PROJECT PROFILE

Greece

Attiki Odos

omega centre

Centre for Mega Projects in Transport and Development

A global Centre of Excellence in Future Urban Transport sponsored by Volvo Research and Educational Foundations (VREF)

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Abbreviations

- AIA: Athens International Airport
- ARR: Athens Ring Road
- CBA: Cost/Benefit Analysis
- **CC: Concession Contract**
- CFO: Chief Financial Officer
- CJV: Construction Joint Venture
- **CPI: Consumer Price Index**
- CSF: Community Support Framework
- DSCR: Debt Service Cover Ratio
- EBRD: European Bank for Reconstruction and Development
- EC: European Commission
- ECU: European Currency Unit
- EIA: Environmental Impact Assessment
- EIB: European Investment Bank
- EIF: European Investment Fund
- EMU: Economic and Monetary Union
- ERDF: European Regional Development Fund
- ESSM: Elefsina Stavros Spata A/P Motorway
- EU: European Union
- GRD: Greek Drachma
- I/C: Interchange
- IRR: Internal Rate of Return
- IWPM: Imittos Western Peripheral Motorway
- LSO: Lump Sum Object
- MEP: Member of Parliament
- MEPPW: Ministry of Environment, Planning and Public Works
- NPV: Net Present Value
- PATHE: Patras-Athens-Thessaloniki-Evzoni
- PPP: Public Private Partnership
- **ROE: Return on Equity**
- SAC: Supreme Administrative Court
- TEN-T: Trans-European Networks/Transport
- VAT: Value Added Tax

A INTRODUCTION

Type of project

Attiki Odos is a closed toll motorway, extending for a length of 65km. It constitutes the ring road of the greater metropolitan area of Athens and a backbone of the road network of the entire Attiki region, connecting thirty municipalities of the metropolitan area and major road, air, sea and rail transport infrastructures. The road connects the new international airport in the area of Spata (Eleftherios Venizelos Airport) with the city and is also a part of the PATHE TEN-T priority axis (Patras – Athens – Thessaloniki – FYROM border), since it links the Patras – Athens and Athens – Thessaloniki segments, bypassing the centre of Athens.

Attiki Odos consists of two motorways running almost perpendicular to each other:

- the Elefsina Stavros Spata A/P Motorway (ESSM), 52km in length; and
- the Imittos Western Peripheral Motorway (IWPM), 13km in length.

The project also includes the extension of three existing highways, totalling 9.4km in length, in order for them to be integrated and linked with Attiki Odos.

(source: www.aodos.gr accessed on 18/05/2007, MEPPW 2000)



Figure 1: The interchange with Kifisias Avenue

(Source: Ron Allen, 2007)



Figure 2: The Metamorfosi interchange with Athens – Thessaloniki National Highway

⁽Source: Attiki Odos S.A, 2007)

Figure 3: Attiki Odos project map



(Source: www.aodos.gr, accessed on 24/5/2007)

Country/location

The location of Attiki Odos within Attiki Region and Greece can be seen in Figure 4. The region of Attiki, or Attica, is one of the 13 Regions of Greece. The region consists mainly of the peninsula jutting into the Aegean Sea and includes the entire metropolitan area of Athens together with other smaller towns and islands in the gulf of Pagasitikos (the grey dotted lines in Figure 4 denote the borders of the region). The region is subdivided into the prefectures of Athens, Piraeus, East Attiki and West Attiki.



Figure 4: Location of Attiki Odos within Greece and Attika Region

(Source: originally from Google Maps, processed by the author)

Current status

The project was broken down into six major sections, each with distinct delivery timetables and operation commencement times (see 'Project programme'). The first section, connecting Pallini with the Airport, has been in operation since March 2001, while the full operation of Attiki Odos commenced in August 2004 (Attiki Odos S.A, 2001b). Currently, traffic levels are approximately 34% more than initially anticipated for the fourth year of full operation (see 'Operations') while an extension of the highway (see Figure 3) is already planned and about to be tendered (MEPPW, 2008).

B BACKGROUND TO PROJECT

Principal project objectives

The central objective for the development of Attiki Odos was to overcome the traffic and environmental problems that the radial road system of the city had created. Therefore, a peripheral highway would enhance quality of life and the balanced development of the city (MEPPW, 2000; Trova and Koutras, 2001 p384).

A breakdown of key objectives, as stated by the Government, consists of the following (MEPPW, 2000):

- to develop the inner ring for the city of Athens and integrate a full road network for fast and safe transport in the entire Attika region;
- to drastically decrease traffic within the city;
- to substantially decrease air and noise pollution;
- to provide the crucial segment of PATHE TEN-T (priority axis 7) by connecting the Patras Athens and Athens Thessaloniki highways;
- to provide the road connection from / to Athens International Airport;
- to contribute to an integrated regional/urban plan for Attika;
- to provide a basis for the balanced development of Attika, providing access to downgraded and isolated areas (targeting mainly Thriasio Pedio on the west and Mesogeia on the east).

Other secondary objectives quoted by the Government include (MEPPW, 2000):

- to approach and potentially access the new port facilities that will be developed on the eastern coast of Attiki to relieve the congested port of Piraeus;
- to support significantly the flood prevention system for the whole Attiki region by substantial interventions in the three main hydrographical basins of Attiki, i.e. the Thriasio Plain, the Athens Basin and Mesogeia;
- To provide an infrastructural basis for the strategic reconfiguration of the power and communication networks of Attiki.

Key enabling mechanisms and decisions to proceed

The conception of Attiki Odos, particularly the section from Elefsina to Stavros (from Elefsina to Agia Paraskevi as seen in Figure 3, see also 'Principal transport nodes') was initiated by plans and proposals in studies by Wilbur Smith & Associates, dating back to the 1960s (Trova and Koutras, 2001 p384). The project planning matured through various subsequent plans (Zekkos, 2008) and included highway access to a new international airport at Spata. Gradually, the proposed route of the Elefsina-Stavros-Spata highway of Attiki Odos became the basis for planning of the areas that the highway would cross, and initial preparatory studies for its development were begun. The Imittos Western Peripheral section of the project (from Agia Paraskevi to Katechaki) was proposed only in the late 1970s, as many alternatives had been evaluated (MEPPW, 2000; Bobolas, 2006, Trova and Koutras, 2001 p384; Kloukinioti 1996).

In 1985, the Regulatory Plan of Athens ('Regulatory Plan and Environmental Protection Programme for the wider Athens Area'), as ratified by Law 1515/85, defined Attiki Odos not as a single project but by proposing the major segments that would connect the new airport with the city and would transform the road system of Athens into a more orbital structure

(Trova and Koutras, 2001 p385).

In the early 1990s, a comprehensive traffic study for the whole Athens basin, the construction study of Attiki Odos and the Environmental Impact Assessments were conducted (Trova and Koutras, 2001 p386). At the same time, the other two mega transport projects in Athens (namely the Metro and the Athens International Airport at Spata) were also in the pipeline for tendering, together with the Rion–Antirion Bridge in Western Greece. The envisioning of four mega transport investments had come to a point where funding and construction/project management expertise were the most crucial prerequisites for their realisation.

The following timeline presents an overview of the key enabling mechanisms from the maturity of the project until the beginning of its operation:

<u>Febuary 1991</u>: The Ministry (MEPPW) tendered the excavation and preliminary works for a segment of Attiki Odos in Immitos Mountain (from Ag. Ioannis Kinigos to Katechaki) which, after some initial progress, were halted by the Supreme Administrative Court (SAC) on the basis of the inadequacy of the Environmental Impact Assessment (EIA) (SAC, 1035/1993; SAC, 1038/1993; SAC, 1040/1993).

<u>February 1992</u>: Tendering of Attiki Odos as a whole on a Design–Build–Finance-Operation– Maintenance Public Private Partnership basis (Trova and Koutras, 2001 p398).

<u>February 1993</u>: Results of Phase A (pre-selection) of the tender. Three consortia, namely CONCIF, PELLA and ATTIKI ODOS, pass to the next phase (Trova and Koutras, 2001 p398).

<u>August 1995</u>: The Ministerial Decree A/6/01/73/9752/27-8-1995 nominated the consortium of ATTIKI ODOS as the provisional concessionaire.

<u>September 1995</u>: The EIA for Attiki Odos, based on a redesigned route (according to 'environmental friendliness' criteria) on the Imittos Mountain, was ratified by the parliament as a law of the state, together with the EIA of the new International Airport (Law 2338/95).

<u>May 1996</u>: The concession contract was signed between the concessionaire and the Minister of Environment, Planning and Public Works and at the end of the year the parliament ratified the concession contract as a law of the state (Law 2245/1996).

<u>December 1997</u>: The European Investment Bank (EIB) and Attiki Odos S.A signed the lending agreement (Trova and Koutras, 2001, p400).

<u>December 1998</u>: The consortium of commercial banks (mainly Greek, see 'Funding sources' for the full list) and the Greek State signed the Guarantee Agreements that would guarantee the commercial banks' loan during the operation period (Trova and Koutras, 2001, p400).

January 1998, April 1999: The concession contract was amended twice, to allow a heavier inflow of state capital at the preliminary works phase, so that construction could progress significantly before financial close, and to satisfy requests by the financial institutions participating in the financing of the project that had evolved since the ratification of the concession contract (Presidential Act 3/1998, Presidential Act 75/1999; Leistner, 2000).

<u>January 1999</u>: The appeal of the American College of Greece to the SAC was successful and accordingly the route had to be revised again so as to have the minimum possible impact on the College's property (SAC, 1675/1999).

<u>March 2000</u>: Financial close. All loan, guarantee and insurance agreements were finalised, signed and approved by the Greek state (Ministerial Decree A/6/00/0101/25283).

<u>October 2001</u>: EU Grant awarded. Attiki Odos measure is included in the Operational Program 'Road Axes-Ports-Urban Development 2000-2006'. The allocation under the European Regional Development Fund (ERDF) for this project was EUR 476m for the period 2000-2006 (EC/Barnier, 2003b; MEPPW, 2002).

Main organisations involved

Government

The Greek Parliament: The Parliament has the legislative duties of the Greek state. The concession contract and the EIA have been ratified by the parliament as Laws of the Greek state.

