Handbook on Seasonal Adjustment and Forecasting of Time Series

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Message

The Government of Sindh is committed to efforts, which bring about positive change in the evidence based planning. The contribution of manufacturing and energy sectors remain a priority agenda of this government for which realistic, valid, and reliable data of provincial industrial statistics is the pre-requisite for improved planning and rational decision making.

I am pleased to know that the research report on Seasonal Adjustment and Forecasting of the time series of electricity consumption in Sindh provides comprehensive knowledge and methodology of the seasonal adjustment of the time series. In addition to the aggregate seasonal adjustment of data, this study also examines the seasonal adjustment of time series with the lens of direct and indirect seasonal adjustment.

The chronological data of energy consumption which provided by the respective DISCOs and compiled by the Sindh Bureau of Statistics is statistically sound and comparable with national and provincial levels. It enables to the government to establish realistic and evidence-based policies and programs and monitoring of progress towards global, national, and provincial goals.

I would like to congratulate, Director General, Bureau of Statistics, Planning & Development Department and his team who worked hard to complete this research study. I would highly appreciate the whole Bureau of Statistics on the completion of this in-house developmental project and production of Handbook for the research, planners and Policymakers.

Syed Hassan Naqvi
Chairman
Planning & Development Board
Government of Sindh

Message

Technical understanding of data is always challenging for laymen; in this regard, a simplified form of presentation of data that is easily understandable for non-statistician users should be the motive of data dissemination organizations. I am extremely pleased to present the Handbook on Seasonal Adjustment and Forecasting of Time Series Data, that is the first ever conducted research study on the seasonal adjusted of time series data at Government of Sindh level.

A diverse nature of data set is essential for effective planning and governance. The Handbook on Seasonal Adjustment and Forecasting of Time Series is an important source of accurate and reliable seasonally adjusted data of the electricity consumption in Sindh. The study was started as in-housed developmental project for the betterment of data dissemination strategies according to the Mission and Vision of Sindh BOS under the supervision of Director General, Bureau of Statistics, Sindh. The methodology has been used for this study is quite sound and according to the literature of Time Series Analysis.

I would like convey my deep appreciation to the Bureau of Statistics team for conducting this study and preparing the handbook, which I feel will provide as baseline knowledge to the other sections of Sindh Bureau of Statistics and the seasonal adjustment of time series will be the regular feature of the annual publication of Bureau of Statistics.

Faisal Ahmed Uqaili
Secretary Planning
Planning & Development Department
Government of Sindh

Foreword

Seasonal Adjustment is the procedure that assesses seasonal effects and removes them from a time series. Seasonally adjusted data delivers genuine variations occur time series and this data is too much valuable for public and private researchers, policymakers, and planners.

Different financial and economic time series are generally prone to seasonal impulsiveness. Whenever data series have the problem of seasonality it makes it difficult to assess whether the variations in the data set for a given period repeat ups and downs in the level of the data whether or these changes happened due to regular fluctuations.

The Sindh Bureau of Statistics (BOS) has been publishing the time series of electricity consumption since 1970-71. Thus, the BOS has a rich time series on electricity consumption, now we are transforming our existing data as per the needs/ standards of the modern era and which is also committed to the Mission and Vision of BOS. Consequently, BOS has decided to produce to seasonally adjusted time series. In this regard, at this time Mr. Muhammad Kazim Jafri, Deputy Director (Industries), and his team took the initiative and prepared a research report on the seasonal adjustment and forecasting of the time series of the electricity consumption in Sindh. I am very proud to announce that the Sindh Bureau of Statistics is first statistical bureau in Pakistan which is going to release first ever seasonally adjusted data. However before this, the State Bank of Pakistan is only institute which publishes seasonally adjusted data on regular basis. This report will be followed by the other sections of Sindh BOS which are producing time series data on a regular basis and I hope seasonally adjusted data of various sectors will be the regular feature of the Development Statistics of Sindh BOS.

All researchers and data users especially in the field of Time Series Analysis are requested to furnish their comments and suggestions for the improvement of data.

Dr. Ishaque Ahmed Ansari
Director General
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Content

List of Figures

List of Tables

Abstract

Direct and Indirect Seasonal Adjustments remain a relevant query when the time series has seasonal impacts and are analyzed. This study is designed to produce seasonally adjusted time series and its forecasting. In this regard, the empirical analysis is performed of an important monthly time series of electricity consumption from July 2006 to June, 2021, which is regularly published by the Sindh Bureau of Statistics. In the modern world, electricity is treated as the basic need of people. The electricity generation and supply system varies from country to country. In Pakistan, the main electricity production and supply companies are NTDC, DISCOs, and KE. Along with these main producers and distributors, there are some independent power producers and distributors which are working parallel to this system though this study is based on the data collected from the main producing and distributing agencies in Sindh.

Keywords— Seasonal Adjustment, Electricity, ARIMA, Forecasting, Time Series Analysis, Sindh

1. Introduction to Seasonal Adjustment

To deal with time series, it is quite essential to understand the different components of time series. Four components make up an observed time series: the seasonal component (S), the trend component (T), the cyclical fluctuations (C), and the irregular variations. Due to the low number of cycles in our data, the trend and cycle components are typically merged to form the trend-cycle component (TC). Real Macroeconomic time series frequently employ the multiplicative model. Models for the relationship between the original series and its elements include:

- Multiplicative Model: $Observed\ (Y_t) = TC_t \times S_t \times I_t$
- Additive Model: $Observed\ (Y_t) = TC_t + S_t + I_t$

One of the most significant elements of the time series is seasonal variation. Seasonality is a term for specific periodic fluctuations that are extremely prevalent in the economy. The aggregated electricity consumption has the five sub-component of electricity consumption, which were chosen for direct and indirect investigation. The US Census Bureau created seasonal adjustment software as an expanded and enhanced version of the X-12 ARIMA approach for time series. It is challenging to determine whether changes in data for a specific period indicate a major rise or decrease in the level of data, or if they are instead the result of periodically occurring variations, due to these data fluctuations. To get a precise image of the data, it must be removed if it appears in the time series data.

A series from which these fluctuations have been eliminated is referred to as a seasonally adjusted series, and it allows comparisons between months or quarters for which there is a difference in seasonal agreement. Seasonal adjustment is the process by which we remove seasonal movements from time series.

Most adjusted series employ a multiplicative decomposition, but if there are zero or negative observations in the series, a multiplicative model cannot be used. When the seasonal component is eliminated, the trend and irregular components are combined to create the seasonally adjusted series, which is identical to the original series. Multiplication and addition seasonal models are Seasonally Adjusted=TC X I and Seasonally Adjusted=TC + I, respectively. It is significant to emphasize that the adjusted series is crucial for decision-makers in government, business, and finance.

This report discusses the two different time series analysis tasks simultaneously; at the first stage we are applying the seasonal adjustment methodology of the direct and indirect approach. The empirical conclusion of both approaches leads to acquiring the best seasonally adjusted series. In the second part of the research, the final seasonal adjusted series and original series are used to forecast adjusted and unadjusted time series for the period of the next twelve months.

2. Electricity Consumption in Sindh

There are two main electrical suppliers in Sindh's energy supply system. The first is Karachi Electric (KE), and the second is the Water and Power Development Authority (WAPDA). The oldest government-owned electric utility in Pakistan, Karachi Electric Supply Corporation (K.E.S.C.), began supplying energy to Sindh in 1970–1971 with the opening of its first office. Later, KESC was privatized, and since 2012–2013, Karachi Electric (KE) has been the source of electrical data. WAPDA was used to gather data for Sindh in areas other than the Karachi Division from 1977 to 1978. All of Sindh's regions, with the exception of those served by Karachi Electric, are supplied with energy by WAPDA via national grids. Electricity generation, transmission, and distribution to Karachi Division and some part of Thatta district's industrial area are all handled by KE.

In Sindh, there are total 5.2 million power customers (2020–21), using 22.9 billion KWH. These users fall into a variety of home, commercial, industrial, agricultural, and other groups. The electrical consumer groups are self-explanatory, and "Other" includes lighting used for public and bulk supplies. Out of 5.2 million consumers, 4.3 million are in the domestic category, which accounts for 53.6% of all energy usage. Commercial consumers, who account for 0.8 million users and 10% of overall electricity use, are the second-largest segment. Even though there are only 0.05 million industrial consumers, they account for 28.1% of all electricity consumption, which is higher than what is consumed by commercial and agricultural users combined.

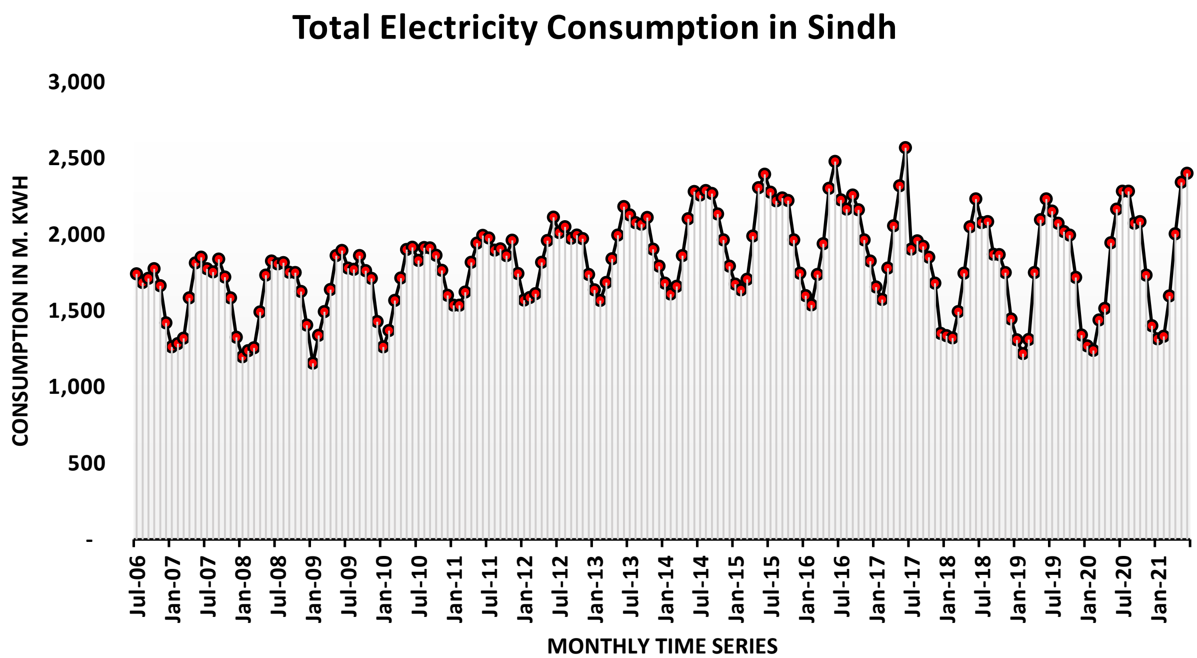
According to data for 2020–21, the industrial sector has the highest per consumer consumption—123.8 thousand KWH—followed by the agricultural sector (15.0 thousand KWH) and the commercial sector (2.8 thousand KWH), while the domestic sector has the lowest per consumer consumption—2.9 thousand KWH on average per household annually. In 2020–21, WAPDA registered 1.98 million consumers out of Sindh's total 5.2 million consumers, whereas KE registered 3.22 million electricity users. Similarly, Karachi makes use of 16.1 billion KWH of total of Sindh energy consumption 22.9 billion KWH and the remaining 6.8 billion KWH are utilized by other regions of Sindh.

The majority of electricity users reside in Karachi, which is supplied by KE. Because Karachi Division's average per-consumer consumption is higher, Karachi's share of overall electricity consumption exceeds its share of total consumers.

Data for this study have been taken from the source of Sind Bureau of Statistics. Monthly data used for Electricity Consumption from July, 2006 to June, 2021. It would be interesting note that, the disintegrated data series are being used in this study to examine the effect of direct and indirect seasonal adjustment. Disintegration of the data series is based on the consumption categories. Total electricity consumption in Sindh is computed by using following five categories:

1. ***Agriculture Consumption:*** It includes the consumption of electricity for agricultural purposes e.g. for irrigation pumps, tube wells etc.
2. ***Commercial Consumption:*** It includes the consumption for commercial use of lamps, fans, heaters, air conditions, refrigerators, tube- wells (Non-agricultural) and all other single phase appliances whose rated capacity should not exceed 4 Kilowatts.
3. ***Industrial Consumption:*** It includes the consumption for industrial purpose in factories and also for tube wells and water pumps operating on three phase 400 volts. The supply given to the offices of the factories are also included.
4. ***Domestic Consumption:*** It includes the general consumption for lamps, fans and other single phase house ware appliances. The rated capacity of any house-ware appliance should not exceed 4 kilowatts.
5. ***Other Consumption:*** Others include public lighting and bulk supply.

The aggregate of all five categories becomes the total Electric Consumption of Sindh, this data is also collected according to another bifurcation which is the domain wise consumption. Major two service providers are the domains which are WAPDA and KE, though we are not interested in the domain wise analysis as it is not the scope of this study. It is essential to know the pictorial behavior of series before data analysis, especially when time series and seasonal adjustment models are being studied. Time series graphs of all the sub-categories are plotted as under:



Total Electricity Consumption in Sindh
3,000
2,500
2,000
1,500
1,000
500
-
CONSUMPTION IN M. KWH
Jul-06
Jan-07
Jul-07
Jan-08
Jul-08
Jan-09
Jul-09
Jan-10
Jul-10
Jan-11
Jul-11
Jan-12
Jul-12
Jan-13
Jul-13
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Jul-15
Jan-16
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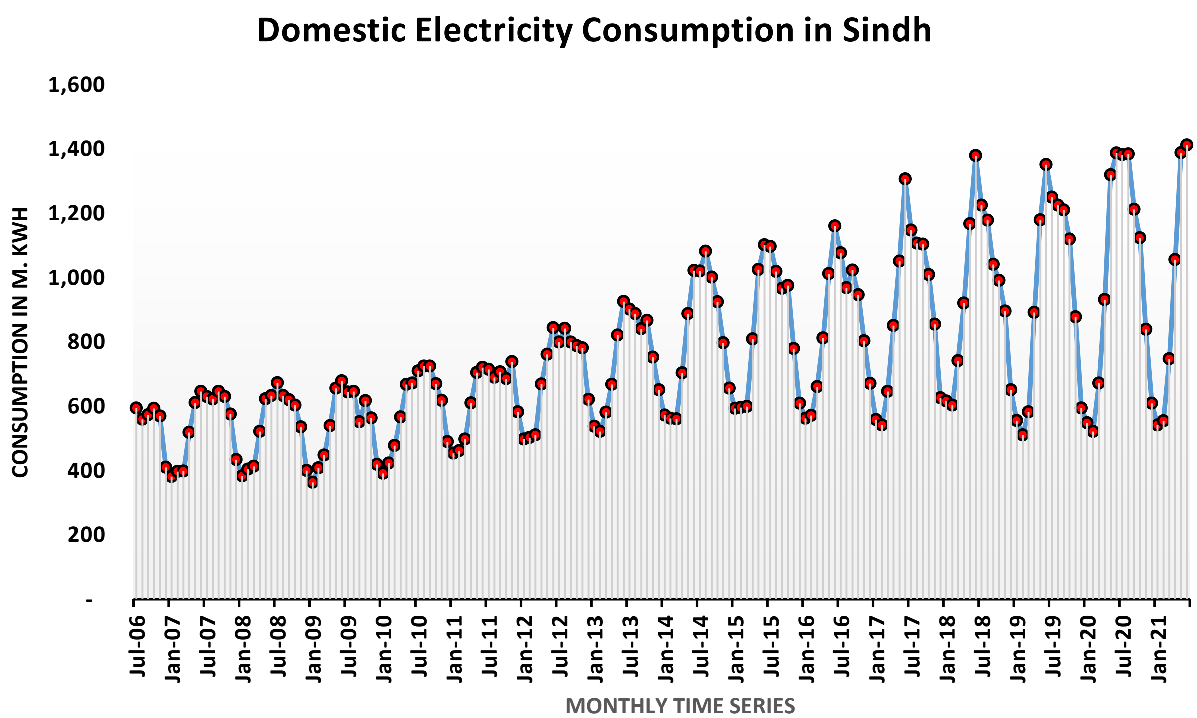
Jan-21
MONTHLY TIME SERIES



Domestic Electricity Consumption in Sindh
1,600
1,400
1,200
1,000
800
600
400
200
-
CONSUMPTION IN M. KWH
Jul-06
Jan-07
Jul-07
Jan-08
Jul-08
Jan-09
Jul-09
Jan-10
Jul-10
Jan-11
Jul-11
Jan-12
Jul-12
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
Jan-16
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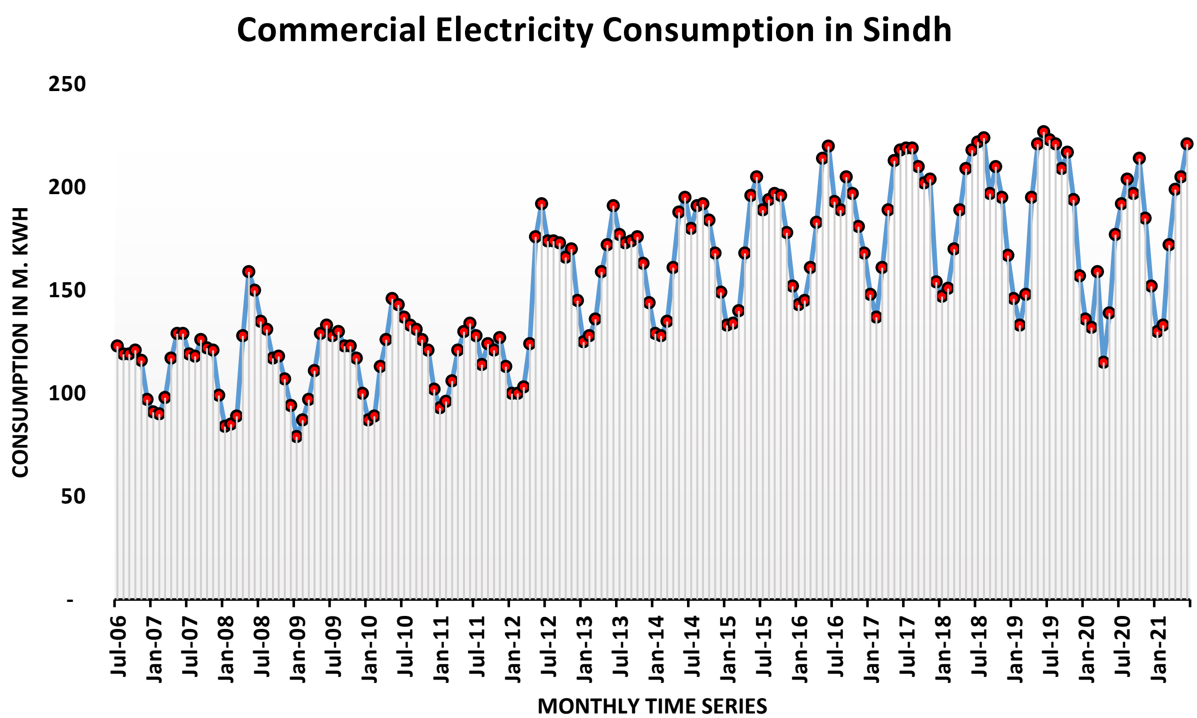
Jan-21
MONTHLY TIME SERIES


Commercial Electricity Consumption in Sindh
250
200
150
100
50
-
CONSUMPTION IN M. KWH
Jul-06
Jan-07
Jul-07
Jan-08
Jul-08
Jan-09
Jul-09
Jan-10
Jul-10
Jan-11
Jul-11
Jan-12
Jul-12
Jan-13
Jul-13
Jan-14
Jul-14
Jan-15
Jul-15
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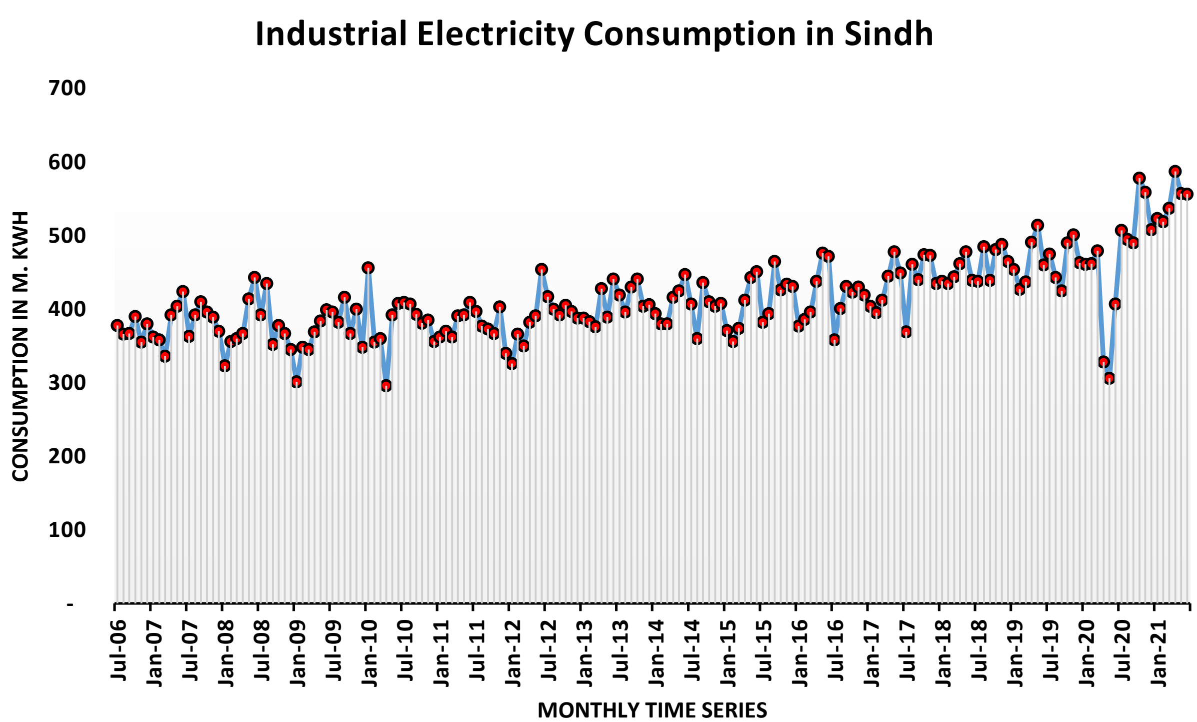
Jul-20
Jan-21
MONTHLY TIME SERIES


Industrial Electricity Consumption in Sindh
700
600
500
400
300
200
100
-
CONSUMPTION IN M. KWH
Jul-06
Jan-07
Jul-07
Jan-08
Jul-08
Jan-09
Jul-09
Jan-10
Jul-10
Jan-11
Jul-11
Jan-12
Jul-12
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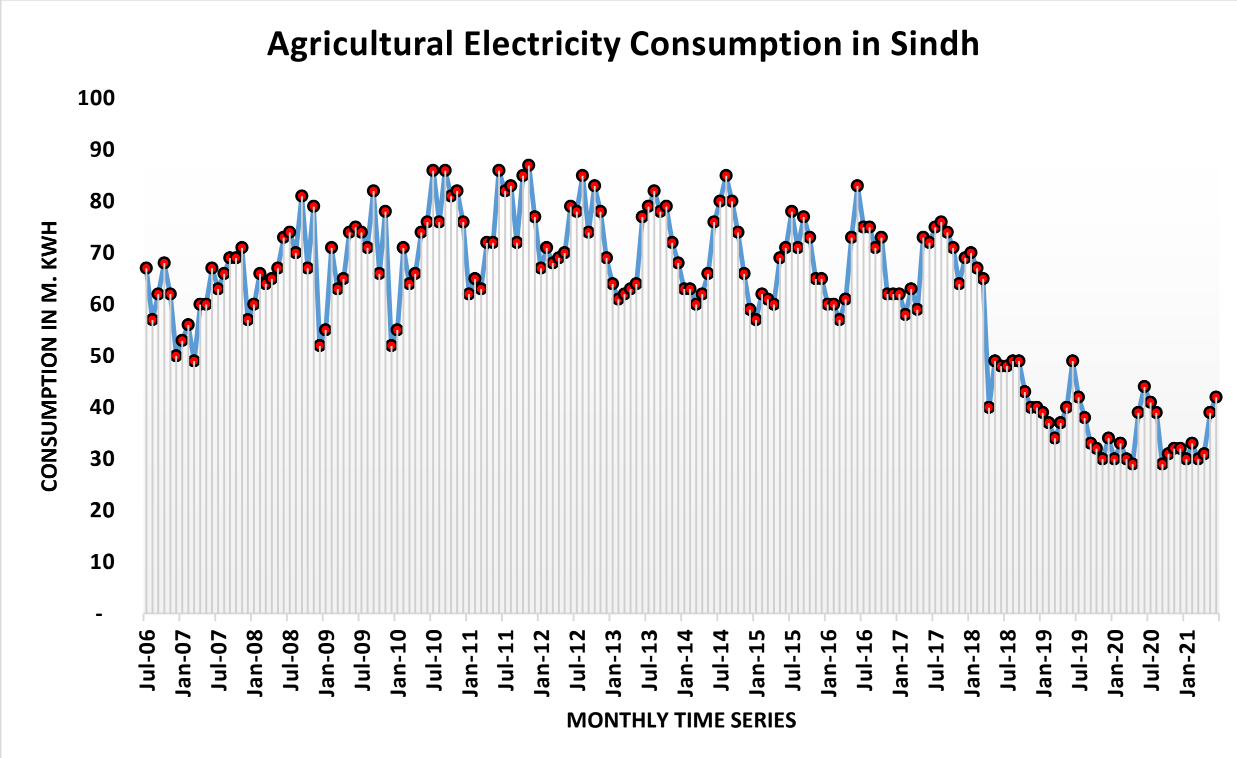
MONTHLY TIME SERIES



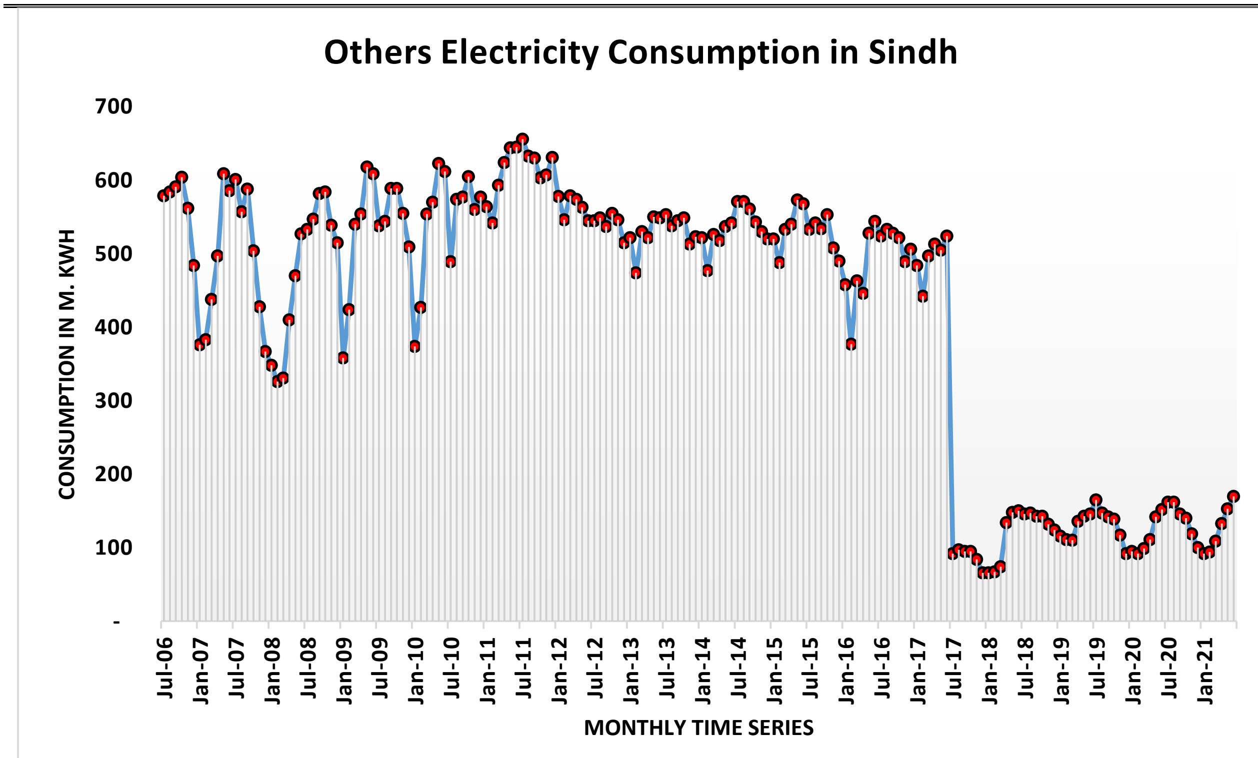


Figure 01: Monthly Time Series of Category wise Electricity Consumption from Jul, 2006 to Jun, 2021

3. Literature Review

Review of the literature always play a pivotal role to explore the research topic, according to review it is explored that different studies have been carried out on seasonal adjustment and forecasting of financial and economic data some of them were reviewed by author such as, Augustin Maravall (2005) worked on extension of ARIMA modeling he discussed automatic modeling procedure with seasonally adjusted series. In his study he described how the SEATS results can help in model selection. He discussed the problem of choosing between direct and Indirect seasonally adjusted series and reached at conclusion the direct series is preferable, even at the cost of demolishing identities among the original series.

