Energy Communities from Municipality Level to Province Level: A Comparison Using Autoregressive Integrated Moving Average Model

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***Abstract*—**Considering the energy crisis that is hitting Europe, it becomes increasingly necessary to change energy policies to depend less on fossil fuels and replace them with energy from renewable sources. This has triggered the urge to use clean energy, not only to satisfy energy needs and fulfill the required consumption, but also to decrease the danger of climatic changes due to harmful emissions. Many countries have already started creating energy communities based on renewable energy sources. The first step to understanding energy needs in any place is to perfectly know the consumption. In this work, we aim to estimate electricity consumption for a municipality that makes up part of a rural area located in southern Italy using forecast models that allow for the estimation of electricity consumption for the next 10 years, and we then apply the same model to the province where the municipality is located and estimate the future consumption for the same period to examine whether it is possible to start from the municipality level to reach the province level when creating energy communities.

***Keywords*—**ARIMA, electricity consumption, forecasting models, time series.

I. Introduction

FORECASTING models have been of great help to estimate energy consumption. Many approaches have adopted forecasting models to estimate several out-puts. For instance, [1] describes a highly adaptable and robust short-term load forecasting algorithm developed using hybrid modeling techniques. The research study in [2] describes an Artificial Neural Network (ANN) approach for annual electricity consumption in high energy consumption industrial sectors while [3] used polynomial curve and moving average combination projection (PCMACP) model to estimate the natural gas consumption in China for the period from 2009 to 2015. Furthermore, [4] proposes a model as a suitable ANN model (having four independent variables being GDP, population, the amount of import and export) to efficiently estimate the energy consumption for Turkey. Another interesting research study presented in [5] applied the grey forecasting model to estimate the amount of CO_2 emissions in Taiwan for a period spanning from 2010 until 2012. The study in [6] is aimed to develop the logistic and logistic-population model-based approach to forecast the medium- (2020) to long- (2035) term natural gas demand in China while [7] aims to apply a hybrid intelligent approach that combines the Adaptive Differential Evolution (ADE) algorithm with Back Propagation Neural Network (BPNN) namely known as (ADE-BPNN) model supported by an adaptive differential evolution algorithm, to estimate energy consumption. Furthermore, [8] performs a crucial and organized review of renewable energy and electricity forecast models for them to be used as an energy planning tool.

In the face of these studies that have treated several problems and estimated for both short and long term several variables, we propose an additional approach that examines based on the results of estimation whether a model made over a small geographical zone could be adopted to examine a larger zone. More specifically, we aim to address the following research question: how to understand if the design of an energy community in small municipalities is valid for long periods and whether it could be extended to reach provincial level.

The remainder of this research is organized as follows: In Section II, we examine the background, and the state of art. Section III proposes the adopted methodology. In Section IV, we present our case study. Analysis of province of Lecce is illustrated in Section V. Analysis of the municipality of Corsano is given in Section VI. Section VII is the discussion. Finally, we conclude and discuss our future work in Section VIII.

II. State of Art

The proposed model in this work is the ARIMA model which was present in many studies with different contexts and had been used to estimate various aspects. For example, in [9], the monthly number of international visitors in Bumthang, Bhutan from January 2012 to December 2016 is modeled by using Box-Jenkins seasonal Autoregressive Integrated Moving Average (ARIMA) model. The research work presented in [10] describes a new integrated model, called the Variational Mode Decomposition-Autoregressive Integrated Moving Average (VMD-ARIMA) model, which reduces the required data input and improves the accuracy of predictions, based on the deficiencies of data dependence and the complicated mechanisms associated with current temperature forecasting. In

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[11], the Box-Jenkins approach has been used to build the appropriate ARIMA model for the Egyptian GDP data.

