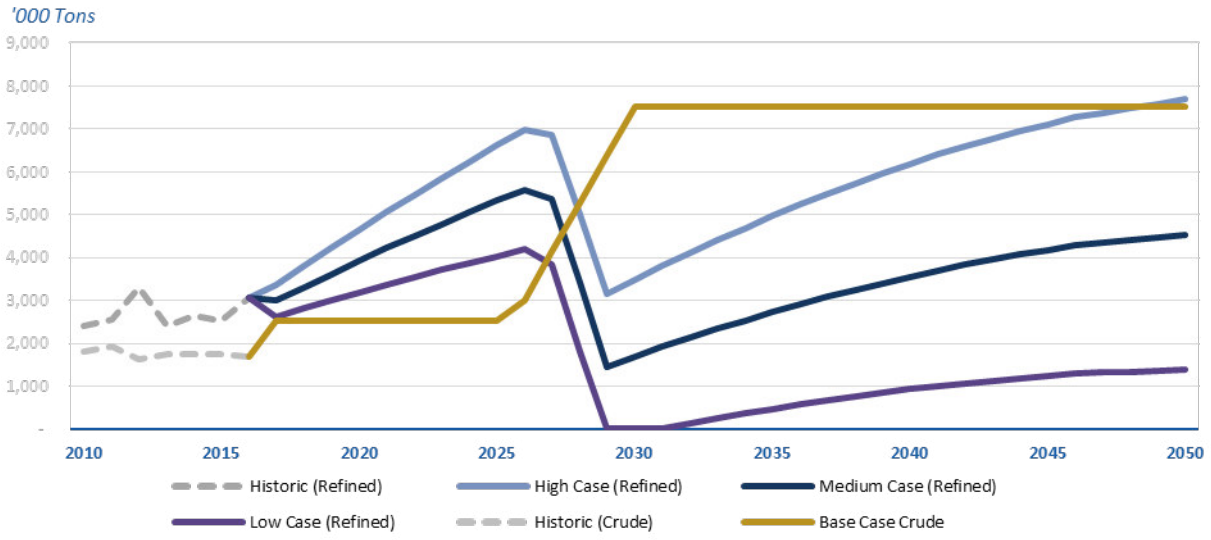


Table 4-21: National Crude & Refined Forecast

'000 Tons	2016	2020	2025	2030	2035	2040	2045	2050
Refined								
High Case	3,059	4,642	6,611	3,489	4,966	6,180	7,106	7,680
5yr – CAGR		*11.0%*	*7.3%*	*-12.0%*	*7.3%*	*4.5%*	*2.8%*	*1.6%*
Medium Case	3,059	3,916	5,322	1,691	2,722	3,556	4,174	4,527
5yr – CAGR		*6.4%*	*6.3%*	*-20.5%*	*10.0%*	*5.5%*	*3.3%*	*1.6%*
Low Case	3,059	3,189	4,033	-	477	931	1,241	1,374
5yr – CAGR		*1.0%*	*4.8%*	-	-	*14.3%*	*5.9%*	*2.1%*
Crude								
Base Case	1,685	2,512	2,512	7,512	7,512	7,512	7,512	7,512

4.3.11 LNG

Forecast Results

The LNG import terminal in the Colombo South Port break water will cater to the first imports of LNG in 2019, which result from the envisaged development of a gas fired power plant in the Colombo region. Subsequently, a ramp-up is expected of the production in Colombo. The forecast is based on the envisaged national energy generation from LNG.

Figure 4-16: National LNG Import Forecasts

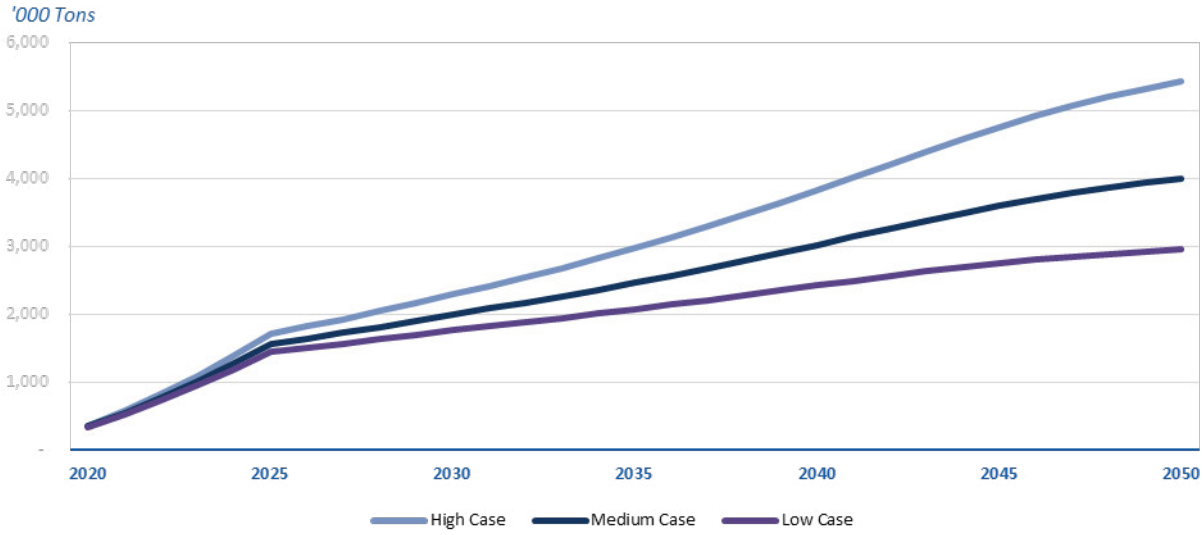


Table 4-22: National LNG Import Forecast

'000 Tons	2020	2025	2030	2035	2040	2045	2050
High	359	1,714	2,292	2,971	3,820	4,749	5,425
5yr – CAGR		*36.7%*	*6.0%*	*5.3%*	*5.2%*	*4.5%*	*2.7%*
Medium	343	1,561	1,991	2,460	3,016	3,594	3,988
5yr – CAGR		*35.4%*	*5.0%*	*4.3%*	*4.2%*	*3.6%*	*2.1%*
Low	333	1,446	1,758	2,070	2,418	2,747	2,951
5yr – CAGR		*34.1%*	*4.0%*	*3.3%*	*3.2%*	*2.6%*	*1.4%*

4.3.12 Ilmenite & Biomass

The ilmenite and biomass forecasts are based on market party initiatives and expectations for the port of Trincomalee. Both are export products destined for the South-East Asian market. The biomass is a cleaner alternative to coal that can be used in coal fired power plants; in order to reduce the carbon footprint, power plants in a growing amount of countries are required to switch from coal to other sources such as biomass.

Forecast Results

Table 4-23: National Export Forecasts Ilmenite & Biomass

'000 Tons	2020	2025	2030	2035	2040	2045	2050
Ilmenite	-	700	700	700	700	700	700
Biomass	150	290	500	500	500	500	500

4.3.13 Non-Containerised General Cargo

Forecast Results

General cargo sees an increase in the period until 2025 due to increasing construction works in Sri Lanka. Because, of the current high containerisation rate of Sri Lanka (exports and imports around 95%) no large effects are to be expected regarding that aspect.

