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Worldwide Global Scenario by Leading  
Indicators of Energy and Economic Growth

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# Worldwide Global Scenario by Leading Indicators of Energy and Economic Growth

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**ABSTRACT.** The purpose of this report is a description of some key indicators of energy and economic growth in order to support scientific activity of the institute-CERIS in the global analysis of market energy and economic growth.

The figures can provide a practical support to scholars, practitioners and policy makers to have an immediate description of worldwide trends in leading indicators of energy and economic growth. These results can be a first basis for further research investigations by scholars specialized in these research topics.

**KEYWORDS:** Market Energy, Energy systems, Economic Growth

**JEL CLASSIFICATION:** L7, N7, Q4, O3, O52

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## 1. INTRODUCTION

In the recent decades, lifestyle and growing wealth have had a profound effect on the energy sector, which is a driving force for economic growth patterns. Moreover, the increasing demand for energy, soaring oil prices, uncertain energy supplies and fears of global warming have opened a hot debate about energy as well as economic growth issues. In order to support policy makers and business community, it can be useful to understand the energy and economic growth trends by some leading indicators.

The focus of this report is to provide several snapshots of energy and economic growth trends, making a comparison of macro region in the world. Results can be a practical tool to give a first description of global trends, which need to be further on investigated by scholars to provide a complete analysis in order to understand and support strategic decision of social planner in these key fields.

Let me first describe the methodology, sources and data, and then I present the main results.

## 2. SOURCE, DATA AND METHODOLOGY

The source of the data concerning measurement of energy and economic growth across countries is from the time series dataset developed by Norris (2008) of the Harvard University (USA). This dataset contains data on the social, economic and political characteristics of 191 nations, with over 600 variables, from 1972 to 2004. Unfortunately, database has some missing data for certain period of time and some countries. Consequently, I have in-depth described the trends of energy variables across countries over two periods, from 1973 to 1980 and from 1990 to 1997. Table 1 shows the variables applied, whereas table 2 describes the macro regions.

In addition, the Norris dataset, although, is incomplete, it is the only one that contains all data concerning world countries and this allows a world global description of energy market based on macro-regions and indicators. Others datasets have some weaknesses, such as Eurostat dataset is limited to European countries and cannot be used for worldwide global comparisons. For this reason, Norris' dataset is the most suitable for our aims and it is preferred to other energy sources.

Table 1: Description of variables

| <i>Indicators</i>                    | <i>Description</i>  |
|--------------------------------------|---|
| Countries                            | From 137 countries for year (minimum) to 191 (maximum)    |
| Year                                 | By comparison with two periods: 1973 -1980 and 1990-1997  |
| Region                               | 8 categories-see table 2                                  |
| Population                           | Population (Banks)  |
| GDP per capita                       | GDP per capita current prices, US\$ (UN)                  |
| Percent GDP                          | Originating in Industrial Activity (1972-1980)            |
| Energy Exports                       | Energy Exports; thou metric ton oil equivalents (UN 2005) |
| Energy Production                    | Energy Production, Metric Tons Coal Equivalent            |
| Energy Production per capita         | Energy Production in Kilograms per capita                 |
| Energy Consumption                   | Energy Consumption, Metric Tons Coal Equivalent           |
| Energy Consumption per capita        | Energy Consumption, in Kilograms per capita               |
| Electric Power Production            | Electric Power Production (kWh)                           |
| Electric Power Production per capita | Electric Power Production (kWh) per capita                |
| Steel Production                     | Steel Production (metric tons)                            |
| Steel Production per capita          | Steel Production (metric tons) per capita                 |
| Cement Production                    | Cement Production (metric tons)                           |
| Cement Production per capita         | Cement Production (metric tons) per capita                |

Dataset groups the variable in the following macro regions:

Table 2: Worldwide macro regions

| <i>Macro - Region 8 categories</i> | <i>Number of countries</i> |
|------------------------------------|----------------------------|
| 1 AFRICA                           | 49                         |
| 2 ASIA-PACIFIC                     | 37                         |
| 3 C&E_EUROPE                       | 27                         |
| 4 MIDDLE EAST                      | 19                         |
| 5 NORTH AMERICA                    | 3                          |
| 6 SOUTH AMERICA                    | 32                         |
| 7 SCANDINAVIA                      | 5                          |
| 8 WESTERN EUROPE                   | 19                         |

As far as the methodology, I have calculated descriptive statistics based on arithmetic pounded mean across countries and over time and the results are represented by bar charts and multiple line charts. When it is not possible to produce a incisive chart (because of different scale variables), the data have been transformed in square roots. From original variables we have also calculated a derived variable called “delta energy”:

$$\sqrt{\text{Energy Production}} - \sqrt{\text{Energy Consumption}}$$

These new indicators are important in order to show the net trends of the energy market over time per macro regions.

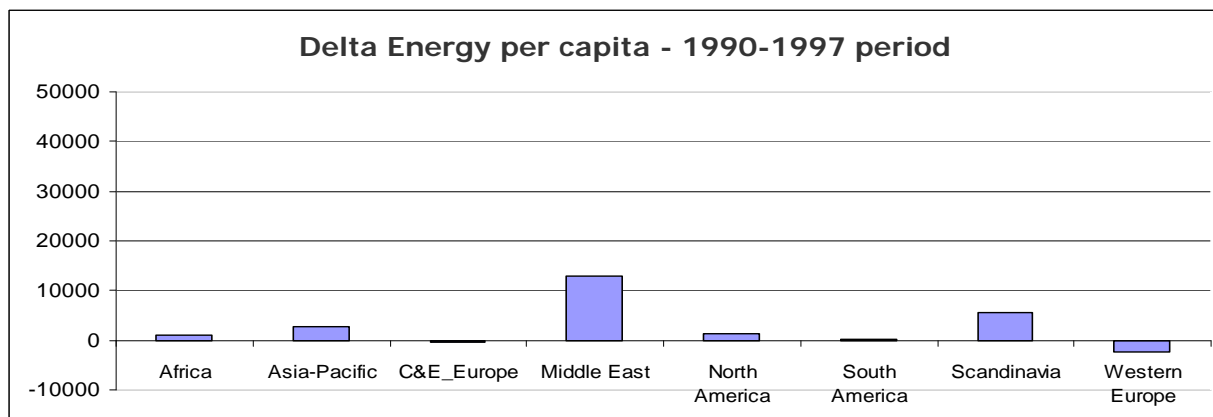
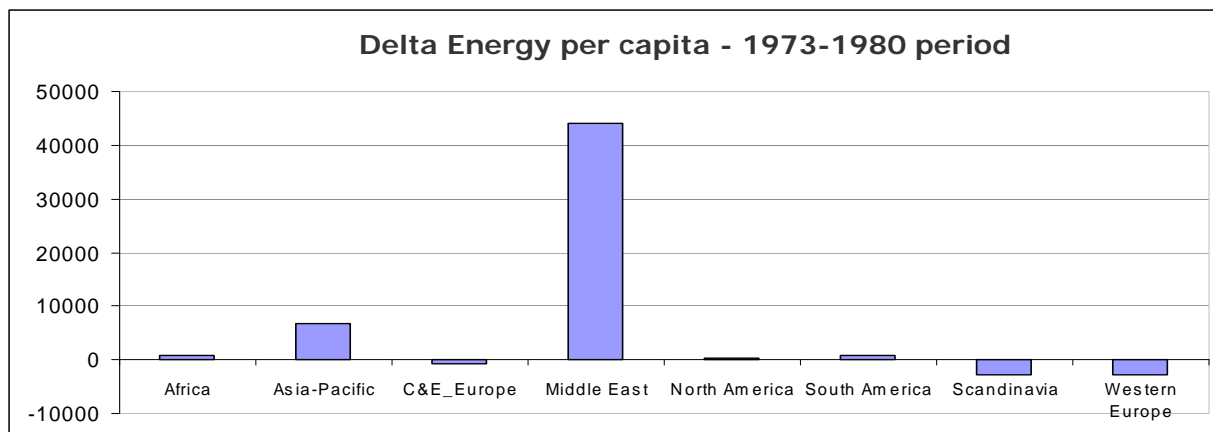
In addition, it is important to note that several charts are represented as *per capita values* in order to make suitable comparisons.