Nevertheless, ARIMA model for energy consumption prediction and energy prediction has been used countless times; for instance, in [15], the model was used to forecast energy demand for a case study of a small-scale agricultural load, while in [16], the model was used is to forecast energy consumption of Turkey for a period of 25 years, nevertheless, in [17], authors have proposed residual modification models to improve the accuracy of seasonal ARIMA for electricity demand forecasting. In [18], a double seasonal ARIMA model was used for electrical power demand forecasting in Indonesia. Furthermore, the ARIMA model was used alongside other models to forecast India's energy demand as in [19], while in [20], ARIMA model was used to forecast the energy consumption because of the accuracy that the model provides in China. Nonetheless in [21], it was used alongside neural network models to compare between the forecasting of energy consumption. Furthermore, it was used in the approach of [22] with the objective of making a comparison of forecasting energy consumption of Shandong in China. Electricity load forecasting was carried out using ARIMA model in [23] for energy management in buildings, while in [21] a comparison of China's primary energy consumption forecasting was made by using ARIMA and GM (1,1), in addition, energy consumption in Afghanistan was made thanks to ARIMA model as in [24]. In Australia, short-term electricity demand forecasting was made using several models including ARIMA model. In [25], electricity consumption in southern Tripoli in the state of Libya during the period from January 1, 2016, to March 24, 2016, was analyzed to determine the best forecasting model of electrical consumption for a future period of two weeks. Reference [26] proposes ARIMA models with different sets of parameters for forecasting electricity consumption by presenting the three ARIMA models, which are quite good and robust to develop a reliable model for providing the required level of performance. Nevertheless, in [27], the authors used the ARIMA and seasonal ARIMA methods to estimate the future primary energy demand of Turkey from 2005 to 2020. Another interesting way of using ARIMA could be found in [28]; in this study, the aim is to remove cycling component in time series in the process of forecasting natural gas consumption in Turkey.

III. Methodology

A. Data

This work refers to a time-series data spanning from 2003 to 2020. Data include electricity consumption per sector (Gigawatt-hours), obtained from TERNA which is the competent authority sector that manages the Italian energy transmission grid. The focus of this study is on one sector which is domestic electricity consumption at both municipality level (municipality of Corsano with population of 5198 inhabitants, last updated 30/11/2021) and province level (province of Lecce with population of 772 276 inhabitants, last update 01/01/2022). National electricity consumption by sector data is shown in Appendix section Fig. 10 taken from the annual reports of TERNA for the whole country, reaching afterwards the data of the Apulian region in Appendix section Fig. 11 arriving finally to the data of the province of Lecce Appendix section Fig. 12 while the data of the demographic components for the municipality of Corsano and the average consumption based on the number of family members can be found in Appendix section Fig. 13, taken from ISTAT (i.e., the Italian National Institute of Statistics). Finally, the domestic electricity consumption of the municipality of Corsano is shown in Appendix section Fig. 14.

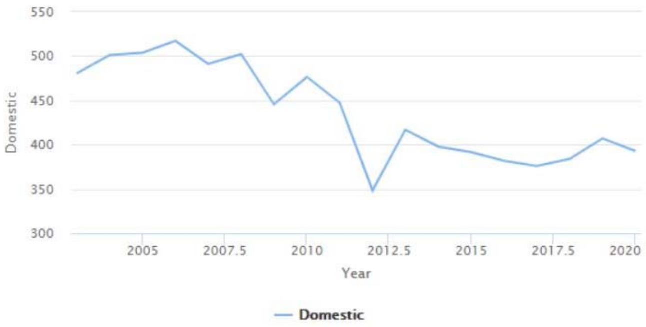

Fig. 1 Trend of domestic electricity consumption (province of Lecce)

To observe the change in domestic consumption in both the municipality and the province, two curves have been plotted, in order to observe the difference in the trend for the period spanning from 2003 to 2020 starting with the province of Lecce.

As noted from Fig. 1, the maximum value of the domestic electricity consumption in the province of Lecce is 517.3 GWh corresponding to 2006, while the minimum value is equal to 348.1 GWh corresponding to 2012, while the average electricity consumption for the domestic sector in the province of Lecce was found to be 443.771 GWh. On the other hand, the curve relative to the municipality of Corsano is shown in Fig. 2.

