Qatar 2050 قطر
الخطة الشاملة للنقل
Transportation Master Plan

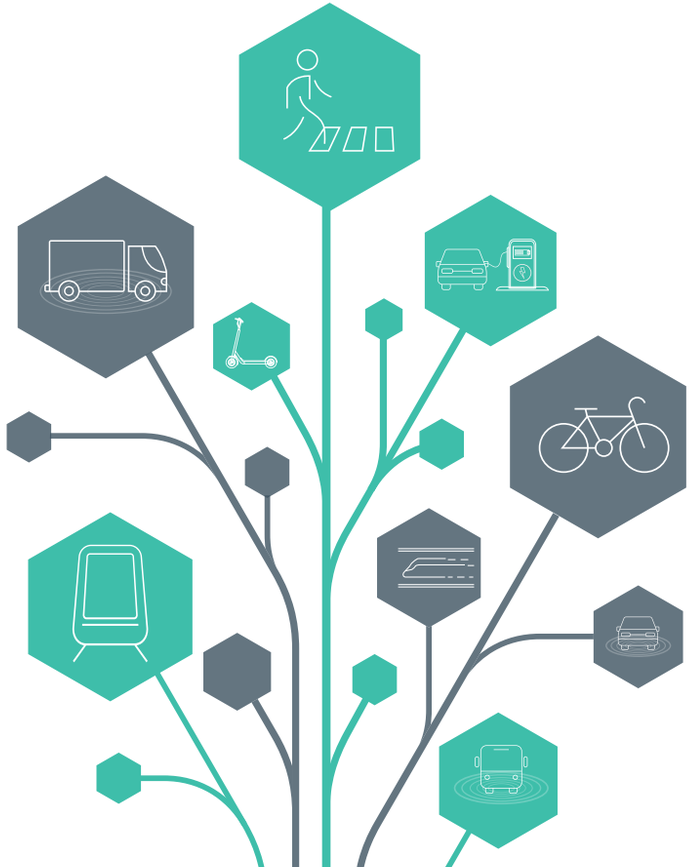
وزارة المواصلات
MINISTRY OF TRANSPORT

2050

Updating Transportation
Master Plan For Qatar
TMPQ

Transportation Assessment Framework User Manual

نقل متكامل ومستدام للجميع
INTEGRATED & SUSTAINABLE TRANSPORT FOR ALL



2050

نقـل متكامـل ومسـتدام للجميـع

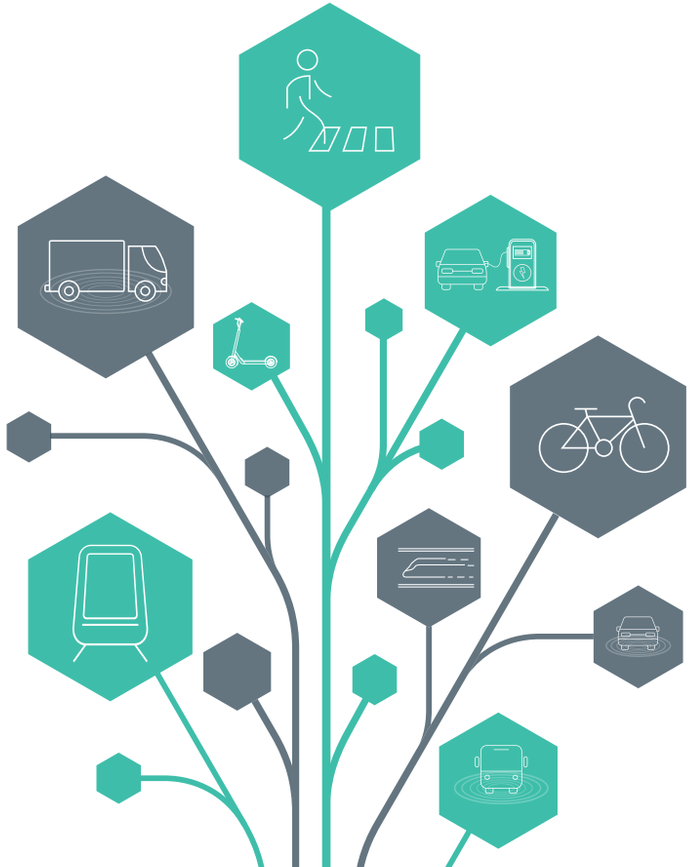
INTEGRATED & SUSTAINABLE TRANSPORT FOR ALL

ملاحظة:

يرجى العلم أن أي إشارة أو ذكر لـ "وزارة المواصلات والاتصالات" واختصارها "MOTC" في هذا التقرير، أصبحت تشير حالياً إلى "وزارة المواصلات" و اختصارها "MOT".

Note:

Please note that any reference or mention of the "Ministry of Transport and Communications" and its abbreviation "MOTC" in this report, now refers to the "Ministry of Transport" and its abbreviation "MOT".



2050

نقـل متكامـل ومسـتدام للجميـع

INTEGRATED & SUSTAINABLE TRANSPORT FOR ALL

مقدمة

يعتبر قطاع النقل البري أحد القطاعات الرئيسية في تطوير مختلف جوانب الحياة وضمان لنقل السلع والخدمات للأفراد والمجتمعات، كما يدعم نمو القطاعات الأخرى، مثل الزراعة والصناعة والتعدين والتجارة ويدفع التنمية المستدامة للمدن والمجتمعات والاقتصاد لتحقيق أهداف رؤية قطر الوطنية 2030.

ومن هذا المنطلق والتزاماً بمسؤولياتها قامت وزارة المواصلات والاتصالات بإعداد خطة النقل الشاملة لدولة قطر حتى عام 2050م بمشاركة ومساهمة العديد من الجهات الحكومية والخاصة والمختصين بهذا المجال.

توفر خطة النقل الشاملة لدولة قطر إطارًا شاملاً لمستقبل النقل البري فضلاً عن مجموعة متكاملة من المبادرات والمشاريع لخدمة جميع مستخدمي أنظمة وشبكات النقل البري، وذلك لتطوير مستوى خدمات النقل بما يتواكب مع النمو السكاني المتزايد في جميع أنحاء دولة قطر والتنمية الاقتصادية على مدار الثلاثين عامًا القادمة حتى عام 2050م. وهذه الخطة بعيدة المدى ستضع دولة قطر في المقدمة كأحد أكثر دول العالم استدامة من خلال توفير حلول نقل مبتكرة ومستدامة لدعم الاقتصاد، وتحسين جودة الحياة للمواطنين والمقيمين في دولة قطر مع الحفاظ على هويتها الوطنية.

واستمدت هذه الخطة مبادراتها وسياساتها وأدلتها من ركائز رؤية قطر الوطنية 2030، والتي تطمح إلى أن تكون دولة قطر في طليعة الدول المتقدمة، في ظل القيادة الرشيدة لحضرة صاحب السمو الشيخ تميم بن حمد آل ثاني أمير البلاد المفدى.

كما قدمت العديد من الجهات مساهمات وتعاوناً كبيراً في إعداد هذه الخطة الطموحة. ولمواصلة تطوير هذه الخطة وضمان تنفيذها بنجاح تحث وزارة المواصلات والاتصالات جميع الجهات الأخرى للاطلاع على هذه الخطة، والعمل معًا مسترشدين بها لتطوير أنظمة نقل بري متكاملة تلتزم بالأهداف الوطنية لمستقبل مزدهر ومستدام.

كما تؤكد وزارة المواصلات والاتصالات على التزامها بالعمل الجاد والدؤوب من خلال المشاريع والبرامج المستقبلية التي تهدف إلى بناء نظام نقل بري قائم على أحدث التقنيات وأفضل الممارسات في هذا القطاع.

Foreword

Land transportation is one of the key sectors that tremendously helps improve all aspects of life and ensures the delivery of goods and services to individuals and communities. It also underpins the growth of other sectors, such as agriculture, industry, mining and trade and drives the sustainable development of cities, societies and the economy in step with the objectives of the Qatar National Vision 2030.

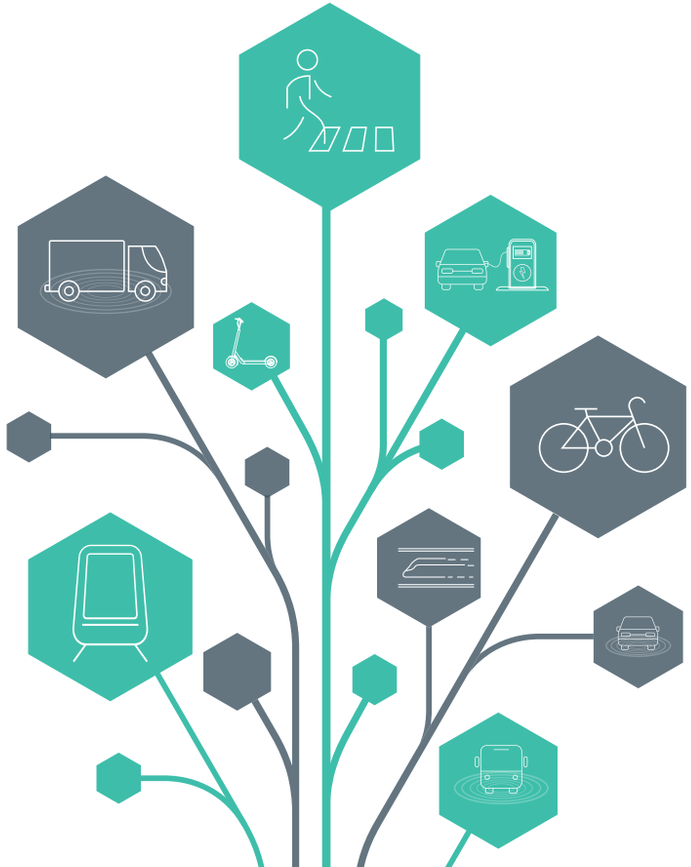
It is with this understanding that the Ministry of Transport and Communications (MOTC), in compliance with its responsibilities, has developed the Transportation Master Plan for the State of Qatar (TMPQ) with collaboration and input from multiple government and private entities and other relevant stakeholders and organizations.

