



THE LISBON METROPOLITAN AREA TRANSPORT NETWORK AND ITS RELATION TO SPAIN AND EUROPE

Rui Rodrigues ¹

Abstract:

In spite of a final good decision, the whole dossier regarding the new Alcochete airport was handled without an integrated vision or articulation with the remaining means of transport. There has been scarce strategy for the Railways, Maritime transport, and the Air sector. Portugal has a huge opportunity to have a perfect interlinking between the different means of transport. The missing link in the integrated Portuguese transport system is the future high-speed and semi-high speed railway network with European gauge.

Keywords: Spain; Portugal; transport networks.

Resumen:

A pesar de una decisión finalmente buena, la cuestión del nuevo aeropuerto de Alcochete se gestionó sin una visión integrada ni una articulación con los demás medios de transporte. Ha habido una carencia de estrategia para los ferrocarriles, transporte marítimo y sector aéreo. Portugal tiene una enorme oportunidad de tener una interconexión perfecta ente los distintos medios de transporte. El eslabón que falta en el sistema integrado de transporte portugués es la futura red de ferrocarriles de velocidad alta y semi-alta con ancho de vía europeo.

Palabras clave: España; Portugal; redes de transporte.

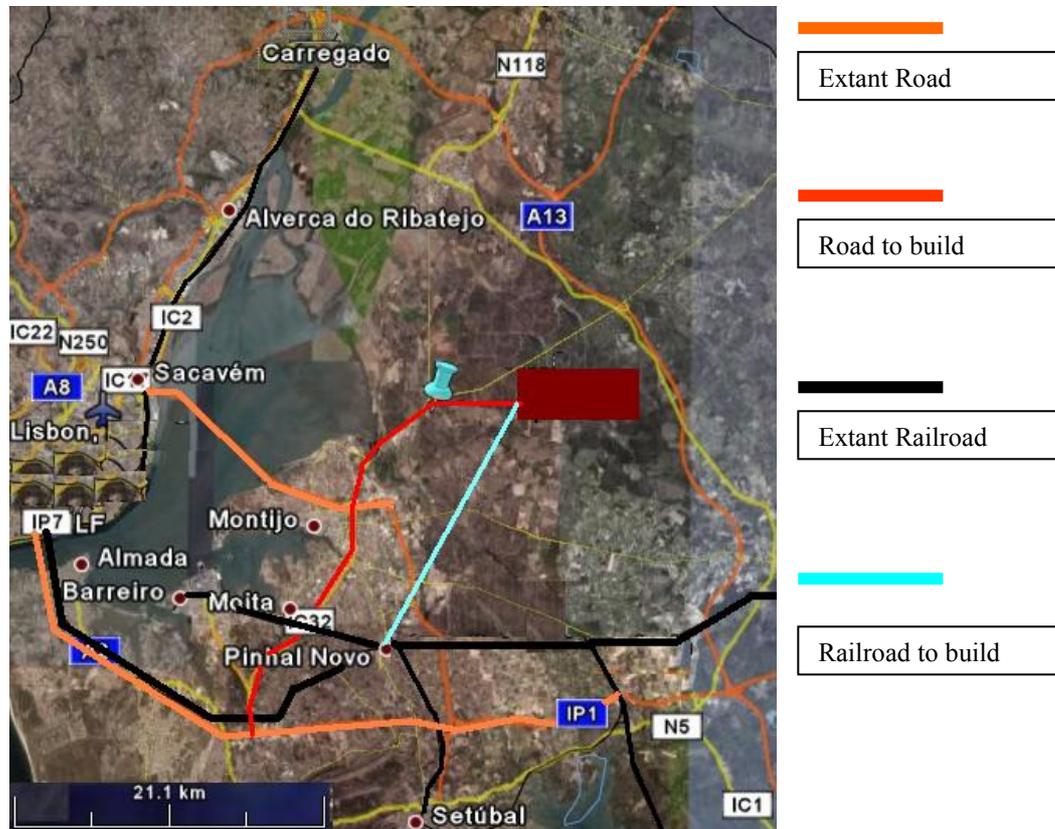
Copyright © UNISCI, 2008.

