

## **PROMOTING RES AND RUE IN TRANSPORT POLICIES FOR SUSTAINABLE TOURISM**

**Christos Dionelis**

National Technical University of Athens  
and

**Maria Giaoutzi**

National Technical University of Athens

### **INTRODUCTION**

Over the last decades tourism has grown enormously and travel distances have increased. Land occupied by tourism related activities is growing significantly, in certain areas, and this trend is expected to continue, at the expense of land previously used in other activities.

According to the World Tourism Organization (WTO), tourism is likely to become the largest single economic activity in the EU (currently accounts for 5.5% of the EU's GNP). In this context, particular emphasis should be placed on the impacts of tourism on sustainable development where the integration of environment considerations into the tourism sector should appear of top priority.

It is of great importance to find solutions that potentially increase the surplus of carrying capacity of the tourist sites, such as flexible arrival and departure dates, larger seasonal price differentiation, better information on traffic and transport and sustainable tourist development for unexploited promising areas with limited demand.

The tourism industry depends heavily on transport and affects significantly traffic generation. Therefore, in the sustainability context, the contribution of renewable energy sources and rational use of energy in the transport sector for tourism, is one of the issues that should be thoroughly explored.

The focus of the present paper will be on the contribution of the Renewable Energy Sources (RES) and Rational Use of Energy (RUE), in the transport sector, for sustainable tourism. In particular, the paper will elaborate on the concerns that should guide future actions on RES and RUE at the various levels of the transport chain in the global Tourism Stakeholder Model.

The first part of the paper will provide some basic definitions and will explore the main Community actions to promote sustainability in European Tourism.

The second part of the paper will describe the major RES and RUE technologies and practices related to transport, which could play a role in the context of sustainable tourism.

The third part will elaborate on policies at the various levels of the transport chain promoting the use of RES and RUE for sustainable tourism.

In the fourth part, a real case from Malta will be presented providing integrated solutions towards this end. Finally, in the fourth part some conclusions and guidelines for action will be drawn.

### **1. SUSTAINABILITY IN EUROPEAN TOURISM**

The scope of this part is to present some information on the tourism sector developments in the European Union, and to comment on the need to ensure sustainability in this major economic and social activity. Some major guidelines that rule EU actions, in this context, are further provided.

#### **1.1 The Tourism Sector in the European Union**

Tourism significantly contributes to the socio-economic development of many of the world countries by expanding their economic base, increasing foreign exchange and providing employment.

Globalization, technological development and growing prosperity in the last two decades have all contributed to the creation of an even greater demand for tourism. As a result tourism has grown enormously and travel distances have increased.

However, the rapid growth of tourism in the EU leads to a number of problems that may challenge the effectiveness of policy-making, planning and management of tourism development. The Treaty on European Union acknowledges that EU actions should also include measures in the field of tourism in order to accomplish other tasks of concern, which have been specifically assigned. [1]

The European Commission, recognizing the role of tourism on European economy, aims to support the EU member States to further develop the tourism sector, in particular sustainable tourism, by strengthening the capacity of both human resources and institutions and by promoting regional cooperation. [2] In this context, the exploitation of RES and RUE are among the Commissions major concerns.

## 1.2 Sustainable Tourism

Sustainable tourism heavily depends on clean environment. However, the achievement of the environmental objectives in the tourism sector depends on the effectiveness of the measures taken in the other sectors, e.g. a switch in transport modes, water and waste management, use of RES and RUE and in particular on measures taken at national and local levels as well as on the tourism industry itself.

In April 1995, the Commission issued a Green Paper on ‘The Role of the Union in the Field of Tourism’ [3]. The Green Paper indulges on the concept of sustainable tourism, and proposes appropriate actions to be carried out in the field of tourism as well as the instruments available towards this end. It also examines the need to introduce a degree of coherence and linkages among three associated domains of tourism, consumer affairs, as well as natural and cultural heritage.

In the context of Agenda 21<sup>1</sup> for tourism in Europe [4], the strategic guidelines for the sustainable development of transport related to tourism are rather pronounced. The purpose is to draw the attention of all parties on the need for a common commitment towards the implementation of the appropriate measures. More specifically these objectives are:

- to prevent and reduce the territorial and environmental impact of tourism in destinations;
- to control the growth of transport linked to tourism;
- to promote “appreciative” tourism as a factor for social and cultural development.

At the EU level a large amount of money was dedicated, under the Structural Funds, for co-financing investment and infrastructure projects for tourism but also projects to upgrade cultural and historical resources; this has greatly contributed to the development of tourism in under-developed regions, regions affected by the decline of industry and those with a concern for rural development. [5]

Member States are in the process of developing integrated sustainable tourism policies where a broad range of instruments has been used to combat growing environmental problems stemming from tourism activities.

In this respect tourism related actions, both supply and demand side measures, have been used e.g. economic (fuel and road tax), regulatory (EIAs, zoning laws, land-use laws, building permits), educational and training instruments (brochures, training manuals), tourism guidelines (codes of conduct), as well as voluntary sustainable management initiatives.

For further actions, the following priority guidelines of measures are considered:

### A. *Integration*

- public authorities should work together to better integrate environmental considerations into their tourism policies at the most appropriate level;

---

<sup>1</sup> An Agenda for the 21st century to implement sustainable development as expressed in an EC Report, which highlights key policy approaches and initiatives taken, and presents key messages for the future.