The Ministry of Environment, Planning and Public Works (MEPPW): The Ministry is responsible for the analysis and studies, preparation, tendering and awarding of the project. All responsibilities were assigned to a unit within the Ministry, 'Special Services for Public Works: Projects Rion – Antirion Bridge and Attiki Odos'. The Ministry also signed the concession contract. The Ministry had been working in very close collaboration with external advisors and consultants (PWC, 2006)

The Ministry of Economy and Finance (MEF): The Ministry allocates parts of the national budget to MEPPW and conducts, in collaboration with MEPPW (and other ministries), the National Development Plan submitted to the EU for co-financing through Structural Funds. (MEPPW, 2002)

European Union: The European Union has subsidised the project through the Structural Funds during both the 1994-1999 and 2000-2006 programming periods. The EC has also played a crucial role in promoting the use of PPPs for the development of transport infrastructure and TENs (Trova and Koutras 2001, p37). The EU grants played a catalytic role in the realisation of the project since the spending capacity of the country was limited. During the early 1990s, the General Government Budget deficit was very high, and deficit targets that had to be achieved for the country to enter the European Monetary Union imposed a low spending policy in subsequent years (PWC 2006).

The most significant part of EU structural aid for the project was received during the 2000-2006 programming period. The project had been prepared and awarded prior to the request for this part of EU funding. This had to be done because the information needed for the funding application had to take into consideration the project's revenues , which could not be calculated and included in the application before the concession contract was signed. The Athens Ring Road was included in the list of objectives of the Operational Programme 'Road Axes, Ports and Urban Development' for 2000-2006 (as a part of the PATHE segment of TEN priority axis 7), and the co-financing from the European Regional Development Fund (ERDF), approved in 2001, amounted to EUR 476m.

Despite the late application for EU structural support, the EU awarding procedures had to be followed in the tendering, as did the related EU legislation for public works contracts. The PWC report (2006) also mentioned that appeals had been made to the EC regarding a violation of certain EU procurement rules, regarding the addition of a small part of the road not previously included in the tendering documentation. A final contribution of the EU relates to the rules of the structural funds, which oblige the Ministry to prepare monitoring reports on the spending and allocation of funds for the projects but also to conduct ex-post

evaluation exercises on the impacts of projects.

The private partner/concessionaire - Attiki Odos S.A

Attiki Odos S.A is the concession company of the project and undertook, through the concession contract, the design, construction, financing, operation and maintenance of the motorway. Attiki Odos S.A (the concessionaire) was formed as a joint venture of almost all large Greek construction companies. After the nomination of Attiki Odos as the winning consortium, the consortium invited all the companies in the two unsuccessful consortia to participate in the Attiki Odos consortium with the terms of the winning bid. All but two of the Greek companies from the other consortia¹ accepted the invitation and participated in the Attiki Odos consortium (Attiki Odos S.A, 2003). According to Interviewee V, this move proved crucial for the progress of the project, since serious potential hurdles due to possible objections to the tender procedures and appeals to the EC by competitors were avoided. Attiki Odos then became a consortium of 14 construction and technical companies and Egis Project, a French traffic management company (a major shareholder of Attikes Diadromes, the operation company of Attiki Odos), which participated in the consortium with a very small shareholding percentage (0.04%). The 14 companies are listed below:

- ALTE
- ELLINIKI TECHNODOMIKI
- AKTOR
- ETETH
- PANTECHNIKI
- AVAX
- TEV
- ATTIKAT
- SARANTOPOULOS
- TEGK
- ZEUS
- ATTEMKE
- ERGAS
- METON

By mid 1999, the consortium had been reduced to eleven companies. ATEMKE, METON and ERGAS could not bear the financial demands and construction complexities of the project (Attiki Odos, 2003). The shares of these three companies were transferred proportionally to the remaining shareholders. The remaining eleven members of the consortium are (Interviewee II):

¹According to PWC (2006), only one large foreign construction company had submitted a bid to the tender. There was also another international company participating in the bid which also did not join the Attiki Odos consortium (Attiki Odos S.A, 2003). Working in an unfamiliar urban setting and the lack of local knowledge to deal with bureaucracies, communities and utilities dissuaded international companies from being interested in the project (PWC, 2006). According to an official press release by Attiki Odos S.A, the bidding offers submitted by the other two consortia were far more expensive compared to the offer of Attiki Odos consortium (Attiki Odos S.A, 2003)

Shareholder name	% of shares
ALTE	8.2%
ELLINIKI TECHNODOMIKI	8.5%
AKTOR	17%
ETETH	9.8%
PANTECHNIKI	9.8%
AVAX	8.5%
TEV	8.5%
ATTIKAT	8.6%
SARANTOPOULOS	7.6%
TEGK	4.9%
J&P	8.5%

A subsequent consolidation in the Greek construction industry has led, through bankruptcies, mergers and acquisitions, to the formation of a few large construction groups. Attiki Odos consortium was a catalyst for this consolidation (Attiki Odos S.A, 2003).

Figure 5: TEN-T Priority Axis 7 and its breakdown into projects

Priority section	Type of work/status	Distance (km)	Timetable	Total cost as of end 2004 (million EUR)	Investment up to 31.1 2.2004 (million EUR)	TEN-T contribution, including studies, up to 31.12.2004 (million EUR)
Via Eginatia	New road	780	1996-2006	4600	3 100	27
Pathe	New road	800	1996-2008	8389	4 654	90.6
Sofia-Kulata-Greek -Bulgarian border	Upgrading motorway	160	2003-10	675	0	0
Nadlac –Sibiu motorway (branch towards Bucharest and Constanta)	Upgrading/ new motorway	316	2004-07	1879	0	0
TOTAL		2 056		15 543	7 754	148.5 (¹)

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(Source: EC, 2005b)

Currently, Attiki Odos S.A has the following shareholding synthesis:

Shareholder name	% of shares
ELLINIKI TECHNODOMIKI TEV – AKTOR Group	39.2%
J&P - AVAX – ETETH Group	30.8%
ATTIKAT	9.9%

(Source: www.aodos.gr)

. . .

Attiki Odos Construction Joint Venture: This is the construction entity of the project, which undertook the construction of Attiki Odos. From its formation, the members of Attiki Odos Construction JV have been the member companies and shareholders of Attiki Odos S.A.

(Source: Attiki Odos, www.aodos.gr).

The design, supply and installation of the tolling and communications equipment was subcontracted to IBI (IBI Group), equally back to back with the Concession Contract for the relevant sections (Bastos 1999).

Attikes Diadromes S.A: This company undertakes the operation and maintenance of the project. All the member companies of the construction Joint Venture participate in the company, holding 80% of the shares. TRANSROUTE INTERNATIONAL (a subsidiary of Egis Projects) participates with 20%. TRANSROUTE INTERNATIONAL initially had a percentage of 49% in Attikes Diadromes S.A, through a Know-how Provider Direct Agreement (Attiki Odos, www.aodos.gr, Interviewee II).

Major advisors and consultants to main parties

A total of 32 consultants were involved in the project in the technical and studying services domain (Konstantopoulos 2001). In the technical, legal and insurance advisory services domain the following entities were involved (Pasgianos et al, 2003):

- a technical advisor to the commercial banks;
- a technical advisor to EIB;
- a legal advisor to the commercial banks;
- a legal advisor to EIB;
- three legal advisors to Attiki Odos S.A;
- an insurance advisor to the commercial banks;
- an insurance advisor to Attiki Odos S.A.

The following five appear to have had a relatively crucial involvement (interviewees I, V):

- Zemberis–Markezinis–Lambrou Law Office and Linklaters & Paines: legal advisors to the government for the development of Attiki Odos as a PPP;
- ETEBA (National Investment Bank for Industrial Development): financial advisor to the Greek State from the Concession Award until Financial Close (ETEBA no longer exists as it has merged with National Bank of Greece);
- Halcrow Group and Metrotech S.A: technical advisor to the commercial banks syndication;
- Allen & Overy and Karatzas & Perakis: legal advisors to the commercial banks;
- Norton Rose: legal advisor to Attiki Odos S.A

<u>Banks</u>

European Investment Bank: EIB was the major lender to Attiki Odos S.A, providing most of the private financing for the development of Attiki Odos. The presence of EIB as the major lender was crucial since Greek commercial banks had limited experience in long term project financing (Interviewee V), and international banks were quite hesitant to enter into a complex deal in a country with a poor PPP record and macro-economic performance. These circumstances played a crucial role in determining the PPP deal, together with the fact that EIB's policy was not to accept construction risk, and to accept the remaining project risks only after a period of satisfactory operation (PWC, 2006). Therefore, the large loan facility provided by EIB was guaranteed by a syndicate of commercial banks during the construction period and by the Greek state during the operation period (PWC, 2006; Leistner et al, 2000)

Consortium of Lending and Guaranteeing Commercial Banks:

Commercial Banks	EIB Loan Guarantors	Commercial Banks' Loan	Standby Loan
Commercial Bank of Greece	X	X	Х
National Bank of Greece	X	Х	X
HypoVereinsbank	Х		X
BANK OF TOKYO MITSUBISHI	Х		X
SOCIETE GENERALE	Х		X
European Investment Fund	Х		
HSBC BANK PIc	Х		X
ABN AMRO BANK NV	Х		X
Agricultural Bank of Greece	Х	Х	X
Alpha Bank	Х	Х	Х
BANCA MONTE DEI PASCHI DI	Х		Х
BANK OF SCOTLAND	х		x
DE NATIONALE INVESTERINGS	X		x
Ergasias Bank	X	Х	X
Pireus Bank.	X	Х	X
ING BANK N.V.	X		X
BANCO BPI, S.A.	X		
BANK OF CYPRUS LTD.	X		
DEPFA BANK AG	X		
ENTENIAL	X		
EXPORT DEVELOPMENT	x		

Table 1: Commercial banks participating in the lending of Attiki Odos S.A.

(Source: interviewee II, Bastos, 1999)

Intercreditor Agent. Bank of Tokyo-Mitsubishi was the Intercreditor Agent of the banks acting on its behalf according to the intercreditor agreement, representing them in various decisions and being responsible for communication with the other parties in the PPP. The Intercreditor Agent approves and checks the legitimacy of any additional works and all processes that involve the banks. The Bank of Tokyo-Mitsubishi was also a lead arranger, together with HypoVereinsbank, in the commercial banks' syndicate (Interviewee II; Leistner et al, 2000).