The TMPQ provides an overarching framework for the future of land transportation that recommends an integrated set of transportation initiatives and projects for all users of land transportation systems, which will accommodate the population growth and a growing development momentum across Qatar over the next 30 years until 2050. This far-reaching masterplan can eventually bring Qatar to the forefront of world's most sustainable nations by providing innovative and sustainable transportation solutions that further boost the economy, improve the quality of life for citizens and residents, while preserving the national identity of Qatar.

The transportation schemes, initiatives, policies and manuals within TMPQ have been derived from the pillars of the Qatar National Vision 2030, which strive to place Qatar in forefront and the most advanced nations under the leadership of the Emir of Qatar, His Highness Sheikh Tamim Bin Hamad Al Thani.

A multitude of stakeholders played key roles and made very significant contributions to this ambitious plan. To continue that development and for successful implementation, MOTC encourages all other entities to familiarize themselves with the TMPQ and work together guided by this plan to develop integrated transportation systems that zoom on in the national objectives for a prosperous and sustainable future.

MOTC further stresses its commitment to working relentlessly on many future projects and programs and which aim to deliver a land transportation system that is based on latest technologies and best practices in the transportation field.



2050

نقـل متكامـل ومسـتدام للجميـع

INTEGRATED & SUSTAINABLE TRANSPORT FOR ALL

Disclaimer

The Ministry of Transport and Communications (MOTC) of Qatar has developed this document with upmost due diligence, using information, statistics and survey data available at the time of writing and following international best practices.

Without any liability to MOTC, the using of content contained herein and its supplementary data for any work purpose, does not relieve the user from exercising due diligence and sound engineering practices as per international best practices, nor does it entitle the user to claim or receive any kind of compensation for damages or loss that might be attributed to such use.

Access to this document shall be officially requested from MOTC Which means your acceptance to what is stated in this notice. Except where otherwise specified, users may view, copy and print the Document Contents only for their own use, provided that all copies and printouts of the Contents bear the copyright and other proprietary notices and disclaimers displayed on the Document. Users shall not advertise, publicize, release statements and/or disclose any information included in this Document whatsoever without the prior written consent from MOTC.

Future changes, amendments and versions of this Document will be made available by MOTC and can be obtained by contacting the department authorized by the Ministry. Users are therefore advised to investigate and verify that the version they have is the latest and up-to-date one.

Note: New findings, technologies, and topics related to the planning, designing, operating, and maintaining of transportation and traffic systems will regularly be used by MOTC to keep this report up to date. Users are encouraged to provide feedback through MOTC communication channels. Feedback will be reviewed, assessed, and possibly included in the next version.

تنويه

قامت وزارة المواصلات والاتصالات بإعداد هذا التقرير ضمن اختصاصاتها وصلاحياتها وفقاً لأحدث الممارسات العالمية في هذا المجال وبناءً على المعلومات، والإحصائيات والبيانات المتوفرة عند إعداد هذا التقرير. لذا إن استخدام هذا التقرير لأي عمل، لا يعفي المستخدمين من استخدام أحدث الممارسات العالمية، واتباع الأساليب الهندسية الصحيحة وفقاً لأحدث التقنيات العالمية المتبعة.

وعليه وجب التأكيد على أن وزارة المواصلات والاتصالات لا تتحمل أي مسؤولية مالية أو قانونية يمكن أن تُعزى إلى هذا الاستخدام، كما أنه لا يحق للمستخدمين المطالبة أو استلام أي نوع من التعويض عن أية أضرار أو خسائر.

وللحصول على نسخة من هذا التقرير، يجب التقدم بطلب رسمي إلى وزارة المواصلات والاتصالات في دولة قطر والذي يعد موافقة على ماورد في هذا التنويه. ويجوز للمستخدمين عرض محتويات التقرير ونسخها وطباعتها للاستخدام الخاص فقط، شريطة أن تحمل جميع النسخ والمطبوعات الخاصة بالمحتويات حقوق النشر وإشعارات الملكية وإخلاء المسؤولية الأخرى المعروضة على التقرير. كما لا يجوز للمستخدمين الإعلان أو النشر أو الإفصاح عن البيانات و / أو الكشف عن أي معلومات مدرجة في هذا التقرير على الإطلاق دون موافقة كتابية مسبقة من قبل وزارة المواصلات والاتصالات.

وفيما يخص التغييرات أو الإصدارات المستقبلية، ستقوم الوزارة بتوفيرها ويمكن الحصول عليها من خلال الاتصال بالإدارة المخولة في الوزارة، وعليه يتوجب على المستخدمين التحقق بشكل متواصل بأن لديهم أحدث إصدار من هذا التقرير.

ملاحظة: ستقوم وزارة المواصلات والاتصالات بمواصلة تحديث وتعديل هذا التقرير مع الأخذ بعين الاعتبار النظريات الجديدة وأحدث الأساليب التكنولوجية والمواضيع المُستجدة التي تتعلق بتخطيط وتحليل وتصميم أنظمة النقل والمرور.

إن وزارة المواصلات والاتصالات تشجع المستخدمين على تقديم الملاحظات والاقتراحات والتعليقات وردود الأفعال وذلك من خلال قنوات الاتصال الخاصة بالوزارة، وسيتم مراجعة هذه الملاحظات والاقتراحات ومن ثم تقييمها للنظر في إمكانية إدراجها ضمن الإصدار القادم من التقرير.

Qatar 2050 قطر
الخطة الشاملة للنقل
Transportation Master Plan

Table of Contents

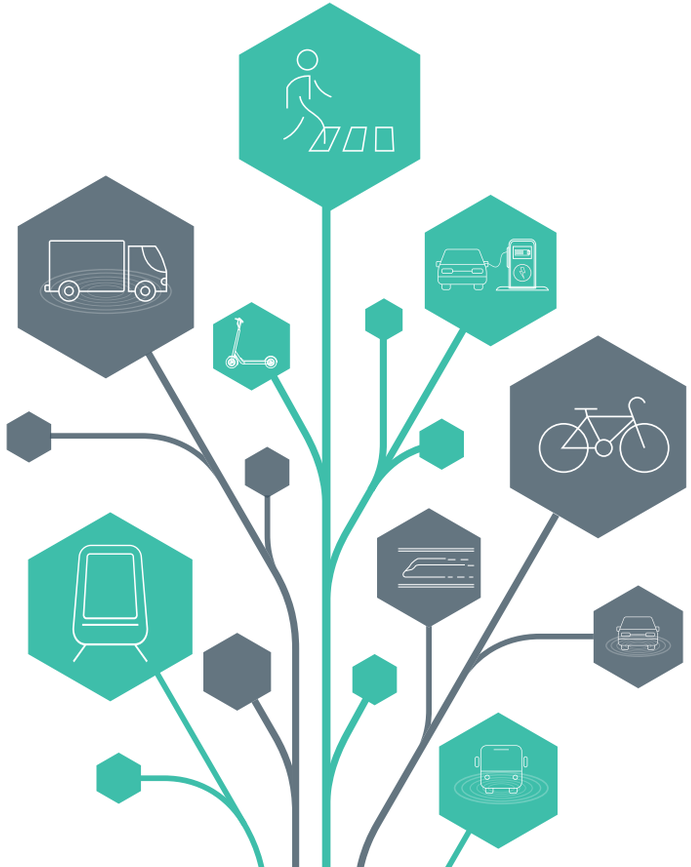
Qatar 2050 قطر
الخطة الشاملة للنقل
Transportation Master Plan