Figure 4-17: National General Cargo Import and Export Forecasts

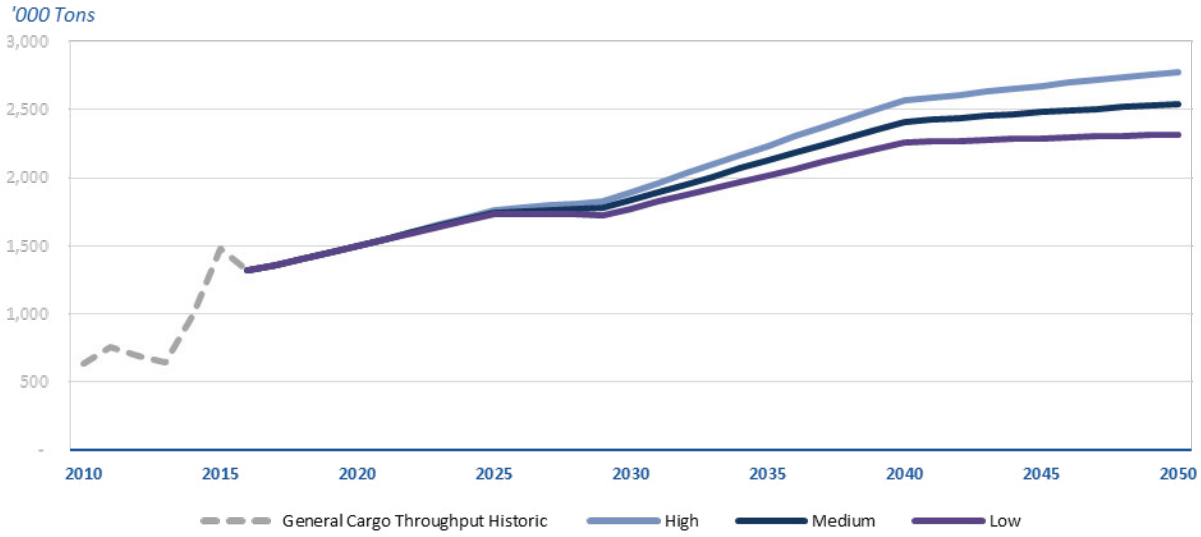


Figure 4-18: National Non-containerised general cargo

'000 Tons	2016	2020	2025	2030	2035	2040	2045	2050
High	1,301	1,497	1,764	1,894	2,235	2,567	2,675	2,774
5yr - CAGR		*3.6%*	*3.3%*	*1.4%*	*3.4%*	*2.8%*	*0.8%*	*0.7%*
Medium	1,301	1,497	1,747	1,834	2,126	2,411	2,481	2,545
5yr - CAGR		*3.6%*	*3.1%*	*1.0%*	*3.0%*	*2.5%*	*0.6%*	*0.5%*
Low	1,301	1,497	1,729	1,775	2,018	2,257	2,290	2,320
5yr - CAGR		*3.6%*	*2.9%*	*0.5%*	*2.6%*	*2.3%*	*0.3%*	*0.3%*

4.3.14 RoRo Domestic

Forecast Results

The three scenarios show significant differences as in the low scenario imports drop to around 90 thousand vehicles per annum whereas in the High Case it rises to 400 thousand.

Figure 4-19: National RoRo Import Forecast

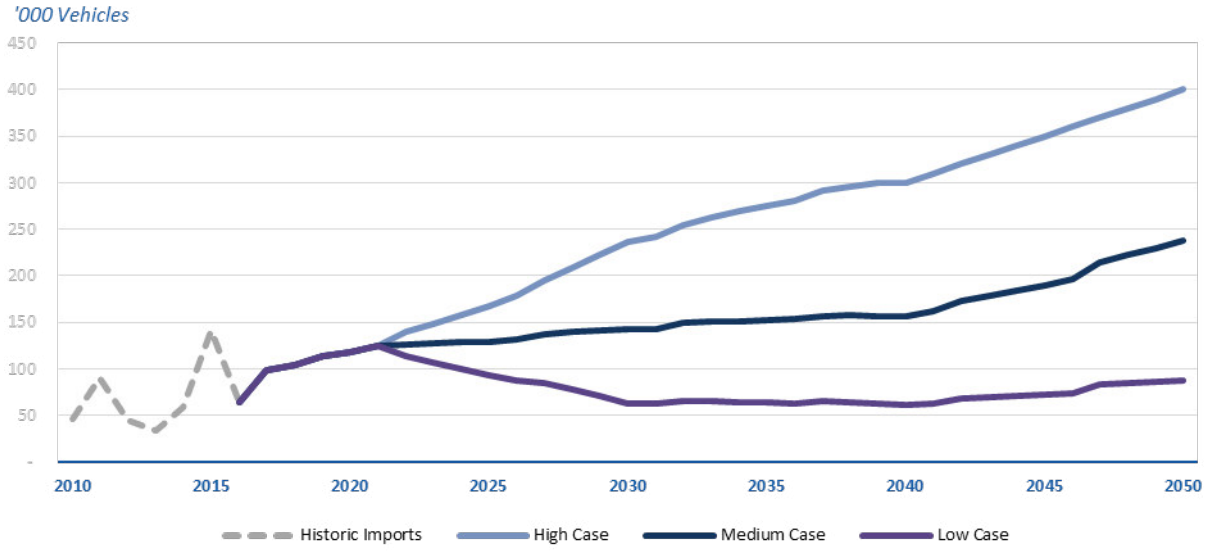


Table 4-24: National RoRo Import Forecast Data Table

'000 Vehicles	2016*	2020	2025	2030	2035	2040	2045	2050
High	63	117	167	236	275	300	350	400
5yr - CAGR		*16.7%*	*7.3%*	*7.2%*	*3.1%*	*1.7%*	*3.1%*	*2.7%*
Medium	63	117	129	142	152	157	190	238
5yr - CAGR		*16.7%*	*2.0%*	*1.9%*	*1.4%*	*0.5%*	*3.9%*	*4.6%*
Low	63	117	94	63	64	62	72	88
5yr - CAGR		*16.7%*	*-4.4%*	*-7.5%*	*0.1%*	*-0.5%*	*3.1%*	*4.1%*

*2016 is used because 2015 is a large outlier

4.3.15 RoRo Transhipment

Forecast Results

The forecast shows a stagnant relation in coming decade as the Increase in Indian exports is countered by the drop in Sri Lanka's market share for the roro transhipment. The market share is stable after that.