- need to develop integrated land-use planning at local or regional level;

#### B. *Protection of Sensitive areas*

- Development of a framework, by the Member States, for the protection of the environment particularly in sensitive areas such as the Mediterranean, the Baltic, the Alps and the coastal zones;

#### C. *Tourist Information*

- public authorities and the tourist industry should provide better information for the public, on the state of the environment, in order to enable public pressure to act as a driver towards sustainable tourism;

#### D. *Management of Tourist Flows*

- public authorities in cooperation with the tourist industry need to examine the carrying capacity of tourist sites and take appropriate measures for the management of the tourists' flows to the lasting benefit of both the sector and the environment.

### **1.3 The Future of European Tourism**

The European Commission pursues clear objectives on how to best exploit the competitive potential of the European tourist industry. Outlined in the Communication on Working together for the future of European tourism<sup>2</sup>, the Commission highlights the need to enhance cooperation on and consistency in the implementation of tourism policies among the stakeholders involved in the sector. These include the European Commission, Member States, regional and local authorities, industry, associations, and tourist destinations. [6]

The Commission underlines the importance of information and experience exchange among the interested parties, in order to prepare for the implementation of the actions recommended in the Communication (COM 2001)665 final).

Some of the key activities advocated in the provisions of this Communication are:

- Promotion of the dialogue among the tourism industry and other interested parties.
- Fostering of networking services and support functions, for instance through competence centres (observatories, study and research centres) at national, regional and local levels.
- Ensuring the efficient use of the EU financial and non-financial instruments to the benefit of the tourism industry.
- Promoting sustainable development by further elaboration and implementation of the "Agenda 21" guidelines.
- Defining and disseminating of the assessment methods and tools (quality indicators and benchmarking) necessary for the monitoring of the quality of tourist destinations and services.

### **1.4 Tourism and Transport**

A number of factors such as the increased demand for tourist activities and services, the deregulation of transport services and the development of transport networks, as well as the increased efficiency of the single market and the growing availability of information society tools, will continue to promote transport mobility and contribute to the growing internationalization of tourist flows. Single currency is one more reason that makes Europe even more attractive as a destination for visitors from non-member countries.

The need to promote sustainable tourism is of high priority in the context of the Union. In the area of transport, some Member States are focusing on the integration of environmentally friendly transport means into tourism development. Austria, for example, has developed a

---

<sup>2</sup> COM(2001)665 final

system of traffic management by promoting traffic free tourism, soft mobility in tourist communes, special land use requirements, and trains to ski resorts. [7]

An overall objective is to improve the information context of transport planning and policy formulation at the regional, national and local levels so that the policy and decision makers in the member countries become more aware and better informed on the emerging issues, developments and alternative policy options.

The areas of focus include transport planning and policy formulation, renewable energy sources, networking, public-private partnerships, and social, environmental and safety aspects of transport.

As a general policy instrument, the White Paper on "European Transport Policy for 2010: time to decide" outlines how to achieve tourist transport that is more efficient, sustainable and of higher quality. [8]

## **2. PROMOTING RES AND RUE IN TRANSPORT POLICIES FOR TOURISM**

The, second, part of the paper describes the major RES and RUE technologies and practices related to transport, which may potentially play an important role in the context of sustainable tourism.

### **2.1 Renewable Energy Sources - RES**

The development of renewable energy sources is a central objective of the European Commission's energy policy.

In the RES-E Directive [9], the following definition of Renewable Energy Sources (RES) is applied:

*“Renewable energy sources” shall mean renewable non-fossil energy sources (wind, solar, geothermal, wave, tidal, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases)”*

Renewable energy policy at the EU level is based on the European Commission's White Paper for a Community Strategy and Action Plan [10].

This strategy aims to double the share of renewable energy sources in gross domestic energy consumption across the EU from the 6% of 2000 to 12% by 2010, and includes a timetable of actions to achieve this objective.

Renewable energy has an important role to play in reducing Carbon Dioxide (CO<sub>2</sub>) emissions - a major Community objective. By increasing the share of renewable energy in the energy balance enhances sustainability, and helps to improve the security of energy supply by reducing the Community's growing dependence on imported energy sources. Renewable energy sources are expected to be economically competitive with conventional energy sources in the medium to long term.

### **2.2 Rational Use of Energy – (RUE)**

Efficient use of energy is a vital component in reducing industry's production costs and thereby raising competitiveness. Even for industries where energy costs account for no more than four or five per cent of their total production costs, the attainable improvements in energy use can make a great difference to profit margins. It is estimated that the EU could save at least 20 % of its present energy consumption in a cost-effective manner, equivalent to EUR 60 billion per year, or in other words the present combined energy consumption of Germany and Finland. [11] Initiatives to promote and increase energy efficiency in the end-use sectors are an important contribution to the achievement of the energy and environmental goals of the European Union and the proposed reduction target of greenhouse gas emissions (GHG).

This policy is part of the EU policies on energy supply including its efforts to promote renewable energy and consists part of the set of priorities first outlined in the 2000 Green Paper “Towards a European Strategy for the Security of Energy Supply”<sup>3</sup>.