The aim of Ongan *et. al.* (2002) study was to analyze the seasonal adjustment of seasonal movements of consumer Price Index and wholesale Price Index by using different methods. Different statistical simulation between the methods of X-11 and X-12, they reached on the conclusion to replace X-11 with X-12 and the model of TRAMO-SEATS is used for adjustment.

Lee (2002) A comparative study was conduct on alternative methods of seasonal adjustment X-12 ARIMA and TRAMO-SEATS, he concluded both methods provides reliable estimates but X-12 ARIMA is slightly preferable than TRAMO-SEATS.

Another comparative study was performed in the scenario of our country by Bukhari and Najam in (2009). They found there were significant difference between detecting seasonality and they concluded TRAMO-SEATS provides more sound results than X-12 ARIMA method.

Alexandrove et al. (2008) reviewed some modern approaches to trend extension to one dimensional time series. They concluded either ARIMA model or State Space model may be used time series trend model.

The study of the financial time series produced by SBP was done using methodologies for applied seasonal adjustment, which are described in the paper. Five significant financial series have been adjusted using the X-12-ARIMA method: currency in movement, broad money, remittances, exports, and imports (from the balance of payments data). The adjusted series was judged to be satisfactory in the X-12-ARIMA tests and practices (Bokhari & Ansari, 2009).

Chen, Pie and Zaho (2021) conducted study on seasonal variations and forecasting of electricity usage. The purpose of this study is to investigate the effects of the 2019 new coronavirus illness (COVID-19) and forecast seasonal variations in electricity consumption as well as the efficiency of industrial sectors' electricity usage. The findings suggest that the AWBO-DGGM (1, 1) models have the ability to detect seasonal variations and changes in time series data as well as forecast the effects of COVID-19 on industrial systems. Between 2020 and 2022, industrial companies in Zhejiang Province will continue to have a propensity to increase their power consumption, added value, and electricity usage efficiency.

Chen, Pie and Zaho (2021) conducted study on industrial electricity usage efficiency. The goal of this study is to estimate seasonal oscillations in power consumption and industrial sector electricity usage efficiency, as well as to detect the effects of the novel coronavirus illness 2019 (COVID-19). A new seasonal grey prediction model (AWBO-DGGM(1,1)) is presented for this purpose, which combines buffer operators and the DGGM(1,1) model. In the training stage, the minimal mean absolute percentage errors for electricity consumption, added value, and electricity use efficiency of industrial firms are 0.12%, 0.10%, and 3.01%, respectively, whereas in the test stage, they are 6.79%, 4.09%, and 2.25%. From 2020 to 2022, the power consumption, added value, and electricity usage efficiency of industrial firms in Zhejiang Province will continue to develop with seasonal changes.

Ghauri et al. (2020) performed a comparative analysis to evaluate the performance of two econometric models for forecasting imports and exports for the fiscal year 2020. They used Pakistan's annual export and import data from 2002 to 2019 for this purpose. Thus, they compared the outcomes of two econometrics models, Box Jenkins or Autoregressive Integrated Moving Average (ARIMA), and Auto-Regressive with seasonal dummies. We used the mean absolute error and root mean square error methodologies to assess predicting precision. The results of the Root Mean Square Error and Mean Absolute Error show that the ARIMA or Box Jenkins technique delivers superior forecast accuracy for exports than the AR model with dummies.

To meet the anticipated increase in energy demand, the Pakistani government has envisioned an open, competitive energy market driven by the private sector that offers dependable, least-expensive energy supply. The government's goal of creating a sustainable, cost-effective energy sector that best serves the nation's strategic and socioeconomic goals as well as the fast increasing demand for energy can be realized through the use of an effective and appropriate method called integrated energy planning. Build the capacity of Government of Pakistan institutions and relevant stakeholders for analysis-based decision-making. Develop the tools and build the capacity of Government of Pakistan to provide a credible analytical platform for evaluating and planning an optimal and comprehensive strategy for the country's energy sector. By implementing integrated energy planning, the government will be better equipped to support the creation of long-term development strategies and provide information for medium- and short-term planning. Additionally, it will offer a workable inter-agency coordination system for locating, resolving, and preventing anomalies. Additionally, a web-accessible database of important energy sector data that is trustworthy, consolidated, and up-to-date will offer more consistent, current, and reliable input for planning, modelling, and assessment. This database can be used by important energy sector players to avoid ad hoc planning and set goals for thorough subsector planning (Moeen, Memon and Hafiz; 2022)

4. Methodology for Seasonal Adjustment

Financial and Economic time series are often prone to seasonal volatility. Whenever series have problem of seasonality which make difficult to check whether the variations in data set for a certain time period reproduce ups and downs in the level of the data, or these changes occurred due to regular variations. If a series has seasonality problem and that is used for Economic or Financial analysis in such instances fairly misleading outcome may have to face.

A procedure which assesses seasonal influences and then removes them from a time series is known as Seasonal Adjustment. Seasonally adjusted data delivers genuine variation occur time series and this data is too much valuable for public and private sectors researchers and planners.

To grasp this subject we study figure 01 which indicates there is a certain pattern which is moving slightly higher, therefore we may deduce that, there are some factor which originate movements in a statistical time series. In figure 01 there is two components are obvious which are deriving movements of electric consumption series. One is rising trend which is demonstrating that the electric consumption is increasing throughout the period of time which has several factors like population rise, launching of new electric gadgets and such. Other movement is due to seasonality that can be readily observed as every year, there is a strong spike in Jun to Aug there looks to be “crest” in the series. Such sort of variance produce mislead findings, thus the time series of electric consumption in Sindh must be seasonally adjusted before study.

4.1. Pre-adjustment

The number of working days, the makeup of the weekdays throughout each period, the timing of movable holidays, and other factors can all significantly affect the series. Pre-adjustment refers to the process of adjusting these effects before forecasting.

The calendar changes component is that element of the seasonal components that indicates calendar fluctuations in a time series, such as trade days or working days, shifting holidays, and other calendar impacts. For instance, Christmas and New Years are the most significant festivals for western nations, whereas Ramadan, Eid-ul-Fitar, Eid-ul-Azha, Ashore, and others are Islamic holidays. These are examples of movable holidays, and correction of these variations is conducted using Reg-ARIMA modelling in X-12 ARIMA software to generate seasonally adjusted statistics. The changes in length of months such as 28, 29, 30, or 31 also have a substantial impact on the time series.

4.2. Methods for Seasonal Adjustment

Renowned and commonly used seasonal adjustment programs X-11 ARIMA, X-12 ARIMA and its extension for X-13 all have been developed by U.S. Census Bureau. The X-11 program was designed to perform the basic operations of seasonal adjustment and this programs mostly relies on the input operation. In the X-12 ARIMA some essential changes are made for its improvement and the regARIMA models were introduced. The objectives of regARIMA are to forecast the series by using symmetric moving average filters that give a moderate level season revisions during preparation of seasonal factors.

Most importantly the program supports to pre-adjust for outliers and specific holidays during the automatic modeling procedure of RegARIMA. In the X-12 method, the new diagnostics checks are introduced for the reliability of estimate model and result output are also improved. In addition to X-12 ARIMA method the latest method of X-13 ARIMS-SEATS which is basically extension of X-12 method some import features are given as under:

- Extensive historical forecasting and model selection capabilities for linear regression models with ARIMA errors (regARIMA models);
- The potential to generate ARIMA model-based seasonal adjustment utilizing a version of the SEATS program.
- Investigations of the quality and stability of the modifications produced under the settings selected;
- A capacity to effectively deal with numerous series at once.

In our analysis the method of X-13 ARIMA is used for the seasonal adjustment of the monthly time series of the electricity consumption.

4.3. Direct versus Indirect Seasonal Adjustment

The seasonal adjustment can be classified as either a direct or indirect adjustment. A time series that is the sum of various seasonal adjusted series is called Indirect Seasonal Adjustment. The alternative is the direct approach of adjusted series, which is derived by applying the adjustment technique to the aggregate series without first applying the seasonally adjusted series.

The parameters for choosing between direct and indirect methods are stated below:

- The indirect adjustment should be adopted if the disaggregated series contain various stochastic features.
- The indirect adjustment is also relevant when the data sources of the sub-sectors are different.
- If a high relationship exists among the variables of the series, then a direct approach is recommended for adjustment.

In the current research, both methodologies have been implemented on the data series of electricity consumption at the aggregated and disaggregated levels.

5. Methodology for Time Series Forecasting

Different methods are described in the literature for the time series forecasting such as smoothing, moving averages, mean method, least square, etc.; along with these methods a sophisticated of Autoregressive Integrated Moving Average (ARIMA) method is quite frequently used and reliable for forecasting point of view. To understand the ARIMA modeling first we understand about the unit-root process of time series.

5.1. Stationarity

It is most probable the time series data contain unit root, therefore the unit root tests are used to identify the rank, at which a time series becomes stationary. Different series become stationary at different levels with constant and constant with trend. Interpretation of ADF and PP is very common because they have hypothesis of non-Stationarity $H_0\colon I(1)$, for instance according to ADF test a time series with intercept and trend is stationary at first difference with a certain level of significance.

$$\Delta y_t = \psi y_{t-1} + \sum_{i=1}^{p} \alpha_i \Delta y_{t-i} + u_t \tag{1}$$

Above equation is used to test the stationarity of the time series Yt, in our case the stationary of electricity of consumption series are tested ADF and PP test through EViews and the results of the unit root testing are presented in the section 07.

5.2. Autoregressive Integrated Moving Average Model

A stationary time series is one whose statistical properties such as mean, variance, autocorrelation and etc. are all constant over time. Statistical forecasting methods are based on the assumption that the time series can be rendered approximately stationary, which consists of two parts, first is deterministic and other is disturbances. Deterministic part can be defined as the regressing the values from its own previous “p” values, is called Autoregressive model (AR) of order “p” which may be written as;

$$y_t = \alpha_o + \alpha_1 y_{t-1} + \alpha_2 y_{t-2} + \cdots + \alpha_p y_{t-p} + u_t \tag{2}$$

Other component disturbances are also used in time series describe stationary series. The values of the time series depend upon the error terms, hence the model can be obtained by regressing the values from its past “q” terms, is referred to the Moving Average model (MA) of order “q” may be written as;

$$y_t = \beta_o u_t + \beta_1 u_{t-1} + \beta_2 u_{t-2} + \cdots + \beta_q y_{t-q} + \mu \quad (3)$$

In practice a time series can be modeled with only modest number of terms “p” or only modest number of terms “q” in the form of either an AR or an MA or it may consist of both that can be known as ARMA model. This model is a tool for understanding and predicting the future values with the self-deterministic as well as error terms, hence the classification of this model is Autoregressive of order “p”, AR (p) and Moving Average of order “q”, MA (q) and if we combine together then it is called ARMA (p,q) may be written as;

$$y_t = \mu + \alpha_1 y_{t-1} + \alpha_2 y_{t-2} + \cdots + \alpha_p y_{t-p} + \beta_o u_t + \beta_1 u_{t-1} + \beta_2 u_{t-2} + \cdots + \beta_q y_{t-q} \quad (4)$$

Practically, many economic time series are non-stationary, therefore we have to difference “d” time to achieve stationary then the ARMA model is expressed as ARIMA (p,d,q) where the symbol “d” denotes “integrated”. For instance ARIMA (p,1,q) time series has to be differenced once (d=1), while if the given series is already stationary then the value of d is 0, means no difference taken in modeling, thus ARIMA (p,0,q) is equals to ARMA (p,q).

5.3. Box-Jenkins Method

The Box-Jenkins methodology is used; either the available series is stationary or non-stationary. This methodology was proposed by Box and Jenkins (1978) to find the best fit of a time series in order to make forecasts. This method consists of four steps in the forecasting which are Model identification, Model selection, Diagnostic checks and forecasting. Diagrammatically the Box-Jenkins Methodology may be defined as:

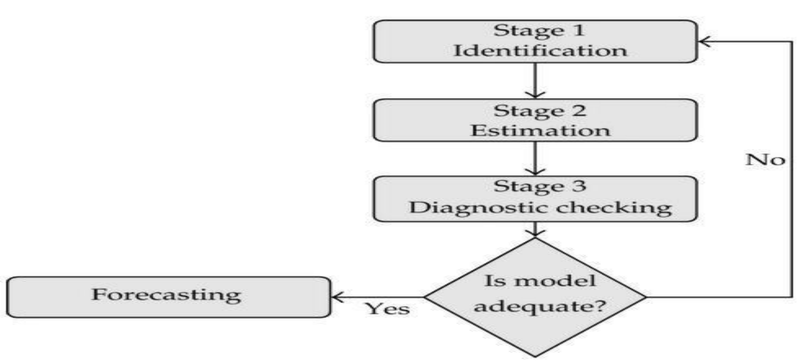


Figure 02: (Box-Jenkins Methodology Flow Chart)

6. Direct and Indirect Seasonally Adjusted Series

According to the data set presented in the figure 01, we have six different time series in which there are 5 subgroups which are determining the total electricity consumption of in sign in aggregation. First we adopt the technique of direct seasonal adjustment and apply the X-13 ARIMA-SEATS on the aggregate series of total electricity consumption in Sindh. The results of the directly seasonally adjusted series are depicted in the figures 03.

As far as pre-adjustments are concerned, apparently the time of electricity consumption is showing level-shift in July, 2017; moreover there are few significant outliers regarding sudden decline in the months of Jan-2018 and Feb-2020. These types of changes will be adjusted by using the option of out remove outlier. After the direct adjustment of seasonal changes of aggregate series, all the subgroups' time series are being adjusted one by one and results of all the series are shows in the figure 05, 07, 09, 11 and 13. The detailed working of seasonal adjustment is available in appendices from A to F.

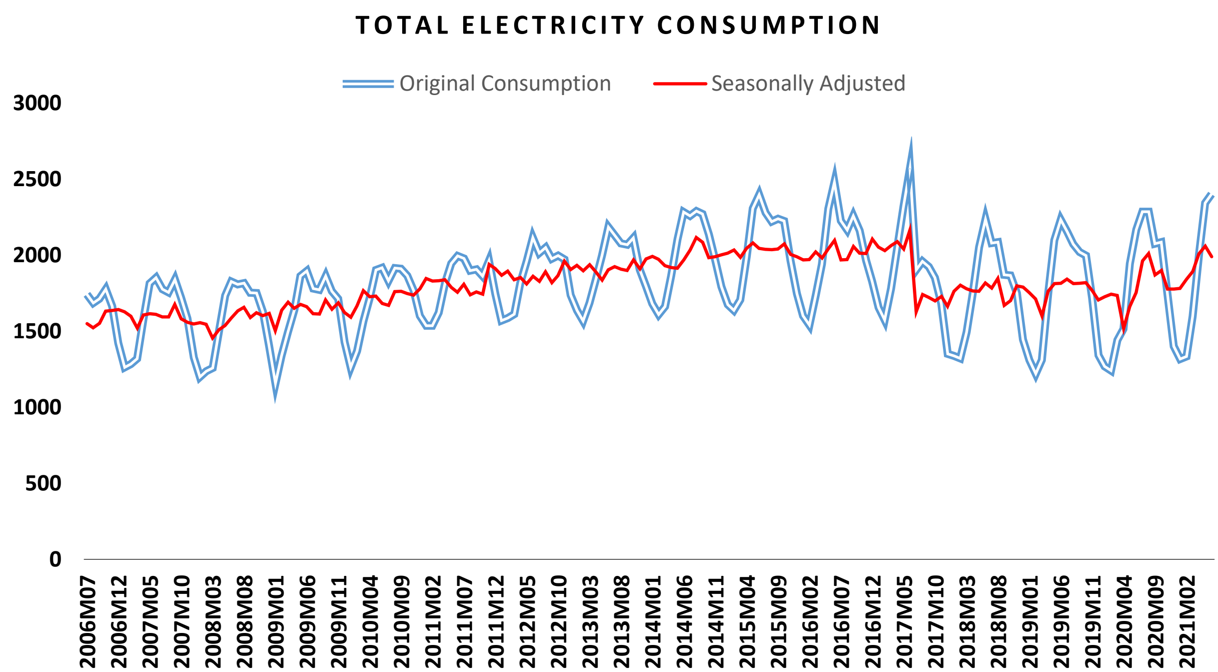


Figure 03: Direct Seosonally Adjusted Series of Electricity Consumption from Jul, 2006 to Jun, 2021

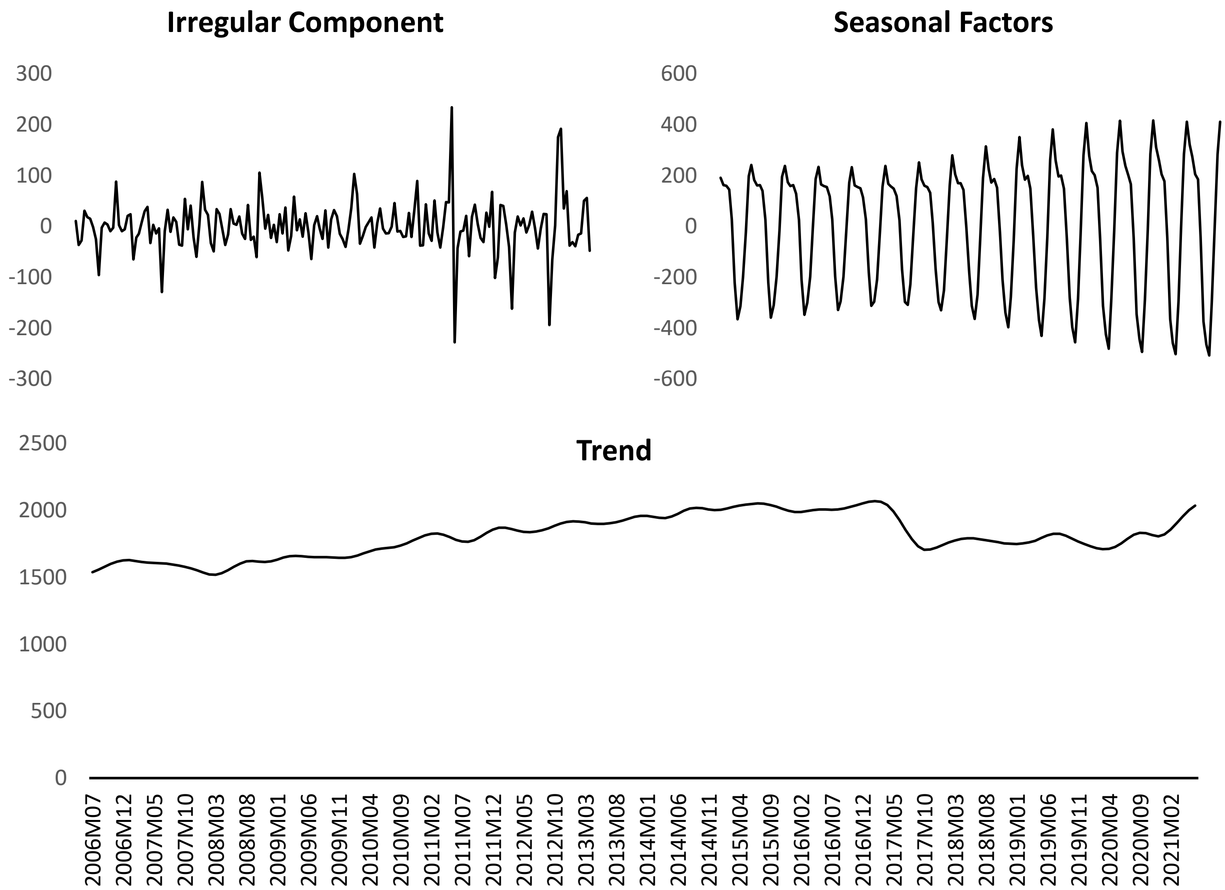


Figure 04: Seasonal, Irregular and Trend Components of the Time Series of Total Electricity Consumption from Jul, 2006 to Jun, 2021

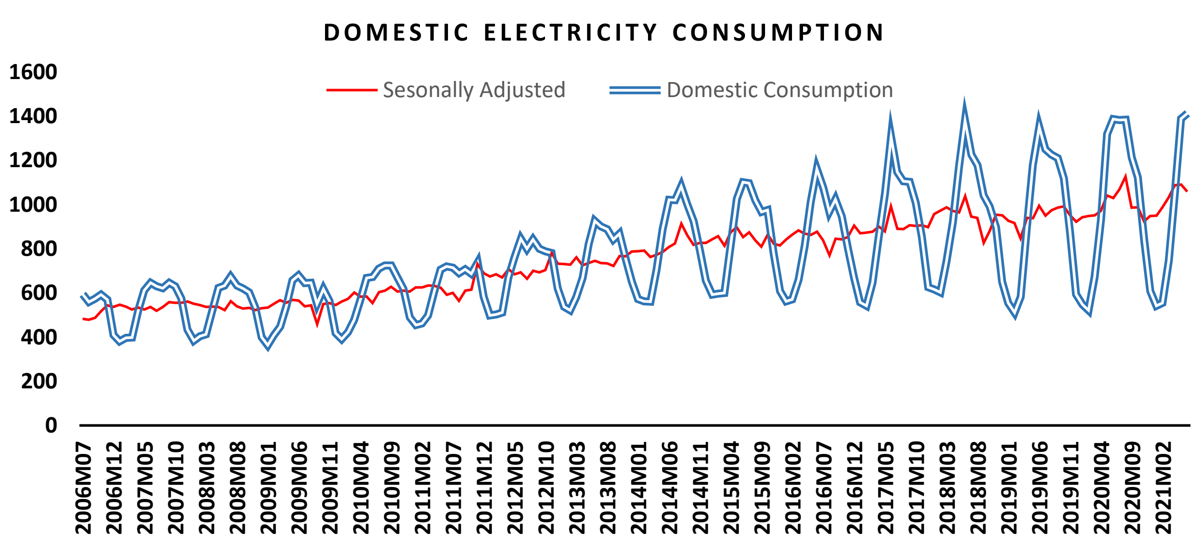


Figure 05: Direct Seosonally Adjusted Series of Dometic Consumers of Electricity Consumption from Jul, 2006 to Jun, 2021

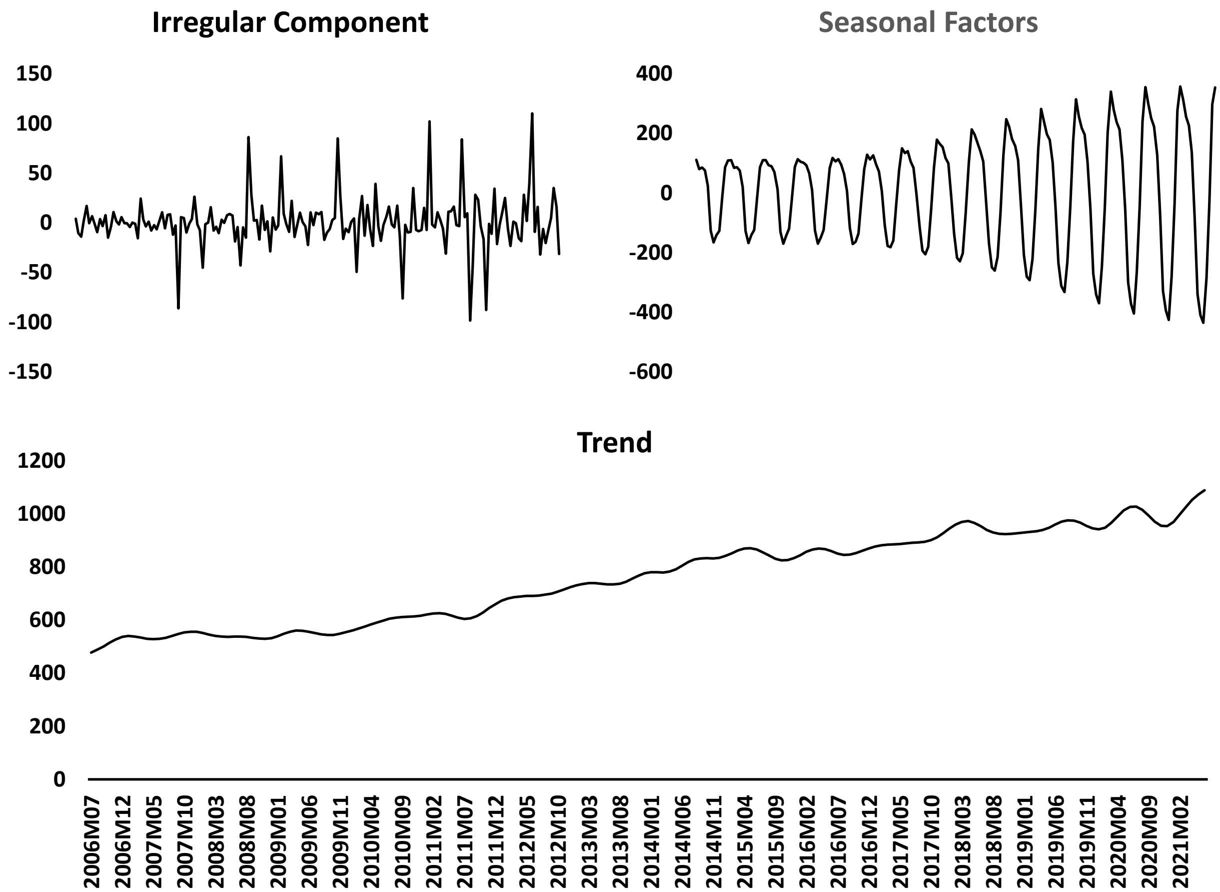


Figure 06: Seasonal, Irregular and Trend Components of the Time Series of Domestic Electricity Consumption from Jul, 2006 to Jun, 2021

