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Master Plan on High-Speed Trains

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Note by the secretariat

I. Mandate

1. The methodology on the development of Master Plan on High-Speed Trains presented below have been prepared by the secretariat in line with the mandate of the Working Party on Rail Transport (SC.2) to elaborate proposals and prepare studies aimed at strengthening, consolidating and extending the position of rail transport on international transport markets and to report on specific Trans-European Railway (TER) project developments to promote international rail traffic and especially the development of high-speed trains in accordance with its programme of work for the period 2014–2018 (ECE/TRANS/2014/26, activity 02.5.2, output (c) and activity 02.5.1, output C (a)).

II. Development of a Master Plan for high-speed trains in the ECE region in cooperation with TER project

2. Seven years ago, the United Nations Economic Commission for Europe (UNECE) published the first Trans-European North-South Motorway (TEM) and Trans-European Railway (TER) projects Master Plan, presenting a reliable and pragmatic short-, medium- and long-term investment strategy for developing road, rail and combined transport backbone networks in the participating countries. The first Master Plan proved to be an important step towards improving the transport sector performance in the study region.

* The present document is being issued without formal editing.

Many targeted investments – for example, about 45 per cent of the 491 road and rail projects contained in the Master Plan – have been completed.

3. In 2011, the TEM and TER projects completed the revision of its Master Plan. The objectives of the Master Plan revision were (a) to analyse the results of the road and rail infrastructure development in 25 participating countries of Central, Eastern and South-Eastern Europe and the Caucasus in the period covering 2005 to 2010, (b) to describe the existing status of road and rail networks, and (c) to set out the road and rail networks development programme until the year 2020.

4. The slower than expected economic growth in some participating countries unfortunately has resulted in a minimal growth of their passenger and freight transport sectors. Budgetary constraints in many of the countries have led to limited transport infrastructure development. The changes in the backbone network, traffic forecast result, as well as the above mentioned socio economic impacts have been reflected in the new Master Plan list of road and rail projects. The list is comprised of 294 motorway/road construction and/or rehabilitation and 191 rail projects, with a total cost of approximately €188 × 109. The average cost of a project (approximately €88 × 106) increased almost twofold in comparison with the average project cost in the original Master Plan. This increase was partly due to inflation, but extensively due to larger and more demanding construction projects (e.g. high-speed rail lines in some countries) which frequently focus on densely populated agglomerations.

5. Specifically for high-speed trains, the TEM and TER revised Master Plan mentions the following:

(a) There is no regional high-speed rail master plan at the Pan-European level: in practice, the vast majority of participating TER countries are planning the development and construction of high-speed railways taking into account only national needs;

(b) Some of the TER participating countries possess national high-speed rail master plans, or future plans for their construction that are at different stages of approval;

(c) At present, some TER participating countries have no plans for a national high-speed rail network;

(d) It is not always clear from country responses which speed category a particular rail section belongs. This is particularly the case with respect to the speed limit of 160 km/h: the term frequently used is “up to 160 km/h” and in some cases the respective data differ (e.g. for the same section, one source indicates a design speed of 140 km/h and another a design speed of 160 km/h);

(e) In many cases it is not clear how realistic (in particular from the point of view of secured funding) the future development plans are, especially as far as the 2020 status is concerned. For example, plans to construct in hilly terrain (where the current line allows speeds from 60 km/h to 80 km/h) hundreds of kilometres of railway links in four to five years and with a design speed of 160 km/h seem to be extremely ambitious.

6. The above mentioned conditions of high speed rail in TER region are reflected in the ECE region too. The elaboration of a strategic plan of priority actions for the ECE region, reflecting not only trans-national concerns but also national and regional development strategies for high-speed rail transport infrastructures is necessary. These strategies should address regional and local priorities and institutional building needs, as well as the identification of alternative scenarios of strategies’ implementation, including the establishment of a list of priority projects for financing and the costs involved.

7. In this way a consistent investment strategy for the high-speed rail transport infrastructure needs in UNECE member States would lead to a complete backbone network.

On this basis, countries concerned would be able to focus on monitoring the implementation of this network, as well as, adopting other developments and economic conditions that will appear during the subsequent years.

