



## Unified Policy on Transit Fees and Tariffs
## Единая Политика по Транзитным Расценкам и Тарифам

# Cost based Tariffs for TRACECA Transit Traffic

# Working Paper: Rail Workshop

**Working Group 2:**
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## CONTENTS

## EXECUTIVE SUMMARY

a) In pursuance of the Multilateral Agreement, The Terms of Reference for Unifying Freight Transit Fees and Tariffs and the Protocol of Traceca Freight Tariffs Working Group TFTWG of June 02, this paper sets out proposals for a new tariff policy and structure for Traceca.

***b)*** The necessity for Traceca partner countries to have an independent tariff policy is founded the imperative ***to provide maintain and develop alternative secure routes for trade and encourage opportunities for longer term regional economic cooperation and development.***

c) The tariff policy also reflects the unique geographical characteristics and muti-modal operating requirements of Traceca.

d) In order to reconcile the disparate fiscal status of each railway enterprise, the proposed tariff structure is founded on the application of normative costs. This is an internationally acceptable basis for costing railway services that will also enable the generation of a reasonable return on the capital invested so providing sustainable services much need by CIS railways.

e) The particular requirements for the proposed tariff structure is that it is commercial – providing customers with value; simple – in derivation understanding and application including discounting; robust – withstanding likely restructuring and other likely changes and equitable in generating a reasonable return to the transport providers.

f) To satisfy these criteria, the proposed tariff structure consists of four components; 1 – movement operations, 2- terminal operations, 3 Infrastructure Access Charge and 4 Handling Fees and Commission.

g) The freight tariff structure is wagon based (rather than weight based) the reasons being that nearly all traffic is consigned as complete wagons or container loads and that for multimodal transport operations, the costs are related more closely to volumetric capacity (wagon or container) than weight.

h) The movement part of the tariff structure is a flat rate for each wagon type that takes into account the capacity and most likely empty running characteristics. (Example - oil tanker wagons always return empty) The rate is applied to the conveyance distance. The terminal part applied to those services that are needed for collection and delivery of the consignment and if necessary load and unloading including at sea ports.

i) The Infrastructure user charge (IUC) relates to the use of the railway track, signalling communications and power supply systems based on train km. The separation of the IUC in the Tariff Structure is due to the increasing interest by National Governments the world over, to divide the responsibility between infrastructure provision and transport operations. IUC s is also increasingly being used for the roads.

j) The commission or handling fee is for organisation and documentation of the (international) transport services provided by the originating transport operator.

k) Indicative tariffs based on the new structure are higher than those currently in use. The reason is partly that current tariffs are reduced to utilise spare capacity

but also that ITT and UTT tariff structures were created when the state, not the transport operator, provided the investment. ***Existing tariffs enable the recovery of short-term variable costs and are not sufficient for the replacement of assets*** – an essential requirement of any tariff structure.

l) The movement part of the tariff for wagons is between 40 cents per wagon km for flat bed wagons to 90 cents per wagon km for isothermal wagons.

m) The paper contains many examples of tariff calculations for different services. Example of the full TTT for containers moving between Poti and Druzhba (2856km) is €1200 per TEU or 0.42 per TEU km. This tariff will provide for the replacement of assets.

n) A discounting policy is recommended to attract new traffic based on short run variable costs, which is approximately 40% of the full TTT. ***Traceca discounted rates would be 22 €cents per TEU km and oil 65 €cents per wagon km.***

o) The movement part of the tariff is sensitive to the proportion of empty running assumed. Because the cost of the return is already factored into TTT, discounting coefficient as high as 0.75 of TTT can be applied to obtain a back load. For example, the special discounted back load tariff Druzbha to Poti could be as low as 0.25 x €700 = €175 or just 6.25 cents per TEU. This would apply if the heavier loaded direction were Poti to Druzbha. Utilising empty back haul capacity by applying discounted tariffs will help the development of the region by reducing the cost of exports.

p) The proposed structure provides an unambiguous basis to replace the current Traceca approach of negotiating discounting coefficients.

q) Application of the proposed tariff structure will utilise many of the traditional conditions of the MTT or UTT that have been built up over time. The official distance for calculating the movement part of the tariff will be determined by Traceca.

r) The Traceca Secretariat who would devise procedures for the functioning of a traditional tariff authority including a periodic tariff conference can administer the proposed tariff policy and structure.

s) Looking forward, to improve customer confidence further it will be a vital next step for railways to have common conditions of carriage because the regulations for the contract of carriage of freight for each railways is currently different.

t) It will be incumbent on members of the TFTWG to approve a protocol that will give licence to Traceca to proceed with the development of the proposed tariff structure.

u) This paper provides the rationale and essential information, including tariff examples, to support TFTWG members and the Traceca Secretariat in their deliberations.

# 1 INTRODUCTION

## 1.1 ToR

The terms of reference for the Unified Policy on Transit Fees and Tariffs (UPTFT) makes it clear that ***the output expected is a new tariff structure for Traceca railways, ports and shipping*** and transit fees for road transportation. ***The overall goal being to increase the use of the Traceca Corridor.***

## 1.2 Working Group

The Inception report published in April and approved by Traceca sets out the approach to achieving these results. The main vehicle being the forum to which this paper is addressed, that is to say the Transit Fees and Tariffs Working Group (TFTWG). The working group programme makes it clear what decisions are expected at each of the five meetings planned to take place over the two-year life of the project.

At the first TFTWG meeting decisions made were

a) To support the objectives to change the tariff structure

b) To appreciate the problems and shortcomings of the MTT and UTT (Refer to Appendix A1)

c) To provide a clear direction that these changes should take

d) To agree to a cost based tariff structure

e) The provide analysis and information necessary for the TFTWG to make further decisions.

## 1.3 Purpose of this paper

This paper sets out recommendations covering tariff policy, structure, application and institutional requirements in sufficient detail to enable the TFTWG second workshop to sign a protocol providing a mandate for the detailed elaboration of the proposals in the next period.

Structure and contents

a) Tariff Policy

b) Normative Cost Basis

c) Tariff Structure

d) Comparison with MTT rates

e) Application

f) Institutional Arrangements

The report text is confined to essential explanations and recommendations that relates closely to the protocol with detail and numerical support being held in appendices. ***Italicised and emboldened items relate directly to items in the protocol.***

# 2 TARIFF POLICY

## 2.1 General Provisions

### 2.1.1 Proponents and signatories

The proposed Traceca Transit Tariff policy (TTT) is expected to apply to all signatories of the MLA and apply totally to all railways ports and shipping lines that constitute the Traceca Network. The draft general provisions of the TTT are contained in Appendix A2)

### 2.1.2 MLA

The TTT is fully compliant with the objectives and articles of the Basic Multilateral Agreement

**Basic Agreement**

***Article 3 Objectives***

a) to develop economic relations...

b) to create equal conditions for competition.

***Article 5 Payments etc.***

...Other payments shall not be imposed ...

***Article 6 Preferential Terms***

Tariffs for transport services shall be established on the basis of preferential terms ... and equally for all parties.

***Article 8 Inter-Governmental Commission (IGC)***

The IGC may establish working groups

**Technical Annex (Rail)**

***Article 4 Preferential Terms and Tariffs***

***Article 6 Cooperation Objectives***

2c) to work out methods of cost calculations as a basis of preferential tariffs and common operational rates.

### 2.1.3 Traceca Network

The Traceca network of railways that the TTT applies includes but is not limited to routes between border stations defined in Table A3 in appendix A and more specifically by the Traceca Secretariat.

### 2.1.4 Definitions

The objectives, main definitions, applicability of the TTT have been set in the draft provisions of the TTT held in Appendix A2.

### 2.1.5 Protocol

The Protocol of October 2002 sets out the main decisions that will be required of the TFTWG affecting the development of the TTT. Draft rail related items are contained in Appendix D1.

### 2.1.6 Specific Policies

- To further the economic development of those countries participating in Traceca in particular the security and unencumbered flow of trade.

- To cooperate in matters of tariff policy for the benefit of the parties to the MLA (Article 6)

## 2.2 Characteristics of the tariff structure

### 2.2.1 Non-Discriminatory and Unified

Provide and international tariff structure that provides for the special needs of Traceca bearing in mind the foregoing policy. This implies an internationally acceptable basis and methodology that is non-discriminatory – not favouring any particular party to the TTT. (MLA Article 3 b)

### 2.2.2 Cost Based

***The tariff structure shall be cost based*** - In recognition that all railways are currently state enterprises and natural monopolies, not profit making but requiring to make an acceptable return on the its assets. (MLA Rail Technical Appendix Article 6 2c)

### 2.2.3 Normative

***That the cost basis for the TTT shall be normative*** – recognising that each Railway has its own fiscal, commercial and confidential policies and are at different phases of development.

### 2.2.4 Wagon Based

***The basic unit of Tariff shall be the freight wagon*** – Recognises that railway traffic using Traceca is almost totally in wagonloads, part loads or less than wagonloads are non-existent to which the TTT will not apply. Additionally, costs vary more with capacity than load - i.e. fuel consumption or rail wear.

### 2.2.5 Anticipating Change

***The tariff structure shall be robust*** – Taking into account the expected growth in traffic and different organizational arrangements (restructuring) - it is not intended to be short term.

### 2.2.6 Transparent and Simple

***The tariff structure will be transparent*** – enabling its main components to be identified and understood by customers, government and others. It will also provide an unambiguous basis for discounting tariffs and tariff negotiations. A simple tariff

structure – able to be applied in a straightforward way by non- experts. The TTT will also reducing the number of coefficients, providing the rationale where they are needed.

### 2.3 Other features of the TTT

#### 2.3.1 Intermodal

The TTT will be unique in combining Rail Road and Shipping Tariffs. Traceca 'Through Multimodal Tariffs' will be presented. ***The requirement for through multimodal tariffs in the TTT recognise the natural intermodal and multimodal characteristics of Traceca.***

#### 2.3.2 Currency

***The currency of the TTT will be the Euro.*** This recognises the probable disappearance of the Swiss Franc and significance of the Euro as the main currency of the European Continent.

#### 2.3.3 Tariff Authority

***The tariff authority will be that of the Traceca Secretariat*** recognizing it as the only institution with a regional mandate in transport.

## 3 TRAFFIC COSTING

### 3.1 Methodology

#### 3.1.1 Approved method

The method using normative costs was approved as the basis for the tariff structure in the TFTWG protocol of June 2002. Relevant items appertaining to the cost basis for the new tariff structure are contained in Appendix B1

#### 3.1.2 Background

The background to the decision to use normative costs is that actual accounts not compatible between partner railways, not normally independently audited or verifiable, suboptimal effected by local economics, low current utilisation, under-investment, not possible to distinguish between costs of domestic, and international traffic, so not a suitable basis for an international tariff policy.

#### 3.1.3 Normative method

Moving forward, the normative approach provides an internationally common cost basis for the proposed tariff structure. The development, application and management of a normative base are familiar to the CIS and therefore sustainable.

#### 3.1.4 Profit vs. Return on Assets

Railways in countries that may be party to the TTT agreement are state enterprises and also considered to be natural monopolies and as such are not expected to maximise profit (like free enterprise) The policy assumed in the TTT is the railways are expected to provide a reasonable return on the capital invested in the assets. ***The normative cost***

***base for the TTT provides for a return on assets that is at least equivalent to the opportunity cost of capital. The value currently used is 12%.***

### 3.1.5 General procedure

The normative costing procedure outlined below is described in Appendix B2.

1. Determine the main factors of production
2. Establish norms for each factor
3. Adjustment factors needed to regularise the norms
4. Derivation of unit costs for each production factor
5. Principle types of railway services for which costs will be required
6. Service specifications
7. Traffic costing
8. Outputs

### 3.1.6 Norms

***It is essential for parties to the TTT to be aware of the norms that are used in cost basis and to ensure that periodically these norms are modified.*** It is suggested that most norms are relatively stable whilst it is the adjustment factors to the norms that change. It is envisaged that the modification of norms will be part of the activities designated to the ***Tariff Authority***. A listing of some of the most important norms used to derive the common cost base are in Appendix B3.

### 3.1.7 Key performance Indicators

***Utilisation in terms of hours of productive use and output in kilometres per locomotive and wagon are most critical in determining the unit costs of equipment.*** Utilisation in hours is used to derive the asset cost per hour. It is obtained from the total hours the asset is available for use less non-productive time such as standing by waiting for business, travelling to and from customers premises (light running) before loading or unloading and in repair. Output- related to distance – is used to derive the maintenance costs per km of locomotives and wagons that constitutes the normative cost base for the TTT. Adjustments are made to these norms for light running and other non-revenue earning kilometres

### 3.1.8 Contemporary Performance

The data is derived from norms that are intended to best reflect contemporary levels of performance on Traceca railways. These recognise the fact that current operations are 50% of those during of the USSR –they are further adjusted to reflect local conditions on Traceca.

### 3.1.9 Traceca Norms

As the TTT is only concerned with Traceca, **norms relate only to Traceca and not national railways**. Norms proposed and applied in this paper and to the first draft of the TTT provide a basis for subsequent refinement. ***It is incumbent on parties to the TTT***

***to submit evidence of alternative levels of performance if they believe it will have a material effect on the normative cost base.***

### 3.1.10 Wagon Norms

***The proposed TTT is to be wagon based.*** **A listing of the wagon types most commonly used on Traceca is contained in Appendix B4. The adjusted normative performance of wagons with respect to hours of utilisation and output in terms of wagon km is tabulated in Appendix B5. The derived unit costs of wagon provision and maintenance are presented in the same table in Appendix B5. Infrastructure Norms**

The Traceca Railway infrastructure is considered designed for conveying train lengths of a common standard of 60 wagons of 60 tons with 22.5 axles at an average operating speed of 40 kph[1]. ***Where sections of the Traceca network have been designed to different standards then notification is required in order for appropriate coefficients to be included in the tariff structure.***

## 3.2 Main cost headings

### 3.2.1 Cost base composition

The common cost base comprises the most significant costs that vary with distance or time. There are many other cost factors but the ones listed below are considered to account for 90% of the variable costs that apply to freight transit traffic.

- Locomotive provision
- Locomotive maintenance
- Wagon provision
- Wagon maintenance
- Freight terminal
- Track maintenance
- Track provision
- Train crew
- Fuel costs
- Shunting costs
- Accident costs

Brief explanations of the derivation and application of these costs are presented in the following sub-sections.

### 3.2.2 Locomotive provision

The provision cost of locomotives is based on the asset replacement cost at current value. The values are average international prices delivered. The cost is made of depreciation over the normative life (30 years) using the straight line method; return on capital invested based on the opportunity cost of capital taken as 12%; loan repayments over a commonly accepted period of 20years. When built into the cost/price provision is

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[1] 40 kph was recently confirmed at the OEJD meeting in Batumi as a standard by KTZ. Refer to Appendix C1.

Track alignment and gradient norms of 1000 m radius over and 5/1000% for over 10 km are suggested.

thus made for the replacement of locomotives. Locomotive provision cost is allocated to the train locomotive hours, that is to say the productive time that the asset is utilized with allowances made for, maintenance, waiting, and operating without a train.

### 3.2.3 Locomotive maintenance

Locomotive maintenance costs are based on the normative inputs of labour, materials and equipment derived from planned maintenance schedules and unscheduled repairs. The costs are allocated over the productive output of the asset in locomotive train kilometres.

### 3.2.4 Wagon provision

Wagon provision (asset replacement) is treated similarly to locomotive provision. Normative wagon provision costs are estimated for each of the 10 main wagon types. New wagon types will be introduced in accordance with international procedures – and accordingly added to the normative base. Wagon provision costs are allocated to the productive utilisation of the asset deductions are made for time waiting for use, time in maintenance etc.

### 3.2.5 Wagon maintenance

Considered similarly to locomotives for each of the 10 wagon types. An example of the step-by-step analysis is presented in Appendix B5.

### 3.2.6 Freight terminal.

Terminal operations which include loading / unloading; collection and delivery and shunting depend also on the requirements of each consignment. General costs for each of 8 types of terminal operations are listed in table 3.4. The costs are based on typical – normative operations at such terminals. Although terminal operations are not relevant to Transit traffic they are covered in the TTT as some parties may wish to apply it to import and export traffic as well transit.