Qatar 2050 قطر
الخطة الشاملة للنقل
Transportation Master Plan

List of Figures

Qatar 2050 قطر
الخطة الشاملة للنقل
Transportation Master Plan

List of Appendices



2050

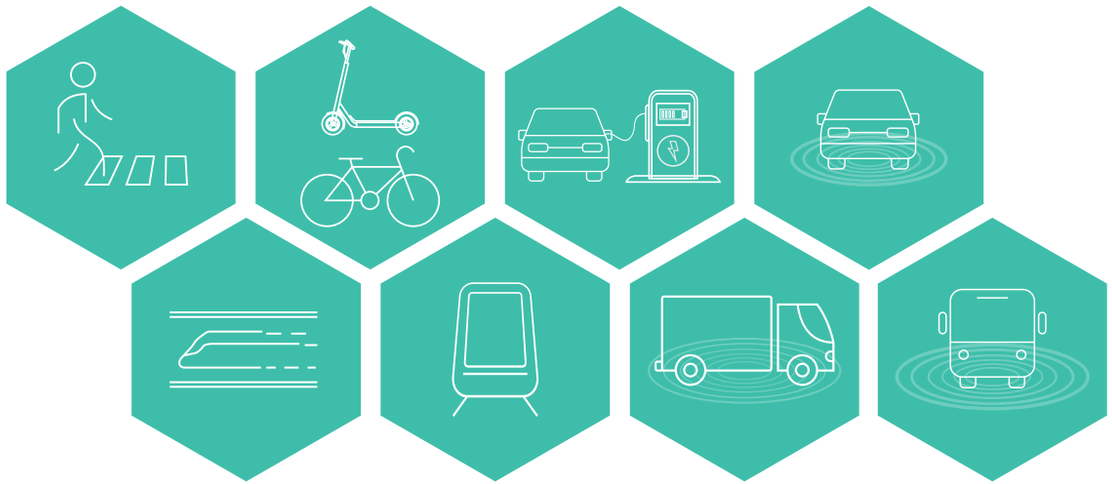
نقـل متكامـل ومسـتدام للجميـع

INTEGRATED & SUSTAINABLE TRANSPORT FOR ALL

2070

SECTION - 01

INTRODUCTION



1 INTRODUCTION

1.1 THE ROLE OF TAF IN THE TMPQ

TAF has a significant role for the overall transportation planning process in Qatar. It will be used as a planning tool by the Working Technical Group formed by the LTPD & TAD (MOTC) and the Department of Public Projects Management & Public Budget Department (MOF) for the assessment, approval and funding of transportation projects. Figure 1.1: illustrates TAF's role in the various stages of the planning process, including scheme development, scheme sifting, scenario development, Multi-Criteria Assessment (MCA) and Cost Benefit Analysis (CBA). It enables important decisions to be made about the approval and funding of projects on the basis of robust information for a range of impacts from the proposals under consideration.

Figure 1.1 - The Role of the TAF in Transportation Planning

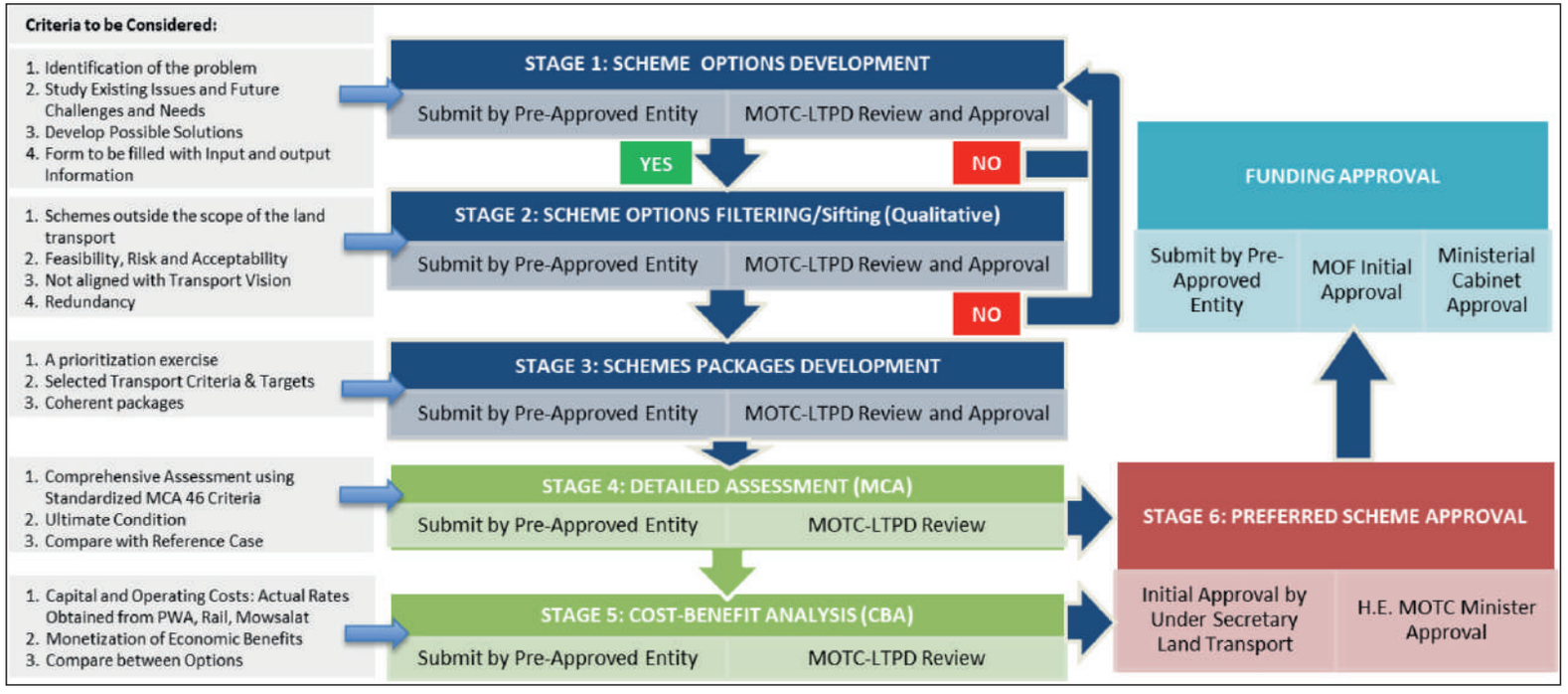


Figure 1.2: illustrates the TAF process within the TMPQ, which comprises:

- Inputs:
  - A range of standard inputs (including parameters and factors) sourced mostly from TMPQ "Transportation Planning and Traffic Analysis Parameters for Qatar", but also from international benchmarking and public authorities, especially the MOTC;
  - Variable inputs, which are the data obtained from external sources, such as the QSTM2.0 Transportation Model and GIS, and vary by scenario and horizon year;
  - Unit cost ratios used for the estimation of capital and operating costs for individual schemes, which are used in the economic analysis.
- The Multi-Criteria Analysis under TAF is carried out in Technical Report 6 of the Updated TMPQ. It contains the assessment of the various TAF indicators. For the purposes of the MCA, only the model results for the ultimate horizon year (2050) will be assessed, when all schemes in each scenario will have been implemented. The MCA will be produced for the scenarios under consideration as well as for the final TMPQ.
- An intermediate, less detailed, CBA is applied to these scenarios, using the model results and capital cost estimates for the ultimate horizon year (2050) (Updated TMPQ-Volume 5).
- The TAF results, together with the results from the intermediate CBA, will enable the assessment of the impacts, implications and trade-offs for all scenarios. This leads to the selection of the final preferred scenario.
- The final preferred scenario is further refined, and sensitivity tests are undertaken, before becoming the proposed Updated TMPQ.
- The preferred scenario is further assessed by a full Cost-Benefit Analysis, indicating the main economic indicators (e.g. NPV, BCR, IRR). For this purpose, costs and benefits will need to be phased against all horizon years (2025, 2030, 2035 and 2050), reflecting the implementation period for each scheme included in the plan.

Figure 1.2 - The TAF Process

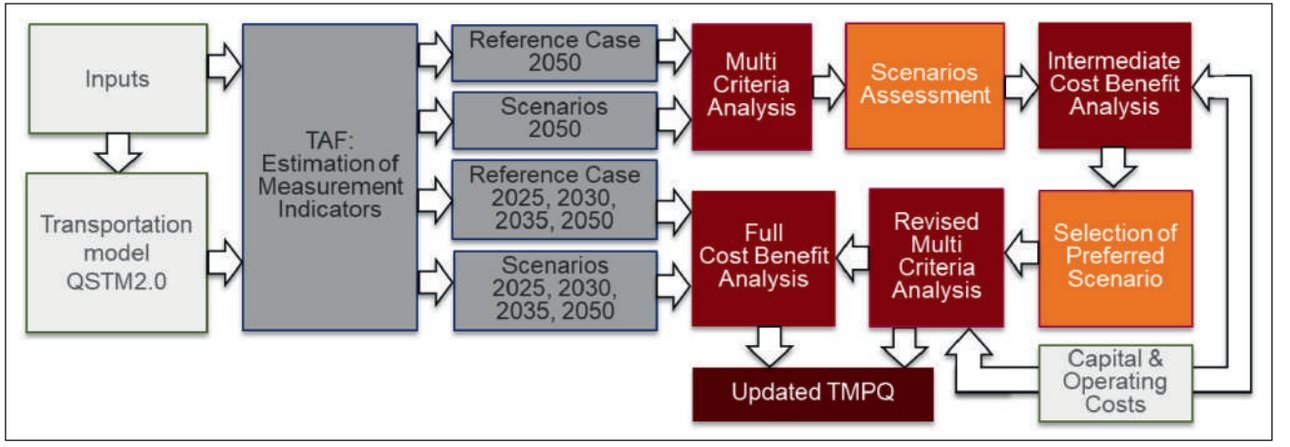


Figure 1.3 below presents the proposed AST, a summary of the assessment of several indicators in relation to the Reference Case. These indicators were defined based on the possible ways of measuring the degree of fulfilment of the specific objectives of the TMPQ. Individually, each indicator can only provide an indication of an aspect or a perspective for a specific impact, but collectively these indicators have been developed to represent a meaningful and sufficiently robust assessment framework. The ASTs ensure that the differences in performance between the alternative transportation scenarios can be clearly identified. Their standardized format provides ease of understanding and interpretation by decision makers. Whenever possible, the assessment indicators have been defined by transportation mode, by passenger/freight or by any other relevant classification.