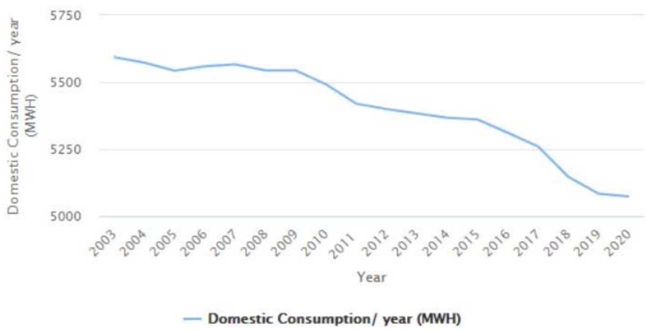

Fig. 2 Trend of domestic electricity consumption in the municipality of Corsano

As noted from Fig. 2, the minimum consumption was found to be 5.084 GWh corresponding to 2019, while the maximum consumption was found to be 5.594 GWh corresponding to 2003, while the average of domestic electricity consumption in Corsano for the given years is 5.421 GWh.

B. ARIMA Model

ARIMA is a model that is used mostly to measure events that happen over a period of time. In other words, it is a time series prediction method that was proposed by Box and Jenkins in the 1970s [29]. ARIMA model consists of three main parameters *p, d, and q* where *p, d,* and *q* are defined as follows:

- *p* represents the part of Autoregressive model (AR).
- *d* represents the Integration indicating the order of single integer (I).
- *q* represents the Moving Average model (MA).

C. Steps to Design ARIMA Model

The steps to apply the ARIMA model start with the data available on which the forecasting needs to be done. Afterward, the stationarity test has to take place, which is also known as the Dickey Fuller test, if stationarity is not fulfilled, differencing has to take place until we reach stationarity. The next step is the autocorrelation and partial autocorrelation in order to obtain the value of *d*, afterward, estimating the values of *p, q* and finally apply forecasting to get the future data.

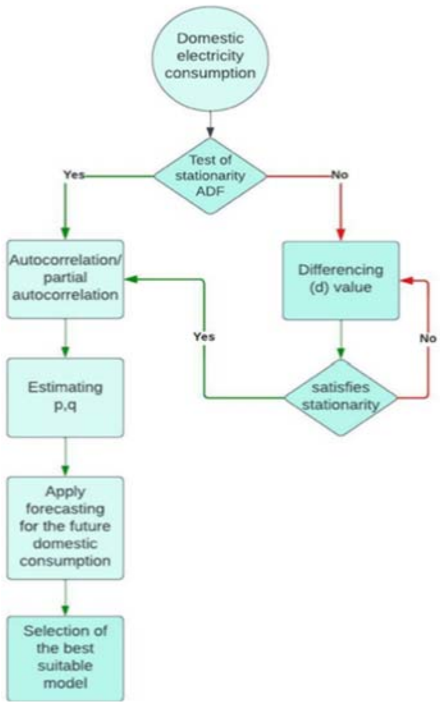

Fig. 3 Procedures of the ARIMA model adapted from [26]

D. Stationarity Test

The stationarity test is done by what is called Augmented Dickey-Fuller Test (ADF). ARIMA (p, d, q), works on stationary data. The ADF test determines whether a time series is stationary or has a unit root, indicating non-stationarity. The ADF test's null hypothesis is that the time series has a unit root (is non-stationary), while the alternative hypothesis is that the time series is stationary. The equation of ADF is as in (1):

$$\Delta Y(t) = \alpha + \beta t + \gamma Y(t-1) + \delta_1 \Delta Y(t-1) + \delta_2 \Delta Y(t-2) + \ldots + \delta p \Delta Y(t-p) + \varepsilon(t) \quad (1)$$

E. Formulas of ARIMA

For an Auto Regressive (AR) only model where Y_t depends only on its own lags. In other words, Y_t is a function of the lags of Y_t. The formula is as follows:

$$Y_t = \alpha + \beta_1 Y_{t-1} + \beta_2 Y_{t-2} + \cdots + \beta_p Y_{t-p} + \vartheta_1 \quad (2)$$

where Y_t is the data on which the ARMA model is to be applied; Y_{t-1} is the lag1 of the series; β_1 is the coefficient of lag1 that the model estimates (β_1, β_2, and so on are the coefficients of AR); α is the intercept term estimated by the model.