8. In order to achieve these objectives a strategic Master Plan of the high-speed railway transport infrastructure needs in the ECE region could be developed as part of a specific project to be undertaken under the auspices of UNECE. Such a master plan should be elaborated in cooperation with TER project. This is to take advantage of the knowledge gained from the development of transport infrastructure master plans during TER project development phases. Also TER region could serve as the pilot area for the implementation of this master plan.

9. The objectives of such a Master Plan should be the following:

- (a) Harmonization of technical parameters regarding the terminology “high-speed trains”;
- (b) Development of a cost benefit analysis tool which would facilitate governments decisions on investing in high speed rail or not;
- (c) Identification of investment priorities;
- (d) Establishment of a time table for their realization;
- (e) Assessment of cost involved and appropriate financing arrangements;
- (f) Development of an integrated high-speed rail transport backbone network for the TER and the ECE region.

10. The tasks that should be elaborated as part of the Master Plan are the following:

- (a) Review of related work (TEM Project and TER Project, European Commission (EC), Commonwealth of Independent States (CIS) countries);
- (b) Review of the market initiatives (Community of European Railway and Infrastructure Companies (CER), International Union of Railways (UIC), etc.) and their interconnection with the UNECE work;
- (c) Presentation of the socioeconomic framework of the UNECE countries and alternative scenarios of growth;
- (d) Identification of methods of work (definitions – assumptions);
- (e) Identification of criteria that determine a cost benefits analysis for high speed rail development;
- (f) Elaboration of a model that would combine all criteria for a cost benefits analysis of high speed rail development;
- (g) Identification of criteria that determine the “high-speed train” infrastructure;
- (h) Identification of criteria of priority infrastructure needs;
- (i) Inventory of bottlenecks, missing links and other priority transport infrastructure needs and assessment of their development costs;
- (j) Elaboration of a realistic Master Plan based on investment priorities;
- (k) Addressing funding questions and financing arrangements;
- (l) Addressing border crossing questions;
- (m) Conclusions, recommendations and dissemination of results.

11. The outputs and deliverables are the following:
 - (a) Organization, monitoring and co-ordination of the work;
 - (b) Review of related work;
 - (c) Socio-economic framework of the countries concerned and alternative scenarios of growth;
 - (d) Methodology and main assumptions for the work;
 - (e) Collection and analysis of required data;
 - (f) Tool – model – for cost benefits analysis of a high speed rail development;
 - (g) Inventory of priority infrastructure needs and assessment of their costs;
 - (h) Implementation Plans;
 - (i) Inventory of specific priority projects for implementation;
 - (j) Definition of technical and institutional actions required;
 - (k) Inventory of border crossing problems and recommendations;
 - (l) Recommendations for conclusions;
 - (m) Dissemination and public awareness actions.

12. For a successful implementation of these activities, the contribution of the national coordinators and/or national experts is extremely important. Therefore, countries should nominate focal points/national coordinators for the project. In addition, an expert – consultant on the development of infrastructure master plans may need to be hired.

IV. Guidance by SC.2

13. SC.2 may wish to consider the above proposal and may wish to provide guidance to the secretariat on further action in this field. The first outline of possible activities for the preparation and implementation of such a master plan is contained in the Annex.

Annex

Work Package Description

Title: Project Management		Working Package No. 0				
Start: Month 1	Duration: 12 months	Number of meetings				
Parties involved	Task/Activity of partner	Expert Groups 2 with following attendance	Coordination Group 2 with following attendance			
SC.2 Secretary	Administration Work – Project Management	X	X			
TER Project Manager	TER coordination	X	X			
National Focal Points	Participation – Contribution	X	X			
External Consultant(s)	Technical and Scientific Analysis – Reporting	X	X			
Observers		X	-			
Objectives:	To ensure the smooth execution of the project and the management of the complex activities and numerous partners from different countries and professions					
Description of the work/tasks:						
Experts from other countries interested in the project outside the ECE region will also be invited and nominated as national coordinators.						
The Master Plan's Expert Groups will meet two times during the period of the project for the elaboration of the specific tasks assigned to them according to the work plan. The meetings will be held at Palais de Nations, Geneva.						
Administrative/organizational tasks:						
<ul style="list-style-type: none"> • Preparation of Terms of Reference (TOR) for the consultant(s) • Preparation of TOR for the work of the national coordinators/experts • Letters from UNECE to the member States and the non-member States (if interested) for the nomination of national coordinators/experts • Establishment of list of a national coordinators/experts for each task • Elaboration of an action plan indicating dates for convening meetings and the submission of deliverables • Distribution of questionnaire(s) to the National Focal Points • Preparation and organization of the coordination group meetings 						
Expected results/outputs/deliverables: organization, monitoring system and co-ordination of the work						
Milestones and Criteria: formation of the groups and their meetings						
Interrelation to other work packages: with all packages						
Number of missions of the National Focal Points:	2 missions					
Number of missions of the UNECE personnel:	0 missions					
Number of missions of the TER PCO personnel:	2 missions					
Number of missions of the consultant:	2 missions (depending on the needs of the project)					