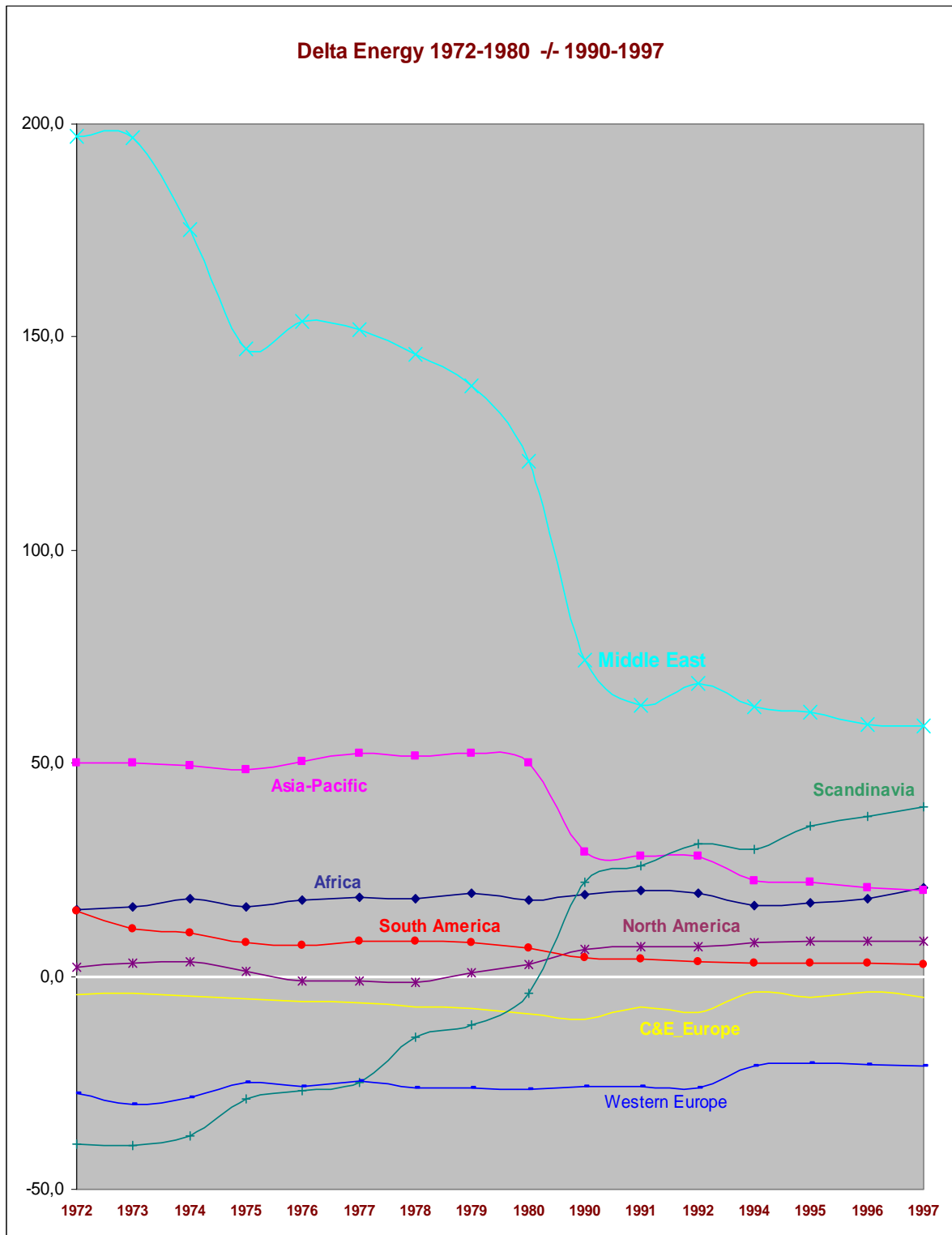
We show also the variables of Gross Domestic Product (GDP), Steel and Cement production across macro-regions since they are leading indicators of economic growth patterns over time.

### 3. MAIN RESULTS

First of all, as already said, results are presented in per capita values. Statistical analysis has been carried out across countries with full data, considering the periods 1973-1980 and 1990-1997 (except 1993). Figures in the following pages show, per each variable, both line growth and bar graph across macro regions.

The figures represent before the energy indicators and then the economic growth variables such as GDP per capita, steel and cement production.

