Generation Performance in Sri Lanka

2016

PUBLIC UTILITIES COMMISSION OF SRI LANKA

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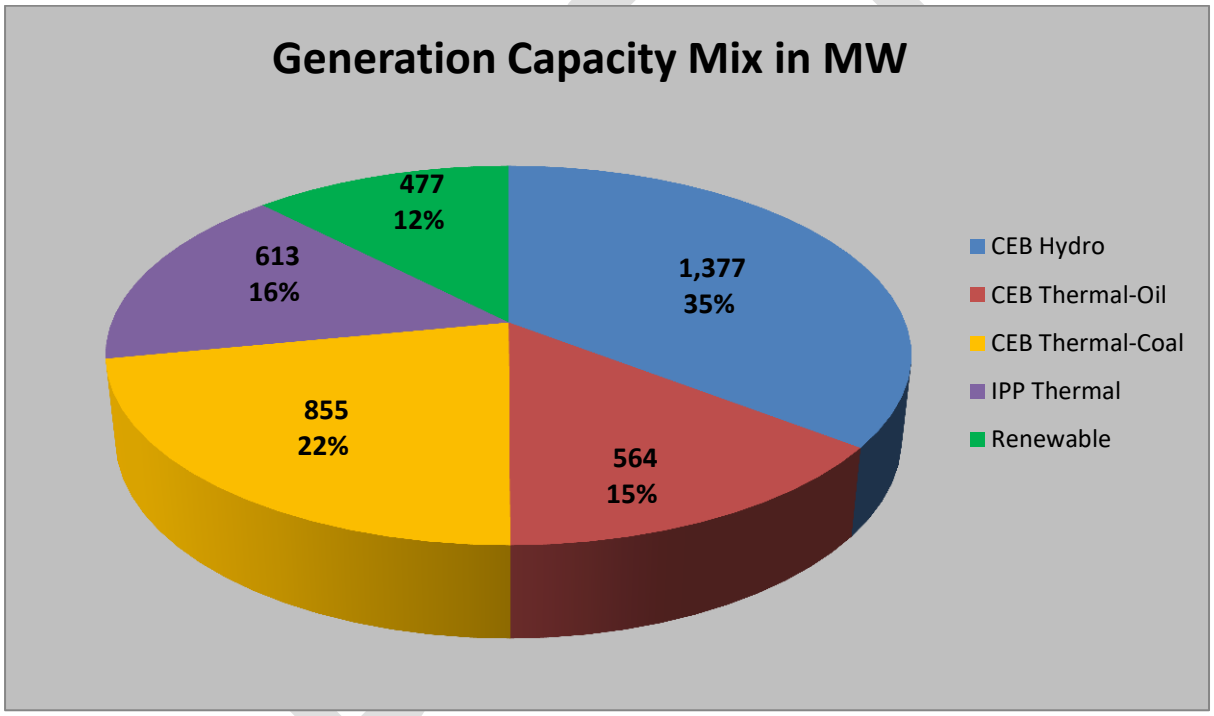
1. Introduction

By the end of the year 2016, 239 grid connected power plants have been operated in Sri Lanka, with total installed capacity of 3,887 MW. Out of these power plants 27 have been owned and operated by Ceylon Electricity Board (CEB) including 17 hydro plants, 9 thermal plants and 1 wind power plant. 5 thermal power plants have been owned and operated by Independent Power Producers (IPPs) and 207 renewable power plants have been operated by Small Power Producers (SPPs) including mini hydro plants, solar power plants, wind power plants and biomass power plants. Out of the above 25 renewable power plants have been commissioned during 2015. Due to the drought conditions prevailed in the country which resulted low hydro reservoir levels and also as a solution to certain transmission constraints that affected the supply quality in southern part of the grid, in April 2016, the Transmission Licensee, CEB entered in to a one year Power Purchase Agreement (PPA) with ACE Power Embilipitiya Private Limited (retired in April 2015). Northern Power private power plant was not operated from January 2015 due to a court order.

The chart below shows the capacity mix by the end of 2016.



This Generation Performance Report contains a summary of information and performance statistics of the generation units and electricity network in Sri Lanka for the year 2016.

All the indices and other calculations in this report are based on the data received through Licensee Information Submission System (LISS) and Monthly Review Reports & Daily Generation Reports submitted by System Control Center of CEB.

2. Energy Generation

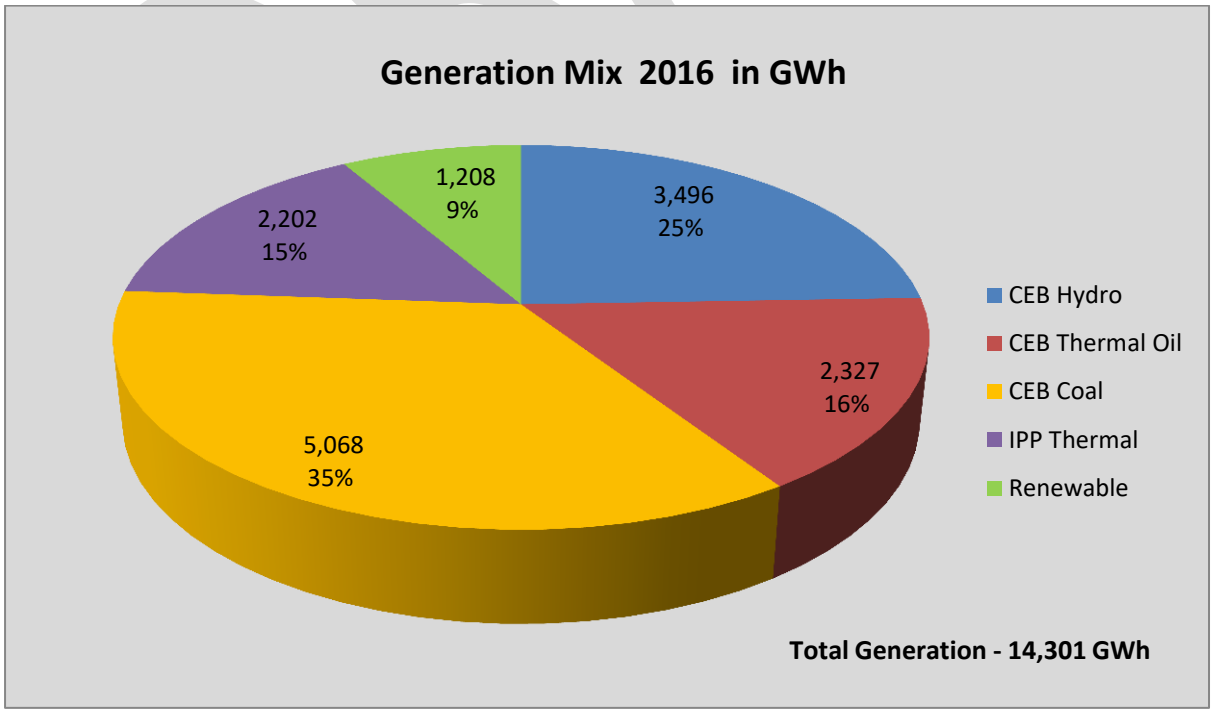
All grid connected generation plants sell their power to the Transmission Licensee, CEB, which deliver the power to the consumers through Distribution Licensees.

The chart and graph below shows the annual generation figures in 2016 in GWh.