### 3.2.7 Track maintenance

Track maintenance costs are built up from norms of selection of 6 types of track from 65 kg/m on concrete sleepers to 40kg on timber sleepers still used on some minor lines. Costs included for mechanized maintenance of heavy trunk lines and manual maintenance of minor lines. Experience shows that track maintenance costs mostly relate to climate, environment and time rather than traffic. The variability of track maintenance relates to weight and speed related factors such rail wear and vibration. The variable part of track maintenance costs has been taken as between 15% for track maintained mechanically to 30% for lighter manually maintained track. Variable track maintenance costs are allocated to gross ton km. The major part of track, indeed infrastructure maintenance is independent of the volume of traffic, relating more to climate and environmental factors. Similarly, the maintenance costs of track structures are not considered to vary with traffic.

The costs of signalling, power supply and communication are also not considered to vary with traffic volumes.

The fixed (non-traffic related) costs associated with the maintenance and provision is covered in sub-section 3.6 on infrastructure user charges.

### 3.2.8 Track provision

Costs associated with provision of track are not considered as variable with traffic are included as part of the proposed infrastructure user charge.

### 3.2.9 Labour Costs

Labour costs are estimated for the entire range of personnel (40 categories). The costs include basic salary, allowances and social costs. Salaries are based on a classical government structure that relates to grade and length of employment. The overall weighted average remuneration for the structure is €500 per month. Labour costs are allocated to productive working time with deductions for holidays, sickness, training etc. An additional cost for train crews is included for distance related payments - normal for this category of personnel.

### 3.2.10 Train crew costs

Train crew costs relate to drivers, assistant drivers break-men and guards that travel on the train.

### 3.2.11 Fuel costs

Calculated for diesel and electric locomotives using normative consumption rates that relate to gross ton km. The consumption includes adjusted factors for age of the locomotive, level of maintenance, speed and the gradient and alignment of the track. The cost of diesel fuel also included the cost of delivery and fuelling. The cost of electrical energy supply systems is included in the Infrastructure User Charge. Norms used for the cost base are included in Appendix B.

### 3.2.12 Accident costs

Accidents, such as derailments, though not so common, are costly when they occur; disrupting traffic as well necessitating repair. Allowance is also made for loss of production and for the cost of damage or loss of goods. These costs are considered to vary with distance.

### 3.2.13 Shunting costs

The costs for shunting are derived for shunting locomotives in the same way as mainline locomotives. The costs are allocated to normative productive output measures as number of shunts per hour. The cost of shunting at intermediate stations and depots and at borders is allocated to the wagon cost as it considered part of normal movement operations. Shunting at terminals is considered to be a part of terminal operations so is not included in the basic wagon cost.

### 3.2.14 Cost Summary

An example cost summary report from the one of the services illustrated in Appendix C (Poti – Druzhba) is presented below to indicate a typical breakdown of those costs headings previously described.

**Table 3.1 Service Cost Breakdown Report**

**Container Services Poti – Druzhba (2856km)**

| COST HEADING | SHORT TERM | % | CUSTOMER OWNED WAGON | % | LONG TERM | % |
|---|---|---|---|---|---|---|
| LOCO PROVISION | 0 | 0 | 24,880 | 24 | 24,880 | 19 |
| LOCO MAINTENANCE | 9,348 | 13 | 9,348 | 9 | 9,348 | 7 |
| WAGON PROVISION | 0 | 0 | 0 | 0 | 8,083 | 6 |
| WAGON MAINTENANCE | 21,000 | 30 | 0 | 0 | 21,000 | 16 |
| FREIGHT TERMINAL | 761 | 1 | 2,929 | 3 | 2,929 | 2 |
| TRACK MAINTENANCE | 10,056 | 14 | 10,056 | 10 | 10,056 | 8 |
| TRACK PROVISION | 0 | 0 | 24,073 | 23 | 24,073 | 18 |
| TRAIN CREW | 171 | 0 | 2,261 | 2 | 2,261 | 2 |
| FUEL COSTS | 19,974 | 29 | 19,974 | 19 | 19,974 | 15 |
| ACCIDENT COSTS | 5,361 | 8 | 5,361 | 5 | 5,361 | 4 |
| SHUNTING COSTS | 3,287 | 5 | 3,904 | 4 | 3,904 | 3 |
| | | | | | | |
| TOTAL SERVICE COSTS | 69,958 | 100 | 102,785 | 100 | 131,868 | 100 |

Source –'RAILCOST[2]'

## 3.3 Costing Results

### 3.3.1 Application

Traffic costing for the derivation of the cost base of the TTT has been carried out using the Consultant's model 'RAILCOST' and calibrated using local data. Though the software is not available through the project, a copy of the user manual maybe available on request.

Steps taken to derive normative costs for wagons are presented in Appendix B5. Similar steps are taken for locomotives and other cost factors.

It is appreciated that Traceca railways may have their own methods. ***Should any party to the TTT have an alternative method for normative costing to that described herein then representation should be made.***

### 3.3.2 Movement Costs/prices

Movement cost prices for each standard wagon types based on the norms presented in B6 are presented in table 3.2.

***The long-term cost will provide the basic unit for the TTT.*** Hence they are denoted as cost/prices since no other additional margin – such as profit – is to be included in the TTT.

[2] 'RAILCOST' Provides service costing data and other information.

**Table 3.2 Normative Cost/Prices for Wagons operating on Traceca**

| Ref. | Wagon type | Empty Running | Cost/price € per 10 wagon km | | |
|---|---|---|---|---|---|
| | | % | Short Term | Long Term | Customer Owned Wagons |
| 1 | 2 | 3 | 4 | 5 | 6 |
| **1** | **Covered** | 40 | 2.473 | **5.191** | 3.866 |
| **2** | **Platforms** | 50 | 3.026 | **5.5581** | 4.663 |
| **3a** | **Open-top Wagon** | 70 | 3.754 | **6.709** | 5.541 |
| **3b** | | | 4.087 | **7.102** | 5.775 |
| **4[a]** | **Tankers** | 100 | 5.096 | **8.773** | 7.369 |
| **4e** | | | 5.571 | **9.573** | 7.483 |
| **5a** | **Isothermal** | 80 | 5.140 | **9.411** | 5.957 |
| **5b** | | | 5.573 | **9.690** | 5.961 |
| **6a** | **Flat-bed wagon** | 40 | 2.986 | **5.338** | 4.493 |
| **6b** | | | 3.608 | **6.843** | 5.518 |

Source Appendix C

Notes to the table:

Assumptions;

Norms as defined plus an allowance for 2 border crossings per 1000 km with waiting time of 1 hour each; reliability factor of 5% over the total transit time.1. Traceca Reference Number for Wagon Type

2. Generally Accepted Name of Type of Wagon

3. The proportion of commercial use where the wagon will return without load

4. Short run variable cost wagons operating in trains taking including distance based costs with given empty running assuming general system norms of speed (40 kph) and train length.

5. Long run variable cost of wagons operating in trains taking including time and distance based costs with given empty running assuming general system norms of speed as SRVC

6. Long run variable costs of wagon on trains excluding wagon ownership and maintenance cost

### 3.3.3 Empty return

***The cost/price includes the cost of returning fully or partially empty. The ratio of empty running is critical to the Cost cost/price.*** Whilst empty running ratios will vary between railways like all other data, certain ratios are fixed such Tanker (100%). Empty ratios refer to Traceca operations only. In table 3.2 the impact of empty running on the unit costs is noticeable. Parties to the TTT should make proposals of any deviation of the norm for empty running. Higher empty running leads to higher basic tariffs. That the cost of the empty return is built into the proposed TTT cost/price for wagons will be very important in the pricing strategy to capture return freight.

### 3.3.4 Commodity costs

In Table 3.3 the movement cost/prices are tabulated for three main commodities using the wagon rates from table 3.2

**Table 3.3 Sample movement cost/prices for oil, coal and container - €**

| **Wagon Type** | **Tanker** | **0pen** | **Flatbed** |
|---|---|---|---|
| **Commodity** | Oil<br>Wagon type 4e | Coal<br>wagon type 3b | Container<br>Wagon type 6a |
| **Empty return** | 100% | 70% | 40% |
| Average Load | 60 tons | 55 tons | 2 TEUs |
| | **Cost / 100 ntk** | **Cost / 100 ntk** | **Cost Per TEU km €** |
| Long term | 15.95 | 11.84 | 26.69 |
| Short term | 9.285 | 6.81 | 14.93 |
| Customer owned | 12.47 | 9.62 | 22.46 |

Source: derived from table 3.2

### 3.3.5 Short and Long Run Variable costs

Short run costs can also be considered as avoidable costs – costs that would not be incurred if the service were cancelled. These costs are almost entirely distance based such as fuel, maintenance of locomotive wagons and track and losses or damages to goods. Short run costs are proportional to empty return ratios. The short run cost/price provides the effective red line below which prices should not be normally discounted. ***The discounting strategy for through tariffs on Traceca will be based on short run costs.***

Long run costs combine distance based short run costs with time-based costs. These costs are almost always related to finance, depreciation, credit loan repayments etc. The slower the transit time for any service the longer those assets are deployed and the higher the cost price. The normative costs build in asset financing costs because in the long-term locomotives, wagons will need replacement.

### 3.3.6 Wagon km or Ton Km - Cost Factors

It is proposed that TTT is wagon based not ton based but it is understood that this is a complete departure from MTT and tariff structures in other economies in transition. Analysis has therefore been carried out to explain the proposal. Track maintenance and fuel costs vary most closely with weight. An analysis compared the costs of a fully loaded train of 3,600 tons with that of an empty train. Track maintenance costs reduced by only 6.8%: the costs of track maintenance relate more to non-variable factors such as weather, environment, poor driving and lack of maintenance. Fuel costs fell by 64%, which is significant. Track and fuel costs make up only 23 % of long run variable costs for a loaded train (Table 3.1) and 19.5% for an empty train, so the difference in cost between conveying a fully loaded train and an empty one is only 3.5%. Therefore, it can be seen that **the incremental change in cost due to changes in load is 0.06% per ton** (i.e. 3.5/60% assuming a 60 ton wagon capacity) Given the relatively low level of sensitivity to load, it must be questionable whether a new freight tariff structure should be based traditionally on tons and commodity types with its concomitant administration

or is simply wagon based. The recommendation for the Traceca Transit Tariff structure is that it be wagon based. Pricing factors related to this issue of wagon versus ton km are covered in section 4.3.1.

### 3.3.7 Adjustment Factors

It is quite clear that the operating costs of various sections of the Traceca Railway Network will be different. ***Factors that provide an acceptable basis for adjusting normative costs are system related.*** These include vertical and horizontal alignment, speed and most significantly maximum permissible train length. The Traceca norm[3] provides the benchmark from which adjustment factors will be estimated. It will be the responsibility of parties to the TTT to apply to Traceca to make the case for an adjustment factor. It is important to emphasise that only railway sections on Traceca are admissible. ***What happens on other parts of the system in the country of one party to TTT should not be of any relevance to another.*** Indicative adjustment factors derived from the normative cost base are as follows:

- Gradient:[4] Combined effect of fuel and track maintenance on cost base is 0.15% per 10/1000 change in gradient.
- Alignment: 0.06 % per 100 metres change in radius
- Train Length reduced from 60 to 50 Wagons +15%; 40 wagons + 36%; 30 wagons +73%.
- Speed (norm = 40 kph) 20 kph = -15%; 30 kph = -7%; 40 kph = 1.0; 50 kph = 7.5%; 60 kph = 15%.

### 3.3.8 Wagons owned by customers

It is necessary to distinguish between customer owned and those owned by the National Railway Organisation. If owned by the customer then the tariff should exclude wagon provision and maintenance costs. Generally movement costs of operating customer owned wagon are 20% to 40% less. The ITT applies a coefficient of 0.85 to customer owned wagon. ***This discount for customer owned wagons should be increased to 25% in the TTT***

## 3.4 Terminal Cost/Prices

### 3.4.1 Customer defined services

It is necessary that the customers define the terminal services needed and perceive the implications on price. The type of terminal services could range from a locomotive travelling to an industrial siding and connecting with an assembled train of wagons to loading, forming the train in a goods yard, marshalling the train and dispatching. Terminals may be Rail owed Government owned or private. ***In order to provide the***

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[3] 1500 m train length, 40 kph, 22.5 axle, -10/1000 to + 10/1000 gradient, >1000 m radius.

[4] Additional fuel consumed is related to the downhill component of load i.e.f-norm x (1+sinθ) where f-norm is the normative fuel consumption on flat ground, θ = gradient in radians. i.e. 1% per 10/1000 increase in gradient above the norm. Additional maintenance due to wheel spin etc = 0.5% per 10/1000 increase in gradient;

***basis for the tariff structure, it will be necessary to define the general types of terminal service required.***

### 3.4.2 Private sidings and loading facilities

If the customer privately owns sidings and loading facilities, the terminal costs will be in two parts.

Part A - Collection and Delivery

For collection and delivery along branch lines that are exclusively used by the customer, then payment for collection and delivery is warranted. The price to be based on collection or delivery distance from the trunk route to the customer's facilities using normative movement costs for trains from Table 4.1

If locomotives run light to or from the customers premises, then an estimated normative long –term variable costs of €1.78 per locomotive km and €150 per locomotive hour may be applied according to RAILCOST. The time related costs should be separated since Railways are not in a position to influence speed if they do not own the connecting railway infrastructure.

Part B - Loading and Unloading

If railways own the terminal and carry out loading and unloading operations then cost depends on the type of handling operation requested by the customer.

RAILCOST is prepared to provide costs for Freight Stations, Industrial sidings, Port/Rail Interface and Container Depots. Costs are estimated for short and long term. Using similar principles as for the movement part.

If railways own or operate the terminal only the part B terminal costs apply, as the collection and delivery costs will be a part of the movement component.

Normative cost/prices for the principle types of terminal services are illustrated in Table 3.4. Collection and delivery cost/prices (i.e. Part A) should be estimated from the movement part of the tariff structure if needed.

### 3.4.3 Proposed terminal costs for application in TTT

A selection of terminal cost/prices derived from Railcost are presented in Table 3.4 for a number of different types of terminal services based on output norms also shown. The costs proposed, are to become part of the common cost base for the TTT.

**Table 3.4 Terminal Services Cost/prices**

| | Indicative Usage of Terminal | | | | Cost/Price € | | |
|---|---|---|---|---|---|---|---|
| Type of Terminal Services | Type of goods | Output Norm | Wagon Type | Ref. | Short Term | Long Term | Unit |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Loading unloading wagons in good sheds and depots | General goods Packaged items; pallets, bagged goods, building materials, timber out of gauge loads | 3000 Tons per year | 1,2 | 1 | 5.92 | 6.34 | Ton |
| Loading unloading storage of refers | Perishable Goods - 48 hours cold storage | 30,000 Tons per year | | 8 | 5.36 | 11.79 | Ton |
| Collection Delivery of made-up trains Industrial Sidings | Dry and liquid bulk | 1 Train per day | 3,4 | 3 | 1.6 | 6.2 | Wagon |
| Collection Delivery of wagon groups from freight yards | All | 20,000 Wagons per year | 1,2,7,8, 9,10 | 2 | 1.9 | 6.8 | Wagon |
| Collection delivery of wagons in Ports | All cargo | 100 Wagons per day | All | 5 | 2.8 | 5.6 | Wagon |
| Loading and unloading containers from rail wagons | All Containerised Cargo | 30,000 TEU s per year | 9,10 | 7 | 7.05 | 16.73 | TEU |
| Border Crossing Operations | | 10 Trains per day | | 9 | 2.0 | 3.0 | |

Source: RAILCOST

Notes to table columns:

1 Brief description of terminal service – a fuller description will appear in the TTT.

2 General indication of the type of goods

3 The output norm for Traceca in tons or wagons handled based on general indications

4 The wagon types most likely to be involved in the terminal operation

5 The Railcost terminal analysis code

6 Short-term costs

7 Long term costs including return on assets of 12%

8 Unit of cost

### 3.4.4 Terminal charges for domestic import, export and transit

Normal convention is applied to the application of terminal costs as follows:

- Domestic traffic will have 2 sets of terminal costs.
- Import and export 1 set of terminal costs
- Services transit through a third country has no terminal costs.