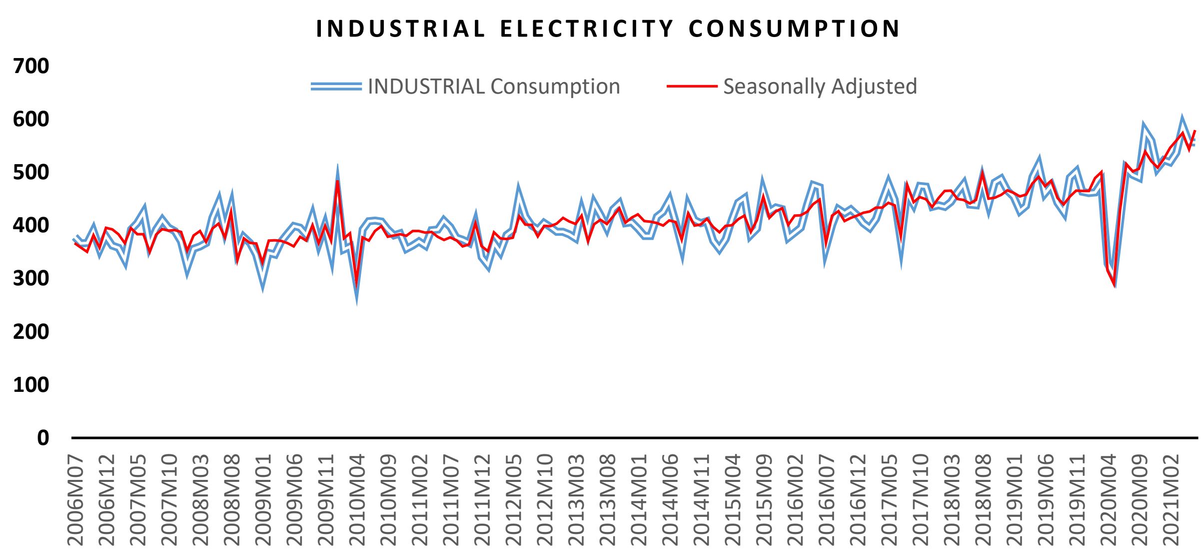


Figure 07: Direct Seosonally Adjusted Series of Industrial Consumers of Electricity Consumption from Jul, 2006 to Jun, 2021

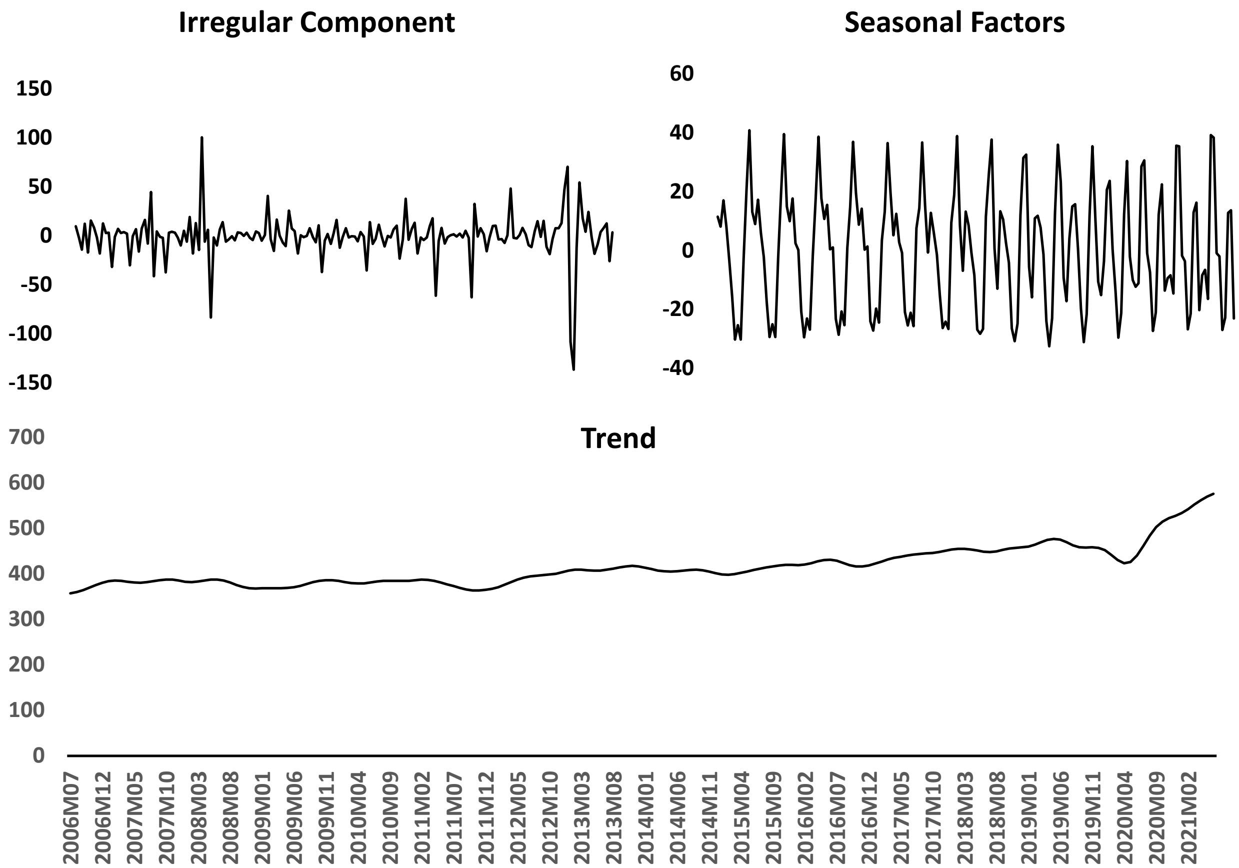


Figure 08: Seasonal, Irregular and Trend Components of the Time Series of Industrial Electricity Consumption from Jul, 2006 to Jun, 2021

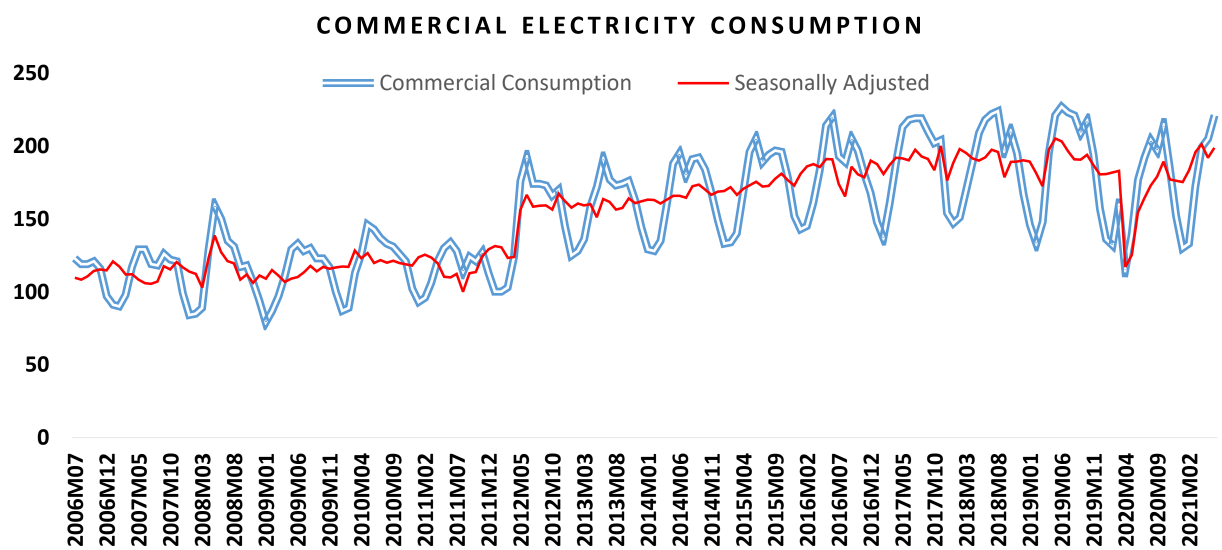


Figure 09: Direct Seosonally Adjusted Series of Commercial Consumers of Electricity Consumption from Jul, 2006 to Jun, 2021

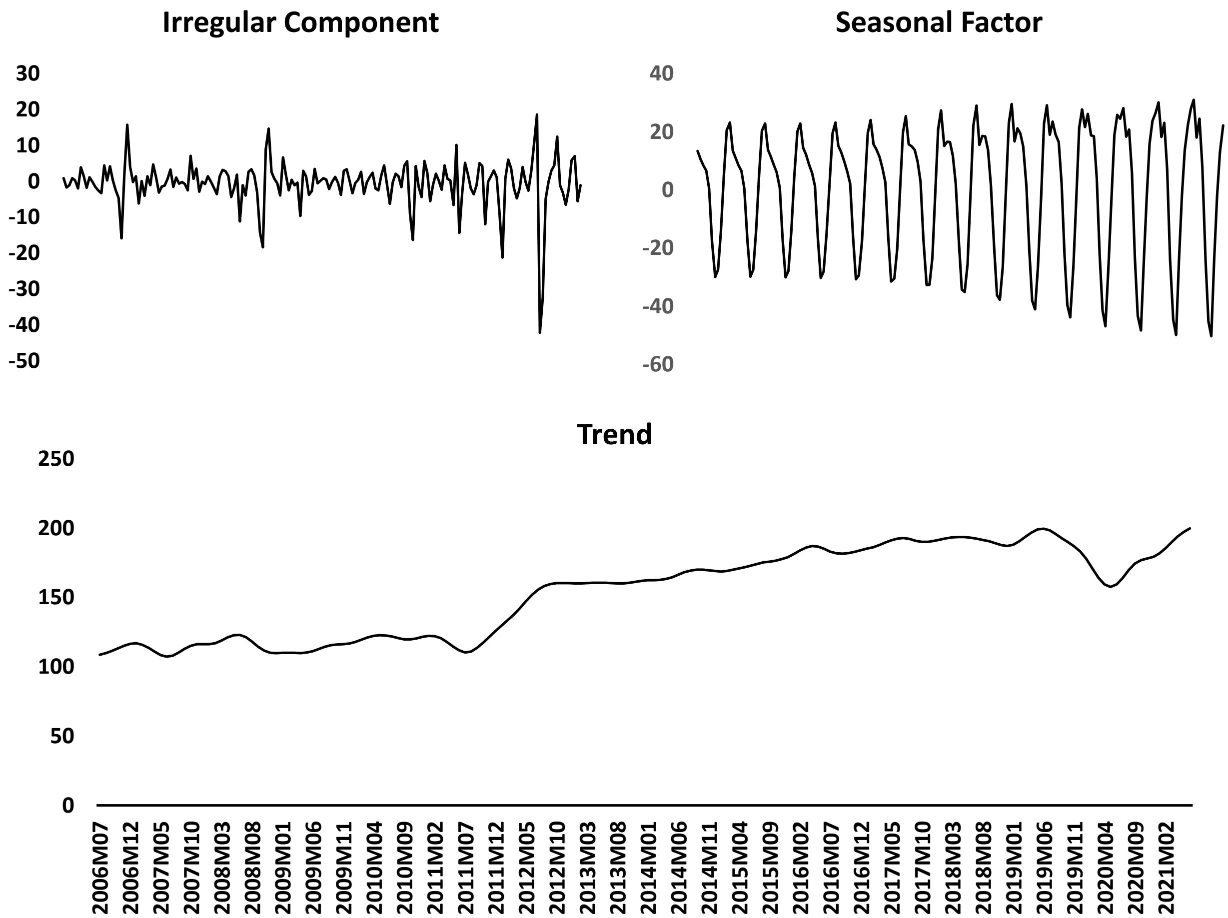


Figure 10: Seasonal, Irregular and Trend Components of the Time Series of Commercial Electricity Consumption from Jul, 2006 to Jun, 2021

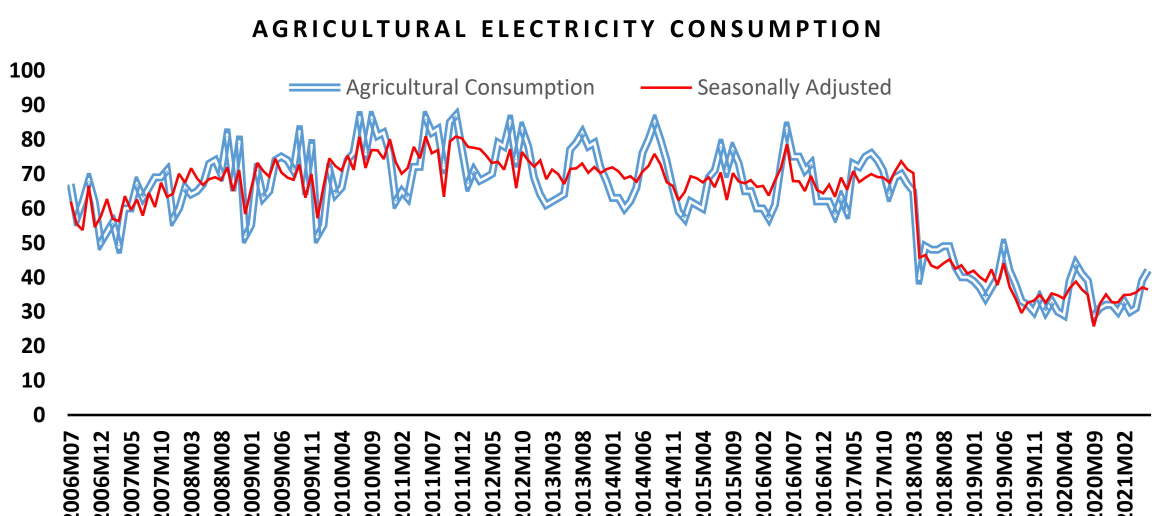


Figure 11: Direct Seosonally Adjusted Series of Agricultural Consumers of Electricity Consumption from Jul, 2006 to Jun, 2021

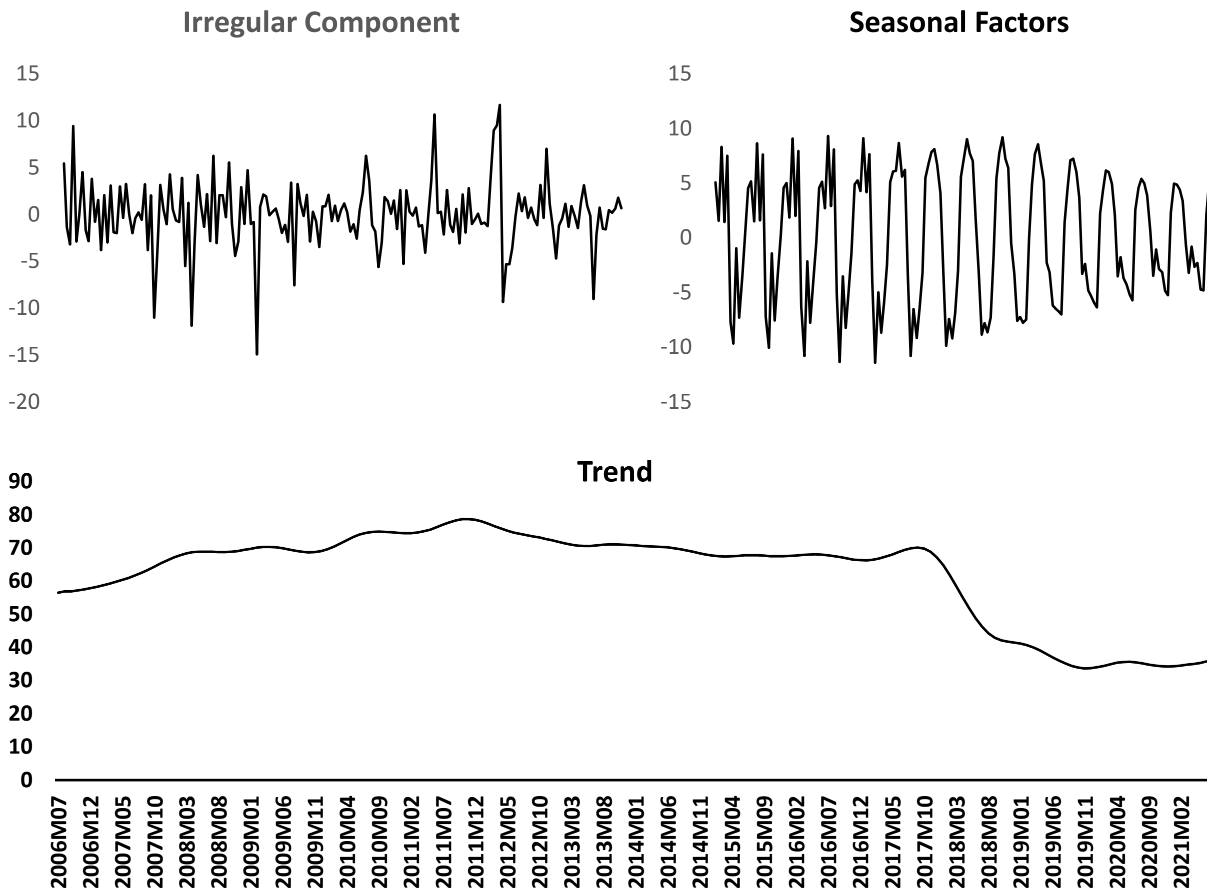


Figure 12: Seasonal, Irregular and Trend Components of the Time Series of Agricultural Electricity Consumption from Jul, 2006 to Jun, 2021

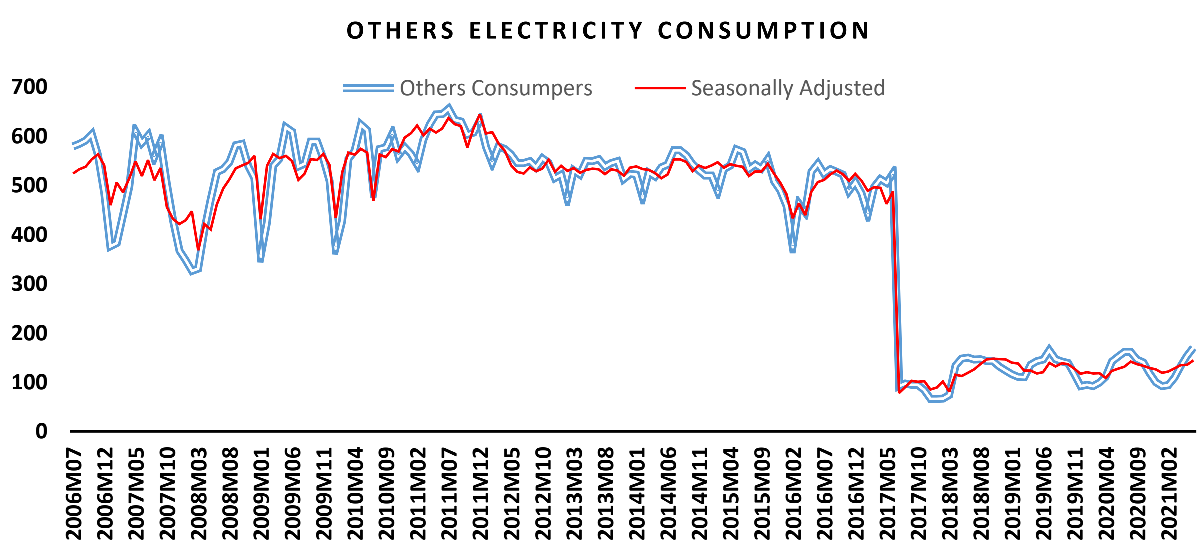


Figure 13: Direct Seosonally Adjusted Series of Other Consumers of Electricity Consumption from Jul, 2006 to Jun, 2021

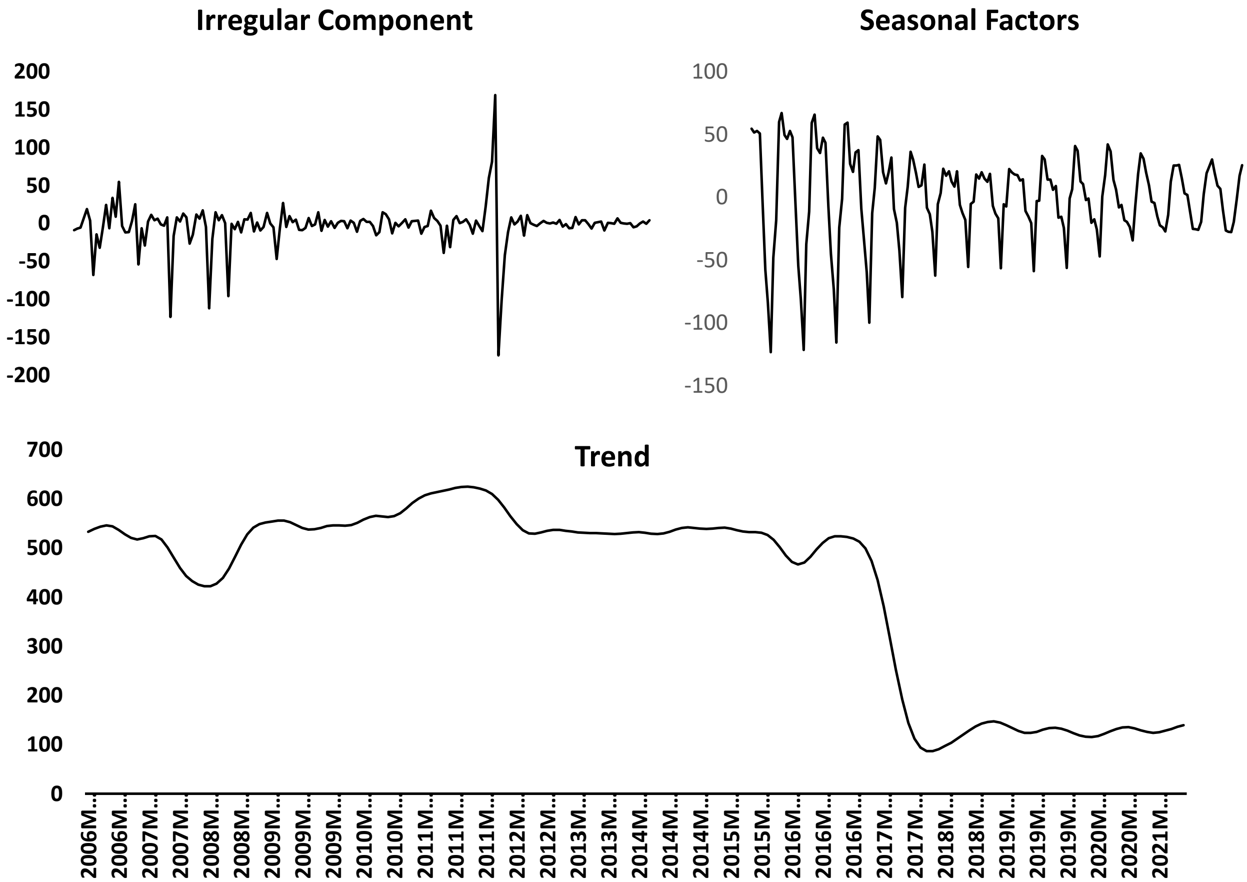


Figure 14: Seasonal, Irregular and Trend Components of the Time Series of Agricultural Electricity Consumption from Jul, 2006 to Jun, 2021

6.1. Empirical Conclusion for Director and Indirect Seasonal Adjustment

Now we made a comparison between the direct and indirect seasonal adjustment of the series of the total electricity consumption. All the adjusted series of all subgroups are depicted in the figures 05, 07, 09, 11 and 13 are combined to make an aggregated seasonally adjusted series of total electricity consumption. This method to make an aggregated seasonally adjusted series is called an indirect seasonal adjustment. The comparison of both seasonally adjusted series is shown in the graph presented below:

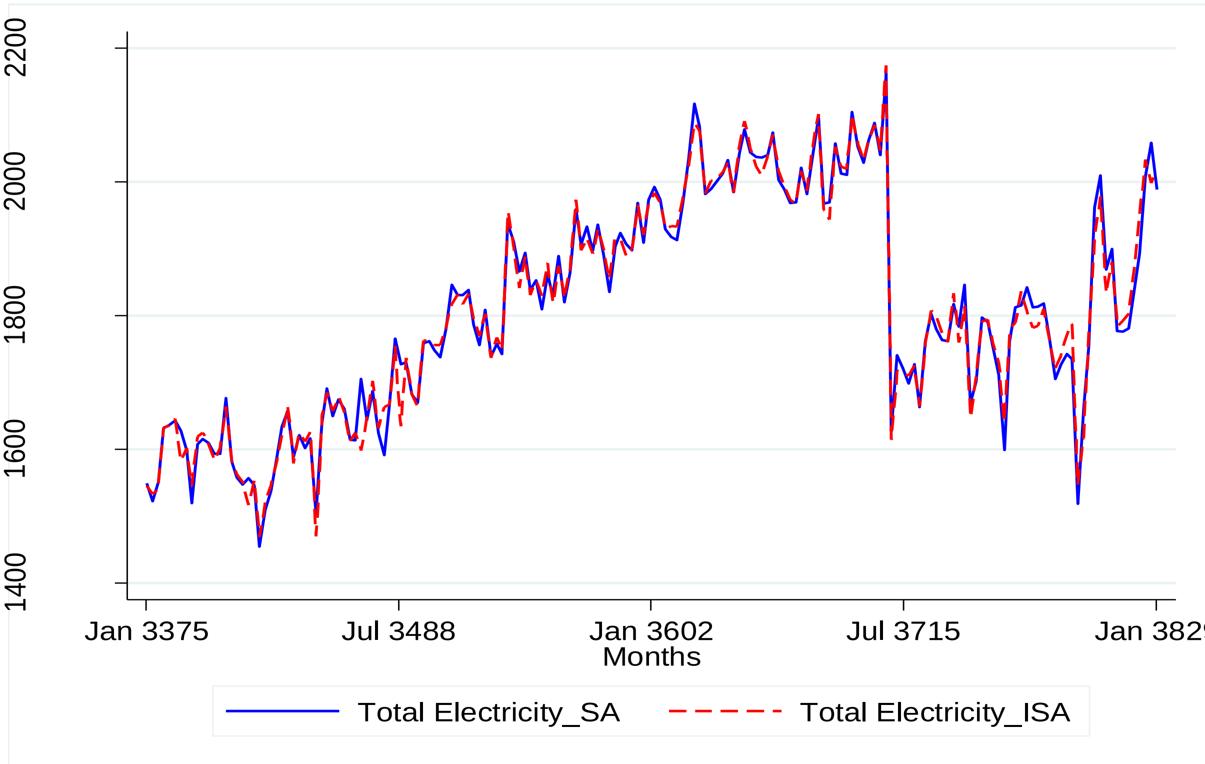


Figure 15: Comparison between Direct and Indirectly Seasonally Adjusted Series

Statistics	Original Series	Direct Series	Indirect Series
Minimum	1,156	1,455	1,468
Maximum	2,569	2,162	2,175
Range	1,413	707	706
Mean	1,809	1,809	1,809
Std. Deviation	304	165	164
Skewness	-0.05	0.02	0.02
Kurtosis	-0.55	-1.01	-1.01

Table 01: Comparison Statistics between Direct and Indirect Seasonally Adjusted Series

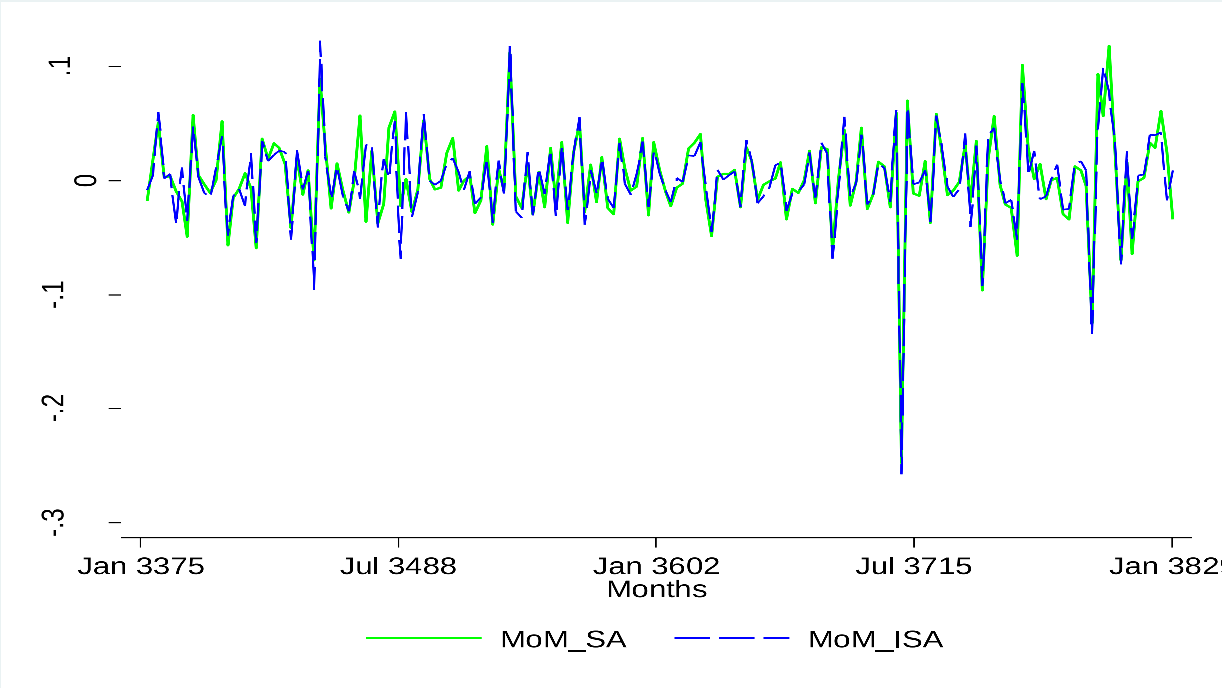


Figure 16: Month to Month (MoM) Comparison between Direct and Indirectly Seasonally Adjusted Series

According to the figure 15, the line (dash) of indirectly seasonally adjusted are inside the line of directly seasonally adjusted most of time periods; that shows the variations in the indirectly seasonally adjusted series are less than the directly seasonally adjusted series. To make it statistically evident, some traditional measures of dispersion are calculated in the table 01, however the difference in the variation in the both adjusted time series are quite minimum but the calculated range-value and standard-deviation clearly indicated that the dispersion of directly seasonally adjusted series is higher than the indirectly seasonally adjusted time series.

