

Pensioners' Association for Progressive Technologies (PAPTech)

H.compl. "Mladost", bl.23, Entr.3, Sofia-1784, BULGARIA

Tel. 359-02-884-8278; 359-0887-769866

TO: The President of the European Council **Mr Herman Van Rompuy**
The President of EU Commission **José Manuel Barroso**
Vice-President and commissioner for transport **Siim Kallas**
Director-General for Mobility & Transport **Matthias Ruete**

A project for suspended railway to be included in EU 2020

Dear Sirs,

It is common concern of people in EU about position of the Union in world's economy and technological development. It is also clear that it is very difficult for EU to compete in the world market with China and Far East Asian countries in the areas of house hold appliances and commodities for everyday use. Therefore, for another areas for EU effective participation should be sought. Generally, they should be related with very complex and big systems. In celebration of 60 anniversary of China's revolution one of the important slogans was: *"From made in China to made by China"*, emphasizing on export of productions based on Chinese innovations. Taking into account that China and Japan pay a lot of attentions and spend efforts and money for advanced development of complex systems, any delay in EU in this direction could lead to the same situation as in popular commodities – China's domination not only in the international market, but in EU.

In order to avoid such development EU top officials and governments of member-states have to concentrate their efforts urgent mobilization of EU intellectual, industrial and financial potentials in projects for big and very complex project. Of this kind is our project for *suspended railway system*. Information and proposals on it were presented to Municipality of Sofia and Bulgarian Government, as well as to President Barroso and Directorate General for Energy and Transport, but except good will, practical support has not been provided.

Now we make use of the invitation for consultations *on the Future Trans-European Transport Network* to present to the attention of top officials of EU this project to be considered as important for achievements of EU 2020 aims.

In addition, it should be mentioned that according to available information in contrast with recommendations of EU Council member-countries to prepare and present their contributions to EU 2020, Bulgarian government is doing nothing in this direction, motivating it with the crisis and lack of financial resources for R&D activities.

Details on our project **PAPTech suspended railway** and proposals for its development are in our response (enclosed) for invitation for consultations. Our hope is that this time this project will overcome EU bureaucracy and fruitful actions will be taken by top authorities of EU.

PAPTech Chairman:

(Prof. Lozan Stoimenov)

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Tel. 359-02-884-8278; 359-0887-769866

to: MOVE-TEN-T-POLICY-REVISION@ec.europa.eu

Remarks and proposals to TNT-T programme

Our response to invitation for public Consultation on the Future Trans-European Transport Network

1. **Objectives of the Programme.** In general they are in accordance to social, economic and environmental requirements and people's interests.

2. **On directions for development.** The main directions are: modes of transport, intermodality of connections, management and control of the transportation process. Few attention is paid on research and development, as well as on innovations, especially in the area of modes used. There is not idea how to reduce the deal of automobiles in the whole transportation process. This reduction is required by economic and environmental reasons:

- Construction and maintenance of roads is too costly;
- Energy resources used per a ton of load are much higher than used in railway transport;
- A lot of labour is required, especially drivers to serve this transport;
- Environmental damages are enormous .

3. **Opportunities for alternative modes of transport.** They should be sought over ground: overground railways and airships. In both directions some experience has been collected but the ideas in this directions do not attract attention and financing. There are considerable reasons for the development of new generation airships.

4. **Heavy and light transporters.** For many years the direction of development of transporters has been increase of their load capacity for several reasons: smaller number of transport units (trains, trams, busses, trucks, ships, etc). and respectively – smaller number of drivers and personnel in service. It seems more efficient economically. But for such heavy transporters correspondent roads, railways, seaports and airports are required. In order to satisfy increased load and sizes this infrastructure is built stronger, bigger, longer or wider and finally – more and more expensive. In addition – more load – longer interval of time to collect it and one should take into account that. In contrast – low load capacity transport units require lighter elements of infrastructure, which allows to built them faster and chipper. At the same time automatically driven they eliminate the basic advantages of heavy loaded transporters. At the same time the interval of time for collection enough load according to capacity is shorter. Thus, transport systems with lighter transporters offer significant advantages compared with transport systems for heavy load transporters. This fact is missed in the Programme.

