

TOURISM AND ENERGY CONSUMPTION IN SELECTED COUNTRIES OF THE EU: COMPARISON WITH AUSTRALIAN STATES AND SELECTED TERRITORIES

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Introduction

- Tourism today is the **fastest growing sector** and has significant growth rates every year
- The growth of tourist nights and spending contributes not only to the **economic prosperity** of a country, but also to **energy consumption**
- Many studies focused on the existence of a relationship between **tourism** and **economic growth & development**
- In the latest research, the analysis of the relationship between **tourism**, **energy consumption** and **CO2 emissions** is increasingly present
- Energy today plays a very important role in the economy of each country, so there is a need to increase **energy efficiency**
- The **motivation for the research** lies in the fact that the increase in tourist arrivals and nights brings greater **responsibility** of the tourism sector and its role in the development of sustainable tourism.



Purpose, aim and research question

- Tourist activities involve **energy consumption** directly or indirectly!
- THE AIM of this paper is to analyse the relationship between tourist nights and energy consumption in the service sector
- THE RESEARCH QUESTION to be asked is whether there is a correlation between tourist nights and energy consumption, and what is its direction and value
- THE PURPOSE of this paper is:
 - ✓ to investigate whether the increase of tourist nights affects the increase in energy consumption in the service sector
 - ✓ to explore the share of the service sector consumption in total energy consumption
 - ✓ to compare the results obtained for the EU countries with the states and territories of Australia, 2 groups of states of completely different historical, geographical and cultural characteristics.



Study area

- **10 EU member countries** that realised most tourist nights in 2016: Spain, France, Italy, Germany, Austria, the Netherlands, Greece, Poland, Croatia and Portugal
- **Australian states:** South Australia, New South Wales, Queensland, Tasmania, Victoria, Western Australia and the Northern Territory



Research methodology

- The research covers a **time period of 16 years**, from 2000 to 2015
- The research includes **two variables**, energy consumption in the service sector (ECSS) and tourist nights (TN) as a proxy variable for tourism
- An analysis through **2 phases** is conducted in the paper:
 - ✓ correlation between tourist nights and energy consumption in the service sector in the selected countries using the Pearson coefficient
 - ✓ relationship between the variables tested using univariate regression analysis.



Results

- According to the descriptive statistics, the average **number of tourist nights** in the EU countries in the period between 2000 and 2015 is over 180 million, and in Australian states just over 55 million
- Regarding **energy consumption**, lower consumption compared to the European countries was also marked. In Australian states the average energy consumption was 39194 TJ, and in the EU countries 414188 TJ
- Statistics confirms that **tourism** in the EU countries as well as in Australian states **develops more and more every year**, i.e. the number of tourist nights increases ... the energy consumption increases...
- Correlation between tourist nights and energy consumption in the service sector in the selected EU countries and in Australian states is shown in **Table 1** and **Table 2**.



Results - Pearson correlation

Table 1. Correlation of the variables in the selected EU countries

Country	Coefficient	P
Italy	0.7882	0.0003
France	0.7844	0.0003
Spain	0.7493	0.0008
Poland	0.6939	0.0029
Germany	0.6310	0.0088
Croatia	0.4000	0.1247
Greece	0.2321	0.3871
Portugal	0.1533	0.5708
the Netherlands	-0.2312	0.3888
Austria	-0.3247	0.2198

Source: the author's research



Results - Pearson correlation

- **Table 1 shows** a high positive correlation between tourist nights and energy consumption in the service sector in **five countries**: Italy, France, Spain, Poland, Germany (at the significance level $p < 0.05$)
- There is a **weak** positive correlation in Croatia, and **no** statistically significant correlation between tourist nights and energy consumption in the service sector in Austria, the Netherlands, Portugal and Greece
- Note: In **France** and **Spain** the number of tourist nights in summer months is five times higher than in winter months.
- Note: **Austria** and **the Netherlands** have an equal number of tourist nights, both in summer and winter. Austria has developed winter tourism, while the Netherlands is the most attractive in spring. Although accommodation capacities are smaller, **the causes of no correlation** in these countries may also be sought in the dominance of some other activities and in their impact on energy consumption.



Results - Pearson correlation

Table 2. Correlation of the variables in Australian states

State	Coefficient	P
Western Australia	0.9519	<0.001
Victoria	0.9070	<0.001
Queensland	0.8824	<0.001
Tasmania	0.8655	<0.001
New South Wales	0.8194	0.0001
South Australia	0.6468	0.0068
Northern Territory	0.6261	0.0095

Source: the author's research



Results - Pearson correlation

- **Table 2** shows a **high positive correlation** between tourist nights and energy consumption in the service sector in Western Australia, Victoria, Queensland, Tasmania and New South Wales, at the significance level $p < 0,05$ ($p < 0,001$). In South Australia and the Northern Territory there is a **medium high positive correlation** at the significance level $p < 0,05$ ($p < 0,01$)
- By comparing Table 1 and Table 2, it is possible to notice, not only (generally) **higher**, but also more **evenly distributed** correlation coefficients in Australian states when compared to the EU countries.
- The mentioned can refer to **functioning mode of this sector** in Australia, its greater homogeneity than in the EU, where cultural and other diversities of each country are significant.