Figure 4-20: National RoRo Transhipment Forecast

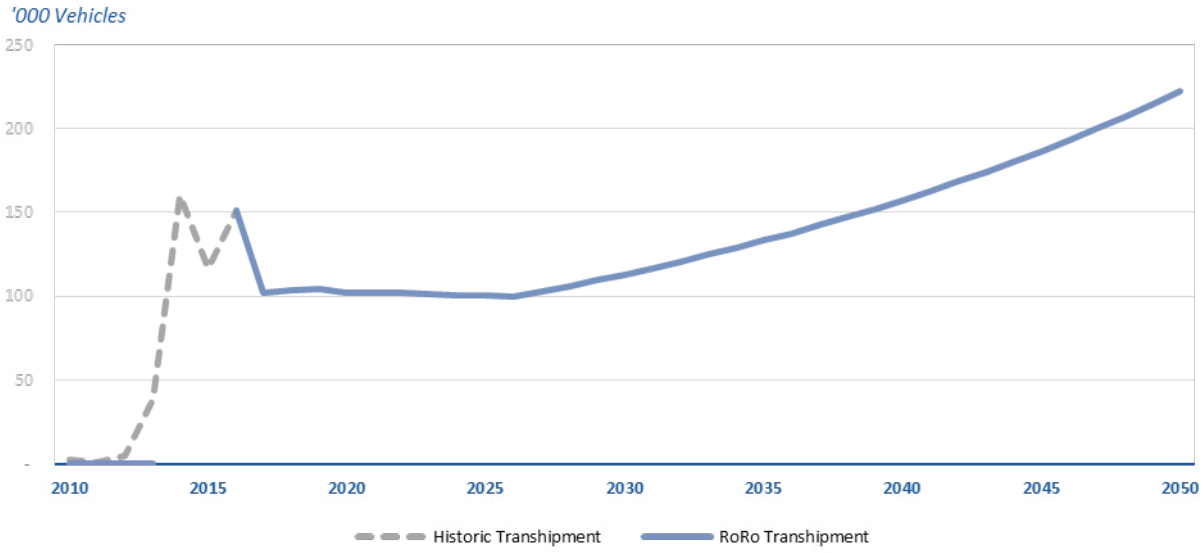


Table 4-25: National RoRo Transhipment Data Table

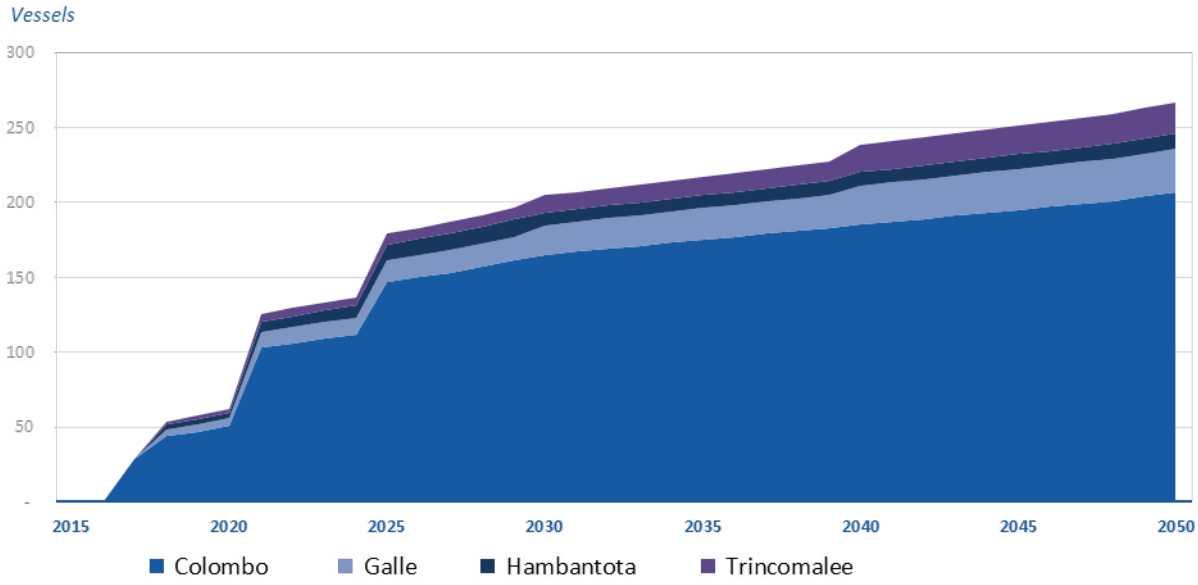
'000 Vehicles	2015	2020	2025	2030	2035	2040	2045	2050
Forecast	116	102	100	113	133	157	187	222
5yr - CAGR		*-2.6%*	*-0.4%*	*2.4%*	*3.3%*	*3.4%*	*3.5%*	*3.5%*

4.3.16 Cruise Vessel Arrival Forecast

Forecast Results

Colombo continues be the main port of call for cruise vessels, while other ports profit from its growth. The figure below presents the projected vessel arrivals. Several substantial increases in project vessel arrivals can be observed, as it is expected that several cruise loops with Colombo as the homeport are to be established.

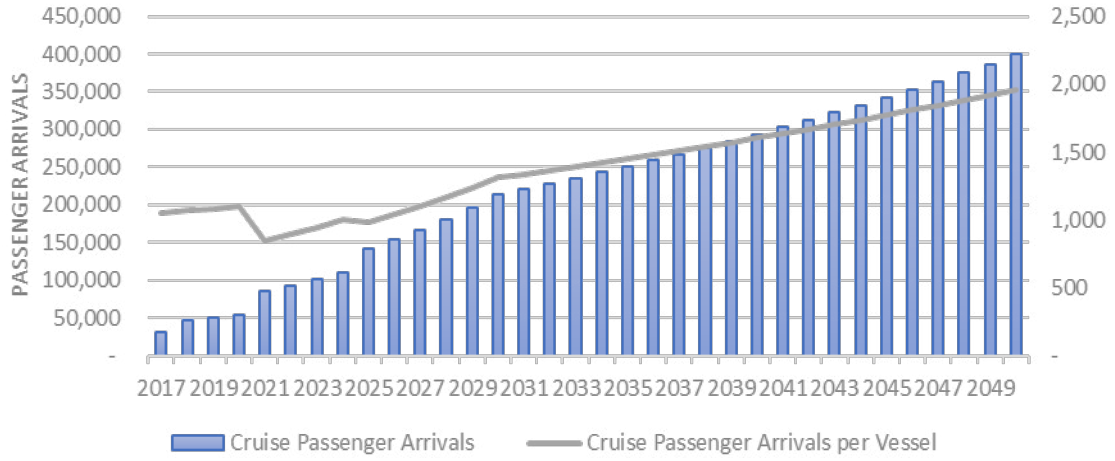
Figure 4-21: Forecast Vessel Arrivals per Port



The average number of passengers that disembark in Colombo is estimated to increase from 1,052 in 2017 to 1,960 in 2050 (CAGR: 1.9%). Figure 4-22 shows the forecast development of the total cruise passenger arrivals in Colombo port for the period from 2017 to 2050, as well as the average disembarking passengers per vessel. The following observations can be made:

- The average number of disembarking passengers per arriving cruise vessel experiences substantial dips in 2021 and 2025, due to the new low-utilisation services that are introduced.
- Despite the decrease in the average number of disembarking passengers in 2021 and 2025, a substantial increase in the total passenger arrivals can be observed for these years.
- Passenger arrivals in Colombo port are estimated to increase from 30,508 in 2017 to 0.4M in 2050 (CAGR: 8.1%).

Figure 4-22 Colombo Passenger Arrivals and Passenger Arrivals per Vessel - Forecast



4.4 Commodity-Level Allocation

4.4.1 Containers

Gateway Containers

- Of the total gateway demand, Colombo port is estimated to handle 98% in 2025, 95% in 2030, and 88% in 2050, due to the port's proximity to the consumer market.
- Hambantota port is estimated to handle 1% in 2020, 4% in 2030, and 9% in 2050, due to the envisaged logistics and industrial zone and the port's proximity to main trade routes.
- The remainder of gateway containers are expected to be handled at Trincomalee, which will solely serve its direct hinterland.

Transhipment

Transhipment container volumes are assumed to remain in Colombo during the forecasting period. While Hambantota is geographically better positioned to handle the transhipment cargo, several factors result in a favourable position for Colombo. These factors include Colombo's proximity to domestic consumer markets, which entails that vessels carrying gateway containers will already call Colombo, the presence of the port community in Colombo, the maximum water depth of 17.0m in Hambantota, and the higher number of berths in Colombo.

Under the Base Case, transhipment volumes are expected to increase to 12.7 M TEU by 2050; under the High Case scenario, which assumes stronger growth of destination markets and a stronger value proposition for the port of Colombo, transhipment volumes are expected to increase to 21.0 M TEU by 2050.

The table below presents the Base Case container forecast and allocation for the Sri Lankan ports.

Table 4-26 Sri Lanka Port Cargo Allocation - Containers

	Current (2016)		2020		2030		2050	
	Volumes ('000 TEU)	Allocation (%)	Volumes ('000 TEU)	Allocation (%)	Volumes ('000 TEU)	Allocation (%)	Volumes ('000 TEU)	Allocation (%)
Gateway								
Colombo	1,300	*100%*	1,643	*99%*	2,498	*95%*	3,289	*88%*

	Current (2016)		2020		2030		2050	
	Volumes ('000 TEU)	Allocation (%)	Volumes ('000 TEU)	Allocation (%)	Volumes ('000 TEU)	Allocation (%)	Volumes ('000 TEU)	Allocation (%)
Trincomalee	-	-	-	-	26	*1%*	112	*3%*
Hambantota	-	-	17	*1%*	105	*4%*	336	*9%*
Other Ports	-	-	-	-	-	-	-	-
National Demand	**1,300**	***100%***	**1,660**	***100%***	**2,630**	***100%***	**3,737**	***100%***
Transhipment								
Colombo	4,355	*100%*	5,775	100%	6,433	100%	12,671	100%
Trincomalee	-	-	-	-	-	-	-	-
Hambantota	-	-	-	-	-	-	-	-
Other Ports	-	-	-	-	-	-	-	-
National Demand	**4,355**	***100%***	**5,775**	**100%**	**6,433**	**100%**	**12,671**	**100%**
Total								
Colombo	5,655	*100%*	7,418	100%	8,931	99%	15,960	97%
Trincomalee	-	-	-	-	26	0.4%	112	1%
Hambantota	-	-	17	0%	105	0.6%	336	2%
Other Ports	-	-	-	-	-	-	-	-
National Demand	**5,655***	***100%***	**7,435**	**100%**	**9,063**	**100%**	**16,408**	**100%**

** Excludes 79,812 TEUs that were re-stowed.*

The table below presents the High Case container forecast and allocation for the Sri Lankan ports.