The moth-to-month series (figure 16) is showing the similar pattern of less variability in the indirectly adjusted series. As far as empirical conclusion is concerned, the less variation series are preferable as compared to high variation series. In other words, the indirectly seasonally adjusted series are more reliable for the data analysis and model building. But it is important to note for our case, the variability is quite less between two time series thus the either series may be chosen for the analysis and further reporting purpose. If high variations are reflected in the both series through measures of dispersion or MoM graph, so in that case the indirectly adjusted (less variation) series would be more preferable.

7. Electricity Consumption Forecasting

In order to forecast, first the stationarity of the time series are examine for the order of integration as described in section 5.1. ADF and PP tests of unit root are applied to check the stationarity of time series with trend and intercept. Results of the both tests are available in Table 02:

Variables of Electricity Consumption	ADF				PP				Decision
	Level		1st Difference		Level		1st Difference		Integration Level
	statistic	p-value	statistic	p-value	statistic	p-value	statistic	p-value	
Total Electricity	-1.2762	*0.8902*	-5.5849	*0.0000*	-3.4895	*0.0436*	-8.8838	*0.0000*	*I(1)*
Domestic	-2.0354	*0.5773*	-7.2037	*0.0000*	-4.7516	*0.0008*	-5.3349	*0.0001*	*I(1)**
Industrial	-7.6278	*0.0000*			-7.6279	*0.0000*			*I(0)*
Commercial	-1.3526	*0.8710*	-11.451	*0.0000*	-3.1079	*0.1076*	-9.2366	*0.0000*	*I(1)*
Agricultural	-1.8137	*0.6938*	-3.7283	*0.0231*	-3.7700	*0.0204*	-22.834	*0.0000*	*I(1)**
Other Consumers	-26516	*0.2582*	-12.744	*0.0000*	-2.3544	*0.4022*	-14.237	*0.0000*	*I(1)*

*on the basis of ADF

Table: 02 Orders of Time Series Integration

According to the unit root testing results most of monthly time series are stationary at first difference except industrial consumption.

<u>Total Electricity Consumption ARIMA Model</u>

Var	Cof.	t-Statistic	P-value
C	0.0011	0.8841	0.3778
AR(1)	1.7288	241.7152	0.0000
AR(2)	-0.9974	-197.8534	0.0000
MA(1)	-1.8708	-25.5432	0.0000
MA(2)	0.7260	4.7392	0.0000
MA(3)	0.6591	4.6289	0.0000
MA(4)	-0.4501	-6.7353	0.0000
SIGMASQ	0.0037	12.4905	0.0000
R-square	0.62	Adj. R-square	0.60
F-stat (Prob.)	39.75 (0.0000)	AIC	-2.634
DW	1.85	HQ	-2.576

Table 03: Results of ARIMA Models for Total Electricity Consumption

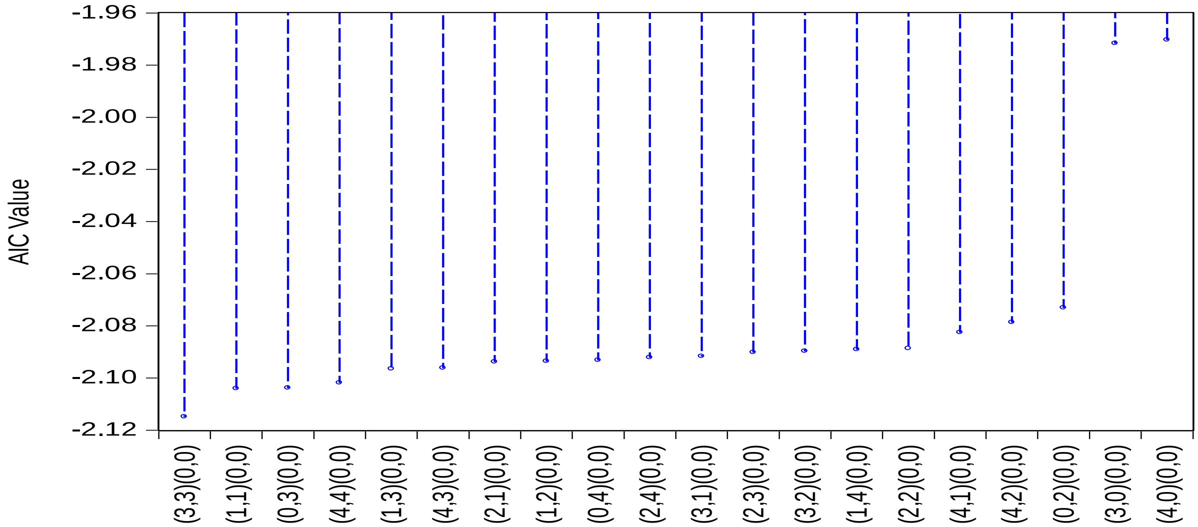


Figure 16: ARIMA (Total Electricity Consumption) Model Selection on AIC

Industrial Electricity Consumption ARIMA Model

Var	Cof.	t-Statistic	P-value
C	0.001664	3.187338	0.0017
AR(1)	-0.601987	-6.564769	0.0000
AR(2)	-0.441112	-4.834779	0.0000
AR(3)	0.502751	7.332065	0.0000
MA(1)	0.092166	0.005436	0.9957
MA(2)	-0.092167	-0.005974	0.9952
MA(3)	-0.999996	-0.004207	0.9966
SIGMASQ	0.006095	0.022450	0.9821
R-square	0.32	Adj. R-square	0.30
F-stat (Prob.)	11.67 (0.0000)	AIC	-2.126
DW	1.95	HQ	-2.069

Table 04: Results of ARIMA Models for Industrial Electricity Consumption

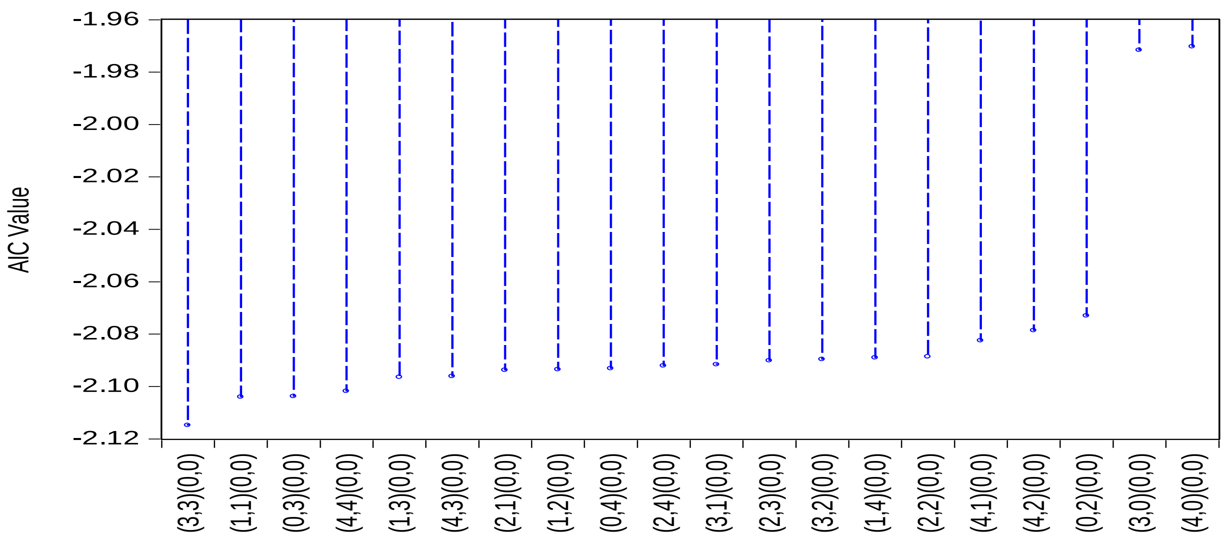


Figure 17: ARIMA (Industrial Electricity Consumption) Model Selection on AIC

Domestic Electricity Consumption ARIMA Model

Var	Cof.	t-Statistic	P-value
C	0.003775	4.806029	0.0000
AR(1)	1.729646	355.3323	0.0000
AR(2)	-0.997789	-283.8985	0.0000
MA(1)	-2.022676	-25.83969	0.0000
MA(2)	0.852807	4.545682	0.0000
MA(3)	0.734229	3.855964	0.0002
MA(4)	-0.529633	-6.484274	0.0000
SIGMASQ	0.005702	8.569767	0.0000
R-square	0.756	Adj. R-square	0.746
F-stat (Prob.)	75.79 (0.0000)	AIC	-2.183
DW	1.85	HQ	-2.125

Table 05: Results of ARIMA Models for Domestic Electricity Consumption

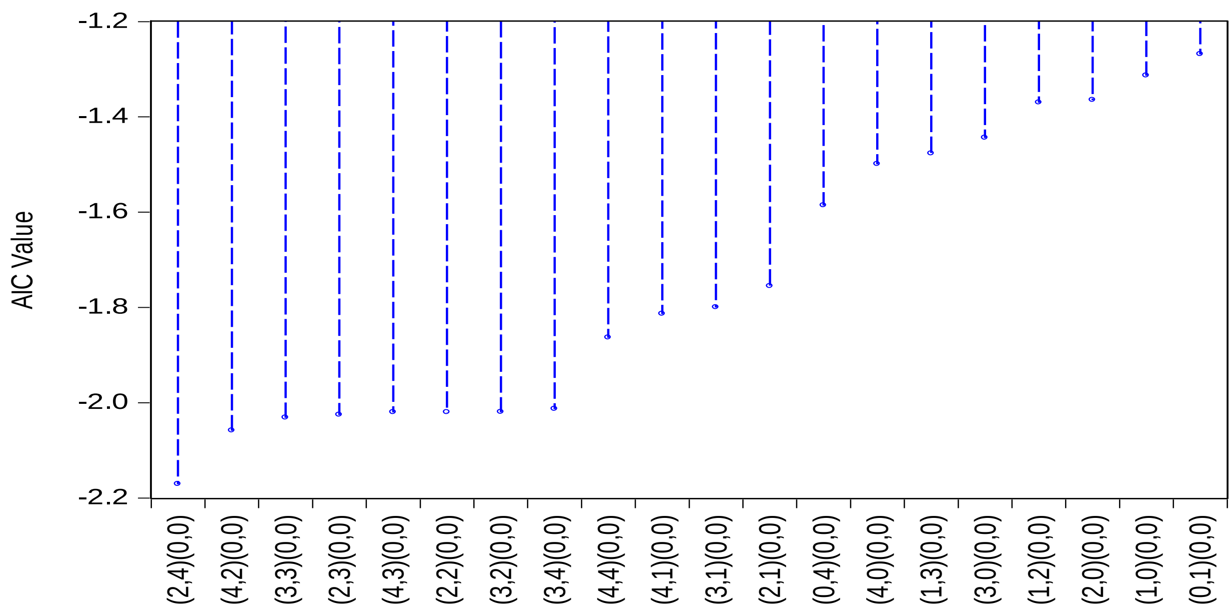


Figure 18: ARIMA (Domestic Electricity Consumption) Model Selection on AIC

Commercial Electricity Consumption ARIMA Model

Var	Cof.	t-Statistic	P-value
C	0.452406	1.906877	0.0582
AR(1)	2.106621	46.99559	0.0000
AR(2)	-1.644738	-22.06366	0.0000
AR(3)	0.372032	8.967707	0.0000
MA(1)	-2.158253	-20.51887	0.0000
MA(2)	1.325810	5.415401	0.0000
MA(3)	0.253667	1.084894	0.2795
MA(4)	-0.382254	-4.454787	0.0000
SIGMASQ	134.7124	12.72554	0.0000
R-square	0.52	Adj. R-square	0.50
F-stat (Prob.)	23.30 (0.0000)	AIC	7.874
DW	1.96	HQ	7.939

Table 06: Results of ARIMA Models for Commercial Electricity Consumption

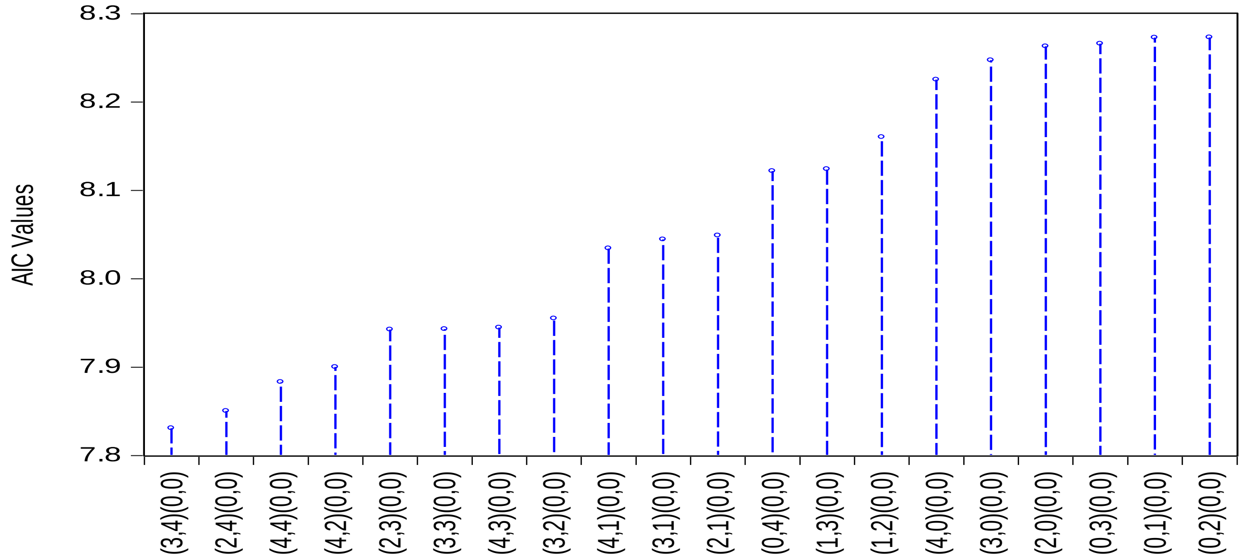


Figure 19: ARIMA (Commercial Electricity Consumption) Model Selection on AIC

Agricultural Electricity Consumption ARIMA Model

Var	Cof.	t-Statistic	P-value
C	-0.130670	-0.720356	0.4723
AR(1)	1.721546	124.8713	0.0000
AR(2)	-0.990717	-81.53971	0.0000
MA(1)	-2.268899	-39.16955	0.0000
MA(2)	1.934638	18.92216	0.0000
MA(3)	-0.568808	-9.371983	0.0000
SIGMASQ	34.89244	11.50054	0.0000
R-square	0.32	Adj. R-square	0.29
F-stat (Prob.)	13.34 (0.0000)	AIC	6.484
DW	1.96	HQ	6.534

Table 07: Results of ARIMA Models for Agricultural Electricity Consumption

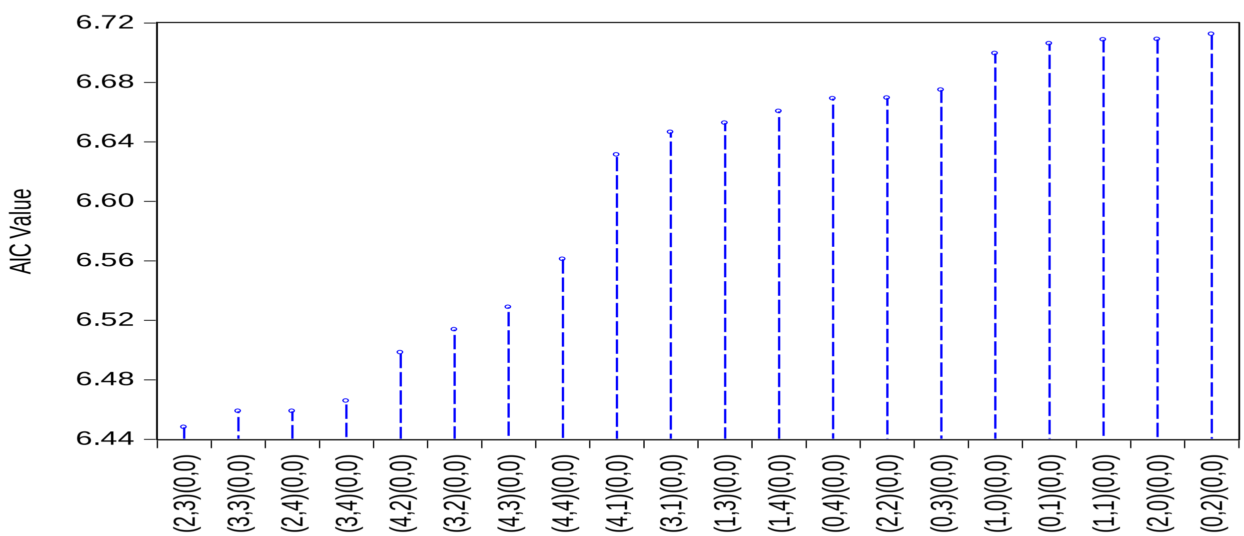


Figure 20: ARIMA (Agricultural Electricity Consumption) Model Selection on AIC

Other Consumers' Electricity Consumption ARIMA Model

Var	Cof.	t-Statistic	P-value
C	-2.371488	-0.795584	0.4274
MA(1)	-0.018010	-0.174099	0.8620
MA(2)	0.003202	0.030423	0.9758
MA(3)	-0.127911	-1.364642	0.1741
MA(4)	-0.283086	-5.951953	0.0000
SIGMASQ	2363.876	23.84139	0.0000
R-square	0.09	Adj. R-square	0.06
F-stat (Prob.)	3.291 (0.0073)	AIC	10.675
DW	1.97	HQ	10.718

Table 08: Results of ARIMA Models for Other Consumers' Electricity Consumption

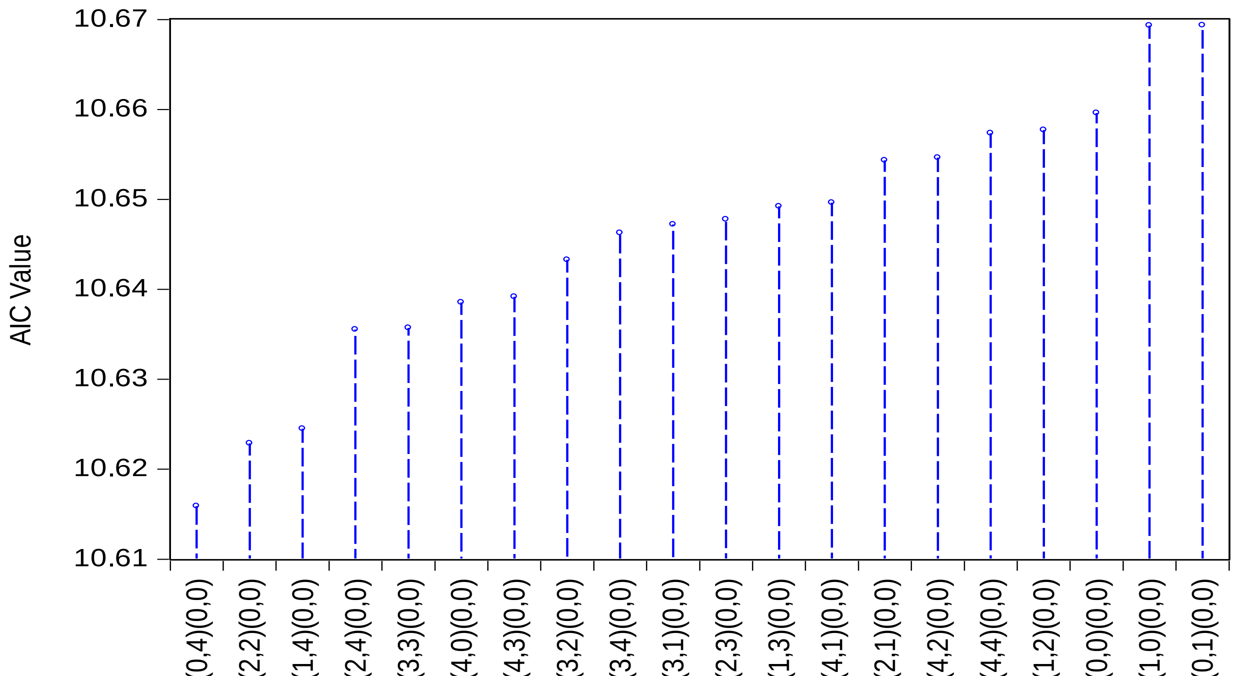


Figure 21: ARIMA (Other Consumers' Electricity Consumption) Model Selection on AIC

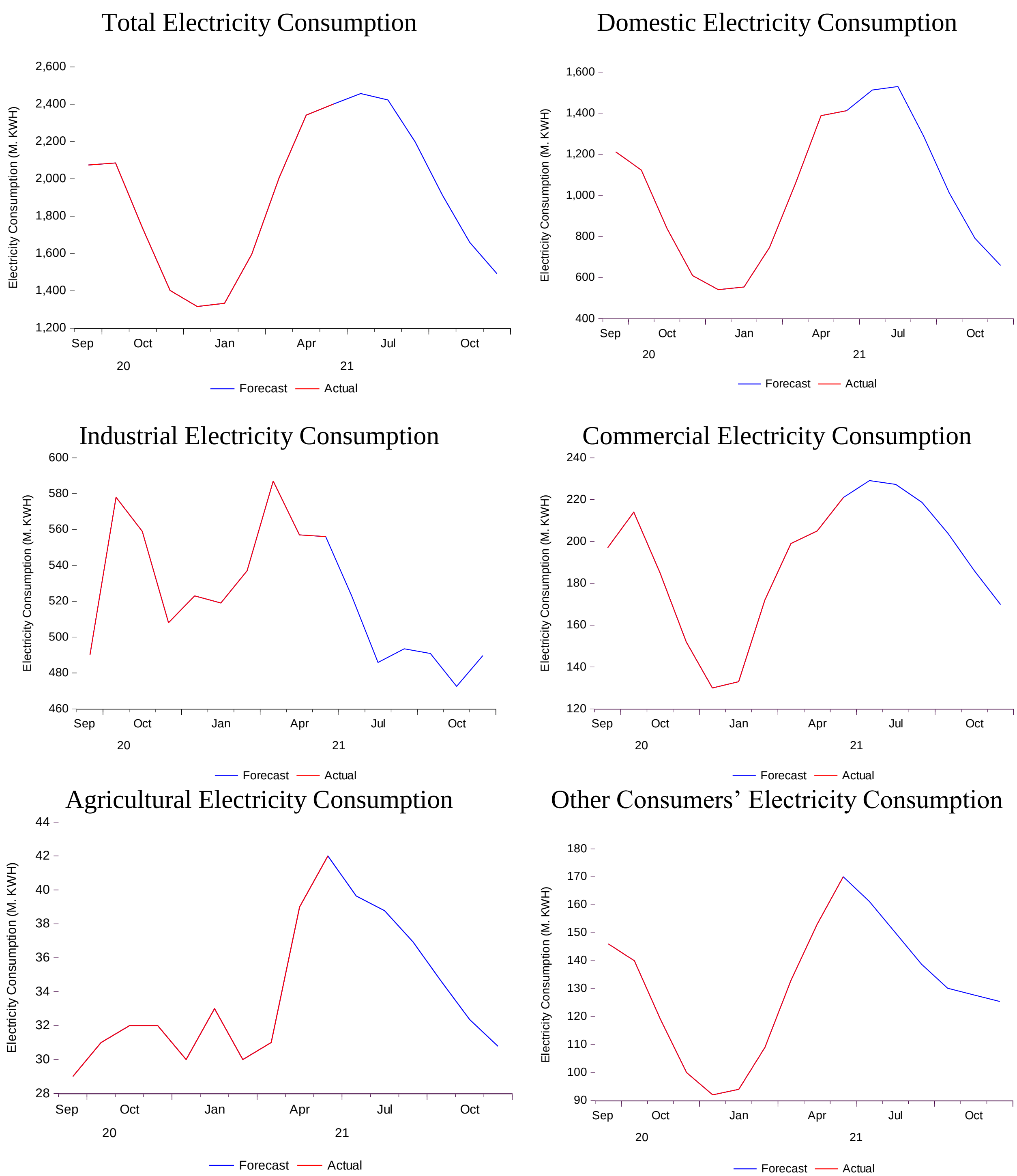


Figure 22: Six-Months Forecasting of Electricity Consumption and its subgroups

8. Statistical Tables

Table 09: Statistical Table for Original, Seasonally Adjusted and Indirectly Seasonally Adjusted Electricity Consumption Time Series from July, 2006 to Jun, 2021 (in Million Kilowatts)