Independent Engineer

Jacobs Gibb Ltd. and SGI – Trademco were appointed as the Independent Engineer to act on behalf of the state, the concessionaire and the banks, with their main duties being to supervise and monitor the works, provide certifications of progress and quality control, approve engineering plans and approve the necessity of any additional works required outside the concessioned object (PWC, 2006; Interviewee II). The Independent Engineer was selected from a shortlist of companies (after an open bid) determined by the banks and was subsequently approved by the Ministry, which also partially pays for the Independent Engineer's services (Bastos, 1999).

Local government

The fragmented institutional regime of local government in Greece brought the project in front of the bureaucracies and diverse priorities of the thirty-three local, municipal and regional authorities in Attiki region that were directly affected by the project. These authorities had to provide permits, authorisations and plans that were essential for the planning and progress of the works. In many cases, the authorities had views and concerns in conflict with those of the project promoters. This significantly influenced the progress of the project, especially in the area of Imittos Mountain. According to Interviewees I and II, municipalities were negotiating (not always through established and transparent procedures) with both the state and the Attiki Odos consortium, to obtain various gains such as new public space and outdoor recreation facilities across the road (the highway crosses the majority of urban areas below ground level) or in the broader area of the road. The project owner and the private investors wanted to keep the mayors happy so that they would not proceed to any action that would negatively affect the progress of the works. Nevertheless, such action had taken place in various instances through appeals to the Supreme Administrative Court, based mostly on the rationale of environmental protection (for Imittos) and adverse traffic impacts on specific areas of their municipalities (see 'Project timeline'). Another noteworthy case of appeal to the EC was by the municipalities of Vrilissia and Halandri, which resulted in the construction of extensive cut & cover tunnels below the level of the physical terrain along the highway and the redesign of several interchanges to minimise the impact of the highway on the areas concerned (Eleftherotypia, 2003; Attiki Odos S.A, 2003; MEPPW 2002).

Pressure groups

The fact that the project was such a large-scale intervention in both the urban tissue and the environmentally sensitive Imittos area, combined with the new approach of active private sector involvement in a multi billion euro project, created significant turbulence and disquiet among citizens, pressure groups and the media, and an increased willingness on their side to become more involved and to press on various issues in a drastic way. This is reflected in newspaper and magazine articles criticising various aspects and characteristics of the project and reporting on substantial action by pressure groups. However, as interviewees III and IV have stressed, there were considerable barriers to public involvement (analysed in the 'Public participation' section of this report) which are common in major projects across all sectors in Greece. Especially, in the selection and negotiation processes between private and public parties, there is no evidence of the influence of other interest groups (EC, 2005).

Planning and environmental regime

The Greek legislation covering planning and development of transport infrastructure comprises a magnitude of legal documents with often conflicting provisions (Zografos et al, 2004). It is a complex legal framework consisting of laws and other legal acts which have been, in many cases, amended through subsequent legal acts, supplemented by substantial relevant EC legislation with statutory standing. Below is a list of the most important legislation of most relevance to Attiki Odos (some of this legislation has been subsequently amended but the amendments that did not influence Attiki Odos have not been included here):

- Presidential Decree 'About the Regulation and Protections Zones of Imittos Mountain', Official Gazette of the Hellenic Republic 544 D'/1978;
- Law 1418/84 and the Presidential Decree 609/85 covering the legislation on public works contracting;
- Law 1515/85: Regulatory Plan and Environmental Protection Programme for the wider Athens Area;
- Law 1650/86: On the protection of the Environment and the Environmental Impact Assessment of projects (amended in 1990 by joint ministerial acts 69269/5387/90 and 75308/5512/90 and in 2000 by Presidential Decree 334/00 to incorporate all relevant EU Directives);
- Law 2338/95 for the ratification of the Public Private Partnership between the Greek state and the private concessionaire 'Athens International Airport S.A' (included the EIA of Attiki Odos);
- Law 2445/96 for the ratification of the Public Private Partnership between the Greek state and the private concessionaire 'Attiki Odos S.A'.

Environmental statements

The Environmental Terms for the ESSM section of Attiki Odos did not involve any serious turbulence or protest, but the EIA for the other section of the highway is a story of legal disputes, protests and significant modifications.

The EIA of the Immitos Western Peripheral Motorway

The first Environmental Impact Terms for Immitos Western Peripheral Motorway were prepared in the early 1990s, before the first tender for excavation and preliminary works (for the section from Ag. Ioannis Kinigos to Katechaki). The Supreme Administrative Court halted construction and cancelled the tender on the basis of the inadequacy of the EIA (SAC, 1035/1993; SAC, 1038/1993; SAC, 1040/1993). Appeals to the SAC were made by various citizens of the area, neighbouring municipalities and the American College of Greece, which owned substantial amounts of land that were to be expropriated. The SAC cancelled the Ministry's tendering result, on two grounds: that works had started before the approval of an adequate EIA for this type of project; and that Immitos Mountain is a sensitive forest area with exceptional flora and fauna, protected by article 24 of the Constitution (as are all forest areas in the country) and by EU legislation as a Site of Community Interest in the EU's Natura 2000 sites network (see Figure 6). Therefore, alternative routes and methods of construction had to be studied before the approval of the new EIA, which was more detailed and offered more protection for the mountain (MEPPW, 2000; Trova and Koutras, 2001 p.398).

For the next two years, alternative routes proposed by stakeholders including the municipalities, with various tunnel lengths of and construction methods, were discussed and examined. The option presented in the EIA involved no tunnelling, but the revised design of

about 13km of the route, and the construction of cut & cover tunnels, were proposed to alleviate the impact on the mountain. The main other options discussed during the consultation exercise² included the 'do-nothing' option and four tunnelling alternatives of various tunnel lengths (from 1.3km to 3.35km). The 'do-nothing' option was rejected on the basis of the documented necessity of the project, while the four tunnelling options were rejected on the basis that they would negatively affect the operation of traffic (SAC, 1675/1999). The new EIA was approved by parliamentary procedures and ratified as a law together with the EIA of the new International Airport in 1995 (Law 2338/95).

Figure 6: Immitos Mountain Site of Community Interest (SCI) of EU Natura 2000 Sites Network - Attiki Odos is in red



(Source: www.mpe.gr, accessed on 3/10/08)

Public participation

As interviewee III stresses, the experience from Attiki Odos and other major projects reveals the lack of adequate procedures to enable the effective involvement of civil society in project planning and development. Information disclosure on the early stages of development of Attiki Odos was poor and inadequate (Interviewee IV). In addition to the inadequate disclosure of information and climate of lack of transparency, the time frames in which citizens could become informed about the project and study its immense documentation were too short for them to form a documented opinion and become effectively involved (Interviewees III, IV).

This led interested and affected groups and communities to appeal to the Supreme

²Consultation exercises for the EIA are run by the Prefectures to which the projects belong. The EIA consultation for IWPM was the responsibility of the Prefecture of Athens. (Law 1650/86)

Administrative Court³ and the EC. These processes proved to be very time-consuming, distant from the citizen. More importantly, they could take place only after project conceptualisation and planning. In the case of Attiki Odos, key project documents such as the concession contract and EIA were approved through parliamentary procedures leading to their ratification by law. This process prevented appeals against them or their modification through public participation exercises. As interviewee IV states, there were standing appeals (that had not yet been discussed in court) directly affecting the terms of the EIA at the time when the parliament was approving it as a law. After this approval, the SAC, based on the fact that the EIA had already been ratified, could not judge the appeal in favour of those who had appealed (SAC, 2158/98; SAC, 2159/98).

Another issue that became a barrier to public participation was article 61 of the Concession Contact (Law 2445/96) regarding 'confidentiality', which prohibits the disclosure of information about the project from the period of negotiations until three years after the concession (Interviewees III, IV). However, article 61 conflicts with the EC directive 90/313/EEC⁴ and the NGO Elliniki Etairia NGO appealed to the EC (Interviewees III, IV) on this basis. After long delays, and when the project was already in the construction phase, the EC obliged the Greek state to issue a circular prohibiting such articles in public work contracts and canceling certain clauses of CC article 61 (Interviewees III, IV). Since then, the disclosure of information has become a responsibility of the Ministry, although it is still difficult to obtain specific information due to the Ministry's bureaucratic processes and lack of openness (Interviewee III).

Contrary to the above is, however, a report by the Directorate General Transport and Energy (EC, 2005), which notes that Attiki Odos demonstrated positive signs of effective involvement of interest groups and consultation, compared to projects based on the conventional method of procuring. This report accords with the views of Interviewee I.

In conclusion, in the case of Attiki Odos, the involvement of community and interest groups was not an integral part of the planning and development practice as a whole. Civil society did not have the power to effectively influence the planning of Attiki Odos under a transparent and timely participation mechanism. Informing, consulting and encouraging the public to participate was not an important concern of the government. It was rather seen as a potential obstacle that would affect the progress and realisation of the project.

Regeneration related impacts

Regeneration of quarries - reforestation

Attiki Odos, taking advantage of the great amount of excavation material produced by the various jobsites and in cooperation with the Organisation of Planning and Environmental Protection of Athens⁵ and the Attiki Forestry Services, proceeded to the regeneration (in terms of landscape and environment) and reforestation of a number of old quarries. This enabled the creation of leisure and sport areas and places for the organisation of cultural events, in the areas of old quarries. The results of this effort are demonstrated by the

³This is the reason why this court has effectively become a major policy maker on environmental issues with a tradition in dealing very challenging issues with unique sensitivity.

⁴The adoption of Aarhus Convention on Access to Information, Public Participation in Decisionmaking and Access to Justice in Environmental Matters led to the issuance of the improved directive 2003/4/EC which has not been yet incorporated into domestic laws (Interviewee IV).

⁵Legal Entity of the Public Sector supervised by the Ministry of Planning, Environment and Public Works. It is the body which is responsible for administrative management of physical planning, urban planning and environmental matters of Athens and its wider area.

regeneration of the quarries in Glika Nera, Zoitsa, Pendeli and others. The design for these specific quarries aimed at completion of the works for regeneration of six such areas, in terms of landscape and flora, in order to achieve the aesthetic and environmental upgrading of the greater area.

<u>Parks</u>

The best possible use was made of the overpasses and the cut & cover sections of Attiki Odos with the help of the local authorities, by creating leisure and sport areas. In this manner, the motorway was smoothly and successfully incorporated into the natural and built environment. The cut & cover section in Iraklio is a typical example. This was handed over to the community in 1999 and includes a football field with seating, two tennis courts, a playground, a snack bar, green areas, storage buildings and several auxiliary spaces. Similar facilities were created on Tatoiou Avenue in the Metamorfosi (a tennis court, playground, small theatre, and green areas) and in Zefiri, while similar areas were also formed on Pentelis Avenue in Vrilissia and on Panagouli Street in Agia Paraskevi (near Doukissis Plakentias Interchange).