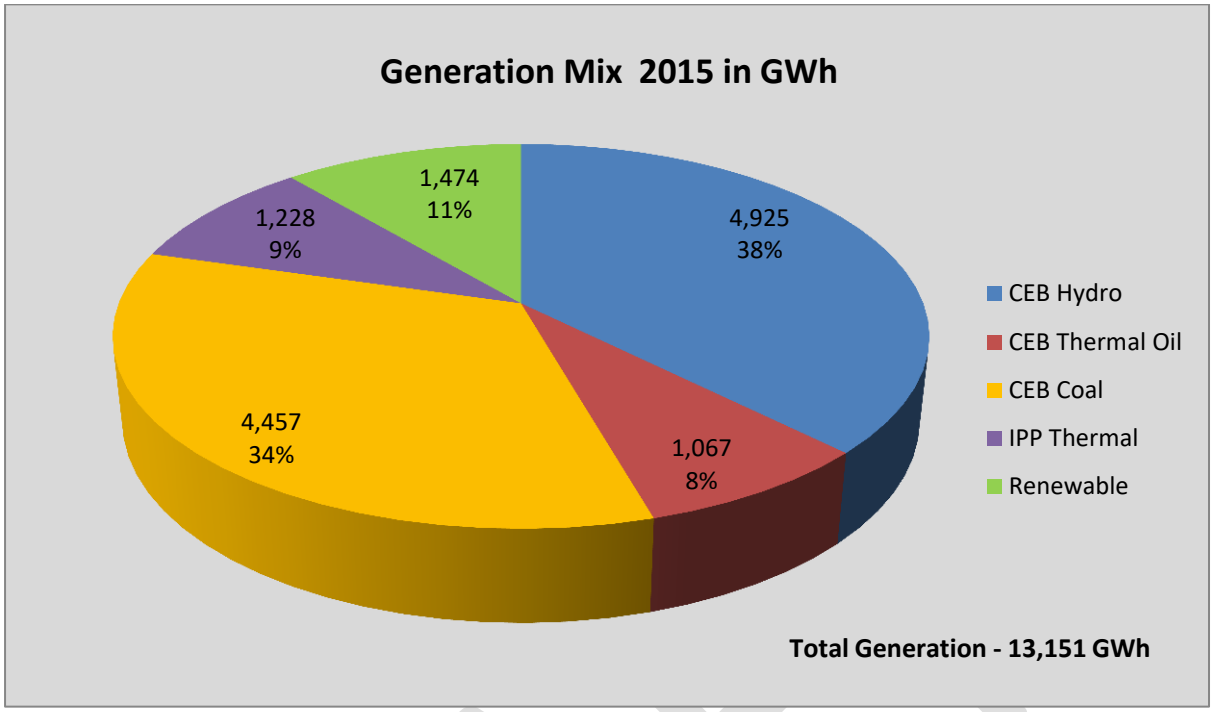
	CEB Hydro	CEB Oil	CEB Coal	IPP	Other Renewables	Total
Jan	417	78	395	170	88	**1,148**
Feb	337	135	343	244	70	**1,130**
Mar	297	274	405	208	73	**1,258**
Apr	234	237	400	228	56	**1,155**
May	347	161	376	128	158	**1,171**
Jun	456	146	390	19	174	**1,184**
Jul	334	168	513	82	120	**1,216**
Aug	240	141	567	187	116	**1,251**
Sep	173	215	539	171	106	**1,204**
Oct	216	262	381	285	82	**1,225**
Nov	238	254	360	204	101	**1,157**
Dec	207	257	399	276	64	**1,203**
Total	3,496	2,327	5,068	2,202	1,208	**14,301**

Source : *Daily Generation Reports of CEB and LISS*

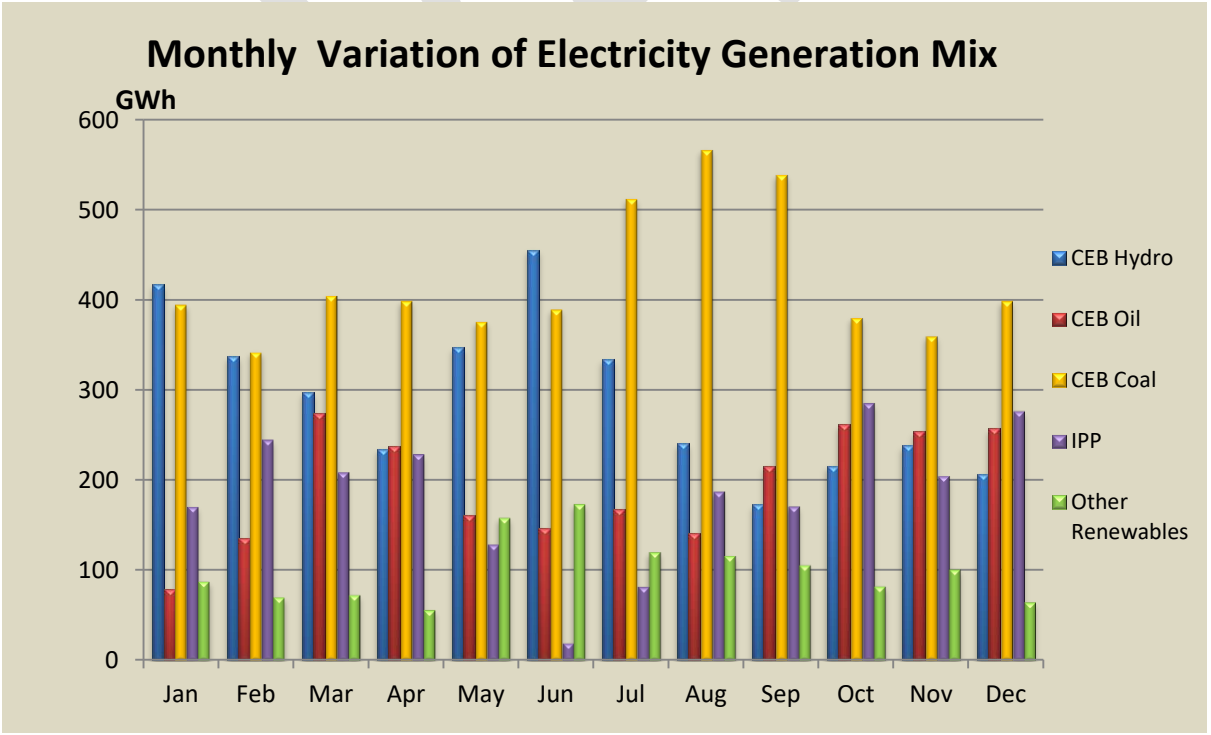
The chart below shows the generation mix of year 2016.



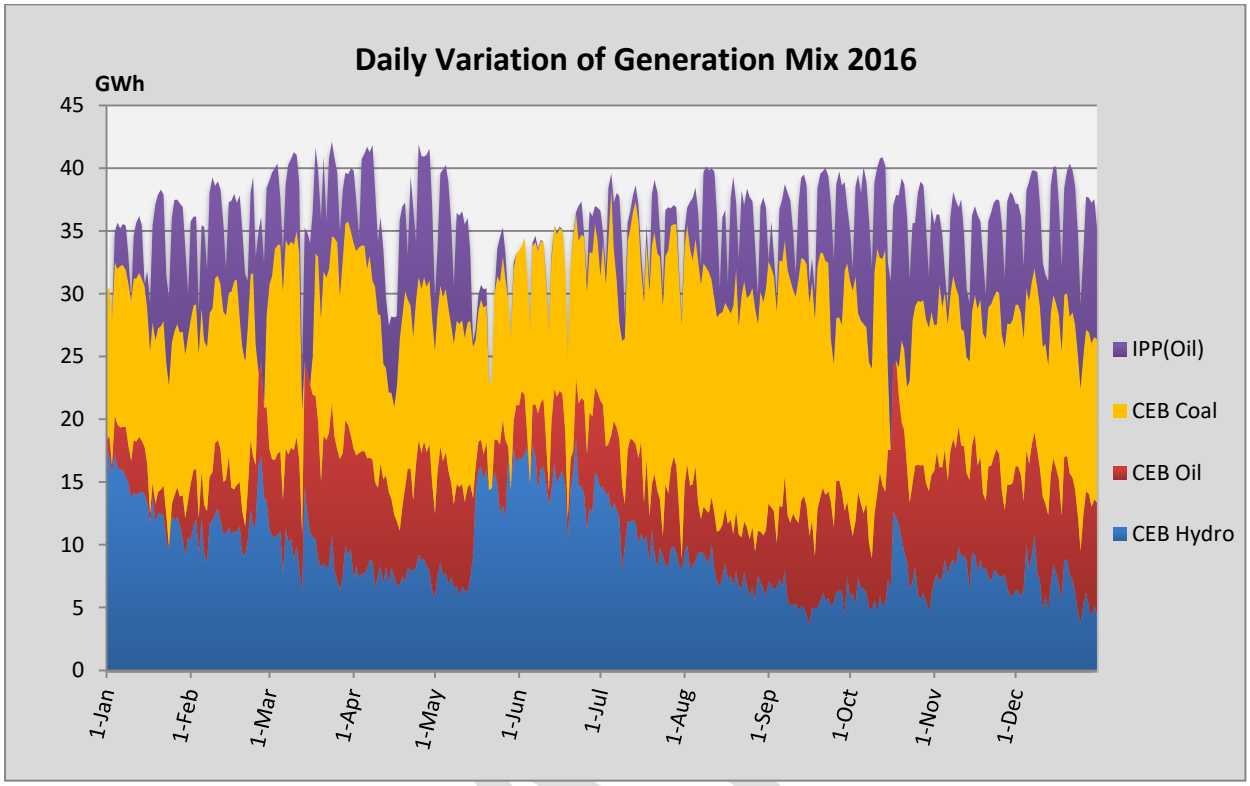
The chart below shows the generation mix of year 2015 in Sri Lanka.