Months	Total Electricity Consumption	Total Electricity Consumption (Seasonally Adjusted)	Total Electricity Consumption (Indirectly Seasonally Adjusted)
Jul-06	1,741	1,549	1,545
Aug-06	1,685	1,522	1,532
Sep-06	1,712	1,551	1,540
Oct-06	1,776	1,631	1,633
Nov-06	1,664	1,636	1,636
Dec-06	1,421	1,643	1,645
Jan-07	1,263	1,627	1,583
Feb-07	1,284	1,598	1,602
Mar-07	1,319	1,519	1,545
Apr-07	1,585	1,607	1,619
May-07	1,813	1,615	1,625
Jun-07	1,852	1,610	1,607
Jul-07	1,776	1,593	1,584
Aug-07	1,755	1,593	1,602
Sep-07	1,839	1,676	1,664
Oct-07	1,721	1,581	1,584
Nov-07	1,584	1,558	1,562
Dec-07	1,327	1,547	1,551
Jan-08	1,198	1,557	1,517
Feb-08	1,237	1,546	1,553
Mar-08	1,257	1,455	1,468
Apr-08	1,492	1,508	1,520
May-08	1,733	1,537	1,547
Jun-08	1,826	1,588	1,582
Jul-08	1,807	1,633	1,623
Aug-08	1,816	1,657	1,664
Sep-08	1,752	1,589	1,579
Oct-08	1,750	1,621	1,624
Nov-08	1,627	1,602	1,612
Dec-08	1,406	1,616	1,625
Jan-09	1,156	1,503	1,470
Feb-09	1,338	1,638	1,650
Mar-09	1,493	1,690	1,685
Apr-09	1,638	1,649	1,657
May-09	1,861	1,675	1,678
Jun-09	1,895	1,661	1,655
Jul-09	1,779	1,614	1,611
Aug-09	1,772	1,613	1,624
Sep-09	1,861	1,705	1,598
Oct-09	1,762	1,644	1,648
Nov-09	1,713	1,687	1,702
Dec-09	1,428	1,624	1,632
Jan-10	1,262	1,591	1,663
Feb-10	1,370	1,665	1,667
Mar-10	1,568	1,766	1,755
Apr-10	1,715	1,727	1,634

Table 09: Statistical Table for Original, Seasonally Adjusted and Indirectly Seasonally Adjusted Electricity Consumption Time Series from July, 2006 to Jun, 2021 (in Million Kilowatts)

Months	Total Electricity Consumption	Total Electricity Consumption (Seasonally Adjusted)	Total Electricity Consumption (Indirectly Seasonally Adjusted)
May-10	1,902	1,730	1,737
Jun-10	1,916	1,683	1,682
Jul-10	1,831	1,670	1,665
Aug-10	1,914	1,759	1,763
Sep-10	1,911	1,761	1,762
Oct-10	1,863	1,748	1,756
Nov-10	1,766	1,738	1,756
Dec-10	1,601	1,780	1,782
Jan-11	1,535	1,846	1,818
Feb-11	1,535	1,830	1,832
Mar-11	1,622	1,830	1,817
Apr-11	1,818	1,838	1,833
May-11	1,943	1,786	1,795
Jun-11	1,994	1,756	1,769
Jul-11	1,977	1,809	1,803
Aug-11	1,897	1,739	1,737
Sep-11	1,906	1,758	1,768
Oct-11	1,862	1,743	1,748
Nov-11	1,962	1,938	1,955
Dec-11	1,743	1,911	1,903
Jan-12	1,569	1,866	1,841
Feb-12	1,586	1,894	1,888
Mar-12	1,611	1,838	1,831
Apr-12	1,818	1,852	1,851
May-12	1,961	1,810	1,830
Jun-12	2,114	1,862	1,878
Jul-12	2,013	1,828	1,820
Aug-12	2,050	1,889	1,874
Sep-12	1,975	1,820	1,826
Oct-12	1,997	1,865	1,869
Nov-12	1,972	1,959	1,974
Dec-12	1,738	1,906	1,897
Jan-13	1,636	1,933	1,916
Feb-13	1,568	1,897	1,893
Mar-13	1,685	1,936	1,930
Apr-13	1,840	1,891	1,899
May-13	1,996	1,835	1,855
Jun-13	2,183	1,903	1,917
Jul-13	2,129	1,924	1,912
Aug-13	2,077	1,907	1,889
Sep-13	2,068	1,898	1,900
Oct-13	2,112	1,969	1,965
Nov-13	1,904	1,909	1,921
Dec-13	1,792	1,974	1,971
Jan-14	1,680	1,992	1,984
Feb-14	1,610	1,973	1,967
Mar-14	1,661	1,929	1,930
Apr-14	1,861	1,918	1,935

Table 09: Statistical Table for Original, Seasonally Adjusted and Indirectly Seasonally Adjusted Electricity Consumption Time Series from July, 2006 to Jun, 2021 (in Million Kilowatts)

Months	Total Electricity Consumption	Total Electricity Consumption (Seasonally Adjusted)	Total Electricity Consumption (Indirectly Seasonally Adjusted)
May-14	2,104	1,913	1,933
Jun-14	2,282	1,967	1,976
Jul-14	2,258	2,034	2,019
Aug-14	2,289	2,117	2,088
Sep-14	2,270	2,084	2,077
Oct-14	2,135	1,982	1,983
Nov-14	1,965	1,989	2,002
Dec-14	1,792	2,001	2,004
Jan-15	1,674	2,013	2,014
Feb-15	1,636	2,033	2,031
Mar-15	1,707	1,985	1,984
Apr-15	1,989	2,043	2,055
May-15	2,306	2,079	2,092
Jun-15	2,396	2,044	2,050
Jul-15	2,278	2,037	2,023
Aug-15	2,220	2,036	2,010
Sep-15	2,239	2,040	2,038
Oct-15	2,223	2,074	2,071
Nov-15	1,964	2,003	2,017
Dec-15	1,747	1,989	1,994
Jan-16	1,600	1,968	1,973
Feb-16	1,539	1,969	1,968
Mar-16	1,738	2,021	2,017
Apr-16	1,940	1,982	1,987
May-16	2,303	2,040	2,053
Jun-16	2,479	2,097	2,102
Jul-16	2,227	1,968	1,958
Aug-16	2,166	1,970	1,944
Sep-16	2,258	2,057	2,053
Oct-16	2,161	2,012	2,023
Nov-16	1,965	2,011	2,019
Dec-16	1,826	2,105	2,101
Jan-17	1,656	2,053	2,058
Feb-17	1,573	2,029	2,032
Mar-17	1,779	2,063	2,063
Apr-17	2,057	2,089	2,086
May-17	2,320	2,040	2,047
Jun-17	2,569	2,162	2,175
Jul-17	1,903	1,626	1,614
Aug-17	1,959	1,740	1,718
Sep-17	1,923	1,721	1,713
Oct-17	1,851	1,698	1,710
Nov-17	1,680	1,728	1,726
Dec-17	1,351	1,663	1,664
Jan-18	1,337	1,761	1,760
Feb-18	1,322	1,803	1,807
Mar-18	1,494	1,779	1,799
Apr-18	1,746	1,764	1,773

Table 09: Statistical Table for Original, Seasonally Adjusted and Indirectly Seasonally Adjusted Electricity Consumption Time Series from July, 2006 to Jun, 2021 (in Million Kilowatts)

Months	Total Electricity Consumption	Total Electricity Consumption (Seasonally Adjusted)	Total Electricity Consumption (Indirectly Seasonally Adjusted)
May-18	2,051	1,761	1,761
Jun-18	2,234	1,818	1,834
Jul-18	2,079	1,783	1,760
Aug-18	2,084	1,846	1,814
Sep-18	1,870	1,668	1,647
Oct-18	1,867	1,701	1,712
Nov-18	1,750	1,797	1,792
Dec-18	1,446	1,790	1,794
Jan-19	1,310	1,753	1,759
Feb-19	1,219	1,712	1,730
Mar-19	1,311	1,599	1,640
Apr-19	1,751	1,762	1,781
May-19	2,097	1,812	1,789
Jun-19	2,233	1,815	1,837
Jul-19	2,154	1,842	1,807
Aug-19	2,073	1,813	1,782
Sep-19	2,019	1,814	1,785
Oct-19	1,997	1,819	1,810
Nov-19	1,719	1,765	1,764
Dec-19	1,341	1,705	1,720
Jan-20	1,269	1,727	1,741
Feb-20	1,240	1,743	1,771
Mar-20	1,440	1,735	1,787
Apr-20	1,514	1,518	1,546
May-20	1,945	1,660	1,616
Jun-20	2,167	1,754	1,777
Jul-20	2,284	1,962	1,916
Aug-20	2,284	2,010	1,978
Sep-20	2,074	1,869	1,833
Oct-20	2,085	1,899	1,880
Nov-20	1,734	1,777	1,785
Dec-20	1,402	1,776	1,793
Jan-21	1,316	1,781	1,802
Feb-21	1,333	1,840	1,875
Mar-21	1,596	1,893	1,951
Apr-21	2,005	2,008	2,034
May-21	2,342	2,058	1,998
Jun-21	2,401	1,989	2,016

Table 10: Statistical Table for Original and Seasonally Adjusted Subgroups wise Electricity Consumption | Time Series from July, 2006 to Jun, 2021 (in Million Kilowatts)

Months	Domestic Consumption	Domestic Consumption (Seasonally Adjusted)	Commercial Consumption	Commercial Consumption (Seasonally Adjusted)	Industrial Consumption	Industrial Consumption (Seasonally Adjusted)	Agricultural Consumption	Agricultural Consumption (Seasonally Adjusted)	Other Consumers 'Consumption	Other Consumers 'Consumption (Seasonally Adjusted)
Jul-06	594	482	123	110	378	367	67	62	579	524
Aug-06	559	479	119	108	366	358	57	55	584	532
Sep-06	573	488	119	111	367	350	62	54	591	538
Oct-06	593	517	121	114	390	382	68	67	604	553
Nov-06	569	544	116	115	355	358	62	55	562	563
Dec-06	410	536	97	115	380	396	50	58	484	541
Jan-07	381	547	91	121	362	392	53	63	376	460
Feb-07	397	538	90	117	358	383	56	57	383	506
Mar-07	398	525	98	112	336	366	49	56	438	486
Apr-07	519	534	117	112	392	395	60	64	497	515
May-07	611	524	129	108	404	383	60	60	609	549
Jun-07	646	537	129	106	424	383	67	62	586	519
Jul-07	630	519	119	105	363	350	63	58	601	551
Aug-07	622	537	118	107	392	383	66	64	557	510
Sep-07	646	559	126	118	410	393	69	60	588	535
Oct-07	630	555	122	115	396	390	69	67	504	456
Nov-07	575	555	121	120	389	391	71	63	428	432
Dec-07	434	562	99	117	370	387	57	64	367	421
Jan-08	383	551	84	114	323	352	60	70	348	429
Feb-08	404	545	85	112	356	381	66	67	326	447
Mar-08	413	536	89	103	360	389	64	72	331	368
Apr-08	522	538	128	123	367	369	65	69	410	421
May-08	623	536	159	139	414	394	67	67	470	411
Jun-08	633	522	150	127	443	403	73	68	527	461
Jul-08	673	562	135	121	392	377	74	69	533	494
Aug-08	633	540	131	119	435	425	70	68	547	512
Sep-08	620	530	117	108	352	334	81	72	582	534
Oct-08	603	532	118	112	378	375	67	65	584	540

Table 10: Statistical Table for Original and Seasonally Adjusted Subgroups wise Electricity Consumption | Time Series from July, 2006 to Jun, 2021 (in Million Kilowatts)

Months	Domestic Consumption	Domestic Consumption (Seasonally Adjusted)	Commercial Consumption	Commercial Consumption (Seasonally Adjusted)	Industrial Consumption	Industrial Consumption (Seasonally Adjusted)	Agricultural Consumption	Agricultural Consumption (Seasonally Adjusted)	Other Consumers 'Consumption	Other Consumers 'Consumption (Seasonally Adjusted)
Nov-08	535	522	107	106	367	367	79	71	539	546
Dec-08	400	530	94	111	345	366	52	58	515	560
Jan-09	363	533	79	109	301	331	55	66	358	431
Feb-09	408	551	87	115	348	371	71	73	424	540
Mar-09	448	567	97	111	345	372	63	71	540	564
Apr-09	539	555	111	107	369	371	65	69	554	555
May-09	656	568	129	109	384	367	74	74	618	560
Jun-09	679	565	133	110	399	360	75	70	609	549
Jul-09	644	539	128	113	396	378	74	69	538	511
Aug-09	646	544	130	118	382	371	71	68	544	524
Sep-09	551	458	123	114	416	401	82	73	589	553
Oct-09	617	550	123	117	367	367	66	63	589	551
Nov-09	563	553	117	116	400	399	78	70	555	564
Dec-09	419	545	100	117	348	371	52	57	509	542
Jan-10	391	561	87	117	456	485	55	66	374	434
Feb-10	423	573	89	117	355	376	71	75	427	527
Mar-10	478	602	113	128	360	385	64	72	554	567
Apr-10	566	582	126	123	296	295	66	71	570	562
May-10	668	584	146	126	392	377	74	75	623	574
Jun-10	672	554	143	120	408	371	76	71	612	566
Jul-10	710	604	137	122	409	389	86	81	489	469
Aug-10	724	610	133	120	407	398	76	72	574	563
Sep-10	724	628	131	121	393	379	86	77	577	557
Oct-10	670	605	126	120	381	381	81	77	605	573
Nov-10	618	610	121	119	385	384	82	74	560	569
Dec-10	490	607	102	118	356	380	76	80	577	597
Jan-11	454	625	93	124	362	389	62	73	564	606

Table 10: Statistical Table for Original and Seasonally Adjusted Subgroups wise Electricity Consumption | Time Series from July, 2006 to Jun, 2021 (in Million Kilowatts)

Months	Domestic Consumption	Domestic Consumption (Seasonally Adjusted)	Commercial Consumption	Commercial Consumption (Seasonally Adjusted)	Industrial Consumption	Industrial Consumption (Seasonally Adjusted)	Agricultural Consumption	Agricultural Consumption (Seasonally Adjusted)	Other Consumers 'Consumption	Other Consumers 'Consumption (Seasonally Adjusted)
Feb-11	462	625	96	125	370	390	65	70	542	621
Mar-11	498	634	106	123	362	387	63	72	593	601
Apr-11	610	632	121	119	391	388	72	78	624	615
May-11	705	624	130	110	392	379	72	74	644	608
Jun-11	720	591	134	110	409	373	86	81	645	615
Jul-11	714	601	128	112	397	377	82	76	656	637
Aug-11	690	564	114	100	377	372	83	77	633	625
Sep-11	707	611	124	113	373	361	72	63	630	620
Oct-11	686	614	121	114	367	364	85	79	603	577
Nov-11	738	731	127	124	403	404	87	81	607	615
Dec-11	582	688	113	129	340	361	77	80	631	644
Jan-12	498	675	100	131	326	352	67	78	578	605
Feb-12	503	685	100	131	366	387	71	78	546	608
Mar-12	511	670	103	123	350	376	68	77	579	584
Apr-12	669	707	124	124	382	374	69	75	574	570
May-12	761	684	176	156	391	377	70	73	563	540
Jun-12	844	693	192	167	454	417	79	74	545	528
Jul-12	799	664	174	158	417	402	78	71	545	524
Aug-12	842	701	174	159	400	401	85	77	549	536
Sep-12	799	693	173	159	392	379	74	66	537	528
Oct-12	788	704	166	156	405	399	83	76	555	534
Nov-12	781	782	170	167	397	398	78	74	546	552
Dec-12	621	733	145	162	388	403	69	72	515	527
Jan-13	537	730	125	158	388	414	64	74	522	540
Feb-13	522	727	128	161	383	407	61	68	474	529
Mar-13	581	762	136	159	376	403	62	71	530	535
Apr-13	668	725	159	160	428	419	63	70	522	525
May-13	821	735	172	151	389	370	64	67	550	532

Table 10: Statistical Table for Original and Seasonally Adjusted Subgroups wise Electricity Consumption | Time Series from July, 2006 to Jun, 2021 (in Million Kilowatts)

Months	Domestic Consumption	Domestic Consumption (Seasonally Adjusted)	Commercial Consumption	Commercial Consumption (Seasonally Adjusted)	Industrial Consumption	Industrial Consumption (Seasonally Adjusted)	Agricultural Consumption	Agricultural Consumption (Seasonally Adjusted)	Other Consumers 'Consumption	Other Consumers 'Consumption (Seasonally Adjusted)
Jun-13	925	745	191	164	441	402	77	71	549	534
Jul-13	901	735	177	162	419	411	79	72	553	533
Aug-13	888	734	173	156	396	403	82	73	538	523
Sep-13	841	723	174	158	430	417	78	70	545	533
Oct-13	867	767	176	164	441	433	79	72	549	530
Nov-13	752	765	163	161	404	405	72	70	513	520
Dec-13	651	787	144	162	406	414	68	71	523	536
Jan-14	572	789	129	163	394	421	63	72	522	539
Feb-14	562	791	128	163	380	408	63	71	477	533
Mar-14	560	762	135	161	380	407	60	69	526	531
Apr-14	704	772	161	163	416	405	62	69	518	525
May-14	888	785	188	166	425	399	66	68	537	514
Jun-14	1,022	808	195	166	447	409	76	71	542	522
Jul-14	1,020	823	180	164	407	406	80	72	571	553
Aug-14	1,082	914	191	172	360	373	85	76	571	553
Sep-14	1,001	860	192	174	436	423	80	73	561	548
Oct-14	924	817	184	170	410	400	74	68	543	528
Nov-14	797	827	168	166	404	402	66	67	530	541
Dec-14	656	826	149	169	408	412	59	62	520	535
Jan-15	593	842	133	169	371	398	57	65	520	540
Feb-15	596	856	134	172	356	387	62	69	488	547
Mar-15	599	813	140	167	374	399	61	69	533	536
Apr-15	809	874	168	171	412	400	60	67	540	543
May-15	1,025	898	196	173	443	412	69	69	573	540
Jun-15	1,101	853	205	175	451	418	71	66	568	538
Jul-15	1,096	874	189	172	382	388	78	70	533	519
Aug-15	1,019	838	194	173	394	410	71	62	542	528
Sep-15	966	809	197	178	465	454	77	70	534	528

Table 10: Statistical Table for Original and Seasonally Adjusted Subgroups wise Electricity Consumption | Time Series from July, 2006 to Jun, 2021 (in Million Kilowatts)

Months	Domestic Consumption	Domestic Consumption (Seasonally Adjusted)	Commercial Consumption	Commercial Consumption (Seasonally Adjusted)	Industrial Consumption	Industrial Consumption (Seasonally Adjusted)	Agricultural Consumption	Agricultural Consumption (Seasonally Adjusted)	Other Consumers 'Consumption	Other Consumers 'Consumption (Seasonally Adjusted)
Oct-15	975	864	196	181	426	414	73	68	553	544
Nov-15	779	822	178	177	434	426	65	67	508	524
Dec-15	609	815	152	173	431	432	65	68	490	505
Jan-16	562	843	143	181	377	401	60	66	458	482
Feb-16	571	863	145	186	386	419	60	66	377	433
Mar-16	661	883	161	187	396	419	57	64	463	464
Apr-16	812	868	183	186	438	425	61	68	446	439
May-16	1,012	863	214	191	476	440	73	72	528	487
Jun-16	1,160	877	220	191	472	449	83	79	544	507
Jul-16	1,077	838	193	174	358	367	75	68	524	511
Aug-16	968	770	189	165	401	418	75	68	533	522
Sep-16	1,023	845	205	186	431	427	71	65	528	530
Oct-16	946	843	197	180	423	408	73	69	522	523
Nov-16	803	852	181	179	430	414	62	65	489	509
Dec-16	671	905	168	190	419	419	62	64	506	523
Jan-17	558	870	148	188	404	424	62	67	484	509
Feb-17	541	873	137	181	395	426	58	63	442	489
Mar-17	646	877	161	187	412	434	63	69	497	496
Apr-17	851	900	189	192	445	433	59	65	513	495
May-17	1,051	879	213	192	478	443	73	71	505	463
Jun-17	1,306	991	218	190	449	438	72	68	524	487
Jul-17	1,147	890	219	197	369	380	75	69	92	78
Aug-17	1,106	888	219	193	461	476	76	70	97	91
Sep-17	1,103	906	210	191	440	444	74	69	95	103
Oct-17	1,009	904	202	183	474	453	71	69	95	101
Nov-17	855	907	204	200	473	449	64	68	84	102
Dec-17	626	897	154	176	435	435	69	71	66	85
Jan-18	616	956	147	189	438	452	70	74	66	89

Table 10: Statistical Table for Original and Seasonally Adjusted Subgroups wise Electricity Consumption | Time Series from July, 2006 to Jun, 2021 (in Million Kilowatts)

Months	Domestic Consumption	Domestic Consumption (Seasonally Adjusted)	Commercial Consumption	Commercial Consumption (Seasonally Adjusted)	Industrial Consumption	Industrial Consumption (Seasonally Adjusted)	Agricultural Consumption	Agricultural Consumption (Seasonally Adjusted)	Other Consumers 'Consumption	Other Consumers 'Consumption (Seasonally Adjusted)
Feb-18	603	972	151	198	435	465	67	71	67	101
Mar-18	741	987	170	195	444	465	65	70	74	81
Apr-18	920	971	189	192	462	450	40	46	134	115
May-18	1,167	964	209	190	478	448	49	46	148	113
Jun-18	1,379	1,038	218	192	439	441	48	43	150	119
Jul-18	1,225	946	222	197	438	448	48	43	146	126
Aug-18	1,178	940	224	196	485	497	49	44	147	137
Sep-18	1,041	827	197	179	439	450	49	45	143	146
Oct-18	991	881	210	189	481	452	43	42	143	147
Nov-18	896	954	195	189	488	457	40	43	132	147
Dec-18	651	951	167	190	465	466	40	41	124	146
Jan-19	555	927	146	189	454	461	39	42	116	140
Feb-19	511	916	133	181	427	454	37	40	111	138
Mar-19	582	847	148	173	437	458	34	39	110	124
Apr-19	892	939	195	198	491	479	37	42	136	124
May-19	1,179	937	221	205	514	492	40	38	143	117
Jun-19	1,351	995	227	203	460	474	49	44	146	120
Jul-19	1,250	950	223	196	475	484	42	37	165	139
Aug-19	1,225	974	221	191	443	451	38	34	147	132
Sep-19	1,210	986	209	191	425	440	33	30	142	139
Oct-19	1,119	992	217	194	490	454	32	33	139	137
Nov-19	878	950	194	187	501	466	30	33	117	128
Dec-19	594	922	157	181	463	465	34	35	92	117
Jan-20	548	943	136	181	461	465	30	33	95	120
Feb-20	522	947	132	182	462	489	33	35	92	118
Mar-20	672	951	159	183	479	501	30	35	99	118
Apr-20	931	972	115	117	328	315	29	34	111	108
May-20	1,319	1,041	139	125	306	290	39	37	142	123

Table 10: Statistical Table for Original and Seasonally Adjusted Subgroups wise Electricity Consumption | Time Series from July, 2006 to Jun, 2021 (in Million Kilowatts)

Months	Domestic Consumption	Domestic Consumption (Seasonally Adjusted)	Commercial Consumption	Commercial Consumption (Seasonally Adjusted)	Industrial Consumption	Industrial Consumption (Seasonally Adjusted)	Agricultural Consumption	Agricultural Consumption (Seasonally Adjusted)	Other Consumers 'Consumption	Other Consumers 'Consumption (Seasonally Adjusted)
Jun-20	1,387	1,029	177	154	407	427	44	39	152	127
Jul-20	1,382	1,068	192	164	507	515	41	36	162	132
Aug-20	1,384	1,127	204	173	495	502	39	35	162	142
Sep-20	1,212	986	197	179	490	506	29	26	146	137
Oct-20	1,123	987	214	189	578	539	31	32	140	133
Nov-20	839	923	185	177	559	521	32	35	119	129
Dec-20	609	949	152	176	508	509	32	33	100	126
Jan-21	541	950	130	175	523	525	30	33	92	119
Feb-21	554	989	133	183	519	546	33	35	94	122
Mar-21	747	1,032	172	196	537	560	30	35	109	128
Apr-21	1,056	1,088	199	201	587	574	31	36	133	135
May-21	1,388	1,090	205	192	557	543	39	37	153	136
Jun-21	1,412	1,058	221	199	556	579	42	36	170	144

Table 11: Total and Subgroups wise Electricity Consumption Predictions for the next Six Months from July, 2021 to December, 2021 (in Million Kilowatts)

Months	Total Electricity Consumption	Domestic Electricity Consumption	Industrial Electricity Consumption	Commercial Electricity Consumption	Agricultural Electricity Consumption	Other Consumers' Electricity Consumption
Jul-21	2,457	1,513	523	229	40	161
Aug-21	2,423	1,530	486	227	39	150
Sep-21	2,197	1,288	493	219	37	139
Oct-21	1,913	1,011	491	204	35	130
Nov-21	1,660	791	473	186	32	128
Dec-21	1,492	659	490	170	31	125

9. Appendix-A: Seasonal Adjustment Working for Total Electricity Consumption

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	TOTAL
2006							
	1741.0	1685.0	1712.0	1776.0	1664.0	1421.0	9999.0
2007	1263.0	1284.0	1319.0	1585.0	1813.0	1852.0	
	1776.0	1755.0	1839.0	1721.0	1584.0	1327.0	19118.0
2008	1198.0	1237.0	1257.0	1492.0	1733.0	1826.0	
	1807.0	1816.0	1752.0	1750.0	1627.0	1406.0	18901.0
2009	1156.0	1338.0	1493.0	1638.0	1861.0	1895.0	
	1779.0	1772.0	1861.0	1762.0	1713.0	1428.0	19696.0
2010	1262.0	1370.0	1568.0	1715.0	1902.0	1916.0	
	1831.0	1914.0	1911.0	1863.0	1766.0	1601.0	20619.0
2011	1535.0	1535.0	1622.0	1818.0	1943.0	1994.0	
	1977.0	1897.0	1906.0	1862.0	1962.0	1743.0	21794.0
2012	1569.0	1586.0	1611.0	1818.0	1961.0	2114.0	
	2013.0	2050.0	1975.0	1997.0	1972.0	1738.0	22404.0
2013	1636.0	1568.0	1685.0	1840.0	1996.0	2183.0	
	2129.0	2077.0	2068.0	2112.0	1904.0	1792.0	22990.0
2014	1680.0	1610.0	1661.0	1861.0	2104.0	2282.0	
	2258.0	2289.0	2270.0	2135.0	1965.0	1792.0	23907.0
2015	1674.0	1636.0	1707.0	1989.0	2306.0	2396.0	
	2278.0	2220.0	2239.0	2223.0	1964.0	1747.0	24379.0
2016	1600.0	1539.0	1738.0	1940.0	2303.0	2479.0	
	2227.0	2166.0	2258.0	2161.0	1965.0	1826.0	24202.0
2017	1656.0	1573.0	1779.0	2057.0	2320.0	2569.0	
	1903.0	1959.0	1923.0	1851.0	1680.0	1351.0	22621.0
2018	1337.0	1322.0	1494.0	1746.0	2051.0	2234.0	
	2079.0	2084.0	1870.0	1867.0	1750.0	1446.0	21280.0
2019	1310.0	1219.0	1311.0	1751.0	2097.0	2233.0	
	2154.0	2073.0	2019.0	1997.0	1719.0	1341.0	21224.0
2020	1269.0	1240.0	1440.0	1514.0	1945.0	2167.0	
	2284.0	2284.0	2074.0	2085.0	1734.0	1402.0	21438.0
2021	1316.0	1333.0	1596.0	2005.0	2342.0	2401.0	
							10993.0
AVGE	1430.7	1426.0	1552.1	1784.6	2045.1	2169.4	
	2015.7	2002.7	1978.5	1944.1	1797.9	1557.4	

Table Total- 325565.0 Mean- 1808.7 Std. Dev.- 304.3
Min - 1156.0 Max - 2569.0

Final unmodified SI ratios

From 2006.Jul to 2021.Jun

Observations 180

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	AVGE
2006							
	213.0	135.1	138.6	178.3	46.0	-209.8	83.5
2007	-371.7	-346.9	-304.3	-31.0	203.7	250.7	
	183.6	171.1	260.4	146.2	15.3	-231.3	-4.5
2008	-346.2	-294.2	-270.1	-42.5	181.4	252.7	
	213.2	207.4	136.7	132.4	6.1	-221.8	-3.7
2009	-482.7	-312.2	-163.2	-18.3	208.5	246.7	
	131.0	121.5	207.8	108.7	62.8	-220.2	-9.1
2010	-388.4	-287.6	-102.3	28.7	199.6	199.2	
	104.0	177.6	163.1	102.0	-9.1	-188.0	-0.1
2011	-265.0	-273.3	-190.1	8.7	141.8	202.5	
	191.3	111.0	112.6	54.8	137.8	-96.3	11.3
2012	-281.0	-267.8	-241.4	-32.8	110.7	260.9	
	154.4	184.1	101.4	116.0	83.1	-158.4	2.4
2013	-266.8	-339.2	-225.6	-71.6	83.1	269.7	
	216.8	164.0	150.1	184.5	-35.0	-157.5	-2.3
2014	-275.1	-346.0	-293.7	-96.5	137.7	302.6	
	264.4	286.1	263.6	129.7	-38.1	-212.2	10.2
2015	-337.1	-385.9	-325.9	-51.4	262.0	350.1	
	231.8	175.8	201.0	194.4	-53.4	-257.7	0.3
2016	-394.4	-450.7	-251.5	-52.5	305.8	478.5	
	222.3	153.0	232.4	121.4	-86.9	-235.8	3.5
2017	-409.7	-489.0	-268.6	38.6	347.5	652.9	
	47.8	162.4	171.2	123.6	-42.4	-378.2	-3.7
2018	-404.5	-431.2	-269.9	-28.0	271.1	453.6	
	300.5	306.5	94.8	96.9	-13.2	-311.5	5.4
2019	-445.3	-539.0	-454.6	-25.3	306.2	428.2	
	342.1	264.0	220.4	212.8	-50.6	-415.4	-13.0
2020	-475.6	-495.5	-289.3	-213.8	211.6	420.0	
	515.6	491.9	264.1	269.8	-77.4	-411.4	17.5
2021	-517.1	-538.7	-325.9	33.1	327.1	354.2	
							-111.2
AVGE	-377.4	-386.5	-265.1	-37.0	219.9	341.5	
	222.1	207.4	181.2	144.8	-3.7	-247.0	

Table Total- 4.3 Mean- 0.0 Std. Dev.- 261.3
Min - -539.0 Max - 652.9

F-tests for seasonality

Test for the presence of seasonality assuming stability.