The AST also shows how each indicator is expected to be measured, if quantitatively by the QSTM2.0, quantitatively by other means (e.g. GIS or estimates made without the use of the model) or qualitatively.

Figure 1.3 - Measurement Indicators Used for Option Assessment

General Objectives	Specific Objectives	Measurement Indicator (Changes in Relation to the Reference Case)	Measurement Type		
			Quantitative Model	Quantitative Other	Qualitative
1. Provide an Efficient & Integrated Transportation System	1.1. Improve Operational Efficiency of the Transportation System	Total distance traveled by mode (vehicle-km/year) Average passenger travel distance by mode (km/journey) Average passenger travel speed by mode (km/h)	✓		
	1.2. Reduce the Amount of Time Spent by Passengers Traveling	Total pass-h by mode (pass-hours/year) Average journey time by mode (minutes/journey)	✓		
	1.3. Seek Reliable Movement of Goods	Number of goods vehicle hours under congested and uncongested conditions (# hours) Percentage of goods vehicle hours under congested conditions over the total hours traveled (%)	✓		
	1.4. Seek Reliable Movement for Travelers	Number of passenger-hours under congested and uncongested conditions for road vehicles (# hours) Percentage of passenger-hours under congested conditions over the total passenger-hours (%)	✓		
	1.5. Improve Integration Between Different Services and Modes	Number of trips and average number of trips that entail ≥1 transfers (#) Average time spent in transfers (hours)	✓		
		Qualitative statements that summarize the extent to which proposed measures are expected to impact in overall levels of network integration between services and modes (both physical improvements and policy-based improvements)			✓

Figure 1.3 - Measurement Indicators Used for Option Assessment

General Objectives	Specific Objectives	Measurement Indicator (Changes in Relation to the Reference Case)	Measurement Type		
			Quantitative Model	Quantitative Other	Qualitative
2. Promote Transportation Mobility & Accessibility	2.1. Increase the Availability and Attractiveness of Public Transport	Market share of Public Transport by mode (%)	✓		
		Population within a certain distance of a PT service (number of residents)		✓	
	2.2. Improve Access to Essential Destinations	Accessibility index to employment, health and education destinations by car and Public Transport (index)		✓	
	2.3. Provide an Affordable Transportation Experience	Average journey cost by mode (QAR/journey) Market share of the different modes per population group / level of income (%)	✓		
	2.4. Improve Non-Motorized Mobility Options	Number of trips made by walking & cycling (#) Percentage of trips made by walking & cycling (%)	✓		
		Pedestrian and Cycling Activity – qualitative statements that summarize the understanding of the scale and impact of any pedestrian and cycle related improvements			✓
	2.5. Ensure Acceptable Travel Conditions by all Modes for all Travelers	Levels of Service on all modes (roads and public transport): ▸ For roads: Km of network operating under different Levels of Service (km) ▸ For PT: km of PT network operating under different Levels of Service (km)	✓		
3. Ensure a Safe & Secure Transportation System	3.1. Reduce Number and Severity of Accidents	Number of expected accidents: total number of accidents by level of severity and road type (number of accidents)	✓	✓	
	3.2. Ensure Safe and Secure Transportation System	Qualitative statements that summarize how security and/or personal safety is anticipated to be improved by the proposed measures included in each alternative scenario.			✓
4. Protect the Environment & Ensure Sustainable Development	4.1. Reduce Transportation Related Local & Global Emissions	Estimation of the annual quantities of CO_2, NO_x, CO, HC, PM emissions (tones/year)	✓	✓	
	4.2. Enhance Transportation Energy and fuel Efficiency	Estimation of the annual fuel consumption by mode (liters/year) Estimation of the annual energy consumption by mode (megajoules/year)	✓	✓	
	4.3. Protect the Streetscape and Urban Realm	Qualitative statements that summarize the extent to which the proposed measures scheduled in each alternative scenario would impact sensitive parts of the urban area.			✓
	4.4. Ensure Sustainable Development	Qualitative statements that summarize the extent to which the proposed measures scheduled in each alternative scenario would contribute to encouraging sustainable development.			✓

Figure 1.3 - Measurement Indicators Used for Option Assessment

General Objectives	Specific Objectives	Measurement Indicator (Changes in Relation to the Reference Case)	Measurement Type		
			Quantitative Model	Quantitative Other	Qualitative
5. Support Economic Development	5.1. Improve Access to the Workforce	Number of employees located within a predetermined travel time catchment, by private vehicles and public transport, for selected employment locations (#)	✓	✓	
	5.2. Improve Access to International Markets	Goods - Average travel times for goods to the airport and ports (hours/journey) Business Travelers - Average travel times between the Central Business District and the airport using both private and public transport (hours/journey)	✓		
	5.3. Improve the Travel Experience for Tourists	Average travel times between main tourist O-D pairs (tourist attractions, hotel areas, HIA, Doha and Hamad Ports) by taxi and PT (minutes/journey) Average travel costs between main tourist O-D pairs (tourist attractions, hotel areas, HIA, Doha and Hamad Ports) by taxi and PT (QAR/journey)	✓		
	5.4. Improve Integration between Transportation & Land Use Planning	Qualitative statements that summarize the extent to which integration between the transportation system and land use will be improved and the impacts this may have in generating additional economic activity			✓
6. Maximize Quality of Life & Preserve Qatari Values	6.1. Promote Transportation Systems that Enhance Quality of Life	Qualitative statements that summarize the extent to which the proposed measures scheduled in each alternative scenario would contribute to increase the availability of travel options and / or increase traveler comfort and convenience			✓
	6.2. Promote Transportation Systems that Preserve Qatari Norms and Culture	Qualitative statements that summarize the Qatari based social and cultural impacts associated with any transportation related infrastructure, service and / or policy improvements scheduled in alternative testing scenarios.			✓
CBA	Ensure Value for Money	Total capital expenditure by scenario by implementation phase (QAR) Annual operating and maintenance costs (QAR/year) Total revenues (QAR/year) Total value of the time savings by passengers by mode (QAR/year) Total vehicle operating cost by mode (QAR/year) Total monetary valuation of changes in emissions (QAR/year) Total monetary valuation of changes in fuel consumption (QAR/year) Total monetary valuation of changes in accidents (QAR/year) Based on the results of the Social Cost Benefit Analysis - CBA: ▸ Benefit-Cost Ratio ▸ NPV and IRR	✓	✓	

1.2 TAF PLANNING TOOLKIT

The TAF Toolkit is a spreadsheet model which represents the factors, parameters, calculations and results reported in the guidance contained in Technical Report 2 of the Updated TMPQ, the Transportation Assessment Framework.

The purpose of this User Manual is to assist MOTC on setting up and running the Transportation Assessment Framework (TAF) Toolkit.

The Toolkit is divided into two files to optimize the performance of the tools and improve the assessment of results, while reducing the running times and performance of these files:

1. TAF_Data Processor.xlsm (Attached as Appendix 1)
2. TAF_Tool.xlsm (Attached as Appendix 2)
   a. Multi-Criteria Analysis (MCA)
   b. Benefit Cost Assessment (CBA)

The **Data Processor** calculates peak hour results using the QSTM2.0 model outputs while the **TAF Tool** collects this information and produces annual results that feed into the MCA and CBA sections of TAF as defined in Technical Report 2 of the Updated TMPQ.

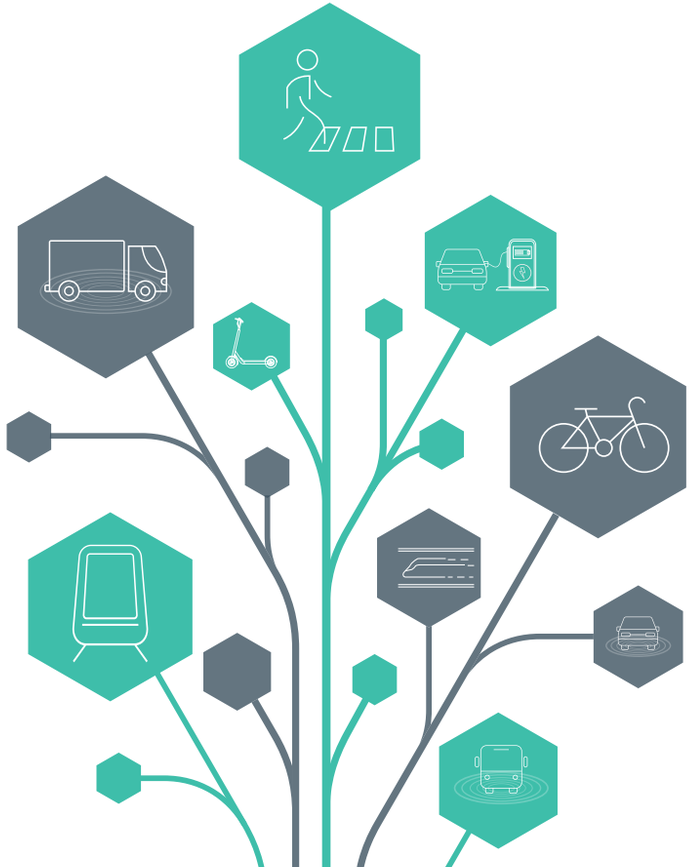
As shown in Figure 1.3, some specific indicators are qualitative while others are obtained by combining QSTM2.0 outputs and GIS. The TAF Toolkit focuses on the QSTM2.0 quantitative indicators, hence the qualitative and GIS dependent indicators must be manually inserted by the User in the TAF Tool as described in subsequent sections of the TAF Tool User Manual.