The chart below shows the monthly variation of generation mix in Sri Lanka during year 2016.

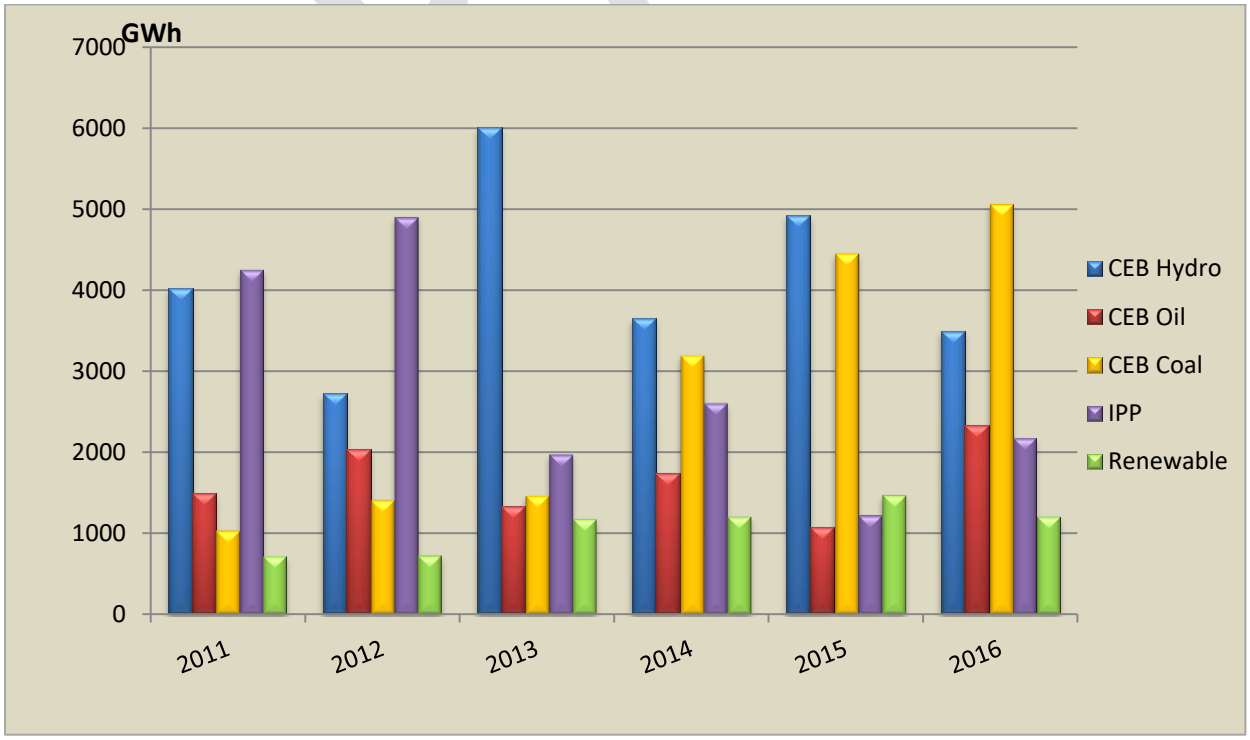


The following chart shows the daily variation of generation mix in Sri Lanka during year 2016.



Note: *Daily generation data of renewable power plants is not included.*

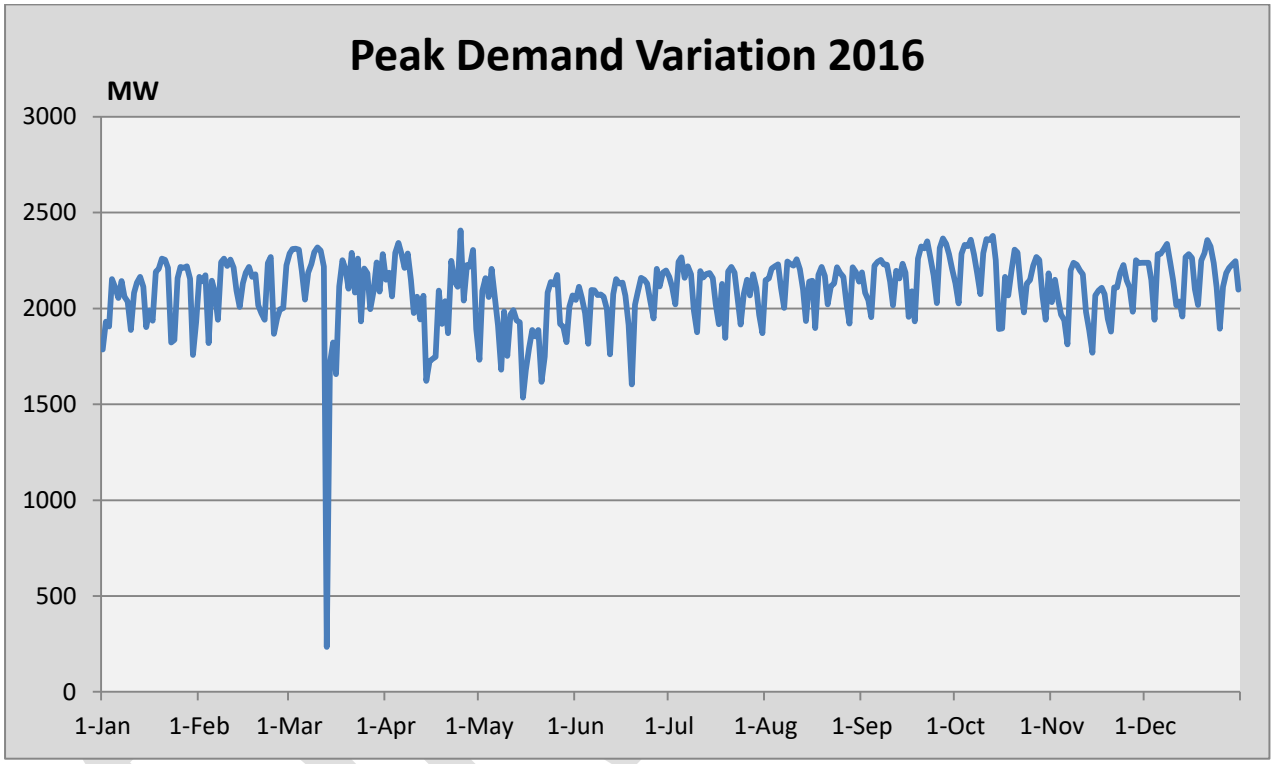
The following chart shows the variation of generation mix in Sri Lanka over the past few years.