5. **Overground railways.** There are two opportunities for over ground location of vehicles with respect to the track supporting beam: to **ride the beam** or **straddle** or to **be hanged** or **suspended**. In some cases riding transporters are traditional railway trains. For them heavy beam constructions are built and supported in short distances by strong massive supports. New version of riding transporters are monorails MAGLEV. In this version the beam is used also as the rail.

The first suspended railway has been used in Wuppertal since 1901. It is monorail. Next version is known as SAFEGE. Since 1970 four systems (two in Japan and two in Germany) have been used. In this system the bogie (propulsion system) ran inside a hollow box girder on the lower face of which was a slot through which the suspension gear passed.

6. PAPTech suspended railway. SAFEGE version is based on the level of technology of metal production of the middle of 20th century. In the last decades of the century production of pipes for oil and gas pipelines was developed. Their diameters are between 820 mm and 1420 mm and are strong enough to be used as beams to which rails can be attached. It means that construction of the track can be at attractive cost. Development of this idea has led us (a group of experienced scientists and specialists named **Pensioners' Association for Progressive Technologies - PAPTech**) to construction in which two direction two rails lines are placed on cantilever frames at both sides of the pipe(illustration is attached). This design creates opportunities to use the upper beams of the frames to support flat surface which can be used by pedestrians and bicycles or other light transporters. In this way PAPTech version provides opportunities for effective solution by the same investments four major problems: a) replacement of automobiles with all advantages with respect to energy and environment, b) independent transport system which is out of congestions, c) opportunities for pedestrians and d) opportunities for light transport means to be used. It is clear that the project offers solutions of urgent and important problems on which the Directorate General for Energy and Transport points out:

"Sustainable transport policies. What do we want to achieve ?

With growing freight and passenger transport, pollution and congestion risk aggravating. The European Commission is working towards a form of mobility that is sustainable, energy-efficient and respectful of the environment.

***Our aim is to disconnect mobility from its adverse effects.** This means, above all, promoting co-modality, i.e. optimally combining various modes of transport within the same transport chain, which is the solution for the future in the case of freight. **Technical innovation and a shift towards the least polluting and most energy efficient modes of transport** — especially in the case of long distance and urban travel — will also contribute to a more sustainable mobility."*

The initial aim of the project was much more effective solution of traffic problems in Sofia than extension of metro system. Careful analysis of the opportunities which this version of suspended railway offers shows that it can be used in intercity and international transport systems. In addition, the same bogie (the same propulsion system) can be used to carry suspended cargo container.

PAPTech version for urban transportation is seen to use single suspended coach for 60 passengers at maximum speed 60 km/h and commercial speed 40 km/h. Minimum intervals can be the same as in Dortmund Safege (H- Bahn) – 40 sec. These characteristics seem to be optimal for urban transportation. For intercity and international systems these characteristics can be properly adjusted.

Taking into account the new construction of the supporting system we worked out draft projects for propulsion system and stability of the vehicle and correspondent switches, as well as a system for addition or removal of trains from or to depots, placed in many places in the system.

In addition 17 diploma projects of students at Technical University in Sofia offered variety of ideas about the design of coaches, stations and the track.

7. Advantages and opportunities offered by PAPTech suspended railway.

7.1. Advantages related to investments. Use of industrially produced metal products and possible use of renovated tubes removed from pipelines offer very low cost of building materials. Industrial production of basic elements also offers their low cost. Estimated cost of production and assembling of the supporting system is in the range €2.0 – 2.5 millions per kilometre. Taking into account that the length of trains is in the range 12 – 20 m, stations are much shorter and cheaper than those in metro (estimated cost of one station is in the range € 0.7 -1.5 millions). Costs of vehicles, power supply, control system and depot are the same as for similar

ground transport systems. Total estimated cost for urban version is in the range of € 2.5 – 4 millions per kilometre.

7.2. Advantages related to construction. Elevation of supporting posts can be done on flat areas and mountains, as well as on rivers and sea beds. In cases when the trace follows existing roads there is no need to stop existing traffic because of elevation of posts and assembling the supporting system. If works are properly organised a kilometre of the track can be built for about a month or even less. In cases when the track has to be changed metal constructions allow required changes to be done without serious damages and losses. Such changes are impossible for underground system and those of concrete.

