

# **SECURITY OF ELECTRICITY SUPPLY**

## **April- June, 2017**

Report published on: April 20, 2017

PUBLIC UTILITIES COMMISSION OF SRI LANKA



## A Summary Results

The average inflow to the major hydro reservoirs during April 1-April 19, 2017 is about 3.8 GWh per day. Despite the rainfall received time to time in April, this inflow level is lower than the lowest inflow level received in month April in last 5 years (4.1 GWh/day in 2016). Here, the difference between Average daily generation and reservoir drawdown is considered as the inflow.

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- If the inflow level remain at the same level during May- June period, energy supply will be marginally sufficient to meet the demand, if one 270 MW generator become unavailable more than 50% of the time(Graph C-4)
- Also, if the demand in month May grows by an additional 5% (therefore 11% growth compared to April), due to expiration of Self-Generation scheme, energy supply will be insufficient to meet the demand, in case of unavailability of one 270 MW plant more than 50% of the time. (Graph E-2)
- If the inflow levels in May and June also close to the lowest inflow levels received during the respective months in last five years, energy supply will be only marginally sufficient even all major thermal plants are available (other than the plants scheduled for maintenance). (Graph D-2)
- If low inflow scenario and additional 5% demand growth in May taken place simultaneously, even with the availability of all major thermal plants(other than the plants scheduled for maintenance), the energy supply will be insufficient to meet the demand (Graph F-3)

**B Basis of Analysis**

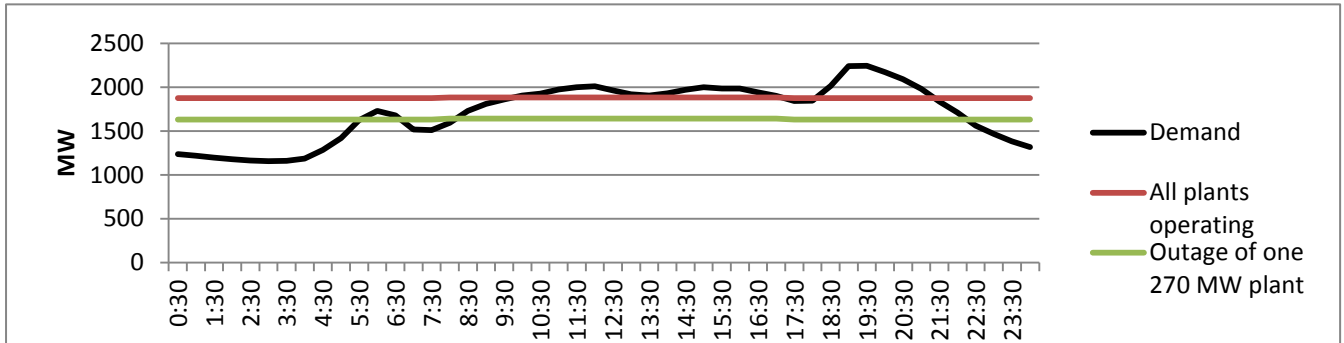
|   |   | Forecast as per the report on |                | Basis of the revised forecast |  |
|---|---|-------------------------------|----------------|-------------------------------|--|
|   |   | April 13, 2017                | April 20, 2017 |                               |  |
| 1 | Demand growth compared to the previous month (%)  | April                         | -5.1%          | -4.0%                         | Actual April 1-19  |
|   |   | May                           | 6.0%           | 6.0%                          | 2015 data  |
|   |   | June                          | 1.0%           | 1.0%                          | 2015 data  |
| 2 | Weekend demand compared to weekdays (%)   | Saturday                      | 97%            | 96%                           | Actual (March 20-April 16)   |
|   |   | Sunday                        | 87%            | 88%                           |  |
| 3 | Day time NCRE Contribution (MW)   | April                         | 70             | 70                            | 2014 data and considering recent solar plant additions                                       |
|   |   | May                           | 130            | 130                           |  |
|   |   | June                          | 200            | 200                           |  |
|   | Peak and Offpeak time NCRE contribution (MW)  | April                         | 60             | 60                            |  |
|   |   | May                           | 120            | 120                           |  |
|   |   | June                          | 190            | 190                           |  |
| 4 | Average inflow to Major Reservoirs(Inflow= Major Hydro Generation- Major Reservoir drawdown) in GWh/day | April                         | 4.7            | 3.8                           | Actual April 1-April 19  |
|   |   | May                           | 4.7            | 3.8                           | Assuming minimum inflow of March&April inflow level can be expected in May-June).            |
|   |   | June                          | 4.7            | 3.8                           |  |
| 5 | Minimum daily Major Hydro dispatch requirement (MWh)  | April- June                   | 3.7            | 3.8                           | Actual April 1-April 16  |
| 6 | New Thermal Capacity additions expected (MW)  | April                         | 0              | 20                            | It is assumed that 100 MW ACE embilipitiya plant will continue operation after April 6, 2017 |
|   |   | May                           | 0              | 0                             |  |
|   |   | June                          | 0              | 0                             |  |

