1. Introduction

During the last 20 years the European Commission and the Member-States have actively supported and promoted decisively the planning and construction of Trans-European and Pan-European Transport Networks. For the region of SE Europe, in particular, the critical importance of transport infrastructure in achieving the goals of economic, social and territorial cohesion it is widely recognised. The Egnatia Motorway is the project which renders Northern Greece a dominant pole of reference and development in the greater area, for the neighbouring but also the greater geographical, economic, and geopolitic space with extensive mainland and a population of millions.
At a European level, the Egnatia Motorway, having a west-to-east direction, acts as a collecting road for three north-to-south Pan-European Corridors: Corridor IV (Berlin to Thessaloniki via Sophia), Corridor IX (Helsinki to Alexandroupoli), and Corridor X (connecting Thessaloniki to Austria and Hungary via Belgrade). Hence, the Egnatia Motorway acquires great significance for the development of the Balkans and SE Europe and that is the reason why it was included in the fourteen priority projects of the Trans-European Transport Network.

More specifically, the three major generators of transport movements in the Balkan area are the Black Sea, the Aegean (Eastern Mediterranean) and the Adriatic / Ionian Sea. Each one of these is connected to the others through a motorway quadrilateral formed by the Egnatia Motorway, its two vertical axes, Ardanio – Ormenio – Burgas and Siatista – Kristallopigi – Pogradec – Tirana – Durres, and Trans-European Axis VIII, Durres – Skopje – Sofia – Burgas. The immediate construction of the three sides is going to boost the development of transports through Greece. This is the reason why EGNATIA ODOS A.E. is promoting the completion of the two vertical axes, Siatista to Kristallopigi and Ardanio to Ormenio.

Map 2. The Egnatia Motorway and basic infrastructures
At a national level, the Egnatia Motorway is the northern axis of development of Greece and is connected with the rest of Greece through the PATHE motorway (Patras – Athens – Thessaloniki – Evzonoi cross-border station to FYROM), and the west axis of the Ionian motorway (from Ioannina to Kalamata through Patras). It is also connected with the islands of the Aegean and Ionian seas through sea corridors starting from Alexandroupoli, Kavala, Thessaloniki, and Igoumenitsa. These four of the six international gates of Greece are directly connected with the Egnatia motorway.

In this context we should highlight the qualitative difference between the Egnatia and the PATHE motorways. The latter follows the traditional axis which connects Greece with the neighboring countries and its operation is not expected to affect dramatically the general levels of development, spatial planning, and transports. On the contrary, the system of the Egnatia motorway and the vertical axes introduces a new network in the west-to-east direction with considerable impact on the interregional and international connections. The opening to traffic of certain sections in East Macedonia & Thrace has resulted into a considerable increase in movements locally, whereas the Kastania bypass in the west section has altered the traffic features of the connection between West and Central Macedonia.

The expectations bred by the Egnatia Motorway in its capacity as the backbone of the transport system and as the main regional development axis bring forward the need for coordinated actions and effective cooperation among agencies in order to fully exploit the consequent advantages. Especially as regards promoting combined transports, the Egnatia Motorway is expected to form the main axis for the road interconnection among terminal stations and nodes of other transport means, especially in relation to transports and movements from Italy to the countries of SE Europe and the Black Sea.

2. Transport Infrastructures

2.1 The Egnatia Motorway

The Egnatia Motorway is a motorway of international standards. The total length is 670 km and the cross section is 24.5m (22m in mountainous areas). It is a dual carriageway separated by a median, with two traffic lanes and a hard shoulder per direction, except for a 45 km – long section (Klidi – Thessaloniki – Derveni) that has three traffic lanes and a hard shoulder per carriageway. The following table illustrates the current status of the entire axis.
Table 1. Progress of the Egnatia Motorway works, November 2005

<table>
<thead>
<tr>
<th>Section constructed before 1994 (common with the PATHE)</th>
<th>Length in km</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Works after 1997 – under the responsibility of EAOE (Programme funded by CSF II and III)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Completed and in use (September 2006)</td>
<td>419</td>
</tr>
<tr>
<td>• To be completed &amp; in use within 2006</td>
<td>21</td>
</tr>
<tr>
<td>Other sections under construction</td>
<td>157</td>
</tr>
<tr>
<td>Sections to be tendered</td>
<td>48</td>
</tr>
</tbody>
</table>

**TOTAL OF AXIS** | 670

Specifically in the Region of East Macedonia & Thrace, and especially in the Prefecture of Kavala, the current progress of works is represented by 76% and 46% respectively by sections in use. The section Chrysoupoli – Vaniano is under construction and the works at Strymonas – Ag. Andreas (inland alignment) and Nestos Bridge are currently being tendered. All Egnatia Motorway works shall be completed within the framework of CSF III, i.e. by the end of 2008.