A new Green Paper [12] seeks to promote a more rational use of energy in the EU. In this respect, the European Commission takes the initiative to help Member States to meet their Kyoto commitments, and contributes to the EU efforts to combat, in the longer term, climate change through further emission reductions, as part of a future post 2012 regime within the United Nations Framework Convention on Climate Change.

The Green Papers seek to identify options on how to eliminate existing obstacles, suggesting a number of key actions that might be taken. Examples include the establishment of annual energy-efficiency action plans at the national level. Such plans identify measures to be taken at national, regional and local levels and subsequently monitor their success both in terms of improving energy efficiency and cost effectiveness.

These plans include the promotion of new energy efficient technologies, such as more energy efficient cars and IT equipment and the development of a new generation of more fuel-efficient vehicles.

During the recent years, energy policies have imposed a number of targets at the European and national levels for rational use of energy (RUE), renewable energy sources (RES) and related CO<sub>2</sub>-reductions. As a result, a wide variety of policy instruments are currently implemented.

The comprehensive review of current policies for promoting RES and RUE technologies covers a broad range of financial and non-financial push and pull instruments in Europe.

Taxation could be another mean of action. It is estimated that energy taxes have a strong impact on both RUE and RES<sup>4</sup>. [13] However, taxation is not an EU competence and Member States want to retain their autonomy in setting taxes. Nevertheless, the Commission has the intention to boost fiscal incentives for greener cars.

### **2.3 RES and RUE in the Context of Cars' Use**

The scope of this section is to provide information on the most recent developments regarding policies and actions related to further promotion of green cars.

#### **2.3.1 Background**

Motor vehicles have become the prime means of personal and commercial mobility in today's world. Growing prosperity has led to a spectacular rise in car use - a phenomenon being repeated in the new Member States which joined the Union in 2004. This success has generated serious concerns about the environmental effects of vehicle use, in particular traffic congestion, air pollution, traffic-related diseases and noise.

These concerns have led the EU to come up with legislations and initiatives in order to drive the change towards cleaner cars while promoting sustainable transport modes and modal shifts (trains, inland shipping, public transport, bikes etc.).

Interest in cleaner, less polluting vehicles and fuel has grown rapidly in the recent years. Emissions from petrol and diesel engines have been significantly reduced, driven mainly by European legislation, and will continue to be reduced in the future. [14]

---

<sup>3</sup> Green Paper “Towards a European strategy for the security of energy supply”, 29 November 2000, (COM, 2000, 769 final).

<sup>4</sup> All countries considered have at least some kind of energy taxes. The most important ones are taxes on transportation fuels, heating oil and electricity.

### 2.3.2 Towards Green Cars

The EU has started several initiatives in order to stimulate the production and marketing of more environmentally friendly cars. The main efforts focus on:

- reducing vehicles' CO<sub>2</sub> emissions and changing consumers' behaviour,
- reducing emissions of pollutants and particles,
- towards sulphur-free fuel,
- equipping vehicles with new technologies,
- alternative fuels (biofuels, natural gas, and hydrogen).

#### 2.3.2.1 Reducing vehicles' CO<sub>2</sub> emissions and changing consumers' behaviour

Almost 40 per cent of the transport sector's CO<sub>2</sub> emissions, in the EU, are produced by the use of private cars in cities. CO<sub>2</sub> emissions are damaging the environment contributing thus to climate change.

Both petrol and diesel engines have their good and bad sides as regards emissions. Engines working with diesel fuel emit less CO<sub>2</sub> than others working with petrol. Diesel engines, on the other hand, are releasing more cancer-causing particles in the air.

**Voluntary commitments** [15] have been made by Automobile Manufacturers to reduce CO<sub>2</sub> emissions from passenger cars. The Association of European Automobile Manufacturers (ACEA) made a voluntary commitment to achieve a target of 140g CO<sub>2</sub>/km for their fleet of new passenger cars sold in the EU by the year 2008. The CO<sub>2</sub> target is to be achieved mainly by technological developments and market changes linked to these developments<sup>5</sup>.

Progress from car makers has been better than expected. The overall EU's aim is to reach - by 2010 at the latest - an average CO<sub>2</sub> emission figure of 120 g/km for all new passenger cars marketed in the Union.

EU legislation requires that **consumers** are provided with information on CO<sub>2</sub> emissions of cars that are offered for sale or lease<sup>6</sup>.

#### 2.3.2.2 Reducing emissions of pollutants and particles

Air pollution caused by car emissions has serious health impacts, which EU legislation is seeking to reduce. The increasingly stringent emission standards for passenger cars and other vehicles have initiated a significant reduction in air pollution per driven kilometer. Emission control technologies (particle filters, catalytic converters) are available but expensive.

Discussions have started on new EURO standards (Euro 5 and Euro 6) to enter into force by 2010. These new standards will focus on reducing emissions of cancer-causing particulates from diesel cars.

#### 2.3.2.3 Toward sulphur-free fuel

The Commission brought forward a proposal in 2005 to amend the sulphur content of petrol and diesel [16]. Sulphur-free fuel is due to be compulsory as of 2009. When this directive is approved, it will lead car-makers to use cleaner technologies<sup>7</sup>.