	Sum of Squares	Dgrs.of Freedom	Mean Square	**F-Value**
Between months	11033699.7003	11	1003063.60912	**134.425****
Residual	1253596.1742	168	7461.88199	
Total	12287295.8745	179		

**Seasonality present at the 0.1 per cent level.

Nonparametric Test for the Presence of Seasonality Assuming Stability

Kruskal-Wallis Statistic	Degrees of Freedom	Probability Level
157.3673	11	0.000%

Seasonality present at the one percent level.

Final unmodified SI ratios, with labels for outliers and extreme values

From 2006.Jul to 2021.Jun

Observations 180

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec
2006						
	213.0	135.1	138.6	178.3	46.0	-209.8
2007	-371.7	-346.9	-304.3*	-31.0	203.7	250.7
	183.6	171.1	260.4*	146.2	15.3	-231.3
2008	-346.2	-294.2	-270.1*	-42.5	181.4	252.7
	213.2	207.4	136.7	132.4	6.1	-221.8
2009	-482.7*	-312.2	-163.2	-18.3	208.5	246.7
	131.0	121.5	207.8	108.7	62.8	-220.2
2010	-388.4*	-287.6	-102.3*	28.7	199.6	199.2
	104.0*	177.6	163.1	102.0	-9.1	-188.0
2011	-265.0	-273.3	-190.1	8.7	141.8	202.5
	191.3	111.0	112.6	54.8*	137.8*	-96.3*
2012	-281.0	-267.8	-241.4	-32.8	110.7	260.9
	154.4	184.1	101.4	116.0	83.1*	-158.4
2013	-266.8	-339.2	-225.6	-71.6	83.1*	269.7
	216.8	164.0	150.1	184.5	-35.0	-157.5
2014	-275.1	-346.0	-293.7	-96.5	137.7*	302.6
	264.4	286.1*	263.6*	129.7	-38.1	-212.2
2015	-337.1	-385.9	-325.9	-51.4	262.0	350.1
	231.8	175.8	201.0	194.4	-53.4	-257.7
2016	-394.4	-450.7	-251.5	-52.5	305.8	478.5*
	222.3	153.0	232.4	121.4	-86.9	-235.8
2017	-409.7	-489.0	-268.6	38.6*	347.5*	652.9*
	47.8*	162.4	171.2	123.6	-42.4	-378.2*
2018	-404.5	-431.2	-269.9	-28.0	271.1	453.6
	300.5	306.5	94.8*	96.9	-13.2	-311.5
2019	-445.3	-539.0	-454.6*	-25.3	306.2	428.2
	342.1	264.0	220.4	212.8	-50.6	-415.4
2020	-475.6	-495.5	-289.3	-213.8*	211.6	420.0
	515.6*	491.9*	264.1	269.8*	-77.4	-411.4
2021	-517.1	-538.7	-325.9	33.1	327.1	354.2

Key to symbols:

* : extreme value as determined by X-11 extreme value procedure

Final replacement values for SI ratios

From 2006.Jul to 2021.Jun

Observations 180

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec
2006						
	********	********	********	********	********	********
2007	********	********	-207.2	********	********	********
	********	********	184.2	********	********	********
2008	********	********	-243.7	********	********	********
	********	********	********	********	********	********
2009	-359.9	********	********	********	********	********
	********	********	********	********	********	********
2010	-388.1	********	-172.1	********	********	********
	108.6	********	********	********	********	********
2011	********	********	********	********	********	********
	********	********	********	89.7	40.3	-106.7
2012	********	********	********	********	********	********
	********	********	********	********	70.7	********
2013	********	********	********	********	125.7	********
	********	********	********	********	********	********
2014	********	********	********	********	144.7	********
	********	191.3	239.9	********	********	********
2015	********	********	********	********	********	********
	********	********	********	********	********	********
2016	********	********	********	********	********	419.3
	********	********	********	********	********	********
2017	********	********	********	29.5	344.5	414.1
	274.9	********	********	********	********	-366.5
2018	********	********	********	********	********	********
	********	********	138.6	********	********	********
2019	********	********	-301.2	********	********	********
	********	********	********	********	********	********
2020	********	********	********	-16.4	********	********
	341.2	303.5	********	269.5	********	********
2021	********	********	********	********	********	********

Final seasonally adjusted data

From 2006.Jul to 2021.Jun

Observations 180

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	TOTAL
2006							
	1549.3	1522.0	1551.4	1631.0	1636.2	1642.6	9532.4
2007	1627.3	1597.6	1519.2	1607.0	1614.9	1609.7	
	1592.7	1593.3	1676.2	1581.4	1557.6	1546.6	19123.5
2008	1556.6	1546.1	1454.5	1508.5	1537.4	1587.6	
	1633.5	1657.2	1588.7	1621.2	1601.6	1616.2	18909.1
2009	1503.0	1637.8	1690.5	1649.4	1674.7	1660.5	
	1614.2	1613.0	1705.3	1643.6	1686.6	1623.8	19702.4
2010	1590.8	1665.0	1765.9	1726.9	1729.8	1682.5	
	1669.9	1758.9	1761.3	1748.1	1737.7	1779.7	20616.5
2011	1846.4	1830.3	1830.4	1838.4	1786.2	1755.7	
	1809.0	1739.0	1757.7	1742.6	1938.1	1911.4	21785.3
2012	1866.3	1893.7	1838.1	1852.4	1809.7	1861.7	
	1827.7	1889.4	1819.6	1864.7	1959.1	1906.1	22388.5
2013	1933.3	1897.1	1936.4	1890.6	1835.1	1903.0	
	1923.8	1907.3	1897.9	1968.7	1909.2	1973.8	22976.2
2014	1992.3	1973.2	1929.3	1917.7	1913.1	1967.4	
	2033.5	2116.6	2083.6	1982.4	1989.2	2001.2	23899.6
2015	2013.1	2032.5	1985.1	2043.0	2078.9	2044.4	
	2037.4	2036.1	2040.2	2073.6	2003.1	1989.1	24376.6
2016	1968.2	1969.5	2021.3	1981.9	2040.0	2096.8	
	1967.6	1969.5	2057.4	2012.3	2011.1	2104.8	24200.4
2017	2052.7	2028.9	2062.8	2088.6	2040.0	2162.0	
	1626.3	1740.4	1721.0	1698.3	1727.6	1663.3	22611.9
2018	1761.2	1802.7	1779.4	1763.7	1761.5	1817.7	
	1783.4	1845.6	1668.4	1700.9	1797.0	1790.3	21271.8
2019	1753.4	1711.9	1599.3	1761.7	1812.3	1815.4	
	1842.1	1812.7	1813.7	1818.6	1765.1	1705.4	21211.7
2020	1726.9	1742.8	1734.9	1518.0	1660.2	1754.4	
	1962.1	2009.6	1869.0	1899.3	1777.1	1776.0	21430.4
2021	1780.6	1839.9	1892.6	2008.1	2058.4	1988.8	
							11568.4
AVGE	1798.1	1811.3	1802.6	1810.4	1823.5	1847.2	
	1791.5	1814.1	1800.8	1799.1	1806.4	1802.0	

Table Total- 325604.8 Mean- 1808.9 Std. Dev.- 164.8

Min - 1454.5 Max - 2162.0

Min - 1423.4 Max - 2174.4

Monitoring and Quality Assessment Statistics

All the measures below are in the range from 0 to 3 with an Acceptance region from 0 to 1.

1.	The relative contribution of the irregular over three Months span (from Table F 2.B).	M1 = 0.178
2.	The relative contribution of the irregular component To the stationary portion of the variance (from Table F 2.F).	M2 = 0.129
3.	The amount of month to month change in the irregular Component as compared to the amount of month to month Change in the trend-cycle (from Table F2.H).	M3 = 0.864
4.	The amount of autocorrelation in the irregular as described by the average duration of run (Table F 2.D).	M4 = 1.011
5.	The number of months it takes the change in the trend-cycle to surpass the amount of change in the irregular (from Table F 2.E).	M5 = 0.898
6.	The amount of year to year change in the irregular as compared to the amount of year to year change in the seasonal (from Table F 2.H).	M6 = 0.290
7.	The amount of moving seasonality present relative to the amount of stable seasonality (from Table F 2.I).	M7 = 0.352
8.	The size of the fluctuations in the seasonal component throughout the whole series.	M8 = 0.462
9.	The average linear movement in the seasonal component throughout the whole series.	M9 = 0.293
10.	Same as 8, calculated for recent years only.	M10 = 0.544
11.	Same as 9, calculated for recent years only.	M11 = 0.529

*** ACCEPTED *** at the level 0.49

*** Check the 1 above measures which failed.

*** Q (without M2) = 0.53 ACCEPTED.

10. Appendix-B: Seasonal Adjustment Working for Domestic Electricity Consumption

Time series data (for the span analyzed)

From 2006.Jul to 2021.Jun

Observations 180

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	TOTAL
2006							
	594.0	559.0	573.0	593.0	569.0	410.0	3298.0
2007	381.0	397.0	398.0	519.0	611.0	646.0	
	630.0	622.0	646.0	630.0	575.0	434.0	6489.0
2008	383.0	404.0	413.0	522.0	623.0	633.0	
	673.0	633.0	620.0	603.0	535.0	400.0	6442.0
2009	363.0	408.0	448.0	539.0	656.0	679.0	
	644.0	646.0	551.0	617.0	563.0	419.0	6533.0
2010	391.0	423.0	478.0	566.0	668.0	672.0	
	710.0	724.0	724.0	670.0	618.0	490.0	7134.0
2011	454.0	462.0	498.0	610.0	705.0	720.0	
	714.0	690.0	707.0	686.0	738.0	582.0	7566.0
2012	498.0	503.0	511.0	669.0	761.0	844.0	
	799.0	842.0	799.0	788.0	781.0	621.0	8416.0
2013	537.0	522.0	581.0	668.0	821.0	925.0	
	901.0	888.0	841.0	867.0	752.0	651.0	8954.0
2014	572.0	562.0	560.0	704.0	888.0	1022.0	
	1020.0	1082.0	1001.0	924.0	797.0	656.0	9788.0
2015	593.0	596.0	599.0	809.0	1025.0	1101.0	
	1096.0	1019.0	966.0	975.0	779.0	609.0	10167.0
2016	562.0	571.0	661.0	812.0	1012.0	1160.0	
	1077.0	968.0	1023.0	946.0	803.0	671.0	10266.0
2017	558.0	541.0	646.0	851.0	1051.0	1306.0	
	1147.0	1106.0	1103.0	1009.0	855.0	626.0	10799.0
2018	616.0	603.0	741.0	920.0	1167.0	1379.0	
	1225.0	1178.0	1041.0	991.0	896.0	651.0	11408.0
2019	555.0	511.0	582.0	892.0	1179.0	1351.0	
	1250.0	1225.0	1210.0	1119.0	878.0	594.0	11346.0
2020	548.0	522.0	672.0	931.0	1319.0	1387.0	
	1382.0	1384.0	1212.0	1123.0	839.0	609.0	11928.0
2021	541.0	554.0	747.0	1056.0	1388.0	1412.0	
							5698.0
AVGE	503.5	505.3	569.0	737.9	924.9	1015.8	
	924.1	904.4	867.8	836.1	731.9	561.5	

Table Total- 136232.0 Mean- 756.8 Std. Dev.- 257.7
Min - 363.0 Max - 1412.0

Final unmodified SI ratios
From 2006.Jul to 2021.Jun
Observations 180

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	AVGE
2006							
	118.6	71.9	72.2	77.7	40.8	-126.7	42.4
2007	-158.5	-140.5	-135.0	-10.5	82.4	115.9	
	95.9	81.6	98.4	76.2	18.1	-122.2	0.2
2008	-168.4	-140.8	-126.7	-15.2	86.1	95.3	
	135.1	96.4	86.1	71.5	4.0	-133.4	-0.8
2009	-176.6	-139.8	-106.8	-19.7	97.4	123.5	
	92.8	98.4	5.0	70.1	12.7	-136.4	-6.6
2010	-170.0	-144.0	-95.5	-15.1	78.3	73.4	
	103.6	111.9	108.9	54.3	2.6	-126.5	-1.5
2011	-165.2	-159.6	-124.2	-10.5	88.6	108.2	
	104.6	78.3	87.7	55.2	94.1	-74.6	6.9
2012	-169.9	-174.2	-173.0	-19.8	68.4	148.5	
	101.4	142.4	97.0	81.6	68.1	-99.0	6.0
2013	-190.2	-211.3	-156.9	-71.8	81.6	187.0	
	163.6	148.6	95.1	111.1	-14.4	-123.8	1.5
2014	-207.0	-217.8	-219.6	-79.0	95.9	217.0	
	201.6	253.9	168.1	90.2	-36.8	-180.3	7.2
2015	-249.4	-255.5	-262.6	-59.1	156.6	237.3	
	241.1	174.8	131.6	146.2	-50.6	-226.4	-1.3
2016	-282.7	-283.8	-201.1	-53.4	147.9	302.0	
	225.3	118.8	171.4	88.8	-61.2	-199.9	-2.3
2017	-317.6	-336.9	-233.2	-29.8	167.2	417.2	
	253.6	209.9	203.9	104.1	-60.1	-303.2	6.3
2018	-329.2	-356.0	-226.7	-49.8	203.5	428.0	
	286.8	248.0	114.3	64.1	-33.0	-280.0	5.8
2019	-378.0	-423.9	-354.5	-47.1	233.9	396.4	
	286.3	255.0	237.8	149.6	-83.1	-358.6	-7.2
2020	-400.8	-432.2	-298.0	-59.6	310.0	368.4	
	363.6	374.9	218.7	147.7	-122.9	-352.4	9.8
2021	-434.5	-446.9	-282.8	-0.2	310.8	321.2	
							-88.7
AVGE	-253.2	-257.5	-199.8	-36.0	147.2	236.0	
	184.9	164.3	126.4	92.6	-14.8	-189.6	

Table Total- 8.3 Mean- 0.0 Std. Dev.- 193.6
Min - -446.9 Max - 428.0

F-tests for seasonality

Test for the presence of seasonality assuming stability.

	Sum of Squares	Dgrs.of Freedom	Mean Square	F-Value
Between months	5563686.4702	11	505789.67911	71.943**
Residual	1181113.7768	168	7030.43915	
Total	6744800.2470	179		

**Seasonality present at the 0.1 per cent level.

Nonparametric Test for the Presence of Seasonality Assuming Stability

Kruskal-Wallis Statistic	Degrees of Freedom	Probability Level
154.0553	11	0.000%

Seasonality present at the one percent level.

Moving Seasonality Test

	Sum of Squares	Dgrs.of Freedom	Mean Square	F-value
Between Years	730755.1127	13	56211.931743	28.672**
Error	280353.8667	143	1960.516550	

**Moving seasonality present at the one percent level.

Final unmodified SI ratios, with labels for outliers and extreme values
From 2006.Jul to 2021.Jun
Observations 180

	Jan	Feb	Mar	Apr	May	Jun
	Jul	Aug	Sep	Oct	Nov	Dec
2006						
	118.6	71.9	72.2	77.7	40.8	-126.7
2007	-158.5	-140.5	-135.0	-10.5	82.4	115.9
	95.9	81.6	98.4	76.2	18.1	-122.2
2008	-168.4	-140.8	-126.7	-15.2	86.1	95.3
	135.1*	96.4	86.1	71.5	4.0	-133.4
2009	-176.6	-139.8	-106.8	-19.7	97.4	123.5
	92.8	98.4	5.0*	70.1	12.7	-136.4
2010	-170.0	-144.0	-95.5*	-15.1	78.3	73.4*
	103.6	111.9	108.9	54.3	2.6	-126.5
2011	-165.2	-159.6	-124.2	-10.5	88.6	108.2*
	104.6	78.3*	87.7	55.2*	94.1*	-74.6*
2012	-169.9	-174.2	-173.0	-19.8	68.4	148.5
	101.4*	142.4	97.0	81.6	68.1*	-99.0
2013	-190.2	-211.3	-156.9	-71.8	81.6	187.0
	163.6	148.6	95.1	111.1	-14.4	-123.8
2014	-207.0	-217.8	-219.6	-79.0	95.9	217.0
	201.6	253.9*	168.1	90.2	-36.8	-180.3
2015	-249.4	-255.5	-262.6*	-59.1	156.6*	237.3
	241.1	174.8	131.6	146.2*	-50.6	-226.4
2016	-282.7	-283.8	-201.1	-53.4	147.9	302.0
	225.3	118.8*	171.4	88.8	-61.2	-199.9
2017	-317.6	-336.9	-233.2	-29.8	167.2	417.2*
	253.6	209.9	203.9	104.1	-60.1	-303.2
2018	-329.2	-356.0	-226.7	-49.8	203.5	428.0*
	286.8	248.0	114.3*	64.1*	-33.0	-280.0
2019	-378.0	-423.9	-354.5*	-47.1	233.9	396.4*
	286.3	255.0	237.8	149.6	-83.1	-358.6*
2020	-400.8	-432.2	-298.0	-59.6	310.0	368.4
	363.6*	374.9*	218.7	147.7	-122.9*	-352.4
2021	-434.5	-446.9	-282.8	-0.2	310.8	321.2

Key to symbols:
* : extreme value as determined by X-11 extreme value procedure

From 2006.Jul to 2021.Jun
Observations 180

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec
2006						
	********	********	********	********	********	********
2007	********	********	********	********	********	********
	********	********	********	********	********	********
2008	********	********	********	********	********	********
	131.4	********	********	********	********	********
2009	********	********	********	********	********	********
	********	********	86.4	********	********	********
2010	********	********	-116.6	********	********	121.1
	********	********	********	********	********	********
2011	********	********	********	********	********	108.4
	********	129.3	********	56.4	10.6	-88.8
2012	********	********	********	********	********	********
	127.1	********	********	********	-2.1	********
2013	********	********	********	********	********	********
	********	********	********	********	********	********
2014	********	********	********	********	********	********
	********	170.1	********	********	********	********
2015	********	********	-221.4	********	148.3	********
	********	********	********	126.2	********	********
2016	********	********	********	********	********	********
	********	189.9	********	********	********	********
2017	********	********	********	********	********	317.6
	********	********	********	********	********	********
2018	********	********	********	********	********	337.0
	********	********	203.6	66.1	********	********
2019	********	********	-267.3	********	********	389.7
	********	********	********	********	********	-356.8
2020	********	********	********	********	********	********
	352.0	259.1	********	********	-112.3	********
2021	********	********	********	********	********	********

Final seasonally adjusted data
From 2006.Jul to 2021.Jun
Observations 180

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	TOTAL
2006							
	482.3	478.6	487.6	517.1	544.3	536.1	3046.0
2007	546.9	537.7	524.8	533.5	524.5	537.0	
	519.1	536.8	558.7	555.2	555.1	561.8	6491.1
2008	551.2	545.2	536.3	537.9	536.1	522.1	
	562.3	540.0	529.8	531.8	521.8	530.1	6444.6
2009	533.0	551.4	567.1	555.2	568.2	565.0	
	538.9	543.5	457.8	550.3	553.3	545.0	6528.7
2010	560.8	572.6	602.2	582.3	583.9	553.7	
	603.9	610.0	628.1	605.4	610.1	606.8	7119.8
2011	624.9	625.2	633.9	632.5	624.2	590.9	
	601.0	563.6	610.8	614.3	731.3	688.3	7540.9
2012	674.9	684.5	670.3	707.0	683.7	693.4	
	664.4	701.1	693.1	703.7	782.2	732.8	8391.1
2013	730.2	727.4	761.7	725.4	734.9	745.4	
	735.4	733.6	722.6	766.8	765.4	787.1	8935.9
2014	789.4	791.5	762.5	772.3	785.3	807.7	
	823.4	913.6	860.1	817.3	826.9	825.7	9775.8
2015	842.4	856.2	813.5	874.1	898.0	852.7	
	873.8	837.6	808.5	864.4	822.3	815.2	10158.7
2016	842.7	863.4	882.6	868.4	863.3	877.0	
	837.7	769.8	845.0	842.8	851.9	905.0	10249.6
2017	870.1	873.1	876.9	900.3	879.3	991.4	
	890.2	888.4	905.9	903.8	906.6	896.7	10782.6
2018	956.5	972.3	986.9	970.8	963.6	1038.0	
	945.8	939.8	827.0	880.9	954.3	950.8	11386.8
2019	926.6	915.7	847.2	938.7	937.4	995.2	
	949.8	973.5	986.0	992.3	950.4	922.5	11335.3
2020	943.0	947.5	950.6	972.0	1041.4	1029.0	
	1068.0	1126.7	985.6	986.8	922.9	948.5	11921.9
2021	950.1	989.4	1031.9	1087.8	1090.5	1057.6	
							6207.2
AVGE	756.2	763.5	763.2	777.2	781.0	790.4	
	739.7	743.8	727.1	742.2	753.3	750.2	

Table Total- 136316.0 Mean- 757.3 Std. Dev.- 172.0
Min - 457.8 Max - 1126.7

```
Monitoring and Quality Assessment Statistics
       All the measures below are in the range from 0 to 3 with an
       Acceptance region from 0 to 1.

    1. The relative contribution of the irregular over three       M1 = 0.049
       Months span (from Table F 2.B).


    2. The relative contribution of the irregular component        M2 = 0.051
       To the stationary portion of the variance (from Table
       F 2.F).

    3. The amount of month to month change in the irregular        M3 = 0.620
       Component as compared to the amount of month to month
       Change in the trend-cycle (from Table F2.H).

    4. The amount of autocorrelation in the irregular as           M4 = 0.046
       Described by the average duration of run (Table F 2.D).


    5. The number of months it takes the change in the trend-      M5 = 0.783
       Cycle to surpass the amount of change in the irregular
       (From Table F 2.E).

    6. The amount of year to year change in the irregular as       M6 = 1.039
       Compared to the amount of year to year change in the
       Seasonal (from Table F 2.H).

    7. The amount of moving seasonality present relative to        M7 = 0.804
       The amount of stable seasonality (from Table F 2.I).


    8. The size of the fluctuations in the seasonal component      M8 = 0.725
       Throughout the whole series.


    9. The average linear movement in the seasonal component       M9 = 0.656
       Throughout the whole series.


   10. Same as 8, calculated for recent years only.                M10 = 1.061


   11. Same as 9, calculated for recent years only.                M11 = 1.037

          *** ACCEPTED *** at the level   0.54

          *** Check the 3 above measures which failed.

          *** Q (without M2) = 0.61 ACCEPTED.
```

11. Appendix-C: Seasonal Adjustment Working for Industrial Electricity Consumption

Time series data (for the span analyzed)
From 2006.Jul to 2021.Jun
Observations 180

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	TOTAL
2006							
	378.0	366.0	367.0	390.0	355.0	380.0	2236.0
2007	362.0	358.0	336.0	392.0	404.0	424.0	
	363.0	392.0	410.0	396.0	389.0	370.0	4596.0
2008	323.0	356.0	360.0	367.0	414.0	443.0	
	392.0	435.0	352.0	378.0	367.0	345.0	4532.0
2009	301.0	348.0	345.0	369.0	384.0	399.0	
	396.0	382.0	416.0	367.0	400.0	348.0	4455.0
2010	456.0	355.0	360.0	296.0	392.0	408.0	
	409.0	407.0	393.0	381.0	385.0	356.0	4598.0
2011	362.0	370.0	362.0	391.0	392.0	409.0	
	397.0	377.0	373.0	367.0	403.0	340.0	4543.0
2012	326.0	366.0	350.0	382.0	391.0	454.0	
	417.0	400.0	392.0	405.0	397.0	388.0	4668.0
2013	388.0	383.0	376.0	428.0	389.0	441.0	
	419.0	396.0	430.0	441.0	404.0	406.0	4901.0
2014	394.0	380.0	380.0	416.0	425.0	447.0	
	407.0	360.0	436.0	410.0	404.0	408.0	4867.0
2015	371.0	356.0	374.0	412.0	443.0	451.0	
	382.0	394.0	465.0	426.0	434.0	431.0	4939.0
2016	377.0	386.0	396.0	438.0	476.0	472.0	
	358.0	401.0	431.0	423.0	430.0	419.0	5007.0
2017	404.0	395.0	412.0	445.0	478.0	449.0	
	369.0	461.0	440.0	474.0	473.0	435.0	5235.0
2018	438.0	435.0	444.0	462.0	478.0	439.0	
	438.0	485.0	439.0	481.0	488.0	465.0	5492.0
2019	454.0	427.0	437.0	491.0	514.0	460.0	
	475.0	443.0	425.0	490.0	501.0	463.0	5580.0
2020	461.0	462.0	479.0	328.0	306.0	407.0	
	507.0	495.0	490.0	578.0	559.0	508.0	5580.0
2021	523.0	519.0	537.0	587.0	557.0	556.0	
							3279.0
AVGE	396.0	393.1	396.5	413.6	429.5	443.9	
	407.1	412.9	417.3	427.1	425.9	404.1	

Table Total- 74508.0 Mean- 413.9 Std. Dev.- 52.9
Min - 296.0 Max - 587.0

Final unmodified SI ratios
From 2006.Jul to 2021.Jun
Observations 180

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	AVGE
2006							
	20.6	5.9	2.9	20.7	-20.2	-0.8	4.8
2007	-22.9	-28.1	-48.7	9.8	23.8	44.5	
	-18.0	8.8	24.7	9.1	1.7	-15.6	-0.9
2008	-60.6	-26.7	-23.9	-18.8	26.8	56.3	
	7.8	55.3	-22.8	7.5	-1.0	-22.7	-1.9
2009	-67.2	-20.7	-23.7	0.2	14.7	28.3	
	22.8	5.2	35.2	-17.1	14.3	-37.8	-3.8
2010	71.4	-27.4	-20.2	-83.1	12.9	27.4	
	26.6	23.0	8.2	-4.2	-0.3	-29.6	0.4
2011	-24.1	-16.4	-23.6	7.5	11.7	32.6	
	24.2	7.7	6.7	2.4	38.6	-25.2	3.5
2012	-41.2	-4.3	-25.0	1.4	4.8	63.2	
	23.1	4.0	-5.7	6.0	-3.9	-15.7	0.6
2013	-18.5	-25.3	-32.8	20.0	-18.6	33.0	
	9.8	-15.0	16.9	26.0	-12.1	-9.6	-2.2
2014	-19.7	-31.2	-28.5	9.3	19.1	41.2	
	0.6	-47.2	28.9	3.9	-0.1	6.3	-1.5
2015	-29.1	-43.7	-26.6	9.5	38.4	44.1	
	-27.6	-18.6	49.3	7.5	13.8	10.3	2.3
2016	-43.9	-35.7	-27.5	11.9	47.8	43.4	
	-68.6	-22.2	10.9	4.5	11.1	-2.0	-5.9
2017	-19.9	-31.6	-17.2	13.4	43.9	11.4	
	-72.8	15.7	-7.4	25.3	23.1	-16.2	-2.7
2018	-14.4	-18.1	-8.9	10.1	27.6	-9.9	
	-10.8	34.3	-14.3	25.8	32.3	8.6	5.2
2019	-4.5	-36.2	-32.9	14.9	35.0	-17.2	
	3.9	-20.3	-32.1	35.8	47.1	9.8	0.3
2020	11.5	19.9	45.6	-100.5	-125.5	-36.8	
	44.5	12.6	-8.7	68.5	42.2	-15.5	-3.5
2021	-8.9	-23.9	-17.8	21.6	-17.0	-24.5	
							-11.8
AVGE	-19.5	-23.3	-20.8	-4.8	9.7	22.5	
	-0.9	3.3	6.2	14.8	12.4	-10.4	

Table Total- -163.1 Mean- -0.9 Std. Dev.- 30.3
Min - -125.5 Max - 71.4

F-tests for seasonality

Test for the presence of seasonality assuming stability.