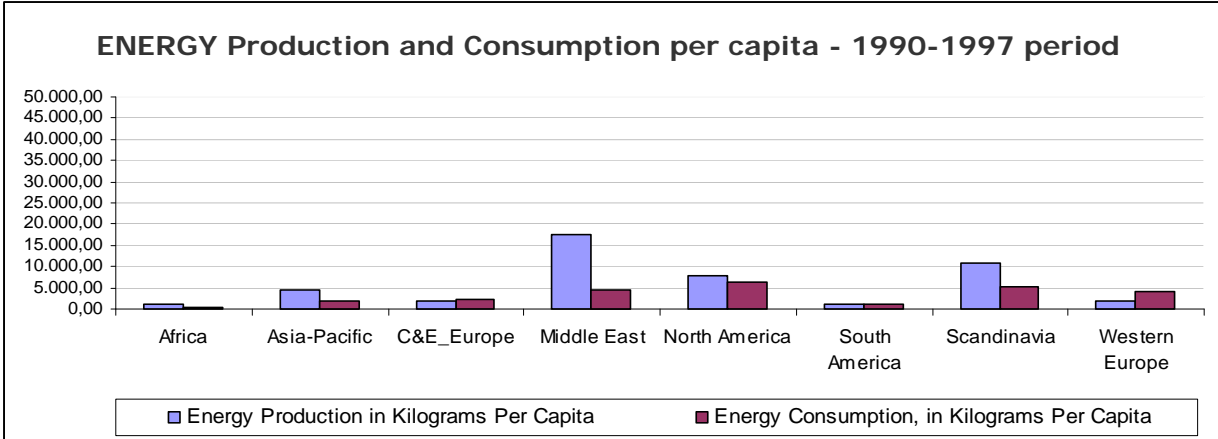
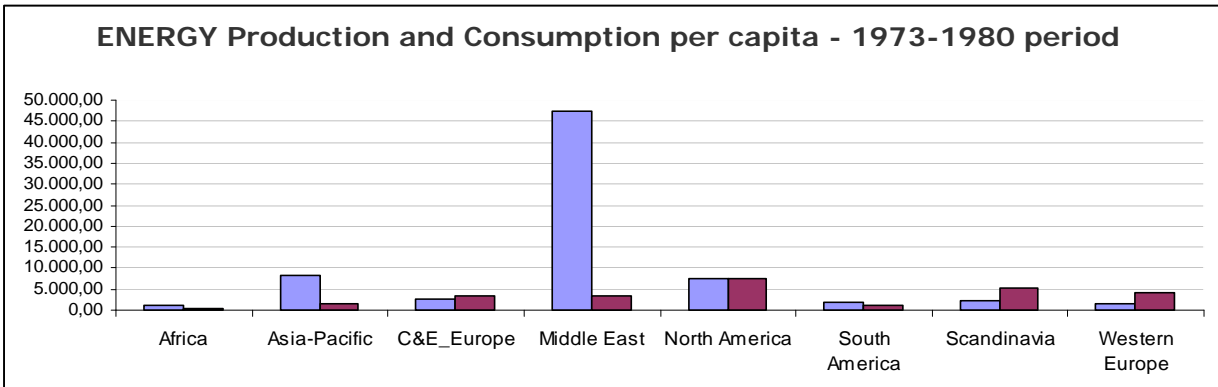
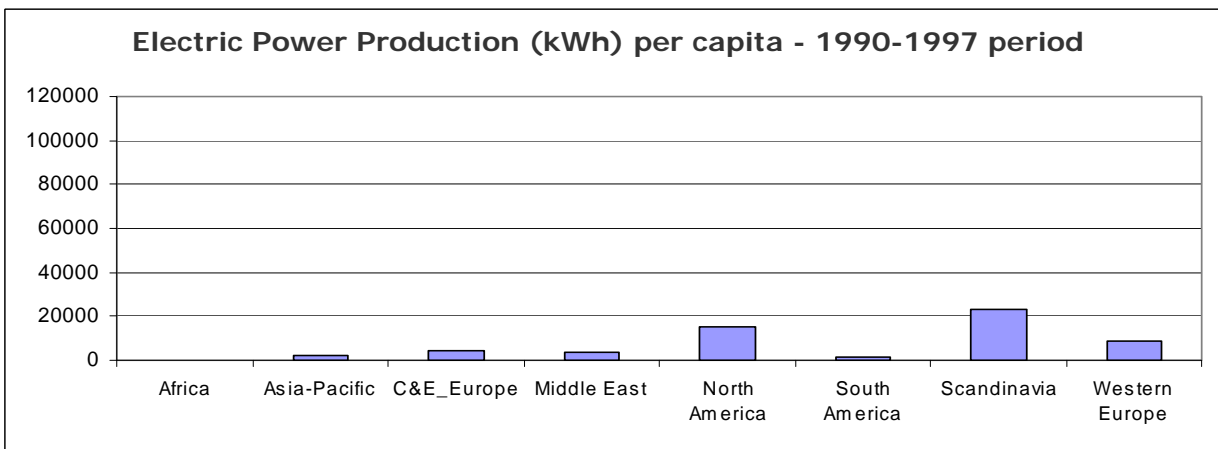
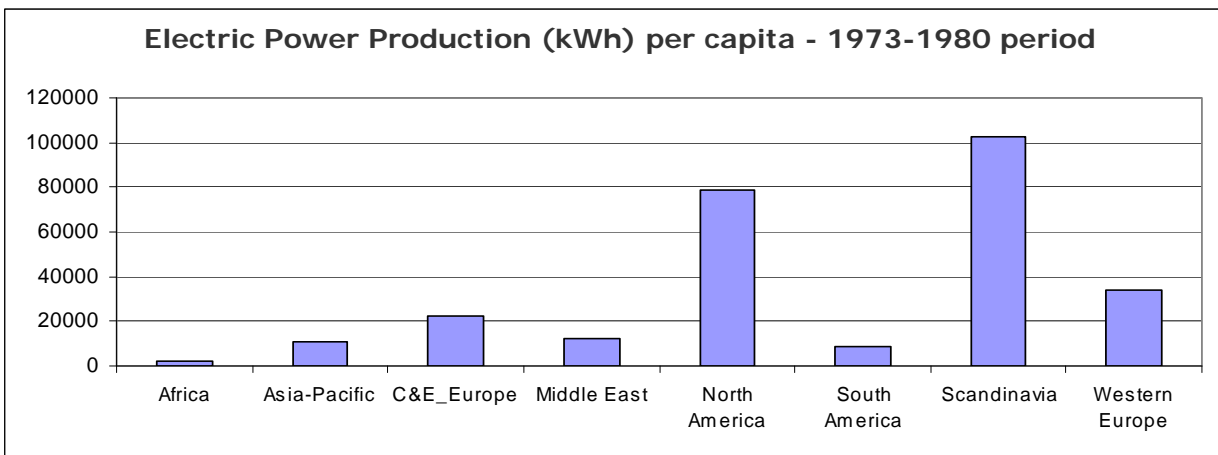