3. System Peak Demand

CEB System Control records the daily peak power demand of the country. During year 2016, maximum recorded electricity demand in Sri Lanka was 2406.4 MW (excluding the contribution of Mini Hydro, Solar and Biomass power plants) which is 8.9% increase compared to the maximum demand of 2,210.4 MW in year 2015.

Daily variation of the system peak demand (excluding the contribution of Mini Hydro, Solar and Biomass power plants) in the year 2016 is depicted in the following graph.



** Drastic reduction in Night peak demand on March 13, 2016 is subsequent to the blackout occurred during the day*

Highest Peak Demand: 2406.4 MW on April 25, 2016

Lowest Peak Demand: 599 MW on May 16, 2016 (excluding the 0 demand recorded during the two blackouts occurred in February 25, 2016 and March 13, 2016, respectively)

Note: *Contribution of SPP Mini Hydro, Solar and Biomass is not included in the peak demand.*

4. Load Factor

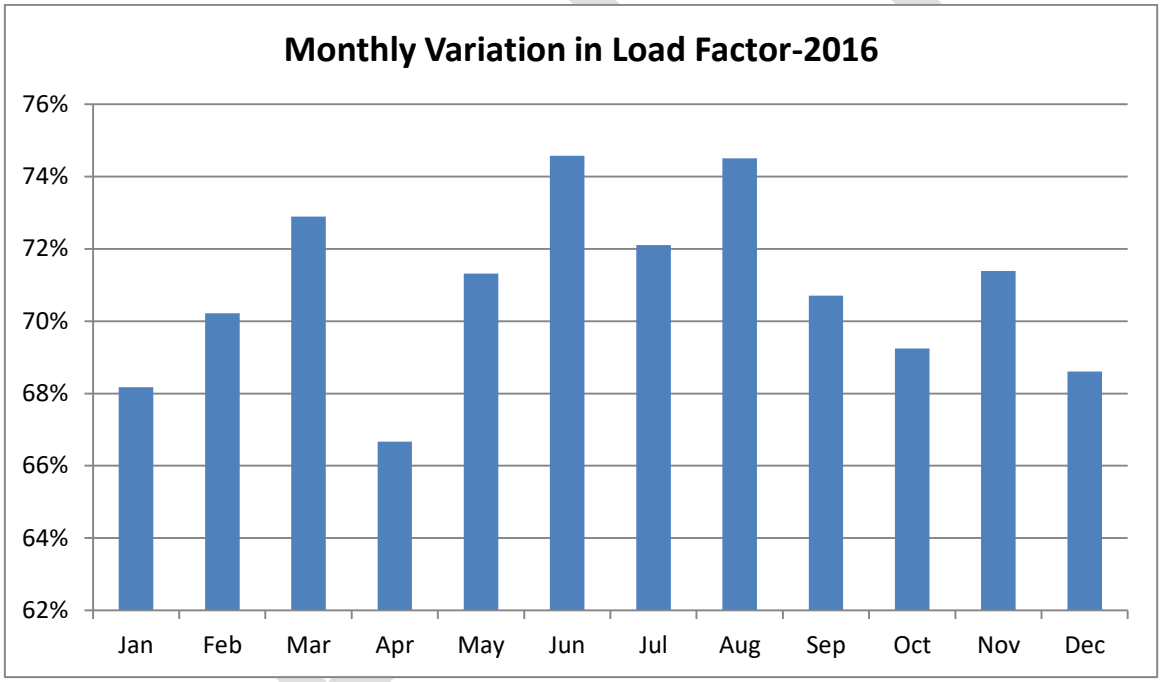
Load Factor is an indicator which shows how steady an electrical load over time. It is simply the average load divided by the peak load in a system over a period of time. But normally load factor is calculated subjected to the produced energy according to the following formula.

$$Load\ Factor = \frac{Total\ Generation\ During\ the\ Nominal\ Period}{Maximum\ Demand\ \mathrm{x}\ No.of\ hours\ in\ the\ report\ period}$$

Calculated Load Factor for the total system in year 2016 = **65.02%**

Calculated Load Factor for the total system in year 2015 = **67.92%**

Load factor of any system must be tried to keep in its maximum by pulling down the concentrated maximum demand and shifting the loads to periods of otherwise low usage. Load factor maximization is essential in maintaining the security of supply of the countries in which, meeting the concentrated maximum demand is critical. Countries which have a flat load curve own a higher load factor.



Sri Lanka has a load curve with a steep peak in the night, where starting from about 6.00 pm the load grows to about 2,300 MW by 7.30 pm and starts falling off after about 08.30 pm. Therefore the system must be comprised a substantial additional generation capacity only to meet that abrupt sharp night peak; hence the load factor in Sri Lanka is comparatively low. As a solution for that, CEB has introduced a three tier tariff plan for the consumers of Industrial, Commercial and General Purpose tariff categories with low off peak rates and penal peak rates to smoothen the daily peak load and push some peak time activities to low demand hours. From 2015 onwards the time-of-use tariff scheme is available for three phase domestic customers also, as an option.

***Note**: Load Factors were calculated excluding NCRE contribution of SPP Mini Hydro, Solar and Biomass component of the system*

5. Plant Factor

The plant factor of a power plant is the ratio of the actual energy output of the power plant over a period of time to its potential output if it had operated at full nameplate capacity the entire time.

Plant Factors vary greatly depending on the type of power plants and it is calculated according to the following formula.

$$Plant\ Factor = \frac{Actual\ Energy\ Production\ During\ the\ Nominal\ Period}{Potential\ Energy\ Production\ During\ the\ Period}$$

Calculated plant factors for all grid connected power plants for the year 2016 are listed below.

Plant	Capacity (MW)	Annual Generation (GWh)	Plant Factor
CEB Hydro			
Wimalasurendra	50	84.74	19.3%
Old Laxapana	53.5	236.86	50.4%
Canyon	60	122.74	23.3%
New Laxapana	116	432.18	42.4%
Polpitiya	75	325.04	49.3%
Kotmale	201	279.64	15.8%
Victoria	210	588.93	31.9%
Randenigala	122	323.44	30.2%
Rantambe	49	142.50	33.1%
Ukuwela	40	158.02	45.0%
Bowatenna	40	42.29	12.0%
Upper Kotmale	150	235.52	17.9%
Samanalawewa	120	260.54	24.7%
Kukule	70	202.26	32.9%
Inginiyagala	11.25	41.73	42.2%
Udawalawe	6	15.53	29.5%
Nilambe	3.2	4.34	15.4%
CEB Thermal-Coal			
Puttalam Coal I	285	746.33	29.8%
Puttalam Coal II	285	2,161.09	86.3%
Puttalam Coal III	285	2,160.19	86.3%
CEB Thermal-Oil			
Uthura Janani	26.01	98.43	43.1%
Sapugaskanda B	69.6	474.70	77.6%
Sapugaskanda A	69.6	308.81	50.5%
Barge CEB	60	356.11	67.6%
KCCP	161	780.71	55.2%
KPS GT 7	113	263.44	26.5%
KPS Small GTs	65.2	44.83	7.8%
IPP			
Asia Power	50.8	126.90	28.4%
Northern Power	30	-	0.0%
Westcoast	270	893.04	37.7%
AES - Kelanitissa	163	795.27	55.5%
ACE Embilipitiya	100	387.19	60.4%