#### 2.3.2.4 Equipping vehicles with new technologies

In order to meet the standards set above, the automobile industry has to produce greener cars with lower-fuel consumption. The objective is to improve the efficiency of engines and to make vehicles lighter.

---

<sup>5</sup> See Commission's page on the automobile industry voluntary commitments.

<sup>6</sup> Directive 1999/94/EC on availability of consumer information on fuel economy and CO<sub>2</sub> emissions in respect of the marketing of new passenger cars.

<sup>7</sup> See Commission page on Automotive Fuel Quality.

Several new technologies (advanced combustion engines, mild hybrid, hybrid and fuel cell propulsion) are currently being tested. The best technologies are due to appear on the market once technological and commercial barriers have been overcome.

### 2.3.2.5 Alternative fuels

Another way to make cars greener is to use alternative fuels. A Commission Communication on alternative fuels suggests a target of 20% use of alternative fuels in road transport by 2020.

The Commission concludes that only three options would have the potential to achieve individually more than 5% of total transport fuel consumption over the next 20 years: *biofuels* which are already available, *natural gas* in the medium term and *hydrogen and fuel cells* in the long term. [17]

**Biofuels** currently represent around 0.3 percent only of diesel and gasoline consumption in the EU. In May 2003, the Commission adopted a draft Directive which requires Member States to take the necessary measures to increase the market share of biofuels.

The Commission estimates that an effective implementation of the 2003 Biofuels Directive could save 19 million tones of oil by 2010. [18]

**Natural gas**, apart from being a clean source of energy, offers the advantage of ensuring security of supply. The *2003 Report of the high level experts on Alternative Fuels* for the Commission comes to the conclusion that natural gas is the only alternative fuel with potential for significant market share well above 5% by 2020, which could potentially compete with conventional fuels in terms of the economics of supply in a mature market scenario. [19]

**Hydrogen** is a clean and storable energy vector that can be produced from a variety of primary energy sources (including fossil, renewable and nuclear). In September 2003, the Commission presented a Communication proposing the creation of a European Hydrogen and Fuel Cells Technology Partnership in order to promote hydrogen research in Europe. This is regarded as a potentially abundant alternative source of energy. [20]

As a consequence, in Brussels, on the 20<sup>th</sup> of January 2004, European Commission President Romano Prodi, whose Advisory Council includes key players of the European hydrogen sector, launched the “**European Hydrogen and Fuel Cell Technology**” Platform.

There are various other initiatives that intent to make cars cleaner, such as:

- **Reduction of pollution from tires:** the Commission is currently elaborating measures to drastically reduce the proportion of certain toxic chemicals used in the production of car tires by end 2008.
- **Recycling of end of life vehicles:** Every year, end of life vehicles in the EU generate between 8 and 9 million tones of waste. To manage this problem, the European Parliament and the Council adopted in September 2000 a Directive which makes vehicle dismantling and recycling more environmentally friendly. [21]

However, many transport experts doubt whether these measures will provide a sustainable solution in the long run. In general, the growth of car use (especially in developing countries) and the increased transport demand are likely to offset the benefits brought by the introduction of greener cars in mature markets.

## 3. RUE IN TRANSPORT IN THE TOURIST SECTOR

The third part of the paper elaborates on policies at the various levels of the transport chain promoting the use of RES and RUE for sustainable tourism. There are various important issues related to a better management of the global transport chain. Section 2 focus on the various aspects related to Renewable Energy Sources (RES) and Rational Use of Energy (RUE) linked to the consumption patterns of transport.

### 3.1 Introduction

The challenges for sustainable tourism are linked to both the consumption (directly linked to RES) and the production patterns, i.e. the infrastructure, facilities and services that are offered to satisfy the demand of tourism for transport, directly linked to RUE. Due to its potential impacts on the environment and public health the transport sector poses one of the greatest policy challenges for sustainable development within the EU.

The environmental impacts of the transportation activity include:

- emissions of greenhouse gases that have been widely accepted as the main cause of global warming;
- emissions of compounds that make the ozone layer thinner and thereby cause damaging infiltration of ultraviolet radiation;
- production of persistent organic pollutants that damage the biological systems;

In addition, transport usually contributes more than half of all local and regional air pollution and noise, and is the major source of external acoustic nuisance in urban areas. [22]

Transport activity is a major user of non-renewable energy resources. About 20 per cent of worldwide energy resources are used for transport.

In the EU, the transport sector is responsible for 32 per cent of energy consumption. Moreover, 90 per cent of transport (road/rail/air/sea) depends on oil; after a hundred years of exploration and extraction, few new oil reserves have been found. If supply declines and demand continues growing, the world could encounter serious shortages.

In pursuing sustainable mobility there are various obstacles and tourism related activities that are among the major contributors to these global problems. The European Environment Agency<sup>8</sup> estimates that in Europe over 40% of transport and its associated energy use is for tourism and leisure activities.

Traffic congestion resulting from tourist travel is a significant factor for bottlenecks, especially if the seasonality of this transport demand is taken into consideration.

Pollution and noise resulting from transport for tourism (in this context, the effects of aviation noise and pollution should also be considered) are major problems, especially for those tourist areas that do not have the technical means to ease these effects.