Archaeological findings

The greatest excavation ever performed in the Athens basin was executed within the framework of the construction of Attiki Odos and brought Attiki closer to its history. Approximately 200 specialised archaeologists, conservators and technicians worked on all aspects of the project, in order to investigate, detect, register and promote elements of cultural heritage. The excavations, which always preceded earthworks, revealed archaeological material dating from all eras, from the Neolithic period up to the modern age.

The most significant findings include:

- the remains of a Neolithic settlement, dating from 6,000 BC;
- ancient roads and burial enclosures of the Classical Period (5th Century BC);
- aurial enclosures of the Hellenistic Period (4th Century BC);
- ancient roads, country houses and workshops of the Roman Age;
- tanks and kilns of the Roman Age;
- agricultural installations of the post-Roman Period;
- foundations of Christian temples and cemeteries, circa 1300 1400.

<u>Noise</u>

Attiki Odos incorporates significant noise reduction measures adapted to the special terrain and characteristics of the areas through which it passes. Along the highways, noise barriers of thousands of square metres have been built, together with buffer zones and special gardening. There are also six noise monitoring stations along the highway and eight air quality measurement stations.

(source: www.aodos.gr, accessed on 20/11/2007)

Figure 7: Noise reduction Study at Kifisias Interchange and noise reduction structures





(Source: www.aodos.gr, accessed on 20/11/2007)

Employment

According to the Ministry's (MEPPW) estimations, the following numbers of jobs have been created (MEPPW, 2000):

- 5,000 per year in the five years of construction;
- 1,000 per year in 18 years of operation;
- 2,000 as a result of the 'multiplier effect' of the project.

Attiki Odos service areas and real estate development

SEA Attiki Stathmoi S.A, a company formed in 2000 by the concessionaire's shareholders, is responsible for the development and exploitation until the end of the concession (according to the concession contract) of the two Motorway Service Areas, SEA Aspropirgou and SEA Mesogeion. The company has developed a total land area of approximately 149,000sq.m with a gross built area in excess of 74,500sq.m. The mixed-use developments include automobile services such as fuel stations, repair shops, snack bars, and significant commercial developments with office buildings, retail shops, hotel and convenience stores. The Motorway Service Areas are developed in two locations on the highway: Paiania area (SEA Mesogeion), which is closer to Athens International Airport; and Aspropirgos (SEA Aspropirgou), a few kilometres before the western end of the Attiki Odos highway.

SEA Mesogeion – 'Motopolis Mesogeia' is located on the 40th kilometre of the Attiki Odos highway in the vicinity of Paiania area (see Figure 3). It occupies a site of approximately 67,000sq.m on both sides of the highway, connected by an overhanging bridge for vehicles and pedestrians. The total above ground area amounts to 33,700sq.m and the underground development is approximately 12,000sq.m. The development includes fuel stations, a vehicle repair shop, fast food restaurants and office buildings which are leased to Ericsson Hellas S.A. and Alpha TV Channel, a 197-room Holiday Inn hotel, and smaller retail shops.

SEA Aspropirgou – 'Motopolis Aspropirgos': The development is situated on the 10th kilometre of the Attiki Odos highway, near the area of Aspropirgos in Western Attiki (see Figure 4). Motopolis Aspropirgos occupies an area of 82,000sq.m on both sides of the highway, connected by an underground passage for vehicles and pedestrians. The total above ground built area of Motopolis Aspropirgos is expected to be about 40,700sq.m although, unlike SEA Mesogeion, it is not yet fully developed and commercially exploited.

(Source: J&P – AVAX Construction Group, www.jpdevelopment.gr, accessed on 20/11/2007)

Land acquisition

Expropriations and the related risks in the PPP structure were undertaken entirely by the Ministry (MEPPW). However, a positive feature was that property development along some parts of ESSM was prohibited many years before the PPP deal and the execution of the expropriations plan by the Ministry (Leistner et al, 2000). Despite that, expropriations became a huge issue in the project, both in terms of costs and delays (see section on costings). The project had to be built mostly in an urban area in which land prices were high compared to greenfield land. Also, land plots in Greece are small (and many) and private property rights are very well protected while, according to the compulsory purchase procedures, land owners can appeal to courts in various circumstances which may lead to decisions that need a long time to be finalised and entail substantial reimbursements by the state.

As Interviewee I states, many property owners took advantage of the public sector's hurry to meet the deadline of the opening of AIA⁶ and the Olympic Games in the summer of 2004. They appealed to courts to be reimbursed by threatening the timeline of the project and in many cases they won rates of GRD 30-40m (approximately EUR 90-120,000) per 1000sq.m, far higher than the commercial values of their properties (Kathimerini 2001). The figures we have for the cost of expropriation are GRD 813m up to 2001 in 2001 prices (EC/Barnier, 2001) and a final figure of GRD 880m in 2002 prices (EC/Barnier, 2003; Konstantopoulos, 2002). The initial estimate (in 2003 prices) was for GRD 314m (Eleftherotypia, 2003). As Hatzidakis (2003) notes, another major reason for the expropriations cost overrun and delays was the lack of national cadastre which could help the Ministry to better estimate the cost of land acquisition.

A major legal dispute with regard to land acquisition involved the property of the American College of Greece on Imittos Mountain. The college had appealed to the SAC at the first tender of the road in 1992, in an attempt to protect a part of its property from expropriation. After the appeal by the College and some municipalities in the area of Immitos, the SAC halted the works and asked for a new, more protective, EIA and a redesign of the route (see 'Environmental statements' section of this chapter). After the approval of the new EIA, the new PPP tender and the signing of the concession contract, the American College of Greece (and the municipality of Ag. Paraskevi with the support of two other neighbouring municipalities and NGOs or pressure groups) continued its legal appeals to the SAC, as the new route still affected its property and part of it had to be expropriated. After almost two years the SAC came to the decision that the American College's property could not be expropriated and the road should have a minimum impact on the operation of the college⁷ (the other appeals based on environmental grounds were rejected). This caused the redesign of the route once again (SAC, 1679/1999; SAC, 1675/1999). Both the delay of the SAC decision and its outcome had at that time a big impact on the costs and progress of the project.

⁶ The development of Attiki Odos was an obligation of the Greek Government to its German copartners in the joint venture PPP for the construction and operation of AIA (Eleftherios Venizelos Airport). More particularly, this obligation was imposed by the European Investment Bank, which was financing both AIA and Attiki Odos. Had the road not been implemented in time and according to the specified quality standards, the successful, profitable and effective operation of the airport would have been compromised. So, penalty clauses were included in the Concession Contract of AIA of approximately EUR 1m per each month of delay (Law 2338/1995).

⁷ According to the media, the United States ambassador had a special concern for the protection of the College's property and took specific action in this direction (Kathimerini, 2001).

C PRINCIPAL PROJECT CHARACTERISTICS

Outline of technical specification

There are three traffic lanes in each direction and an additional emergency lane. In the centre and along major parts of the route, there is a special traffic island, where the suburban railway operates. The major technical features of the project are listed below:

- total length: 65.2km;
- service / side roads network: 150km;
- interchanges: 29;
- motorway overpasses: 100;
- motorway underpasses: 25;
- rail bridges: 38;
- river / stream bridges: 21;
- pedestrian overpasses: 12;
- tunnel / cut & cover sections: 56;
- total length of tunnel / cut & cover sections: 15.36km;
- flood protection works: 66.7km;
- motorist service stations (MSS): four;
- operation and maintenance centre: one
- customer service centres: nine;
- toll stations: 38;
- total number of toll lanes: 193;
- electronic toll collection (ETC) lanes: 54;
- manual toll collection (MTC) lanes: 139;
- closed circuit cameras (CCTV): 200;
- digital signing and messaging system (MVMS and AVMS): 75 screens;
- emergency roadside telephones (ERT): 600;
- traffic measurement system (VDS): 600 detectors;
- lane control signals (LCS) and variable speed limit signs (VSLS): 1,240;
- meteorological stations: three;
- over-height vehicle detection system (OVDH): 43 detectors;
- CO/opacity detectors and automatic tunnel ventilation system: 52;
- supervision, intervention and maintenance vehicle fleet: patrol vans, sweepers, multipurpose trucks, trucks, signing trailers, mobile VMS;
- communications: two fibre optic network loops along motorway, 100% redundancy (data, video, audio), TETRA personnel communication, wireless coverage for Police, Fire Brigade, Ambulances;
- toll collection system: open system check on entry only flat rate, payment by cash or transponder.

(Source: www.aodos.gr, accessed on 18/05/2007; B. Halkias, 2004).

Principal transport nodes

The transport nodes of the two major parts of the highway are listed below:

	ELEFSINA	Motorway Extremity, Merge with Athens – Patras Motorway, Access to the industrial port town of Elefsina.
1	THIVA/MANDRA	Interchange to Thiva
2	MAGOULA	Interchange to Magoula
3	AGIOS LOUKAS	Future Interchange
4	ASPROPYRGOS	Interchange to Aspropurgos
5	EGALEO	Interchange to Egaleo and System Interchange to Egaleo Western Peripheral Motorway (Egaleo WPM)
6	LIOSIA	Interchange with Filis Avenue
7	ACHARNES	Interchange to Acharnes
8	METAMORFOSI	Interchange with Athens-Thessaloniki Motorway
9	IRAKLIO	Interchange with Irakliou Avenue
10	KIMIS	Interchange with Kimis Avenue
11	KIFISIAS	Interchange with Kifisias Avenue
12	PENTELIS	Interchange with Pentelis avenue
13	D. PLAKENTIAS	Interchange with D. Plakentias Avenue and System Interchange to Imittos Western Peripheral Motorway
14	ANTHOUSA	Interchange to Anthousa
15	MARATHONOS	Interchange to Marathonos Avenue
16/Y7	LEONTARIO	Interchange to Leontario
17	KANTZA	Interchange to Kantza
18	PAIANIA	Interchange to Paiania
19	IMITTOS	Future Interchange
20	SPATA AIRPORT	Interchange to Athens International Airport and System Interchange to Koropi-Airport Motorway
K1	AIRPORT SOUTH GATE	Motorway extremity, Contiguous to airport south access
	MARKOPOULO	Interchange to Markopoulo - Motorway Extremity