### 3.4.5 International border crossings

An international border crossing is not normally considered a terminal for costing and pricing of services. The costing base however does include an allowance for the costs incurred waiting at border crossings and any shunting movements.

### 3.4.6 Connections to terminals

Where customers are exclusive users of tracks that connect their facilities to the trunk network, railways should encourage customers to enter into leasing agreements. The customer can determine whether to finance the maintenance of the infrastructure directly or pay infrastructure user charges depending on the volume of traffic generated[5].

### 3.4.7 Flexibility

In order that the costs of terminal services are effectively included and given that the scope of services will vary with each customer, a certain amount of discretion and flexibility is necessary.

## 3.5 Infrastructure usage charges (IUC) for Traceca

### 3.5.1 Contemporary Policy

The separation of the management of the railways infrastructure from railway operations is in vogue. Several CIS railways have proceeded to restructure in this way. Most CEEC railways have already done so and all EU railways have completed this step some years ago.

***One of the innovations in the TTT is that it provides for the separation of the infrastructure costs***

A more detailed examination, including the estimation of a normative IUC is in Appendix B7

### 3.5.2 Allocation of IUC by train km

***The base unit for charging for the use of railway infrastructure is considered to be train kilometres,*** as it will best induce the most optimum utilisation of capacity whilst minimising the costs of administering the procedures

### 3.5.3 Passenger subsidy

The issue of passenger and other subsidies is political. Determination of appropriate IUC invariably raises the issue of passenger subsidies. ***In this regard the imposition of additional costs on Traceca freight transport such as subsidies of passenger services is not considered in the best interests of economic development nor is it in the spirit of the basic MLA.***

***Freight transport on Traceca shall not be expected to subsidise domestic passenger transport.***

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[5] In order to encourage enterprises, existing and new, to be rail connected, some EU countries provide interest free or partial grant funding to the entity.

### 3.5.4 Indicative IUC

Based on the normative calculation in Appendix B6 ***the recommended infrastructure user charge should be €9.5 per train km*** (15.8 cents per wagon km assuming a 60 wagon train). This level of IUC provides for a 12% return on assets. If the replacement costs are not to be recovered through the TTT, the IUC would be €3.76 per train km. This would be considered a short-term cost equivalent to 0.063 c per wagon km.

### 3.5.5 Investment – internal rate of return

Should investment be required from any international financing agency such as the European Bank for Reconstruction and Development or the European Investment Bank, to replace or rehabilitate the assets, rates of return of 12% would be acceptable.

### 3.5.6 Adjustment factors

Adjustment factors to the normative cost would be justified in the following circumstances.

- Track standards are higher than the norm[6]. The normative cost would be adjusted by a speed related enhancement coefficient of 2% for each 1% increase in average operating speed
- There would be extraordinary high provision and maintenance costs because some sections of track signalling and communications and power supply infrastructure may be more costly to replace. In this case it will be necessary for the host railway to provide convincing variant information to the Tariff Authority.
- Temporary speed restrictions exist because there has been insufficient maintenance spending. In this case it will be necessary link an adjustment factor to the propensity and severity of speed restrictions and an adjustment factor determined. ***For example every 1% reduction in speed should result in a 2% reduction in the IUC.***

### 3.5.7 Relationship of IUC for Rail and Road

Before making a final decision on the level of charges it is suggested that the IUC for rail should be compared to that for road transport (or its proxy) in order to reflect its policies within the transport sector.

## 3.6 Commission and handling fees

### 3.6.1 Indirect costs and administration

Often these costs account for 40% of a railways costs, though through restructuring the figure reduces dramatically. For any new tariff structure it is important to separate these costs in the interests of transparency[7]. ***For Traceca, administrative costs only***

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[6] The normative track provision for Traceca is a train length of 2 locomotives and 60 wagons of 60 tons at an average operating speed of 40 kph.

[7] It unreasonable that freight customers should have to cross-subsidise passenger services, or to pay for a large and non-productive labour force. The alternative of maintaining high transit tariffs in order to pay for domestic policies is counter-economic to regional development and contrary to the principles of the Traceca Basic Multilateral Agreement where a new clause clarifying this point should be added.

***associated with transit need be incorporated. The recovery of all other administrative costs should be domestic matter.*** An appropriate charge to be included in the proposed tariff structure will be determined.

### 3.6.2 The charging unit

For those involved in arranging transport or providing rail services, it is acceptable to charge a fee that covers management expenses, overheads, etc. The basis upon which this charge is made could be the consignment but the wagon may be the best unit for application to reflect the costs of fully documenting each wagon.

### 3.6.3 Variations in charges

The charges may vary according to whether the service is domestic, import, export or transit. Hazardous and special transport may need a higher charge to be levied.

### 3.6.4 Indicative commission charge

***An amount of €20.0 per wagon may be appropriate for import or export and Transit and domestic being lower.*** Alternative proposals for the level of commission should be made by TFTWG delegates provided it is of significance at this stage in the evolution of the TTT. Otherwise opportunities to fine-tune the TTT will be incorporated in procedures for administering the TTT.

### 3.6.5 Application of the costing base

The costing base has been applied to a number of possible Traceca services and summarised in Appendix C.

# 4 THE PROPOSED TARIFF STRUCTURE

## 4.1 Introduction

### 4.1.1 The criteria

The criteria for the establishing a new tariff structure shall be that it:

- reflects market demand and business needs;
- is transparent to rail users and stakeholders;
- anticipates the structural changes of the railway sector;
- is relatively simple to understand and apply.

### 4.1.2 TTT reflects market demand and business needs;

Looking forward there will be less government and more private railway freight customers; the TTT is more acceptable to private customers for the following reasons:

- It is intermodal;
- Provides potentially a single shop window, one price for a through service
- It is time sensitive

- Encourages investment by building in an acceptable rate of return
- Permits privately owned wagons and terminals
- Provides sound basis for negotiating contracts
- Clearly provides rationale for discounting

### 4.1.3 Transparent to rail users and stakeholders;

The TTT is explanatory to customers because:

- The tariff is divided into four distinct parts
- The rationale behind the derivation of the tariff structure is understandable
- There are no hidden charges
- Terminal part of the TTT can be applied where appropriate – Generally goods in transit do not require terminal services
- Customers perceive the price for the services required
- Customers will gain confidence
- TTT will apply to all Traceca railways.

**(To improve customer confidence further a vital next step for railways will be to have common conditions of carriage across Traceca.)**

### 4.1.4 Anticipates the structural changes of the railway sector;

Most, if not all, Traceca railways are undergoing transformation, the TTT is forward looking, anticipating many of the changes that will occur, including:

- The construction of a normative base that is independent from historic and suboptimal performance and inappropriate policies;
- The separation of infrastructure from operational management;
- Building in tariffs for customer owned wagons;
- Identifying the return on assets required by government and IFIs;
- Facilitating better sector management by government.
- Providing a more rational basis for financially supporting unremunerative freight services
- Provides a more rational approach for funding passenger services
- The normative costing basis, that provides the rationale for the TTT, will provide a common language between railways.

### 4.1.5 Simple to understand and apply.

The MTT was started in 1950 and the basis for it is not understandable today[8]. The TTT being contemporary is simpler to understand:

- Wagon based no need for complex volume/weight calculations and adjustment coefficients;
- Simplifying large tariff books containing a different rate for each 10km of movement;
- No taper - without a formula;
- A single rate for movement for each wagon type whether 1 km or 5000 km across Traceca.
- Also one through rate for rail, ports and shipping
- Adjustments for level of service understandable to customers and railways

## 4.2 Structure

In order to satisfy the above criteria, ***the TTT consists of four parts***:

1. Part 1 – **Movement** operations for trunk haulage;
2. Part 2 – **Terminal** operations for collection, delivery and handling services;
3. Part 3 - **Infrastructure** usage charges for the use of the track;
4. Part 4 - **Commission** and handling fees for arranging the transportation.

## 4.3 Part 1 - Movement Charges

### 4.3.1 Wagon versus Ton Km as the basic unit pricing

The proposed movement part of the tariff structure relates to wagon type only, the reasoning being that ***railways are in the business of selling transport capacity***. A normal operational objective is '***to maximise the use of available infrastructure and rolling stock capacity***'. Many countries have found it appropriate to convert their pricing from tonnes to wagons[9]. One of the main ***business objectives is to maximise the daily revenue earned by each wagon***. Typical daily revenue earned per wagon day is expected to be only € 30 whereas a much higher figure is attainable with better utilisation and pricing.

The rationale for proposing a pricing system based on wagon type is as follows:

- The difference in cost between operating a fully loaded or empty wagon is around 15% Explained in section.
- The effect on revenue would be negligible.
- Almost all Traceca freight traffic is conveyed in full wagonloads.

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[8] In the TFTWG June meeting there was no consensus as to the cost components of MTT or the formula for the tariff taper.

[9] In aviation freight tariffs are based on weight because 70% of operating costs are weight related. In road haulage, shipping and increasingly railways, weight related tariffs are rare.

- Customers not railways tend to load wagons.
- It is in the interest of customers to load each wagon to capacity and a system of penalties exists for dangerous overloading;
- New wagons will gradually replace older ones that have loading restrictions.

### 4.3.2 Reflecting the needs of different commodities

Generally wagon types relate to commodities both in terms of load and utilisation. For example, tank wagons either carry 60 of 100 tons of liquid loaded in one direction only with very little variability of load. If wagon-based pricing is to be gradually introduced, then it should start with tankers. The characteristics of coal transport are adequately documented to make statistically significant assessments of load and empty running. The characteristics of other bulk cargo are rather similar to coal. Containers are standardised, though in their case, there is an argument for charging per full or empty box rather then per flat wagon. Livestock and refrigerated cargo also have their own specialised wagons and hence it is possible through the wagon rate to reflect the nature of the commodity to be transported.

Hazardous and other special freight necessitate additional charges based on norms built up from their particular operating requirements as exists in the current tariff structure.

### 4.3.3 Proposed rates

A wagon rate for each type is proposed in Table 4.1. The rates are to be applied uniformly across Traceca. The rates quoted are for each 10 wagon km rounded to the nearest € 0.5.

**Table 4.1 TTT - Proposed wagon rates operating on Traceca**

| Ref. | Wagon type | Rate € per 10 wagon km | | |
|---|---|---|---|---|
| | | TTT | Customer Owned Wagons | Notes |
| 1 | Covered | 5.0 | 4.0 | |
| 2 | Platforms | 5.5 | 5.0 | |
| 3a | Open-top Wagon | 7.0 | 5.5 | |
| 3b | | 7.0 | 6.0 | |
| 4[a] | Tankers | 9.0 | 7.5 | |
| 4e | | 9.5 | 7.5 | |
| 5a | Isothermal | 9.5 | 6.0 | |
| 5b | | 10.0 | 6.5 | |
| 6a | Flat-bed wagon | 5.5 | 4.5 | |
| 6b | | 7.0 | 5.5 | |

Source Table 3.2

Notes are to be added later

### 4.3.4 Adjustment for different operating conditions

It is expected that where the design parameters of a section of Traceca Railway is sufficiently different from the norm to cause a change of operating performance then an

adjustment factor is applied to the above rates. It should be incumbent on any party to the TTT to propose and justify adjustment factors that are required.

### 4.3.5 Levels of service

Speed is the best proxy for level of service. It is essential that TTT include factors (coefficients) that are applied to reflect higher speeds. The derivation of the factor though is not straightforward.

For the movement part the cost actually reduces. If the speed increases100 % from 40 kph to 80 kph, the cost reduces by 25%, due to a better utilisation of assets. The operator, or service provider benefits from a better infrastructure and is able to pass on the benefit to the customer

However to achieve an average operating speed is 80 kph (implied technical speed of 120 kph), the IUC would increase since the cost of providing infrastructure whose would be 250% to 350% higher. The Infrastructure provider – normally government will insists that the IUC will be increased.

It is to be noted therefore that TTT would incorporate two levels of service factors. The TTT is thus transparent in the matter.

As it is important for TTT to incorporate factors that reflect service levels that are superior to the norm it is also necessary to reflect sub-standard levels of service.

Service level adjustments will be considered in later stages of development of the TTT.

## 4.4 Part 2 Terminal Charges

### 4.4.1 Transit

Terminal charges do not normally apply to Transit Traffic but have been included in the TTT as some railways may wish to use the TTT for import and export in the future.

### 4.4.2 Port Access Charges

Access charges to the ports are a feature of Traceca transit. The only charge that is applied to rail transit traffic is in respect of port access charges. This covers breaking the train down into wagon groups for delivery to the Port. These charges are fixed irrespective of the Port. Once inside the Port another set of Port handling charges apply.

### 4.4.3 Other Terminal Charges

Collection and delivery, loading and unloading tariffs can be applied to import and export traffic.

### 4.4.4 Tariffs

It is proposed that Tariffs for terminal operations should be based on those of table 3.4

## 4.5 Part 3 Infrastructure User Charges - IUC

### 4.5.1 Level of IUC

Irrespective of the costs proposed in this or other reports, it is envisaged that the Traceca IUC will be set by the IGC and national governments. It will reflect political as well as economic considerations. Once fixed it will not be possible for operators to alter it.

### 4.5.2 Tariff Examples

In this paper the full charge of € 9.5 per train km are assumed.

In reality it will probably be something less than this figure as the IGC will press for parity with road where users do not pay the full costs of access.

## 4.6 Part 4 Commission / Handling

### 4.6.1 Commission and handling fee

A fee of €20.00 per wagon is assumed in the TTT tariff example. This is equivalent €1200 per train, applies irrespective of distance and is paid to the originating railway only.

## 4.7 TTT Examples

### 4.7.1 Application

Examples of TTT are provided in table 4.2 to provide an opportunity for comparison with MTT. The estimation assumes a standard train length of 60 wagons. Services include provision for border crossings and where appropriate port access charges.

### 4.7.2 Results

***Full TTT rates are about 30% higher than MTT.*** This is in not surprising as the normative cost base includes for the replacement of assets. The rates are not unreasonable and provide a sound basis from which discounts can be calculated.