The White Paper on "*European transport policy for 2010: time to decide*", which is the main document expressing the Common Transport Policy, outlines how to achieve tourist transport that is more efficient, sustainable and of higher quality.

The proposed strategy and measures are designed to gradually break the decoupling between transport growth and economic growth in order to reduce congestion and the pressure on the environment.

The proposed strategy and measures aim at maintaining the EU's economic competitiveness developing at the same time a transport policy of quality for European citizens. Road safety, low congestion, sustainable mobility, passengers' rights, better quality of transport services, and sustainable infrastructure meet the concerns of tourists and local population and significantly affect the tourist product and life in destinations.

An efficient strategy for sustainable tourism can influence the way in which people travel around during their holidays. In the context of a global strategy, there are many policy options that could be applied in order to facilitate sustainable tourism.

---

<sup>8</sup> <http://www.eea.eu.int>



In the following paragraphs some of the main policies are provided, implemented in the context of tourism, in order to facilitate sustainable mobility.

### 3.2 Planning and Managing Transport Networks

The goal of the Union's transport policy is to ensure *sustainable mobility* for people and goods and create a coherent global transport system, which will enable for the best possible returns, not only in terms of investment, but also in securing safety and other environmental and social priorities.

All transport networks, either regional or international, are systems incorporating compatible physical infrastructure and operational standards ensuring sustainability.

In the broader European context, the existence of an integrated transport network is a prerequisite for the creation of the internal market and the territorial cohesion. The Trans-European transport network (TEN-T), comprising infrastructure for the different modes of transport and traffic management systems, strongly facilitates sustainable mobility. [23]

The same network serves the main flows of the European tourism demand for transport. In this sense, the successful design of such a European network, meeting the needs at regional and local level plays a significant role in the promotion of sustainable tourism.

### 3.3 Modal Split

In order to reduce the environmental damage caused by the prevailing trends the EU is trying to increase the use of road and air transport, by promoting alternative modes of transport, such as rail and maritime transport. This is one of the main goals that have been set by Common Transport Policy.

The White Paper on "*European Transport Policy for 2010: time to decide*", stresses the importance of a balanced growth among the different modes of transport.

Some of the policies towards this end, ensuring the fair competition among the different modes of transport, could be the internalization of the external costs of transport and the targeted investments on the networks.

Revitalizing the more environmentally friendly modes of transport (e.g. railways) would be an important step towards sustainability. Some examples of the railways advantages include:

- low environmental impacts;
- high standards of safety;
- low external costs (e.g. costs related to accidents, air pollution, climate change risks, noise, and congestion);
- high efficiency concerning capacity, energy, space and time.

Railways traditionally serve high flows of tourists (especially youngsters); their modernization could make the European railways ideal means for generalized tourist trips and this would have tremendous positive impacts for sustainability [24].

For **maritime transport**, effective sea motorways are planned as part of the trans-European network. According to the definition of the European Commission, "*motorways of the sea are aimed at acting as a substitute for motorways on land, either to avoid saturated land corridors or to give access to countries separated by the rest of Europe by sea*".

To further promote this mode of transport, a European maritime traffic management system is to be established and strict rules on maritime safety are to be introduced.

Maritime transport is the main means to reach many tourist destinations, and especially islands. In this sense, the promotion of sustainable maritime transport would be valuable for sustainable tourism.

### **3.4 Promoting the Use of Public Transport**

More than 75 per cent of the population of the European Union lives in urban areas. Therefore urban transport accounts for a significant part of total mobility. Increased car use has been accompanied by safety and environmental problems (such as congestion and pollution) as well as by a downward spiral of under-investment in public transport. The initiatives taken so far to face this challenge at an EU level include the promotion of:

- lower-consumption vehicles and new propulsion technologies to reduce emissions;
- the use of improved collective and non-motorized modes in conjunction with mobility management schemes;
- information systems for traffic management in order to improve traffic flow;
- local services that increase accessibility for peripheral residential areas, provide access to the main employment and education areas as well as to the town centres and provide interchange for rural and feeder routes to core bus services;
- integration of bus and rail ticketing.

Promoting the use of public transport is an important objective for cities with tourist attractions, in order to achieve sustainable tourism.

### **3.5 Influencing Travel Behaviour**

Changing the patterns of travel behaviour in tourist regions may imply the development of special local facilities, such as walking and cycling networks and park and ride facilities.

#### *Walking and Cycling*

The development and maintenance of principal walking and cycling routes may have multiple benefits by providing residents sustainable travel and exercise opportunities but also visitors with a healthy “car-free day out” activity. Improved pedestrian infrastructure may help to reduce the number of short car trips.

An efficient cycling strategy may comprise the provision of new on road cycle routes as well as improved links to the existing routes.

A cycling network may link together major land uses, bus and rail interchanges as well as major tourist attractions.

For every aspect, the town strategies must be developed taking into consideration the *seasonal peaks* congestion issues.

#### *Park-and-Ride*

The development of *park-and-ride* facilities could result in significant growth in traffic levels if appropriate land use planning measures are not taken to reduce the patterns of travelling together with adequate investments in the transport network. This would be essential in order to ensure a reduction in potential future traffic generation and control congestion across the highway networks in urban areas.