Table 4-27 Sri Lanka Port Cargo Allocation -High Case Containers

	Current (2016)		2020		2030		2050	
	Volumes ('000 TEU)	Allocation (%)	Volumes ('000 TEU)	Allocation (%)	Volumes ('000 TEU)	Allocation (%)	Volumes ('000 TEU)	Allocation (%)
Gateway								
Colombo	1,300	*100%*	1,643	*99%*	2,713	*95%*	4,003	*88%*
Trincomalee	-	-	-	-	28	*1%*	136	*3%*
Hambantota	-	-	17	*1%*	114	*4%*	409	*9%*
Other Ports	-	-	-	-	-	-	-	-
National Demand	**1,300**	***100%***	**1,660**	***100%***	**2,855**	***100%***	**4,548**	***100%***
Transhipment								
Colombo	4,355	*100%*	6,304	100%	8,473	100%	20,995	100%

	Current (2016)		2020		2030		2050	
	Volumes ('000 TEU)	Allocation (%)	Volumes ('000 TEU)	Allocation (%)	Volumes ('000 TEU)	Allocation (%)	Volumes ('000 TEU)	Allocation (%)
Trincomalee	-	-	-	-	-	-	-	-
Hambantota	-	-	-	-	-	-	-	-
Other Ports	-	-	-	-	-	-	-	-
National Demand	**4,355**	***100%***	**6,304**	**100%**	**8,473**	**100%**	**20,995**	**100%**
Total								
Colombo	5,655	*100%*	7,947	100%	11,186	98.7%	24,998	98%
Trincomalee	-	-	-	-	28	0.2%	136	1%
Hambantota	-	-	17	0%	114	1.0%	409	2%
Other Ports	-	-	-	-	-	-	-	-
National Demand	**5,655***	***100%***	**7,964**	**100%**	**11,328**	**100%**	**25,543**	**100%**

** Excludes 79,812 TEUs that were re-stowed.*

Under the high case it is assumed that all transhipment is performed by Colombo port. Two scenario's have been drafted for the case that Hambantota also performs transhipment hampering the competitiveness of Port of Colombo. These scenario's are presented in the Colombo Port Development Plan.

4.4.2 Coal

Currently, the majority of coal volumes is handled at the Puttalam pier, as the coal is destined for the nearby coal fired power plant. The remainder of coal volumes is handled at Trincomalee port. This allocation is expected to remain constant, as other envisaged coal fired power plants near Trincomalee have been cancelled. The table below presents the coal allocation.

Table 4-28 Sri Lanka Port Cargo Allocation - Coal

	Current (2016)		2020		2030		2050	
	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)
Colombo	-	-	-	-	-	-	-	-
Trincomalee	103	*5%*	120	*5%*	120	*5%*	120	*5%*
Hambantota	-	-	-	-	-	-	-	-
Other Ports	1,836	*95%*	2,280	*95%*	2,280	*95%*	2,280	*95%*
National Demand	**1,932**	***100%***	**2,400**	***100%***	**2,400**	***100%***	**2,400**	***100%***

4.4.3 Wheat / Maize / Corn

Grains are mainly handled at the port of Trincomalee; these grain volumes consist of wheat grain imports for the Prima Flour milling facility and exports of processed products and by-products. The remaining grain

imports are handled in Colombo, mainly at the Grain Elevators facility; these imports consist of products for local consumption.

It is expected that Trincomalee will remain the major port for grain handling, as the Prima Flour facility envisages further development in the Trincomalee area. Additionally, some grain volumes are foreseen for the Port of Hambantota, in order to serve the surrounding developments. The table below presents the Base Case allocation.

Table 4-29 Sri Lanka Port Cargo Allocation – Wheat / Maize / Corn

	Current (2016)		2020		2030		2050	
	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)
Colombo	190	*18%*	211	*17%*	302	*15%*	342	*15%*
Trincomalee	867*	*82%*	1,054	*83%*	1,509	*75%*	1,709	*75%*
Hambantota	-	-	-	-	201	*10%*	228	*10%*
Other Ports	-	-	-	-	-	-	-	-
National Demand	**1,057**	***100%***	**1,265**	***100%***	**2,012**	***100%***	**2,279**	***100%***

**Includes 152,650 tons of wheat bran pallet (by-product of Prima Flour's production process) exports*

4.4.4 Cement / Clinker

Processed cement is handled in the port of Colombo, as the majority of cement is consumed by construction projects in the Colombo Metropolitan area. Additionally, clinker is handled at the ports of Trincomalee and Galle, due to the presence of cement processing facilities in and around these ports. Over the forecast period, the following development is foreseen for the allocation:

- Colombo's share of cement imports is expected to remain dominant in the short to medium term, due to substantial infrastructure projects. In the long term, Colombo's share of volumes is expected to decrease.
- Trincomalee's share of cement and clinker volumes is expected to remain relatively constant, as the nearby facilities envisage expansion in line with total demand growth.
- Galle's share of cement and clinker volumes is expected to remain relatively constant, as the nearby facilities envisage expansion in line with total demand growth.
- Some cement volumes are foreseen for the port of Hambantota, in order to facilitate the region's envisioned future development.

The table below presents the Base Case allocation.

Table 4-30 Sri Lanka Port Cargo Allocation – Cement, Clinker & Gypsum

	Current (2016)		2020		2030		2050	
	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)
Colombo	2,179	*49%*	2,871	*50%*	2,560	*40%*	2,334	*30%*

Trincomalee	1,712*	*39%*	2,297	*40%*	2,560	*40%*	3,113	*40%*
Hambantota	-	-	287	*5%*	640	*10%*	1,556	*20%*
Other Ports	535	*12%*	287	*5%*	640	*10%*	778	*10%*
National Demand	**3,890**	***100%***	**5,374**	***100%***	**6,399**	***100%***	**7,782**	***100%***

**Excludes 535,962 tons of clinker that is loaded (transhipped) in Trincomalee for transport to Galle, as it is already counted as an import (unloading move).*

4.4.5 Fertiliser

Fertilisers are currently fully imported through the port of Colombo. It is expected that bulk fertiliser imports will fully diminish over time, as local production facilities are developed and the remaining volumes will be imported in containerised form. As such, bulk fertiliser imports through Colombo will diminish over time.

In order to develop the local fertiliser production, a SSP fertiliser plant is envisaged to be established in Trincomalee. This plant will import sulphuric acids for its production process and is envisaged to export any produced fertiliser in excess of domestic demand. Hence, Trincomalee is envisioned to become Sri Lanka's main fertiliser port. The expected Base Case allocation is presented in the table below.

Table 4-31 Sri Lanka Port Cargo Allocation – Fertiliser

	Current (2016)		2020		2030		2050	
	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)
Colombo	314	*100%*	160	*56%*	-	-	-	-
Trincomalee	-	-	128	*44%*	1,536	*100%*	1,536	*100%*
Hambantota	-	-	-	-	-	-	-	-
Other Ports	-	-	-	-	-	-	-	-
National Demand	**314**	***100%***	**288**	***100%***	**1,536**	***100%***	**1,536**	***100%***

4.4.6 Crude Oil

Crude oil imports are currently fully handled at Colombo, as the imports are destined for the nearby Sapugaskanda refinery. It is expected that the old refinery, which is in a poor state, will be revamped or rebuilt in the Colombo region. As such, crude oil imports in the Colombo region will remain stable over the forecast period. Additionally, it is foreseen that a new 100,000 bbl/day refinery will be developed in Hambantota by 2025. The expected Base Case allocation is presented in the table below.

Table 4-32 Sri Lanka Port Cargo Allocation – Crude Oil

	Current (2016)		2020		2030		2050	
	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)
Colombo	1,685	*100%*	2,512	*100%*	2,512	*33%*	2,512	*33%*
Trincomalee	-	-	-	-	-	-	-	-
Hambantota	-	-	-	-	5,007	*67%*	5,007	*67%*

Other Ports	-	-	-	-	-	-	-	-
National Demand	**1,685**	***100%***	**2,512**	***100%***	**7,512**	***100%***	**7,512**	***100%***

4.4.7 Refined Oil

The majority of refined oil imports are handled in Colombo, due to the port's proximity to the main consumption center. Colombo is expected to remain the country's primary consumption center over the forecast period; however, development of the southern and eastern regions of the countries are expected to result in a more even distribution of refined oil imports among the country's 3 major ports. The expected Base Case allocation is presented in the table below.

Table 4-33 Sri Lanka Port Cargo Allocation – Refined Oil

	Current (2016)		2020		2030		2050	
	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)
Colombo	2,871	*90%*	3,010	*77%*	845	*50%*	2,264	*50%*
Trincomalee	238	*9%*	541	*14%*	507	*30%*	1,358	*30%*
Hambantota	25	*1%*	365	*9%*	338	*20%*	905	*20%*
Other Ports	-	-	-	-	-	-	-	-
National Demand	**2,639**	***100%***	**3,916**	***100%***	**1,691**	***100%***	**4,527**	***100%***

4.4.8 LNG

The first gas fired power plant is envisaged to be developed in the Colombo region; subsequently, it is expected that a gas fired power plant will be developed in the Hambantota region to further increase the country's share of LNG based power generation. The expected Base Case allocation is presented in the table below.