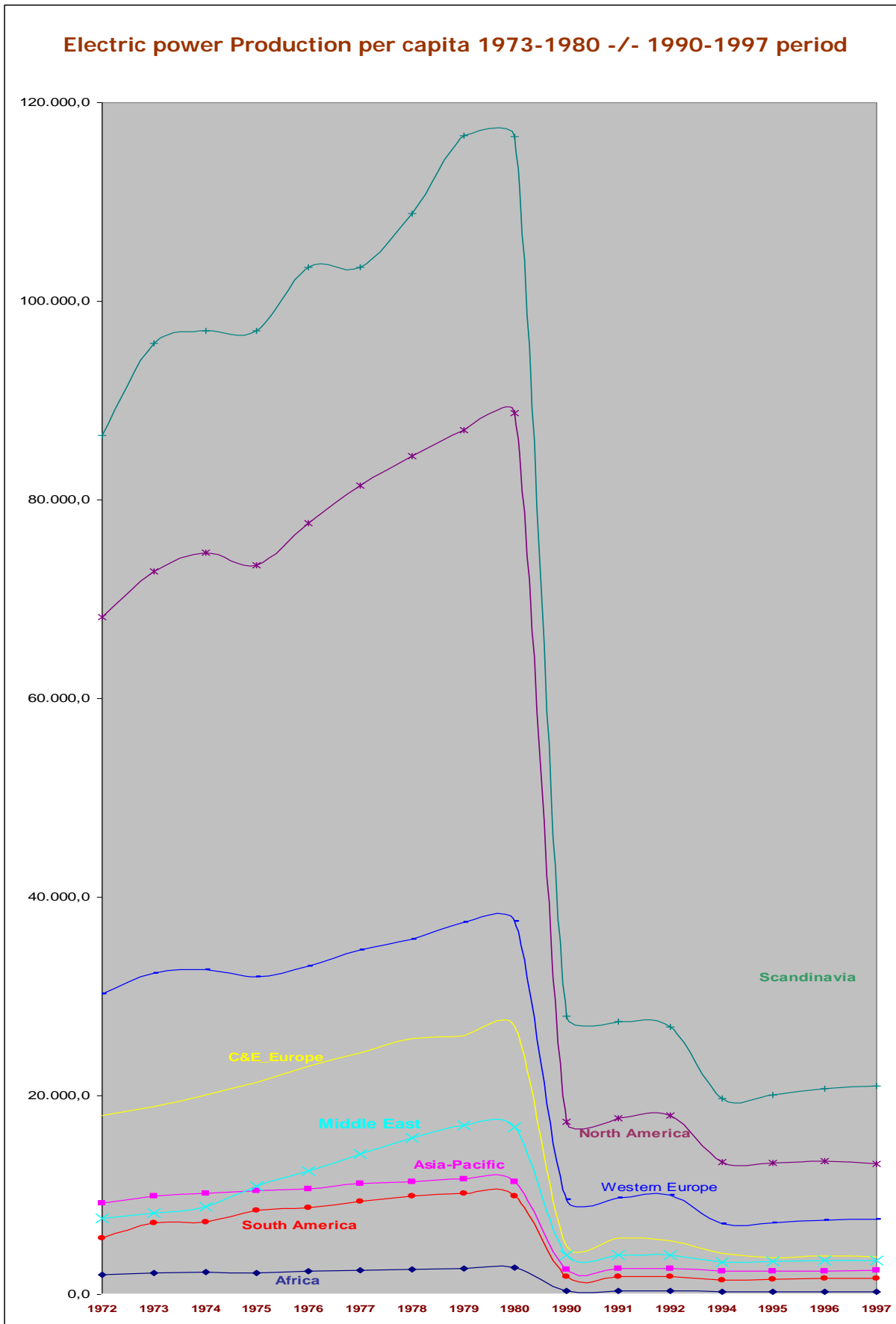


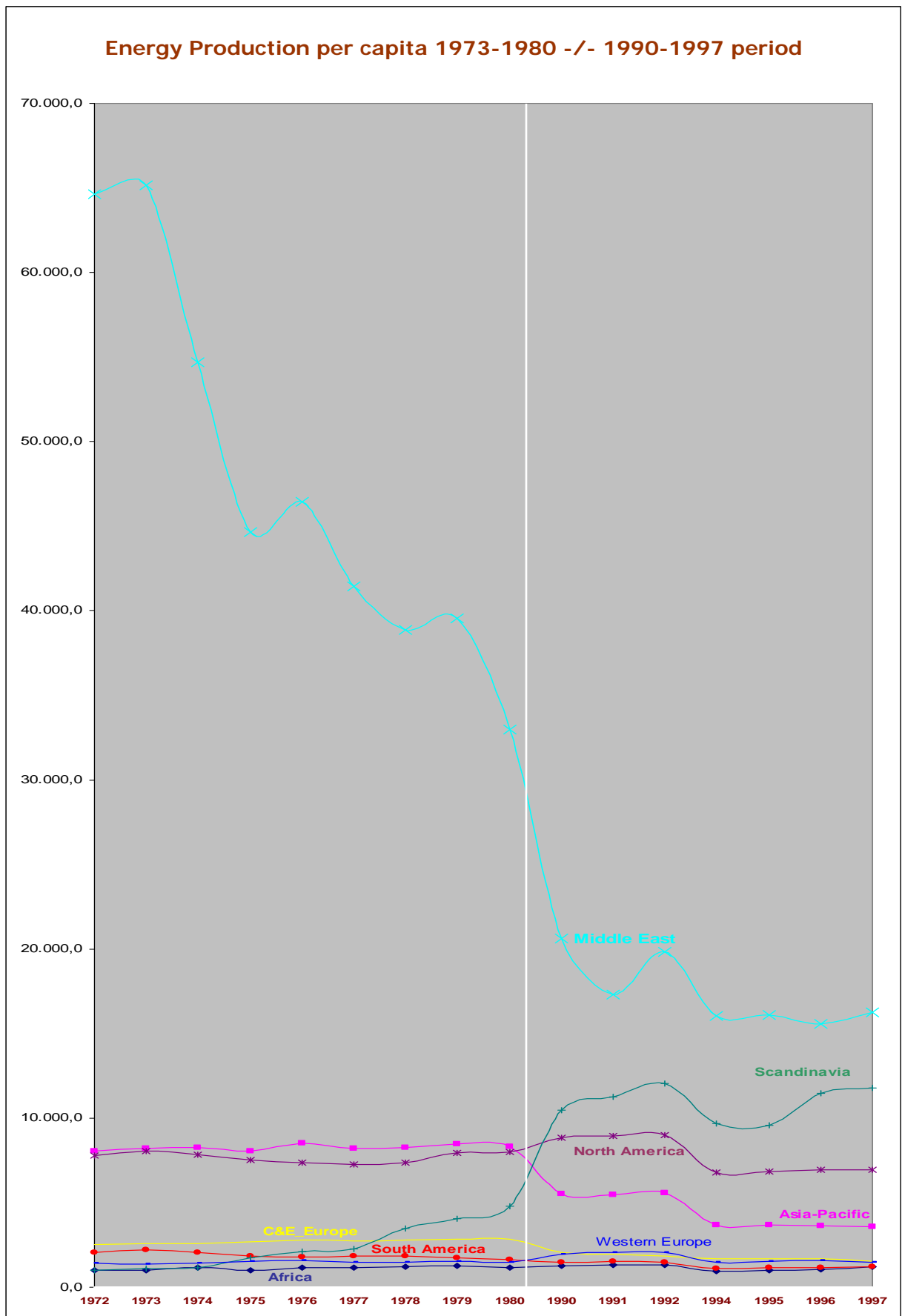
**Remark:** “Delta energy” is the result get per year and region, by the math difference of the square roots of energy production and energy consumption (values express in kilograms per capita).