The TAF Toolkit uses a series of Visual Basic for Applications (VBA) scripts to process the information from the QSTM model. The computer requirements to run the TAF Toolkit are shown below:

1. Processor Intel® Core™ i7-8850H CPU @ 2.60GHz 2.59GHz
2. RAM 32.0GB
3. System Type 64-bites operating system, x64-based processor
4. Hard-drive (ROM) space 18 GBs per Scenario and HY.

The TAF Toolkit running times are around 8-10 hours for each TMPQ scenario and full set of Horizon Years (HYs) using the 32-bit version of Microsoft Excel. Nonetheless, it is worth mentioning that the Toolkit performance could be improved by using more powerful computers and 64-bit version of Microsoft Excel.

The following sections provide an overview of the main features, user guidelines and structure of the Toolkit



2050

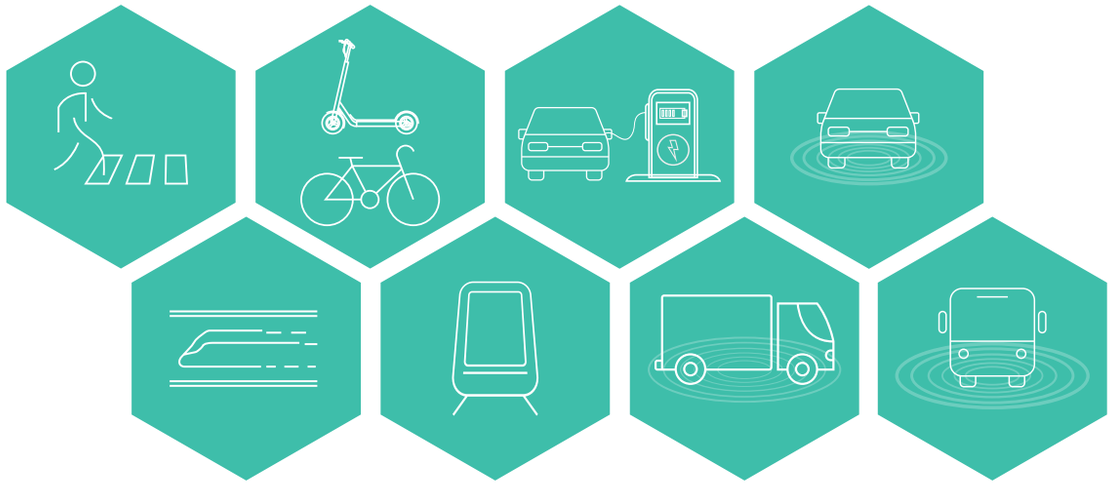
نقـل متكامـل ومسـتدام للجميـع

INTEGRATED & SUSTAINABLE TRANSPORT FOR ALL

02

SECTION - 02

MODEL KPI EXTRACTION PROCEDURE




Park & Ride
Park & Ride

2 MODEL KPI EXTRACTION PROCEDURE

This section summarizes the steps to be followed in extracting the KPIs from QSTM (Scenario) Models. TAF tool need the three outputs from the model:

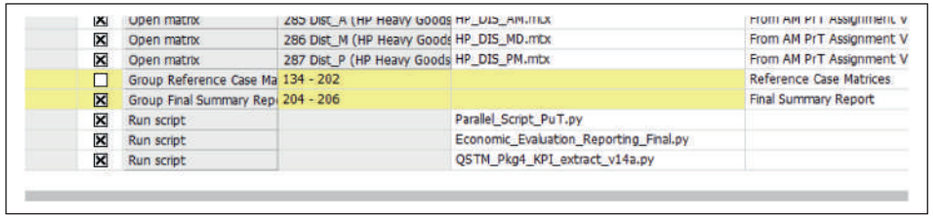
- KPI Extract
- Network Output Extract
- Mode-Purpose matrices Extract

2.1 KPIS EXTRACT

KPI extraction process is automated and implemented through Visum procedure sequence. QSTM_pkg4_KPI_extract_v14a.py file should be placed in ../Py folder of the model setup. A step-by-step approach is presented as follows:

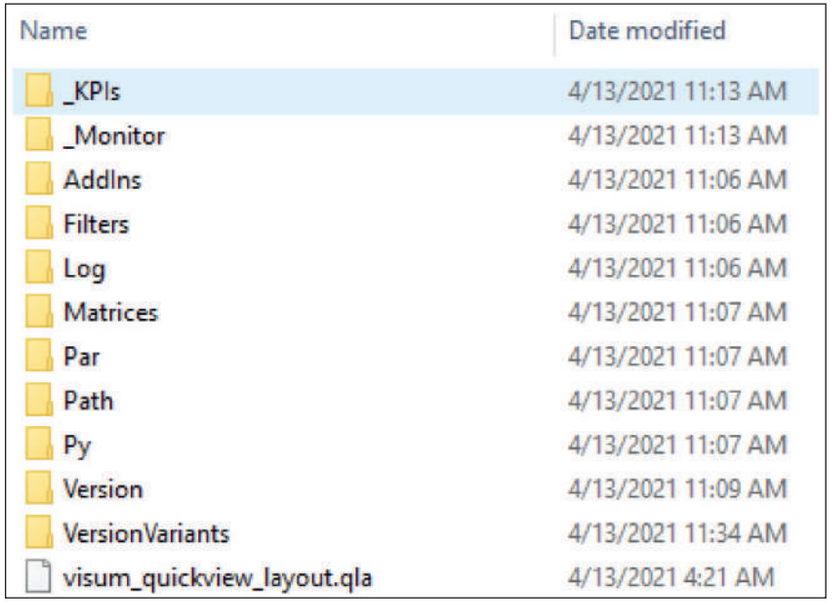
- Model run should finish before extracting the results and project directories setup should be undertaken using the ../Path/*.pfd file.
- Attach the QSTM_pkg4_KPI_extract_v14a.py to the end of the procedure sequence. The script is available in the Model Py folder.
- Run selected procedure.

Figure 2.1 - QSTM 2.0 Procedure Sequence

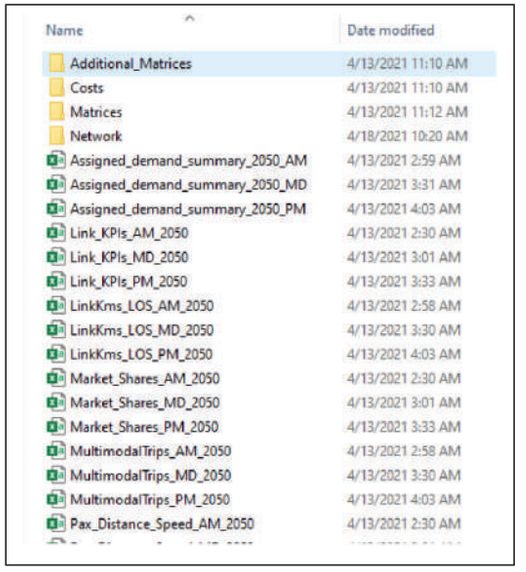


- This will save the required output files in the folder /_KPIs in the main folder structure. Different outputs produced are shown in the below figures.