Table 4-34 Sri Lanka Port Cargo Allocation – LNG

	Current (2016)		2020		2030		2050	
	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)
Colombo	-	-	343	*100%*	995	*50%*	1,994	*50%*
Trincomalee	-	-	-	-	-	-	-	-
Hambantota	-	-	-	-	995	*50%*	1,994	*50%*
Other Ports	-	-	-	-	-	-	-	-
National Demand	**-**	**-**	**343**	***100%***	**1,991**	***100%***	**3,988**	***100%***

4.4.9 Ilmenite

Sri Lanka has pockets of ilmenite which is used as a metal in titanium production. Currently, they are already exporting the ilmenite in small vessels, using a facility north of Trincomalee. In the future, the exports are

envisaged to be handled at the port of Trincomalee. The expected Base Case allocation is presented in the table below.

Table 4-35 Sri Lanka Port Cargo Allocation – Ilmenite

	Current (2016)		2020		2030		2050	
	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)
Colombo	-	-	-	-	-	-	-	-
Trincomalee	-	-	-	-	700	*100%*	700	*100%*
Hambantota	-	-	-	-	-	-	-	-
Other Ports	-	-	-	-	-	-	-	-
National Demand	**-**	**-**	**-**	**-**	**700**	***100%***	**700**	***100%***

4.4.10 Biomass

Biomass is being produced by a private company for which a bulk export location is needed. Trincomalee is the preferred export location due to the possibility to load into bulk carriers and the availability of land near the Ashroff quay. The expected Base Case allocation is presented in the table below.

Table 4-36 Sri Lanka Port Cargo Allocation – Biomass

	Current (2016)		2020		2030		2050	
	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)
Colombo	-	-	-	-	-	-	-	-
Trincomalee	-	-	150	*100%*	500	*100%*	500	*100%*
Hambantota	-	-	-	-	-	-	-	-
Other Ports	-	-	-	-	-	-	-	-
National Demand	**-**	**-**	**150**	***100%***	**500**	***100%***	**500**	***100%***

4.4.11 Non-Containerised General Cargo

Non-containerised general cargo is currently mainly handled at the port of Colombo, as the majority of the general cargo volumes are inputs for the construction projects in the Colombo region. It is expected that Colombo's share of non-containerised general cargo volumes will decrease in the medium and long term, as the construction boom in the Colombo region recedes and increasing amounts of development projects are carried out in the southern and eastern regions of the country. The expected Base Case allocation is presented in the table below.

Table 4-37 Sri Lanka Port Cargo Allocation – Non-Containerised General Cargo

	Current (2016)		2020		2030		2050	
	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)	Volumes ('000 Ton)	Allocation (%)
Colombo	801	*62%*	948	*64%*	733	*40%*	509	*20%*
Trincomalee	-	-	-	-	183	*10%*	832	*30%*
Hambantota	399	*31%*	477	*32%*	697	*38%*	1,054	*38%*
Other Ports	86	*7%*	101	*7%*	220	*12%*	333	*12%*
National Demand	**1,287**	***100%***	**1,492**	***100%***	**1,834**	***100%***	**2,774**	***100%***

4.4.12 RoRo

All transhipped vehicles are currently handled at the port of Hambantota, following a political decision to move the vehicle transhipment away from the busy Colombo area. It is expected that all vehicle transhipment activities will remain at Hambantota. As Colombo is expected to remain the main consumption center for vehicles imported for local use, it is foreseen that Colombo will keep handling a share of domestic vehicles; however, Colombo's share of domestic imports is expected to decrease due to space constraints. The expected Base Case allocation is presented in the table below.

Table 4-38 Sri Lanka Port Cargo Allocation – RoRo

	Current (2016)		2020		2030		2050	
	Volumes (Vehicles)	Allocation (%)	Volumes (Vehicles)	Allocation (%)	Volumes (Vehicles)	Allocation (%)	Volumes (Vehicles)	Allocation (%)
Gateway								
Colombo	31,888	*50%*	40,048	*37%*	21,770	*15%*	23,569	*10%*
Trincomalee	-	-	-	-	-	-	-	-
Hambantota	31,519	*50%*	68,694	*63%*	123,361	*85%*	212,125	*90%*
Other Ports	-	-	-	-	-	-	-	-
National Demand	**80,307**	***100%***	**108,742**	***100%***	**145,130**	***100%***	**235,695**	***100%***
Transhipment								
Colombo	778	*0%*	-	-	-	-	-	-
Trincomalee	-	-	-	-	-	-	-	-
Hambantota	150,143	*100%*	102,076	*100%*	113,033	*100%*	222,031	*100%*
Other Ports	-	-	-	-	-	-	-	-
National Demand	**101,019**	***100%***	**102,076**	***100%***	**113,033**	***100%***	**222,031**	***100%***

4.4.13 Cruise

- Cruise development in Sri Lanka is expected to increase due to the attractiveness of the country (nature, culture, beaches, wildlife) and the still relatively under developed touristic sector.
- Colombo is currently the main cruise destination in Sri Lanka; due to the envisaged development of a dedicated passenger terminal in Colombo, Colombo will remain the primary passenger port of the country.
- Trincomalee, Hambantota and Galle will benefit from the significant cruise development in Colombo. Cruise liners will add these ports to their Sri Lankan schedule for their specific touristic value propositions.

Table 4-39 Sri Lanka Port Cargo Allocation – Cruise

	Current (2016)		2020		2030		2050	
	Vessels	Allocation (%)	Vessels	Allocation (%)	Vessels	Allocation (%)	Vessels	Allocation (%)
Colombo	43	*100%*	51	*82%*	165	*81%*	207	*78%*
Trincomalee	No data	*0%*	3	*4%*	12	*6%*	21	*8%*
Hambantota	No data	*0%*	4	*6%*	8	*4%*	10	*4%*
Other Ports	No data	*0%*	5	*8%*	20	*10%*	29	*11%*
National Demand	**43**	***100%***	**63**	***100%***	**205**	***100%***	**267**	***100%***

4.5 Capacity development needs

The capacity gap is based on the current capacities calculated using actual and benchmark productivities. The 2016 capacity is deducted from the 2050 capacity to uncover potential future capacity gaps. Container capacity is calculated in more detail, especially the development options which are already on the table at Colombo.

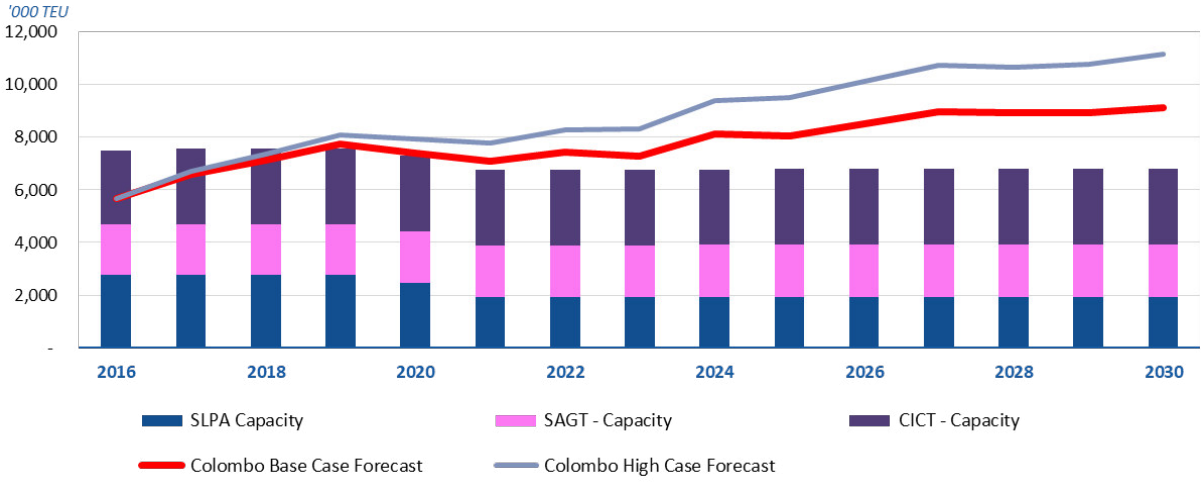
In the tables, the following colour code is adhered to: red indicates a capacity shortage; orange indicates a deficit within the margin of error of 10%; and green indicates a capacity surplus.

4.5.1 Containers

Port of Colombo in 2030

Figure 4-23 displays the expected 2030 container volumes demand under the Base Case and High Case, in relation to the existing capacity in the Port of Colombo. This shows a clear and urgent demand for development.

Figure 4-23 2030 Container Demand and Existing Capacity Supply – Colombo Current Facilities



The capacity gaps in TEU (2030) are illustrated in next table.