Table 2: Transport nodes on Elefsina - Stavros - Spata Airport Motorway ESSM

Table 3: Transport nodes on the Imittos Western Peripheral Motorway (IWPM)

Y1	KATECHAKI	Motorway extremity, Interchange to Katechaki – Alimou Avenue		
Y2	AG. IOANNIS THEOLOGOS	Interchange To Papagou, Holargos		
Y3	DIMOKRITOS	Interchange to Ag. Paraskevi, Dimokritos		
Y4	AG. IOANNIS KINIGOS - KLEISTHENOUS	Interchange to Ag. Paraskevi/Stavros and System Interchange with Elefsina - Stavros - Spata Airport Motorway (ESSM)		
Y5	IMITTOS Eastern Peripheral Motorway	Future interchange		
Y6	GLYKA NERA	Interchange to Gluka Nera, Rafina Avenue, Motorway extremity		
	KATECHAKI – KESSARIANI	Interchange to Katechaki Avenue and Kessariani - Motorway Extremity		

(Source: www.aodos.gr, accessed on 26/12/08)

Figure 8: Attiki Odos and its interchanges (aerial view)



(Source: www.aodos.gr, accessed 20/11/07)



Figure 9: Attiki Odos and its interchanges (diagrammatic view)



Figure 10: Attiki Odos and its interchanges (map view)

Major associated developments

New Attika Urban Highways Project

This new 55km highways project will extend Attiki Odos to the east and south and provide links with existing urban roads. The project is estimated to cost EUR 1.2bn and to be in full operation by the end of 2013. The highway is planned to go under the entire lmittos Mountain through a tunnel and to access the waterfront avenue at the Athens Metropolitan Park, bypassing the southern urban areas through extensive tunnelling for a distance of over 14km. The preliminary stage of planning and studies is now completed and the project will be developed through a concession-type PPP to be tendered by the end of 2008. It is worth mentioning that the New Attika Urban Highways will use an electronic toll system with a distance-based charge for users, unlike the existing toll system of Attiki Odos, while the intention of the Ministry (MEPPW) is that the tolls on the new highways will be cheaper than those of Attiki Odos. This probably implies that the existing tolling system of Attiki Odos will need to be changed in order to integrate with the new highways tolling mechanism. Some additional highway projects with an estimated budget of EUR 0.5bn will be procured as public works (mainly redevelopment of existing roads). As declared in the Ministry's strategic declarations, those projects, together with the existing Attiki Odos and the New Attika Urban Highways Project, will comprise an integrated system of inner peripheral highways of the metropolitan area of Athens.

(Source: MEPPW, 2008)

Figure 11: New Attika Urban Highways Project (red dotted lines denote tunnels, the blue line is Attiki Odos)



(Source: MEPPW, 2008)

New Motorways Programme

The ongoing motorways redevelopment programme consists of projects connecting Athens with major cities and providing improved road accessibility to mainland Greece. The programme is implemented through several PPP concession schemes (co-financed by EU/ERDF, the Greek State and the private concessionaires), shown in light and dark blue, green, purple and red in Figure 12.

- Antirio Ioannina segment of Ionia Odos and Athens-Maliakos of PATHE Motorway (shown in green):
 - length: 382km;
 - construction budget: EUR 1.4bn;
 - planned end of construction: 2013.
- Maliakos Kleidi segment of PATHE Motorway (shown in dark blue):
 - length: 230km;
 - construction budget: EUR 1.3bn;
 - planned end of construction: 2012.
- North-western Motorway of Peloponisos: Elefsina Corinth Patras Pyrgos -

Tsakona (shown in light blue):

- length: 365km;
- construction budget: EUR 2.8bn;
- planned end of construction: 2013.
- East Motorway of Peloponisos: Corinth Tripoli Kalamata and Lefktro Sparta (shown in purple):
 - length: 205km;
 - construction budget: EUR 1.05bn;
 - planned end of construction: 2012.
- Central Greece Motorway (shown in red):
 - length: 175km;
 - construction budget: EUR 1.6bn;
 - planned end of construction: 2012.

(Source: MEPPW, 2007)



Figure 12: Greek Motorway Programme

(Source: www.minenv.gr, accessed 20/05/08)

Athens Metro and Suburban Railway

Several stations of the Metro and Suburban Railway are located along Attiki Odos and combined with interchanges on the highway (see Figure 12). These include Halandri, Neratziotissa, D. Plakentias and Acharnes. Some elements of the construction of Neratziotissa and D. Plakentias metro stations were incorporated within the Attiki Odos project, as were major infrastructure works allowing the suburban railway to run along the highway. Neratziotissa was also the transport hub serving the main Olympic complex at Marousi during the 2004 Olympics. The planned extension of the Metro and Suburban Railway network will add major Metro and Suburban Railway hubs along Attiki Odos.



Figure 13: Athens Metro and Suburban Railway

(Source: www.ametro.gr, accessed on 18/05/2007)

Athens International Airport

Attiki Odos serves as the principal road access to Athens International Airport. The two projects were formally introduced together in the Regulatory Plan of Athens in 1985. Moreover, the development of Attiki Odos was an obligation of the Greek Government to its German co-partners in the Joint Venture PPP for the construction and operation of AIA (Eleftherios Venizelos Airport). More particularly, the Pallini – Airport section of the road had to be implemented by 28 February 2001 to ensure that the operation of the airport would not be compromised. So, penalty clauses were included in the Concession Contract of AIA (Law

2338/1995). The EIA for Attiki Odos was approved and ratified as a law by the parliament together with the EIA of the New International Airport (Law 2338/1995).

Project costs

The attempt to find absolutely accurate figures for project costs encountered serious difficulties due to discrepancies between versions of the budget and its breakdown available from different sources, the different timing of budgeting from these sources and the currency change in Greece from Drachma to Euro (the exchange rate has not been stable). Having compared and merged the data from the various sources, we have confidence that the figures presented here provide a safe and sound picture of project costs (the closest possible to reality).

Predicted costs

The project budget was determined (in Greek Drachmas) in the Concession Contract and had two major components:

The Lump Sum Price covering the basic project (Lump Sum Object), the part of the project that strictly corresponds according to the Concession Contract to the construction and operation responsibility of the concessionaire. The financing and guarantees to be raised on the basis of the PPP project financing are to provide the funding for the Lump Sum Object.

The Parallel and Additional works which, under the Concession Contract, include works required for the realization of the project, paid according to the bill of quantities of the Parallel and Additional works (the discount on which was a tender criterion). The Concession Contract included a predetermined amount for Parallel works and a provision for an increase in their cost of up to 50%. The Additional works are directly awarded (without tendering) to the concessionaire according to the Parallel and Additional works price list included in the concessionaire's bidding offer. According to the concession contact, the value of Additional works could not exceed 50% of the Lump Sum Object⁸.

The equivalent in 2003 prices for the above budget is (EC/Barnier, 2003):

Lump Sum Price:	EUR 1.249bn ⁹
Parallel and Additional Works:	EUR 147m ¹⁰ (the predicted amount)

Total: EUR 1.396bn.

The total project budget also includes the cost of expropriations, fees for independent engineers, archaeological works and moving of public utilities¹¹. The predicted cost of the above was EUR 440m (EC/Barnier,2001).

⁸ This provision of the Concession Contact had generated conflicts with the domestic public works legislation. However, an EEC directive resolved the issue by allowing the state to award up to 50% of additional works outside the Concession Contract to the concessionaire under the same pricing determined in the Concession Contract.

⁹ This amount derives from an official answer of the EC to a Greek member of parliament. We have seen similar figures in other sources, for example a total of EUR 1.253bn (Attiki Odos S.A, 2003).

¹⁰ This amount derives from an official answer of the EC to Greek member of parliament. We have seen quite different figures in other sources, for example a total of EUR 240m (Attiki Odos S.A, 2003).

¹¹ These costs and the Parallel and Additional works are funded entirely by the Greek state (and EU subsidies).

Actual Costs

The actual costs are presented in 2003–2004 prices so as to be comparable with the predicted costs.

The concessionaire carried out the predetermined sum of works included in the Lump Sum Object within the predetermined budget of EUR 1.249bn (Attiki Odos S.A, 2003; PWC, 2006).

The actual cost of the Parallel works reached the maximum allowed limit of EUR 220m (EC/Barnier, 2003; PWC, 2006).

The actual cost of the Additional works reached EUR 571m (EC/Barnier, 2003; PWC, 2006).

The grand total of the project budget within the concession contract reached 2.04bn.

The cost of expropriations, fees for independent engineers, archaeological works and moving of public utilities (costs outside the concession contract) reached EUR 1.16bn, an increase of 164% (compared to EUR 440m).

To sum up, the total cost of the project reached 3.2bn.

The increase in costs covered the following costs not initially anticipated (specific costs are not included due to discrepancies between figures from different sources):

- the cost of modifying the Highway's construction to facilitate the development of a suburban railway line along the road (EC/Barnier,2002; Interviewee I);
- the cost of works related to the construction of D. Plakentias Metro and Suburban Railway station, located in the area of Attiki Odos and assigned to the concessionaire (Attiki Odos S.A, 2003);
- costs due to modifications of the design, study and construction works (for example, tunnels) of specific routes for environmental and other reasons mainly in Imittos Mountain, the areas of Vrilissia and Halandri and in the Airport Interchanges (MEPPW, 2001; EC/Barnier,2002);
- the development of further drainage and flood protection works (Hatzidakis, 2003; Eleftherotypia, 2003; Kitsos, 2004);
- further archaeological works (MEPPW, 2001; Attiki Odos S.A, 2003; Eleftherotypia, 2003);
- increase in land acquisition costs;
- increase in Independent Engineer costs, whose scope of work became larger due to the extent of additional works (Eleftherotypia, 2003).

Another cost that cannot be included in the project budget but involves additional expense for the public sector is that of the penalties paid to the concessionaire by the state due to legal disputes and late approvals. These are estimated at EUR 197m (EC/Barnier, 2001).

Project programme

Construction of the project had started long before the formal construction period marked by commencement of the concession contract on 06 March 2000. By June 1997 pilot works had already been procured and constructed (mainly on the section from Metamorfosi to Kimis), to the value of about EUR 90m, outside the concession contract (Haralampidou, 1997). In mid-1997, works within the concession contract started (Haralampidou, 1997) even though the concession had not commenced (financial close had not yet been

achieved). These works, funded mainly by the state, had accounted for 14.5% of the project construction by the end of 2000.