Table 2. Progress of works of the Egnatia Motorway in the Region of East Macedonia & Thrace and the Prefecture of Kavala, November 2005

<table>
<thead>
<tr>
<th>Region of EM&amp;T</th>
<th>Pref. of Kavala</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length in km</td>
<td></td>
</tr>
<tr>
<td>Sections in use</td>
<td>187</td>
</tr>
<tr>
<td>Sections under construction</td>
<td>16</td>
</tr>
<tr>
<td>Sections to be tendered</td>
<td>43</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>246</td>
</tr>
<tr>
<td></td>
<td>98</td>
</tr>
</tbody>
</table>

2.2. Vertical Axes

EGNATIA ODOS A.E. has undertaken, in parallel with the mainline, the design and construction management of three main vertical axes out of the nine axes that supply it with traffic.

Specifically, the axes are:

A. Siatista – Krystallopigi (Albania – Pan-European Axis VIII)
B. Thessaloniki – Serres – Promachon (Bulgaria – Pan-European Corridor IV)
C. Ardanio – Ormenio (Bulgaria – Pan-European Corridor IX).
Table 3. Progress of works of Vertical Axes, November 2005

<table>
<thead>
<tr>
<th></th>
<th>Siatista – Krystallopigi</th>
<th>Thessaloniki – Serres – Promachon</th>
<th>Ardanio – Ormenio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length in km</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sections in use</td>
<td>15.3</td>
<td>22.5</td>
<td>93</td>
</tr>
<tr>
<td>Sections under construction</td>
<td>23.2</td>
<td>37.5</td>
<td>31</td>
</tr>
<tr>
<td>Sections to be tendered</td>
<td>42.5</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>81</td>
<td>96</td>
<td>124</td>
</tr>
</tbody>
</table>

Map 3. Progress of works in the Region of East Macedonia & Thrace

Upon completion of the Egnatia motorway works the density of the road network (km/km²) in the Region of East Macedonia & Thrace is estimated to increase by 36%. The density of the road network in the Prefecture of Kavala is estimated to increase by 8.5%, which is the highest estimated increase at a Prefecture’s level.
Map 4. Egnatia motorway and existing road network in the Region of E. Macedonia & Thrace

Map 5. Egnatia motorway in the greater area of Kavala city
2.2. The Corridor Thessaloniki – Istanbul

In the context of developing the connections of Greece in the area of SE Europe, the European Corridor Thessaloniki – Istanbul is an initiative of the bilateral cooperation between Greece and Turkey, as agreed by the ministers for Transports & Communications of the two countries, by signing a Memorandum of Understanding on 22/01/04.

This corridor regards both the road connection, by expanding the Egnatia motorway, and the upgrading of the existing railroad connection between Greece and Turkey, from Thessaloniki to Istanbul.

The objective of both countries is to promote this corridor through mutual cooperation and exchange of information on issues of infrastructures and operation. This development is based on the operation standards of Pan-European transport corridors. To this end a Stirring Committee was established, with representatives from both countries. The Stirring Committee is to be supported as regards its function by two Technical Secretariats with the respective task forces (one for the road axis and one for the railroad).

The Ministry of Transportation recommended that Egnatia Odos A.E. should undertake the Technical Secretariat for the road project (in both Greece and Turkey). The Road Technical Secretariat took over according to the decisions taken at the 1st meeting of the Steering Committee. Since then it has taken action in all fields of responsibility and specifically proceeded with the following:

- Mapping of the current status of the corridor by collecting data (technical issues, toll stations, customhouses, corridor operation) so that the additional needs and related actions be determined (e.g. preparation of supplementary designs, need to upgrade sections, improving procedures etc.)

- Processing and management of data, by developing a Geographic Information System (G.I.S).

- Development of a website for information diffusion (www.etcti.org)

- Transfer of know-how regarding the preparation of applications for funding from funding agencies.

- Award of research to identify problems and submit proposals regarding the improvement of cross-border procedures and infrastructures on the road axis (Kipi / Ipsala).
As regards the road axis, 83 km (section Istanbul – Kinali) out of a total of 256 km are completed with highway properties. This is a common section with Pan-European Corridor IV. The Turkish Government made clear that it is not in its intentions to construct a highway for the remaining 173 km (Kinali – border). Improvement – upgrading works with widening of the existing road are to be carried out instead. The section design involves constructing a dual carriageway with carriageway separation, a design speed of 80 km/hour, with at-grade junctions and a few interchanges. The cost is estimated at € 190m.