| 7 Major Thermal Plant availability(source: CEB) |          |                    |          |            |
|---|----------|--------------------|----------|------------|
|   | Capacity | April              | May      | June       |
| LVPS Coal I                                     | 270 MW   |                    |          |            |
| LVPS Coal II                                    | 271 MW   |                    |          |            |
| LVPS Coal III                                   | 272 MW   |                    | Week 4   | Full month |
| KCCP  | 165 MW   |                    | week 3,4 |            |
| Westcoast                                       | 270 MW   | week 4             | week 1-3 |            |
| Sojitz  | 163 MW   |                    |          |            |
| ACE Emb   | 100 MW   |                    |          |            |
| KPS GT 7  | 115 MW   |                    |          |            |
|   |          | Unavailable Plants |          |            |

**C Analysis**

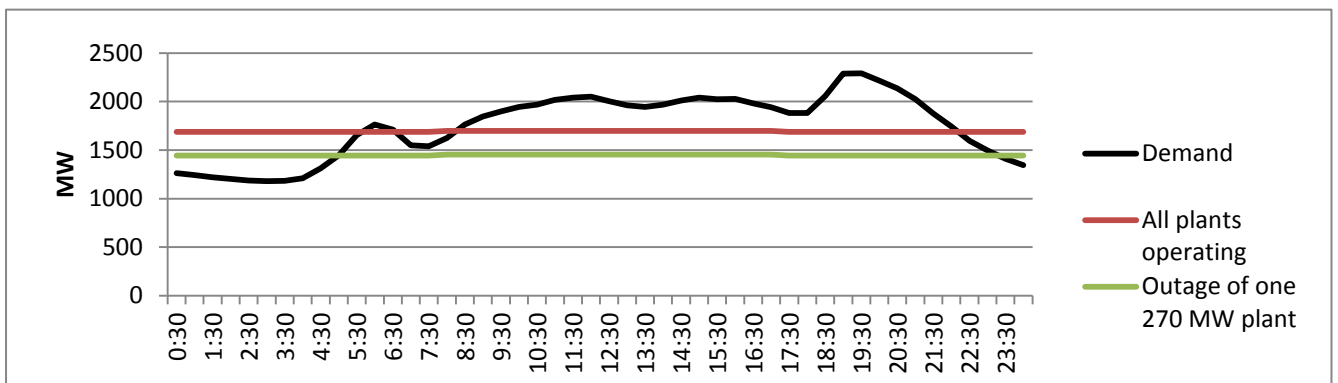
**C-1 Average weekday demand curve and Thermal Plant Availability**

April : Average demand curve of weekdays from March 20-April 16 (excluding holidays)



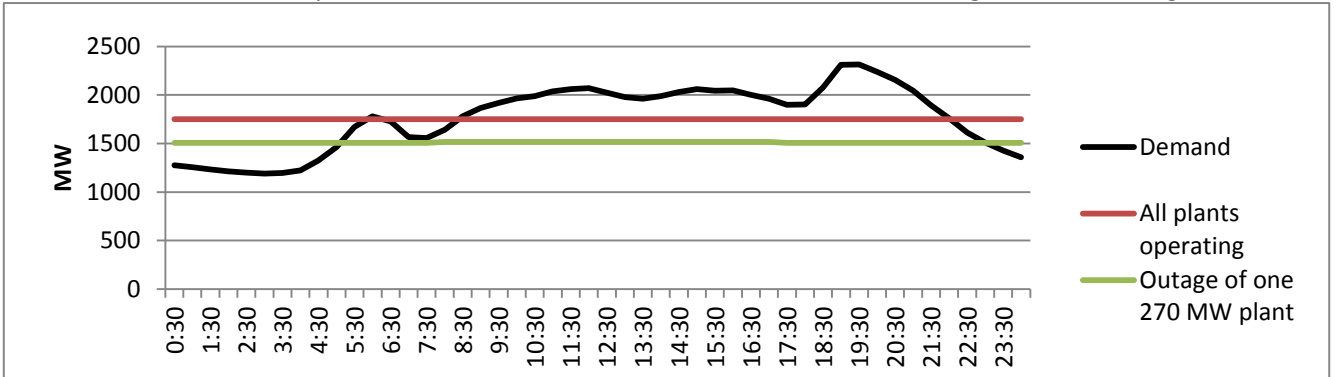
Energy Demand 41,176 MWh  
Peak Demand 2,247 MW