According to MEPPW's yearly reviews of the operational programme 'Road Axes, Ports and Urban Development', the progress of construction was as follows (MEPPW, 2002; MEPPW, 2002; MEPPW, 2005):

31 December 2000	31 December 2002	31 December 2004
14.5 %	59.0 %	98.2 %

The progress of works according to the Independent Engineer's reports to the banks was as follows (Interviewee II):

	31 July 2000	31 July 2001	30 August 2003	04 August 2004	20 January 2005
Lump Sum Object	24%	48%	94%	100%	
Parallel & Additional Works	18%	48%	90%		100% ¹²

The construction end dates of the project sections are presented below (MEPPW, 2005b):

Gerakas – Spata Airport and Metamorfosi – L. Kimis	March 2001
Pallini – L. Pentelis and L. Kimis – L. Pentelis	January 2003
Imittos Western Peripheral Motorway (without the western branch)	December 2003
Western branch of IWPM	July 2004

The following table gives the deadlines of the project sections according to the concession contract and actual delivery dates (issue of the Official Delivery for Operation Certificates) (source: Interviewee II):

Table 4: Concession contract deadlin	nes and delivery dates
--------------------------------------	------------------------

Project Section	Deadline	Delivery	Changes in Schedule
A: Elefsina – Egaleo	30/09/03	31/01/03	8 months earlier
B: Egaleo - Metamorfosi	30/09/03	03/08/04	10 months later
C: Metamorfosi - Kifisias	30/09/03	31/01/03	8 months earlier
D: Kifisias – Pallini	30/09/03	31/01/03	8 months earlier
E: Pallini – Spata Airport	28/02/01	28/2/01	on time
F: IWPM	28/02/03	30/08/03	6 months later

¹² This figure was projected on 04 August 2004 to be accomplished in 20 January 2005.

Figure 14: Sections of Attiki Odos Project



(Source: www.aodos.gr, accessed 20 May 2008, processed by the author)

Figure 15: Aerial view of Attiki Odos



Main contracts and contractors

According to Halkias and Deighton (2006), a total of 138 contracts and agreements were let to 65 different contracting parties. The contracts included:

- 23 Principal Engineering Contracts;
- 78 Lending and Guarantee Agreements;
- eight Special Fees & Payments Contracts;
- seven Other Special Agreements;
- 22 Other Contracts.

A schematic overview of the main contracts is presented in Figure 16.

Figure 16: Main Project Contracts



Section	section length	width		interchanges		tunnels (B=14.0 M)		cut &	cover		pedes bridge	strian es	underp	asses	overpasses	
	metres		units	name	type	units	m.	units	m.	sq.m.	units	sq.m.	units	sq.m.	units	sq.m.
A. Elefsina –	17,359	2x(3L+1EL)+	+ 3 ELEFSINA DIAMON + ASPROPYRGOS DIAMON	DIAMOND	2	650				2	485	11	20,299	10	9,006	
Egaleo		RW Or		MAGOULA	DIAMOND											
		RW		ASPROPYRGOS	DIAMOND											
B. Egaleo -	12,662	2x(3L+1EL)+	4	EGALEO	SYSTEM			1	270	16,200	1	385	22	14,447	15	24,615
Metamorfosi		RW		LIOSIA	DIAMOND											
				ACHARNES	DIAMOND											
				THRIASIO	TRUMPET											
C.	6,538	2x(3L+1EL)+	4	METAMORFOSI	SYSTEM								1	200	18	22,143
Metamorfosi – Kifisias		RW		IRAKLIO	DIAMOND											
				KIMIS	DIAMOND LIKE											
				KIFISIAS	LOOP ROUND											
D. Kifisias - Pallini	7,850	50 2x(3L+1EL)+ RW	3	PENTELIS	ABOUT DIAMOND	-					1	123	2	825	21	25,155
				D. PLAKENTIAS	SYSTEM											
				KOTNOPEFKO	SYSTEM											
				DRAFI	HALF DIAMOND	1										
E. Pallini -	18,070	2x(3L+1EL)+	7	PALLINI	PARCLO						2	420	15	10,322	17	25,846
Spata		RW ~		RAFINA	SYSTEM											
		RW		KANTZA	DIAMOND LIKE]										
				PEANIA	DIAMOND											
				STATA	SYSTEM (3LEGS)	-										
				SPATA SOUTH	DIAMOND											
				MARKOPOULO	HALF DIAMOND											

Main engineering facts and figures and civil engineering components

Section	section length	width		nterchanges ti		tunnels (B=14.0 M)		cut & cover			pedestrian bridges		underpasses		overpasses	
F. Imittos Western Peripheral Motorway	10,243	Main Sector: 2x(3L+1EL)+I SL Branches: 2x(2L+1EL)+I SL	5	GLYKA NERA DIMOKRITOS AG. I. THEOLOGOS	DIAMOND (FLYOVER JUNCT.)	2	555	18	2,834	35,067	2	151	4	14,230	14	7,630
Total	72,722		26			4	1,205	19	3,104	51,267	8	1,564	55	60,323	95	114,395

(L: Lane, EL: Emergency Lane, ISL: Central Island, RW: Railway line in the Central Island)

Section	pedestrian pavements	supportive safety walls	New Jersey	fencing	excavations	rock excavation	supportive earthwork	supportive walls	noise barriers	green	service areas	users' service centre
A. Elefsina – Egaleo	767,605 sq.m	31,784 m	34,050 m	39,150 m	1,632,344 m ³	1.370.973 m ³	1,560,906 m ³	11,680 m ³	0 m	262,286 sq.m.	1	
B. Egaleo – Metamorfosi	623,03 sq.m.	43,770 m	8,500 m	16,300 m	2,203,500 m ³	121,600 m ³	700,100 m ³	32,941 m ³		193,720 sq.m.		
C. Metamorfosi – Kifisias	415,751 sq.m.	37,490 m	6,880 m	10,300 m	1,752,152 m ³	0 m ³	275,727 m ³	34,778 m ³	15,915 m	363,840 sq.m.		
D. Kifisias – Pallini	461,869 sq.m.	21,062 m	14,344 m	13,600 m	2,118,106 m ³	20,605 m ³	289,004 m ³	35,188 m ³	2,958 m	142,269 sq.m.		
E. Pallini – Spata	993,477 sq.m.	70,674 m	28,320 m	36,600 m	1,761,916 m ³	78,984 m3	2,853,453 m ³	22,776 m ³	0 m	690,772 sq.m.	1	1
F. Imittos Western Peripheral Motorway	429,512 sq.m.	13,707 m	18,576 m	17,900 m	809,516 m ³	1,293,953 m ³	492,725 m ³	23,465 m ³		69,732 sq.m.		

(source: MEPPW www.minenv.gr. Accessed on 23 June 2008, tables compiled by the author)

D PROJECT TIMELINE

Year	Month	Туре	Key Event/Decision
1963		Planning, conception	'Athens Basin Transportation Survey and Study' by Wilbur Smith & Associates provides the basis for a proposal for a peripheral road.
			<complex-block></complex-block>
			(picture source: Zekkos, 2008)
1973		Planning, conception	'Athens – Attiki Region Traffic and Transportation Study' by W. Smith & Associates proposes an outer Peripheral Highway on a similar route as the ESSM part of Attiki Odos
			(picture source: Zekkos, 2008)
1979		Planning	The Ministry (MEPPW), with the support of all major
		conception	planning offices of Athens, prepares a comprehensive plan and detailed masterplans (Capital 2000) in which Attiki Odos, Spata Airport and the Metro comprise key components.

Year	Month	Туре	Key Event/Decision
			(picture source: Zekkos, 2008)
1985		Planning, conception	The Regulatory Plan of Athens ('Regulatory Plan and Environmental Protection Programme for the wider Athens Area'), the first Athens plan with statutory standing (Law 1515/85), defined Attiki Odos, not as a single project but by proposing its major segments on the premises of the transformation of the Athens road system into a more orbital structure.
1991		Planning	 ODOMICHANIKI and DROMOS start technical consultancy services, known as 'Transport Mega Projects of Attiki Prefecture – Technical Consultancy' to the Ministry (MEPPW), including: the detailed design and operation study of the 100km network of urban highways in Attiki (mainly Attiki Odos) and 30km of suburban railway; traffic analysis and forecasting; and preparation of tender documents.
1991	February	Tender	The Ministry (MEPPW) tendered the excavation and preliminary works for a segment of Attiki Odos in Immitos Mountain (From Ag. Ioannis Kinigos to Katechaki).
1992	February	Tender	Tendering of Attiki Odos as a whole on a Design- Build-Finance-Operation-Maintenance Public Private

Year	Month	Туре	Key Event/Decision
			Partnership (pre-selection phase)
1993	February	Tender	End of Phase A (pre-selection). Three consortia, namely CONCIF, PELLA and ATTIKI ODOS, are preselected. The bidding consortia had submitted a series of documents related to their capability of fulfilling the objectives of the tender (e.g. technical, legal) as well as a design study, which was not a factor of selection.
1993	May	Legal	The Supreme Administrative Court cancels the tender and halts the works (SAC 1035/1993, SAC 1038/1993, SAC 1040/1993). Appeals to the SAC had been made by various citizens in the area, neighbouring municipalities and the American College of Greece, which owned substantial land needing to be expropriated. The SAC cancelled the Ministry's tendering result on the basis that works had started before the approval of an adequate EIA for this type of project, and that Immitos Mountain is a sensitive forest area, protected by the article 24 of the Constitution, and therefore alternative routes should be studied.
1994		Tender	Initiation of Phase B of the tender: Tender documents were provided to the pre-selected consortia. The submission deadline of November 1994 was postponed in a climate of increased insecurity due to the uncertain final design of IWPM (the EIA was not finalised). The auction had two stages. At the first stage the financial offers (financial plans/ projections, risk analysis, sources of funds/finance-ability) were evaluated and scores were estimated in order to proceed to the second stage. All financial offers got adequate scores to pass to the second stage, the evaluation of the complete offer of the three bidders. The complete offer score was estimated by a mathematical formula weighting the following criteria: the amount of state contribution, the amount of the concessionaire's equity, the mean return on equity, the toll rate, the discount on the study of parallel works, the concession period and the required loan guarantees (amount and period) from the Greek state during the Operation Period.
1995	August	Tender	The Ministerial Decree A/6/01/73/9752/27-8-1995 rejected the objections that all three consortia had submitted, nominated the Attiki Odos consortium as the provisional concessionaire, and negotiations for the finalization of the terms of the concession contract between the Attiki Odos consortium and the state were initiated.
1995	September	EIA, Route Change	The EIA for the IWPM, based on a redesigned route (according to environmental friendliness criteria) on Imittos Mountain was ratified by the parliament as a law of the state, together with the EIA of the new International Airport. Various alternative routes, using