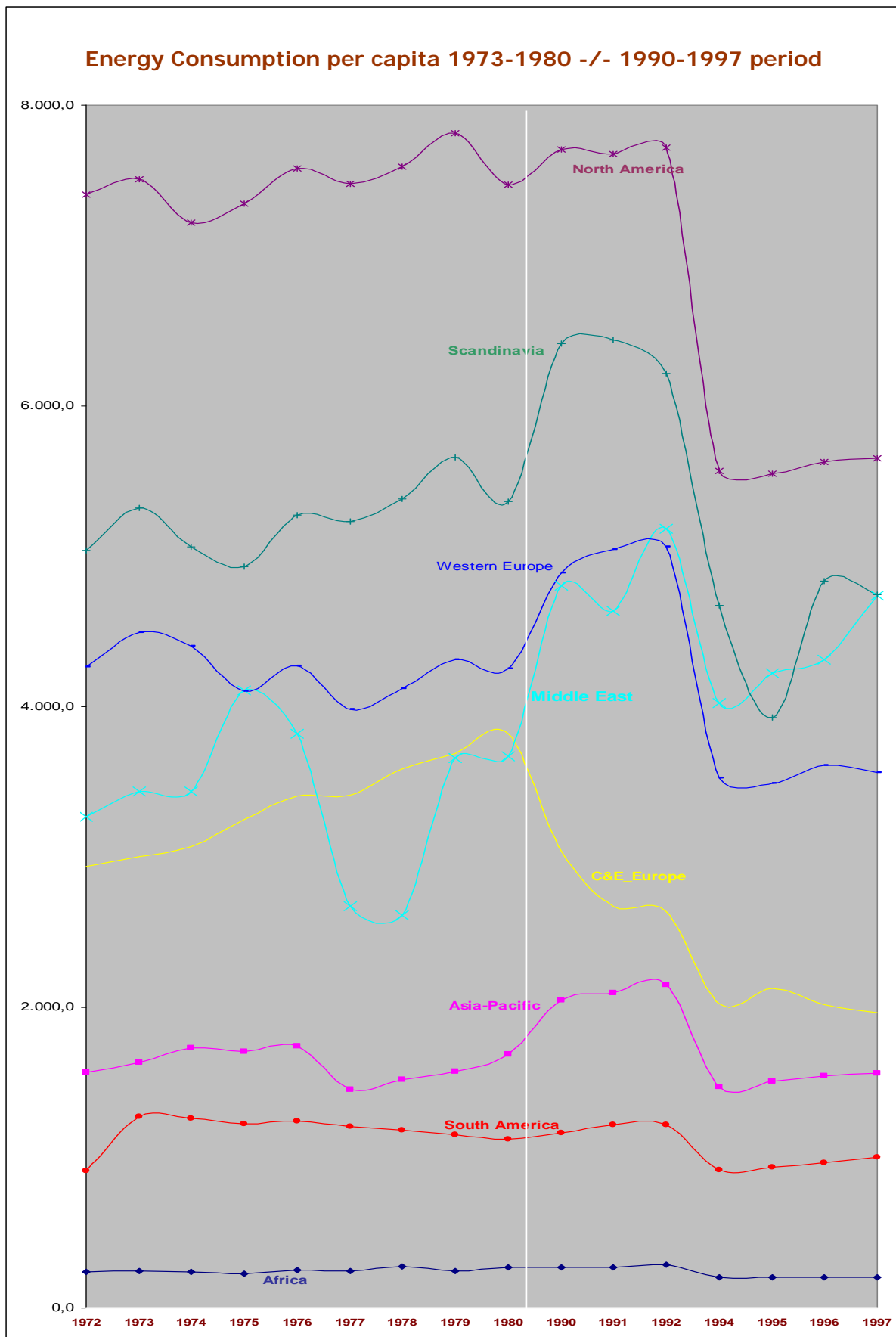
I choose this solution (and not the simple difference of absolute values) to permit a mutual comparison of trends per regions over time.