7.3. Advantages and opportunities related to exploitation. They are in three main directions. One is that the same supporting system can be used in two levels – under and over it. In urban version upper level is used for pedestrians and bicycles. In intercity version the upper level can be used for two direction road for cars which total mass is less than 3000 kg. In this way cars can be separated from heavy trucks and many places to which construction of usual roads and railways is difficult and expensive can be properly related to bigger towns and main transport systems. Second one is that smaller trains need shorter time to collect acceptable for their effectiveness load (passengers and cargo). For example, acceptable average number of passengers for a metro train is 400. Average passengers inflow is 40 per a minute. To collect them intervals between trains is 10 min. A train of suspended railway acceptable load is 40 passengers. The intervals between trains can be 1.0 min. Average waiting time per a passenger in metro system is 5.0 min and total for 400 passengers – 2000 min. Average waiting time per a passenger in suspended railway system is 0.5 min. For 400 passengers the total waiting time is 200 min or **10 times less**. Taking into account that the time is money the advantage is important. Third one is that the propulsion system can be used not only for passengers coach but to attach to it a cargo container (mainly 20' size which total mass is less than 25000 kg). In this way the number of trailers for containers will be considerably reduced on roads.

8. PAPTech suspended railway in the trans-European transport network. In general this mode can be used in two ways: as additional transport opportunities above existing roads and to build new tracks in areas where building of other transport modes is difficult and expensive.. The project offers easy and comfortable connections between variety of transport modes. This mode can be used for fast and low cost trans-European routes in addition to included in the programme. In Balkans some of them could be:

- Istanbul –Burgas –Varna – Constanta – Odesa;
- Plovdiv – Samokov – Kjustendil – Skopie –Struga – Tirana –Duras ;
- Bucuresti – Turnu-Magurele- Nikopol – Pleven – Karlovo – Plovdiv – Devin – Dospat – Kavala, which could be a part of trans-European route in the east part of EU from Tallin through Latvia –Lithuania – Estonia – Poland – Hungary – Romania- Bulgaria – Greece, which will connect Baltic Sea with Aegean Sea.

This mode of transport can provide easy and low cost transport connections across large rivers and mountains in many regions of EU.

9. About realisation of PAPTech project for suspended railway.

9.1. R&D Centre for suspended rail transport. As every railway system, this one is also very complex, including number of complex subsystems. Fortunately, some of them are used in existing transport system and can be adjusted for the offered project. In spite of this, as a whole the system is completely new and for its practical use the programme for development should include all required for a new idea stages. It means that before mass production and building such systems in three versions: urban, intercity and international, complex R&D activities are required. For them correspondent facilities and organisation have to be established. Proper form is seen as

R&D Centre for suspended rail transport including three main structures: *research, art and technical design and production and tests of the equipment.*

9.2. EU Association for development of PAPTech project. Taking into account the complexity of the project and that it includes products of different companies in EU it could be useful for EU to accept the approach of China with respect to projects of such a scale. Recently in China, taking into account the complexity of development of production of electric cars was established special association in which are included many companies which production can be used in the project. The association is headed by a Minister for transport. Detailed information is below:

BEIJING, Aug. 19 (UPI) -- China has formed an electric vehicle industry association aimed at developing electric cars. The 16 state-owned companies participating in the alliance -- including China National Petroleum Corp., China's largest oil and gas producer -- are expected to invest \$14.7 billion in electric vehicles by 2012. The Beijing Times reports that the association wants to integrate technological standards and help Chinese companies master technologies necessary for the production of electric vehicles. "The (Chinese) government could easily underwrite or subsidize the development costs and do it at a time when the global car industry is still reeling," Oded Shenkar, a professor of management at The Ohio State University and the author of "The Chinese Century," told The New York Times. China, the world's top emitter of greenhouse gases, aims for 500,000 energy-efficient vehicles to reach the market over the next three years. In 2008, Beijing launched a national campaign aimed at putting 1,000 electric vehicles on the roads in at least 10 cities each year to encourage people to buy electric cars. China overtook the United States as the world's biggest auto market in terms of vehicles sold in 2009.

Similar EU association for development of PAPTech project should include companies in EU which production is in the areas of transport, communications, automations, public services, construction technologies, etc. The association is reasonable to be headed by EU Commissioner for transport or another top officer of EU. Above mentioned R&D Centre could be supporting companies of the Association which practically will establish coordination of production and particular participation of the members of the Association in the system.