For a Moving Average (MA) only model, where Y_t depends only on the lagged forecast errors, the formula is shown as:

$$Y_t = \alpha + \vartheta_t + \varphi_1 \vartheta_{t-1} + \varphi_2 \vartheta_{t-2} + \cdots + \varphi_q \vartheta_{t-q} \quad (3)$$

where φ_1, φ_2, are MA coefficients.

Therefore, an ARIMA model is the model in which the time series was differenced for at least once (or more) to make it stationary, then the autoregressive and the moving average terms are combined. So, the equation is as follows:

$$Y_t = \alpha + \beta_1 Y_{t-1} + \beta_2 Y_{t-2} + \cdots + \beta_p Y_{t-p} \vartheta_t + \varphi_1 \vartheta_{t-1} + \varphi_2 \vartheta_{t-2} + \cdots + \varphi_q \vartheta_{t-q} \quad (4)$$

IV. Case Study

The proposed model is addressed to estimate domestic electricity consumption for a specific zone located in southern Italy - specifically, for the municipality of Corsano alongside the province where it is located which is the province of Lecce. The municipality is part of a group of municipalities sharing specific cultural and geographical commonalities (called “Terra di Leuca”) located in southern tip of the Salento peninsula and exhibiting the typical features of a rural area.

Fig. 4 Geographical location of the municipality of Corsano

V. Analysis Results for the Province of Lecce

A. Stationarity Test

Stationarity test was executed to check the stationarity of the data of the province of Lecce. The output of the stationarity test indicated negative values while performing the analysis, which means that the data are not stationary, the curve of Autocorrelation is shown in Fig. 6.

Fig. 5 Geographical location of the province of Lecce

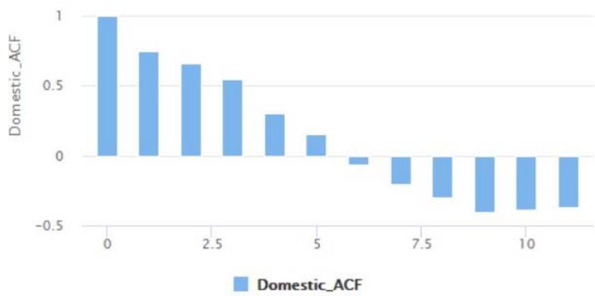

Fig. 6 ACF for domestic electricity consumption (province of Lecce)

As shown in Fig. 6, the output contains negative values which means that the stationarity is not fulfilled. So, a first differentiation must take place. After executing the first differentiation, the stationarity was fulfilled. Hence, we can say that the value of *d* is equal to 1.

After identifying the value of (*d*), it is time to find out the values of AR (*p*) and MA (*q*).

B. Choose the Best ARIMA Model

Several trials have taken place in order to choose the best model. The best model in the case of using the RapidMiner platform [29] is the one that satisfies linearity between the original domestic electricity consumption curve and the forecasted values. The model that satisfies these conditions is found to be the ARIMA model (0,1,1) which means that the model is a pure moving average (MA only). The resulting Forecast Model is reported in Table I.

C. Forecasted Values from 2021 to 2030

The forecasted values are shown in Table II.