#### *Managing Traffic Flows (Demand Management)*

Commuter parking spaces could be converted to shopper/ visitor use, allowing the economic vitality of towns to be sustained through shopping and tourist trips. Within the city centre, priority for on-street parking should be given to certain categories of users, with other cars

discouraged from travelling into the centre. Other improvements could encourage residents and visitors to travel to the centre without using cars.

#### *Marketing and Publicity*

Individual marketing and publicity activities that will be undertaken to encourage people to make more sustainable trips include:

- “Car Free Days Out” leaflets;
- Inter-operator ticketing promotions;
- Improved tourist information;
- Publicity leaflets, improved signage and website information regarding the walking and cycling network;
- Measures utilizing the various media promoting the public transport network.

Traditionally, many European cities or regions are tourist destinations. By taking into consideration the seasonality of the tourist traffic, it can be said that those cities and regions suffer from unregulated transport behaviour. All the above mentioned measures could play a significant role in promoting sustainable tourism, contributing in turn to a more Rational Use of Energy.

#### **4. CASE STUDY**

One of the main problems of leisure tourism in Europe is the seasonality of the activity and its concentration on specific periods of the year. This leads to poor working and employment conditions with negative impacts on qualification levels, service quality and business competitiveness, along with certain saturation of the communication infrastructure and tourist facilities.

Member States are already implementing some policies with respect to the environmental impacts of tourism. In this context, improvements in infrastructure, identified through analyses of tourist flows, are a sound tool to increase the capacity, eliminate bottlenecks and reduce energy consumption in the peak season.

The above improvements in transport infrastructure may contribute heavily in reaching the objectives for RUE, as well as for better use of RES.

In this part of the paper a Case Study is presented, undertaken in the context of “*TINA-Transport Infrastructure Needs Assessment in Malta*” that was carried out between April 2001 and March 2002. [26]

The study focus was on the definition of the components of the transport network that were proposed to become parts of the revised TEN, after the 2004 enlargement.

The importance of tourism for the country was among the leading factors for the structuring of all the proposed measures regarding the modernization of the transport network.

One of the main problems in this context was the existing bottlenecks on the road transport network, mainly due to tourist flows that caused significant operational and environmental problems (see Annex I). More specifically:

There had been a steady growth in the influx of tourists, between 1995 and 2000, by approximately 1.5% per annum, while by 2000, the total number of tourist arrivals in Malta had reached 1.2 million i.e. three times more than Malta’s residential population.

Statistical analysis of the data collected as part of an expenditure survey carried out in 1998 indicated that tourism earnings in the Maltese Islands’ amounted approximately € 800 million each year. More precisely this can be described as follows:

**Table 4.1** Economic Impacts of Tourism in Malta

Aviation related (Air-Malta and airport) Revenues	€ 175.88 million
Passenger Handling Revenues	€ 14.88 million
Accommodation Revenues	€ 314.75 million
Catering (food and beverage) Revenues	€ 133.90 million
Domestic Transport Revenues	€ 35.75 million
Recreation Revenues	€ 48.85 million
Shopping Revenues	€ 66.90 million
Other Revenues	€ 7.72 million
<b>TOTAL</b>	<b>€ 798.63 million</b>

Source: The Economic Impact of Tourism in Malta, Malta Tourism Authority, 2000

Tourism had considerable impacts on the Maltese economy (namely on: Employment, Gross National Product, National Income and Imports/ Exports). In 1998 the impacts were as follows:

- *Employment: 41,451 persons (34% of the total working population) were employed directly or indirectly within the tourism sector.*
- *Gross National Product: The direct impact was €348 million accounting for 10.45% of the national total GNP.*
- *National Income: the maximum impact contribution of the tourism sector components on national income in 1998 was 21%.*
- *Import + Outflows: Slightly more than 9% of the total imports and outflows are as a direct result of tourism earnings, this rises up to 13.69% when indirect earnings are taken into account.*

The 1998 expenditure survey was also used to give an estimation of the tourists' *willingness to spend* during their stay in Malta, if no financial or time constraints existed, as well as the type of facilities and attractions they would like to find in this particular destination.

From the results of the survey, it is clearly evident that transport and its infrastructure have an important impact on tourists' perception as to the quality of their stay in Malta (accounting 33.6% of responses).

In total 28.9% of tourists felt that more investments should be directed towards improving road infrastructure, signage, pavements, footpaths and the quality and frequency of bus services (used by 80.6% of tourists). A further 4.7% of the respondents felt that further investment should also be made to improve the quality of car hire and taxi services.

In conclusion, it can be seen that in a small country such as Malta, with limited natural resources, the economy is almost totally dependent on the service sector and, in particular, on tourism. In a highly competitive tourism market, a poor perception by the visitors on the country's transport system may, in the medium to long term, cause significant damage to the tourist industry and, through the multiplier effects, to the economy as a whole.

In this context, it was found that road transport faces severe congestion problems in Malta due to the extreme demand and the problem is expected to worsen in the coming years, therefore measures to extend capacity were necessary, in order to eliminate infrastructure bottlenecks.

It has to be mentioned that the above analysis was based on surveys by Tour Operators and the Travel Agents Association<sup>9</sup>.