The views expressed in these articles are those of the authors, and do not necessarily reflect the views of UNISCI. *Las opiniones expresadas en estos artículos son propias de sus autores, y no reflejan necesariamente la opinión de UNISCI.*

¹ Rui Rodrigues is a consultant to the Associação Comercial do Porto, and a columnist for *O Público*.

Introduction

The Portuguese Government defined in January, 10, 2008 the location of the new airport at Alcochete, some 37 km East of Lisbon.



The new airport must be adapted to the current rail network and its location suggest the adoption of new European gauge lines. This will implicate an integrated transport network in the Lisbon Metropolitan Area, that will link maritime, rail, aerial and road transport. All of these means of transport are associated. Hence, road transport comprises motorways and conventional roads, whereas railways are supported by conventional, suburban and high-speed networks. Each of these is organised into nodes, which in the case of railways correspond to stations, in maritime transport to ports and in aerial networks to airports. Nodes can be considered as points where it is possible to change between networks and the nodes must be interlinked. The Lisbon Metropolitan Area transport system must fully promote the coordination between its networks and their associated means of transport.

1. Defining the best model

3.4- A AML E A INTEGRAÇÃO TERRITORIAL



A AML encontra-se no vértice de dois grandes eixos: o Eixo Atlântico Norte/Sul (Valença-Sines, com prolongamento a Faro) e o Eixo Oeste/Leste (Lisboa-Évora, com prolongamento a Badajoz e Madrid).

O cruzamento destes dois eixos dá-se na zona Pinhal Novo - Poceirão (fora de Lisboa, mas ainda dentro da AML), que se apresenta, assim, como o verdadeiro centro de gravidade logístico do país.

A zona Pinhal Novo - Poceirão reúne, portanto, condições para se constituir como o verdadeiro distribuidor de tráfegos do país, nas várias direcções: Norte, Sul, Lisboa ou Évora (Espanha), o que está em linha com a intenção de instalar uma grande plataforma logística no Poceirão.

Para uma boa integração territorial do país, será desejável que as deslocações Norte-Sul não atravessem Lisboa e se façam antes pelo leste do Tejo, entrando e saindo de Lisboa apenas o que for absolutamente necessário para as actividades nessa zona.

The laying down of high-speed and semi-high speed lines can only be carried out by specialised companies, since there is a need for exhaustive studies regarding soil resistance, environmental impact and relief assessment. We will analyse the concept of transport bearing in mind only the start and termination points. In Portugal as late as 2004, at the Luso-Spanish Summit, in Figueira da Foz, a model, similar to a horizontal 'Pi', was put forward for a European gauge high-speed network.²

Let us analyse the new network without the constraint of a pre-defined airport. As mentioned earlier, the new mixed (passengers and cargo) European gauge track must interlink all of the main nodes of all of the current transport networks linked to the Spanish and European networks. Spain will build mixed European gauge lines that will connect with Portugal at 4 border points: Vigo, Salamanca, Badajoz and Huelva, where Badajoz's will be high-speed and the remainder semi-high speed. Portugal needs only to extend these same lines to its ports and the rest of its territory.

Let us start with the international and transversal lines as they are the priority.

- Aveiro-Salamanca - Rail *highway* to the E.U., will be used mostly for cargo, in semi-high speed with a max. speed of 220-240 Km/h. It will connect all of Portugal's regions to the E.U., to Madrid and to the North and South of Spain. For this condition to take place, there needs to be a strategic connection to Medina del Campo, near Valladolid. Principal nodes are Aveiro, Viseu, Guarda and Salamanca.

The Aveiro-Salamanca section will originate in a seaport and will allow for cities such as Oporto, Aveiro, Coimbra and Leiria to be within 3 hours or less of Madrid.

If this transversal line is built south of Aveiro, Oporto would then be within more than 3 hours of Madrid.

² Would a model such as the horizontal 'T' serve these objectives? We think it would not, as it only takes into account the transport of passengers and excludes cargo.

- Lisbon-Badajoz – A new hope for the Alentejo and for Tourism in Lisbon. It will be mixed, but mainly used for passenger transport at high-speed (max. speed 350 Km/h), for passengers and cargo (120 Km/h) which will connect the ports of Lisbon, Setúbal and Sines. Building a mixed line between Lisbon and Badajoz will avoid having two separate lines as demanded by the horizontal ‘T’ plan. A third bridge crossing the Tagus in Lisbon will be required, but only for trains, linking Lisbon and Pinhal Novo.