May : Based on previous months' forecast demand curve and demand growth forecast given in B1



Energy Demand 41,991 MWh  
Peak Demand 2,292 MW

June : Based on previous months' forecast demand curve and demand growth forecast given in B1



Energy Demand 42,399 MWh  
Peak Demand 2,314 MW

It can be observed that the thermal plants alone cannot meet the daily demand. Such deficit need to be provided with Hydro generation

**C-2 Assessment of Daily hydro energy requirement**

Minimum Daily Hydro Dispatch 3,800 MWh (Section B. 5)

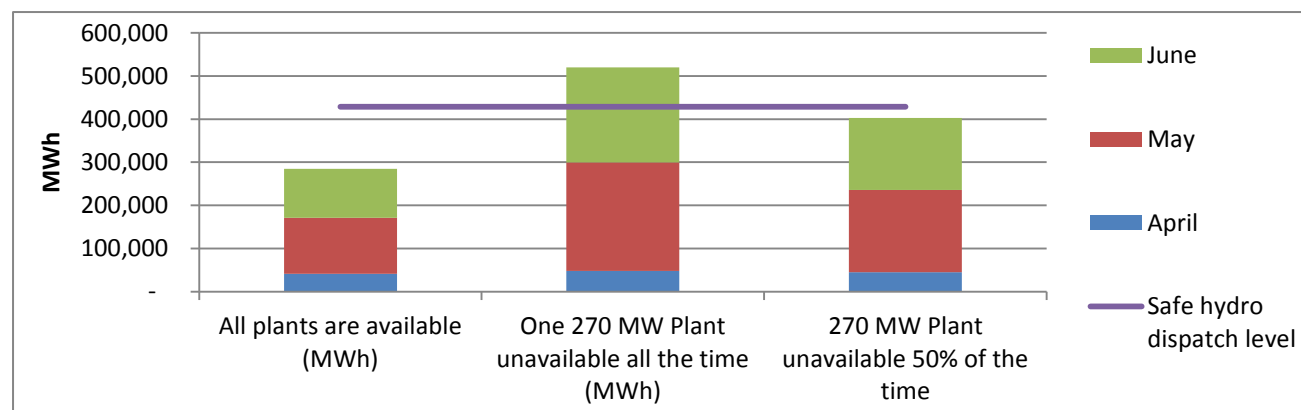
| Hydro requirement |                            | All plants are available (MWh) |           | One 270 MW Plant unavailable all the time (MWh) |           |
|-------------------|----------------------------|--------------------------------|-----------|---|-----------|
| Month             | No of days remaining/month | Perday                         | Per month | Perday  | Per month |
| April             | 11                         | 3,800                          | 41,800    | 4,493   | 47,983    |
| May               | 31                         | 4,258                          | 129,288   | 8,300   | 251,978   |
| June              | 30                         | 3,800                          | 114,000   | 7,498   | 220,131   |
|                   |                            | Total                          | 285,088   | Total   | 520,092   |

**C-3 Assessment of Daily Hydro Energy Availability**

|                                   |         |           |
|-----------------------------------|---------|-----------|
| Reservoir Level at March 19, 2017 | 455,200 | MWh       |
| Minimum Safe Reservoir Level      | 300,000 | MWh       |
| Inflow/day                        | April   | 3,800 MWh |
|                                   | May     | 3,800 MWh |
|                                   | June    | 3,800 MWh |

|  |         |     |
|--|---------|-----|
| Safe daily hydro dispatch level            | 5,956   | MWh |
| Safe hydro dispatch level for the 3 months | 428,800 | MWh |

**C-4 Graphical representation of Hydro energy requirement under different plant availability scenarios and Safe hydro dispatch level (MWh)**



**C-5 Observations**

There is a risk of an energy deficit if one 270 MW generation unit become unavailable more than 50% of the time.