The Transport Infrastructure Needs Assessment for Malta resulted in both a priority TINA Main Road Network and a network of access roads to the TINA main road network. Investment needs of the order of €233.60 million were identified for the modernization of the road network in Malta by 2015.

<sup>9</sup> For example, it has been reported that 85% of all tourists to Malta visit Rabat and Mdina.

### RES and RUE in the Transport System of Malta

By identifying the priority main road network, and in order to reach the objective for sustainable tourism, the TINA exercise focused on infrastructure measures that could promote sustainable transport.

In this context measures for the Rational Use of Energy (RUE) in the transport sector were proposed, for meeting the very high summer demand for energy, due to tourist flows.

In search for more RUE, transport planning could be extended to study and use a broader spectrum of measures, including additional transport modes.

Towards this end, it has been pursued by the authorities the revitalization of an older plan for the establishment of a railway line in Malta connecting Valetta, the capital of the island, with its suburbs, that was assessed as having potentially, valuable external benefits for the country

The operation of a suburban railway line could contribute to a significant shift of road traffic towards more energy efficient and less polluting modes such as the electric railway. It is estimated that the operation of an electrified suburban railway line in Malta (length: approx. 15 km) could save some € 3.45 million per year due to energy reductions. The estimations have been based on average consumptions shown in the following Table.

**Table 4.2** Indicative energy consumption

Mode	Average Consumption per pas/km
Passenger Car	0.194 lit petrol equivalent
Suburban train	0.031 lit petrol equivalent

Source: "Railway and Environment", CER (Community of European Railways), September 2001

An average price of oil of €1.00 per lit was taken into account. In order to estimate other external benefits from such a traffic shift to rail, the figures of the following table (presenting the average costs of passengers transport due to environmental impacts) are taken into consideration:

**Table 4.3** Costs of Environmental Impacts

For passengers traffic	Environmental impacts (figures expressed in Euros per pas.km)
Road modes in total	0.044
Rail	0.022

Source: "Environmental and Safety Aspects in Rail Transport" (Dionelis and Giaoutzi, 2005)

Based on the above figures, it is estimated that the operation of an electrified Suburban Railway line in Malta could save some additional €460 thousand per year (The estimations have been based on an assumption of moving about 3,800 passengers per day by train, i.e. making some 21,000,000 pas/km every year).

The measures described in the previous paragraphs are the results of infrastructural transport planning studies, serving the goal for more RUE.

However, such measures alone cannot be effective without integrated actions for an extensive use of Renewable Energy Sources (RES).

In the framework of the TINA exercise in Malta, the main objective for sustainable tourism was pursued through recommendations for extensive use of Renewable Energy Sources (RES) in road transport.

Emphasis was placed, in this context, on the extensive use of cleaner, less polluting cars for at least tourist trips that may seriously contribute towards a better environment on the islands. The efficiency of such actions has as a prerequisite political will plus close cooperation among local authorities, Tour Operators as well as the Travel Agents Associations in the islands.

## 5. CONCLUSIONS

Tourism growth is one of the greatest success stories of our times but, in recent years, there have been increasingly some alarming signs, such as: over-saturation and deterioration of local conditions in destinations, the overwhelming pressure on local cultures, the bottlenecks in transport facilities, as well as a growing resentment by residents for the disturbance and the pressure, on natural resources, caused by the visitors, in some destinations. In this context, the emerging environmental problems force policy makers but also stakeholders to realize that the depletion of natural and human resources goes much faster than the society and the environment can afford. Meeting the world energy needs without considerable environmental impacts is one of the major challenges to sustainable development while access to reliable and affordable energy is an essential prerequisite to sustainable tourism. Therefore, developing Renewable Energy Sources (RES) has become one of the main pillars of the European Union's energy policy. Furthermore, rational use of energy (RUE) has become a vital component in reducing consumption and thereby reducing costs and raising competitiveness. Increased share of Renewable Energy Sources (RES) and Rational Use of Energy (RUE) help to improve the security of energy supply by reducing the dependence on imported energy sources, and to promote sustainability. The transport sector is a major actor in energy consumption. It is estimated that in the EU context, the transport sector is responsible for 32 per cent of energy consumption, while, over 40 per cent of transport and its associated energy use is for tourism and leisure activities. For reaching sustainable tourism, transport is one of the fields where strict measures should be taken. Tourist travel is a significant factor for increased energy consumption, due to the high traffic flows it creates, and the seasonality of transport demand. Furthermore, pollution and noise resulting from tourist transport are also major problems, especially for those tourist areas that do not have the technical means to ease these effects. Promoting RES and RUE in transport policies should be one of the main fields for action, towards sustainable tourism. The increase of the share of renewable energy in the transport energy balance and the rational use of energy can be achieved through measures undertaken at national, regional and local levels. Therefore part of our efforts to meet the pressing environmental challenges of tourist demand, should involve a revised vision of our transport systems, where RES and RUE are at the core of concerns for reaching both sustainable transport and indirectly sustainable tourism. On the other hand, sustainable tourism has a direct link with RUE, through the efforts for better design of international, national and regional transport systems. New transport strategies need to focus on questions relating to RES and RUE. These may involve:

- Reorientation of land use and infrastructure planning;
- improvements in cars' technology and fuels;
- changes in transport consumption patterns, such as more efficient traffic management, diverse modal transport mix comprising increased public and non-motorized transport, and investment measures concerning infrastructure improvements.