Figure 2.2 - QSTM 2.0 Folder Structure and Output File Structure

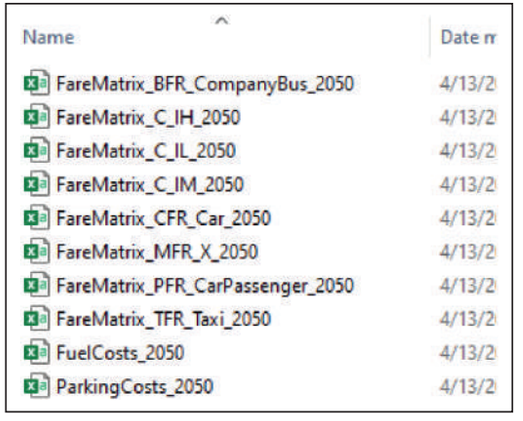


Overall Folder Structure

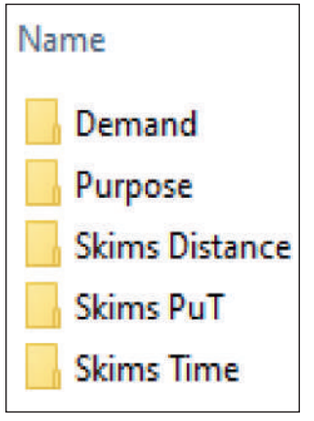


Files in _KPIs Folder

Files in _KPIs/Additional_Matrices



Files in _KPIs/Costs



Files in _KPIs/Matrices

The files used by the TAF Data Processor are described below:

1. Cost matrices provide information regarding the average trip cost in QAR between OD pairs. Their names use the following naming convention: FareMatrix_User_HY.
2. Passenger matrices provide information regarding the passenger demand between OD pairs. Their names use the following naming convention: PaxMatrix_User_Peak_HY
3. Vehicle matrices include information regarding the vehicle demand between OD pairs. Their names use the following naming convention: VehMatrix_User_Peak_HY
4. Purpose matrices provide information regarding the passenger demand by population group, purpose and model area (Greater Doha Metropolitan Area / Outside Doha Metropolitan Area) between OD pairs. Their names use the following naming convention: GDA/notGDA_PopulationGroup_Purpose_Peak_HY
5. Skim distance matrices provide information regarding the weighted average distance between OD pairs in kilometers with (DCur) and without (DIS0) congestion conditions. Their names use the following naming convention: SkimMatrix_User_Distance_Peak_HY
6. Skim time matrices provide information regarding the weighted average journey time between OD pairs in hours with (TCur) and without (TT0) congestion conditions. Their names use the following naming convention: SkimMatrix_User_Time_Peak_HY
7. Public transport skim matrices provide information for different indicators such as:
    a. Number of transfers between OD pairs. Their names use the following naming convention: SkimMatrix_NTR_Peak_HY.

b. Total waiting time between OD pairs. Their names use the following naming convention: SkimMatrix_TWT_Peak_HY.

c. Travel time between OD pairs. Their names use the following naming convention: SkimMatrix_JRT_Peak_HY.

8. There are two network statistics files for private and public transport:

a. Link level file for private transport, using the following naming convention Link_Level_HY.

b. Route level file for public transport, using the following naming convention Route_Level_HY.

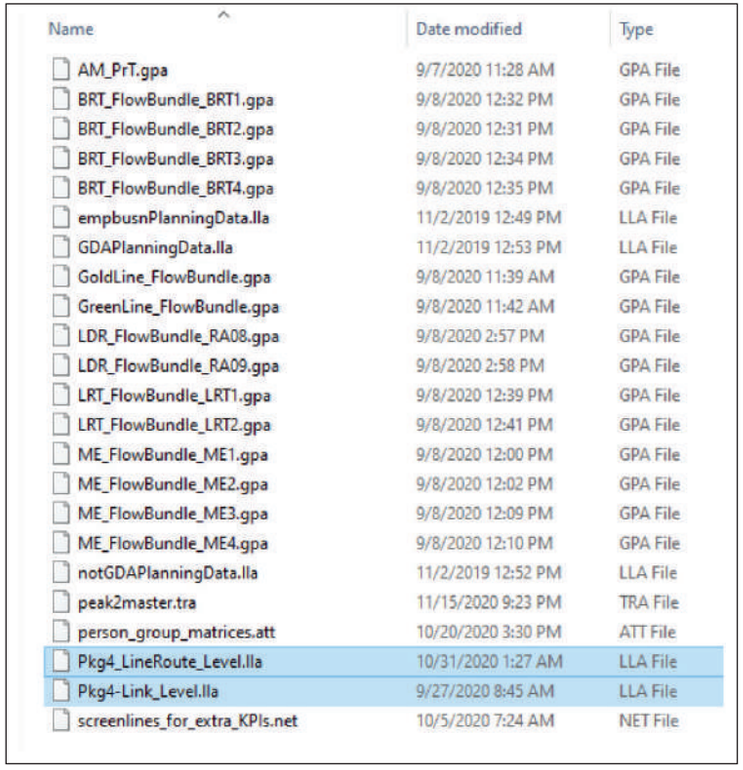
2.2 NETWORK OUTPUT EXTRACT

Network output extraction is done manually. The following steps are suggested:

- Create two excel files with names: Link_Level_20xx.xlsx, Line_Level_20xx.xlsx. Create tabs AM, MD, and PM in each.

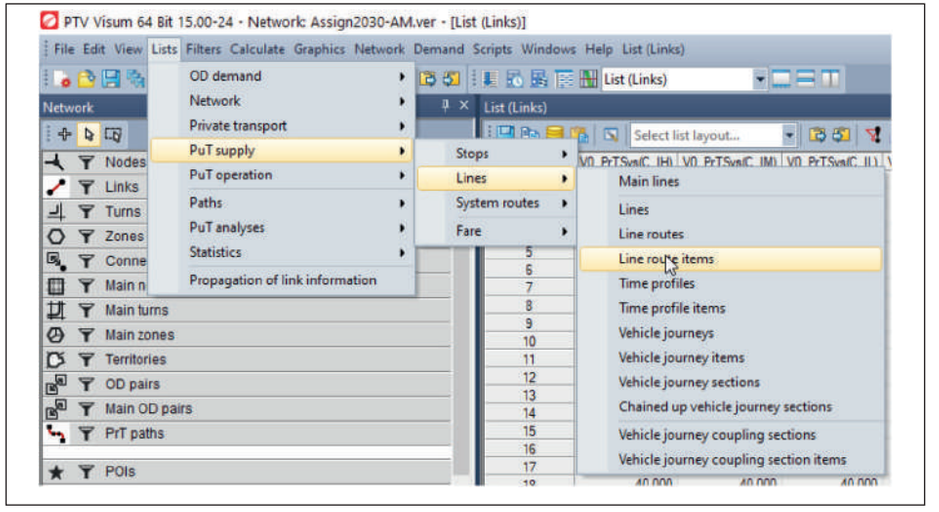
Open the peak Visum version file. Open Links list. In the _Monitor folder select the Pkg4-Link_Level.lla and drop on the links list in Visum. Copy and paste the overall link list in respective peak hour (ex: AM) Tab.

Figure 2.3 - QSTM 2.0 Procedure Sequence



- Repeat the step for other peaks. Save and close the Link_Level_20xx.xlsx file.
- Open the peak Visum version file. Open Line Route Items list. In the _Monitor folder select the Pkg4-Line_Level.lla and drop on the line route items list in Visum. Copy and paste the overall results list in Peak Tab.

Figure 2.4 - QSTM 2.0 Line Route Items List



- Repeat the procedure for other peaks. Save and close the Line_Level_20xx.xlsx file.

2.3 MODE PURPOSE MATRICES EXTRACT

Extraction of mode-purpose matrices are automated through Visum procedure sequence.

Assumptions used in developing mode aggregation and purpose aggregation is presented in detail in the "Area_Mode_Purpose by PG.xlsx" made available in the VersionVariants folder. The detailed steps to be followed were documented in the "Mode_Purpose_Matrices Extraction. docx" available in the same folder. Summary of the steps required to generate the mode purpose matrices for QSTM 2.0 Models is as follows:

- The folder has the transfer files, python script files, and Procedure Parameters files as shown below.

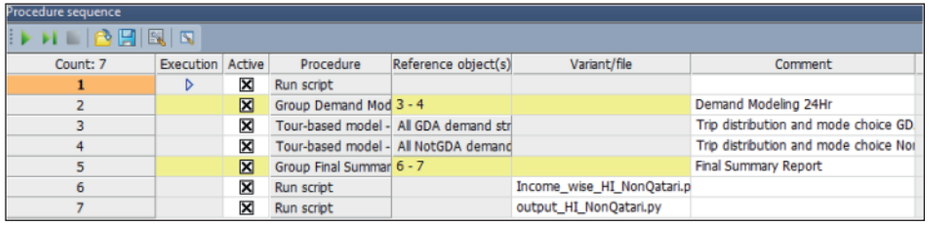
Figure 2.5 - QSTM 2.0 Procedure Sequence