Plant Factors of NCRE Power Plants

Mini-hydro Power Plant	PF
Lower Atabage MHP	58%
Lenadora MHP	55%
Rathganga MHP	51%
Batatota MHP	50%
Mulgama MHP	48%
Kaduruwan Dola Athuraliya MHP	47%
Owala MHP	46%
Watawala B Estate MHP	45%
Maduru Oya MHP	45%
Koladeniya MHP	45%
Carolina MHP	44%
Rajjammana MHP	44%
Somerset MHP	44%
Ranmudu Oya MHP	44%
Ross State MHP	43%
Wee Oya MHP	42%
Erathna (Waranagala) MHP	41%
Palmerston MHP	40%
Barcaple II MHP	40%
Halathura Ganga MHP	39%
Branford MHP	38%
Amanawala Oya MHP	38%
Watakelle MHP	37%
Kandadola MHP	36%
Sheen MHP	36%
Gomala Oya MHP	35%
Green Energy (Kiriweldola) MHP	35%
Karawila Ganga MHP	35%
Karawila Ganga MHP	35%
Hapugastenna - 2 MHP	35%
Rakwana Ganga MHP	34%
Gampola Walakada MHP	34%
Kirkoswald MHP	34%
Mandagal Oya MHP	33%
Galaboda (Denawak Ganga) MHP	33%
Delta MHP	33%
Magal Ganga MHP	33%
Lower Neluwa MHP	33%
Ellapita Ella MHP	32%
Delgoda MHP	32%
Lower Kotmale Oya MHP	32%
Ritigaha Oya I MHP	32%
Upper Magal Ganga MHP	31%
Coolbawn MHP	31%
Bopekanda MHP	31%
Hapugastenna - 1 MHP	30%
Guruluwana MHP	30%
Wembiyagoda MHP	30%
Watawala (Carolina ii) MHP	30%
Radella MHP	30%
Minuwanella MHP	29%
Theberton MHP	29%
Waverly MHP	29%
Loggal Oya MHP	29%
Kokawita 1 MHP	29%
Niyanawita Oya MHP	29%
Ritigala oya MHP	29%
Punugala MHP	29%
Punugala MHP	29%
Bowhill MHP	28%
Madugeta MHP	28%
Lower Hemingford MHP	28%
Kehelwatta MHP	28%
Waltrim MHP	28%
Kadawala I MHP	27%
Monaraela MHP	27%
Adavikanda MHP	26%
Aggra Oya MHP	26%
Kudawa Lunugalahena MHP	26%
Sithagala MHP	26%
Gangaweraliya MHP	25%
Dunsinane MHP	25%
Devituru MHP	25%
Kiriwan Eliya MHP	25%
Kehelgamu Oya MHP	25%
Black Water MHP	25%
Rideepana MHP	25%
Giddawa MHP	25%
Bogandana MHP	25%
Kotanakanda MHP	24%
Badulu Oya MHP	24%

Upper Ritigaha Oya MHP	24%
Kadurugal Dola MHP	24%
Koswatta Ganga MHP	23%
Glassaugh MHP	23%
Labuwewa MHP	22%
Mille Oya MHP	22%
Pathaha MHP	21%
Kalupahana MHP	21%
Maduruoya MHP	20%
Kotapola (Kiruwana) MHP	20%
Henfold (Agra Oya) MHP	20%
Denawak Ganga MHP	20%
Sanquahar MHP	20%
Thebuwana MHP	20%
Baharandha MHP	19%
Belihul Oya Oya MHP	19%
Stellenberg MHP	19%
Atabage Oya MHP	19%
Brunswic MHP	19%
Wellawaya MHP	19%
Bambarabotuwa II &IIIMHP	18%
Barcaple I MHP	18%
Werapitiya MHP	18%
Ganthuna Udagama MHP	18%
Nakkawita MHP	18%
Gurugoda Oya MHP	17%
Dick Oya MHP	17%
Manelwala MHP	17%
Huluganga MHP	17%
Bulathwaththa MHP	17%
Upper Hal Oya MHP	17%
Kolonna MHP	17%
Soranathota MHP	16%
Niriella MHP	16%
Kolapathana MHP	16%
Nandurana MHP	16%
Asupiniella MHP	16%
Pathanahenagama MHP	16%
Kudah Oya MHP	16%
Naya Ganga MHP	15%
Kumburuteniwela MHP	15%

Way Ganga MHP	15%
Maha Oya MHP	15%
Gonagamuwa MHP	15%
Deiyanwala MHP	13%
Lemastota MHP	13%
Gampola MHP	13%
Forest Hill MHP	13%
Nugedola MHP	13%
Falcon Valley MHP	13%
Rakwana Ganga II MHP	12%
Dunsinane Cottage MHP	12%
Demodara II MHP	11%
Indurana MHP	11%
Maa Oya MHP	11%
Kabaragala MHP	10%
Kalupahana Oya MHP	9%
Galatha Oya MHP	8%
Kadawala I MHP	8%
Kalugala-Pitawala MHP	8%
Kalugala-Pitawala MHP	8%
Nilambe Oya MHP	8%
Battalagala MHP	7%
Malpel Dola Owala MHP	7%
Mul Oya MHP	5%
Bambarabatu Oya MHP	5%
Lower Atabage Oya II MHP	4%
Upper Korawaka MHP	3%
Seetha Eliya MHP	3%
Maduruoya II MHP	2%
Batugammana MHP	0%
Bowhill (Kadiyanlena) MHP	0%
Weddemulle MHP	0%
Gammaduwa MHP	0

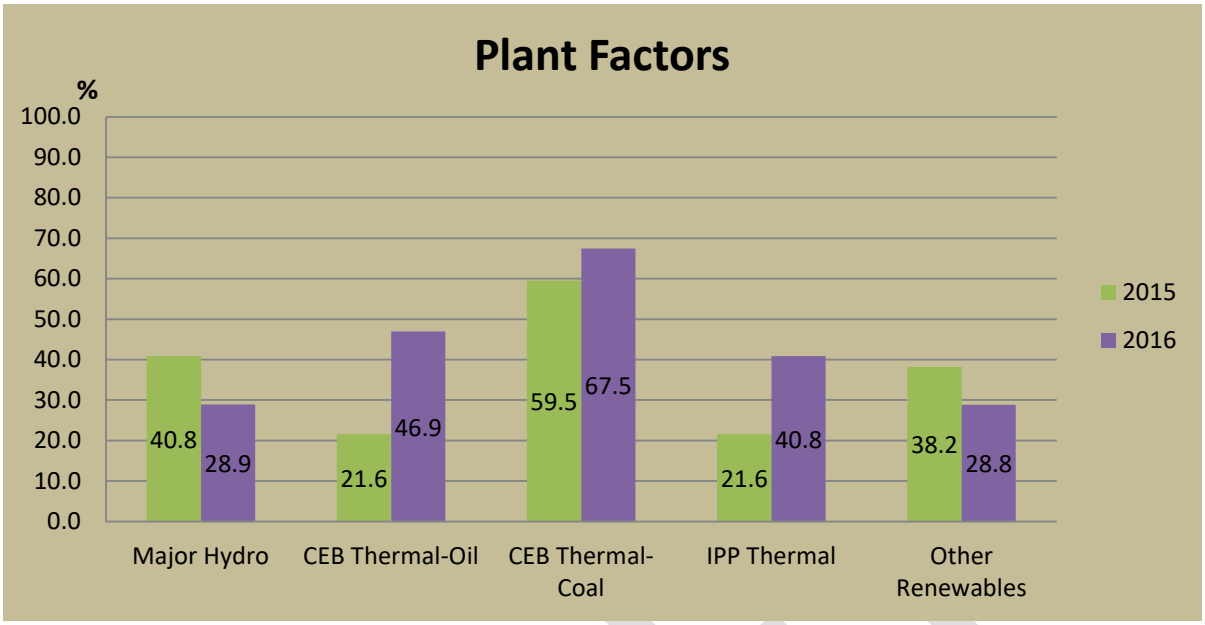
Note: 22 Minihydro plants are excluded from the list due to unavailability of data.