TABLE I
RESULTS OF THE ARIMA FORECASTING MODEL FOR THE PROVINCE OF LECCE

ARIMA Model	(p = 0, d = 1, q = 1)
AR Coefficient:	[0]
MA Coefficients:	[-0.5038]
constant:	-6.1064
length of residuals:	1
Equation of Domestic electricity consumption for the province of Lecce	-6.1064+ -0.5038ϑ_{t-1}

TABLE II
FORECASTED VALUES OF THE PROVINCE OF LECCE

Year	Estimated values	Original values
2003		480.4
2004		501.3
2005		503.9
2006		517.3
2007		491.2
2008		502.1
2009		445.9
2010		476.4
2011		447.3
2012		348.1
2013		416.8
2014		397.7
2015		391.6
2016		381.7
2017		375.8
2018		383.9
2019		407.1
2020		392.8
2021	381.681	
2022	375.575	
2023	369.468	
22024	363.362	
2025	357.255	
2026	351.149	
2027	345.042	
2028	338.936	
2029	332.830	
2030	326.723	

D. Forecasting of Domestic Consumption

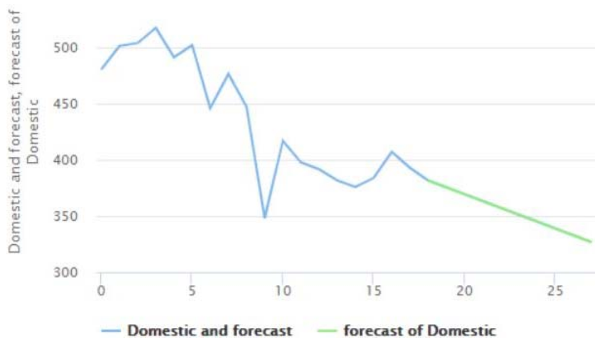

Fig. 7 Forecasted values of the domestic consumption for the province of Lecce

As shown in Fig. 7, the original curve of the historic data is in blue while the forecasted values are shown in green. We can notice that the curve is a descending curve indicating a decrease in the domestic electricity consumption in the province of Lecce for the next 10 years.

VI. Analysis Results for the Municipality of Corsano

A. Stationarity Test

Stationarity test was executed to check the stationarity of the data of the municipality of Corsano. The output of the stationarity test indicated some negative values while performing the analysis, which means that the data are not stationary, the curve of autocorrelation is shown in Fig. 8.

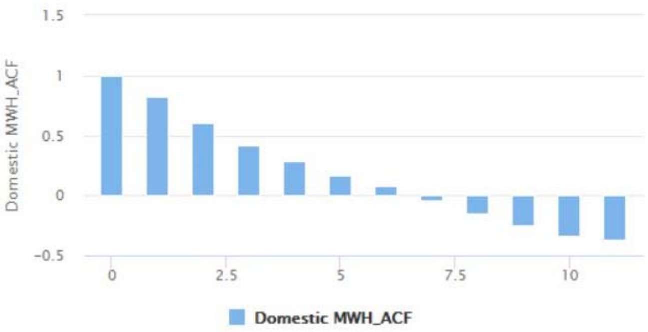

Fig. 8 ACF for Corsano

As shown in Fig. 8, the output contains negative values which means that the stationarity is not fulfilled. So, a first differentiation must take place. After executing the first differentiation, the stationarity was fulfilled. Hence, we can say that the value of d is equal to 1.

B. Choosing the Best ARIMA Model

Similarly, several trials have taken place to choose the best model. The best model in this case is found to be the ARIMA model (0,1,1) which means that the model is a pure moving average (MA only). Fig. 9 shows the original curve and the forecasted curve. The resulting forecast model is reported in Table III.

TABLE III
RESULTS OF THE ARIMA FORECASTING MODEL FOR THE MUNICIPALITY OF CORSANO

ARIMA Model	(p=0, d=1, q=1)
AR Coefficients:	[0]
MA Coefficients:	[0.5321]
Constant:	-29.1035
Length of residuals:	1
Domestic electricity consumption:	-29.1035+ 0.5321$\boldsymbol{\vartheta_{t-1}}$

C. Forecasted Values from 2021 to 2030

The forecasted values are shown in Table IV.