3. Impacts of the Egnatia Motorway on mobility, accessibility, and networking

The main impact of the transport infrastructure is the increase in the potential to move and access various areas or the activities within or beyond an area. Improving the accessibility and networking of various areas with the objective to achieve equal access to new infrastructures is the main objective of the European transport policy, as well as of the European Spatial Development Perspective, and generally of the policy for economic and social cohesion.

3.1. Mobility

According to volume counts performed in 2004, which estimated the average number of vehicles moving between two successive interchanges on the Egnatia Motorway, it occurs that the highest traffic volumes are recorded between K4 (TITAN) and Serres interchanges (over 54,100 vehicles per day), in the outer area of Thessaloniki. The counts performed in the sections of the east region of the Egnatia motorway in use indicate that the daily traffic volume reaches 78% of the respective forecast. In the east region the highest traffic volumes are recorded in the sections crossing the Prefecture of Kavala.

Throughout the length of the Egnatia motorway the composition of traffic is relatively stable. Most vehicles (80% to 90%) are private cars. The remaining 10% to 20% are heavy goods vehicles; half of them articulated trucks and the other half non-articulated trucks. In the sections of the Prefecture of Kavala the composition of traffic is approx. 81% private cars and 19% HGV’s.

The completion of the motorway shall result in a substantial saving of travel time along N. Greece. Map 7 shows the estimated travel time reduction – compared to the situation before the Egnatia motorway construction – to be achieved for travels from Kavala to other areas.
upon completion of the motorway. As one can see that the travel time from Kavala to Igoumenitsa shall be reduced by more than 3 hours, whereas the trip Kavala – Kipi (Greek-Turkish border) shall be reduced by 1 hour.

Map 6. Traffic volume in sections of the Egnatia Motorway in the Region of East Macedonia & Thrace

Map 7. Reduction of time distances starting from Kavala city and with full operation of the Egnatia Motorway
3.2. Accessibility

To estimate the parameter of accessibility the directly benefited population was used as a main indicator. The “benefited population” was assessed in function of the distance on the road network, considering two types of distances: first, the 50km from Prefecture seats, a distance expressing an area of daily commuting, and therefore a space-operation entity. Second, the 150km from Region centres, a distance expressing a greater area of potential usual movements, and therefore an area with increased potential of operating connections.

Compared to the total population of Zone IV, the population benefited by the Egnatia motorway is very high: the population at a distance of 50km from seats of Prefectures crossed by the axis amounts to 2,588,037 people. This population is 2/3 of the total population of Zone IV and 1/4 of the population of Greece. The population located at a distance of 150km from the seats of Prefectures of Zone IV amounts to 3,517,605 people and represents 90% of the entire population of Zone IV and approx. 1/3 of the population of Greece.

The population residing at a distance of 50km from Kavala amounts to 292,175 people (11% of the total benefited population); it is approx. 5 times the city population and twice the Prefecture population.

Map 8. Potentially benefited population by the operation of the Egnatia Motorway at a distance of 50km from the seats of Prefectures
At all cities, and in absolute numbers, accessibility improves substantially by the operation of the axis, but at a different degree per case. Cities located towards the ends of the axis and especially at the west region, therefore less accessible in the status before the operation of the Egnatia, enjoy a higher improvement in accessibility. The accessibility to Kavala is also improved, but at a lesser degree than cities located at the ends of the motorway.

**Map 9. Change in the accessibility to urban centres upon full operation of the Egnatia motorway**

### 3.3. Networking

The Regional Framework of Spatial Planning and Sustainable Development of East Macedonia & Thrace highlights the need to set up a polycentric spatial model based on a balanced network of urban centres, combined with the development of integrated systems of transports and improvement of accessibility and cohesion thereof. The following Table shows the main urban networking in the Region of East Macedonia & Thrace identified by the Regional Framework or recommended by it as main poles of urban development.
Table 4. Urban networking in the Region of East Macedonia & Thrace and main connection road network

<table>
<thead>
<tr>
<th>Urban centres</th>
<th>Population 2001</th>
<th>Main Connection Road Network</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drama – Kavala – Xanthi</td>
<td>146,275</td>
<td>Egnatia Motorway, vertical axis</td>
</tr>
<tr>
<td>Xanthi – Komotini – Alexandroupoli</td>
<td>137,322</td>
<td>Egnatia Motorway</td>
</tr>
<tr>
<td>Alexandroupoli – Orestiada</td>
<td>64,131</td>
<td>Vertical axis</td>
</tr>
<tr>
<td>Drama – Kavala – Xanthi – Komotini – Alexandroupoli – Orestiada</td>
<td>253,732</td>
<td>Egnatia Motorway, vertical axes</td>
</tr>
</tbody>
</table>