	Sum of Squares	Dgrs.of Freedom	Mean Square	F-Value
Between months	37446.3242	11	3404.21129	4.482**
Residual	127602.0531	168	759.53603	
Total	165048.3773	179		

**Seasonality present at the 0.1 per cent level.

Nonparametric Test for the Presence of Seasonality Assuming Stability

Kruskal-Wallis Statistic	Degrees of Freedom	Probability Level
58.0966	11	0.000%

Seasonality present at the one percent level.

Moving Seasonality Test

	Sum of Squares	Dgrs.of Freedom	Mean Square	F-value
Between Years	7505.2004	13	577.323108	1.705
Error	48425.6603	143	338.640981	

No evidence of moving seasonality at the five percent level.

Final unmodified SI ratios, with labels for outliers and extreme values
From 2006.Jul to 2021.Jun
Observations 180

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec
2006						
	20.6	5.9	2.9	20.7	-20.2	-0.8
2007	-22.9	-28.1	-48.7	9.8	23.8	44.5
	-18.0*	8.8	24.7	9.1	1.7	-15.6
2008	-60.6*	-26.7	-23.9	-18.8	26.8	56.3
	7.8	55.3*	-22.8*	7.5	-1.0	-22.7
2009	-67.2*	-20.7	-23.7	0.2	14.7	28.3
	22.8	5.2	35.2*	-17.1*	14.3	-37.8*
2010	71.4*	-27.4	-20.2	-83.1*	12.9	27.4
	26.6	23.0	8.2	-4.2	-0.3	-29.6
2011	-24.1	-16.4	-23.6	7.5	11.7	32.6
	24.2	7.7	6.7	2.4	38.6*	-25.2
2012	-41.2*	-4.3*	-25.0	1.4	4.8	63.2*
	23.1	4.0	-5.7*	6.0	-3.9	-15.7
2013	-18.5	-25.3	-32.8	20.0	-18.6*	33.0
	9.8	-15.0	16.9	26.0*	-12.1	-9.6
2014	-19.7	-31.2	-28.5	9.3	19.1	41.2
	0.6	-47.2*	28.9	3.9	-0.1	6.3
2015	-29.1	-43.7	-26.6	9.5	38.4	44.1
	-27.6*	-18.6	49.3*	7.5	13.8	10.3
2016	-43.9*	-35.7	-27.5	11.9	47.8	43.4*
	-68.6*	-22.2	10.9	4.5	11.1	-2.0
2017	-19.9	-31.6	-17.2	13.4	43.9	11.4
	-72.8*	15.7*	-7.4	25.3	23.1	-16.2
2018	-14.4	-18.1	-8.9	10.1	27.6	-9.9
	-10.8	34.3*	-14.3	25.8	32.3	8.6
2019	-4.5	-36.2	-32.9	14.9	35.0	-17.2
	3.9	-20.3	-32.1	35.8	47.1	9.8
2020	11.5	19.9*	45.6*	-100.5*	-125.5*	-36.8
	44.5*	12.6	-8.7	68.5*	42.2	-15.5
2021	-8.9	-23.9	-17.8	21.6	-17.0*	-24.5

Key to symbols:
* : extreme value as determined by X-11 extreme value procedure

Final replacement values for SI ratios

From 2006.Jul to 2021.Jun

Observations 180

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec
2006						
	********	********	********	********	********	********
2007	********	********	********	********	********	********
	-1.0	********	********	********	********	********
2008	-40.2	********	********	********	********	********
	********	10.7	13.4	********	********	********
2009	-33.2	********	********	********	********	********
	********	********	34.5	-16.8	********	-31.0
2010	-21.4	********	********	-2.9	********	********
	********	********	********	********	********	********
2011	********	********	********	********	********	********
	********	********	********	********	0.6	********
2012	-35.9	-4.7	********	********	********	48.4
	********	********	-1.1	********	********	********
2013	********	********	********	********	15.6	********
	********	********	********	25.9	********	********
2014	********	********	********	********	********	********
	********	-16.2	********	********	********	********
2015	********	********	********	********	********	********
	-15.4	********	15.3	********	********	********
2016	-41.4	********	********	********	********	35.2
	-13.4	********	********	********	********	********
2017	********	********	********	********	********	********
	-14.1	-15.3	********	********	********	********
2018	********	********	********	********	********	********
	********	-7.9	********	********	********	********
2019	********	********	********	********	********	********
	********	********	********	********	********	********
2020	********	-28.2	-27.2	1.1	3.2	********
	-16.3	********	********	62.3	********	********
2021	********	********	********	********	-7.2	********

Final seasonally adjusted data
From 2006.Jul to 2021.Jun
Observations 180

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	TOTAL
2006							
	366.6	357.9	350.0	381.8	358.2	395.5	2209.9
2007	392.3	383.4	366.3	394.8	383.4	383.1	
	349.9	383.0	392.8	390.0	391.2	387.3	4597.6
2008	352.5	381.0	389.4	369.2	394.5	403.4	
	377.1	425.0	334.3	375.5	366.9	365.7	4534.5
2009	330.6	371.1	371.9	371.0	366.6	360.3	
	378.3	371.3	400.5	366.6	398.9	371.3	4458.4
2010	484.7	375.7	385.4	295.2	377.2	371.1	
	389.4	398.3	378.8	380.8	383.7	380.1	4600.3
2011	389.3	389.7	386.6	387.5	378.8	372.5	
	377.4	371.8	360.5	364.3	403.8	361.0	4543.2
2012	351.5	387.2	375.7	374.4	376.6	417.3	
	401.7	400.7	379.2	398.8	398.5	403.1	4664.6
2013	414.4	407.2	402.6	418.6	370.1	402.1	
	410.5	402.9	416.8	432.5	404.9	414.5	4897.3
2014	420.9	408.3	406.7	404.6	399.4	409.3	
	406.3	373.0	422.6	399.5	401.6	412.2	4864.4
2015	397.5	386.9	398.9	400.0	411.5	418.4	
	387.6	409.9	454.0	414.2	426.2	432.4	4937.6
2016	401.0	418.5	419.0	425.3	440.0	448.7	
	367.3	418.3	426.9	408.1	414.3	418.6	5005.9
2017	423.6	426.2	433.7	433.2	442.6	437.9	
	379.6	476.1	443.8	453.4	449.3	434.7	5234.1
2018	451.5	464.6	465.3	449.7	447.6	441.1	
	448.0	497.3	450.2	452.4	457.4	466.0	5491.2
2019	461.4	454.3	458.0	478.9	491.6	473.6	
	484.4	451.5	439.7	454.4	465.7	464.8	5578.1
2020	464.6	488.8	500.5	315.1	289.7	427.3	
	515.4	501.5	506.5	538.8	520.7	508.9	5578.0
2021	525.0	546.1	559.8	574.2	543.4	579.1	
							3327.5
AVGE	417.4	419.3	421.3	406.1	407.5	423.0	
	402.6	415.9	410.4	414.1	416.1	414.4	

Table Total- 74522.6 Mean- 414.0 Std. Dev.- 49.5
Min - 289.7 Max - 579.1

```
Monitoring and Quality Assessment Statistics
       All the measures below are in the range from 0 to 3 with an
       Acceptance region from 0 to 1.

    1. The relative contribution of the irregular over three       M1 = 1.283
       Months span (from Table F 2.B).


    2. The relative contribution of the irregular component        M2 = 0.909
       To the stationary portion of the variance (from Table
       F 2.F).

    3. The amount of month to month change in the irregular        M3 = 1.152
       Component as compared to the amount of month to month
       Change in the trend-cycle (from Table F2.H).

    4. The amount of autocorrelation in the irregular as           M4 = 0.253
       Described by the average duration of run (Table F 2.D).


    5. The number of months it takes the change in the trend-      M5 = 2.409
       Cycle to surpass the amount of change in the irregular
       (From Table F 2.E).

    6. The amount of year to year change in the irregular as       M6 = 0.158
       Compared to the amount of year to year change in the
       Seasonal (from Table F 2.H).

    7. The amount of moving seasonality present relative to        M7 = 1.163
       The amount of stable seasonality (from Table F 2.I).


    8. The size of the fluctuations in the seasonal component      M8 = 1.374
       Throughout the whole series.


    9. The average linear movement in the seasonal component       M9 = 0.835
       Throughout the whole series.


   10. Same as 8, calculated for recent years only.                M10 = 2.128


   11. Same as 9, calculated for recent years only.                M11 = 2.026

          *** CONDITIONALLY REJECTED *** at the level 1.17

          *** Check the 7 above measures which failed.

          *** Q (without M2) = 1.21 REJECTED.
```

12. Appendix-D: Seasonal Adjustment Working for Commercial Electricity Consumption

Time series data (for the span analyzed)
From 2006.Jul to 2021.Jun
Observations 180

	Jan	Feb	Mar	Apr	May	Jun	
	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
2006							
	123.0	119.0	119.0	121.0	116.0	97.0	695.0
2007	91.0	90.0	98.0	117.0	129.0	129.0	
	119.0	118.0	126.0	122.0	121.0	99.0	1359.0
2008	84.0	85.0	89.0	128.0	159.0	150.0	
	135.0	131.0	117.0	118.0	107.0	94.0	1397.0
2009	79.0	87.0	97.0	111.0	129.0	133.0	
	128.0	130.0	123.0	123.0	117.0	100.0	1357.0
2010	87.0	89.0	113.0	126.0	146.0	143.0	
	137.0	133.0	131.0	126.0	121.0	102.0	1454.0
2011	93.0	96.0	106.0	121.0	130.0	134.0	
	128.0	114.0	124.0	121.0	127.0	113.0	1407.0
2012	100.0	100.0	103.0	124.0	176.0	192.0	
	174.0	174.0	173.0	166.0	170.0	145.0	1797.0
2013	125.0	128.0	136.0	159.0	172.0	191.0	
	177.0	173.0	174.0	176.0	163.0	144.0	1918.0
2014	129.0	128.0	135.0	161.0	188.0	195.0	
	180.0	191.0	192.0	184.0	168.0	149.0	2000.0
2015	133.0	134.0	140.0	168.0	196.0	205.0	
	189.0	194.0	197.0	196.0	178.0	152.0	2082.0
2016	143.0	145.0	161.0	183.0	214.0	220.0	
	193.0	189.0	205.0	197.0	181.0	168.0	2199.0
2017	148.0	137.0	161.0	189.0	213.0	218.0	
	219.0	219.0	210.0	202.0	204.0	154.0	2274.0
2018	147.0	151.0	170.0	189.0	209.0	218.0	
	222.0	224.0	197.0	210.0	195.0	167.0	2299.0
2019	146.0	133.0	148.0	195.0	221.0	227.0	
	223.0	221.0	209.0	217.0	194.0	157.0	2291.0
2020	136.0	132.0	159.0	115.0	139.0	177.0	
	192.0	204.0	197.0	214.0	185.0	152.0	2002.0
2021	130.0	133.0	172.0	199.0	205.0	221.0	
							1060.0
AVGE	118.1	117.9	132.5	152.3	175.1	183.5	
	169.3	168.9	166.3	166.2	156.5	132.9	

Table Total- 27591.0 Mean- 153.3 Std. Dev.- 39.2

Min - 79.0 Max - 227.0

Final unmodified SI ratios
From 2006.Jul to 2021.Jun
Observations 180

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	AVGE
2006							
	14.2	8.9	7.4	7.7	1.0	-19.3	3.3
2007	-25.6	-25.6	-15.4	6.2	20.5	21.6	
	10.9	7.6	12.9	6.8	4.6	-17.6	0.6
2008	-32.6	-32.2	-29.8	7.2	36.6	27.5	
	14.1	13.1	2.4	5.8	-3.7	-16.2	-0.7
2009	-31.1	-22.9	-12.6	1.5	19.0	21.9	
	15.2	15.3	6.9	6.3	0.1	-17.2	0.2
2010	-30.9	-30.1	-7.4	4.5	23.8	20.5	
	14.9	11.5	10.2	5.4	0.2	-19.3	0.3
2011	-28.4	-24.9	-13.4	3.7	15.2	21.4	
	16.4	1.7	9.5	3.3	5.6	-12.2	-0.2
2012	-29.0	-33.0	-34.4	-18.2	28.7	39.9	
	18.1	15.6	13.4	6.0	10.0	-14.9	0.2
2013	-34.9	-32.3	-24.9	-2.2	10.9	30.2	
	16.9	13.4	14.4	15.9	2.1	-17.9	-0.7
2014	-33.6	-35.1	-28.3	-2.9	23.0	28.7	
	12.3	22.2	22.5	14.3	-1.6	-20.4	0.1
2015	-36.2	-35.5	-30.1	-2.8	24.4	32.2	
	14.9	18.8	20.9	19.0	-0.1	-27.5	-0.2
2016	-38.6	-38.7	-24.4	-3.2	28.1	35.5	
	10.1	7.0	22.8	14.0	-3.1	-17.2	-0.6
2017	-37.9	-49.4	-26.2	0.6	23.2	26.9	
	26.9	26.8	18.4	10.8	12.8	-37.7	-0.4
2018	-45.3	-41.8	-23.1	-4.1	16.2	25.7	
	30.4	32.9	6.6	20.8	6.9	-20.7	0.4
2019	-42.8	-58.4	-46.7	-2.6	21.6	27.6	
	25.4	26.5	17.7	28.4	8.0	-25.8	-1.7
2020	-42.1	-40.1	-7.1	-46.4	-20.3	16.8	
	28.2	35.4	24.4	39.2	8.6	-26.4	-2.5
2021	-51.7	-53.3	-19.3	3.3	6.0	19.6	
							-15.9
AVGE	-36.1	-36.9	-22.9	-3.7	18.5	26.4	
	17.9	17.1	14.0	13.6	3.4	-20.7	

Table Total- -138.7 Mean- -0.8 Std. Dev.- 23.5
Min - -58.4 Max - 39.9

F-tests for seasonality

Test for the presence of seasonality assuming stability.

	Sum of Squares	Dgrs.of Freedom	Mean Square	F-Value
Between months	84928.0054	11	7720.72776	91.644**
Residual	14153.4564	168	84.24676	
Total	99081.4618	179		

**Seasonality present at the 0.1 per cent level.

Nonparametric Test for the Presence of Seasonality Assuming Stability

Kruskal-Wallis Statistic	Degrees of Freedom	Probability Level
149.8071	11	0.000%

Seasonality present at the one percent level.

Moving Seasonality Test

	Sum of Squares	Dgrs.of Freedom	Mean Square	F-value
Between Years	3640.3113	13	280.023948	5.632**
Error	7109.6226	143	49.717641	

**Moving seasonality present at the one percent level.

COMBINED TEST FOR THE PRESENCE OF IDENTIFIABLE SEASONALITY

Final unmodified SI ratios, with labels for outliers and extreme values
From 2006.Jul to 2021.Jun
Observations 180

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec
2006						
	14.2	8.9	7.4	7.7	1.0	-19.3
2007	-25.6	-25.6	-15.4	6.2	20.5	21.6
	10.9	7.6	12.9	6.8	4.6	-17.6
2008	-32.6	-32.2	-29.8*	7.2	36.6*	27.5
	14.1	13.1	2.4*	5.8	-3.7	-16.2
2009	-31.1	-22.9*	-12.6	1.5	19.0	21.9
	15.2	15.3	6.9	6.3	0.1	-17.2
2010	-30.9	-30.1	-7.4*	4.5	23.8	20.5
	14.9	11.5	10.2	5.4	0.2	-19.3
2011	-28.4	-24.9	-13.4	3.7	15.2	21.4
	16.4	1.7*	9.5	3.3	5.6	-12.2
2012	-29.0	-33.0	-34.4*	-18.2*	28.7*	39.9*
	18.1	15.6	13.4	6.0	10.0*	-14.9
2013	-34.9	-32.3	-24.9	-2.2	10.9*	30.2
	16.9	13.4	14.4	15.9	2.1	-17.9
2014	-33.6	-35.1	-28.3	-2.9	23.0	28.7
	12.3	22.2	22.5	14.3	-1.6	-20.4
2015	-36.2	-35.5	-30.1	-2.8	24.4	32.2
	14.9	18.8	20.9	19.0	-0.1	-27.5*
2016	-38.6	-38.7	-24.4	-3.2	28.1	35.5*
	10.1*	7.0*	22.8	14.0	-3.1	-17.2
2017	-37.9	-49.4	-26.2	0.6	23.2	26.9
	26.9	26.8	18.4	10.8	12.8*	-37.7*
2018	-45.3	-41.8	-23.1	-4.1	16.2	25.7
	30.4	32.9	6.6*	20.8	6.9	-20.7
2019	-42.8	-58.4	-46.7*	-2.6	21.6	27.6
	25.4	26.5	17.7	28.4	8.0	-25.8
2020	-42.1	-40.1*	-7.1*	-46.4*	-20.3*	16.8
	28.2	35.4	24.4	39.2*	8.6	-26.4
2021	-51.7	-53.3	-19.3	3.3	6.0	19.6

Key to symbols:
  * : extreme value as determined by X-11 extreme value procedure

Final replacement values for SI ratios
From 2006.Jul to 2021.Jun
Observations 180

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec
2006						
	********	********	********	********	********	********
2007	********	********	********	********	********	********
	********	********	********	********	********	********
2008	********	********	-14.3	********	20.7	********
	********	********	5.8	********	********	********
2009	********	-23.0	********	********	********	********
	********	********	********	********	********	********
2010	********	********	-12.9	********	********	********
	********	********	********	********	********	********
2011	********	********	********	********	********	********
	********	12.7	********	********	********	********
2012	********	********	-21.5	-0.7	19.5	26.1
	********	********	********	********	6.2	********
2013	********	********	********	********	20.3	********
	********	********	********	********	********	********
2014	********	********	********	********	********	********
	********	********	********	********	********	********
2015	********	********	********	********	********	********
	********	********	********	********	********	-27.2
2016	********	********	********	********	********	32.9
	11.7	22.0	********	********	********	********
2017	********	********	********	********	********	********
	********	********	********	********	7.1	-25.1
2018	********	********	********	********	********	********
	********	********	11.2	********	********	********
2019	********	********	-25.5	********	********	********
	********	********	********	********	********	********
2020	********	-44.7	-28.1	-7.2	9.1	********
	********	********	********	31.3	********	********
2021	********	********	********	********	********	********

Final seasonal factors
From 2006.Jul to 2021.Jun
Observations 180
Seasonal filter 3 x 5 moving average

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	AVGE
2006							
	13.4	10.7	8.5	6.7	0.6	-17.6	3.7
2007	-29.9	-27.4	-13.9	4.9	20.6	23.2	
	13.6	11.0	8.5	6.6	0.5	-17.7	0.0
2008	-29.9	-27.4	-13.9	4.8	20.4	22.9	
	13.8	11.5	8.7	6.2	0.8	-17.2	0.1
2009	-30.0	-27.8	-14.2	4.2	20.1	22.9	
	14.5	12.3	8.9	5.8	1.3	-16.6	0.1
2010	-30.2	-28.1	-15.3	3.0	19.6	23.2	
	15.3	13.0	9.7	6.3	2.2	-16.0	0.2
2011	-30.8	-29.4	-17.4	1.5	19.6	24.1	
	15.7	14.0	11.4	7.5	2.6	-16.2	0.2
2012	-31.4	-30.5	-20.3	0.1	19.8	25.4	
	15.7	15.0	13.8	9.7	2.9	-17.0	0.3
2013	-32.6	-32.6	-23.3	-1.2	21.0	27.4	
	15.2	16.7	16.5	11.8	2.2	-18.1	0.2
2014	-34.3	-35.1	-25.6	-2.1	22.1	29.1	
	15.6	18.6	18.5	13.7	1.6	-19.6	0.2
2015	-36.2	-37.8	-26.5	-2.6	23.0	29.6	
	16.7	21.3	19.5	15.0	1.3	-20.8	0.2
2016	-38.1	-41.0	-26.5	-2.5	22.9	29.2	
	19.1	23.6	19.2	16.5	2.3	-22.0	0.2
2017	-39.7	-43.8	-26.0	-2.9	21.5	27.8	
	21.6	26.2	18.8	18.5	3.8	-22.4	0.3
2018	-41.5	-46.9	-25.2	-2.6	19.0	25.9	
	24.5	28.2	18.3	20.8	5.8	-23.2	0.3
2019	-43.2	-48.4	-24.5	-2.6	15.9	23.8	
	26.6	30.1	18.3	23.1	7.1	-23.6	0.2
2020	-44.7	-49.8	-24.0	-2.2	13.8	22.6	
	27.9	31.0	18.0	24.6	7.9	-24.1	0.1
2021	-45.2	-50.3	-23.9	-2.2	13.1	22.3	
							-14.4
AVGE	-35.8	-37.1	-21.4	-0.2	19.5	25.3	
	18.0	18.9	14.4	12.9	2.9	-19.5	

Table Total- -32.7 Mean- -0.2 Std. Dev.- 22.1
Min - -50.3 Max - 31.0

Final seasonally adjusted data
From 2006.Jul to 2021.Jun
Observations 180

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	TOTAL
2006							
	109.6	108.3	110.5	114.3	115.4	114.6	672.7
2007	120.9	117.4	111.9	112.1	108.4	105.8	
	105.4	107.0	117.5	115.4	120.5	116.7	1359.0
2008	113.9	112.4	102.9	123.2	138.6	127.1	
	121.2	119.5	108.3	111.8	106.2	111.2	1396.2
2009	109.0	114.8	111.2	106.8	108.9	110.1	
	113.5	117.7	114.1	117.2	115.7	116.6	1355.7
2010	117.2	117.1	128.3	123.0	126.4	119.8	
	121.7	120.0	121.3	119.7	118.8	118.0	1451.5
2011	123.8	125.4	123.4	119.5	110.4	109.9	
	112.3	100.0	112.6	113.5	124.4	129.2	1404.3
2012	131.4	130.5	123.3	123.9	156.2	166.6	
	158.3	159.0	159.2	156.3	167.1	162.0	1793.9
2013	157.6	160.6	159.3	160.2	151.0	163.6	
	161.8	156.3	157.5	164.2	160.8	162.1	1915.2
2014	163.3	163.1	160.6	163.1	165.9	165.9	
	164.4	172.4	173.5	170.3	166.4	168.6	1997.6
2015	169.2	171.8	166.5	170.6	173.0	175.4	
	172.3	172.7	177.5	181.0	176.7	172.8	2079.5
2016	181.1	186.0	187.5	185.5	191.1	190.8	
	173.9	165.4	185.8	180.5	178.7	190.0	2196.4
2017	187.7	180.8	187.0	191.9	191.5	190.2	
	197.4	192.8	191.2	183.5	200.2	176.4	2270.4
2018	188.5	197.9	195.2	191.6	190.0	192.1	
	197.5	195.8	178.7	189.2	189.2	190.2	2295.9
2019	189.2	181.4	172.5	197.6	205.1	203.2	
	196.4	190.9	190.7	193.9	186.9	180.6	2288.4
2020	180.7	181.8	183.0	117.2	125.2	154.4	
	164.1	173.0	179.0	189.4	177.1	176.1	2000.9
2021	175.2	183.3	195.9	201.2	191.9	198.7	
							1146.2
AVGE	153.9	154.9	153.9	152.5	155.6	158.3	
	151.3	150.1	151.8	153.3	153.6	152.4	

Monitoring and Quality Assessment Statistics

All the measures below are in the range from 0 to 3 with an Acceptance region from 0 to 1.