A third bridge over the Tagus in Lisbon is inevitable as there is no track space between the Central Station and the North of Lisbon. Lisbon needs to be connected to the important rail node at Pinhal Novo so that the third bridge would serve both high-speed and suburban trains of European gauge. Only this would allow a high-speed train to link Lisbon and Madrid in less than 2 hours and 45 minutes.

The Lisbon-Madrid connection should serve around 4 million passengers in its first year (source: Min. Fomento Espanha). This value corresponds to the sum of all traffic.

The Lisbon-Madrid and Badajoz-Madrid lines should justify the use of 10 non-stop trains with a max. speed of 350 Km/h and of 6 regional high-speed trains with a max. speed of 250 Km/h between the intermediate points. Most of these would connect Badajoz-Mérida-Cáceres-Plasencia-Talavera de la Reina-Madrid and the remaining would link Extremadura-Évora-Tagus South Bank-Lisbon. The company exploiting this infrastructure should be co-owned between Portugal and Spain (resembling the case of the high-speed connection between Paris and Brussels).

There will later be direct links between Lisbon and Zaragoza, Barcelona, Valencia, Murcia and Alicante, without a stopover in Madrid, via Toledo, which will be close to the 3 links between Madrid and the cities of Seville, Valencia and Lisbon.

2. Why a Third Bridge is needed in Lisbon

Firstly, this is due to the fact that “25 de Abril” Bridge is close to saturation. Its capacity is 12 trains per hour per direction, and its current use is nearing 9 trains per hour at peak times. If Fertagus³ owned more trains, saturation would have already taken place. This means that, if the issue of the railway is not addressed, crossing the River Tagus via the “25 de Abril” bridge will become a serious limiting factor.



³ Company that currently operates this service. (translator’s note)



By building a third bridge, we would be solving several problems at once, such as the links to the North, the Algarve, the Alentejo, Spain and the establishment of a new suburban rail line to the south bank.

When connecting both banks of the Tagus, the link between Lisbon and Pinhal Novo can be made through 3 corridors: one through Barreiro, another siding the “Vasco da Gama” Bridge, and a more central option. All of these should be studied so as to establish which is best.

Third Tagus Crossing – Main data:

Difference between current and future distances: 23.5 to 28.5 Km

Distance between banks of the Tagus on all 3 corridors: 5.5 to 7 Km

Distance between Chelas and Pinhal Novo: 20 to 25 Km

Journey time would be reduced by 30 minutes between these two points.

It is likely that, when analysing the corridor near Montijo, one may reach the conclusion that here the costs would be considerably lower. The River Tagus is not deep near the Vasco da Gama bridge. This fact would allow for the construction of a tunnel and, if this corridor were to follow the A12 motorway (that connects the Vasco da Gama Bridge to Setúbal) and from there headed towards Pinhal Novo, the costs would also be lower as there is available track space, which does not happen in the Barreiro-Pinhal Novo link.

Even if only two tracks are built, the capacity of the third crossing will be enough for the long-term. The two tracks would obviously have European gauge, which will require further measures to be taken, since the suburban network has a different gauge. The tunnel would have three great advantages: less visual impact, it would not cause any constraint to the seaport and would allow for trains to run regardless of weather conditions. If this option were selected, further study would be required on how the Barreiro and Moita region should link up to this third crossing of the Tagus, on the Montijo corridor.

Another advantage that this option offers is the creation of a new link between Lisbon and the airbase at Montijo. Charter flights and those from Madeira and the Azores (except for connecting flights) could be diverted to this airbase. This option has already been studied by the National Airports Authority (ANA) in 1994.

When the Northern Line changes gauge, the long-haul trains coming from the North via the new Lisbon-Oporto link will approach via Alhandra, which will save 10 minutes on journey time, when compared with the south bank option. However, in an early stage, the approach will be via the third Tagus crossing.