### 4.7.3 Traceca Special Discounts

A paper will be prepared on pricing for the market, but it is possible to recommend in the interim, that discounting is based on short run variable costs. Generally the SRVC is about 40% of the long run cost upon which the TTT is based. Therefore, 40% of the TTT rates would provide a reasonable guide to the discount that will be proposed for Traceca traffic. For example ***Traceca discounted rates would be 22 €cents per TEU km and oil 65€cents per wagon km.***

## Table 4.2 Examples of Full TTT Tariff Calculations

| | Service | | | | TTT Components | | | | | Tariff | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ref | Type | From | To | Distance | Part 1 | Part 2 | Part 3 | Part 4 | Total | Full | |
| | | | | | Movement | Terminal | IUC | Fee | Tariff | Service | Rate |
| | | | | Km | Per wagon km | Per wagon | Per wagon km | Wagon | | Per TEU | Per TEUkm |
| 1 | Container | Poti | Dusanbe | 2856.00 | 0.55 | 16.80 | 0.16 | 20.00 | 123,588 | 1029.90 | 0.36 |
| 2 | Container | Jagodin | Baku | 1805.00 | 0.55 | 44.66 | 0.16 | 20.00 | 80,592 | 671.60 | 0.37 |
| 3 | Container | Ungheni | Druzhba | 5403.00 | 0.55 | 22.40 | 0.16 | 20.00 | 232,172 | 1934.76 | 0.36 |
| | | | | | | | | | | Per Wagon | Per Wagon km |
| 4 | Oil Tanker | Kazakh a | Moldova | 4800.00 | 0.75 | 28.60 | 0.16 | 20.00 | 264,516 | 4408.60 | 0.92 |
| 5 | Oil Tanker | Baku | Batumi | 890.00 | 0.95 | 11.20 | 0.16 | 20.00 | 61,057 | 1017.62 | 1.14 |
| 6 | General Freight | Poti | Osh | 3176.00 | 0.50 | 16.80 | 0.16 | 20.00 | 127,660 | 2127.67 | 0.67 |
| 7 | Platform | Poti | Serak' | 1860.00 | 0.55 | 143.60 | 0.16 | 20.00 | 88,866 | 1481.10 | 0.80 |
| 8 | Open Top | Druzhba | Termez | 2014.00 | 0.70 | 126.80 | 0.16 | 20.00 | 112,529 | 1875.48 | 0.93 |

Ref Service

1 rail transit including port access charges( 3 ports 2 shipping lines to be added)
2 rail import plus container handling including port access charges ( 2 ports 1 shipping lines to be added)
3 rail transit port access included ( 4 ports 2 shipping lines to be added)
4 rail export in **customer owned wagons** plus collection from industrial sidings (4 ports and 2 shipping to be added)
5 rail transit including port access charges
6 rail transit port access charges
7 rail import plus delivery and unloading to goods shed (3 ports and 1 shipping to be added)
8 rail import plus delivery and unloading to goods shed, no ports and shipping involved

# APPENDICES

## Appendix A1 Problems with the MTT and ETT

1. partly because of the combination of movement and terminal charges, it is non-service specific, that is to say, there is no account taken of the individual characteristics of each service;
2. not time sensitive, that is to say that cost is deemed to vary only with distance; not with time. This is clearly not the case;
3. does not include the costs of investment - which for modern railways in non-centrally planned economies is clearly a problem;
4. allocates fixed costs and overheads as a proportion of direct (or variable) costs, *de facto* making fixed costs variable;
5. there is no possibility of making tariff changes based on efficiency or service improvements, as the costs of neither can be reflected – for those countries engaged in route improvements the inability to raise tariffs based on better performance is limiting;
6. the main problem lies with the application of the taper. Originally set to flatten at 2,500 km in USSR, such distances are no longer attainable in any single country accept Russia and Kazakhstan;
7. services between pairs of cities in the USSR, which were once considered domestic, are now treated as either transit, import or export traffic. As such, the taper applies border-to-border rather than between origin and destination;
8. as a result of g) there has been an increase in rates. Railways have come to rely on revenue from transit traffic to cross subsidise loss-making domestic and passenger rail services. In fact, because there should be no terminal charges, transit traffic should be the least costly and therefore lowest tariff service. Instead it is the most expensive.
9. high priced transit affects the cost of trade and hence economic development.
10. the other major problem about the tariff structure is that, being only sensitive to distance; there is no extra revenue to be gained from faster transit. This may be acceptable for low value primary commodities such as coal and oil, but for higher value goods it is a problem. Surveys show that customers are prepared to pay more for faster journey times.
11. this leads on to reliability, which is very important in this age of multimodal transport and just-in-time logistics. Ships will not wait an extra day because the train is late arriving.
12. the basis for discounting is not clear, e.g. for empty back hauls, advance notice, use of capacity off-peak or out-of-season etc.
13. conditions of carriage may not be uniform between CIS or Traceca states so that, for example, compensation for under-performance requires strengthening in any new revised tariff structure.
14. for a shipper, possibly having to negotiate tariffs with 5 or more different railways is a disadvantage. Understanding the rationale behind the variations is hard to understand and accept. Other problems also have to taken into

consideration, such as different documentation requirements, conditions of carriage, payment conditions, etc[10].

[10] The proposed Traceca User Guide is aimed at reducing some of these difficulties. TFTWG delegates are asked to support the Trader Access Survey in preparation for the User Guide and also to help improve price-setting practices.

**Appendix A2 Traceca Transit Tariff Policy and Structure - TTT**

# Draft

**Traceca Transit Tariff Policy and Structure - TTT**
**Preamble and General Provisions**

**TRACECA – TRANSPORT CORRIDOR EUROPE CAUCASUS ASIA**

**CONTENTS**

# Draft

## TRACECA TRANSIT TARIFF POLICY

## FOR INTERNATIONAL FREIGHT TRANSPORTATION

## BY RAIL PORTS AND SHIPPING

## 1 PREAMBLE

### 1.1 Parties to the agreement

The said Traceca Transit Tariff Policy (TTT) is a product of the Basic Multilateral Agreement (MLA) on International Transport for the Development of the Europe-Caucasus Asia Corridor signed on 8th September 1998 in Baku for and on behalf of:

The Republic of Armenia - ARM

The Republic of Azerbaijan - AR

The Republic of Bulgaria - AR

The Republic of Kazakhstan - KR

The Kyrgyz Republic - KRG

The Republic of Moldova - RM

Romania

The Republic of Tajikistan - TR

The Republic of Turkey - TUR

Ukraine - U

The Republic of Uzbekistan - UZR

and by their hand are hereinafter known as the Parties to this agreement.

### 1.2 The subject of this agreement

The subject matter of this agreement concerns a common tariff policy and *inter alia* a common basis for its derivation and application by the Parties to this agreement.

Railways Ports and Shipping Lines

The railway, ports and shipping lines implementing this agreement are the national railways of the Parties to the agreement, the Ports of Varna, Borgas, Samsun, Illechevsk, Odessa, Batumi, Poti, Baku, Turkmenbashi, Aktau, the Caspian Shipping Company and UKRAFERRY.

### 1.3 Policy of the TTT

The TTT particularly responds to Articles 3,5 and 6 in the main part and articles 4 and 6 in the technical annex of the Basic Multilateral Agreement. In particular it aims to ensure that

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Traceca provides alternative transport routes to secure international trade for the parties to this agreement and that services provided on Traceca are economically sustainable.

### 1.4 Objectives of the TTT

In accordance with the agreed policy goals the objectives of the TTT are *to simplify and unify rail tariff policy and integrate it with ports and shipping to reflect the intermodal nature of international transportation in Traceca.*

#### 1.4.1 Outcomes from the TTT

In pursuance of the stated objective, the parties to this agreement through their harmonious actions and through the unification of tariff policy expect to consolidate the position of TRACEA as an alternative trade route and enhance the interest in the services provided.

### 1.5 Relationship with other Tariff Policies

In its formulation the TTT takes many of its general and specific conditions from the Tariff Policy of Railways Administrations of the Commonwealth of Independent States dated 17th February 1993 and as subsequently amended and will continue to utilise new or revised conditions in the CIS Railway Tariff Policy as is considered appropriate for Traceca.

### 1.6 Coordination

The coordinating authority for this agreement shall be the Traceca Secretariat.

### 1.7 Changes to this Agreement

#### 1.7.1 Notification of Changes

Changes to this agreement shall made in writing by any Party to this agreement to the coordinating authority who shall in notify in writing all other Parties to the agreement of the said changes.

#### 1.7.2 Conferences

Changes shall be made at meetings of the parties convened by the Coordinating Authority not less than annually.

## 2 GENERAL PROVISIONS

### 2.1 Definitions

#### 2.1.1 International Freight transportation

The provisions of the TTT shall apply to 'international freight transportation' by rail, by rail ferry or other maritime vessels regardless of document types passing though the territories of the Parties whose origin or destination are beyond the boundaries of one or

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all of the Parties and which traverses over those parts of the transport system defined in Annex A 1 known as 'Traceca'.

### 2.1.2 Railways ports and shipping

The term 'Railways' encompasses all or part of those railways defined in Annex A.1 to this agreement.

The term 'Ports' encompasses those ports listed in Article 1.4

The term 'Shipping' encompasses those shipping lines listed in Article 1.4

The term Intermodal transport refers to transport units that can be conveyed without change on different modes (rail wagón on rail ferries; trucks on railway wagons and in ferries)

## 2.2 Application and jurisdiction

### 2.2.1 Minimum Units of Load

The TTT shall apply to loads in units of not less than one railway wagon of types and containers of dimensions listed in Annex A 3

### 2.2.2 Limits of application

The TTT rates apply to the main transport activities between points defined in Traceca.

### 2.2.3 Other charges

The Tariff Policy rates that are defined in Appendix B3 for Railways and C3 for Ports and shipping are exclusive of any additional charges incurred that fall outside the remit of the TTT policy.

### 2.2.4 Outside Traceca

The rates do not necessarily apply to transport activities beyond the boundaries of the parties to this agreement.

### 2.2.5 Extension of limits

The TTT can be extended to beyond the boundaries of the parties to this agreement by unanimous consent of the parties to this agreement and that of the additional participating party.

## 2.3 Tariffs

### 2.3.1 Rates

The TTT rates are those quoted for the current year stated in Appendices B3 and C3

### 2.3.2 Validity

The said rates are valid from the period stated as follows .....

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on transit Railways -Parties to the Tariff Agreement – in Appendix A2 or in accordance with the Tables of Tariff Distances officially declared by the Railways in the ITT and UTT tariffs which ever is the lesser.

Railways not party to the aforesaid agreements to declare their Tables of Tariff Distances at the TTT Annual Conference or to submit to the Traceca Secretariat;

### 2.4.6 Freight Charges Calculation (Ports and Shipping)

Ports and shipping: Rates will be charged on the basis of

### 2.4.7 Multimodal rates

Special rates for the conveyance of international maritime containers as part of multimodal or combined transport operations are listed in Appendix D 3.

### 2.4.8 Discounted Rates

Railways Ports and Shipping Administrations - Parties to the Tariff Agreement, entering into contracts with organisations, independently establish the size of discounts and the mechanism of financial responsibility for non-fulfilment of accepted liabilities on the basis of their economic interests.

## 2.5 Payments

### 2.5.1 Inter-railway settlements

Payments can be made between parties to this agreement in Euro or other currency declared by the Tariff Policy or regulating documents of each Railway, Port or Shipping Administration.

### 2.5.2 Payments to freight forwarders

Payments for international freight transportation through forwarding organisations are made if there is an agreement with a Railway, Ports or Shipping -Party to the Tariff Agreement and the full official name and legal address of the forwarding organisation has been announced to the Parties to the Tariff Agreement and on the market of international transportation.

# Draft for comment only
# To be completed

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### 2.3.3 Unit

The basic unit for railway tariffs is the wagon.

### 2.3.4 Currency

The currency of the TTT shall be the Euro.

For the recalculation of TTT Policy rates into other currencies the exchange rate established by the European Central Bank published monthly shall apply.

### 2.3.5 Taxation

Freight and additional charges do not include VAT

## 2.4 Notice of Change of Tariff

### 2.4.1 Increases

Railways Ports and Shipping Administrations Implementing the Tariff Agreement have the right to increase the freight and additional charges of this Tariff Policy not more often than annually by informing the Coordinating Authority and other Parties to the Tariff Policy not later than one month before the enactment of the changes.

### 2.4.2 Decreases

Parties to the Tariff Agreement have the right to reduce the freight tariffs and additional charges of this Tariff Policy for transportation on respective Railways, Ports and Shipping during the freight year.

### 2.4.3 Calculation of Freight charges

Freight charges are established by Railways Ports and Shipping on the basis of this Tariff Policy separately for each Railway Port and Shipping Organisation involved in international freight transportation in accordance with the transportation distance wagon type and other services provided.

### 2.4.4 Through tariffs

The Parties to this agreement desirous of encouraging intermodal transport Agreements will apply special through rates with the participation of Railways Ports and Shipping wherever possible.

Parties to this agreement are entitled to enter into a contract with any shipper that entails transport on the territory of any other party to this agreement through application of 'special through rates' that are quoted in Appendix D3.

### 2.4.5 Transit Distance

For freight charge calculation, the distance is determined:

by the Parties to the Tariff Agreement in accordance with the Appendix Tariff Guidance No 4 officially announced by the Railways;

## Appendix A 3 Table of Traceca Distances

| *№* | *Country* | *Border Stations* | *Distances (km)* |
|---|---|---|---|
| 1. | Ukraine | Yagodin – Ilyichevsk | 940 km |
| 2. | Ukraine | Kuchurgan – Ilyichevsk | 127 km |
| 3. | Moldova | Ungheny – Klimentovo | 270 km |
| 4. | Moldova | Ungheny – Kuchurgan | 213 km |
| 5. | Georgia | Poti – Gardabani | 362 km |
| 6. | Georgia | Poti – Ayrum | 387 km |
| 7. | Georgia | Batumi – Gardabani | 387 km |
| 8. | Georgia | Batumi – Ayrum | 423 km |
| 9. | Azerbaijan | Beyuk-Kasik – Baku | 503 km |
| 10. | Turkmenistan | Turkmenbashi – Serkhetabad | 1225 km |
| 11. | Turkmenistan | Turkmenbashi – Farap | 1362 km |
| 12. | Turkmenistan | Turkmenbashi –Serakhs | 995 km |
| 13. | Kazakhstan | Aktau – Beyney | 422 km |
| 14. | Uzbekistan | Beyneu – Chengeldy | 1847 km |
| 15. | Uzbekistan | Farap – Chengeldy | 787 km |
| 16. | Uzbekistan + Turkmenistan | Farap – Termez | 406+194=600 km |
| 17. | Uzbekistan + Turkmenistan + Tajikistan | Farap – Dushanbe | 548+194+71=813 km |
| 18. | Uzbekistan + Tajikistan + Kyrgyzstan | Farap – Osh | 817+231+23=949 km |
| 19. | Kazakhstan | Chengeldy – Druzhba | 1771 km |
| 20. | Kazakhstan | Druzhba – Aktau | 4141 km |
| 21. | Kazakhstan | Aktau – Chengeldy | 2524 km |
| 22. | Kazakhstan + Kyrgyzstan | Aktau – Balygchy | 2846+324=3170 km |

## Appendix B1 Protocol of June 20th Items Pertaining to Cost Basis of Tariff Structure

Item l

The new rail tariff structure should be based on transport mode, method of carriage and volume rather than by type of commodity, whilst being sensitive to load, distance, time and level of service.

Item m

The new tariff structure for rail transit traffic should (a) be based on the recovery of those costs that are directly associated with such traffic, including amortization of assets deployed to provide services to acceptable standards, and (b) provide sufficient margin for recovery of those costs that do not vary directly with traffic.

Item n

The different financial structures of national railways, ports and shipping enterprises in the TRACECA Corridor are appreciated. For this reason the consultants were requested to develop any new tariff structure through the application of unified, normative technical and financial bases relating to the costs associated with providing transit services.

### Principle Recommendations

- The main recommendations for a new tariff structure are recorded in the Protocol in are listed below
- A new tariff structure should be cost-based, reflecting technical and financial norms that achieve and sustain a desirable level of service
- The structure should be based on long run variable costs for movement and terminal operations
- Track access charge and a fixed fee for indirect costs to be separately identified.
- It is necessary to establish a basis for variations from these norms such as:
    - Ruling gradients
    - Maximum train length
- Service standards, where proven to be better than the norm.
- The new structure should separate tariffs for movement and terminal services.
- The tariff structure should thus be flat (not tapered)
- The tariff structure should continue to be wagon (not commodity) based
- Main explanatory variables are distance; load; time and level of service
- The modified CIS tariff policy should utilise as far as possible the special terms and conditions currently in force in the MTT.
- The structure should not be artificially high to cross subsidise other railway operations.
- It should apply to Traceca transit traffic only (and also in the future to import and export traffic).
- The tariff structure should apply to Traceca countries – precise distances for tariff calculations should be agreed.

- The tariff structure should not replace ETT or MTT for transit in other non- Traceca routes
- The tariff structure should not apply to less than wagonload where ETT to MTT shall apply.
- Due to the intermodal nature of Traceca, through tariffs should include charges for ports and shipping services on the Black and Caspian Seas
- Overall, the new tariff policy shall provide the basis for intermodal through rate calculations.

### 1.2.3 Resolving conflicting requirements

There are always conflicting requirements and ideas in any organisation. Invariably, management requires the highest production rate at the lowest cost and are sometimes prepared to take risks. On the other hand, engineers are inclined to seek better technology and can at times be oblivious to the cost of production. In the past in the USSR there may have been more influence from engineering than management sciences. Traffic costing provides the necessary linkages where the impact of decisions can be tested. The example of purchasing new locomotives or new locomotive repair equipment, provided in the box below, illustrates that costing models can be used to predict the impact of major investment decisions on traffic costs.