1.	The relative contribution of the irregular over three Months span (from Table F 2.B).	M1 = 0.229
2.	The relative contribution of the irregular component To the stationary portion of the variance (from Table F 2.F).	M2 = 0.187
3.	The amount of month to month change in the irregular Component as compared to the amount of month to month Change in the trend-cycle (from Table F2.H).	M3 = 0.571
4.	The amount of autocorrelation in the irregular as Described by the average duration of run (Table F 2.D).	M4 = 1.494
5.	The number of months it takes the change in the trend-Cycle to surpass the amount of change in the irregular (From Table F 2.E).	M5 = 0.819
6.	The amount of year to year change in the irregular as Compared to the amount of year to year change in the Seasonal (from Table F 2.H).	M6 = 0.302
7.	The amount of moving seasonality present relative to The amount of stable seasonality (from Table F 2.I).	M7 = 0.361
8.	The size of the fluctuations in the seasonal component Throughout the whole series.	M8 = 0.482
9.	The average linear movement in the seasonal component Throughout the whole series.	M9 = 0.376
10.	Same as 8, calculated for recent years only.	M10 = 0.702
11.	Same as 9, calculated for recent years only.	M11 = 0.695

*** ACCEPTED *** at the level 0.52

*** Check the 1 above measures which failed.

*** Q (without M2) = 0.56 ACCEPTED.

13. Appendix-E: Seasonal Adjustment Working for Agricultural Electricity Consumption

Time series data (for the span analyzed)
From 2006.Jul to 2021.Jun
Observations 180

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	TOTAL
2006							
	67.0	57.0	62.0	68.0	62.0	50.0	366.0
2007	53.0	56.0	49.0	60.0	60.0	67.0	
	63.0	66.0	69.0	69.0	71.0	57.0	740.0
2008	60.0	66.0	64.0	65.0	67.0	73.0	
	74.0	70.0	81.0	67.0	79.0	52.0	818.0
2009	55.0	71.0	63.0	65.0	74.0	75.0	
	74.0	71.0	82.0	66.0	78.0	52.0	826.0
2010	55.0	71.0	64.0	66.0	74.0	76.0	
	86.0	76.0	86.0	81.0	82.0	76.0	893.0
2011	62.0	65.0	63.0	72.0	72.0	86.0	
	82.0	83.0	72.0	85.0	87.0	77.0	906.0
2012	67.0	71.0	68.0	69.0	70.0	79.0	
	78.0	85.0	74.0	83.0	78.0	69.0	891.0
2013	64.0	61.0	62.0	63.0	64.0	77.0	
	79.0	82.0	78.0	79.0	72.0	68.0	849.0
2014	63.0	63.0	60.0	62.0	66.0	76.0	
	80.0	85.0	80.0	74.0	66.0	59.0	834.0
2015	57.0	62.0	61.0	60.0	69.0	71.0	
	78.0	71.0	77.0	73.0	65.0	65.0	809.0
2016	60.0	60.0	57.0	61.0	73.0	83.0	
	75.0	75.0	71.0	73.0	62.0	62.0	812.0
2017	62.0	58.0	63.0	59.0	73.0	72.0	
	75.0	76.0	74.0	71.0	64.0	69.0	816.0
2018	70.0	67.0	65.0	40.0	49.0	48.0	
	48.0	49.0	49.0	43.0	40.0	40.0	608.0
2019	39.0	37.0	34.0	37.0	40.0	49.0	
	42.0	38.0	33.0	32.0	30.0	34.0	445.0
2020	30.0	33.0	30.0	29.0	39.0	44.0	
	41.0	39.0	29.0	31.0	32.0	32.0	409.0
2021	30.0	33.0	30.0	31.0	39.0	42.0	
							205.0
AVGE	55.1	58.3	55.5	55.9	61.9	67.9	
	69.5	68.2	67.8	66.3	64.5	57.5	

Table Total- 11227.0 Mean- 62.4 Std. Dev.- 15.4
Min - 29.0 Max - 87.0

Final unmodified SI ratios
From 2006.Jul to 2021.Jun
Observations 180

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	AVGE
2006							
	9.0	-0.2	5.3	11.5	5.4	-7.1	4.0
2007	-4.8	-2.5	-10.1	0.4	-0.3	6.1	
	1.3	3.5	5.8	4.8	5.6	-9.5	0.0
2008	-7.4	-2.0	-4.3	-3.5	-1.6	4.4	
	5.2	1.1	12.0	-2.0	10.1	-17.0	-0.4
2009	-14.3	1.1	-7.4	-5.8	3.2	4.6	
	4.2	2.0	13.7	-1.9	10.0	-16.7	-0.6
2010	-14.6	0.4	-7.6	-6.4	0.8	2.2	
	11.6	0.9	10.5	5.6	7.0	1.7	1.0
2011	-11.7	-8.6	-11.1	-2.9	-3.9	9.3	
	4.8	5.4	-5.8	6.8	8.4	-1.8	-0.9
2012	-11.6	-7.0	-9.0	-6.9	-4.9	4.9	
	4.4	11.6	0.6	9.7	5.0	-3.5	-0.6
2013	-7.8	-10.2	-8.8	-7.5	-6.5	6.4	
	8.3	11.1	7.1	7.9	0.9	-3.1	-0.2
2014	-7.9	-7.6	-10.2	-8.0	-4.0	5.8	
	9.6	14.9	10.6	5.5	-1.8	-8.4	-0.1
2015	-10.5	-5.9	-7.1	-8.0	1.4	3.8	
	11.0	3.9	9.4	5.1	-2.9	-2.6	-0.2
2016	-7.4	-7.3	-10.6	-7.0	4.6	14.5	
	6.7	7.2	3.9	6.6	-3.9	-3.6	0.3
2017	-3.6	-7.8	-3.4	-8.4	4.6	2.9	
	5.5	6.3	4.3	1.3	-5.4	0.5	-0.3
2018	3.4	3.6	5.9	-14.3	-0.9	1.4	
	3.3	5.2	5.5	-0.1	-2.4	-1.4	0.8
2019	-1.6	-3.1	-5.8	-2.5	1.1	11.1	
	5.4	2.8	-1.1	-1.4	-3.2	0.8	0.2
2020	-3.5	-1.0	-4.5	-6.2	3.1	7.7	
	4.7	3.0	-6.4	-3.6	-2.0	-1.7	-0.9
2021	-3.8	-1.1	-4.7	-4.2	3.2	5.7	
							-0.8
AVGE	-7.1	-3.9	-6.6	-6.1	0.0	6.1	
	6.3	5.2	5.0	3.7	2.1	-4.9	

Table Total- -2.3 Mean- 0.0 Std. Dev.- 6.8
Min - -17.0 Max - 14.9

F-tests for seasonality

Test for the presence of seasonality assuming stability.

	Sum of Squares	Dgrs.of Freedom	Mean Square	F-Value
Between months	4770.8074	11	433.70977	21.158**
Residual	3443.7655	168	20.49860	
Total	8214.5730	179		

**Seasonality present at the 0.1 per cent level.

Nonparametric Test for the Presence of Seasonality Assuming Stability

Kruskal-Wallis Statistic	Degrees of Freedom	Probability Level
108.4515	11	0.000%

Seasonality present at the one percent level.

Moving Seasonality Test

	Sum of Squares	Dgrs.of Freedom	Mean Square	F-value
Between Years	319.1945	13	24.553423	2.106
Error	1667.1815	143	11.658612	

Moving seasonality present at the five percent level.

COMBINED TEST FOR THE PRESENCE OF IDENTIFIABLE SEASONALITY

IDENTIFIABLE SEASONALITY PRESENT

Final unmodified SI ratios, with labels for outliers and extreme values
From 2006.Jul to 2021.Jun
Observations 180

	Jan	Feb	Mar	Apr	May	Jun
	Jul	Aug	Sep	Oct	Nov	Dec
2006						
	9.0	-0.2	5.3	11.5*	5.4	-7.1
2007	-4.8*	-2.5	-10.1	0.4	-0.3	6.1
	1.3	3.5	5.8	4.8	5.6	-9.5
2008	-7.4	-2.0	-4.3	-3.5	-1.6	4.4
	5.2	1.1	12.0	-2.0	10.1	-17.0*
2009	-14.3	1.1	-7.4	-5.8	3.2	4.6
	4.2	2.0	13.7*	-1.9*	10.0	-16.7*
2010	-14.6	0.4*	-7.6	-6.4	0.8	2.2
	11.6*	0.9*	10.5	5.6	7.0	1.7*
2011	-11.7	-8.6	-11.1	-2.9	-3.9	9.3*
	4.8	5.4	-5.8*	6.8	8.4	-1.8
2012	-11.6	-7.0	-9.0	-6.9	-4.9	4.9
	4.4	11.6	0.6*	9.7	5.0	-3.5
2013	-7.8	-10.2	-8.8	-7.5	-6.5*	6.4
	8.3	11.1	7.1	7.9	0.9	-3.1
2014	-7.9	-7.6	-10.2	-8.0	-4.0	5.8
	9.6	14.9*	10.6*	5.5	-1.8	-8.4*
2015	-10.5	-5.9	-7.1	-8.0	1.4	3.8
	11.0*	3.9*	9.4*	5.1	-2.9	-2.6
2016	-7.4	-7.3	-10.6*	-7.0	4.6	14.5*
	6.7	7.2	3.9	6.6	-3.9	-3.6
2017	-3.6	-7.8	-3.4	-8.4	4.6	2.9
	5.5	6.3	4.3	1.3	-5.4	0.5
2018	3.4*	3.6*	5.9*	-14.3*	-0.9*	1.4*
	3.3	5.2	5.5	-0.1	-2.4	-1.4
2019	-1.6	-3.1	-5.8	-2.5*	1.1	11.1*
	5.4	2.8	-1.1*	-1.4	-3.2	0.8
2020	-3.5	-1.0	-4.5	-6.2	3.1	7.7
	4.7	3.0	-6.4*	-3.6	-2.0	-1.7
2021	-3.8	-1.1	-4.7	-4.2	3.2	5.7

Key to symbols:
* : extreme value as determined by X-11 extreme value procedure

Final replacement values for SI ratios
From 2006.Jul to 2021.Jun
Observations 180

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec
2006						
	********	********	********	2.9	********	********
2007	-4.9	********	********	********	********	********
	********	********	********	********	********	********
2008	********	********	********	********	********	********
	********	********	********	********	********	-7.5
2009	********	********	********	********	********	********
	********	********	11.8	-1.2	********	-6.2
2010	********	-0.2	********	********	********	********
	8.4	1.1	********	********	********	-1.6
2011	********	********	********	********	********	7.9
	********	********	7.2	********	********	********
2012	********	********	********	********	********	********
	********	********	5.8	********	********	********
2013	********	********	********	********	-6.5	********
	********	********	********	********	********	********
2014	********	********	********	********	********	********
	********	11.1	9.9	********	********	-5.1
2015	********	********	********	********	********	********
	9.5	7.1	9.1	********	********	********
2016	********	********	-9.0	********	********	5.2
	********	********	********	********	********	********
2017	********	********	********	********	********	********
	********	********	********	********	********	********
2018	-0.5	-2.4	-3.8	-5.5	-0.6	1.8
	********	********	********	********	********	********
2019	********	********	********	-2.5	********	5.7
	********	********	1.4	********	********	********
2020	********	********	********	********	********	********
	********	********	2.5	********	********	********
2021	********	********	********	********	********	********

Final seasonally adjusted data
From 2006.Jul to 2021.Jun
Observations 180

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	TOTAL
2006							
	61.9	55.4	53.7	66.5	54.5	57.7	349.8
2007	62.7	57.0	56.3	63.5	59.5	62.5	
	57.8	64.5	60.4	67.4	63.4	64.2	739.1
2008	70.0	67.4	71.6	68.6	66.8	68.4	
	69.0	68.1	71.9	65.0	71.1	58.3	816.3
2009	65.8	73.2	70.8	69.2	74.4	70.4	
	68.9	68.3	72.7	63.1	69.9	57.1	823.8
2010	66.4	74.5	72.3	70.9	75.4	71.1	
	80.7	71.7	76.9	76.8	74.3	80.0	891.2
2011	73.4	70.0	71.7	77.9	74.5	80.9	
	75.9	76.9	63.3	79.4	80.8	80.3	905.0
2012	77.8	77.5	77.2	75.4	73.2	73.5	
	71.2	77.2	65.9	76.3	73.9	72.1	891.2
2013	73.9	68.4	71.2	69.9	67.0	71.4	
	71.6	73.0	70.3	72.0	70.2	71.3	850.3
2014	71.9	70.8	68.6	69.3	67.7	70.6	
	72.3	75.8	72.8	67.6	66.5	62.3	836.2
2015	64.6	69.3	68.8	67.5	69.0	66.1	
	70.4	62.4	70.2	67.8	67.3	68.1	811.5
2016	66.2	66.5	63.7	68.0	71.6	78.6	
	67.9	67.8	65.0	69.4	65.3	64.4	814.4
2017	66.8	63.3	68.9	65.4	70.8	67.7	
	68.8	70.0	69.1	68.9	67.5	70.8	818.0
2018	73.7	71.3	70.2	45.7	46.4	43.4	
	42.6	44.0	45.1	42.4	43.5	41.1	609.5
2019	41.9	40.2	38.8	42.3	37.7	44.0	
	37.1	33.6	29.6	32.6	33.2	34.8	445.9
2020	32.6	35.3	34.7	33.8	36.9	38.7	
	36.4	35.0	25.7	32.3	35.0	32.7	409.3
2021	32.7	34.9	34.9	35.6	37.0	36.4	
							211.5
AVGE	62.7	62.6	62.6	61.5	61.9	62.9	
	63.5	62.9	60.8	63.2	62.4	61.0	

Table Total- 11223.2 Mean- 62.4 Std. Dev.- 14.2
Min - 25.7 Max - 80.9

Monitoring and Quality Assessment Statistics

All the measures below are in the range from 0 to 3 with an acceptance region from 0 to 1.

1.	The relative contribution of the irregular over three months span (from Table F 2.B).	M1 = 1.495
2.	The relative contribution of the irregular component to the stationary portion of the variance (from Table F 2.F).	M2 = 0.406
3.	The amount of month to month change in the irregular component as compared to the amount of month to month change in the trend-cycle (from Table F2.H).	M3 = 1.371
4.	The amount of autocorrelation in the irregular as described by the average duration of run (Table F 2.D).	M4 = 0.368
5.	The number of months it takes the change in the trend-cycle to surpass the amount of change in the irregular (from Table F 2.E).	M5 = 1.726
6.	The amount of year to year change in the irregular as compared to the amount of year to year change in the seasonal (from Table F 2.H).	M6 = 0.289
7.	The amount of moving seasonality present relative to the amount of stable seasonality (from Table F 2.I).	M7 = 0.561
8.	The size of the fluctuations in the seasonal component throughout the whole series.	M8 = 1.151
9.	The average linear movement in the seasonal component throughout the whole series.	M9 = 0.440
10.	Same as 8, calculated for recent years only.	M10 = 1.422
11.	Same as 9, calculated for recent years only.	M11 = 1.384

*** CONDITIONALLY ACCEPTED *** at the level 0.90

*** Check the 6 above measures which failed.

*** Q (without M2) = 0.97 CONDITIONALLY ACCEPTED.

14. Appendix-F: Seasonal Adjustment Working for Other Consumers of Electricity Consumption

Time series data (for the span analyzed)
From 2006.Jul to 2021.Jun
Observations 180

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	TOTAL
2006							
	579.0	584.0	591.0	604.0	562.0	484.0	3404.0
2007	376.0	383.0	438.0	497.0	609.0	586.0	
	601.0	557.0	588.0	504.0	428.0	367.0	5934.0
2008	348.0	326.0	331.0	410.0	470.0	527.0	
	533.0	547.0	582.0	584.0	539.0	515.0	5712.0
2009	358.0	424.0	540.0	554.0	618.0	609.0	
	538.0	544.0	589.0	589.0	555.0	509.0	6427.0
2010	374.0	427.0	554.0	570.0	623.0	612.0	
	489.0	574.0	577.0	605.0	560.0	577.0	6542.0
2011	564.0	542.0	593.0	624.0	644.0	645.0	
	656.0	633.0	630.0	603.0	607.0	631.0	7372.0
2012	578.0	546.0	579.0	574.0	563.0	545.0	
	545.0	549.0	537.0	555.0	546.0	515.0	6632.0
2013	522.0	474.0	530.0	522.0	550.0	549.0	
	553.0	538.0	545.0	549.0	513.0	523.0	6368.0
2014	522.0	477.0	526.0	518.0	537.0	542.0	
	571.0	571.0	561.0	543.0	530.0	520.0	6418.0
2015	520.0	488.0	533.0	540.0	573.0	568.0	
	533.0	542.0	534.0	553.0	508.0	490.0	6382.0
2016	458.0	377.0	463.0	446.0	528.0	544.0	
	524.0	533.0	528.0	522.0	489.0	506.0	5918.0
2017	484.0	442.0	497.0	513.0	505.0	524.0	
	92.0	97.0	95.0	95.0	84.0	66.0	3494.0
2018	66.0	67.0	74.0	134.0	148.0	150.0	
	146.0	147.0	143.0	143.0	132.0	124.0	1474.0
2019	116.0	111.0	110.0	136.0	143.0	146.0	
	165.0	147.0	142.0	139.0	117.0	92.0	1564.0
2020	95.0	92.0	99.0	111.0	142.0	152.0	
	162.0	162.0	146.0	140.0	119.0	100.0	1520.0
2021	92.0	94.0	109.0	133.0	153.0	170.0	
							751.0
AVGE	364.9	351.3	398.4	418.8	453.7	457.9	
	445.8	448.3	452.5	448.5	419.3	401.3	

Table Total- 75912.0 Mean- 421.7 Std. Dev.- 190.3
Min - 66.0 Max - 656.0

Final unmodified SI ratios
From 2006.Jul to 2021.Jun
Observations 180

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	AVGE
2006							
	48.0	46.9	48.8	58.4	17.0	-55.8	27.2
2007	-156.2	-142.4	-84.5	-26.3	84.1	63.4	
	88.0	61.0	112.4	47.2	-15.2	-67.6	-3.0
2008	-80.9	-100.0	-94.9	-20.0	29.5	69.5	
	53.3	42.8	56.7	44.1	-9.2	-37.4	-3.9
2009	-197.5	-133.4	-16.7	1.0	71.0	67.9	
	0.2	6.0	48.1	44.6	9.0	-36.7	-11.4
2010	-170.9	-119.1	3.1	12.3	59.4	45.3	
	-77.5	8.6	10.4	33.2	-20.2	-12.9	-19.0
2011	-34.4	-62.8	-16.4	10.9	27.0	23.9	
	30.9	5.6	2.8	-21.3	-13.0	16.8	-2.5
2012	-28.5	-49.5	-2.1	8.7	12.7	5.9	
	12.0	17.5	4.0	20.2	10.5	-19.4	-0.7
2013	-10.6	-57.4	-1.2	-9.6	17.4	16.2	
	21.5	8.4	17.2	21.7	-15.2	-7.4	0.1
2014	-10.0	-55.2	-5.5	-13.5	4.4	7.2	
	33.6	32.1	21.9	4.7	-7.5	-17.8	-0.5
2015	-19.8	-54.3	-10.1	-1.1	35.7	34.2	
	1.3	10.9	4.3	27.5	-8.3	-12.0	0.7
2016	-27.7	-95.5	-3.8	-24.3	46.2	47.4	
	13.3	11.9	1.8	-4.6	-35.2	-13.7	-7.0
2017	-27.1	-53.3	28.0	83.4	127.7	207.7	
	-161.6	-99.0	-55.1	-22.9	-14.1	-22.6	-0.8
2018	-20.5	-21.8	-19.8	33.2	38.4	30.5	
	16.7	8.9	-1.6	-5.2	-16.6	-21.6	1.7
2019	-23.8	-22.2	-17.5	12.0	19.5	20.2	
	35.6	14.7	9.1	7.7	-10.8	-31.8	1.0
2020	-25.6	-27.0	-20.2	-10.3	17.7	24.6	
	32.0	30.6	15.1	11.3	-7.0	-24.2	1.4
2021	-32.1	-32.2	-20.7	-0.9	14.8	27.8	
							-7.2
AVGE	-57.7	-68.4	-18.8	3.7	40.4	46.1	
	9.8	13.8	19.7	17.8	-9.1	-24.3	

Table Total- -404.5 Mean- -2.2 Std. Dev.- 50.6
Min - -197.5 Max - 207.7

F-tests for seasonality

Test for the presence of seasonality assuming stability.

	Sum of Squares	Dgrs.of Freedom	Mean Square	F-Value
Between months	206029.4600	11	18729.95091	12.365**
Residual	254482.4143	168	1514.77628	
Total	460511.8743	179		

**Seasonality present at the 0.1 per cent level.

Nonparametric Test for the Presence of Seasonality Assuming Stability

Kruskal-Wallis Statistic	Degrees of Freedom	Probability Level
109.3227	11	0.000%

Seasonality present at the one percent level.

Moving Seasonality Test

	Sum of Squares	Dgrs.of Freedom	Mean Square	F-value
Between Years	78770.1884	13	6059.245265	7.474**
Error	115925.2033	143	810.665757	

**Moving seasonality present at the one percent level.

COMBINED TEST FOR THE PRESENCE OF IDENTIFIABLE SEASONALITY

IDENTIFIABLE SEASONALITY NOT PRESENT

Final unmodified SI ratios, with labels for outliers and extreme values
From 2006.Jul to 2021.Jun
Observations 180

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec
2006						
	48.0	46.9	48.8	58.4	17.0	-55.8
2007	-156.2*	-142.4	-84.5*	-26.3	84.1	63.4
	88.0*	61.0	112.4*	47.2	-15.2	-67.6
2008	-80.9	-100.0	-94.9*	-20.0	29.5	69.5
	53.3	42.8	56.7	44.1	-9.2	-37.4
2009	-197.5*	-133.4	-16.7	1.0	71.0	67.9
	0.2	6.0	48.1	44.6	9.0	-36.7
2010	-170.9*	-119.1	3.1*	12.3	59.4	45.3
	-77.5*	8.6	10.4	33.2	-20.2	-12.9
2011	-34.4	-62.8	-16.4	10.9	27.0	23.9
	30.9	5.6	2.8	-21.3*	-13.0	16.8*
2012	-28.5	-49.5	-2.1	8.7	12.7	5.9
	12.0	17.5	4.0	20.2	10.5	-19.4
2013	-10.6	-57.4	-1.2	-9.6	17.4	16.2
	21.5	8.4	17.2	21.7	-15.2	-7.4
2014	-10.0	-55.2	-5.5	-13.5	4.4*	7.2
	33.6*	32.1*	21.9	4.7	-7.5	-17.8
2015	-19.8	-54.3	-10.1	-1.1	35.7	34.2
	1.3	10.9	4.3	27.5	-8.3	-12.0
2016	-27.7	-95.5*	-3.8	-24.3*	46.2	47.4
	13.3	11.9	1.8	-4.6	-35.2	-13.7
2017	-27.1	-53.3	28.0	83.4*	127.7*	207.7*
	-161.6*	-99.0*	-55.1*	-22.9	-14.1	-22.6
2018	-20.5	-21.8	-19.8	33.2	38.4	30.5
	16.7	8.9	-1.6	-5.2	-16.6	-21.6
2019	-23.8	-22.2	-17.5	12.0	19.5	20.2
	35.6	14.7	9.1	7.7	-10.8	-31.8
2020	-25.6	-27.0	-20.2	-10.3	17.7	24.6
	32.0	30.6	15.1	11.3	-7.0	-24.2
2021	-32.1	-32.2	-20.7	-0.9	14.8	27.8

Key to symbols:
 * : extreme value as determined by X-11 extreme value procedure

Final replacement values for SI ratios
From 2006.Jul to 2021.Jun
Observations 180

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec
2006						
	********	********	********	********	********	********
2007	-89.6	********	-69.2	********	********	********
	62.4	********	55.6	********	********	********
2008	********	********	-42.0	********	********	********
	********	********	********	********	********	********
2009	-77.7	********	********	********	********	********
	********	********	********	********	********	********
2010	-66.1	********	-4.5	********	********	********
	15.9	********	********	********	********	********
2011	********	********	********	********	********	********
	********	********	********	25.9	********	-3.8
2012	********	********	********	********	********	********
	********	********	********	********	********	********
2013	********	********	********	********	********	********
	********	********	********	********	********	********
2014	********	********	********	********	12.4	********
	30.1	29.1	********	********	********	********
2015	********	********	********	********	********	********
	********	********	********	********	********	********
2016	********	-67.6	********	-9.4	********	********
	********	********	********	********	********	********
2017	********	********	********	34.2	51.4	38.7
	8.0	-3.0	-27.8	********	********	********
2018	********	********	********	********	********	********
	********	********	********	********	********	********
2019	********	********	********	********	********	********
	********	********	********	********	********	********
2020	********	********	********	********	********	********
	********	********	********	********	********	********
2021	********	********	********	********	********	********

Final seasonally adjusted data
From 2006.Jul to 2021.Jun
Observations 180

	Jan Jul	Feb Aug	Mar Sep	Apr Oct	May Nov	Jun Dec	TOTAL
2006							
	524.3	532.3	538.1	552.9	563.2	541.3	3252.1
2007	460.0	506.2	485.9	515.1	548.8	518.6	
	551.3	510.3	535.0	456.0	431.8	421.3	5940.3
2008	429.2	447.4	368.2	421.2	410.6	460.9	
	493.7	511.7	534.3	540.4	545.9	560.0	5723.4
2009	431.2	539.7	564.0	555.0	559.9	549.2	
	511.3	523.5	553.1	551.2	564.0	541.7	6443.9
2010	433.6	526.8	566.6	562.4	574.4	566.2	
	468.8	562.7	557.3	573.3	569.2	597.3	6558.5
2011	606.3	621.4	601.2	615.3	607.5	615.0	
	636.6	624.6	620.3	576.7	615.1	644.2	7384.2
2012	605.4	608.3	584.5	570.4	540.1	527.6	
	524.0	536.4	528.4	534.0	552.0	527.3	6638.3
2013	539.9	529.2	535.1	525.2	531.6	534.1	
	532.8	523.0	532.7	530.1	519.6	535.6	6368.9
2014	538.6	533.5	531.4	525.2	514.4	522.1	
	552.6	553.0	547.6	528.4	540.7	535.0	6422.5
2015	540.5	546.6	535.9	542.7	540.0	537.7	
	518.8	527.7	527.8	543.7	524.0	505.4	6390.8
2016	482.3	433.1	463.7	439.5	486.9	506.9	
	511.2	522.3	530.0	522.7	509.1	523.4	5931.0
2017	509.4	488.9	496.4	495.1	462.7	487.4	
	78.1	90.6	102.9	100.8	102.0	85.5	3499.8
2018	89.4	101.3	81.0	115.2	112.9	119.3	
	126.1	137.3	146.4	147.4	147.2	146.3	1469.8
2019	139.6	138.1	123.8	123.6	117.5	120.5	
	139.0	132.3	138.7	136.9	127.8	117.0	1554.7
2020	120.2	117.8	118.3	108.4	122.7	127.5	
	131.7	142.1	136.6	133.1	128.9	126.3	1513.5
2021	119.4	121.7	128.4	134.8	135.6	144.4	
							784.2
AVGE	403.0	417.3	412.3	416.6	417.7	422.5	
	420.0	428.7	435.3	428.5	429.4	427.2	

Table Total- 75875.9 Mean- 421.5 Std. Dev.- 185.2
Min - 78.1 Max - 644.2

Monitoring and Quality Assessment Statistics

All the measures below are in the range from 0 to 3 with an acceptance region from 0 to 1.

1.	The relative contribution of the irregular over three months span (from Table F 2.B).	M1 = 0.752
2.	The relative contribution of the irregular component to the stationary portion of the variance (from Table F 2.F).	M2 = 0.078
3.	The amount of month to month change in the irregular component as compared to the amount of month to month change in the trend-cycle (from Table F2.H).	M3 = 0.127
4.	The amount of autocorrelation in the irregular as described by the average duration of run (Table F 2.D).	M4 = 0.460
5.	The number of months it takes the change in the trend-cycle to surpass the amount of change in the irregular (from Table F 2.E).	M5 = 0.640
6.	The amount of year to year change in the irregular as compared to the amount of year to year change in the seasonal (from Table F 2.H).	M6 = 0.316
7.	The amount of moving seasonality present relative to the amount of stable seasonality (from Table F 2.I).	M7 = 1.091
8.	The size of the fluctuations in the seasonal component throughout the whole series.	M8 = 1.558
9.	The average linear movement in the seasonal component throughout the whole series.	M9 = 0.789
10.	Same as 8, calculated for recent years only.	M10 = 1.321
11.	Same as 9, calculated for recent years only.	M11 = 0.927

*** ACCEPTED *** at the level 0.73

*** Check the 3 above measures which failed.

*** Q (without M2) = 0.82 CONDITIONALLY ACCEPTED.

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