As shown in Fig. 9, the original data are shown in blue while the estimated values are in green. We can understand from the estimated curve that the consumption in the municipality of Corsano is going to decrease for the next 10 years. It must be said that a validation has been made using another platform called gretl and the results are almost the same for the predicted values.

TABLE IV
ESTIMATED VALUES OF THE DOMESTIC CONSUMPTION IN THE MUNICIPALITY OF CORSANO

Year	Estimated values	Original values
2003		5593.61
2004		5573.162
2005		5543.408
2006		5558.807
2007		5566.956
2008		5544.597
2009		5543.659
2010		5492.31
2011		5419.71
2012		5400.07
2013		5383.792
2014		5367.03
2015		5360.688
2016		5311.349
2017		5260.291
2018		5146.514
2019		5083.584
2020		5073.753
2021	5052.247	
2022	5023.143	
2023	4994.040	
22024	4964.936	
2025	4935.832	
2026	4906.729	
2027	4877.625	
2028	4848.522	
2029	4819.418	
2030	4790.315	

D. Forecasting of Domestic Consumption

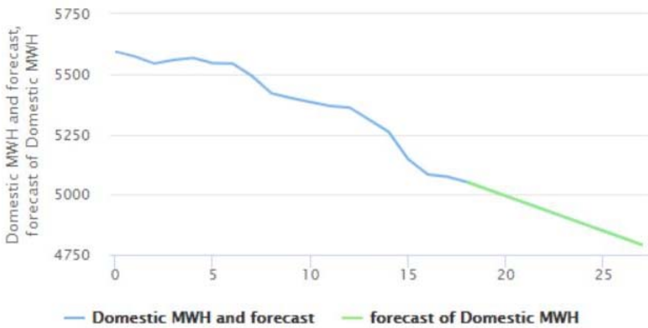

Fig. 9 Forecasted values of the domestic consumption in Corsano

VII. Discussion

After the analysis, many aspects became very clear to decide if an energy community at a municipality level could be extended at a provincial level, for instance:

- The future electricity consumption for the province of Lecce for the next 10 years has indicated a significant decrease.
- The future electricity for the municipality of Corsano for the next 10 years has indicated a significant decrease as well.
- Both ARIMA models suitable for the province and municipality were found to be the same (0,1,1).

- The predicted curves in both cases have the same trend.

From the above-mentioned points, we can answer to our main research question stating that the design for a long period is feasible and efficient and the similarity of the predicted curves for both municipality and province are behaving almost the same. Nonetheless, for both the municipality and the province the values are decreasing which means that an energy community model for the municipality of Corsano could be extended at the level of the province of Lecce.

VIII. Conclusion and Future Work

In this article, an ARIMA model has been used on a case study to predict the future domestic consumption of electricity for the municipality of Corsano, a small town in a rural area located in the province of Lecce (in southern Italy) in order to understand whether a municipality in the province of Lecce might be considered a good starting point to make an energy community model that reaches provincial level. The data regarding consumption were obtained from the annual reports of the competent authority in Italy from 2000 to 2020 afterward, the forecast was done for 10 years starting from 2021 to 2030. The model was found to be ARIMA (0,1,1) for both the municipality and the province, as it fulfills the linearity between original consumption and forecasted consumption. As for the future work a multi-variable analysis must be taken into consideration after this univariate analysis to have a rock-solid idea about all the aspects to create the future energy community.

Appendix

The data for the electricity consumption by sector in Italy are taken from the statistical repository provided by TERNA [30].