**Traffic Costing – As a management tool**

**QUESTION:**

**Is investment in new locomotives the only option to improve availability and output? Or, as an alternative, what will be the effect of investment in new electric locomotive engine cleaning equipment, more precise electric motor coil winding and better circuit testing technology on the cost of production and ultimately on price?**

**ANSWER:**

**Investment in new locomotive repair technology will enable electric engines for locomotives to:**

- **Run for 500,000 km between major repairs and not 100,000 km;**
- **Be guaranteed for 3 years and not 6 months, thus raising locomotive availability from 65% to 85%;**
- **Consequently enabling locomotives to produce 4,000 hours of revenue earning output per year instead of 3,000 hours.**

**The traffic-costing model predicts that that there will be a potential reduction of 5% in traffic costs.**

**ROLES:**

**The engineer should be able to advise the management of the foregoing. But to realise the potential benefits, management for its part must be able to realise the benefit that the engineers have created (i.e. Either lower prices to obtain more traffic, reduction in the locomotives fleet size, increased prices due to improved reliability or a combination of all. Such should be the uses of a well-constructed normative traffic-costing model.**

### 1.2.4 The traditional approach

In the past traffic costing has evolved initially as a mechanism to allocate all expenditure to traffic so that the total costs of all services will equal the total expenditure on the balance sheet. Railways to achieve this result have applied considerable mathematical effort. However, ***the implication of the historic full allocation model is that traffic costs will reflect sub-optimal performance.*** The effects of this have become especially clear since the break-up of the USSR where traffic have significantly decreased but costs have not. As a consequence unit costs have increased leading to increases in tariffs whilst traffic volumes have fallen. For most railways this has represented a classical spiral of decline at some time during their evolution. The reverse logic should also apply, that if demand increases, unit costs decrease, prices fall and demand continues to increase. However, this pattern has rarely applied to railways, not because demand has not increased in the past, but because the railways are state-owned with social and political objectives that are usually unwritten and commercially conflicting.

Whilst there was recognition that some costs varied directly with traffic volumes and others did not, all costs continued to be allocated to traffic. The reason was partly because traffic costing was used in the former USSR, as a means of determining revenue allocation and expenditure budgets for regional railway administrations. The practise of using fully allocated costs continues to exist in CIS railways. The red line, below which prices cannot be charged, is normally set as the total

**Appendix B 2 Description of costing methodology**

# 1 INTRODUCTION

This is included to explain some of the general principles applied to the costing methodology used for the elaboration of the common cost base for the proposed Traceca Transit Tariffs policy and structure.

### 1.1.1 'RAILCOST' Normative Costing Model

The costing method and model RAILCOST developed by the consultants has been used over the years for many railways. It has been calibrated from past use and updated for CIS railways and applied to provide the normative costs for the TTT.

### 1.1.2 In-house method of costing

Traceca partners no doubt have developed or will develop their in house costing systems. This note describes background to traffic costing and is based on the steps used in RAILCOST.

## 1.2 An overview

It should be appreciated from the outset that a traffic costing is not a perfect science and is intended as a planning and decision making tool. As such it is not designed to replicate the past but is intended as a predictive tool to be refined over time. A large number of decisions will have to be made during the process of constructing a costing model and requires the active participation of the management and their input.

### 1.2.1 The art of costing

Costing models provide estimates or indications of what should be, rather than describe what has happened in the past. A costing model can be detailed or approximate depending on what is being investigated and the level of confidence required in the results generated. One thing that is important is that all the parties understand the picture. In practice, the picture has to be well detailed in order to represent, as closely as possible, the reaction of the entity being modelled to changes in the factors that influence it. The level of detail is also a function of the technology available and the decision maker's expectations from it. But it is worth restating that ***irrespective of the analytical speed and power available, traffic costing is and will always be a creative tool.***

### 1.2.2 The science of costing

Traffic costs are built up from many tens if not hundreds of smaller decisions that reflect contemporary economic and management practices. Perhaps these are best thought of as building blocks. ***Traffic costs are best built from the bottom up***, that is from each of the smallest elements of the business that has consequence on another possibly higher element. The costing philosophy is thus one of assuming the business is starting from scratch. Knowledge of the nature of the business, management systems and economic science is necessary to construct a normative model. The closer the costing model reflects the way that the business entity behaves, the more useful and reliable it can be. ***The purpose of a traffic-costing model is to predict the effects on production costs of changes to the variables that affect them.***

### 2.1.2 Norms for the production factors

For each production factor norms are developed which generally can be considered as follows:

- ***Output – what should be produced (i.e. productive output) to give an acceptable rate of return on investment in the asset?***

  Normally when a locomotive, or any equipment is purchased, there is a plan that includes an estimate of the expected output from that equipment to justify its acquisition. The information in investment proposal for relatively new equipment should provide this output norm. As the plan changes, due to economic factors, the norm may also have to be adjusted.

- ***Input – what is needed to sustain the normative output of the asset in the long term?***

  This includes inputs such as quality materials, effective equipment and qualified labour. Normally the source of this data can be found in the equipment manufacturers specifications. These norms rarely change.

- ***Finance – what financial provisions are needed to acquire and replace the asset?***

  This includes typically depreciation at current asset replacement cost. Such rules can be influenced by financial regulations as well as economic factors but normally do not often change.

Initially, ***output, input and financial norms should be set to provide an optimum result as if the business is being started from scratch.*** Changes to norms are important corporate decisions that will materially affect the business and should be approved by all the stakeholders in the business.

An example of norms for locomotives is given in the box below. The main feature of this example is that the input and finance is allocated to only productive output (i.e. the output from which revenue is directly generated).

**EXAMPLE OF NORMS FOR LOCOMOTIVE**

**Output: for the main line locomotives normally set at between 100,000 and 200,000 km per year – must be productive (i.e. revenue earning) km, excluding light running and train preparation - allocate as train-locomotive km Also operating hours based on a 12 hours a day with reductions for waiting time, time in workshops, etc., hence giving between 2,000 and 4,000 productive operating hours per year**

**Input: normally set as manufactures recommended maintenance schedule and allocated as train loco km. Or for fuel as the consumption per gross ton/km. Local variations can relate to topographical conditions.**

**Finance: International current replacement cost - €2.5 to €3.5 million per unit, depreciation 30 years. Interest or return on asset set at the opportunity cost of capital taken as 12%. Loan repayment set at typical development bank terms of 20 years. Costs allocated to train locomotive hours.**

### 2.1.3 Adjustment Factors

***To reflect the prevailing sub-optimal situation, adjustment factors to the norms are determined.*** Adjustment factors are considered as temporary, with railway management seeking to minimise divergence from the optimum. In the example above, the output norms of some older locomotives may have to be reduced to say 80,000 km per year. If the output norm were set at 160,000 train locomotive km per year, the adjustment factor would be 0.5. Also some of these assets have already been fully depreciated and the financial norms may also be adjusted. When the output norm becomes uneconomic (e.g. less than 0.5) a management decision is needed to replace the uneconomic asset. The TTT authority should be in a position to annually modify adjustment factors in agreement with parties to the TTT.

expenditure divided by the total output (i.e. fully allocated costs). The pressure that the railway management find itself under today is that modernising laws and regulations is forcing them to operate on a commercial basis but without offering the management the power to:

- Decline traffic it considers to be not commercial;
- Reduce costs, such as labour;
- Operate passenger services for social reasons
- Having to keep lines open for purpose of national security, etc.

Normative traffic costing should help with restructuring and become the common language from which decisions can be made.

# 2 NORMATIVE METHOD OF TRAFFIC COSTING

## 2.1 Steps in normative costing

The steps taken to provide normative traffic costs are listed below:

- Determination of the main factors of production
- Establishment of norms for each factor
- Adjustment factors needed to regularise the norms
- Derivation of the unit costs for each production factor
- Agreement on the principle types of railway services for which costs will be required
- Specifications for each service
- Costing services
- Output

These steps are described in more detail in the following sub-sections:

### 2.1.1 Factors of production

The first step in developing a normative costing methodology is to determine the main factors that affect production. It is important to concentrate on the most significant factors and to recognise that though many other factors exist, their impact on cost may be relatively small. The main production factors that characterise an entity tend to be unchanged as long as business objectives and supporting technology remain essentially the same. For railways, these factors include:

- Locomotives including main line and shunting;
- Wagons and passenger coaches;
- Infrastructure including structures, track signalling power supply and communications;
- Terminals, yards, energy, fuel and fuelling;
- Finance and financial costs

The above factors between them often account for 90% of production costs with other factors contributing the remaining 10%.

### 2.1.8 Terminal Costs

Terminal costs are defined for types of terminal handling operations, including loading and unloading and train formation. The unit costs are built up from normative inputs of labour, materials, equipment and asset replacement costs. Output norms are defined and unit costs derived

Collection and delivery costs are then added using appropriate movement costs. The main cost unit is the ton if handling is involved, but the main output from terminals are wagons loaded and ready for transportation.

### 2.1.9 Other Costs

The two other cost categories included in the model are infrastructure usage charges and administrative charges arising from each consignment. The subject of infrastructure usage charges is elaborated later

### 2.1.10 Service Costing

RAILCOST provides traffic information for

- Freight Mixed Train – From ***several*** origins to several destinations;
- Freight, Block Train – ***Homogeneous*** cargo from point to point;
- Passenger – ***Intercity;***
- Passenger – ***Suburban;***
- Mixed freight and passenger service – usually in remote and less developed regions.

Service parameters will be determined by the customer and the operator and will include

OPERATING

- Origin, Destination
- Distance
- Timing - movement
- Timing – terminals
- Level of reliability expected
- Train crew
- Locomotive number and type needed
- Consignment size and frequency
- Number of wagons and type needed
- Routing and infrastructure used

COMMERCIAL

- Load
- Possible back-haul ratio

All the above data is required input to costing model.

### 2.1.4 Derivation of Unit Costs

Unit costs are derived in the normal way. For input costs, using the standard inputs (adjusted if necessary) covering labour, materials, energy, equipment and finance - unit production costs are then derived by dividing input costs by the output norms. Unit costs are variable with distance and time. Unit costs in RAILCOST are built up for

- Locomotives - 8 types
- Wagons -10 types
- Track – 6 types
- Terminal- 8 types and border crossing
- (Passenger coaches 3 types also suburban electric and diesel units 2 types)
- (Passenger stations – 4 types)

### 2.1.5 Specification of Services

For any type of service, traffic costs are constructed from the unit costs based on the specification of the service. Specification include start and end time, an allowance for reliability, distance, number of stops, type and number of locomotives needed, loading, ownership of wagons, empty running factors, track type age and alignment.

### 2.1.6 Costing

The model used indicates the effect on traffic costs on changes to any of the foregoing variables such as distance timing load and other service variables. Traffic costs distinguish between those associated with movement and those with terminal operations.

### 2.1.7 Movement Costs

The most significant cost element relates to movement. Movement costs are fully variable with distance and in the long-term with time. Movement costs in RAILCOST are derived from the output costs for the main functions (i.e. locomotives, wagons, shunting, energy and fuel, the small variable part of track maintenance and also accidents and losses). The basic unit of movement cost is presently the net ton/km. However it must be recognised that less than 20% of the costs such as fuel actually are related to weight and that most costs are related to the provision of capacity. Therefore ***the more preferable unit for costing should be the wagon/km.***

Movement costs are derived for short term and long term. In the short-term cost exclude amortisation loan and credit costs. In the long-term the costs of asset depreciation and replacement are included, as assets have to be replaced or expanded. Such costs are considered to be variable where as at present they are thought by CIS railways to be 'conditionally fixed'.

A way of considering the matter is to imagine that operators rent locomotives and wagons in the same way the motorcars can be hired when needed. When seen this way, rental costs will vary with demand. Movement costs also naturally depend on the ownership of the wagons. If owned by customers, then the unit movement costs should exclude the provision and maintenance costs of rolling stock.

The model also produces costs for customer owned wagons since in many cases it is the consignor that actually owns the rolling stock.

## Appendix B 3 Schedule of principal norms

### Locomotives

| Output | | Input | | Financial | |
|---|---|---|---|---|---|
| **Requirements** | **Norms** | **Requirements** | **Norms** | **Requirement** | **Norms** |
| Train haulage according to timetable or customers requirements to meet traffic demand.<br>Train formation | **1.Utilisation of available capacity set at 2500 to 5000 revenue earning hours per year for main line locomotives**<br>**2. Production set at between 100,000 to 200,000 main line revenue-earning train locomotive km per year / locomotive type**<br>**3. Set at 6000 working hours per year for shunting locomotives.**<br>**4.Production set at 10 shunted wagons per hour.**<br>**Traceca Trains hauled by 2 main line locomotives** | A fleet of different power rated locomotives.<br>Available, in good repair and ready for service.<br>Maintained in accordance with manufacturer's specifications.<br>Range of skills trained labour<br>Procurement and storage of materials<br>Major maintenance equipment incl.<br>Wheel Lathes<br>Over head cranes<br>Engine cleaning<br>Electric motor repair equipment | **1.Number of different types of locomotives.**<br>**2. Availability of each type of locomotive > 85%**<br>**3.Types of repair**<br>**4.Periodicity of repair**<br>5. Hours of labour per skill per repair type<br>6.Materials per repair type<br>7.Equipment productive hours, fuel and maintenance per repair type. | Valued at current replacement costs<br>Makes an acceptable return on the capital invested.<br>Is fully amortised.<br>Generates sufficient income for credit repayments either to Bank direct or to Government (including on-leant funding).<br>Fixing cost recovery ratio | **1.International Prices €1.5m to €3.5m per loco type**<br>**2.Set IRR at 12%**<br>**3. 30 years depreciation period**<br>**4. Current replacement value revised annually**<br>**5. Credit period set 15 to 25 years**<br>**6. Allocation over productive /revenue output.**<br>**7. Cost recovery ratio - 100%** |

### 2.1.11 Output

The information that management obtained from the model includes:

- Unit traffic costs for short and long term and also with customer ownership of wagons
- Total service costs
- Annual service costs
- Cost break down by function (i.e. locomotive provision, track, fuel etc)

## 2.2 Development of Railway's internal costing system

If Traceca partner railways are planning traffic costing systems then in addition to the above the following is advised.

- Determine traffic costing and management information requirements
- Develop computer model
- Make institutional changes
- Carry out training programme

### 2.2.1 Return on Assets

In the normative approach to costing, a return on productive assets is implicitly included into costs and consequently tariffs. For public sector assets the return on investment shall be no less than the opportunity cost of capital. This is normally set by an appropriate government agency such as the Ministry of Finance. The rate is based on the cost of global capital as well as local, enhanced to take into account credit risks of the sector in which the investment is being made. A possible estimation is given in the box below.

**Inset 1 Return on Assets**

**RETURN ON ASSETS**

For example, 6.5 % might be appropriate interest to be paid for global capital and say 17.5% for local. If the asset is funded 50/50 global and local then an opportunity cost[11] of capital could be taken as about 12%. Subsequent investment decisions should be based on this figure. For example, if investment in new railway infrastructure generates an economic internal rate of return of only 8% then it should not be approved, or at least not on commercial grounds. All the Traceca Railways investment plans should be evaluated against a benchmark figure that would normally be set by the Ministry of Finance.

[11] Opportunity Cost of Capital is the return on capital invested at minimum risk, normally AAA graded bonds etc.