Work Package Description

Title:	Review of related Work	Working Package No. 1
Start: Month	1	Duration: 2 months
Parties involved		Remarks
SC.2 Secretary	1.1 to 1.6	
TER PCO	1.1 to 1.6	
National Focal Points	1.1 to 1.6	
External Consultant(s)	1.1 to 1.6	
Observers		
Objectives:	Review of related work (TEM and TER, EC, CIS countries, etc.) and initiatives (CER, UIC, etc.), policies and studies and their interconnection with the Project/Analysis of developments in the world and the ECE region	
Description of the work/tasks	Task 1.1	Introduction to high speed rail systems – characteristics, benefits and challenges
	Task 1.2	High speed rail technical specifications/standards, respective decisions and guidelines for their implementation
	Task 1.3	Summary of the existing high speed rail technical, operational and maintenance parameters
	Task 1.4	Collection and review of existing relevant studies, assessments and works
	Task 1.5	Introduction of the existing and future high speed rail networks and plans in Pan European level
	Task 1.6	European Union railway infrastructure package and its impact in the ECE region
Expected results/ Outputs – deliverables	Detailed review and analysis of the existing work and initiatives to avoid duplication of work and take advantage of existing work	
Milestones and Criteria	Presentation of respective report(s)	
Interrelation to other work packages	Provides the necessary data to other WPs	

Work Package Description

Title:	Methodology and main assumptions for the work	Working Package No. 2
Start: Month	2	Duration: 3 months
Parties involved		Remarks
SC.2 Secretary	2.1 to 2.4	
TER PCO	2.1 to 2.4	
External Consultant(s)	2.1 to 2.4	Main responsible
Objectives:	Methodology of work and main assumptions	
Description of the work/ tasks	Task 2.1 Task 2.2 Task 2.3 Task 2.4	Review and identification of the necessary parameters and assumptions for the work: <ul style="list-style-type: none"> • Social, environmental and safety aspects • Interoperability between high speed rail and other transport modes, especially conventional railways and public (urban) transport ones • International connections, interrelations and dynamism towards neighbouring regions Transport demand and traffic forecasting, development scenarios Elaboration and distribution of the questionnaires to the UNECE countries Analysis and processing of the returned questionnaires
		This work will be among the main responsibilities of the external consultant, to be elaborated with the support and in cooperation with the UNECE Transport Division and the TER PCO. The work will be based on: the UNECE AGC, AGTC and TER technical standards and recommendations <ul style="list-style-type: none"> • the UNECE document "Development of a Master Plan for high-speed trains in ECE region" • Directive 2004/50/EC of the European Parliament and of the Council of 29 April 2004 amending Council Directive 96/48/EC on the interoperability of the trans-European high-speed rail system.
		Administrative/Organizational Tasks: <ul style="list-style-type: none"> • Establishment of criteria for assessment of project priorities • Preparation of list of required information • Preparation of the questionnaire to be fulfilled by the member countries concerned through the National Coordinators/experts • Establish the rules for the data collection from the countries concerned
Expected results/ Outputs – deliverables		Methodology and main assumptions for the work
Milestones and Criteria		Setting up the methodological characteristics of the project
Interrelation to other work packages		Input required from other WPs