NATIONAL (*)					
CONSUMPTION OF ELETTRICAL ENERGY PER SECTOR in GWH					
YEAR	AGRICULTURE	DOMESTIC	INDUSTRIAL	TERTIARY/SERVICES	TOTAL CONSUMPTION
2000	4.906,6	61.111,7	148.192,4	60.635,1	274.845,8
2001	5.162,6	61.553,2	150.973,4	63.409,8	281.099,0
2002	4.890,2	62.957,6	151.314,1	67.364,7	286.526,6
2003	5.162,2	65.015,8	152.720,9	72.361,4	295.260,3
2004	5.184,8	66.592,2	153.155,3	75.153,3	300.085,6
2005	5.364,4	66.932,5	153.726,8	79.304,9	305.328,6
2006	5.503,5	67.602,6	156.150,6	84.009,5	313.266,2
2007	5.659,2	67.220,4	155.804,3	86.001,5	314.685,4
2008	5.669,5	68.388,9	151.366,6	89.149,1	314.574,1
2009	5.649,9	68.924,4	130.505,9	90.376,0	295.456,2
2010	5.610,3	69.550,5	138.439,3	92.161,0	305.761,1
2011	5.907,0	70.140,4	140.039,6	93.246,5	309.333,5
2012	5.923,6	69.456,6	130.800,9	96.454,0	302.635,1
2013	5.677,1	66.983,2	124.870,8	94.966,5	292.497,6
2014	5.372,1	64.255,0	122.505,0	94.201,4	286.333,5
2015	5.689,9	66.187,3	122.362,3	97.834,3	292.073,8
2016	5.567,5	64.304,3	122.738,0	97.452,1	290.061,9
2017	5.990,4	65.490,7	125.524,6	99.360,0	296.365,7
2018	5.843,3	65.137,8	126.432,0	100.328,4	297.741,5
2019	6.052,4	65.588,0	128.940,0	95.673,6	296.254,0
2020	6.310,5	66.211,6	125.417,3	81.231,8	279.171,2

Fig. 10 Electrical energy consumption (in GWh) per sector in Italy

Demographic data were taken from ISTAT (National Institute of Statistics) [31].

Domestic consumption per year was calculated based on the average consumption of the families in Corsano. Average consumption based on the number of family members was obtained from [32].

REGION PUGLIA					
CONSUMPTION OF ELETTRICAL ENERGY PER SECTOR in GWH					
YEAR	AGRICULTURE	DOMESTIC	INDUSTRIAL	TERTIARY/SERVICES	TOTAL CONSUMPTION
2000	565,8	3.791,9	8.432,1	2.817,1	15.606,9
2001	580,4	3.743,9	8.545,9	2.840,0	15.710,2
2002	498,0	3.895,8	8.335,5	3.129,0	15.858,3
2003	510,1	3.986,7	8.420,6	3.297,5	16.214,9
2004	472,2	4.101,4	8.646,0	3.425,6	16.645,2
2005	530,6	4.101,4	9.118,3	3.724,1	17.474,4
2006	515,7	4.161,1	9.162,7	4.024,8	17.864,3
2007	556,5	4.200,9	9.224,2	3.980,5	17.962,1
2008	615,9	4.222,4	9.180,2	4.213,3	18.231,8
2009	514,8	4.260,6	7.192,5	4.306,3	16.274,2
2010	510,8	4.265,3	8.230,6	4.372,6	17.379,3
2011	545,8	4.346,3	9.288,1	4.475,8	18.656,0
2012	570,2	4.415,5	8.827,7	4.613,3	18.426,7
2013	500,9	4.124,3	7.711,7	4.425,9	16.762,8
2014	403,2	3.988,5	8.085,0	4.371,7	16.848,4
2015	492,1	4.160,7	7.254,0	4.573,0	16.479,8
2016	436,0	3.996,7	7.725,2	4.548,9	16.706,8
2017	582,4	4.168,0	7.343,5	4.698,1	16.792,0
2018	466,9	4.100,6	7.208,2	4.729,4	16.505,1
2019	512,3	4.133,9	7.372,6	4.557,9	16.576,7
2020	528,7	4.175,4	6.934,8	3.923,8	15.562,7

Fig. 11 Electrical energy consumption (in GWh) per sector in Apulia administrative region