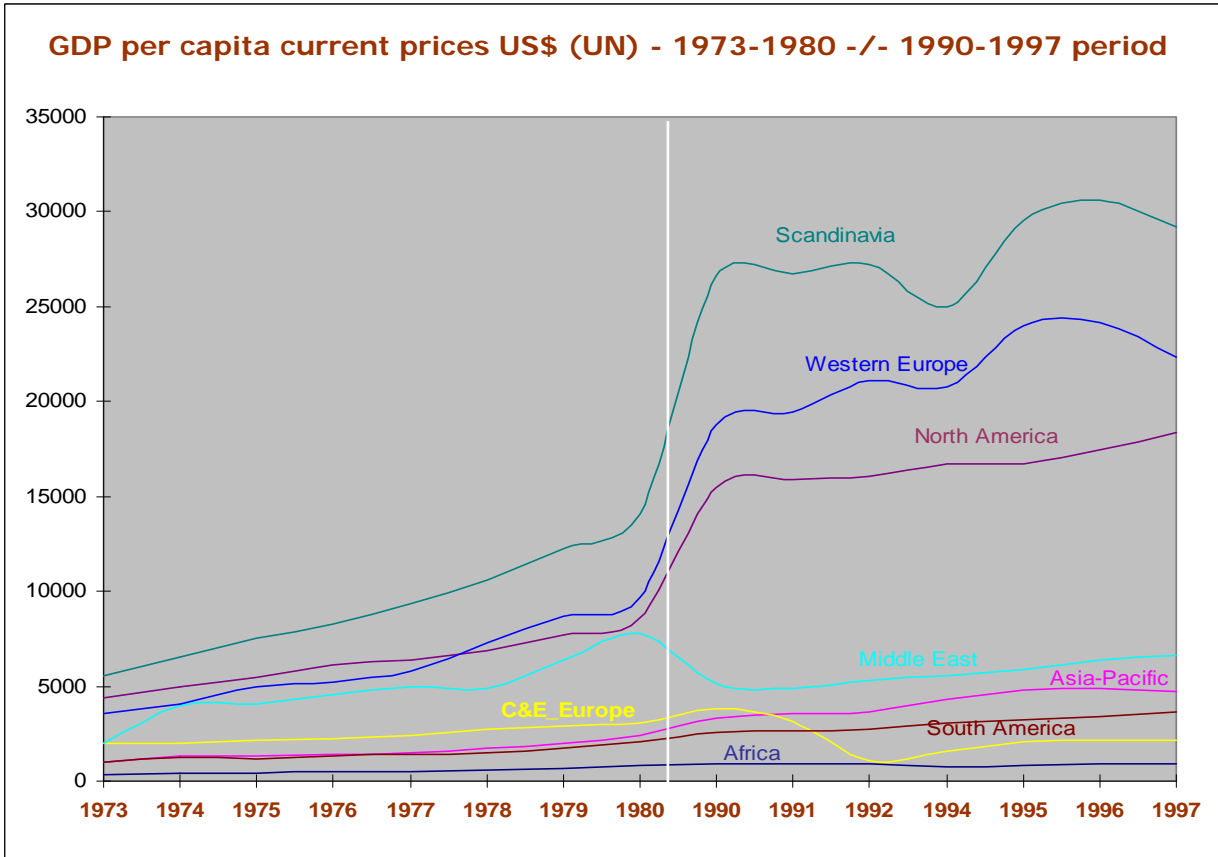
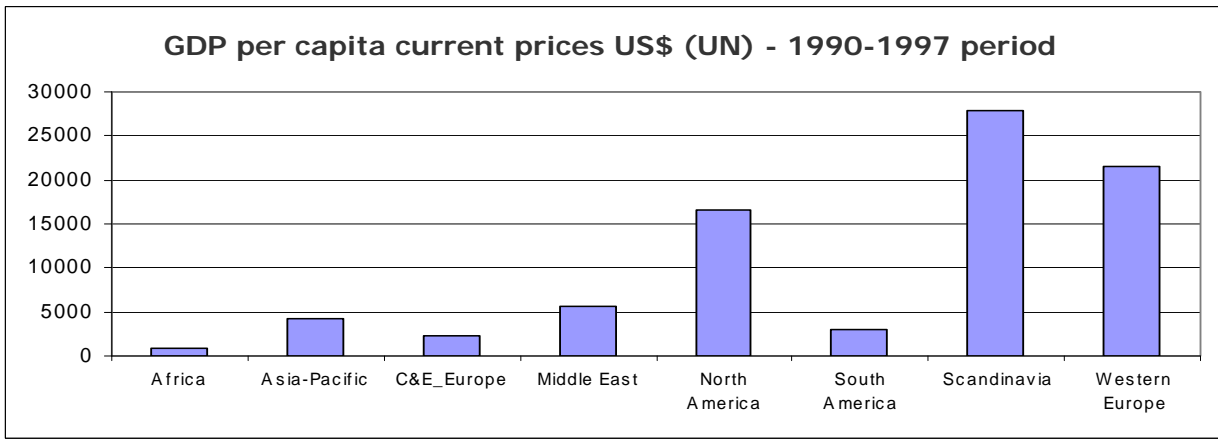
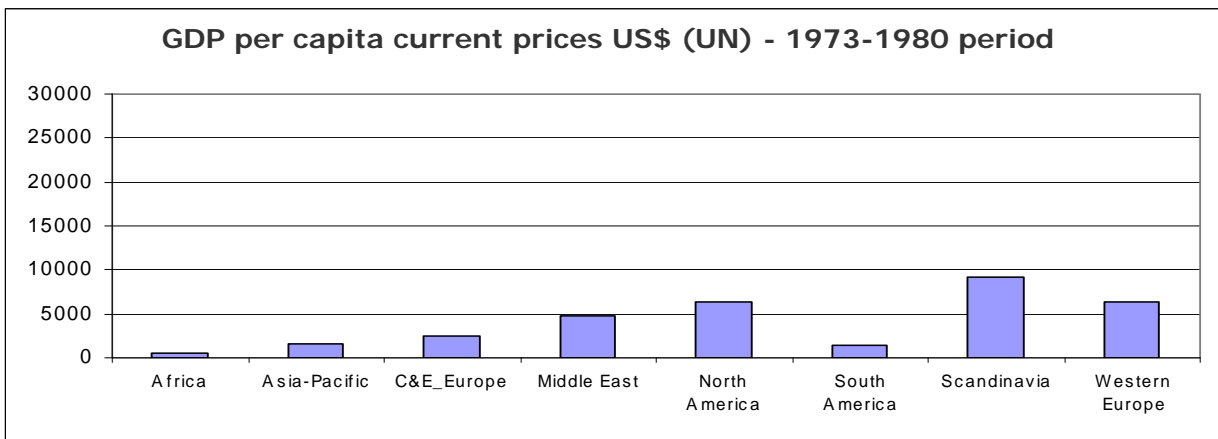