Wind Power Plant	PF
Madurankuliya WPP	45%
Valimunai WPP	39%
Puloppalai WPP	37%
Nirmalapura WPP	36%
Mampuri II WPP	34%
Erumbukkudal WPP	33%
Musaipetti WPP	30%
Kalpitiya WPP	30%
Seguwantivu WPP	28%
Mampuri WPP	28%
Vidatamunai WPP	27%
Uppudaluwa WPP	24%
Ambewela WPP	17%
Willwind WPP	13%
Mampuri III WPP	13%
CEB WPP	5%

Bio-Mass Plant	PF
Bathalayaya BMP	89%
Ninthaur BMP	70%
Badalgama BMP	29%
Tokyo BMP	19%
Embilipitiya BMP	2%
Kottamurichchana BMP	0%
Loluwagoda BMP	Not available
Madampe (Waste Heat)	Not available
Walapane (Waste Heat)	Not available

Solar Power Plant	PF
Gonnoruwa I SPP	15.1%
Gonnoruwa II SPP	15.5%
Saga SPP	14.6%
Solar PV SPP	0.0%
Tirappane SPP	0.0%

Annual Overall Plant Factors for the major types of generation options in 2015 & 2016 are given below.



The reduction in plant factors of Major hydro plants and Other Renewable power plants compared to the same in 2015 is due to the lower rainfall in 2016. The same caused to large increase in the plant factors of oil fired power plants.

6. Running Plant Factor

The running plant factor of a generation unit is the ratio of the actual energy output of a generation unit over a period of time to its potential output if it had operated at full nameplate capacity during the period in which it has been operated.

Running Plant Factor shows the extent to which the generation units have been operated when they are running out of their nominal capacities.

Calculated running plant factors for CEB owned generation units in year 2016 are listed below.

CEB Hydro

Plant	Unit	Running PF
Canyon	1	64%
	2	62%
Wimalasurendra	1	65%
	2	66%
New Laxapana	1	50%
	2	48%
Old Laxapana	1	54%
	2	61%
	3	57%
	4	54%
	5	54%
Polpitiya	1	54%
	2	62%
Ukuwela	1	98%
	2	96%
Bowatenna		39%
Victoria	1	64%
	2	64%

Plant	Unit	Running PF
	3	68%
Upper Kotmale	1	72%
	2	71%
Kotmale	1	67%
	2	64%
	3	64%
Randenigala	1	85%
	2	92%
Rantmbe	1	82%
	2	84%
Samanalawewa	1	56%
	2	59%
Kukule	1	86%
	2	86%
Inginiyagala	1,2,3,4	18%
Udawalawe	1,2,3	29%
Nilambe	1,2	50%

CEB Thermal

Plant	Unit	Running PF
Kalanithissa Gas Turbines	1	80%
	2	84%
	4	67%
	5	80%
	7	83%
Kalanithissa Combined Cycle	GT	89%
	ST	94%

Plant	Unit	Running PF
Sapugaskanda	1	73%
	2	69%
	3	67%
	4	79%
Sapugaskanda Extension	5	84%
	6	84%
	7	83%
	8	85%

Plant	Unit	Running PF
	9	86%
	10	83%
	11	86%
	12	84%
Lakvijaya	1	73%
	2	86%
	3	87%

Plant	Unit	Running PF
Uthuru Janani	1	99%
	2	98%
	3	98%
Barge		100%
		100%
		100%
		100%

IPP

Plant	Running PF
Asia Power	96%
AES Kalanithissa	92%
ACE Embilipitiya	92%

***Note**: Running Plant Factors for West Coast power plant and all SPPs were not calculated since the operation durations of those plants were not available.*

7. Generation Cost

Power Station	Annual Generation (GWh)	Total Cost to CEB (Mn.LKR)	Average Unit Cost(Rs/kWh)
Asia Power	127	4,900	38.61
AES Kelanitissa	795	17,680	22.23
ACE Embilipitiya	387	8,480	21.90
Westcoast	893	29,591	33.14
Northern Power	-	725	
Sapugaskanda A	309	8,194	26.53
Sapugaskanda B	475	10,969	23.11
Kelanitissa Small GTs	45	2,984	66.56
Kelanitissa PS GT 7	263	10,198	38.71
Kelanitissa CCY	781	19,845	25.42
Puttalam Coal	5,068	50,187	9.90
Uthura Janani	98	3,219	32.71
Barge-CEB	356	7,783	21.86
Victoria	589	2,345	3.98
Ukuwela	158	697	4.41
Kotmale	280	2,129	7.61
Upper Kotmale	236	1,770	7.52
Randenigala/Rantambe	466	2,021	4.34
Bowatenna	42	534	12.63
Nilambe	4	136	31.46
Old Laxapana/New Laxapana	669	1,630	2.44
Polpitiya	432	2,201	5.09
Wimalasurendra	85	458	5.40
Canyon	123	720	5.86
Samanalawewa	261	1,868	7.17
Kukule	202	832	4.11
Inginiyagala	42	154	3.68
Udawalawe	16	632	40.69
Renewable	1,208	20,185	16.71
All Hydro	3,603	18,126	5.03
All CEB Thermal	7,395	113,379	15.33
ALL IPP Thermal	2,202	61,376	27.87
All Plants	14,408	213,066	14.79

Source: *LISS Data*

Note: Loan installment cost component is not included in the cost figure of Puttalam Coal plant

7.1 Amount Paid in Excess of Capacity and Energy Charges

CEB has paid to Independent Power Producers (IPP) in excess of capacity and energy charges according their Power Purchase Agreements (PPA). The amounts which have been paid are summarized below.

Power Plant	Start/Stop Charge (Mn.LKR)	Reimbursement Claim (Mn.LKR)	O & M Charge (Mn.LKR)	Total (Mn.LKR)
Asia Power	102.23	122.77		224.99
AES - Kelanitissa	459.76	199.69		659.45
ACE Power-Embilipitiya	81.29	250.65		331.94
Westcoast	709.27	602.74		1,312.01
Northern Power	-	-	-	-
Total (Mn.LKR)	**1,352.55**	**29,348.60**	**-**	**30,701.15**

8. Comparison of Scheduled Dispatch and Actual Dispatch

CEB implements a generation dispatches schedule every 6 months prior operation. It contains the amount of energy to be produced by each power plant for the forthcoming months. Due to numerous reasons the actual dispatch could be deviated from this schedule and, the comparison between actual and scheduled dispatches for the year 2016 is given below.

	Capacity MW	Scheduled GWh	Actual GWh	Variation GWh	Scheduled PF	Actual PF
Major Hydro	1,377	4,028	3,496	(532)	33%	29%
				-		
Puttalam Coal III	855	5,400	5,068	(332)	72%	67%
Uthura Janani	26	108	98	(10)	47%	43%
Sapugaskanda B	70	94	475	381	15%	78%
Sapugaskanda A	70	334	309	(25)	55%	51%
Barge CEB	60	157	356	199	30%	68%
KCCP	161	727	781	54	51%	55%
KPS GT 7	113	2	263	261	0%	27%
KPS Small GTs	65	-	45	45	0%	8%
Asia Power	51	3	127	124	1%	28%
Northern Power	30	-	-	-	0%	0%
Westcoast	270	574	893	319	24%	38%
AES - Kelanitissa	163	615	795	180	43%	56%
ACE Embilipitiya	99	60	387	328	9%	60%
	-		-	-		
NCRE	477	1,587	1,208	(379)	38%	29%
Total	3,787	13,689	14,301	613	41%	43%

9. Auxiliary Consumption

Auxiliary system facility is a major part of a power generation facility and the auxiliary consumption of a power plant depends on its configuration, age and related technical parameters. Purpose of an auxiliary system is to supply power for its own electricity requirements.

Normally 0.5% - 2% of power generated is consumed for the auxiliary system in hydro plants while the auxiliary consumption in fossil fuel power plants is 7% - 15% since there are different equipment like feed pumps, cooling water pumps, air fans, coal grinding mills, ash handling equipment etc. utilized in thermal plants.