Table 4-40 Container Capacity Supply Gap

		2016	2020	2025	2030
Base Case					
Demand	'000 TEU	5,655	7,418	8,026	8,931
Capacity	'000 TEU	7,500	7,294	6,789	6,806
Capacity Gap	'000 TEU	1,845	(124)	(1,237)	(2,125)
High Case					
Demand	'000 TEU	5,655	7,947	9,518	11,186
Capacity	'000 TEU	7,500	7,294	6,789	6,806
Capacity Gap	'000 TEU	1,845	(653)	(2,729)	(4,380)

Subsequently, Table 4-41 displays the envisaged development options of Colombo. Under the Base Case forecast, the nearly completed ECT Phase I should provide adequate capacity. Under the High Case forecast, the second phase of the ECT terminal is required; alternatively, the first phase of the WCT could be developed.

Table 4-41 2030 Container Capacity Development Options - Colombo

Facility	Capacity ('000 TEU)	Quay (m)
Current Facilities (2030)		
SLPA	1,928	1,292
SAGT I	1,999*	940
CICT	2,880*	1,200
Development Options (2030)		
WCT I	3,360	1,400
WCT II	3,360	1,400
ECT I	2,880	1,200
ECT II	1,440	600
SAGT II	2,640	1,200

*Assuming an increase in productivity.

Port of Colombo in 2050

The following tables illustrate the situation in 2050.

Table 4-42: 2050 Container Capacity Development Scenarios - Colombo

Facility	SAGT I	CICT	WCT I	WCT II	ECT I	ECT II	SAGT II	North Port	Capacity ('000 TEU)	Quay (m)
Capacity Development Scenarios										
1. Current Facilities	x	x							4,948	2,140
2. Current & Planned	x	x	x		x				11,188	4,740
3. Current, Planned & Extended ECT + SAGT	x	x	x		x	x	x		15,268	6,540
4. Current, Planned & North Port	x	x	x		x			x	16,588	6,990
5. Full Port Development	x	x	x	x	x	x	x	x	24,028	10,190

Table 4-43 displays the container capacity gap analysis based on the estimated 2050 container volumes and the capacity development scenarios presented above. Red indicates a capacity shortage; orange indicates a deficit within the margin of error of 10%; and green indicates a capacity surplus.

The following table shows the TEU capacity gap by 2050 and is an indicator for the capacity required to be developed.

Table 4-43: TEU Gap Analysis Colombo 2050

	Unit	Base Case	High Case
1. Current Facilities	'000 TEU	(11,726)	(20,050)
2. Current & Planned	'000 TEU	(4,772)	(13,810)
3. Current, Planned & Extended ECT + SAGT	'000 TEU	(6,92)	(9,730)
4. Current, Planned & North Port	'000 TEU	628	(8,410)
5. Full Port Development	'000 TEU	8,068	(970)

The main conclusions from the analysis are:

- The future capacities of SAGT, WCT I, CICT and ECT (scenario 2: current and planned facilities) are insufficient for Colombo under the Base Case.
- Under the High Case scenario, which entails higher transhipment volumes for the Port of Colombo, the north port expansion is required to accommodate all container volumes.
- For both scenarios, the expansion capacities are based on improved handling efficiencies in the future.

Hambantota

Phase II of the Hambantota port development, which includes a container terminal, is nearing completion. Expansion options still exist for the port. Table 4-44 provides an overview of the forecasts, including the quay wall requirement given an assumed 2,400 TEU per metre per annum throughput capacity.

Table 4-44 Container Demand in TEU and Quay Metres for Base and High Case Hambantota

Scenario	2050 Capacity Requirement ('000 TEU)	2050 Quay wall Requirement (m)
Base Case Scenario	336	330
High Case Scenario	336	330

Subsequently, Table 4-45 displays the envisaged or planned development options at the port of Hambantota. Table 4-46 identifies the development scenarios that comprise several of the facilities planned.

Table 4-45 2050 Container Capacity Development Options - Hambantota

Facility	Capacity ('000 TEU)	Quay (m)
Current Facilities (2050)		
Phase II Container Terminal	3,116	1,299
Development Options (2050)		
Phase IV Container Terminal	9,240	3,850

Table 4-46 2050 Container Capacity Development Scenarios - Hambantota

Facility	Phase II Container Terminal	Phase IV	Capacity ('000 TEU)	Quay (m)
3. Current	x		3,116	1,299

4. Full Port Development	x	x	12,356	5,149

Table 4-47 presents the gap analysis for Hambantota for the Base Case and High Case scenarios, based on estimated 2050 container volumes. The gap analysis yields the following conclusion:

- The current Phase II container terminal is sufficient to handle expected demand under both the Base Case and High Case scenarios. Based on this gap analysis the Phase II container development is not required as it would provide unwanted overcapacity, hence part of phase II container terminal may be used for other purposes in the future.

Table 4-47 2050 TEU Gap Analysis Hambantota

	Unit	Base Case	High Case
1. Current Facilities	'000 TEU	2,854	2,854
2. Full Development	'000 TEU	12,094	12,094

Trincomalee

Table 4-48 presents the estimated 2050 container volumes and quay wall requirement. The following is concluded:

- A single berth in Trincomalee is sufficient to accommodate estimated future demand.
- No detailed plans for container terminals are considered as projected demand is low.

Table 4-48: Container Demand in TEU and Quay Metres for Base and High Case Trincomalee

Scenario	2050 Volumes ('000 TEU)	2050 Quay Wall Requirement (m)
Base Case	112	300 m
High Case	112	300 m

4.5.2 Coal

Table 4-49 presents the current coal capacity and estimated 2050 Base Case demand. The following can be concluded:

- Projected coal volumes do not show strong growth, as recent coal fired power plant projects have been cancelled. As such, only volumes for the Puttalam power plant and small volumes for the cement plants need to be accommodated.
- The current capacity in Puttalam is sufficient to handle its estimated future demand.

Table 4-49 Coal Capacity Analysis

	2016 Capacity ('000 Tons)	2016 Throughput ('000 Tons)	2050 Forecast Base ('000 Tons)
Colombo	-	-	-
Trincomalee	347	103	120
Hambantota	-	-	-
Puttalam	2,500	1,836	2,280

Other Ports	-	-	-

4.5.3 Wheat, Maize, and Corn

Table 4-50 presents the current wheat, maize and corn capacity, as well as estimated 2050 Base Case demand. The following can be concluded:

- Colombo's capacity is sufficient in the future, as the majority of bulk cargoes is allocated to Trincomalee.
- Due to its capacity to handle large bulk vessels, Trincomalee is the ideal point of entry for grain products; it is assumed that an efficient transport corridor to the western part of the country will be developed, which will further strengthen Trincomalee's position.
- Trincomalee will need additional grain processing capacity if it is to accommodate the projected throughput.

Table 4-50 Wheat, Maize & Corn Capacity Analysis

	2016 Capacity ('000 Tons)	2016 Throughput ('000 Tons)	2050 Forecast Base ('000 Tons)
Colombo	710	190	342
Trincomalee	1,161	867	1,709
Hambantota	-	-	228
Other Ports	-	-	-

4.5.4 Cement, Clinker, and Gypsum

Table 4-51 presents the current cement, clinker and gypsum capacity, as well as estimated 2050 Base Case demand. The following can be concluded:

- The private facilities in Colombo and Trincomalee are operating at or near maximum capacity.
- Galle cement handling capacity will remain sufficient over the forecasting period, but will need modernisation.
- Future expansion is best accommodated in Hambantota in case of large scale developments; alternatively, the port of Colombo also offers suitable access for deep-water vessels.

Table 4-51 Cement, Clinker & Gypsum Capacity Analysis

	2016 Capacity ('000 Tons)	2016 Throughput ('000 Tons)	2050 Forecast Base ('000 Tons)
Colombo	2,250	2,179	2,334
Trincomalee	2,200	1,712	3,113
Hambantota	-	-	1,556
Galle	1,000	535	778
Other Ports		-	-

4.5.5 Crude Oils

Table 4-52 presents the current crude oil capacity and estimated 2050 Base Case demand. The following can be concluded:

- The crude pumping and storage capacity in Colombo is sufficient to handle future demand.
- As crude oil imports are foreseen in Hambantota, to serve the envisaged 100,000 bbl/day refinery, substantial crude oil handling capacity will need to be developed in the port.