**Schedule of principal norms**

**Infrastructure**

| **Output** | | **Input** | | **Financial** | |
|---|---|---|---|---|---|
| *Requirements* | **Norms** | **Requirements** | **Norms** | **Requirement** | **Norms** |
| Safe use of line capacity for freight and passenger trains | **1. Utilisation of available capacity set between 10 and 30 freight and passenger revenue earning train paths per day (single track)**<br>**2. Traceca average operating speed of 40 kph (technical speed allowing for waiting time at stations/freight depots).** | Different classifications of infrastructure depending on:<br>Line capacity<br>Traffic Mix<br>Load<br>Train length<br>Speed<br>Control / Safety<br>Power Supply.<br>The extent to which infrastructure operated at below design specifications.<br>Labour, materials equipment maintenance norms for different track types. | **1.Network route km KTZ/non-KTZ**<br>**2. Proportion of single / double track in KTZ network = 90 %**<br>**3.Frequency / Length of passing loops single line 20 km 1500 m**<br>**4.Maximum train length – 60 wagons**<br>**5.Load rating Standard axle load > 22.5 tons =10%**<br>**6. Design speed < 80 kph =10%,**<br>**7. Operating at less than design speed, 10%**<br>**Horizontal alignment < 1000 m radius =10 %**<br>**8. Vertical alignment < 5/1000 =10%**<br>**9. Waiting for clearance 1 hour per 24 hours**<br>**10. Route km electrified = % of total**<br>**11. Maintenance down-time < 10%**<br>**12. Other requirements as loco' items 3 to 7** | Valued at current replacement costs for each infrastructure component depending on level of service such as speed, waiting time, train length etc.<br>Makes an acceptable return on the capital invested.<br>Is fully amortised.<br>Generates sufficient income for credit repayments either to Bank direct or to Government (including on-leant funding)<br>Fixing cost recovery ratio to be similar to competing transport - road | **1.Track reconstruction between €0.3m and €0.6m per km.**<br>**2.Existing track formation, structures drainage value = 0**<br>**3.Signalling replacement €0. 05m to €0.1m per km.**<br>**4.Power supply rehabilitation €0.15m per km.**<br>**5.Communications new technology**<br>**€25,000 per km**<br>**6.Set IRR at 12%**<br>**7. 40 years depreciation period**<br>**8. Current replacement value revised annually**<br>**9. Credit period set 20 to 25 years**<br>10.Maintenance either as planned or 5% of above costs i.e. 25,000 |

**Wagons**

| Output | | Input | | Financial | |
|---|---|---|---|---|---|
| **Requirements** | **Norms** | **Requirements** | **Norms** | **Requirement** | **Norms** |
| Use of conveyance capacity with different types of commodities. | **1. Utilisation of available capacity set between 3000 to 6000 revenue hours per year.**<br>**2. And 60,000 and 120,000 revenue earning wagon km per year depending on wagon type.**<br>**3. Traceca train lengths of 60 wagons** | A fleet of differently specified wagons<br>Others requirements as locomotives. | **1.Number of different types of wagons.**<br>**2. Availability of each type of wagon > 95%**<br>**3.Types of repair**<br>**4.Periodicity of repair**<br>Others requirements as locomotives | As locomotives | **1.International Prices €30,000 to €100,000 per wagon type**<br>**2.Set IRR at 12%**<br>**3. 30 years depreciation period**<br>**4. Current replacement value revised annually**<br>**5. Typical credit period set 20 to 25 years** |

**Labour, Materials, Fuel**

| **Output** | | **Input** | | **Financial** | |
|---|---|---|---|---|---|
| *Requirements* | **Norms** | **Requirements** | **Norms** | **Requirement** | **Norms** |
| Labour<br>Productive time<br>Materials<br>Quality materials expeditiously utilised for train and infrastructure operations and maintenance.<br>Fuel for Diesel Locomotives on demand. (Including purchasing, storage, delivery systems)<br>Electric Energy for electric locomotives on demand. (excluding delivery systems as part of infrastructure) | **1. Productive labour cost per hour for each grade of personnel /position.**<br>**2. Cost of materials consumed per unit of output such as train km, wagon km etc**<br>**3.Cost of diesel fuel consumed per gross ton km**<br>**4.Cost of electric power per gross ton km** | Labour<br>Appropriate conditions<br>Productive time excluding leave, sickness, training, weekends, public holidays etc.<br>Training<br>Materials<br>Design, specification, procurement, inspection, storage, distribution waste and losses.<br>Supply of diesel fuel of appropriate grade. Storage and fuelling<br>Supply of Electric Energy to power railways delivery system. | **1. Labour 38 hour, 5 days per week**<br>**Leave – 15 days pa**<br>**Sickness - 10 days pa**<br>**National holidays – 12 pa**<br>**Training – 5 days pa**<br>**(118 productive hours pm)**<br>**2. Materials can be taken as percentage of replacement cost. Say 3%**<br>**3. Diesel Fuel Price per litre**<br>**Fuelling costs as % of price**<br>**Electric Energy Price per KW hr** | Labour<br>Indexed to price inflation<br>Remuneration to retain good, well trained personnel.<br>**Allowances, housing, meals, clothing, family etc. + 15%**<br>**Materials at cost net of taxes**<br>**Fuels and energy at cost net of taxes**<br>**Fuelling and delivery % of supply price** | **1.Average wage across scale €500 pm plus allowances etc.**<br>**2. Train crew bonus – 1c per train km.**<br>**3. Material prices as specified or set x% of asset replacement cost depending on asset.**<br>**4. Fuel Prices as specified, can be also world market prices such 30 c per litre diesel plus 2.5% delivery and fuelling**<br>**5 c per KW hr electricity.** |

**Schedule of principal norms**

**Freight Terminals**

| **Output** | | **Input** | | **Financial** | |
|---|---|---|---|---|---|
| *Requirements* | **Norms** | **Requirements** | **Norms** | **Requirement** | **Norms** |
| Utilisation of handling capacity according to designated type and size of terminal.<br>Applies to KTZ terminals.<br>Where non-KTZ speed of collection and delivery. | 1. Number of wagons of dry or liquid bulk freight per year.<br>2. Tons of smaller freight per year.<br>3. Numbers of containers loaded or unloaded per year. | Assets supplied and maintained for the purposes of handling goods.<br>Labour for handling equipment and for administration<br>Energy consumed in the process | **1. A listing of handling equipment for different terminal types and operations**<br>**2. Labour inputs for each type of operation**<br>**3. Energy as above** | Valued at current replacement costs for handling equipment depending on type of terminal.<br>Makes an acceptable return on the capital invested.<br>Is fully amortised.<br>Generates sufficient income for credit repayments either to Bank direct or to Government (including on-leant funding)<br>Cost recovery ratio to be 1 | **1.Various international prices for supply of major equipment items.**<br>**2.Set IRR at 12%**<br>**3. 20 years depreciation period**<br>**4. Current replacement value revised annually**<br>**5. Credit period set 20 to 25 years**<br>**6. Maintenance either as planned or 7% of above** |

**Appendix B5 Steps in estimating normative costs of wagons**

Step 1 Determine output norms for each wagon type and adjust to local conditions

| DISTANCE Km | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| CODE | STANDARD OUTPUT | ADJUST FACTOR | TOTAL Km/YEAR | FACTOR | LIGHT RUNNING Km | TRAIN WAGON Km | Traceca Type Reference | Name |
| 1 | 60000 | 0.7 | 42000 | 0.05 | 2100 | 39900 | 1 | Covered |
| 2 | 50000 | 0.7 | 35000 | 0.05 | 1750 | 33250 | 2 | Platforms |
| 3 | 85000 | 0.7 | 59500 | 0.05 | 2975 | 56525 | 3a | Open-top axle |
| 4 | 90000 | 0.8 | 72000 | 0.05 | 3600 | 68400 | 3b | Open top bogie |
| 5 | 80000 | 0.8 | 64000 | 0.05 | 3200 | 60800 | 4a | Tank axle |
| 6 | 100000 | 0.9 | 90000 | 0.05 | 4500 | 85500 | 4e | Tanker bogie |
| 7 | 30000 | 0.5 | 15000 | 0.15 | 2250 | 12750 | 5a | Isothermal axle |
| 8 | 45000 | 0.7 | 31500 | 0.15 | 4725 | 26775 | 5b | Isothermal bogie |
| 9 | 60000 | 0.7 | 42000 | 0.05 | 2100 | 39900 | 6a | Flat-bed axle |
| 10 | 80000 | 0.8 | 64000 | 0.05 | 3200 | 60800 | 6b | Flat-bed bogie |

**Step 2 Determine norms for the availability of each wagon type - that is the number days the wagon is available for productive use.**

**Appendix B4 List of Current Approved Wagons operating on Traceca**

| Ref. | Wagon type | Length | Tare weight (t) | Typical Cargo |
|---|---|---|---|---|
| 1 | Covered | 14,7-17,24 | 22,7-27 | Piece and bulky goods |
| 2 | Platforms | 14,28-14,7 | 22,0-20,9 | Building materials, timber, bulky and out-of-gage-load |
| 3a<br>3b | Open-top Wagon | 14-14,42<br>eight axle-20,3 | 22-22,6<br>eight axle 44,5 | Building materials, timber, bulky and out-of-gage-load |
| 4[a] | Tanks | 14,14-14,7 | Oil – bitumen 31,5-36,5 | Oil – bitumen, mineral oil, chemical and food products |
| 4b | | 12,04-12,32 | mineral oil - 23,2-28 | |
| 4c<br>4d | | 12,04-15,82 | chemical freight -20,4-35,3 | |
| 4e | | 12,04-12,18<br>18,76-21,28 | food products. - 22,3-28<br>eight axle –48,8-51,0 | |
| 5a | Isothermal | 14,7-22,12 | 32-52 | Perishable products |
| 5b | | | eight axle -67,7 | |
| 6a | Flat-bed wagon | 14,28-14,7 | For two containers TEU-18,4-21,0 | Large capacity containers |
| 6b | | 19,6 | For three containers TEU - 22,0 | |

| AVAILIBILITY | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| TYPE | STANDARD DAYS SET ASIDE | ADJUST FACTOR | ACCEPTED DAYS SET ASIDE | STANDARD DAYS MAINTAIN | ACCEPTED DAYS MAINTAIN | STANDARD DAYS AVAILABLE | ACCEPTED DAYS AVAILABLE | ACCEPTED AVAILABLE |
| 1 | 30 | 2.0 | 60 | 4 | 4 | 331 | 296 | 0.82 |
| 2 | 25 | 1.5 | 38 | 2 | 3 | 338 | 319 | 0.89 |
| 3 | 20 | 2.0 | 40 | 6 | 6 | 339 | 314 | 0.87 |
| 4 | 20 | 1.2 | 24 | 5 | 7 | 340 | 329 | 0.91 |
| 5 | 20 | 1.5 | 30 | 6 | 7 | 339 | 323 | 0.90 |
| 6 | 15 | 1.1 | 17 | 10 | 14 | 340 | 330 | 0.92 |
| 7 | 50 | 2.0 | 100 | 2 | 3 | 313 | 257 | 0.71 |
| 8 | 40 | 1.6 | 64 | 4 | 5 | 321 | 291 | 0.81 |
| 9 | 30 | 1.7 | 51 | 3 | 0 | 332 | 309 | 0.86 |
| 10 | 25 | 1.5 | 38 | 5 | 5 | 335 | 317 | 0.88 |

Note that days in maintenance is derived from normative maintenance schedules in step 5

**Step 3 Derive the normative output for each wagon type. i.e. the number of productive (revenue earning hour per wagon per year)**

| UTILISATION | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|

| TYPE | STANDARD WAIT TIME HRS/DAY | ADJUST FACTOR | ACCEPTED WAIT TIME HRS/DAY | STANDARD LIGHT RUN HRS/DAY | ADJUST FACTOR | ACCEPTED LIGHT RUN HRS/DAY | STANDARD TRAIN WAGON HRS /WAGON DAY | ACCEPTED TRAIN WAGON HRS /WAGON DAY | ACCEPTED UTILISE TRAIN WAGON HRS/ WAGON YR |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 8 | 1.5 | 12 | 1.5 | 1.1 | 1.65 | 14.5 | 10.35 | 3066.6 |
| 2 | 8 | 1.5 | 12 | 1 | 1.3 | 1.3 | 15 | 10.7 | 3418.6 |
| 3 | 8 | 1.5 | 12 | 1.1 | 1.1 | 1.21 | 14.9 | 10.79 | 3383.0 |
| 4 | 6 | 1.2 | 7.2 | 2.5 | 1.3 | 3.25 | 15.5 | 13.55 | 4455.3 |
| 5 | 8 | 1.2 | 9.6 | 1.5 | 1.1 | 1.65 | 14.5 | 12.75 | 4113.6 |
| 6 | 6 | 1.2 | 7.2 | 1.5 | 1.2 | 1.8 | 16.5 | 15 | 4949.2 |
| 7 | 8 | 1.7 | 13.6 | 1 | 1.1 | 1.1 | 15 | 9.3 | 2390.5 |
| 8 | 6 | 1.7 | 10.2 | 1.5 | 1.1 | 1.65 | 16.5 | 12.15 | 3536.1 |
| 9 | 8 | 1.3 | 10.4 | 1.5 | 1.1 | 1.65 | 14.5 | 11.95 | 3692.6 |
| 10 | 6 | 1.2 | 7.2 | 1.5 | 1.1 | 1.65 | 16.5 | 15.15 | 4806.4 |

**Step 4 Derive the normative financial charges for each wagon type building in the normative rate of return on assets of 12%**

| DEPRECIATION AND INTEREST CHARGES | | | | |
|---|---|---|---|---|
| TYPE | REPLACE | ECONOMIC | DEPN + | DEPN |

| TYPE OF WAGON | | 1 | COVERED | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| TYPE | STANDARD | ADJUST | ACCEPTED | STANDARD | ACCEPTED | STANDARD | ADJUST | ACCEPTED | STANDARD | ACCEPTED |
| CODE | DISTANCE | FACTOR | DISTANCE | NO OF | NO OF | TIME IN | FACTOR | TIME IN | IN DEPOT | TIME IN |
| | INTERVAL | | INTERVAL | SERVICES | SERVICES | DEPO/WS | | DEPOT//WORKSHOP | | DEPO/WS |
| | Km/SERVICE | | Km/SERVICE | PER YR | PER YR | /SERVICE | | WORKSHOP | PER YR | PER YEAR |
| | | | | | | | | | | |
| A | 10000 | 1.5 | 15000 | 3.99 | 2.66 | 0.3 | 1.20 | 0.36 | 1.20 | 0.96 |
| B | 50000 | 1.6 | 80000 | 0.80 | 0.50 | 1 | 1.20 | 1.20 | 0.80 | 0.60 |
| C | 500000 | 1.3 | 650000 | 0.08 | 0.06 | 10 | 1.40 | 14.00 | 0.80 | 0.86 |
| U1 | 500000 | 0.8 | 400000 | 0.08 | 0.10 | 10 | 1.30 | 13.00 | 0.80 | 1.30 |
| U2 | 2500000 | 0.4 | 1000000 | 0.02 | 0.04 | 20 | 1.30 | 26.00 | 0.32 | 1.04 |
| | | | | | | | | TOTAL | 3.59 | 3.71 |

A,B,C ---- scheduled U ----- Unscheduled

**Step 6 Derive the labour inputs for each type of maintenance or repair**

LABOUR INPUTS

WAGON TYPE 1 STANDARD MAN DAYS INPUT

| OCCUPATION | SERVICE | A | B | C | U1 | U2 | PRODUCTIVITY |
|---|---|---|---|---|---|---|---|

| | COST | LIFE | FINANCE | PER |
|---|---|---|---|---|
| | € | YEARS | CHARGES | WAGON HR |
| | | | | |
| 1 | 50000 | 20 | 8361 | 2.7264 |
| 2 | 35000 | 20 | 5852 | 1.7119 |
| 3 | 35000 | 20 | 5852 | 1.7299 |
| 4 | 50000 | 20 | 8361 | 1.8765 |
| 5 | 35000 | 20 | 5852 | 1.4227 |
| 6 | 60000 | 20 | 10033 | 2.0272 |
| 7 | 60000 | 20 | 10033 | 4.1970 |
| 8 | 80000 | 20 | 13377 | 3.7829 |
| 9 | 35000 | 20 | 5852 | 1.5849 |
| 10 | 50000 | 20 | 8361 | 1.7395 |

For each wagon build up the normative maintenance costs

**Step 5 Derive the maintenance schedule of <u>each wagon type</u> given the normative output in step 1**

| WAGON MAINTENANCE | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| ADJUSTMENT FACTOR | 1 | 0.6 | 0.6 | 1 | 0.6 |
| ACCEPTED INPUT | 10 | 60 | 1800 | 1000 | 6000 |
| OVERHEAD FACTORS | | | | | |
| PURCHASING | 1 | 3 | 90 | 50 | 300 |
| STORAGE | 1 | 3 | 90 | 50 | 300 |
| INVENTORY | 1 | 3 | 90 | 50 | 300 |
| LOSSES | 1 | 3 | 90 | 50 | 300 |
| ADJUSTED COST | 12 | 72 | 2160 | 1200 | 7200 |

**Step 9 Apply normative allocations of equipment usage**

| | | | | | | |
|---|---|---|---|---|---|---|
| WORKSHOP EQUIPMENT | | | | | | |
| (Equivalent Labour Cost | | | | COSTS | € | |
| Factor | 1 | A | B | C | U1 | U2 |
| EQUIVALENT LABOUR & MATERIALS | | 46 | 210 | 4647 | 3061 | 10432 |
| HAND TOOLS | | | | | | |
| | STANDARD PROVISION | 2 | 10 | 232 | 153 | 522 |
| | ADJUSTMENT FACTOR | 1 | 1 | 1 | 1 | 1 |
| | ACCEPTED PROVISION | 2 | 10 | 232 | 153 | 522 |
| HEAVY EQUIPMENT | | | | | | |
| UNIT COST/SERVICE | | | | | | |
| | ACCEPTED PROVISION | 0 | 1 | 14 | 13 | 25 |

**Step 10 Summarise normative inputs of labour, materials and equipment** from the previous steps.

Derive the unit maintenance costs using the output form step 1

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| WAGON FLEET MAINTENANCE | | | | | | | |
| WAGON TYPE 1 | | | | | | | |
| | | | ACCEPTED COST / SCHEDULED SERVICE | | | | |
| | LABOUR | MATER | EQUIP | OVER | TOTAL/ | TOTAL | WAGON |

| 1 MD = 6.3 HOURS | | | | | | | ADJUSTMENT |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| 1 | | 0.01 | 0.05 | 0.5 | 0.5 | 1 | 1 |
| 9 | | 0.04 | 0.05 | 1 | 1 | 2 | 1 |
| 10 | | 0.15 | 1 | 20 | 10 | 20 | 1 |
| 11 | | 0.04 | 0.1 | 1 | 1 | 2 | 1 |
| 33 | | 0.3 | 1 | 20 | 20 | 30 | 1 |
| 34 | | 0.1 | 0.3 | 2 | 2 | 4 | 1 |

Labour costs are derived for each category of productive personnel (40 categories in RAILCOST) and applied to each activity.