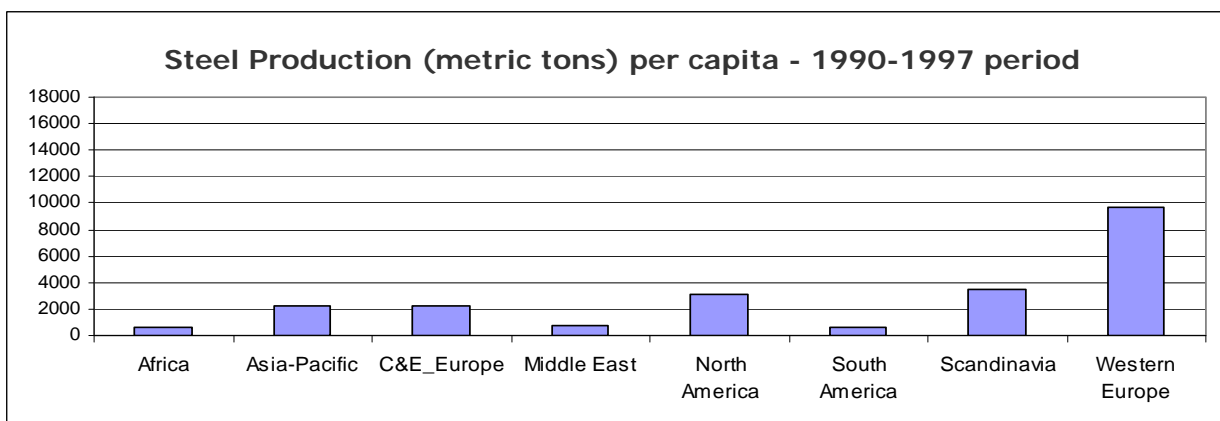
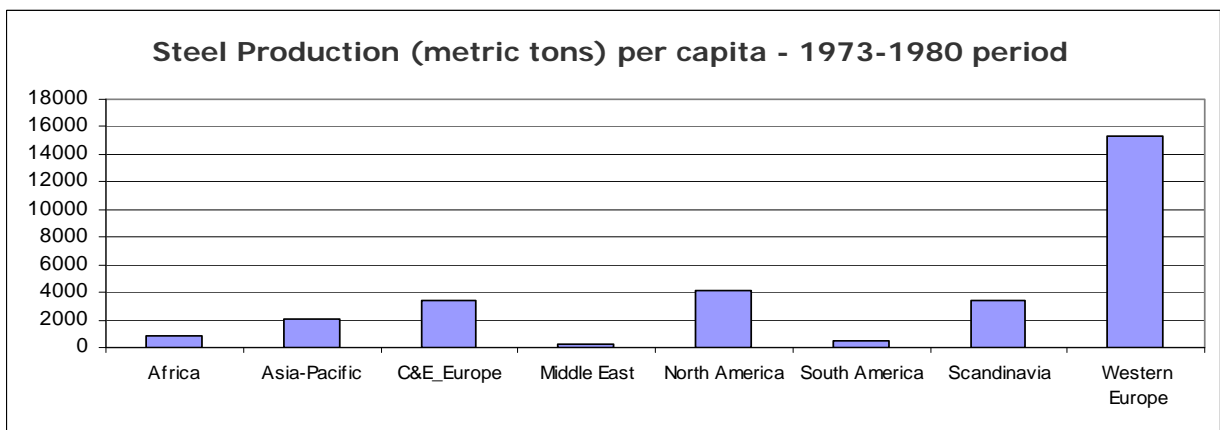
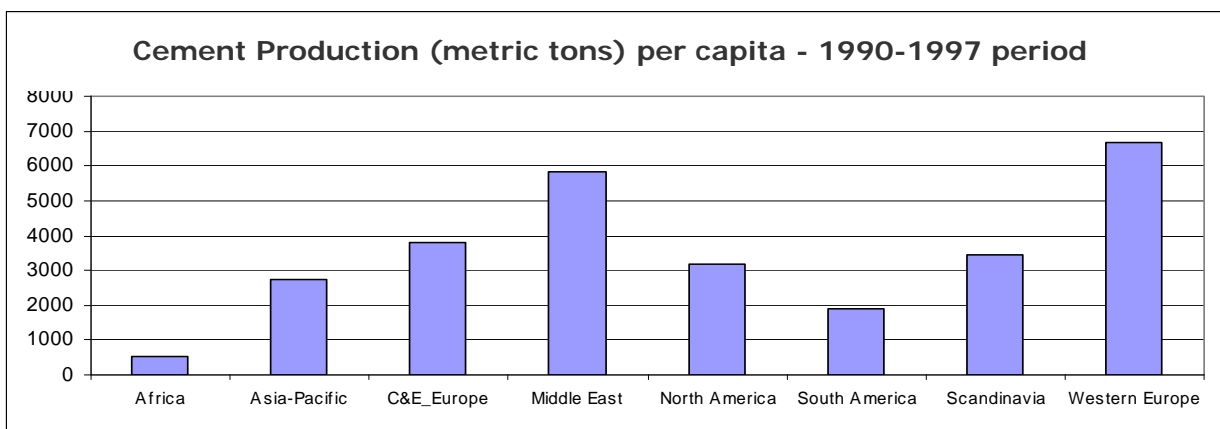
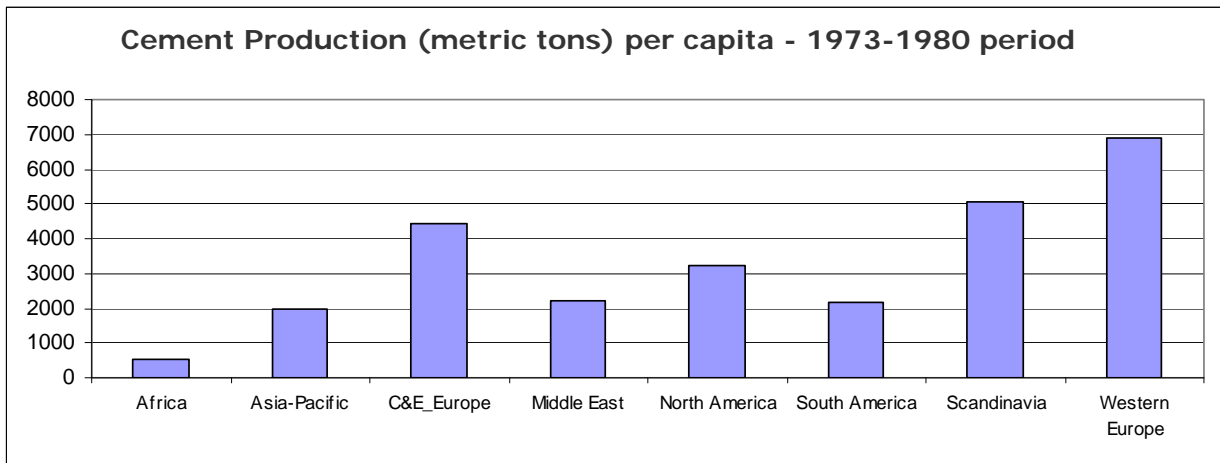