It would be easier for cargo transport from the ports of Sines and Setúbal to avoid the capital, using the Pinhal Novo-Alhandra line on the east bank of the Tagus, and go directly to the terminal at Bobadela (3 Km north of Lisbon) and onto the Northern Line. This solution would require a new bridge near Alhandra, since there are already 4 tracks to Lisbon south of this point, hence avoiding the quadrupling between Alverca and Vila Franca de Xira (this



quadrupling would cost hundreds of millions of euros, a value much higher than that of a new bridge).

The Pinhal Novo-Lisbon crossing should be used exclusively for passengers, so as to allow for suspended-decks of 25 by 1000 metres, which will create a lot less difficulties and inferior costs in its construction. If it were to be a mixed line, the suspended-decks would have to be less than 18 by 1000 metres.

3. North-South Axis – Atlantic Route will be built in a secondary stage

The *Atlantic route* should be coordinated between seaports and the existing conventional network, crossing it along several points near Braga, Pedras Rubras-Leixões, Oporto, Gaia, Aveiro, Pampilhosa where it connects to the Beira Alta-Coimbra-Leiria-Entroncamento line so that, in the future, it can link to the Beira Baixa line and from there to Pinhal Novo, which will serve as the point where several lines will intersect. From here it will proceed to Sines and then onto the Algarve and Huelva.

This European gauge route, which will connect North and South, should be used both for passengers and cargo as it is the only line able to connect the Lisbon Region, Oporto and the Centre to Medina del Campo. It is worth noting that the plan laid-out coincides with the cargo terminals in Leixões, Pampilhosa, Entroncamento and Bobadela. This will avoid doubling the investment, something that is unfortunately occurring with other stations.

The Lisbon-Oporto-Vigo route must pass by Pinhal Novo, as there is no track space North of the capital. It should follow the left (east) bank of the Tagus along the A13 motorway, as it is a plain area and with low urban development. It would continue via the important node at Entroncamento, through Caranguejeira (node between the A1 and A8 motorways and the linking of the new Lisbon-Oporto line, the Northern Line and the West Line), connecting to the Northern Line. The future Leiria station should be near the road node between the A1, A8 motorways and the IC2 and the rail node West Lisbon-North Lisbon and high-speed.

As mentioned above, it would then connect to the Pampilhosa node, continuing via Aveiro, and sharing the station with the Northern and Aveiro-Salamanca lines. It would go on to Gaia and Oporto-Campanhã, where stations will also be shared, connecting with the Pedras Rubras airport, seaport of Leixões and Vigo.

The approach to Lisbon of the fast trains, coming from the North, would be made in the following way: during the time when the Northern Line and the new line have different gauges, the European gauge trains can come in and out of Lisbon through the future third Tagus bridge, sharing it with the high-speed Lisbon-Madrid connection. Once both have the same gauge, the route between Chelas-Olarias (future Central station), Gare do Oriente-Alhandra (as there are 4 tracks south of this point), Left Bank (where a bridge would be built) should be used as it is more direct and would save 10 minutes when compared to the previous one.



4. Modernisation of the Main Ports. Betting on Intermodal Terminals

Once the whole national network is finished and with European gauge, cargo transport from the South and North of Portugal will run to and from Europe through the Aveiro-Salamanca line, via Irun or Canfranc, hence becoming the most important axis, a real ‘rail highway’ connected to the E.U..

Leixões is a good port, but increasing its capacity would prove difficult, both in terms of its area, of the depth of the sea around the harbour and of its faulty accesses. Aveiro also has limitations as far as the depth of the water around the harbour. Lisbon Harbour has always experienced good conditions, but has been suffering strongly from pressure from the real estate sector and is increasingly more limited due to difficulties in road and rail accesses. Setúbal is a multipurpose port and is the one that presents the greatest potential for growth, as long as the depth of its bar is increased from -12m to -15m HZ (Hydrographical Zero – linked to the lowest tide recorded within a specific period). Sines is a deepwater port and is increasingly used for cargo transfer or for transferring transshipment containers.

5. Figueira da Foz Agreements and their Consequences

The setting of priorities by incoming Governments is dependent on the agreements made with Spain in November 2003. Besides, one should bear in mind that these agreements (established at the Luso-Spanish Summit, in Figueira da Foz) must be implemented, otherwise Portugal could lose its international credibility. In practice, these agreements have set investment in railways as a priority and have defined the deadlines for doing so.