Calculated percentages of auxiliary consumption of power plants out of gross generation during 2016 are as follows.

CEB Hydro

Power Plant	Auxiliary Consumption %
Canyon	0.37%
Wimalasurendra	0.44%
New Laxapana	0.28%
Old Laxapana	0.25%
Polpitiya	0.27%
Ukuwela	0.26%
Bowatenna	0.90%
Victoria	0.24%
Upper Kotmale	0.57%
Kotmale	0.56%
Randenigala	0.74%
Rantambe	1.21%
Samanalawewa	1.40%
Kukule	1.79%
Inginiyagala	0.38%
Udawalawe	2.23%
Nilambe	0.07%

CEB Thermal

Power Plant	Auxiliary Consumption %
Sapugaskanda A	3.51%
Sapugaskanda B	3.72%
Lakvijaya	0.40%
Barge (CEB)	3.25%
Kalanithissa Combined Cycle	2.19%
Kalanithissa Small GTs	2.55%
Kalanithissa GT7	0.60%
Uthuru Janani	3.32%

IPP

Power Plant	Auxiliary Consumption %
Asia Power	2.10%
AES Kalanithissa	2.52%
ACE Embilipitiya	5.92%

10. Availability Factor

The evaluation of availability of a power plant is one of the most important tasks at any power station. To analyze plant availability performance, generation unit outages should be scrutinized to identify the causes of unplanned or forced energy losses and to reduce the planned energy losses. Reducing outages increases the number of operating hours, therefore increases the plant availability factor.

Availability Factor of a generation plant can be calculated using the formula given below.

$$Availability\ Factor = \frac{Duration\ in\ which\ the\ generation\ unit\ was\ available\ for\ opertaion}{Total\ length\ of\ the\ period}$$

Total Availability Factor for all CEB generation units in 2016 = **86%**

Availability Factor for CEB hydro generation units in 2016 = **89%**

Availability Factor for CEB thermal generation units in 2016 = **84%**

Availability Factor for CEB wind generation units in 2016 = **64%**

Calculated availability factors for CEB owned generation plants in 2016 are listed below.

CEB Hydro

Plant	Unit	Availability factor (%)
Canyon	1	95%
	2	98%
Wimalasurendra	1	86%
	2	86%
New Laxapana	1	87%
	2	91%
Old Laxapana	1	96%
	2	93%
	3	93%
	4	97%
	5	96%
Polpitiya	1	85%
	2	89%
Ukuwela	1	85%
	2	72%
Bowatenna		96%
Victoria	1	83%
	2	88%
	3	96%
Upper Kotmale	1	89%
	2	94%
Kotmale	1	77%
	2	90%
	3	83%
Randenigala	1	88%
	2	89%
Rantmbe	1	96%
	2	97%
Samanalawewa	1	90%
	2	89%
Kukule	1	91%
	2	92%
Inginiyagala	1,2,3,4	91%
Udawalawe	1,2,3	42%
Nilambe	1,2	95%

CEB Thermal

Plant	Unit	Availability factor (%)
Kalanithissa Gas Turbines	1	93%
	2	70%
	4	95%
	5	85%
	7	87%
Kalanithissa Combined Cycle	GT	70%
	ST	64%
Sapugaskanda	1	69%
	2	81%
	3	85%
	4	69%
Sapugaskanda Extension	5	85%
	6	90%
	7	81%
	8	84%
	9	88%
	10	88%
	11	90%
	12	91%
Lakvijaya	1	40%
	2	96%
	3	94%
Uthuru Janani	1	79%
	2	79%
	3	84%
Barge	1	98%
	2	96%
	3	98%
	4	98%

CEB Wind Plant

Plant	Unit	Availability factor (%)
Wind	1,2,3,4,5	64%

IPP

Plant	Availability factor (%)
Asia Power	32%
AES Kalanithissa	94%
ACE Embilipitiya	58%

Note: *Interruption data is available only for CEB owned power plants and some IPPs*

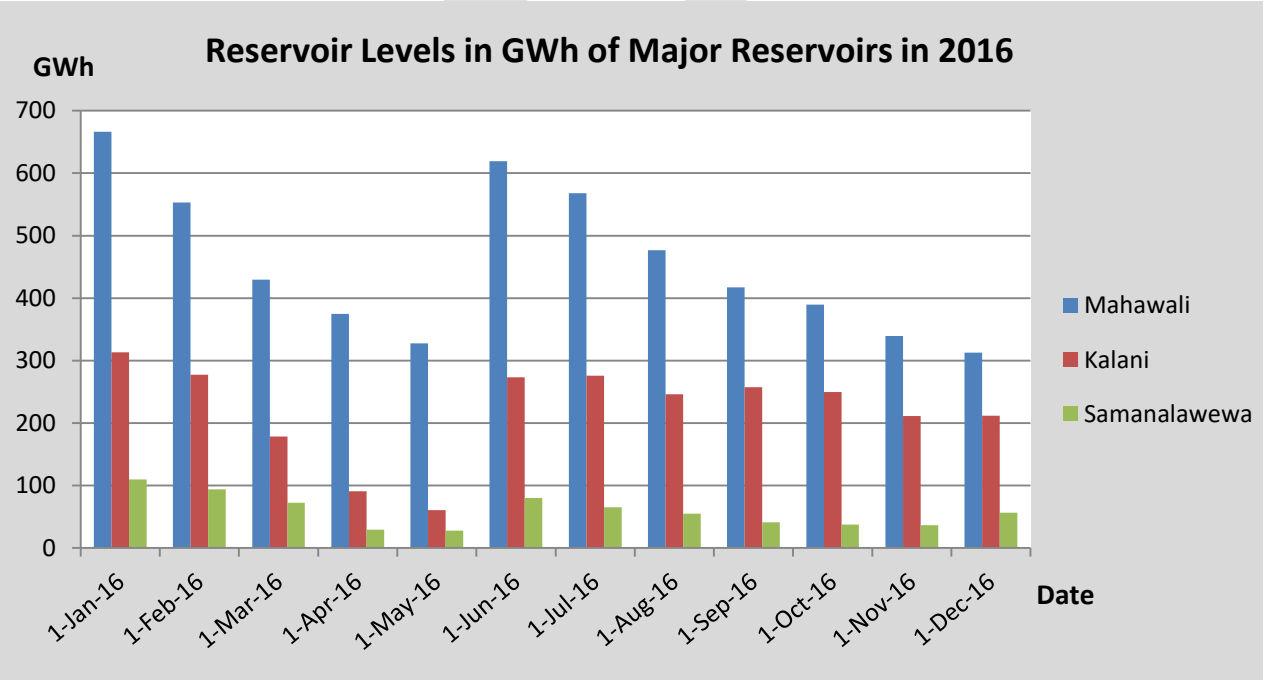
11. Reservoir Storages

Hydro power is one of the major sources of electricity generation in the Sri Lanka and most of the large scale hydro projects have been developed by CEB. The capacity share of hydro power plants by end of 2016 is 35%. Also hydro power generation has contributed to 25% of the energy generation in 2016.

The major hydropower schemes already developed are associated with Kelani and Mahaweli river basins. Laxapana complex comprises five hydro power stations which have been built associated with the two main tributaries of Kelani River; Kehelgamu Oya and Maskeli Oya. Castlereigh and Moussakelle are the major storage reservoirs in the Laxapana complex. Mahaweli complex comprises seven hydro power stations and three major reservoirs; Kotmale, Victoria and Randenigala. In addition to above mentioned reservoirs Samanalawewa, which is on Walawe River, is also can be considered as a large reservoir. And all the other small reservoirs which contribute to power up the run-of-river type plants are considered as ponds.