Work Package Description

Title: High speed rail status and needs in the UNECE member countries		Working Package No. 3
Start: Month 4	Duration: 3 Months	Remarks
Partners involved	Task/Activity of partner	
UNECE	3.1 to 3.12	UNECE main responsible
TER PCO	3.1 to 3.12	Provision of TER data
National Focal Points	3.1, 3.3 to 3.12	Provision of national data
External Consultant	3.2 to 3.12	Elaboration of the Package
Objectives: Inventory of the present status and future high speed rail (HSR) development plans in the region		
Description of the work/tasks:	Task 3.1	Collection of necessary information and data
	Task 3.2	Analysis and control of information obtained
	Task 3.3	Approved or proposed national legislation and standards
	Task 3.4	High speed links in operation, under construction, planned (accompanied by maps)
	Task 3.5	Pre-feasibility, feasibility and alignment studies (under elaboration, approved)
	Task 3.6	Technical parameters (speed, gradient, stations, catenary, etc.)
	Task 3.7	Existing and future traffic flows
	Task 3.8	Present and envisaged rolling stock to be used on high speed lines
	Task 3.9	Information and communication systems at present, in the future
	Task 3.10	Agreements on high speed lines with neighboring countries
	Task 3.11	Construction costs and timing, maintenance and operation costs
	Task 3.12	Financial sources – available and proposed
Expected results/ Outputs-deliverables	1.	Collection of data needed
	2.	Inventory of high speed rail needs and planned development in the UNECE member countries
Milestones and Criteria	Elaboration of diagram of information required and results of their collection evaluated	
Interrelation to other work packages:	Provide data for the continuation of the work	

Work Package Description

Title:	Elaboration of a cost benefits analysis tool – model – for the high speed rail development	Working Package No. 4
Start: Month	2	Duration: 7 months
Parties involved		Task/Activity of partner
SC.2 Secretary		4.1 to 4.4
TER PCO		4.1 to 4.4
External Consultant(s)	4.1 to 4.4	Main responsible
Objectives:	Elaboration of the tool	
Description of the work/ tasks	Task 4.1	Review of existing tools existing which facilitate Governments decision on investing in high speed rail
	Task 4.2	Identification of the main parameters that such a tool should include and analyse
	Task 4.3	Development of the tool/model in a type of software format which would facilitate its use and the dissemination of its results;
	Task 4.4	Pilot use of the tool for countries' case studies the results of which will be included at the final report
Expected results/ Outputs – deliverables	Tool – Model	
Milestones and Criteria	Development of an operational tool	
Interrelation to other work packages	Input required from other WPs	

Work Package Description

Title: elaboration of the TER and ECE Master Plan for High Speed Railways – Working Package No. 5a
 PART A

Start: Month 8	Duration: 2 Months	Remarks
Partners involved	Task/Activity of partner	
UNECE	5a.1, 5a.2 and 5a.8	
TER PCO	5a.1 to 5a.8	
External Consultant	5a.1 to 5a.8	Elaboration of this part of methodology

Objectives:

Elaboration of a general part of the realistic methodology for elaboration of the Master Plan for High Speed Railways covering the identified priority needs of the TER and ECE regions.

Description of the work/tasks	Task 5a.1 Economic and social characteristics as well as economic growth analysis in TER and ECE regions
	Task 5a.2 UNECE high speed standards, technical specifications for interoperability and recommendations (geometric parameters, track distances and systems, catenary and energy supply), performance parameters (speed, length of trains)
	Task 5a.3 Basic design principles – size of connected cities/agglomerations, distances and location of stations and terminals, their design, equipment and services
	Task 5a.4 Design speeds, upgrading of existing lines/building of new lines, types of operation (high speed only, mixed operation with conventional passenger trains or with speed freight trains, operation by all type/special rolling stock)
	Task 5a.5 Construction, maintenance and operation average unit costs (new links, rehabilitation)
	Task 5a.6 Information, communication and signaling systems
	Task 5a.7 Maintenance, operation and management
	Task 5a.8 Costs and benefits/revenues, economic and risk analyses, social and environmental impacts
Expected results/Outputs-deliverables	TER and ECE Master Plan for High Speed Railways general part covering standards, recommendations, basic design principles, construction, maintenance and operation fundamentals and economic considerations
Milestones and Criteria:	Presentation of general features of the TER and ECE Master Plan for High Speed Railways
Interrelation to other work packages:	Provide data for the continuation of the work

Work Package Description

Title: Elaboration of the TER and ECE Master Plan for High Speed Railways – Working Package No. 5b
 PART B

Start: Month	9	Duration: 2 Months	Remarks
Partners involved	Task/Activity of partner		
UNECE	5b.1, 5b.4, 5b.6, 5b.7and 5b.8		
TER PCO	5b.1 to 5b.8		
External Consultant	5b.1 to 5b.8		Elaboration of this part of methodology

Objectives:

Elaboration of the detailed Master Plan for High Speed Railways system covering the TER and ECE region and its main aspects including the respective GIS maps

Description of the work/tasks	Task 5b.1 UNECE High Speed Railways network system incl. its connections to neighboring countries and its position vis-à-vis the EU transport core network Task 5b.2 Alignment of individual corridors/links Task 5b.3 Construction schedule, priorities, phasing, Master Plan time limits (2030 and 2050) Task 5b.4 Construction, maintenance and operation costs Task 5b.5 GIS maps of high speed rail lines in the individual member countries and in the whole TER and ECE region Task 5b.6 Identification of interconnections with other transport components (sea ports-inland ports-airports) Task 5b.7 Identification of possible connections and extensions to other regions (East Asia, Japan, etc.) Task 5b.8 Identification of possible missing links, border crossings bottlenecks and of other inefficiencies along the TER and ECE high speed backbone network.
Expected results/Outputs deliverables	1. UNECE High Speed Railways network system 2. GIS presentation of the system and its individual links on the maps of the region as well as maps of individual UNECE member countries
Milestones and Criteria:	Presentation of the TER and ECE Master Plan for High Speed Railways
Interrelation to other work packages:	Provide major data for the continuation of the work

Work Package Description

Title: Addressing funding questions		Working Package No 6
Start: Month 8	Duration: 3 Months	Remarks
Partners involved	Task/Activity of partner	
UNECE	6.1 to 6.6	
TER PCO	6.1 to 6.6	
External Consultant	6.1 to 6.6	Elaboration of the WP
Objectives:		
Addressing funding questions for the implementation of the UNECE Master Plan for High Speed Railways		
Description of the work/tasks	Task 6.1 Estimate of budget for the implementation of the UNECE Master Plan for High Speed Railways	
	Task 6.2 Possibilities of stage construction	
	Task 6.3 Definition on a macro-scale of the necessary technical and institutional actions for assisting the implementation of the proposed UNECE Master Plan for High Speed Railways	
	Task 6.4 Estimate of financial resources available and of potential revenues	
	Task 6.5 Possibilities and potential sources of funding the proposed links of the UNECE Master Plan for High Speed Railways incl. the EU grants and project bonds, PPP and BOT schemes	
	Task 6.6 Remarks on the perspectives to construct the UNECE Master Plan for High Speed Railways	
Expected results/Outputs-deliverables	1. Estimate of implementation costs and potential revenues 2. Definition of technical and institutional actions required	
Milestones and Criteria:	Inventory of projects	
Interrelation to other work packages:	Contributes to the completion of the work	

Work Package Description

Title: Conclusions/Recommendations – Public awareness actions and dissemination of results – Follow-up preparations		Working Package No 7
Start: Month 3	Duration: 10 Months	Remarks
Partners involved	Task/Activity of partner	
UNECE	7.1 to 7.4	Quality control
TER PCO	7.1 to 7.4	Recommendations
External Consultant	7.1	Formulation of conclusions and recommendations
Objectives: Presentation of conclusions and recommendations. Development of necessary actions to increase awareness for the implementation of the UNECE Master Plan for High Speed Railways to the stakeholders and interested parties and dissemination of its conclusions, results and outcomes.		
Description of the work/tasks	Task 7.1 Task 7.2 Task 7.3 Task 7.4	Presentation of final report with conclusions and recommendations Presentation of the Master Plan for High Speed Railways on the UNECE website Publication of a project newsletter, brochures and a summary report, findings and conclusions Organization of workshops to present the progress of the project and the final results
Expected results/Outputs-deliverables	1. 2. 3. 4.	Final Report Dissemination Public awareness Follow-up preparations
Milestones and Criteria:	Preparation of the UNECE Master Plan for High Speed Railways final report and materials for presentation	
Interrelation to other work packages:	Completion of the work	

Work Time Plan (English only)

The Gantt chart displays the timeline for various tasks from January to December 2015. The tasks are represented by yellow bars:

- WP0**: A long task starting in January and ending in December.
- WP1**: A short task starting in January and ending in February.
- WP2**: A task starting in February and ending in May.
- WP3**: A task starting in March and ending in June.
- WP4**: A task starting in April and ending in August.
- WP5a**: A task starting in July and ending in September.
- WP5b**: A task starting in August and ending in October.
- WP6**: A task starting in September and ending in November.
- WP7**: A task starting in October and ending in December.