Table 4-52 Crude Oil Capacity Analysis

	2016 Capacity ('000 Tons)	2016 Throughput ('000 Tons)	2050 Forecast Base ('000 Tons)
Colombo	6,570	1,685	2,512
Trincomalee	-	-	-
Hambantota	-	-	5,007
Other Ports	-	-	-

4.5.6 Refined Oils

Table 4-53 presents the current refined oil capacity and estimated 2050 Base Case demand. The following can be concluded:

- Colombo has sufficient capacity to handle estimated refined oil demand.
- Trincomalee is expected to retain refined oils handling capacity, if (a share of) the dilapidated storage tanks are rehabilitated. However, a new deep sea jetty will be required to accommodate larger vessels and enable more efficient operations.
- Refined oil handling facilities are required to support the expected future imports in Hambantota.
- A swing factor in the forecast is the new location of a new refinery should the existing refinery not be revamped.

Table 4-53 Refined Oil Capacity Analysis

	2016 Capacity ('000 Tons)	2016 Throughput ('000 Tons)	2050 Forecast Base ('000 Tons)
Colombo	4,531	2,871	2,264
Trincomalee	10,692	238	1,358
Hambantota	-	21	905
Other Ports	-	-	-

4.5.7 Non-Containerised General Cargo

Table 4-54 presents the current non-containerised general cargo capacity and estimated 2050 Base Case demand. The following can be concluded:

- The current capacity of Colombo is sufficient, even if ECT and BQ will be given different functions in the future, as a substantial share of general cargo volumes will flow to other ports in the future.
- Trincomalee requires expansion of the Ashroff jetty (already planned for by SLPA).
- KKS requires an expansion of the general cargo berth (already planned for by SLPA).
- Hambantota requires additional handling capacity to accommodate the substantial general cargo volumes related to the region's development.
- Capacity in Oluvil is sufficient, following the recent expansion.
- Capacity in Galle is sufficient, if the new passenger berth is regarded as common berth whilst not occupied by cruise vessels.

Table 4-54 Non-Containerised General Cargo Capacity Analysis

	2016 Capacity ('000 Tons)	2016 Throughput ('000 Tons)	2050 Forecast Base ('000 Tons)

Colombo	2,000	801	555
Trincomalee	250	-	832
Hambantota	750	399	1,054
KKS	125	32	277
Oluvil	250	-	28
Galle	250	42	28

4.5.8 RoRo

Table 4-55 presents the current RoRo capacity and estimated 2050 Base Case demand. The following can be concluded:

- Capacity in Colombo is sufficient, as a result of the strategic decision to handle the majority of RoRo at Hambantota.
- Capacity in Hambantota is sufficient.

Table 4-55 RoRo Capacity Analysis

	2016 Capacity ('000 Vehicles)	2016 Throughput ('000 Vehicles)	2050 Forecast Base ('000 Vehicles)
Colombo	84	33	24
Trincomalee	-	-	-
Hambantota	515	182	434
Other Ports	-	-	-

4.5.9 Cruise Vessels

Table 4-56 presents the current cruise capacity and estimated 2050 Base Case demand. The following can be concluded:

- Colombo will need 3 berths and a passenger terminal building for which development plans are being written.
- Trincomalee is an attractive location for cruise passengers; as such, a dedicated cruise berth will need to be developed.
- Hambantota is close to wild parks in the southern region. No dedicated facilities are required; vessels can use common berths.
- Galle is attractive location for cruise passengers. A dedicated berth can service demand whereas a passenger terminal is only necessary when cruise vessel arrivals are further increased.

Table 4-56 Cruise Capacity Analysis

Port	Dedicated Facilities	2050 Forecast (vessels)	Berth Requirement	Passenger Terminal Requirement
Colombo	Small scale terminal	207	3 dedicated	Yes
Trincomalee	No	21	1 dedicated	No
Hambantota	No	10	1 multi-purpose	No
Galle	No	29	1 dedicated	No

4.5.10 LNG

Table 4-57 presents the current LNG capacity and estimated 2050 Base Case demand. The following can be concluded:

- Currently, none of the ports are able to handle LNG volumes.
- Capacity is required in Colombo and Hambantota, as gas fired power plants are envisaged near these ports.

Table 4-57 LNG Capacity Analysis

	2016 Capacity ('000 Tons)	2016 Throughput ('000 Tons)	2050 Forecast Base ('000 Tons)
Colombo	-	-	1,994
Trincomalee	-	-	-
Hambantota	-	-	1,994
Other Ports	-	-	-

4.5.11 Fertilizer

Table 4-58 presents the current fertilizer capacity and estimated 2050 Base Case demand.

Table 4-58 Fertilizer Capacity Analysis

	2016 Capacity ('000 Tons)	2016 Throughput ('000 Tons)	2050 Forecast Base ('000 Tons)
Colombo	314	314	-
Trincomalee	-	-	1,536
Hambantota	-	-	-
Other Ports	-	-	-

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5 Port Development Directions

5.1 Introduction

This chapter analyses the port development needs, based on scenario's and allocations. For each of the ports the port directions are explained summarized through each commodity segment.

The following approach has been used for this chapter:

- Paragraph 5.2 provides the Colombo port directions;
- Paragraph 5.3 provides the Trincomalee port directions;
- Paragraph 5.4 displays the Hambantota port directions;
- Paragraph 5.5 displays the Port of Galle directions;
- Paragraph 5.6 displays the Kankesanthurai port directions;
- Paragraph 5.7 displays the Oluvil port directions; and
- Paragraph 5.7 displays the Puttalam Coal Jetty port directions.

5.2 Colombo port directions

> Port of Colombo will be leader in the Indian Ocean, Middle East and East African hub ports, and is to become an efficient logistic hub to attract sustainable investment and trade, to facilitate the national import and export strategies and to become an international maritime centre.

As such a four tier focus applies to Port of Colombo:

- Maintaining a World Class Transhipment Hub, serving the Middle East, East Africa, India, Pakistan and the Bay of Bengal;
- Becoming an efficient logistic hub for imports and newly developed exports;
- Becoming a sustainable Port.
- Becoming an international maritime centre.

Colombo Port is leader in the Indian Ocean as Transhipment Hub port and should stay competitive with other national and international transhipment ports. To achieve this, focus should be on operational excellence both on the marine services, cargo handling services, auxiliary functions and on interterminal traffic. The marine activities and handling activities are one of the core activities of SLPA. Port designs are adjusted, and future capacity is planned for in order to stay ahead of demand. Innovations and new technologies will support this development.

The Port of Colombo should also become more efficient to facilitate the National Export Strategy on targeted exports sectors, as well as improving the logistics on import cargoes. As many trades are transported by containers, the container logistics chain is prime focus to become more efficient. This can be catered for through better infrastructure on port and hinterland connections as well as on administration and procedures. The latter can be achieved through a combination of digitalisation through a single maritime window as well as through trade facilitation and improved customs procedures. Further the development of cargo villages or Free Trade Zones (FTZ) connecting to the port should cater for demands on export manufacturers and foreign direct investment (FDI).

The above shows that the port sector needs to move fast on the innovation and efficiency improvements through investments to stay competitive both to support the transhipment Hub as well as the exports visionary. The port of Colombo will be a reliable partner in developing the nation and serving new clients.

Sustainability has become an important element in the global production chain. Global supply chains focus on partners which have a sustainability policy in place. Port of Colombo wants to align with modern practises of sustainability standards and green policies, innovation in the priority export sectors and integrate the logistics operation in the green supply chain.

Port of Colombo and the city are under massive development and together with the new Port City ideally situated to become an International Maritime Centre (IMC). The Port of Colombo is to become a well recognized as International Maritime Centre, a place in which efficient maritime services are provided and which various trade related services and maritime industries are vested. The strategy is to be developed over time. Development in three main "centres" have been identified such as trade, port and shipping industry and supporting industries. Examples of be be the establihment of corporate companies in the filed of shipping, classification societies, maintenance and repair and bunkering. Importantly is to increase the knowledge industry on training, research and development and concultancy. Several tasks are to be executed to create an international maritime centre:

- Profiling and branding Colombo Port
- Boosting Ease of Doing Business
- Creating a vibrant business and living environment
- Facilitate new business opportunities
- Provide incentives to attract business
- Partnership with other IMCs

Port role in the Country

The Port of Colombo is important for Sri Lanka and facilitates the majority of the import and exports trades today. The city is under large developments with the erection of many new hotels and resident flats and the rehabilitation of historic buildings. Furthermore, a new city port is under development, south of the existing port, including hotels, conference centres, residential flats, shops and marinas. The new port city will be connected through an elevated highway that also creates additional entrances to the port. The western region has several plans for city and urban developments and improvements. Combined, the western region developments and the city of Colombo generate high demands for the port of Colombo. This translates to required port improvements, a new cruise terminal, enhanced connectivity and major future port planning both for containers as well as for liquid bulk and multipurpose. Additional demand for warehousing and logistics needs to be captured in future planning as well.