Name	Date modified	Type	Size
HI_NonQatari.att	10/8/2020 10:24 AM	ATT File	295 KB
HI_Qatari.att	10/8/2020 10:24 AM	ATT File	294 KB
LBR_NonQatari.att	10/8/2020 11:05 AM	ATT File	301 KB
LI_NonQatari.att	10/8/2020 11:05 AM	ATT File	295 KB
MI_NonQatari.att	10/8/2020 11:05 AM	ATT File	296 KB
Area_Mode_Purpose by PG	10/6/2020 6:39 PM	Microsoft Excel W...	26 KB
Matrices list	10/8/2020 12:15 PM	Microsoft Excel W...	692 KB
Mode, Purpose Analysis_2050Sce5a_PT3	10/8/2020 12:18 PM	Microsoft Excel W...	290 KB
Mode_Purpose_Matrices Extraction	3/24/2020 9:02 AM	Microsoft Word D...	424 KB
Proc_HI_NonQatari.par	10/6/2020 5:39 PM	PAR File	549 KB
Proc_HI_Qatari.par	10/6/2020 7:43 PM	PAR File	495 KB
Proc_LBR_NonQatari.par	10/6/2020 3:41 PM	PAR File	484 KB
Proc_LI_NonQatari.par	10/6/2020 6:45 PM	PAR File	435 KB
Proc_MI_NonQatari.par	10/6/2020 7:10 PM	PAR File	738 KB
Income_wise_HI_NonQatari	10/6/2020 5:31 PM	Python File	11 KB
Income_wise_HI_Qatari	10/6/2020 5:28 PM	Python File	11 KB
Income_wise_LBR_NonQatari	10/6/2020 5:31 PM	Python File	11 KB
Income_wise_LI_NonQatari	10/6/2020 5:32 PM	Python File	11 KB
Income_wise_MI_NonQatari	10/6/2020 5:30 PM	Python File	11 KB
output_HI_NonQatari	10/6/2020 5:07 PM	Python File	3 KB
output_HI_Qatari	10/6/2020 5:07 PM	Python File	3 KB
output_LBR_NonQatari	10/6/2020 5:08 PM	Python File	3 KB
output_LI_NonQatari	10/6/2020 5:08 PM	Python File	3 KB
output_MI_NonQatari	10/6/2020 5:09 PM	Python File	3 KB
Master_To_HI_NonQatari.tra	10/6/2020 5:36 PM	TRA File	290 KB
Master_To_HI_Qatari.tra	10/6/2020 5:03 PM	TRA File	289 KB
Master_To_LBR_NonQatari.tra	10/6/2020 5:06 PM	TRA File	295 KB
Master_To_LI_NonQatari.tra	10/6/2020 5:04 PM	TRA File	290 KB
Master_To_MI_NonQatari.tra	10/6/2020 5:05 PM	TRA File	290 KB

- Copy the Master Version File to the "..//VersionVariants" Folder (5 copies). Rename the Master Version for the corresponding model year with following prefixes:
  - HI_NonQatari
  - HI_Qatari
  - MI_NonQatari
  - LI_NonQatari
  - LBR_NonQatari

STEPS for each Version File – No need to add paths.

- PFD settings are not required. Results are automatically directed to _KPIs/Matrices/Purpose.
- Open HI_NonQatari (High Income) Version file and drag and drop the "HI_NonQatari.tra" file corresponding to the category.
  - Press OK to all following windows that appear. No need to Save.
- Drag and drop the corresponding procedure parameter file "Proc_HI_NonQatari.par" into VISUM procedures window.
- Check the link to two corresponding python files.

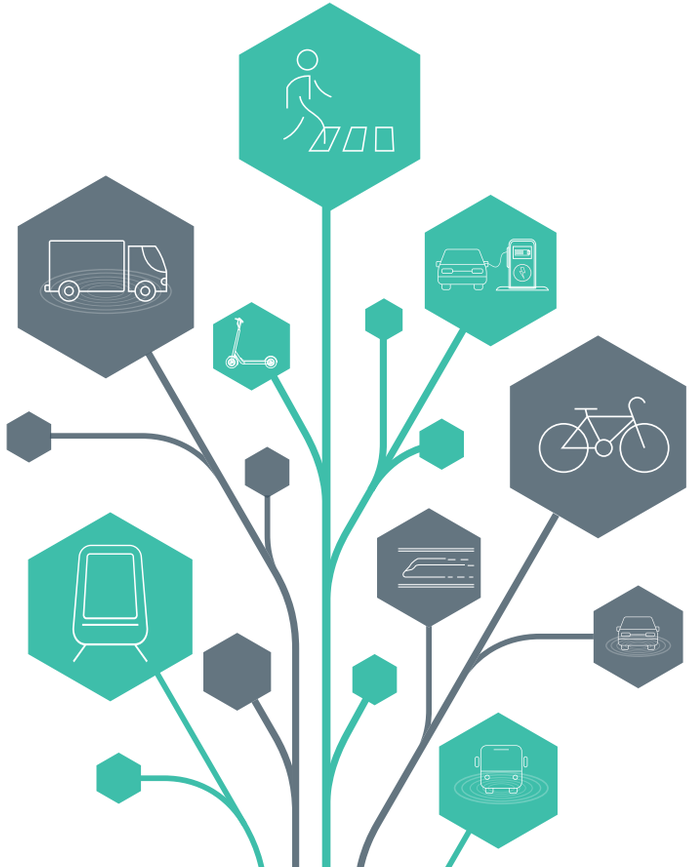

Procedure sequence

Count: 7	Execution	Active	Procedure	Reference object(s)	Variant/file	Comment
1		☒	Run script			
2		☒	Group Demand Mod	3 - 4		Demand Modeling 24Hr
3		☒	Tour-based model -	All GDA demand str		Trip distribution and mode choice GD
4		☒	Tour-based model -	All NotGDA demand		Trip distribution and mode choice No
5		☒	Group Final Summar	6 - 7		Final Summary Report
6		☒	Run script		Income_wise_HI_NonQatari.p	
7		☒	Run script		output_HI_NonQatari.py	

- Run the Procedure sequence.
- No need to save and maintain the version files. (20GB approximately per version)
- Repeat the process for the rest of the population category models.

2.4 INPUT TO TAF

Full folder _KPIs shall be carried to TAF input specification folder and change the name of the folder to the corresponding year.



2050

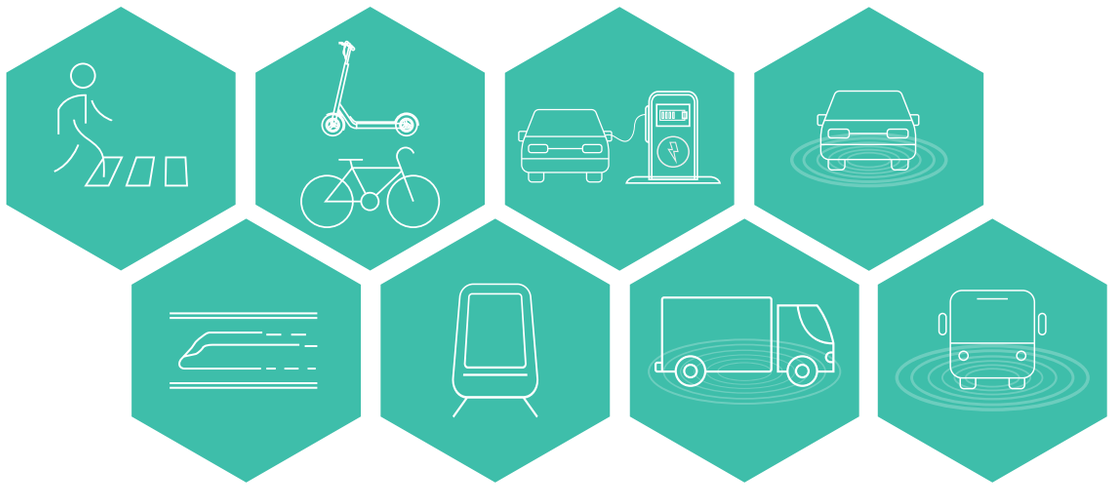
نقـل متكامـل ومسـتدام للجميـع

INTEGRATED & SUSTAINABLE TRANSPORT FOR ALL

2070

SECTION - 03

TAF DATA PROCESSOR



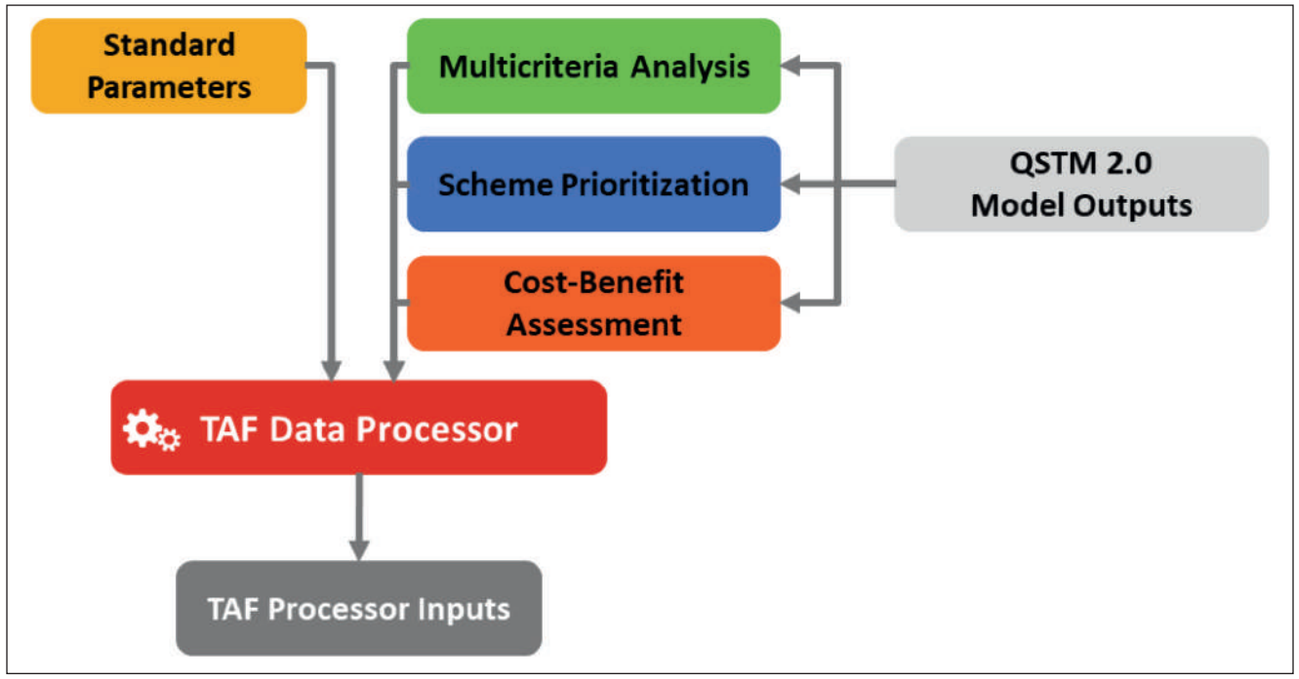

Park & Ride
qatar 2022
FIFA WORLD CUP
qatar
Park & Ride
qatar
BUS
STOP
STOP

3 TAF DATA PROCESSOR

3.1 DATA PROCESSOR – TOOL STRUCTURE

The TAF Data Processor structure is shown in Figure 3.1.