According to the National Origin – Destination Study of 1993, in East Macedonia – Thrace the connection of Drama to Kavala was strong in 1993, with dependency elements of the first on the latter: approx. 45% of total movements from Drama regarded Kavala. A big percentage was also regarding Xanthi and Komotini with a balance between the two (31% and 24% respectively on the total of movements from the two origins towards Greece). Compared to Central Macedonia, the urban centres of East Macedonia & Thrace had in 1993 a reduced connection to Thessaloniki. A greater dependency was found in Drama, followed by Kavala, which are the closest urban centres.

The sampling data of the Origin – Destination Research of 2002 indicate that the movements between Kavala – Xanthi – Komotini – Alexandroupoli increased by 85% to 150%. Specifically, the movements between Kavala and the other cities of the Region increased remarkably (85% to Xanthi, 100% to Komotini, and 125% to Alexandroupoli). These are very big increases, considering that a 100% increase in 9 years represents an increase in traffic volume by 8% annually. It is indicatively mentioned that the movements Alexandroupoli – Komotini increased by 153%, which is equal to an increase in the traffic volume of 11% annually. Note that in the 1990’s the average increase rate of car ownership was 5.6% (Eurostat data for the whole of Greece). Therefore, the highest increase percentages of movements should be attributed also to the increased use of private cars due to improved infrastructure.

The operation of 169km of the Egnatia motorway in the east region, from 2000 to 2002, is considered to have had a decisive contribution to the increase of this level. Note that the movements between Thessaloniki and the above cities – all of them on the Egnatia mainline – increase by 95% (Thessaloniki – Kavala) to 108% (Thessaloniki – Xanthi). On the other hand, the movements between Thessaloniki and Drama increased by 45%. Generally, it is
concluded that the operation of the Egnatia motorway, as well as of vertical axes, de facto improves the connection between peripheral urban centres, and dramatically affects the spatial organization standards.

**Map 10. Increases in cross-prefecture movements in the Region of East Macedonia & Thrace**

---

4. Combined transports

The facts arising from the study of indicators for the monitoring of the Egnatia’s spatial impacts show that the operation of the motorway brings many changes to mobility, with a remarkable increase in movements and a parallel increase in connections among regions and cities of N. Greece. This increase in mobility and operational connection sets up a new framework for the operation of combined transports.

Promoting combined transports is a new innovative policy supporting the holistic approach to the transport system, as it aims at the balanced and effective use of transport capacity (infrastructure, means, management equipment). At a more general level, combined transports are a strategic action of the European transport policy to achieve both social / territorial integration and protection of the environment. The objective is to configure faster, safer cost-effective corridors of combined transport of higher quality, by promoting road and railroad
axes as well as Short Sea Shipping and Sea motorways, including, of course, river and air transports.

This means that the concept of competition among means of transport should be replaced by the concept of complementarity. Connection and interoperability are the main concepts of combined transports. It is considered necessary to create centres of commercial transports, including all means, and to reinforce the role of ports, as junctions of combined transports. Other important factors are: (a) resolving the issue of standardization, and (b) promoting technologies and networks of telematics for transports (information, management, control) using an electronic means of data transmission (EDI), the Internet, automated load identification and management systems, establishment of an electronic accompanying document etc. Generally, we should also keep in mind that when carrying out combined transports, a flow of information is added to the flow of products. The degree of automation of this information determines to a great extent the cost and quality of combined transports.

Specifically in relation to ports, those considered to be connected to the sea motorways shall have the appropriate overland connections and shall offer a high level of service to short sea shipping clients. The initial cost assessments show that establishing new regular sea connections shall be much less expensive than constructing the respective new overland infrastructures. Nevertheless, the objective of the European policy for promoting combined transports is lagging behind, as the percentage of combined transports is no more that 10% of total transports (according to Eurostat 2005 data).

In this context, one should mention that the optimum connection of the Egnatia to the ports and airports of N.Greece has been one of the main objectives when designing and is the main component of the development role of the axis. In Zone IV the transport system is complemented with the connection of the Egnatia motorway and vertical axes to 5 ports, 8 airports and the railroad network. In the Region of Eastern Macedonia & Thrace there are two airports (Kavala and Alexandroupoli) classified as international airports, and two ports (Kavala and Alexandroupoli) classified as ports of national importance. This fact underlines the role of Kavala and Alexandroupoli.