5.2.1 General port overview

Colombo is located on the West coast of Sri Lanka and is the country's principal city and port. The port handles containerized cargoes, liquid bulk (crude oil and refined products), dry bulk (mostly grain and cement), general cargoes (mainly steel products, timber and RoRo) and cruise passengers. Colombo is located near the main East-West shipping routes and has become a major port for gateway cargo and the transhipment of containers. The port covers three large containers terminals and has a fourth under development. Container transhipment accounts for approximately 75% of Colombo's total container traffic; the remaining 25% comprises local containerized cargo, mainly driven by the export of garment, tea, and rubber, and imports of consumer products, industrial and agricultural equipment. Whilst there is almost no effective competition for domestic cargo, Colombo competes with several major hub ports for transhipment traffic. In this cargo segment, the

port has benefitted from its strategic location, both close to the main East-West trade lanes and close to the large and strongly growing Indian market.

The port handled 81.8 million tons in 2016 including 5.7 million TEU of containers. In 2016 the port had about 4,405 ships arrivals and was ranked as the 23rd largest container port in the world. The port handles the largest container vessels in the world having dimensions of 400 m in length and a capacity of 21,500 TEU due to quays with ample water depths of CD -18 m and state of the art terminals.

The port was developed along the natural bay at the city and the old basin covering approximately 201.5 ha. A major expansion program has resulted in the development of South Harbour which became operational in 2013. The new port basin consists of one state of the art terminal container terminal (58.0 ha) and another container terminal that soon will be launched. The basin has space for a third container terminal and a liquid terminal.

Additionally, to handling imports, exports and transhipment, the Port of Colombo offers non-cargo services including harbour master services, pilotage and tugging, bunkering, ship repair, warehousing, water supply, weighing and scanning services, firefighting, hospital services, financial services and ship chandlery. Also, the navy is situated within the port limits. To the north of the port a maritime training institute is situated.

Summary Conclusions

The following table provides a summary of the analyses done in part B for the port of Colombo, followed by the main conclusions from part B.

Figure 5-1: Colombo Summary Table

Commodity	Demand 2016	Demand 2050 (Base Case)	CAGR	Capacity 2016
Containers ('000 TEU)				
Gateway	1,300	3,289	2.7%	
Transhipment	4,355	12,671	3.2%	
Total	**5,735***	**15,960**	**3.1%**	**7,100**
Dry Bulk ('000 Tons)				
Coal	-	-	-	-
Wheat / Maize / Corn	190	342	1.7%	710
Cement / Clinker / Gypsum	2,179	2,334	0.2%	2,250
Fertiliser	314	-	-100.0%	-
Biomass	-	-	-	-
Ilmenite	-	-	-	-
Total	**2,683**	**2,676**	**-0.0%**	**2,960**
Liquid Bulk ('000 Tons)				
Crude Oil	1,685	2,512	1.2%	6,570
Refined Oil	2,871	2,264	-0.7%	4,531
LNG	-	1,994	-	-
Total	**4,556**	**6,770**	**1.2%**	**11,101**
General Cargo				
Non-containerised General Cargo	801	555	-1.1%	2,000

Commodity	Demand 2016	Demand 2050 (Base Case)	CAGR	Capacity 2016
RoRo ('000 Vehicles)				
RoRo	33	24	-0.9%	84
Cruise				
Vessels	43	207	4.7%	

*Includes 79,812 TEUs that were re-stowed.

Containers

- There is adequate container capacity to handle the current and short-term projected container volumes under the condition that ECT is operational soon.
- A substantial share of JCT equipment is outdated and should be replaced in the short term, to avoid loss of container handling capacity.
- Phase 1 of the East Container Terminal development has been completed, adding 0.8 M TEU to the container handling capacity.
- 88% of gateway container volumes are estimated to be handled at Colombo port by 2050, due to the port's proximity to the consumer market.
- Under both the Base Case and High Case scenarios, all transhipment volumes are assumed to be handled at Colombo. However, a stronger transhipment market growth and stronger international competitive position of Colombo result in increased transhipment volumes under the High Case. As such, the North Port development is required to accommodate projected volumes under the High Case scenario, whereas the North Port development is not considered crucial under the Base Case scenario.

Dry Bulk

- Colombo shall not develop coal handling capacity, as no new coal fired power plants are foreseen and small coal volumes for the cement plants are handled at Trincomalee and Galle.
- Colombo port has ample grain storage and handling capacity in the short term. Having adequate capacity in Colombo is considered crucial, as Colombo is the largest consumption centre of the country.
- By 2050, an efficient transport corridor will have been set up between Colombo and Trincomalee, enabling low cost land transport of dry bulk from Trincomalee to the Colombo district. Due to the consequent shift of bulk cargoes from Colombo to Trincomalee, Colombo's grain capacity remains sufficient in the future.
- The Tokyo cement facility in Colombo is nearing maximum capacity considering the 2016 throughput and the estimated quay side capacity. Imports for the cement industry in Colombo mainly comprise finished cement.
- In contrast to many other commodities, a relatively high share of fertiliser volumes is destined for rural areas. As such, fertiliser does not have to be handled in Colombo and can be more adequately handled at other ports, such as Trincomalee for the northern and central regions and Hambantota for the southern regions.

Liquid Bulk

- Currently, Colombo has ample refined oil capacity based on both jetty and storage assessments for the Sapugaskanda refinery
- The Sapugaskanda facility needs either to be revamped or to be replaced by another facility. This will have serious consequences for storage and pipeline infrastructure.
- Colombo has enough capacity to handle future refined oils demand under the Base Case, should the refinery be revamped. However, facilities at the port should also be revamped in the future.

- The consultant envisions a new refinery to be developed north of Colombo. This refinery is to be constructed close to the main domestic consumption centre, but at distance from densely populated areas.
- The crude pumping and storage capacity in Colombo is sufficient to handle future demand as long as no plans for relocation arise. Once a new refinery is planned, a new pipeline connection with port facilities and or SBM buoys will have to be created.
- A gas power station is planned near Colombo using LNG as main supply. Similarly, a power station is planned at Hambantota using LNG as main supply. LNG handling facilities are required to accommodate LNG imports for the planned LNG power plant. Moreover, the LNG facilities at Colombo and Hambantota can also be used for supplying LNG to vessels in the future.
- Considering the assumptions posited above, it is assumed that 50% of LNG volumes will be handled at Hambantota port, and that the remaining 50% will be handled at Colombo.

General Cargo, RoRo & Cruise

- The current capacity of Colombo is sufficient to handle general cargo despite the fact that ECT and BQ will be used for different purposes than general cargo in the future, as a substantial proportion of general cargo will flow to other ports in the future.
- A substantial share of domestic vehicles is handled at Colombo port, due to the proximity to the end user market. Nearly all transhipment vehicles are handled at Hambantota port.
- 10% of gateway vehicles are assumed to be handled at Colombo port by 2050. This share is restricted by the port's lack of space.
- A new passenger terminal should be planned for, providing two additional berths due to increased cruise vessel demand. A multicriteria analysis has shown that the BQ quay could be a favourable location.

Other Port Functions

- The navy facilities at Colombo port lack sufficient (large) berths to accommodate new naval vessels. Hence, the facility may need to be relocated and or additional berths sought for. This could be at the existing port or at a new location.
- At Colombo, there is also need for one or more marina's. However, with Port City development it can be expected that the logical place for these marina's is Port City.

Observations Capacity & Efficiencies

The table below provides an overview of key issues that hamper capacity and efficient operations in the port of Colombo.

Table 5-1: Colombo - Port Issues

Category	Issue	Severity
Container Activities		
Infrastructure	CD -9.0m water depth is insufficient for large container vessels and therefore less suited for handling containers	High
Equipment	Investment in 2 mobile harbour cranes (newbuilt or second hand)	Low
Equipment	Three gantry cranes need to be upgraded and moved towards JCT terminal	Low
Operations	Terminal is underutilised for container vessels and often used for RoRo cargo Terminal can be used for general cargo more often	High
Logistics	Gate (with two in-lanes and two out-lanes) is sufficient	Low
Logistics	UCT has space available for warehousing when it is converted to General cargo berth	High
Infrastructure	Quay extension with 120 metres (currently, the planning phase is in progress)	High