Personnel 1- Administrative; 9- Supervisor; 10- Depot Mechanic/ Electrician; 11-Material Storage

33-Metal worker, painter, fitter; 34 - General labourer, cleaner

## Step 7 Productivity adjustments

| | SERVICE | A | B | C | U1 | U2 | COST PER | COST PER |
|---|---|---|---|---|---|---|---|---|
| OCCUPATION | | ACCEPTED MAN DAYS INPUT | | | | | HOUR | DAY |
| | | | | | | | | |
| 1 | | 0.01 | 0.05 | 0.5 | 0.5 | 1 | 10 | 62 |
| 9 | | 0.04 | 0.05 | 1 | 1 | 2 | 12 | 74 |
| 10 | | 0.15 | 1 | 20 | 10 | 20 | 10 | 63 |
| 11 | | 0.04 | 0.1 | 1 | 1 | 2 | 8 | 49 |
| 33 | | 0.3 | 1 | 20 | 20 | 30 | 8 | 49 |
| 34 | | 0.1 | 0.3 | 2 | 2 | 4 | 7 | 43 |
| | | | | | | | | |
| TOTAL LABOUR COST | | 34.48 | 138 | 2487 | 1861 | 3232 | | |

## Step 8 Derive the normative inputs of material

| MATERIALS | | | | | |
|---|---|---|---|---|---|
| | | | COSTS € | | |
| | A | B | C | U1 | U2 |
| | | | | | |
| STANDARD INPUT | 10 | 100 | 3000 | 1000 | 10000 |

The 10 steps are repeated for each of 10 wagon types used on Traceca

The results are tabulated as shown.

| SUMMARY OF WAGON COSTS | | | | | | |
|---|---|---|---|---|---|---|
| CODE | Traceca Type Reference | Name | UTILISATION HOURS /YEAR | KM /YEAR | PROV COST/ HR | MAINTENANCE COST /KM |
| 1 | 1 | **Covered** | 3066.5784 | 39900 | 2.726 | 0.035 |
| 2 | 2 | **Platforms** | 3418.6003 | 33250 | 1.712 | 0.023 |
| 3 | 3a | **Open-top axle** | 3383.0385 | 56525 | 1.730 | 0.030 |
| 4 | 3b | **Open top bogie** | 4455.3435 | 68400 | 1.877 | 0.036 |
| 5 | 4a | **Tank axle** | 4113.6392 | 60800 | 1.423 | 0.032 |
| 6 | 4e | **Tanker bogie** | 4949.1655 | 85500 | 2.027 | 0.050 |
| 7 | 5[a] | **Isothermal axle** | 2390.4648 | 12750 | 4.197 | 0.097 |
| 8 | 5b | **Isothermal bogie** | 3536.1458 | 26775 | 3.783 | 0.125 |
| 9 | 6a | **Flat-bed axle** | 3692.55 | 39900 | 1.585 | 0.025 |
| 10 | 6b | **Flat-bed bogie** | 4806.4461 | 60800 | 1.739 | 0.035 |

Source 'Railcost'

| | | IALS | MENT | HEAD | SERVICE | YEAR | KM |
|---|---|---|---|---|---|---|---|
| A | 34 | 12 | 2 | 1 | 50 | 134 | 0.0034 |
| B | 138 | 72 | 12 | 7 | 228 | 114 | 0.0028 |
| C | 2487 | 2160 | 246 | 147 | 5040 | 309 | 0.0078 |
| U1 | 1861 | 1200 | 166 | 97 | 3324 | 332 | 0.0083 |
| U2 | 3232 | 7200 | 547 | 329 | 11308 | 451 | 0.0113 |
| | | | | | | 1339.49 | **0.0336** |

**Appendix B6 Norms used in Cost Basis for TTT of Wagons operating on Traceca**

| Ref. | Wagon type | Utilisation Norms | | Financial Norms € | | |
|---|---|---|---|---|---|---|
| | | Hours / year | Km/year | Replacement Cost | Provision Cost/hr | Maintenance Cost /km |
| Column. 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 1 | Covered | 3067 | 39,900 | 50,000 | 2.73 | 3.53 |
| 2 | Platforms | 3419 | 33,250 | 35,000 | 1.71 | 2.31 |
| 3a | Open-top Wagon | 3383 | 56,525 | 35,000 | 1.73 | 2.97 |
| 3b | | 4461 | 68,400 | 50,000 | 1.87 | 3.61 |
| 4[a] | Tanks | 4949 | 60,800 | 35,000 | 1.42 | 3.22 |
| 4e | | | 85,500 | 60,000 | 2.03 | 5.02 |
| 5a | Isothermal | 2390 | 12,750 | 60,000 | 4.20 | 9.69 |
| 5b | | 3536 | 26,775 | 80,000 | 3.78 | 12.25 |
| 6a | Flat-bed wagon | 3693 | 39,900 | 33,000 | 1.58 | 2.52 |
| 6b | | 4086 | 60,800 | 50,000 | 1.74 | 3.52 |

Notes and definitions referring to columns in table:

1 Traceca Reference Number for Wagon Type

2 Generally Accepted Name of Type of Wagon

3 Number of hours per year of productive utilisation in traffic either conveying goods or returning empty excludes all down time in maintenance, train formation or waiting for use

4 Number of km per year of commercial use either conveying goods or returning empty excludes km in maintenance, train formation empty operations to and from terminals before and after commercial use - assuming normal conditions.

5 Current replacement cost of asset at international prices delivered. Net of taxes

6 The annual financial costs of the asset including depreciation (30 years), loan repayments (20 years), normal return on assets (12%) divided by the number of productive hours in column 3

7 The annual costs of planned and unscheduled maintenance based on technical norms including inputs of productive trained labour, quality materials and appropriate equipment.

## Appendix B7 Infrastructure User Charges (IUC)

### Transport Policy

Government's have become increasingly interested in identifying the costs of access and use to the railway's infrastructure. This is partly due to the vogue in restructuring railways but it also relates to the desire to create more equality in the provision and resourcing of road and rail.

### Normative Cost Basis for Fixing the IUC

There are various ways of fixing the level of infrastructure user charge. The approach here is a normative one, for which indicative calculations are included in the box below.

a) Provision and Maintenance _ Inputs norms

Based on Network of Trunk Routes of 10,000 km

Provision service standards- section design speed 80 kph; average speed 40 kph; for single track- passing-loop waiting-time 1 hour per 100 km. 22.5 ton axel, 65 kg/m, CTC, radio communications etc.

Maintenance Expenditure taken as 5% pa of replacement cost; (A common assumption used for simplicity)

b) Financial Norms

Average replacement cost of track, signalling and communications over trunk route €350,000 per km.

(This cost will increase with raising standards, higher speeds, less waiting time etc. to say €500,000 per km; also it can be reduced due to poor track, many speed variations etc.)

Depreciation 40 years, Opportunity cost of capital 12%, loan repayment 20 years

Annualised provision cost/km – (87.5 + 177.21)/10,000 = €26,647

Maintenance Expenditure @ 5% pa of replacement cost = €17,500

Full recovery cost for provision and maintenance = €44,147 per km per year. (1)

Or €440 million pa for 10,000 km

c) Output Norms:

Freight tonne km on Traceca routes = 120,500 million net ton km - all freight

Average net tonnes per train = 3500

Freight train / km per year = 3442 (freight train route density per year) (3)

Average freight train per day per km = 9.43

Passenger km = 8,000 million, (need to distinguish between trunk and local services and deduct for local services)

Average loading per train = 700

Passenger train / km per year = 1143 (passenger train route density per year) (2)

Average Passenger Train per day per km = 3.13

**Derived average daily trains per day per km = 12.58 -**

(This is equivalent to 1 passing each 2 hours)

d) Derived Normative Unit Costs / possible access fee - assuming replacement and maintenance

**Variant 1 passenger and freight equal charges = 1/(2+3) = €9.5 per train km**

Equivalent to 1.3 c per passenger km, 0.27 c per freight tonne km (15.8c per wagon km)

**Variant 2 passenger train exempt from charges = 1/3 = €12.8 per train km**

Equivalent to 0.36 c per freight tonne km (21.3 c per wagon km)

If variant 2 then there is an effective subsidy by freight of passenger services

e) Derived Normative Unit Costs / possible access fee - assuming maintenance only

**Variant 1 passenger and freight equal charges = 1/(2+3) = €3.76 per train km**

**Variant 2 passenger train exempt from charges = 1/3 = €5.00 per train km**

### Allocation of IUC by train km or gross ton km

Firstly it is important to recognise what unit infrastructure costs vary most closely to. GTK certainly relates to rail wear. Typically 4 x 10**9 axles for 65 kg/m over about 40 years would be typical life of for the rail.

But ***most other track and structural items do not vary with gtk but with time and climate.*** For signalling and power supply there is no direct variation with gtk at all. In total probably 5% of cost varies with gtk. Alternatively infrastructure capacity and so provision cost is determined by speed and signalling irrespective of size of train.

Secondly whilst the proportion of passenger train km to total km is 25% that proportion when expressed in gtk is 5%. Therefore, if gtk used then passenger trains would generate about €2.0 per km and freight about €10.0 If train km used then each will generate about €9 per km.

In terms of the fee being nearer to cost generation, the train km better represents the case. It may also be simpler and less expensive to administer and easier for customers to understand. But it will require passenger services to contribute about 5 times more than if GTK were used. This may be correct but may not be politically acceptable.

The way forward is to determine whether passenger or freight services most influence the nature of the infrastructure provided. For Suburban and High Speed Intercity services they usually do, but for normal trunk lines and feeders it will most likely be freight. Once the prime users of the routes are determined then train km should be used to generate the IUC from either passenger or freight; where undecided both services pay.

**Passenger subsidy**

The issue of passenger and other subsidies is political. The imposition of additional costs on Traceca freight transport is not considered in the best interests of economic development nor is it in the spirit of the basic MLA.

**Appendix C 1 Extracts from the OEJD Protocol Batumi June 2002**

The extract is inserted to

a) Indicate the intentions of KTZ with respect to the development of multimodal services

b) Willingness to discount MTT tariffs

c) The proposed service standards

On the territory of Kazakhstan the TRACECA corridor passes along the areas of Aktau – Beyneu, Drujba – Aktau, Drujba -Chengeldy. To develop and increase the freight flows for the freight year of 2002 there were fixed the following reducing coefficients for goods transportations by large-capacity containers:

- the port of Aktau – station Drujba - 0,5;

- the port of Aktau – station of Beyneu – 0,7;

- the port of Aktau – station of Chengeldy – 0,7.

The exports volumes via the port of Aktau for January – May 2002 made 1 260 thousand tons of goods including crude oil – 930 thousand tons, wheat – 180 thousand tons and ferrous metal rolling – 130 thousand tons.

The organization of container train admittance along the route of Drujba – Aktau – Baku – Poti is currently fulfilled in order to attract the goods to the TRACECA route. Within its framework in the beginning of June 2002 in the port of Aktau there was held the meeting of the representatives of CJSC "Kazakhstan Temir Joli", the port of Aktau, the Urumchi Administration of the Chinese Railway and "Kosko" company (one of the biggest shipping companies in China). During this meeting there was made a decision on the cooperation in taking actions for attracting freight flows to the Kazakhstan route of the TRACECA corridor one of which is the presentation of a container train in Urumchi and in the port of Aktau.

The trip time of a container train along the route from the station of Drujba to the station of Mangishlak will make:

**- along the even direction (Drujba-Mahgishlak) - 110 hours 30 minutes - 4,6 days.**

**- along the odd direction (Mangishlak - Drujba) – 114 hours 20 minutes. – 4,8 days.**

The train route speed along this way will make:

**- along the even direction (Drujba - Mangishlak) – 871,73 km/day;**

**- along the odd direction (Mangishlak - Drujba) – 861,78 km/day.**

**There has been received the agreement of the Azerbaijan and Georgian railways regarding the Kazakh initiative on the attraction of transit traffic to the TRACECA route.**

## Appendix C3 - Summary of Railways Service Costing for sample of services

| Service | | | | TTT Components | | | | Tariff | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Type | From | To | Distance | Part 1 | Part 2 | Part 3 | Part 4 | Full | | Discount | |
| | | | | Movement | Terminal | IUC | Fee | Service | Rate | Service | Rate |
| | | | Km | Per wagon km | Per wagon | Wagon | Wagon | Per TEU | Per TEUkm | Per TEU | Per TEUkm |
| Container | Poti | Dusanbe | 2856 | 6.77 | 42.29 | 411.2 | 20 | 1200 | 0.42 | 700 | 0.25 |
| Container | Jagodin | Baku | 1805 | 6.90 | 48.8 | 277.6 | 20 | 796.2 | 0.44 | 454.9 | 0.25 |
| Container | Ungheni | Druzhba | 5403 | 6.65 | 55.33 | 280.8 | 20 | 2225 | 0.41 | 1306 | .025 |
| | | | | | | | | Per Wagon | Per Wagon km | Per Wagon | Per Wagon km |
| Oil Tanker | Ungheni | Druzhba | 5403 | 9.39 | 33.2 | 780.8 | 20 | 5907 | 1.09 | 3159 | 0.58 |
| Oil Tanker | Baku | Batumi | 890 | 10.04 | 13.05 | 124.1 | 20 | 1082.5 | 1.21 | 575.6 | .065 |
| General Freight | Poti | Osh | 3176 | 5.74 | 273.4 | 467.5 | 20 | 2568 | .080 | 1011 | .032 |
| Platform | Poti | Serakhs' | 1860 | 6.45 | 273.4 | 274 | 20 | 1768 | 0.95 | 770 | 0.41 |
| Open Top | Druzhba | Termez | 2014 | 7.58 | 6.7 | 331 | 20 | 1885 | 0.92 | 994.7 | 0.49 |