The Egnatia motorway, through its vertical axes, is also connected to the network of Pan European Corridors (TINA). Specifically, the Vertical Axes Ardanio – Ormenio and Komotini - Nymphaea, as well as the section Komotini – Alexandroupoli, are parts of Corridor IX. The axis Thessaloniki – Promachonas is part of Corridor IV and the axis Thessaloniki –
Evzoni is part of Corridor X. The latter shall be connected at a second location to the Egnatia motorway, through the Vertical Axis Siatista – Krystallopi. The above connections as well as the connection to Turkey through the Corridor Thessaloniki – Istanbul indicate the crucial role of the Egnatia as the backbone of a system of combined transports in the greater area of SE Europe.

On the other hand, one of the most important sea motorways for European transports is the Adriatic Sea motorway. The comparative advantages of transport cost, speed and reliability against the road axes crossing Bulgaria – Romania to the north or through Bulgaria – FYROM – Albania (Corridor VIII), have made the Adriatic Sea motorway the most important combined transport axis between southern Balkans and Europe. All the above indicate that Igoumenitsa port is the main junction of combined transports in W.Greece. The other ports of N.Greece are also expected to play a more active role in the development and use of combined transports in the area of SE Europe.

Specifically in relation to the port of Kavala, an important perspective for its integration in the system of combined transports of the Egnatia Motorway is concerned with the plans of upgrading it and operating it in the context of national and international transit trade. The cooperation agreement with the ports of Igoumenitsa and Taranto (Italy) is considered an important step towards the development of a smart system of combined transports among Italy, Greece and the other countries of SE Europe (Bulgaria, Turkey), as well as the Middle East and the Black Sea. Its main weakness is that the railway line catering for East Macedonia & Thrace does not cross the Prefecture of Kavala. A positive perspective opens, though, given that among the new projects in the ERGOSE AE planning is also the railway connection Thessaloniki – Kavala through Amphipoli, which includes a connection to the new port of Kavala.

An important advantage for the new port of Kavala is the direct access to the Egnatia motorway, and by extension to the border station of Promachonas (through Serres), and hence the main axis of the trans European network Nis – Sofia – Plovdiv – Edirne – Istanbul, and through that to the North – South Trans-European motorway. Note that the international gate of Promachonas is also an access to Romania and Hungary, and through them to the other states of Eastern Europe and the Commonwealth of Independent States (former USSR). Alternative accesses to Bulgaria are the border station of Exochi (through Drama) and the future gate of Echinos (Xanthi Prefecture). Therefore, in the future the increase in the activity
of the port of Kavala shall be combined with its enhancement as a commercial port junction, complementary or competitive to the ports of Thessaloniki or Alexandroupoli.

Additionally, the Egnatia Motorway (through the junction of Ag.Andreas, only 5’ from the port of Nea Peramos) caters for the successful operation of the ferry boat connection Nea Peramos – Prinos, Thasos island, providing travellers in Central and West Macedonia (coming from the West / Thessaloniki) with the potential to shorten their trip to Thasos, without being obliged to go through Kavala, while the drivers of HGV’s do not burden the centre of Kavala or the tourist port of Keramoti.

EGNATIA ODOS A.E. shall monitor the development and operation of combined transports through the respective indicators of the Observatory. The indicator, i.e. “combined transports” regards the tracking and recording of data regarding the transport of goods and individuals with railway or sea means that are then forwarded by road in the impact zone of the Egnatia motorway and vice versa. The ultimate goal by calculating this indicator is: (a) to record and underline the potential for developing combined transports, and (b) to identify problems of other means of transport, depending on their contribution to combined transports, and then their resolution either by improving infrastructures or by facilitating procedures. In this way the benefits that occur from monitoring the indicator “combined transports” relate to: (a) a potential for better planning in the provision of traffic infrastructure, so that it may be able to cater for the assessed demand in a satisfactory way and with safety for vehicles, (b) a documented assessment of the approach of the public towards various transport means, (c) tracking of the characteristics that affect the selection of a transport means at the inter-urban level, and an effort to improve the weak points of each choice (especially cost and safety).

Moreover, recording all means of transport located in the impact zone of the Egnatia, their dynamics and the distance and time-distance from the nearest junction of the motorway, shall be the scope of a special study to be prepared by the Observatory within its 5-year business plan. The programme of Observatory studies also includes the measurement and monitoring of other indicators related to combined transports and regarding commercial movements, the general transport cost, the subsequent movements, the changes in movements per means of transport, and the traffic at border stations.