In the case of Malta, it was found that the very high tourist traffic flows seriously damage the environment causing bottlenecks and congestions, as their seasonable character cannot be served by the capacity of the existing transport infrastructure. By employing basic principles of transportation planning, the Transport Infrastructure Needs Assessment (TINA) for the islands identified the necessary measures, regarding the modernization of the existing road network that

may promote sustainable transport and tourism. These take into account all the options available for the utilization of RES and RUE in the transport sector especially for tourism development. Another finding drawn from the Malta case study was the necessity for the establishment of an electrified railway line connecting Valetta with its suburbs that could contribute towards more RUE, as this plan would cause a significant shift of road traffic towards more energy efficient and less polluting modes. The above measures should be coupled with concrete actions for enhancing the use of Renewable Energy Sources (RES), where sustainable tourism would be pursued through incentives and policies for the extensive use of Renewable Energy Sources (RES) in road transport but also the use of cleaner, less polluting cars for at least tourist trips that could greatly contribute towards a better environment on the islands.

The conclusions drawn from the present case study could also apply to any other typical tourist destination, where tourism creates bottlenecks and has negative impacts on the local transport systems and the environment. Conclusions drawn from the present paper underline that future developments in general and in the tourism sector in particular should take into account the depletion of resources resulting from irrational use and lack of planning that seriously threaten sustainable development. Therefore it is necessary plan carefully for the preservation of resources in order to support policy decisions for the implementation of sustainable mobility and tourism. Tourism and travel will inevitably continue to increase. Meeting the objectives of sustainability, in the present era, in a way that effectively preserves natural resources and the environment is the challenge of our times.

## ANNEX I



## REFERENCES

1. Treaty Establishing the European Community, Rome 25 March 1957
2. COMMISSION COMMUNICATION, COM (2003) 716 final, "Basic Orientations for the Sustainability of European Tourism", Brussels, 21.11.2003
3. Green Paper - The Role of the Union in the Field of Tourism COM (95) 97, April 1995
4. "AGENDA 21 - THE FIRST 5 YEARS", Report on the Implementation of Agenda 21 in the European Community (Brussels, 1997)
5. "EU Support for Tourism Enterprises and Tourist Destinations", European Commission - D/3 Tourism

6. COMMISSION COMMUNICATION COM(2001) 665 final, “*Working Together for the Future of European Tourism*”, Brussels 13.11.2001
7. European Commission – DG Environment Progress Report on Tourism, January 2005
8. White Paper on European Transport Policy for 2010: COM (2001) 370: Time to decide: European Commission DG TREN, 2001
9. DIRECTIVE 2001/77/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 September 2001, on the “*Promotion of Electricity Produced from Renewable Energy Sources in the Internal Electricity Market*”
10. White Paper for a Community Strategy and Action Plan, Energy for the Future: Renewable Sources of Energy, COM (97)599, 23.11.97
11. Report edited by the European Copper Institute (ECI), with the support of the Motor Challenge Programme, Brussels, April 2004
12. Green Paper on “Energy Efficiency or Doing More with Less”, 22.6.2005, COM (2005) 265 final
13. GPF (Global Policy Forum) Reports ([www.globalpolicy.org](http://www.globalpolicy.org))
14. European Commission – Press Releases: MEMO/05/495, “Directive on the Promotion of Clean Road Transport Vehicles”, Brussels, 21 December 2005
15. Commitment of the European Automobile Manufacturers Association (ACEA) on CO2 emissions reductions from new passenger cars, and subsequent COMMISSION RECOMMENDATION of 5 February 1999
16. European Directive 2003/17/EC relating to the quality of petrol and diesel fuels
17. COMMISSION COMMUNICATION, COM (2001) 547 final, on an “*Action Plan to Foster the Use of Alternative Fuels for Transport*”
18. DIRECTIVE 2003/30/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 8 May 2003, on the promotion of the use of bio-fuels or other renewable fuels for transport
19. “*Development of Alternative Fuels*”, Report of the alternative fuels experts, December 2003
20. European Commission – Press Releases: IP/03/1229: EU roadmap towards a European Partnership for a Sustainable Hydrogen Economy, Brussels, 10 September 2003
21. DIRECTIVE 2000/53/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 September 2000, on ‘end-of life vehicles’.
22. Several EC publications, among others: White Paper on European Transport Policy for 2010: COM (2001) 370: Time to decide: European Commission DG TREN, 2001
23. Decision No 884/2004/EC of the European Parliament and of the Council of 29 April 2004 amending Decision No 1692/96/EC on Community guidelines for the development of the trans-European transport network
24. “Environmental and Safety Aspects in Rail Transport”, by Dionelis C. and M. Giaoutzi, 8th NECTAR Conference, Las Palmas, June 2005
25. White Paper on European Transport Policy for 2010, and Euractiv ([www.euractiv.com](http://www.euractiv.com) – 17 March 2006) on EU action plan seeking to shift freight to rivers (NAIADES programme)
26. “*TINA-Transport Infrastructure Needs Assessment in Malta*”, Contract MLT-01-002.00 of the European Commission, TINA Vienna, Final Report – April