## Appendix C4 Traffic Costing Example for Rail Freight Block Train Services

**BLOCK FREIGHT SERVICE BETWEEN POTI AND DUSANBE**

**CONTAINERS ON FLAT BED WAGONS**

**OUTPUT**

| | SHORT TERM | CUSTOMER OWNED WAGON | LONG TERM |
|---|---|---|---|
| **1. MOVEMENT** | | | |
| UNIT COST/NET TONNE Km | 0.0106 | 0.0117 | 0.0169 |
| UNIT COST PER WAGON KM | 0.4242 | 0.4671 | 0.6771 |
| **2. TERMINAL** | | | |
| UNIT COST/WAGON | 9.1567 | 42.2877 | 42.2877 |
| **1+2 SERVICE COST** | | | |
| COST PER WAGON | 1216.35 | 1371.77 | 1969.20 |
| SERVICE COST/TONNE | 30.41 | 34.29 | 49.23 |
| SERVICE COST PER TEU | **608.18** | **685.89** | **984.60** |
| **3. INFRASTRUCTURE USER CHARGE** | | | |
| PER WAGON | 164.49 | 411.23 | 411.23 |
| **4. ADMINISTRATION** | 20.00 | 20.00 | 20.00 |
| **TOTAL COST PER WAGON** | **1400.84** | **1803.00** | **2400.42** |
| **TOTAL SERVICE COST/TONNE** | **35.02** | **45.07** | **60.01** |
| **TOTAL SERVICE COST PER TEU** | **700.42** | **901.50** | **1200.21** |

Source: 'RAILCOST' Normative costing model

Distance 2856 km; Average Operating Speed = 40 kph; 60 X 40 Ton wagons; 2 TEU s; 20% empty running;

## APPENDIX C

### Traffic Costing Example for Rail Freight Block Train Services

**BLOCK FREIGHT SERVICE BETWEEN JAGODIN AND BAKU**

**CONTAINERS ON FLAT BED WAGONS**

**OUTPUT**

| | SHORT TERM | CUSTOMER OWNED WAGON | LONG TERM |
|---|---|---|---|
| **1. MOVEMENT** | | | |
| UNIT COST/NET TONNE Km | 0.0106 | 0.0119 | 0.0173 |
| UNIT COST PER WAGON KM | 0.4245 | 0.4773 | 0.6903 |
| **2. TERMINAL** | | | |
| UNIT COST/WAGON | 12.6792 | 48.8118 | 48.8118 |
| **1+2 SERVICE COST** | | | |
| COST PER WAGON | 778.86 | 910.29 | 1294.76 |
| SERVICE COST/TONNE | 19.47 | 22.76 | 32.37 |
| SERVICE COST PER TEU | **389.43** | **455.14** | **647.38** |
| **3. INFRASTRUCTURE USER CHARGE** | | | |
| PER WAGON | 111.03 | 277.56 | 277.56 |
| **4. ADMINISTRATION** | 20.00 | 20.00 | 20.00 |
| **TOTAL COST PER WAGON** | **909.89** | **1207.85** | **1592.32** |
| **TOTAL SERVICE COST/TONNE** | **22.75** | **30.20** | **39.81** |
| **TOTAL SERVICE COST PER TEU** | **454.94** | **603.93** | **796.16** |

Source: 'RAILCOST' Normative costing model

Distance 1805 km; Average Operating Speed = 40 kph; 60 X 40 Ton wagons; 2 TEU s; 20% empty running;

## Traffic Costing Example for Rail Freight Block Train Services

**BLOCK FREIGHT SERVICE BETWEEN UNGHENI AND DRUZHBA**

**CONTAINERS ON FLAT BED WAGONS**

**OUTPUT**

| | SHORT TERM | CUSTOMER OWNED WAGON | LONG TERM |
|---|---|---|---|
| **1. MOVEMENT** | | | |
| UNIT COST/NET TONNE Km | 0.0105 | 0.0114 | 0.0166 |
| UNIT COST PER WAGON KM | 0.4189 | 0.4565 | 0.6652 |
| **2. TERMINAL** | | | |
| UNIT COST/WAGON | 16.2017 | 55.3359 | 55.3359 |
| **1+2 SERVICE COST** | | | |
| COST PER WAGON | 2279.71 | 2521.56 | 3649.36 |
| SERVICE COST/TONNE | 56.99 | 63.04 | 91.23 |
| SERVICE COST PER TEU | **1139.86** | **1260.78** | **1824.68** |
| **3. INFRASTRUCTURE USER CHARGE** | | | |
| PER WAGON | 312.31 | 780.78 | 780.78 |
| **4. ADMINISTRATION** | 20.00 | 20.00 | 20.00 |
| **TOTAL COST PER WAGON** | **2612.03** | **3322.34** | **4450.14** |
| **TOTAL SERVICE COST/TONNE** | **65.30** | **83.06** | **111.25** |
| **TOTAL SERVICE COST PER TEU** | **1306.01** | **1661.17** | **2225.07** |

Source: 'RAILCOST' Normative costing model

Distance 5403 km; Average Operating Speed = 40 kph; Total transit time 150 hours; 60 X 40 Ton wagons; 2 TEU s; 20% empty running;

## Traffic Costing Example for Rail Freight Block Train Services

**BLOCK FREIGHT SERVICE BETWEEN UNGHENI AND DRUZHBA**

**OIL IN 8 AXLE TANK WAGONS**

**OUTPUT**

| | SHORT TERM | CUSTOMER OWNED WAGON | LONG TERM |
|---|---|---|---|
| **1. MOVEMENT** | | | |
| UNIT COST/NET TONNE Km | 0.0087 | 0.0127 | 0.0157 |
| UNIT COST PER WAGON KM | 0.5202 | 0.7611 | 0.9390 |
| **2. TERMINAL** | | | |
| UNIT COST/WAGON | 16.3509 | 33.2092 | 33.2092 |
| **1+2 SERVICE COST** | | | |
| COST PER WAGON | 2827.22 | 4145.16 | 5106.90 |
| SERVICE COST/TONNE | 47.12 | 69.09 | 85.11 |
| SERVICE COST PER TEU | **0.00** | **0.00** | **0.00** |
| **3. INFRASTRUCTURE USER CHARGE** | | | |
| PER WAGON | 312.31 | 780.78 | 780.78 |
| **4. ADMINISTRATION** | 20.00 | 20.00 | 20.00 |
| **TOTAL COST PER WAGON** | **3159.53** | **4945.94** | **5907.67** |
| **TOTAL SERVICE COST/TONNE** | **52.66** | **82.43** | **98.46** |
| **TOTAL SERVICE COST PER TEU** | **0.00** | **0.00** | **0.00** |

Source: 'RAILCOST' Normative costing model

Distance 5403 km; Average Operating Speed = 40 kph; Total transit time 150 hours; 60 X 60 Ton wagons; 50% empty running;

## Traffic Costing Example for Rail Freight Block Train Services

**BLOCK FREIGHT SERVICE BETWEEN BAKU AND BATUMI**

**OIL IN 8 AXLE TANK WAGONS**

**OUTPUT**

| | SHORT TERM | CUSTOMER OWNED WAGON | LONG TERM |
|---|---|---|---|
| **1. MOVEMENT** | | | |
| UNIT COST/NET TONNE Km | 0.0093 | 0.0142 | 0.0173 |
| UNIT COST PER WAGON KM | 0.5606 | 0.8501 | 1.0396 |
| **2. TERMINAL** | | | |
| UNIT COST/WAGON | 7.0450 | 13.0481 | 13.0481 |
| **1+2 SERVICE COST** | | | |
| COST PER WAGON | 505.96 | 769.60 | 938.33 |
| SERVICE COST/TONNE | 8.43 | 12.83 | 15.64 |
| SERVICE COST PER TEU | **0.00** | **0.00** | **0.00** |
| **3. INFRASTRUCTURE USER CHARGE** | | | |
| PER WAGON | 49.65 | 124.13 | 124.13 |
| **4. ADMINISTRATION** | 20.00 | 20.00 | 20.00 |
| **TOTAL COST PER WAGON** | **575.62** | **913.73** | **1082.46** |
| **TOTAL SERVICE COST/TONNE** | **9.59** | **15.23** | **18.04** |
| **TOTAL SERVICE COST PER TEU** | **0.00** | **0.00** | **0.00** |

Source: 'RAILCOST' Normative costing model

Distance 8905km; Average Operating Speed = 40 kph; Total transit time 29 hours; 60 X 60 Ton wagons; 50% empty running;

## Traffic Costing Example for Rail Freight Block Train Services

**BLOCK FREIGHT SERVICE BETWEEN** **POTI** **AND** **OSH**

**GENERAL FREIGHT**

**OUTPUT**

| | SHORT TERM | CUSTOMER OWNED WAGON | LONG TERM |
|---|---|---|---|
| **1. MOVEMENT** | | | |
| UNIT COST/NET TONNE Km | 0.0062 | 0.0114 | 0.0143 |
| UNIT COST PER WAGON KM | 0.2497 | 0.4556 | 0.5735 |
| **2. TERMINAL** | | | |
| UNIT COST/WAGON | 17.2582 | 273.4007 | 273.4007 |
| **1+2 SERVICE COST** | | | |
| COST PER WAGON | 804.44 | 1709.99 | 2081.72 |
| SERVICE COST/TONNE | 20.11 | 42.75 | 52.04 |
| SERVICE COST PER TEU | **0.00** | **0.00** | **0.00** |
| **3. INFRASTRUCTURE USER CHARGE** | | | |
| PER WAGON | 186.98 | 467.46 | 467.46 |
| **4. ADMINISTRATION** | 20.00 | 20.00 | 20.00 |
| **TOTAL COST PER WAGON** | **1011.42** | **2197.45** | **2569.18** |
| **TOTAL SERVICE COST/TONNE** | **25.29** | **54.94** | **64.23** |
| **TOTAL SERVICE COST PER TEU** | **0.00** | **0.00** | **0.00** |

Source: 'RAILCOST' Normative costing model

Distance 31764Km; via Farap Turkmenbashi Average Operating Speed = 40 kph; Total transit time 96.5 hours; 60 X 40 Ton wagons; 20% empty running;

## Traffic Costing Example for Rail General Freight Train Services

**BLOCK FREIGHT SERVICE BETWEEN** **POTI** **AND** **SERAKHS**

**CONSTRUCTION MATERIALS ON PLATFORM WAGONS**
**OUTPUT**

| | SHORT TERM | CUSTOMER OWNED WAGON | LONG TERM |
|---|---|---|---|
| **1. MOVEMENT** | | | |
| UNIT COST/NET TONNE Km | 0.0084 | 0.0132 | 0.0161 |
| UNIT COST PER WAGON KM | 0.3353 | 0.5292 | 0.6455 |
| **2. TERMINAL** | | | |
| UNIT COST/WAGON | 17.2582 | 273.4007 | 273.4007 |
| **1+2 SERVICE COST** | | | |
| COST PER WAGON | 640.93 | 1257.68 | 1474.01 |
| SERVICE COST/TONNE | 16.02 | 31.44 | 36.85 |
| SERVICE COST PER TEU | **0.00** | **0.00** | **0.00** |
| **3. INFRASTRUCTURE USER CHARGE** | | | |
| PER WAGON | 109.61 | 274.04 | 274.04 |
| **4. ADMINISTRATION** | 20.00 | 20.00 | 20.00 |
| **TOTAL COST PER WAGON** | **770.54** | **1551.71** | **1768.04** |
| **TOTAL SERVICE COST/TONNE** | **19.26** | **38.79** | **44.20** |
| **TOTAL SERVICE COST PER TEU** | **0.00** | **0.00** | **0.00** |

Source: 'RAILCOST' Normative costing model

Distance 1885Km; via Turkmenbashi; Average Operating Speed = 40 kph; Total transit time 58 hours; 60 X 40 Ton wagons; 25% empty running;

## Traffic Costing Example for Rail General Freight Train Services

**BLOCK FREIGHT SERVICE BETWEEN** **DRUZHBA** **AND** **TERMEZ**

**BUILDING MATERIALS IN OPEN TOP WAGONS**
**OUTPUT**

| | SHORT TERM | CUSTOMER OWNED WAGON | LONG TERM |
|---|---|---|---|
| **1. MOVEMENT** | | | |
| UNIT COST/NET TONNE Km | 0.0070 | 0.0104 | 0.0126 |
| UNIT COST PER WAGON KM | 0.4172 | 0.6257 | 0.7581 |
| **2. TERMINAL** | | | |
| UNIT COST/WAGON | 1.9224 | 6.7700 | 6.7700 |
| **1+2 SERVICE COST** | | | |
| COST PER WAGON | 842.07 | 1267.02 | 1533.61 |
| SERVICE COST/TONNE | 14.03 | 21.12 | 25.56 |
| SERVICE COST PER TEU | **0.00** | **0.00** | **0.00** |
| **3. INFRASTRUCTURE USER CHARGE** | | | |
| PER WAGON | 132.63 | 331.57 | 331.57 |
| **4. ADMINISTRATION** | 20.00 | 20.00 | 20.00 |
| **TOTAL COST PER WAGON** | **994.70** | **1618.59** | **1885.18** |
| **TOTAL SERVICE COST/TONNE** | **16.58** | **26.98** | **31.42** |
| **TOTAL SERVICE COST PER TEU** | **0.00** | **0.00** | **0.00** |

Source: 'RAILCOST' Normative costing model

Distance 2014Km; via Bukhara Average Operating Speed = 40 kph; Total transit time 60.5 hours; 60 X 40 Ton wagons; 35% empty running;

**Appendix D1 Draft TTT and related items for the TFTWG Protocol October 2002**

# PROTOCOL
# ON RESULTS OF SECOND MEETING OF PLENIPOTENTIARY RAILWAY, MARITIME ADMINISTRATION, SEAPORT AND SHIPPING COMPANY REPRESENTATIVES (EXPERTS) CONCERNING TARIFF POLICY FOR RAILWAY AND MARITIME TRANSIT SERVICES ON THE TRACECA TRANSPORT CORRIDOR (TFTWG2)

Baku 17 October 2002

## RAIL TARIFFS

The following was agreed by delegates:

1) The new rail tariff structure for Traceca transit traffic will be based on unified, normative costs i.e. costs reflecting acceptable technical and financial standards. (These productivity data and costs are defined in the working paper presented at TFTWG2 "Traceca Rail Transit Tariff Policy"). Delegates agreed to the use of normative costs in paragraph 2 n. of the TFTWG 1 protocol.
2) Allowances will be made for variations from the agreed standards, i.e. higher tariffs will be applicable to sections of the Traceca network where ruling gradients, train lengths, service standards and other attributes exceed those specified.
3) The tariff structure will be based on the costs of moving a full wagon (not weight based), i.e. it will vary by type of wagon or container. An allowance will be made in the costs for empty or partially empty return loads. The new tariff structure will not apply to less than wagon-loads.
4) The new tariff structure will consist of four components:
   (a) movement tariff (flat rate per kilometre for each wagon type);
   (b) terminal tariff (in two sub-parts – per wagon and per wagon-kilometre; and for collection/delivery )
   (c) infrastructure user charge per train-kilometre (for access to track, signalling, communications, power supply)
   (d) handling fees and commission per assignment
5) The tariff structure will be based on long run variable costs – these costs are defined in the abovementioned working paper and were explained at the meeting.
6) An allowance will be built in to provide a return on assets of 12%. No other allowance will be included for profits.
7) In the short run, to build up Traceca transit traffic, discounts should be offered from the new tariff scales down to the levels reflecting normative short run

variable costs – these costs are defined in the working paper. These discounted tariffs will be 50% of the full tariff scale. Where there are empty returning wagons a discount of 75% will be allowed.

8) As transit traffic volumes approach current capacity, i.e. where new investment is being contemplated, tariffs should be gradually raised to the full tariff scale.

9) Traceca transit tariffs will not be used to cross subsidise other railway operations, such as domestic freight or passenger services.

10) The tariff structure will be based on the Euro.

11) Delegates will provide the outstanding data on costs, tariffs, revenues and traffic needed by the Contractor.

12) Delegates will monitor carefully the effects on transit traffic of changes in tariffs.

## INTERMODAL (THROUGH) TARIFFS

1) The discounted transit tariffs for rail, sea freight and ports will be combined in intermodal (through) tariffs. The Contractor will develop a schedule of these tariffs for distribution to delegates and discussion at TFTWG 3.

Definitions:

Variable cost; is the incremental change in cost with volume distance and time taken for the conveyance of freight.

Short Run Variable Costs; the incremental change in cost with each ton kilometre consisting of fuel, locomotive and wagon maintenance, a proportion of track maintenance and losses and accidents.

Long run Variable Cost; includes the above plus costs associated with provision / replacement of assets such as loan repayments, interest payments and amortisation.

Normative costs are costs that should be incurred to provide effective and sustainable services and may not necessarily be similar to actual costs.