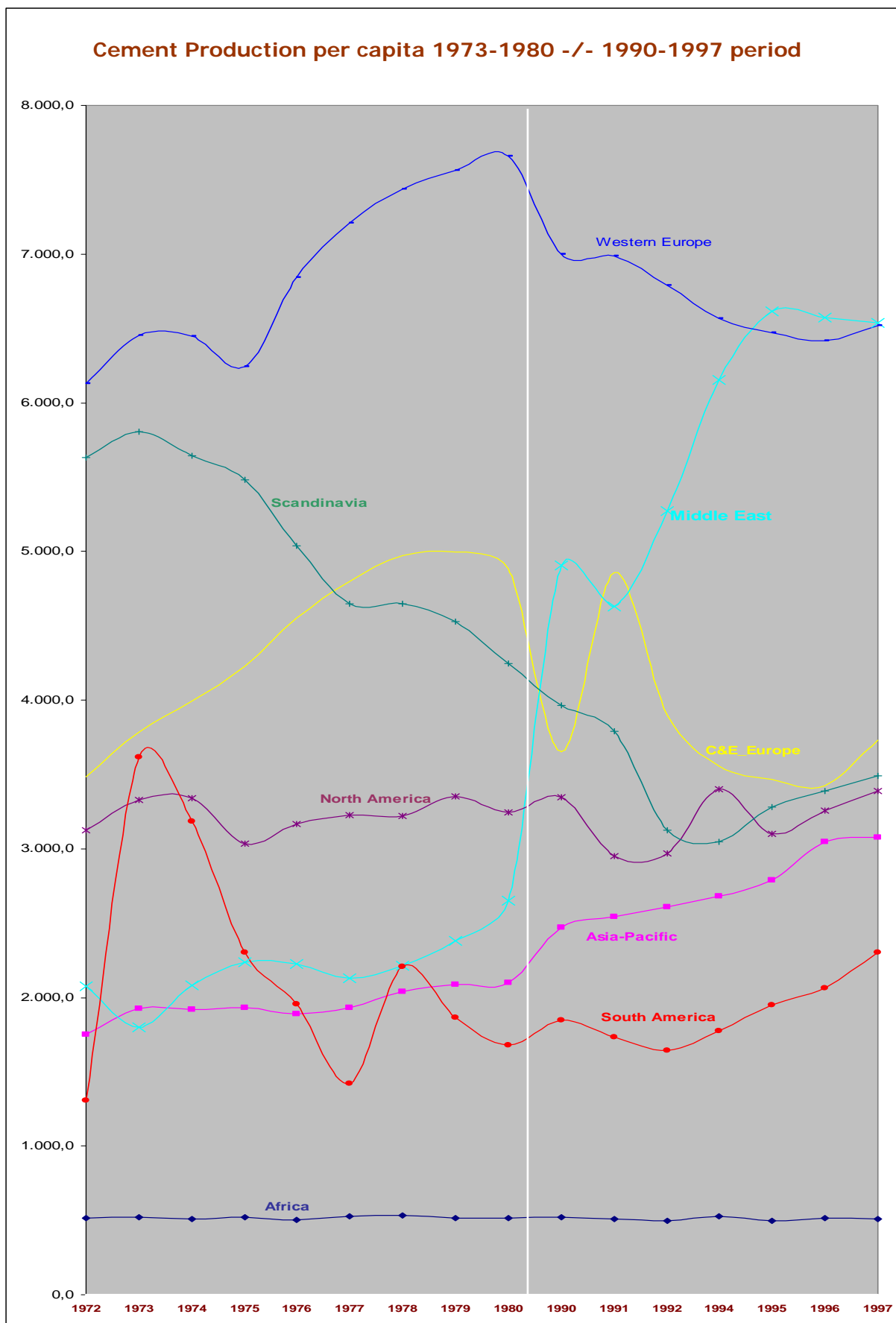


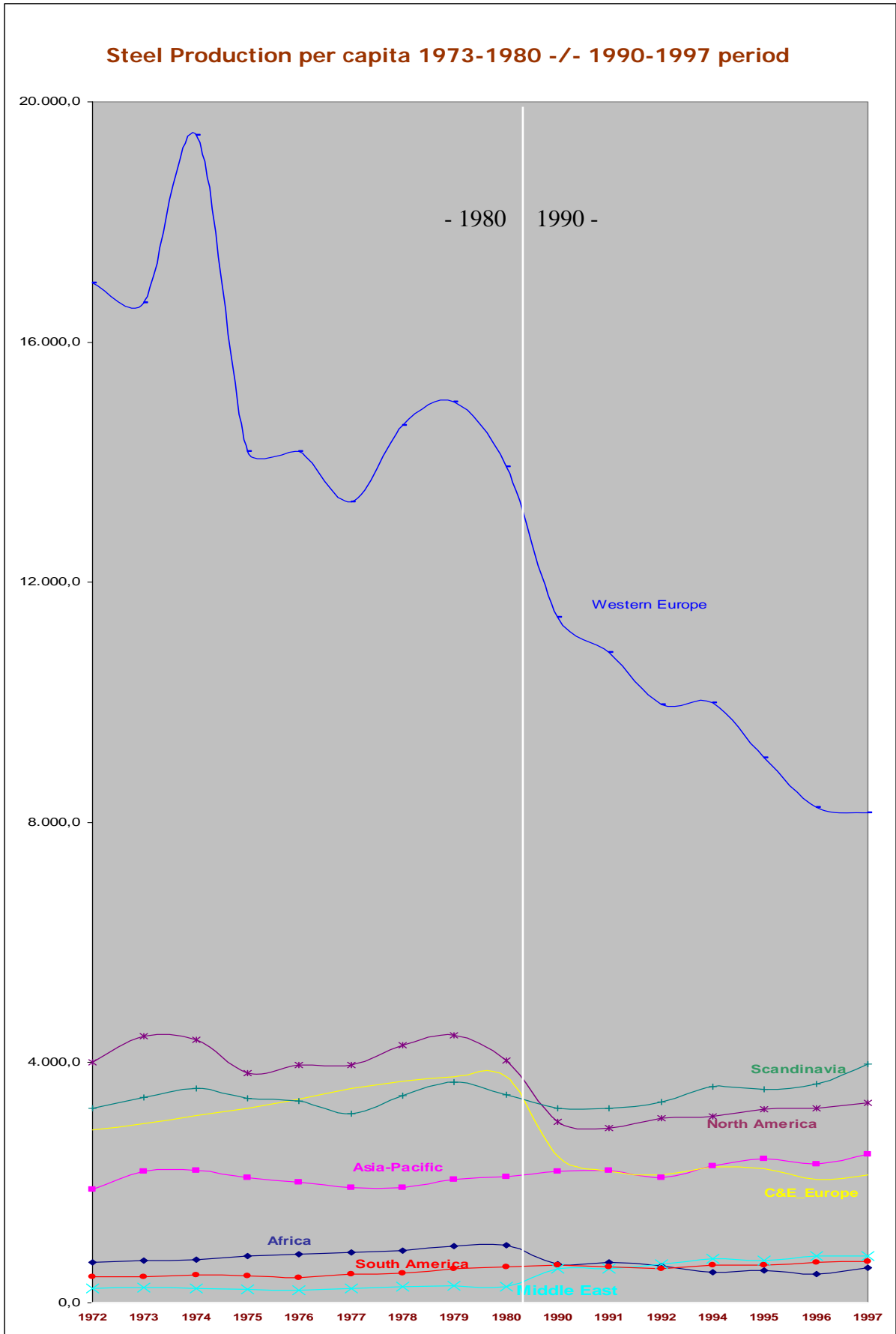














#### 4. CONCLUDING REMARKS

Energy and energy systems are driving forces for economic growth patterns of countries (Coccia, 2008). They play a fundamental role in modern economies and their efficiency can transfer competitive advantages to the firms and the economic system as whole, improving country's economic performance. In fact, efficient energy systems generate cheaper goods and services that lead to higher wealth and well-being of countries over time. The important trends, here described, should be further on analyzed to find out weaknesses as well as strengths of macro regions, and to have information in order to support energy and industrial policy with synergic effects for sustainable development of countries. Although this report presents some drawbacks, since original dataset has missing data over 1980s, I hope these results can be a stimulus for scholars that would further on investigate this important research field for the future worldwide economic growth patterns.

Next developments of this research, in collaboration with researchers, will be based on new statistical analysis of other datasets such as OECD data and the US Department of Energy data, to cover the gaps and refine the trends for having a complete representation of worldwide tendency of current market energy. In addition, the investigation will be integrated by the analysis of gas and nuclear energy, as well as renewable energy resources, because these are the primary energy resources of future economic development of the world that I hope will be more sustainable.

In conclusion, I hope that these basic statistics of energy markets are fruitful results for researchers, policy makers and politicians that would like to have an immediate picture of the market energy per macro regions. However, this research field has to be in-depth investigated with more advanced statistical techniques to understand and forecast the dynamics, paths and tendencies of energy and economic resources that have, more and more, an important role to support future sustainable economic growth corridors.

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