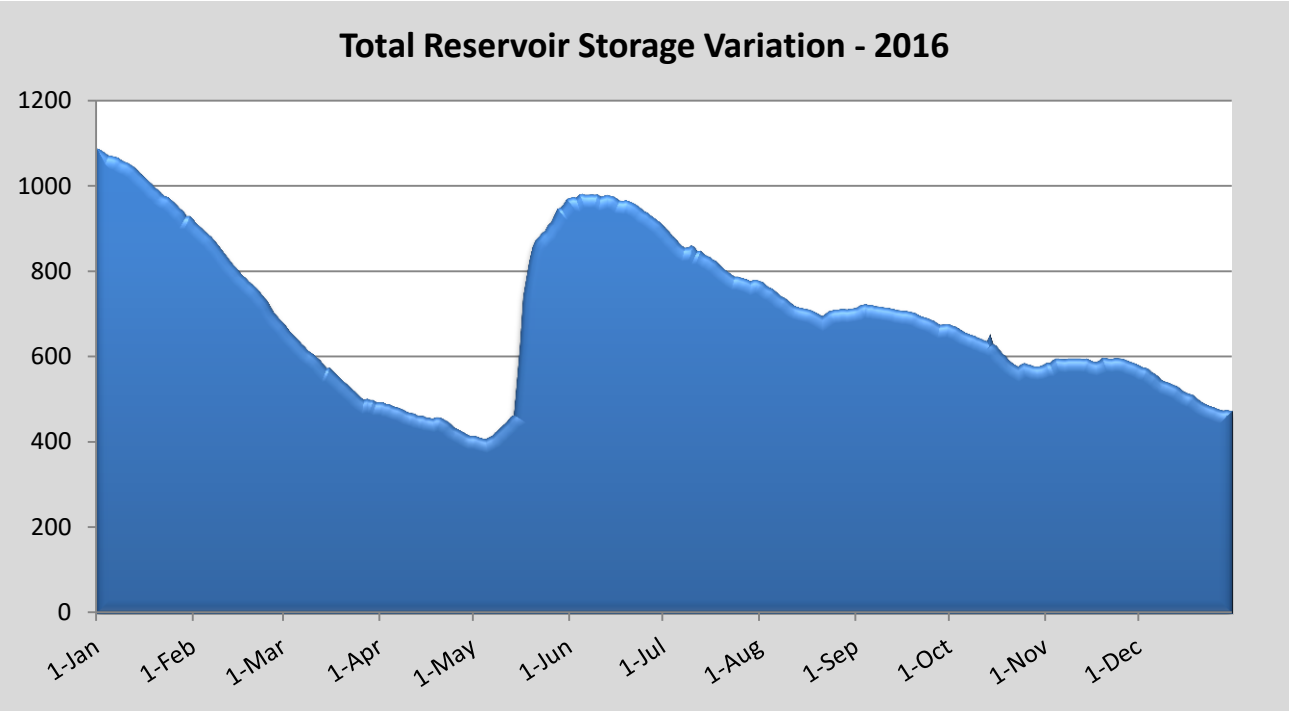
Therefore having a satisfactory capacity of water in these reservoirs throughout the year is essential to dispatch the hydro power to a significant amount.

The monthly variation of major reservoir storage levels in 2016 are depicted below.

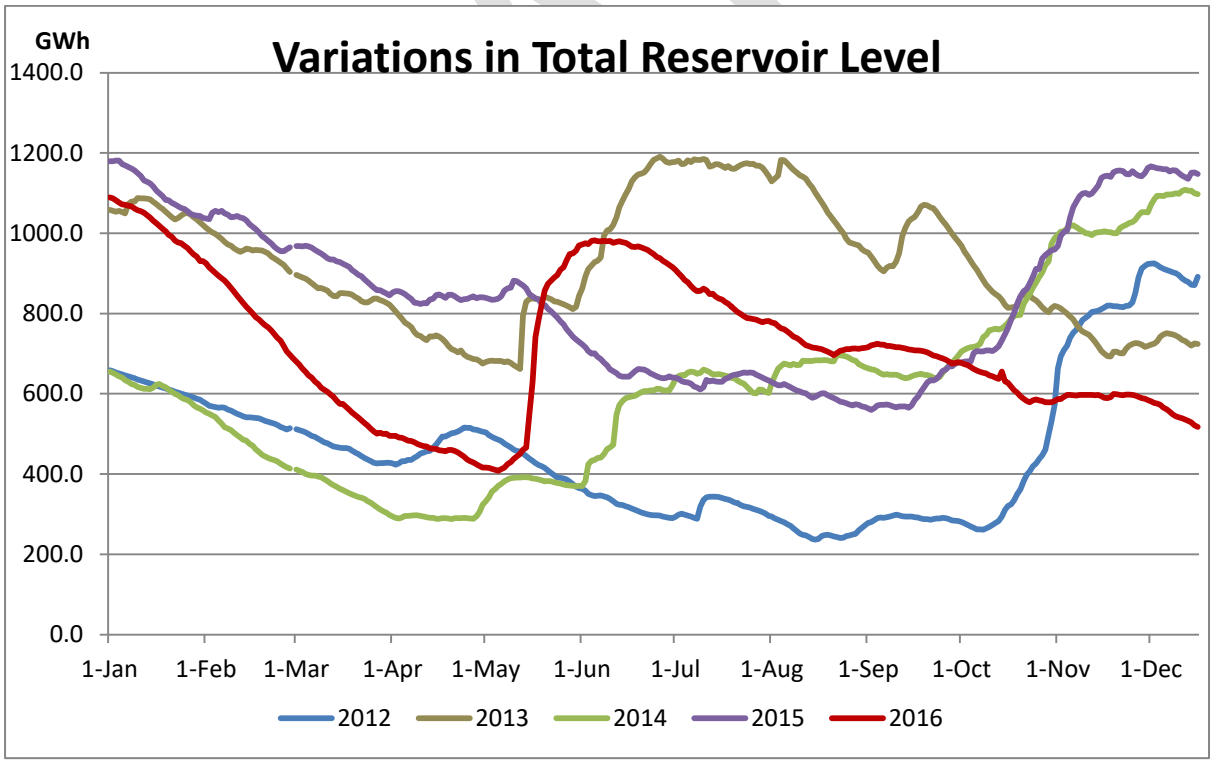


Total reservoir capacity in each complex

Mahaweli Complex: 717.8 GWh
Laxapana Complex: 367.8 GWh
Samanalawewa: 173.7 GWh



Note: Only Mahaweli, Laxapana and Samanalawewa Complexes' reservoirs are considered in total reservoir storage profile.



12. Conclusion

Compared to the generation figures in year 2015, hydro generation contribution of 35% has been decrased to 25% during year 2016 as a result of the lower rainfall received throughout the year. The contribution of renewable energy component has also droped by 1% from 2015 to 2016. Coal power generation of 34% in 2015 became 35% in 2016.

The Report has described and calculated a number of key performance indicators for total generation system and individual generation plants operated in Sri Lanka. And it moreover gives a comparison of the generation statistics between years 2014 and 2015. The indicators for the present technical performance of the generation system are useful when planning the future developments and taking the corrective actions if necessary to improve the efficiency of generation.

Maximum electricity demand recorded in the year 2016 is 2,406.4 MW and is expected grow to 2,631 MW in 2017 as per the Least Cost Long Term Generation Expansion Plan 2015-2034. To achieve this demand a firm system capacity of 3,480 MW (excluding NCRE contribution) will be available during 2017. This considering the 100 MW ACE Power Embilipitiya plant, which is planned to be retired in April 2017 and 170 MW furnace oil fired power plants which are expected to be added, according to the Least Cost Long Term Generation Expansion Plan 2015-2034. Therefore the estimated reserve margin in 2017 will be 32% at the peak demand, assuming that all the power plants are readily available to dispatch with their full capacities. But when it comes to the practical state it is obvious that all plants will not be available fully at every time.

However, even if the available dispatchable total capacity is dropped by 586 MW, the Reserve Margin can be maintained above 10%, which is the minimum allowed Reserve Margin by the Least-Cost Generation Expansion Planning Code.