PROVINCE OF LECCE					
CONSUMPTION OF ELETTRICAL ENERGY PER SECTOR in GWH					
YEAR	AGRICULTURE	DOMESTIC	INDUSTRIAL	TERTIARY/SERVICES	TOTAL CONSUMPTION
2000	86,6	480,7	558,8	816,2	**1.942,3**
2001	91,5	500,2	581,1	802,3	**1.975,1**
2002	75,5	477,0	633,1	830,3	**2.015,9**
2003	69,0	480,4	654,4	840,9	**2.044,7**
2004	69,6	501,3	689,7	859,2	**2.119,8**
2005	70,6	503,9	727,4	855,8	**2.157,7**
2006	68,9	517,3	799,3	868,6	**2.254,1**
2007	67,9	491,2	794,9	878,8	**2.232,8**
2008	75,2	502,1	826,5	884,9	**2.288,7**
2009	68,5	445,9	836,3	887,0	**2.237,7**
2010	68,1	476,4	847,8	891,2	**2.283,5**
2011	74,8	447,3	869,4	918,7	**2.310,2**
2012	70,3	348,1	885,7	930,9	**2.235,0**
2013	66,4	416,8	840,4	870,2	**2.193,8**
2014	58,5	397,7	832,9	836,8	**2.125,9**
2015	61,4	391,6	865,2	886,3	**2.204,5**
2016	60,4	381,7	860,2	852,3	**2.154,6**
2017	64,3	375,8	889,5	898,2	**2.227,8**
2018	58,9	383,9	908,4	882,5	**2.233,7**
2019	56,8	407,1	853,3	886,5	**2.203,7**
2020	56,8	392,8	731,1	890,7	**2.070,6**

Fig. 12 Electrical energy consumption (in GWh) per sector in the administrative province of Lecce

Year	Population	Number of families	Average of family members
2003	5.795	1.775	3,26
2004	5.770	1.813	3,18
2005	5.754	1.838	3,12
2006	5.760	1.861	3,09
2007	5.769	1.882	3,06
2008	5.742	1.893	3,03
2009	5.740	1.918	2,99
2010	5.693	1.926	2,95
2011	5.620	1.940	2,89
2012	5.595	1.967	2,84
2013	5.586	1.968	2,83
2014	5.557	1.990	2,79
2015	5.558	2.002	2,77
2016	5.500	1.998	2,75
2017	5.432	2.008	2,71
2018	5.335	1.994	2,67
2019	5.278	1.992	2,64
2020	5.250	2.011	2,61

Fig.13 Demographic data for the municipality of Corsano

Year	Population	Number of families	Average of family members	average consumption for a single family / year (MWH)	Domestic Consumption/ year (MWH)
2003	5.795	1.775	3,26	3,151	5593,61
2004	5.770	1.813	3,18	3,074	5573,162
2005	5.754	1.838	3,12	3,016	5543,408
2006	5.760	1.861	3,09	2,987	5558,807
2007	5.769	1.882	3,06	2,958	5566,956
2008	5.742	1.893	3,03	2,929	5544,597
2009	5.740	1.918	2,99	2,89	5543,659
2010	5.693	1.926	2,95	2,851	5492,31
2011	5.620	1.940	2,89	2,793	5419,71
2012	5.595	1.967	2,84	2,745	5400,07
2013	5.586	1.968	2,83	2,735	5383,792
2014	5.557	1.990	2,79	2,697	5367,03
2015	5.558	2.002	2,77	2,677	5360,688
2016	5.500	1.998	2,75	2,658	5311,349
2017	5.432	2.008	2,71	2,619	5260,291
2018	5.335	1.994	2,67	2,581	5146,514
2019	5.278	1.992	2,64	2,552	5083,584
2020	5.250	2.011	2,61	2,523	5073,753

Fig. 14 Yearly domestic consumption of electrical energy (in MWh) for the municipality of Corsano

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