9.3. Financing the development of the project. Recent experience of EU in the area of innovations shows that established system of financial support lacks effectiveness. And this system is completely inadequate for financing a large scale innovative projects, for they can not be pushed in the limited frames in neither of CIP nor of FP7. It seems reasonable to ensure initially direct financing of PAPTech project for suspended railway from EU. This approach will allow better coordination of activities of companies organised in above mentioned Association and clear transparency of spendings.

9.4. How to start the development of the project. Taking into account that the project is in the direction of basic aims of programme EU 2020 it is reasonable to present it to highest level of EU administration. In this regard we are ready to present it before responsible officials of EU and representatives of companies which production and activities are related to the project. Taking into account that the project is developing by pensioners and students who cannot afford travel and accommodation there are two options:

- a) EU Commission or Directorate General for Transport and Mobility meets expenses for 10 – 15 persons to arrive in Brussels or
- b) presentation to be organised here in Bulgaria.

As in October this year decisions by the Council will be taken on EU 2020, it should be useful to organise this presentation before the meeting of the Council. On the basis of presentation two steps should be made: working out a programme for development of the project, including its financing and establishment of the Association.

10. Organisation and main base for R&D and production of PAPTech suspended railway systems. Taking into account that the project has been launched in Bulgaria and in order to create jobs for Bulgarian engineers and scientists in Bulgaria it is reasonable the main R&D and production base of the systems to be located in Bulgaria. One useful opportunity offers former still plant Kremikovtzi. In its site near Sofia can be established proposed EU R&D Centre and later required production system can be developed. Correspondent infrastructure is available (railway, power supply, etc.). Status of R&D Centre has to be decided at EU level. Generally, it should

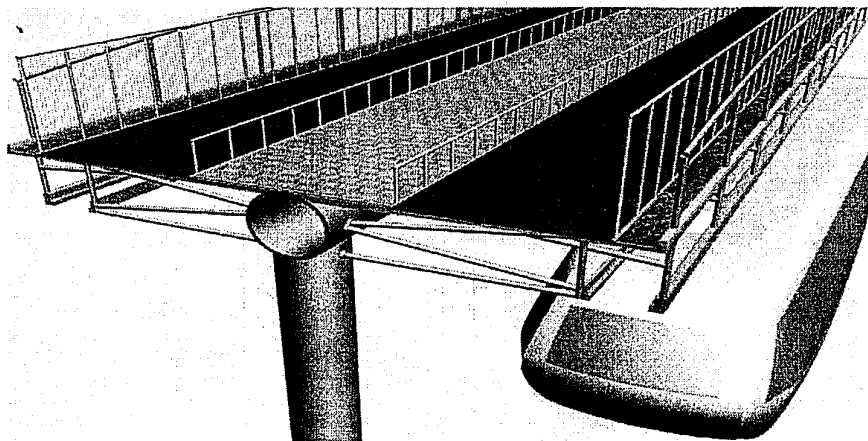
coordinate participation of Association's member-companies in the project and it could be their joint venture. The same approach can be used with respect to production system.

11. Conclusion. The basic aim of PAPTech project is to replace automobiles with electrical vehicles in three directions: a) improvement of urban mobility and in this way to reduce the use of cars as means for personal mobility; b) to replace busses as means for public transport; c) to replace lorries as means for cargo transport.

Effects of this replacement are in two main directions: radical reduction of environmental pollution and economical efficiency. The latest is also in two directions: reduction of time which people spend for their everyday urban mobility (taking into account that time is money) and reduction of the cost of transportation. As a basis for calculation one should compare what is the cost of energy used by a bus for 60 – 80 passengers or 10 tons lorry and the same capacity of vehicle of suspended railway per a kilometre. The difference is at least three times in favour of electrical vehicle moving on rails. The average distance covered in a day by a bus or cargo lorry can be assumed in the range of 300 km. The cost of the used fuel in EU is in the interval €100 - 120. The cost of electricity used by the same capacity of electrical vehicle on rails for the same distance is in the range €30 – 40. The one day effect for EU and each member-state can be easily calculated multiplying the number of busses and lorries by €60. On this basis it is easy to calculate the period in which only on this basis the investments for construction of suspended railway system will be recovered.

One important direction of effectiveness of the offered project is that its realisation will create due to the complexity of the system considerable number of jobs for specialists and workers of many areas of engineering, economy and social sciences.

Negligence of these effects by EU and member-states top officials may not find any reasonable explanation.



Students' illustration of the basic idea of PAPTech project

PAPTech Chairman:

(Prof. Lozan Stoimenov)