**C-6 Uncertainties in the above calculation**

- Variations in inflow level: The actual inflow may become lower than the assumed level of 3.8 GWh/day.
- Variations in demand growth: This analysis is conducted considering the contribution from Self-Generation scheme as a negative demand. However, the scheme expires in April 30, 2017. Hence, demand in month May, may become higher than the assumed growth of 6% compared to month April

**D Analysis of security of energy supply under low inflow levels**

Lowest inflow levels received in past 5 yers

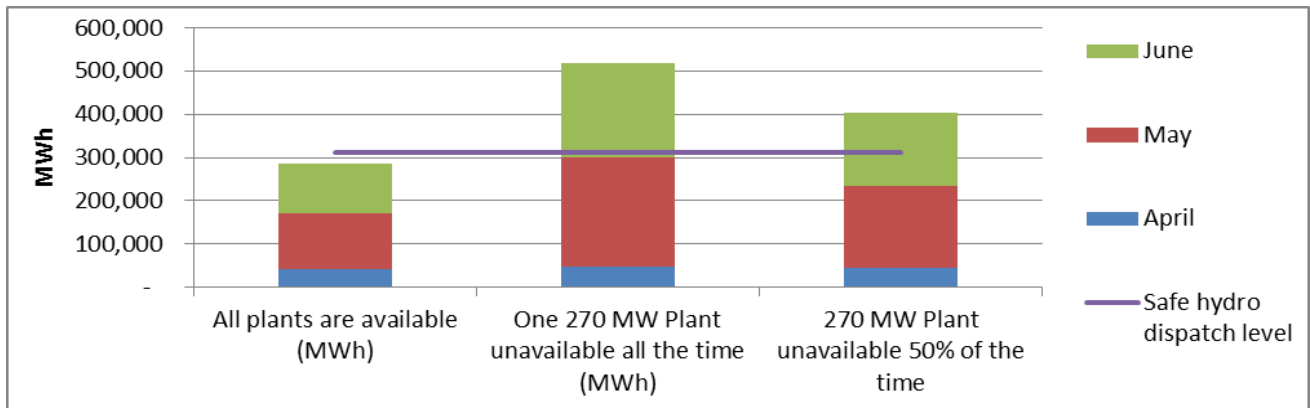
|       |                             |
|-------|-----------------------------|
| April | 3.8 GWh (Actual April 1-19) |
| May   | 1.7 GWh (in 2012)           |
| June  | 2.1 GWh (in 2012)           |

**D-1 Revised Assesment of Daily Hydro Energy Availability**

|                                   |         |           |
|-----------------------------------|---------|-----------|
| Reservoir Level at March 31, 2017 | 455,200 | MWh       |
| Minimum Safe Reservoir Level      | 300,000 | MWh       |
| Inflow/day                        | April   | 3,800 MWh |
|                                   | May     | 1,700 MWh |
|                                   | June    | 2,100 MWh |

|                                      |         |     |
|--------------------------------------|---------|-----|
| Safe Daily Hydro Dispatch            | 4,343   | MWh |
| Safe Hydro Dispatch for the 3 months | 312,700 | MWh |

**D-2 Revised Graphical representation of Hydro energy requirement (MWh), for low inflow levels**



**D-3 Observations**

If the inflow levels are close to the lowest inflow levels received during the respective month in last five years, even with availability of all major thermal plants (other than those scheduled for maintenance), enegy supply will be only marginally sufficient to meet the demand.

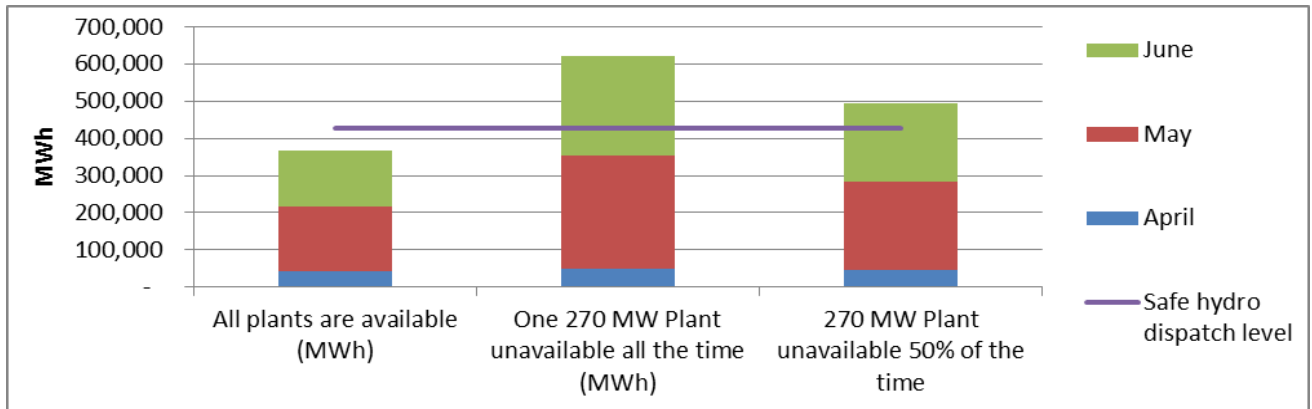
**E Analysis of security of energy supply in case of demand in May grow by additional 5% compared to April due to expiration of Self-Generation scheme**