Year	Month	Туре	Key Event/Decision
			different tunnel lengths and construction methods, proposed by different stakeholders were discussed and examined. The option not to construct the project at all was rejected, as were four tunnelling alternatives of various tunnel lengths (from 1.3km to 3.35km), mainly for traffic operation reasons. The option selected in the EIA involved no tunnelling but a redesign of the route for about 13km and the construction of cut & cover tunnels to alleviate the impact on the mountain.
1996	March	Tender/ Investors synthesis	The Ministerial Decree A/6/01/73/10844/26-3-1996 approved the result of the tender and the expansion of Attiki Odos concessionaire to incorporate companies in the unsuccessful consortia (see 'Main organisations involved'), and nominated the Attiki Odos consortium with its new synthesis as the concessionaire. Attiki Odos S.A was formed as the Special Purpose Vehicle.
1996	Мау	Concession Contract	The concession contract between the representatives of Attiki Odos S.A and the Minister of Environment, Planning and Public Works was signed.
1996	July	Funding	Decision No 1692/96/EC of the European Commission on TEN-T development incorporated the segment of Attiki Odos from Metamorfosi to Elefsina in the priority TEN-T axis 7.
1996	November	Concession Contract	The parliament ratified the concession contract and additional regulations related to the implementation of works
1996	December	Finance	A loan of ECU 145m was made available to the Greek state, to contribute to the financing of works by the Ministry for the Attiki Odos project.
1997	December	Finance	European Investment Bank (EIB) and Attiki Odos S.A sign the lending agreement for a GRD 220bn long term loan (EUR 645m).
1998	January	Concessio n Contract, Funding	The concession contract is amended by Presidential Act 3/1998, to allow a heavier inflow of state capital at the preliminary works phase, so that construction could progress significantly before financial close.
1998	December	Finance	The consortium of commercial banks and the Greek State sign Guarantee Agreements guaranteeing the commercial banks' loan during the operation period.
1999	January	Route Change, Expropriatio ns	The Supreme Administrative Court imposes a new redesign of the IWPM route, intended to have the minimum possible impact on the property (a part of which had to be expropriated) and operation of the American College of Greece. After the approval of the new EIA, the new PPP tender and the signing of the concession contract, the College and the municipality of Ag. Paraskevi, with the support of two neighbouring municipalities and NGOs/pressure groups, continued their appeals to the SAC. It took almost two years for these appeals to be resolved. Finally only the

Year	Month	Туре	Key Event/Decision					
			College's appeal was successful, resulting in a further change to the route.					
			American College Design					
			Modification					
			Old alignment DHPATTER KOALETOY OLE TRABUE AK KALEIZBENOYE Land College Land OLE NEATOVEDE Land (picture source: Halkias and Deighton, 2006)					
1999	April	Concession Contract, Financing	The concession contract was amended again by Presidential Decree 75/1999, to satisfy various claims of the lenders and adapt to circumstances that had evolved since the ratification of the concession contract.					
1999	November	Accident	Two workers were killed and nine seriously injured in the collapse of a bridge in the Paiania – Markopoulo section of Attiki Odos. The investigation reveals that the accident is the responsibility of the contractors and concessionaire. The families of the dead are compensated through legal appeals.					
1999	October	Funding	The European Commission in Decision nr. 8595 of 27/10/1999, on the subsidy regime of the project under the EU regulations, judged that the terms of the concession contract do not comprise conflicts under the EU law and the project will be subsidised.					
2000	March	Finance	Financial close and commencement of concession. All loan, guarantee and insurance agreements were finalised, signed and approved by the Greek state (Ministerial Decree A/6/00/0101/25283). It took almost four years from the signing of the concession contract until financial close. The arrival of the international banks in the deal in 1997 resulted in major changes to the structure of the project. The banks showed increasing hesitation about proceeding to financial close if the financial structure did not coverthem against all risks. In this very long negotiation period between the Ministry, the banks and Attiki Odos S.A, there were also emerging problems and uncertainty about the outcome of events such as the legal disputes. Moreover, the concession contact was					

Year	Month	Туре	Key Event/Decision
			already signed when the banks entered the deal, and neither Attiki Odos nor the Ministry had any previous experience of the requirements of international banks. International magazines focusing on infrastructure and project finance characterise the financing of Attiki Odos as extremely complex and time-consuming compared to similar deals elsewhere in the world.
2001	October	Funding	An EU Grant was awarded. Attiki Odos was included in the Operational Program 'Road Axes-Ports-Urban Development 2000-2006'. The allocation under the European Regional Development Fund (ERDF) for this project was initially EUR 476m for the period 2000- 2006.
2001	February	Delivery	The critical Pallini – Spata section (Section E) connecting the north of Athens to the Airport is delivered on time. The development of Attiki Odos was an obligation of the Greek Government to its German co-partners in the Joint Venture PPP for the construction and operation of AIA (Eleftherios Venizelos Airport). This obligation was imposed by the European Investment Bank, which was financing both AIA and Attiki Odos. Had this part of the road not been implemented in time and according to the specified quality standards, the successful, profitable and effective operation of the airport would have been compromised. So, penalty clauses were included in the AIA Concession Contract of approximately EUR 1m per month of delay.
2003	January	Delivery	Section A (Elefsina – Egaleo) was delivered for operation.
2003	March	Delivery	Sections A (Elefsina – Egaleo), C (Metamorfosi – Kifisias) and D (Kifisias – Pallini) were delivered for operation.
2003	August	Delivery	IWPM was delivered for operation.
2004	August	Delivery	Section B (Egaleo – Metamorfosi) was delivered for Operation.
2004			The 2004 budget review of the CSF operational programme 'Road Axes, Ports and Urban Development', changed the ERDF budget allocation for the project from EUR 476m to EUR 322m. Some of the costs initially submitted to the EC were not eligible for co-financing by EU structural funds. The parallel and additional works not described in the concession contract or imposed by legal decisions were excluded from the subsidised budget. Therefore, the state had to fund all excluded costs.
2004	August		End of construction and full operation.
2023	August		The latest possible end of the concession. The concession will end when the concessionaire achieves a predetermined Return On Equity as defined in the Concession contract (11.6%).

E PROJECT FUNDING/FINANCING

Background to funding/financing

Attiki Odos was the first road project financed through a concession-type PPP in Greece. It was procured and developed over almost the same time period as the Rion – Antirion Bridge and Athens International Airport at Spata. These three projects were the first to be financed by PPPs in Greece with the instrumental support of Structural Funds and the EIB.

Role of traffic forecasts

The role of traffic forecasts becomes absolutely decisive in a PPP deal where the major source of revenues are real tolls. Traffic forecasts are used, in conjunction with toll levels and the concession period, to estimate the revenues that the project can yield. Revenues are then used to pay for the motorway operation and maintenance, and to repay loans and investors' equity plus a return on that equity throughout the concession period. Traffic forecasts are instrumental for the public sector in order to prepare the tender and the bid. For this reason, in the case of Attiki Odos both parties mandated traffic studies which showed significant demand and growth but did not capture the very high traffic levels that Attiki Odos has attracted from the beginning of its operation.

Prior to the tendering process, the Greek state commissioned a traffic study and developed a multimodal traffic model, to evaluate the traffic captured by the motorway for various scenarios of economic and land use development and under various toll levels.

(source: Bastos, 1999)

Estimating future motorway traffic

The Attiki Odos consortium, led by Aktor, one of Greece's largest contractors, in conjunction with six other Greek contractors, namely Alte, Atemke, Atticat, Ergas, Eteth and Pantechniki, together with Egis Projects (formerly known as Transroute International), a French motorway operator, was formed to prepare a bid for the project. Although the results of the Government's traffic studies (prepared by Halcrow Fox of the UK and Dromos of Greece) were provided to the tenders, the Attiki Odos bidding consortium decided to develop their own forecasts (prepared by highly experienced traffic consultants – ISIS of France and Impetus of Greece), using in part data from the Government's studies but also the most recent data available on actual traffic levels, population, vehicle ownership and other demographic factors. These data evidenced the strong development of the northern and eastern suburban areas and the resulting high traffic growth. The data also demonstrated the need for the development of additional road infrastructure.

Traffic forecasting methodology

Demand for travel

The most important element of the analysis is the description in sufficient detail of the existing demand for travel, which is the basis for estimating the future traffic demand over the Concession Period.

In order to take into account the differing traffic conditions that occur at different times of the year, the week and the day in Athens and the impact of congestion at peak hours, the average annual traffic was segmented into eight different periods. The demand for travel for

these periods varies from plus 10% to minus 70% around the average working day conditions, and includes significant asymmetry in traffic direction due to commuter traffic.

The Attiki region was split up into 104 traffic zones and the exchange of trips between those zones were quantified in one Origin/Destination (O/D) matrix for each period. The initial O/D matrices were then calibrated for the year 1990, starting from the average daily matrix included in the Government's studies and fitting it to the actual traffic counts available for each period. Those matrices were then projected for the years 2000, 2005 and 2015 using the changes in demand for travel estimated by the Government's studies, based on expert forecasts for long term city planning.

The final element of the analysis of the demand for travel relates to the type of road user. The overall demand was first split up into different categories of vehicles (private cars, goods vehicles, buses and taxis). The largest category – private cars – was further broken down according to trip purpose (commuting, business, and other purposes). For each of the resulting six categories, the traffic analysts estimated the 'Time Value', the amount of money that a driver would be prepared to pay in order to save one hour on his trip. Taking into consideration the weight of each category in the overall demand, the average Time Value was estimated and used in the traffic computer model.

Present and future motorway network

Based on the Government's study work and site visits, the existing situation of the road network was precisely described in terms of geometric and physical characteristics. From this information, traffic characteristics of road network links were derived (capacity and speed/flow relationship). The anticipated configuration and characteristics of the road network for the years 2000, 2005 and 2015 were also analysed by including several new roads or extensions and improvements of existing roads which were officially identified.