During the same Summit, the following 4 international European gauge links were established: Oporto-Vigo in 2009, Lisbon-Madrid in 2010, Aveiro-Salamanca in 2015 and Faro-Huelva in 2018. However, for this network to be possible, the costs of its construction will have to be controlled by defining the best routes, delaying the building of the new airport or reviewing any unnecessary works and reducing expenses in the transport sector.

6. If no Measures are Taken

This would be the worst situation for Portugal as it would become dependent on dry ports near its border and the road transport of containers in lorries would be more visible between these dry ports and our commercial centres. A dry port is an intermodal road and rail cargo terminal, located in inland regions with a direct link to a maritime port. Instead of letting foreign companies take hold of this business, Portugal could take advantage of it by prolonging the transversal lines between Salamanca and Aveiro and between Badajoz and the South Bank of the Tagus (near Lisbon).

7. Focusing on Priority Investments

We have mentioned that transversal rail lines were a priority. We shall now justify this statement.



At the moment, with the existing network, any electric-powered passenger and cargo train with Iberian gauge may go from Braga to Faro or from the ports of Sines and Setúbal to the North of the country without any constraints.

A new European gauge line would only make sense if it is built entirely, from start to finish. If this line were only built between Lisbon and Oporto, trains from the existing Iberian gauge network, coming from Braga, Setúbal or the Algarve, would not be able to use it. If a new section were built between Oporto and Aveiro, the Iberian gauge trains from Lisbon and the South would also be unable to use it.

One can hence conclude that changing the gauge of the North-South axis only makes sense if it is built wholly and not in stages; otherwise gauge related incompatibilities will remain a problem. Besides, a line through the city of Oporto would be another serious problem as there is not enough track space; this could only be solved by changing the gauge of the Minho line and by building a new bridge near the existing S. João Bridge when the new Lisbon-Oporto line were completed. This would avoid creating a new channel through the Greater Oporto region, otherwise costs would be immense.

A phased construction would be possible in transversal lines, as they would not interfere with the North-South axis.⁴

Through these priority investments, by 2012-2015 Portugal would have railways that would be initial stages that would lead to the final objective whereby Portugal becomes an integral part of the future European gauge cargo network. The north-south axis would be built in a secondary stage.

- The Lisbon-Badajoz connection, due in 2010, will require the building of the third Tagus crossing, as well as the future Lisbon Central Station. Once the high-speed European gauge Lisbon-Badajoz line for cargo and passengers is finished, one could, at an early stage, double the line between Sines-Ermidas-Poçoirão. One of the tracks should remain with Iberian gauge so as to preserve the link between the port of Sines and the existing network and the other, with European gauge, would connect to the Lisbon-Badajoz line.
- The new Aveiro-Mangualde section would constitute the first phase of the future Aveiro-Salamanca line for passengers and cargo, with a top speed of 220-240 Km/h and, by altering the gauge in the Beira Alta line, between Mangualde and Vilar Formoso, which would allow for the connection between the North and Centre regions to the E.U., Madrid and the rest of Spain.
- The Oporto-Vigo line, for cargo and passengers, due in 2009 should first be built with Iberian gauge, but with tracks prepared for dual-gauge, so as to allow a future conversion to European gauge at a later stage. It should start in Oporto, northbound, connecting Campanhã to the airport at Pedras Rubras, through the Leixões branch, proceeding then to Braga-Barcelos and finally Vigo.

⁴ Even with financial constraints, it would be possible to prolong the mixed Badajoz-Pinhal Novo line and, from there, connect to the port of Setúbal and to Sines via Poçoirão or Vendas Novas. This section could be shared with the future Algarve line. In the North, a new section between Aveiro and Magualde could be built and, from there on the gauge could be changed up to the Spanish border. This option would solve most of the problem related to cargo transport.



- Aveiro-Gaia should be the first section of the new Lisbon-Oporto line to be built and would be shared with the Oporto-Salamanca line, for cargo and passengers. Its objective would be to avoid that long-haul trains be limited, in terms of speed, due to the layout of the track and of the high suburban traffic on it. It should be built for as high a speed as possible and, at an early stage, with Iberian gauge with tracks prepared for dual-gauge so that conversion to European gauge would be possible at a later phase.