Revised demand growth in  
May(compared to April) 11%

**E-1 Revised assesment of Daily hydro energy requirement for 11% demand growth in May**

| Hydro requirement |                  | All plants are available (MWh) |           | One 270 MW Plant unavailable all the time (MWh) |           |
|-------------------|------------------|--------------------------------|-----------|---|-----------|
| Month             | No of days/month | Perday                         | Per month | Perday  | Per month |
| March             | 31               | 3,800                          | 41,800    | 4,493   | 47,983    |
| April             | 30               | 5,745                          | 174,431   | 10,044  | 304,944   |
| May               | 31               | 5,156                          | 151,376   | 9,218   | 270,629   |
|                   |                  | Total                          | 367,606   | Total   | 623,556   |

**E-2 Revised Graphical representation of Hydro energy requirement (MWh), for high demand growth in May**



**E-3 Observations**

If the demand in May increased by additional 5% compared to April, the energy supply will not be sufficient to meet the demand, if one 270MW plant unavailable more than 50% of the time.

**F Analysis of security of energy supply if both low inflow and high demand in May occurred simultaneously**

**F-1 Assessment of Daily hydro energy requirement**

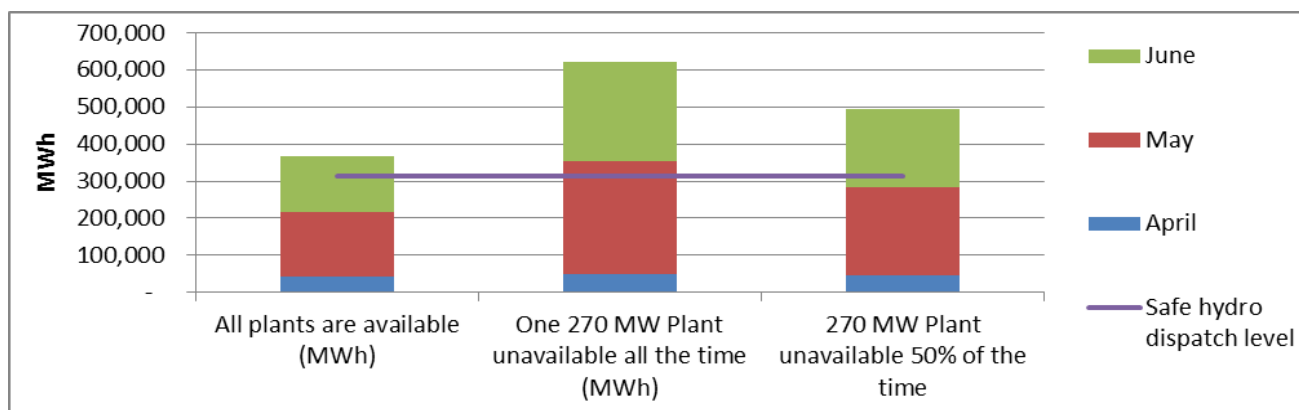
| Hydro requirement |                  | All plants are available (MWh) |           | One 270 MW Plant unavailable all the time (MWh) |           |
|-------------------|------------------|--------------------------------|-----------|---|-----------|
| Month             | No of days/month | Perday                         | Per month | Perday  | Per month |
| March             | 31               | 3,800                          | 41,800    | 4,493   | 47,983    |
| April             | 30               | 5,745                          | 174,431   | 10,044  | 304,944   |
| May               | 31               | 5,156                          | 151,376   | 9,218   | 270,629   |
|                   |                  | Total                          | 367,606   | Total   | 623,556   |

**F-2 Assessment of Daily Hydro Energy Availability**

|                                  |       |         |     |
|----------------------------------|-------|---------|-----|
| Reservoir Level at March 1, 2017 |       | 455,200 | MWh |
| Minimum Safe Reservoir Level     |       | 300,000 | MWh |
| Inflow/day                       | March | 3,800   | MWh |
|                                  | April | 1,700   | MWh |
|                                  | May   | 2,100   | MWh |

|  |         |     |
|--|---------|-----|
| Safe daily hydro dispatch level                  | 4,343   | MWh |
| Safe daily hydro dispatch level for the 3 months | 312,700 | MWh |

**F-3 Graphical representation of Hydro energy requirement under different plant availability scenarios and Safe hydro dispatch level (MWh)**



**F-4 Observations**

- If low inflow scenario and additional 5% demand growth in May taken place simultaneously, even with the availability of all major thermal plants (other than the plants scheduled for maintenance), the energy supply will be insufficient to meet the demand.