Results - Regression Analysis

Table 3. The relationship between tourist nights and energy consumption in the service sector in the EU and Australia of the confirmed correlation of the variables (in conditions of the increase of tourist nights by 1 000)

Country/ State	Coefficient	p
Poland	5.535951	<0.001
Germany	4.096318	<0.001
France	2.651744	<0.001
Italy	1.693958	<0.001
Spain	0.989579	<0.001
Victoria	1.000043	<0.001
South Australia	0.8280084	<0.001
Tasmania	0.7339255	<0.001
Northern Territory	0.6888461	<0.001
New South Wales	0.6248756	<0.001
Western Australia	0.6137061	<0.001
Queensland	0.5220024	<0.001

Source: the author's research



Results - Regression Analysis

- The results from **Table 3** show that energy consumption changes with the increase of tourist nights
- In **the EU**, the most significant change was noted in **Poland**. If the number of tourist nights in Poland increases by 1000, the energy consumption in the service sector will increase by 5.5 TJ
- In **Australia**, the most significant change is recorded in the state of **Victoria**. The increase of the number of tourist nights by 1000 will increase energy consumption by 1 TJ. There are fewer changes in other federal states.



Results - Regression Analysis

Table 4. The share of the service sector consumption in total energy consumption of the EU and Australia (in conditions of the increase of tourist nights by 1 000 000)

Country/State	Coefficient.	P
Poland	0.0021618	<0.001
Germany	0.0004527	<0.001
France	0.0004152	<0.001
Italy	0.0003198	<0.001
Spain	0.0002707	<0.001
Northern Territory	0.0081911	<0.001
Tasmania	0.006762	<0.001
South Australia	0.0023908	<0.001
Victoria	0.0007134	<0.001
Western Australia	0.0006796	<0.001
Queensland	0.0004113	<0.001
New South Wales	0.0004014	<0.001

Source: the author's research



Results - Regression Analysis

- The results from **Table 4** show that by increasing the number of tourist nights by 1 000 000, the share of energy consumed by the service sector in total energy consumption increased by 0.027% in Spain, 0.032% in Italy, 0.04% in France and Germany, and even **0.2% in Poland**
- In the **Northern Territory**, this share would increase by **0.8%**, in Tasmania by 0.7%, in South Australia by 0.2%, while in other Australian states this impact would be smaller
- **In general**, the share of energy consumed by the service sector in total energy consumption will be higher in Australian states than in the EU countries.



Final results

- **In the EU**, the share of energy consumption in the service sector in total energy consumption is equal in Poland (11.98%), as well as in Italy (11.77%) and Spain (10.13%), and slightly higher in Germany (15.01%) and France (14.08%). - Eurostat
- **In Australia**, the largest share is in the Northern Territory (7.96%) and Tasmania (7.34%), equal in South Australia (5.95%), Victoria (5.91%), New South Wales (5.23%), and slightly lower in Queensland (4.26%) and Western Australia (3.32%). - Australian Government
- Although THE SHARE of energy consumption in the service sector in total energy consumption is **similar between the group of countries**, the group of the EU countries (10-15%) and the group of Australian states (3-8%), it is possible to notice that this share is **more than twice as smaller** in Australia (on average 5.71%) than in the EU countries (on average 12.59%).



Discussion I

Without going into the reasons for such a phenomenon, one can conclude the following:

- The share of the service sector energy consumption in total energy consumption is **twice as small** in Australia than in the EU countries
- By increasing tourist nights by 1 000 000, the share of energy that goes to the service sector in total energy consumption in the EU countries would increase from 0.002% to 0.27% (on average 0.0724%), and in Australian states from 0.008% to 0.40% (on average 0.279%), i.e. **as much as four times more**.



Discussion II

Even after the correction of this result (given the twice smaller share of the service sector energy consumption in total energy consumption in Australian states), the **question** that arises is **what is the reason for this difference**:

- Is it the lower energy efficiency of the service sector in Australian states compared to the EU?
- Is it a lower orientation on tourism considering the small share of the service sector energy consumption in total energy consumption (i.e. lower representation of the service sector in total industry) in Australian states compared to the EU?
- The difference in energy sources prices?
- Or something else?



Conclusion

- The results have confirmed that in most EU countries, as well as in Australian states, there is a **correlation between tourist nights, i.e. tourism and energy consumption**, and that by increasing the number of tourist nights, energy consumption increases as well
- **Sustainability of the tourism sector** is one of the main focuses in the discussions on ecologically integrated tourism development
- **Thoughtless consumption of energy** encouraged by tourism presents a threat on local, national and global levels
- **The priority** should be to increase energy efficiency and the use of energy from **renewable sources** in order to reduce energy consumption through fossil fuels
- Each country should implement energy consumption measures defined in national strategic documents, as well as supranational strategies, taking into account the **broader social wellbeing**.



Limitations and Contribution

- The conducted research included **only two variables** in the analysis, which can be regarded as a certain limitation of this paper: *in future research, the analysis could include GDP, CO2 emissions, tourism income and other relevant variables*
- One more limitation could possibly be the **choice of relatively simple methodology**: *the recommendation for future research is to conduct a panel analysis that provides the possibility to use multiple variables, a larger sample of countries, longer time periods, and a deep analysis of the relationship between variables*
- The **contribution** of this paper is manifested in an extensive literature review, as well as in the analysis of the fundamental relationship between tourist nights and energy consumption in the service sector, and the comparison of this and other related phenomena between the EU countries and Australian states.



Thank you for your attention!

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