8. How to Finance the Projects

The involvement of the private sector has been suggested on public-private partnership scheme. However, this suggestion would prove almost impossible to be carried out, since the direct costs and the high investment needed for the construction of a high-speed or semi-high speed railway, would hardly yield a profit.

Contrary to this, if only the concession is taken into account, all high-speed railways in Europe are profitable, except for the Eurostar due to its high toll costs when crossing the English Channel. This means that the private sector could be interested in the concession to operate in this network, but not to finance its infrastructures, which account for the largest part of the total investment. This investment would have to be assured by the State and taking full advantage of possible E.U. funds.

9. How the State will Finance this Infrastructure

Given the current financial constraints, any Government will have to select the most important projects for the country and where the most E.U. funds are available and, at the same time, it will have to reduce costs in the transport sector, which are becoming increasingly hard for the State to keep up to.

Some options would be to:

- Reduce mobility costs in Lisbon
- Abandon the idea for new investments in the Lisbon Underground
- Delay the construction of high-speed Lisbon-Oporto line
- Delay the construction of the new Lisbon airport

Transport in Lisbon account for a yearly loss of 300 million euros. If this value would decrease or even cease to exist, the money saved could be invested in new projects.

Increase mobility in cities has usually been based on the following aspects:

- Restrictions on car use
- Correct urban planning
- Encouragement of Public Transport



In general, cities which have attained greater mobility for their citizens have structured their public transport system around a network of heavy conventional trains, coordinating it with their Underground or Tram services, the latter being a more agile surface train, able to reach certain areas of the city where conventional trains cannot operate.

Regardless of all the investment made, it is verifiable that circulation in Lisbon is increasingly difficult, movements within the city have increased substantially and the public transport deficit has reached values impossible to maintain. On the other hand, average occupancy for each car is 1.2 passengers.

To invert this cycle a commitment to public transport is needed, furthered by restrictions on car use in the city, fostering of unsynchronised work and study schedules and the making sure that more people are living in the city centre.

On December 17th 2004, plans were announced for the expansion of the Lisbon Underground. Several specific project were put forward, which are part of the extension of several lines and of the current network until 2010. The allocated cost for this plan is more and 1,400 million euros. However, bearing in mind that in Lisbon, the average cost for this type of construction is 65 million euros per kilometre, the predicted costs will surely increase sharply. The values under consideration are so high that the projects by the Lisbon Underground will certainly have to be reviewed.

One of the new structures announced was the '7 Colinas' line, stretching for 8.5 Km and with 16 new stations. This new line was suggested without any prior geological or topographical study of the terrain through which it will be built. Due to the enormous difficulties that this project will pose, we believe it should be dropped. It is surprising to see that those responsible for such as project (predicted to cost more than 1000 million euros, according to the cost per kilometre ratio) are now worried about the costs of the new Tagus crossing.

With regard to the Lisbon Underground, demand has not kept up to the increased circulation caused by the extension of the network. Annual traffic corresponds to around 140 million passengers. The underground is the means of transport considered by the city's inhabitants to have the best image.⁵

All future projects should be halted in an attempt to finish all those currently taking place. The most important of these is the extension of the Red Line, as it will shorten distances considerably, a solution badly needed at the moment.

Besides, it would be far more prudent to first build the third Tagus crossing and the future Lisbon Central Station to then articulate it with the new Underground and Tram lines. Sadly, the current plan is for taking these steps in the reverse order.

Whichever Government, for political, economic and management reasons, will take far more dividends, for itself and the country, if a new European gauge network is built rather than a new airport. The latter would not create anything new, except for the substitution of Portela, whereas the future European gauge network will allow for the direct connection for cargo and passengers to the E.U., which the current network does not allow. At an early stage,

⁵ In 2002, Lisbon Underground had 173 million euros worth of losses and turnover from ticket sales currently account to only 28% of operational costs. The debt accumulated over several years is nearing 2,500 million euros.



for this to happen, only the transversal lines need to be built, leaving the north-south axis for later. The use of European gauge on the North-South axis will only be completely effective if applied from Vigo to Faro. Otherwise, there will be incompatibility problems between gauges.