Traffic assignment

The actual assignment of the traffic demand along the various routes available throughout the network was modeled using dedicated traffic software packages. Such software had been used for many years in Europe and the USA to assess the traffic and revenues on toll motorways and includes advanced concepts in terms of traffic assignment calculation under toll constraints.

Tolling assumptions

The traffic and revenue forecasts are based on the toll system proposed in the project owner's preliminary studies. The toll collection is based on paying a flat toll when entering the motorway. This is implemented through three one-direction toll plazas at the extremities of the motorway and toll barriers located on access ramps at each interchange.

The toll fare will be generally the same at all toll stations and will only vary according to the category of vehicle. The traffic estimates have been based on two toll categories: private cars (normal fare); and goods vehicles and buses (double fare). Obviously traffic levels on the motorway are dependent on the toll level. Higher toll levels result in less traffic being 'captured' by the motorway. Based on this assumption, the actual toll fare structure will have to be finalised in order to optimise the number of toll categories, the toll variation in off peak periods and, possibly, the toll variation at interchanges located near the ends of the motorway.

Traffic and revenues estimates

Using the methodology and the assumptions outlined above, traffic and revenue estimates were prepared for three different time horizons (forecasting years), and the toll levels presented below, assuming full opening of the motorway:

	2000	2005	2015
Toll level = GRD 450 (excluding VAT)			
Number of toll transactions – daily average in Passenger Car Units(PCUs)	182,977	299,510	282,635
Annual revenues (GRD bn, 1994 prices)	30,054	37,697	46,423
Annual average growth (%)		4.6	2.1
Toll level = GRD 600 (excluding VAT)			
Number of toll transactions – daily average in Passenger Car Units(PCUs)	148,091	193,475	244,927
Annual revenues (GRD bn, 1994 prices)	32,432	42,371	53,639
Annual average growth (%)		5.5	2.4

Table 5: Estimated toll revenues

In addition to the above, estimates were developed for the phase when the Motorway would be partially open. As seen in Table 5, the toll level structure is fundamental to estimating traffic and consequently project revenues. Figure 17 presents in a graphical form the variation of traffic and revenue based on different toll levels. Although the GRD 600 toll level generates higher revenues, the Attiki Odos Bidding Consortium decided to base its financing strategy on the lower toll level structure (that of GRD 450, excluding VAT) in a bid to offer 'social' benefits and to win more evaluation points. The traffic estimates were finalized on the basis of a GRD 450 toll level for all time periods. The toll level factor was proven to be of paramount importance in the winning of the bid. Attiki Odos offered an 18-year concession period with the normal toll fare capped at ECU 1.56 (1994 terms), or GRD 450 (1994 terms) excluding VAT. The ceiling is indexed contractually according to both Greek inflation and the GRD/ECU exchange rate. Revenue estimates in the base case model have only been based on an increase in the toll rate in line with Greek inflation.



Figure 17: Variation of traffic and revenues according to toll level

(Source: Bastos, 1999)

Using the above basic results, quarterly traffic and revenue estimates were developed for the entire operating period, taking into consideration the actual contractual toll rate of GRD 531 including 18% VAT (obtained by interpolation between the results obtained at GRD 450 and GRD 600) and the progressive build-up of traffic levels after each partial opening, through the application of a reduction factor to the minimal revenues.

Sensitivity of revenue estimates to key parameters

The key parameters affecting the traffic and revenue estimates are the overall demand for travel, the time value and the development of competing transportation infrastructure. Reasonable variations in these factors are not believed to represent a major risk of reduced toll revenues. With regard to the demand for travel, the forecasts were based on actual traffic data and the anticipated long-term trends in land development arising from the Athens City plan. Whilst expected development may be slower in the event of difficult economic conditions in Greece, it is highly unlikely that there will be no growth at all.

Finally, the development of competing transportation infrastructure able to reduce traveling on the motorway is unlikely and is covered by the Concession Contract. The only identified project of this kind is the Suburban Railway to be constructed within the median of the motorway. In such an eventuality the Concession Contract includes compensation for the Concession Company from the Project Owner. The social benefits analysis of the project has shown a very high social internal rate of return of about 18%. This mainly relates to timesavings generated for all vehicles in the Athens road network, as a result of the expected relief of traffic congestion.

Demand risk sensitivity analysis

Table 6: Demand risk sensitivity analysis

Traffic lower than expected	Base case	10% lower	15% lower
Minimum DSCR (Debt Service Cover Ratio)	1.81	1.49	1.33
Return on Enquity (%)	9.03	5.95	4.32
Project IRR	12.61	10.99	10.12
Drawdown under Standby (GRD m)	-	1,300	1,950

Funding sources

Table 7 illustrates the sources of funds for each of the three core cost components:

- The Lump Sum Object;
- The Parallel and Additional works;
- The expropriations, Independent Engineer, moving of utilities and archaeological investigations.

Table 7: Sources of funds

Sources of Funds	EUR m.	% of cost component	% of total costs			
Lump Sum Object						
Long term loans (mainly from EIB)	637	51%	20%			
Revenues before end of construction	37	3%	1%			
Private Equity	162	13%	5%			
EU Grants	225	18%	7%			
Greek state contribution	187	15%	6%			
Total	1,249	100%	39%			
Additional & Parallel works						
Greek State	736	93%	23%			
EU Grants	37	5%	1%			
Total	791	98%	24%			
Expropriations, Independent Engineer & Archaeology						
Greek State	1,100	95%	34%			
EU Grants	60	5%	2%			
Total	1,160	100%	36%			
Total Costs	3,199		100%			

(Sources: Interviewee II, Attiki Odos 2003, PWC 2006, MEPPW 2005b)

EU grants and EIB loans

The initial assistance awarded to the project was EUR 476m, but the 2004 budget review of the CSF operational programme 'Road Axes, Ports and Urban Development' changed the ERDF budget allocation for the project to EUR 322m. Some of the costs initially submitted to the EC were not eligible for co-financing by EU structural funds (MEPPW 2005b). The parallel and additional works that were not described in the Concession Contract or imposed by legal decision were excluded from the subsidised budget (MEPPW 2005b). In December 1996, an initial loan of ECU 145m was made available to the Greek state, to contribute to the financing of works carried out by the Ministry on Attiki Odos (EIB 1997). On 18 December 1997 the EIB signed the master facility agreement for a GRD 220bn loan to Attiki Odos S.A (EIB 1997).

Loans and guarantees

	Maturity (years)	Grace period (years)
EIB Loan Facility	20.0	7.0
Guarantee for EIB facility	5 or 7	N/A
Commercial Banks' Direct Loans	12.0	7.0
Standby Facility	12.0	7.0

(Source: Interviewee II)

The repayment period for the EIB loan is 20 years and the credit line is GRD 220bn (EUR 645m). The loan was guaranteed during the construction period by the consortium of commercial banks and the European Investment Fund. During the operation period the loan is guaranteed by the Greek state. The commercial banks' loan of EUR 140m has a repayment period of 12 years. The loan is guaranteed during the operation period by the Greek state. Only a part of this loan was needed for the construction of the project. The stand-by facility of EUR 85m was intended to be activated at the end of the construction

period if the EIB loan, commercial banks' loan and other sources of funds were not adequate to cover the construction costs.

BANKS	European Investment Bank Ioan guarantees	Commercial banks' loan	Stand-by facility
Emporiki Bank S.A (former Commercial Bank of Greece)	15,315,650.45	29,120,000	8,675,000
National Bank of Greece S.A	19,349,401.75	40,880,000	12,775,000
BAYERISCHE VEREINSBANK	26,912,686.13		4,875,000
BANK OF TOKYO MITSUBISHI	21,870,496.54		2,375,000
SOCIETE GENERALE	16,639,225.28		3,000,000
European Investment Fund (E.I.F)	28,679,155.66		
HSBC BANK PIC	17,456,877.36		1,800,000
ABN AMRO BANK NV	16,891,334.38		1,500,000
Agricultural Bank of Greece S.A.	6,234,599.06	17,500,000	11,000,000
Alpha Bank S.A	6,234,599.06	17,500,000	11,000,000
BANCA MONTE DEI PASCHI DI SIENA S.p.A.	16,891,334.38		1,500,000
BANK OF SCOTLAND	16,891,334.38		1,500,000
DE NATIONALE INVESTERINGS BANK N.V.	16,891,334.38		1,500,000
Eurobank S.A (former Ergasias Bank)	6,234,599.06	17,500,000	11,000,000
Pireus Bank S.A	6,234,599.06	17,500,000	11,000,000
ING BANK N.V.	16,891,334.38		1,500,000
BANCO BPI, S.A.	7,793,248.82		
BANK OF CYPRUS LTD.	12,469,198.11		
DEPFA BANK AG	7,793,248.82		
ENTENIAL	7,793,248.82		
EXPORT DEVELOPMENT CORPORATION	7,793,248.82		
Total	480,000,000	140,000,000	85,000,000

Table 8: Breakdown of loans and guarantees



Figure 18: Financial and contractual structure of Attiki Odos PPP

(Source: author's own elaboration)



Figure 19: Project Schedule and Basic Inflows/Outflows of the Concessionaire

(Source: Law 2245/1996: addendum 8, vertically aligned text boxes inserted by the author)

F OPERATIONS

Traffic volume

Figure 20 illustrates predicted versus actual daily toll transactions. Full operation started in August 2004 but crucial parts of the highway were already in operation before this date. The concessionaire also had the right to apply tolls before the end of the construction period.

Figure 20: Real versus forecast traffic



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People interviewed and their relevant role:

I: Mr. Stelios Markianos

Deputy CFO of AKTOR Group (the leader company of the concessionaire) during bidding, negotiations with the state and construction.

II: Mr. Emmanuel Zozonakis

Manager in Project Finance Division of Emporiki Bank, account manager of Attiki Odos financing and key participant in the lending negotiations with Attiki Odos S.A., the EIB and the Public Sector. Data from related banking documents which can not be referenced in this report were also gathered at the interview.

III: Mr. George Tsolakis

General Secretariat of the Association of Greek Environmental Scientists and Engineers.

IV: Mr. Vassilis Dorovinis

Lawyer of the Municipality of Ag. Paraskevi (one of the areas heavily affected by Attiki Odos), legal consultant and former chairman of Elliniki Etairia (one of the most active Greek NGOs concerning environment and heritage)

V: Mr. George Kotsoridis

Head of the ETEBA team (National Investment Bank for Industrial Development) which was the financial advisor of the Greek government during the period from concession award to the financial close of the Attiki Odos project.