Apart from this, the Alfa Pendular⁶, as from the end of 2005 links Lisbon and Oporto in less than 2h30m, with stopovers in Aveiro and Coimbra. This is becoming competitive with regard to air transport, since planes land at Pedras Rubras, 11 Km from the city of Oporto. In a new high-speed line, if a train has two stopovers, it will only save 30 minutes of journey time when compared to the Alfa Pendular. It is obvious that Portugal is not at this time in a position to spend 5000 million euros to save 30 minutes in the new Lisbon-Oporto line.⁷

Conclusion

Up to this date, (January 2008) no one has explained how the new airport will be financed. All of the information available is vague and does not refer to private investment. The financing of all the accesses to it has also not been explained. The latter will account for thousands of millions of euros.

The building of a new airport would entail spending, at least, around 5,000 million euros (taking as points of comparison the new airports in Oslo and Athens). This is a huge concentration of investment, which would only receive 11% of its funding from the E.U. and would have to be made very quickly, since, should it take place, would have to be done at once, without interruptions of phasing. On the other hand, the new rail network can be built in stages and with much higher E.U. funding.

Another question that remains unanswered has to do with the privatisation model for ANA-Aerportos. Should one advance with the building of such a new infrastructure without defining this question? Portela Airport is profitable and its profits currently fund other national airports which operate at a loss. Should the Government keep for itself only the airports that will prove to be a liability for the National Budget, hence increasing the Deficit?

Democratic governance forbids that a handful of people should decide the future of investments which will have consequences for the whole of the 21st century without explaining carefully the options taken and involving the civil society. The Portuguese government has made public all relevant studies through the Internet so that no doubts would remain on the decisions taken. If these really are the best for the country, all will agree to them and accept them.

As has been described in this paper, in spite of a final good decision, the whole dossier regarding the new Alcochete airport was handled without an integrated vision or articulation with the remaining means of transport.

⁶ Fast train, currently operating on the Northern Line (translator's note)

⁷ The future high-speed network will not only reduce air traffic at Portela airport, but more importantly, it will reduce its growth rate, allowing for the slowing down of its saturation. Delaying the construction of the new airport and of the Lisbon-Oporto high-speed line for the aforementioned reasons, would in itself represent saving 10,000 million euros, the use of which will allow the development of an infrastructures model suitable for Portugal.

There has been scarce strategy for the Railways, Maritime transport, and the Air sector. The delays in arriving at a decision for positioning the new airport at Alcochete brought national decision-making to a standstill and forced the country backwards several years.

Of the four means of transport, Railway, Maritime, Aerial and Road, the first two are the ones lagging further behind and, due to high oil prices, should be the ones receiving the most funding, since external costs in euros per 1000 Km are several times lower than those of road transport. Globalisation would not be possible without maritime transport and the activities related to this sector. Investing in it will always be a good option given the conditions of the Portuguese coast and its Exclusive Economic Zone.



Portugal has a huge opportunity to have a perfect interlinking between the different means of transport, so as to combine their advantages, hence reducing costs and energy consumption, etc, yet, they should work as pieces of a jigsaw, linking with each other gracefully, without any breakpoint.

Improving the interconnectivity of the different networks would be a way to allow for a more direct link between Portugal's production centres and the great consumer centres of Europe, which could create the conditions to induce investment and the creation of new jobs.

We can conclude that the missing link in the integrated Portuguese transport system is the future high-speed and semi-high speed railway network with European gauge.

- The new mixed track network should connect to the main nodes of the conventional network
- When the Northern Line changes in gauge in 2020, it will probably only be used for cargo and regional trains, whereas the new line will be directed at passengers only
- If the West Line is modernised, the project should meet the following objectives: allow for a more direct link to Lisbon and a connection to the Northern Line, near Leiria, to the new high-speed track between Lisbon and Oporto. The layout of the West Line could be changed near Malveira, so that there would be a direct link to Lisbon, passing



by Loures, the MARL⁸ and terminating, if possible, in Bobadela near the cargo terminal. Passenger trains could follow the remaining itinerary of the Northern line, via Gare do Oriente and Chelas-Olaias, which will be terminal of several lines.

⁸ Large wholesale market on the outskirts of Lisbon (translator's note)