Figure 3.1 - TAF Data Processor Structure



The Data Processor tool includes 5 main sections as defined in Figure 3.1: Standard Parameters, Multicriteria Analysis, Scheme Prioritization, Cost-Benefit Assessment and TAF Processor Inputs. The Tool is defined in a user-friendly manner with separate sheets corresponding to each of these sections using distinctive color-coding (as in the above figure) and sheets structured within these sections.

There is an additional introduction section named '***Info***', which includes the User Guidelines that explain the Data Processor contents and the interface that allows running the different sets of scripts in the Tool.

The '***Standard Parameters***' section covers the information related to rates applicable to the TAF Data Processor calculations, such as accident rates and emission rates, as reported in Technical Report 2 of the Updated TMPQ.

The '***Multicriteria Analysis***' and '***Cost-Benefit Assessment***' sections include the calculation and data sources used by the Data Processor to produce peak hour information from the QSTM2.0 model outputs.

The '***Scheme Prioritization***' section include the calculations and data sources used by the Data Processor to assist in the Scenario Development process.

The '***TAF Processor Inputs***' section summaries the Data Processor results after running the scripts.

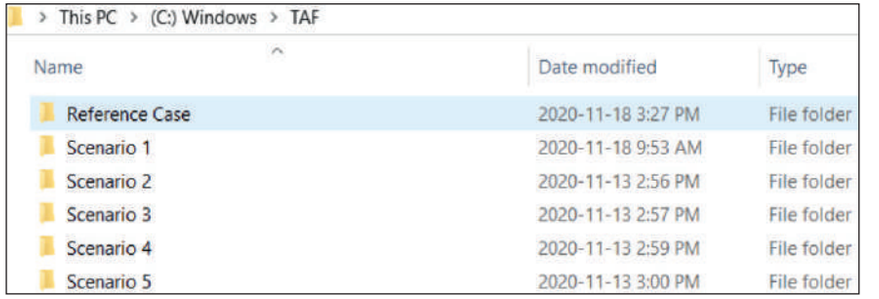
3.2 DATA PROCESSOR – SETTING UP THE FOLDER STRUCTURE

The Data Processor requires setting up a folder structure in order to properly run the macros included in the tool. The Data Processor uses the QSTM2.0 model data (*input*) and produces the quantitative results required by TAF (*output*). The following figures use the Reference Case folder structure as an example. In addition, it is possible to set up the folder structure in any other local drive, in this example the Data Processor structure is placed in a '***C***' local drive.

The main folder structure is shown below:

C:\TAF

Figure 3.2 - TAF Main Folder



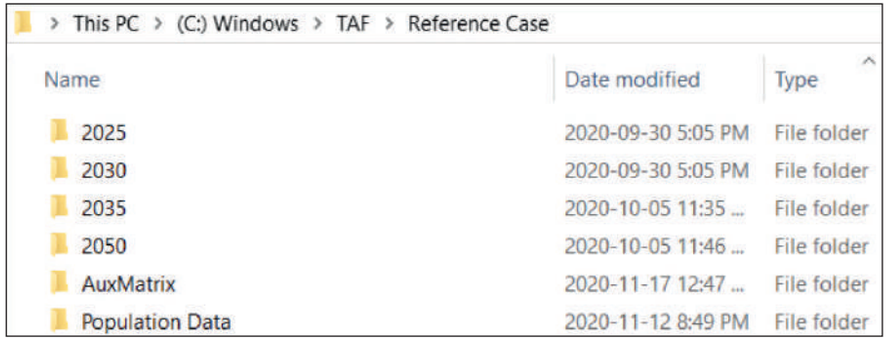
The next folder level contains the information related to each horizon year as shown in figure below.

C:\TAF\Scenario

Where:

- Scenario corresponds to the TMPQ Scenarios: Reference Case, Scenario 1, Scenario 2, Scenario 3, Scenario 4 or Scenario 5.
- Year corresponds to the TMPQ Horizon Years: 2025, 2030, 2035 and 2050.

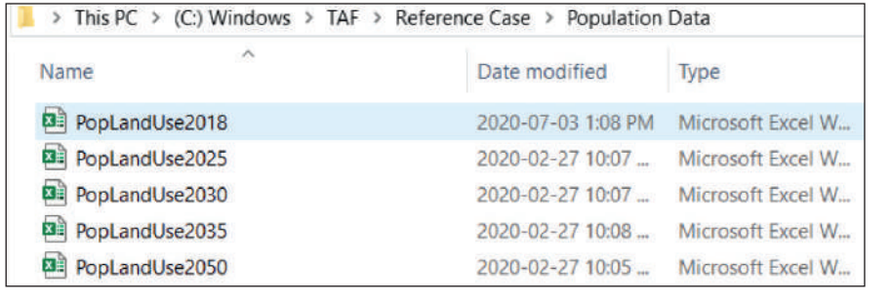
Figure 3.3 - Data Processor Scenario Folder



The folder contains the HYs folders (2025, 2030, 2035 and 2050) and two additional folders '*AuxMatrix*' and '*Population Data*'. The files included in each of the folders are described in the next paragraphs.

C:\TAF\Scenario\Population Data

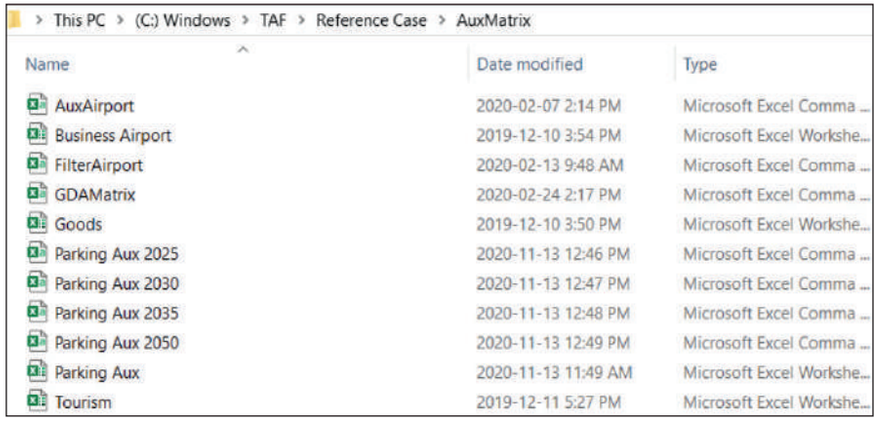
Figure 3.4 - Data Processor Population Data Folder



This folder contains the QSTM2.0 Planning Interface files. These files are required to run the Accessibility Index calculation.

C:\TAF\Scenario\AuxMatrix

Figure 3.5 - Data Processor AuxMatrix Folder



This folder contains supporting files for specific TAF calculations such as private and public average costs calculation, revenue calculation or average travel times calculation.

- AuxAirport is a matrix used to filter trips towards the airport.
- Business Airport is a matrix used to filter trips between the business areas in Qatar and the airports.
- Filter Airport is a matrix used to filter trips to and from the airport.
- GDAMatrix is a matrix used to filter trips to and from the Greater Doha Area.
- Goods is a matrix used to filter goods trips between ports and airports.
- Parking Aux 2025/2030/2035/2050 is a matrix used to filter the

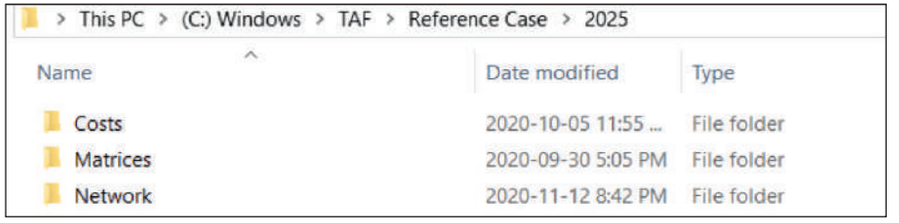
location of parking proposals.

- Parking Aux is the main file used to produce the Parking Aux 2025/2050.
- Tourism is a matrix used to filter the trips to and from touristic areas in Qatar.

C:\TAF\Scenario\Year

Within each year's folder, the archives are organized as follows:

Figure 3.6 - Data Processor Year Folder

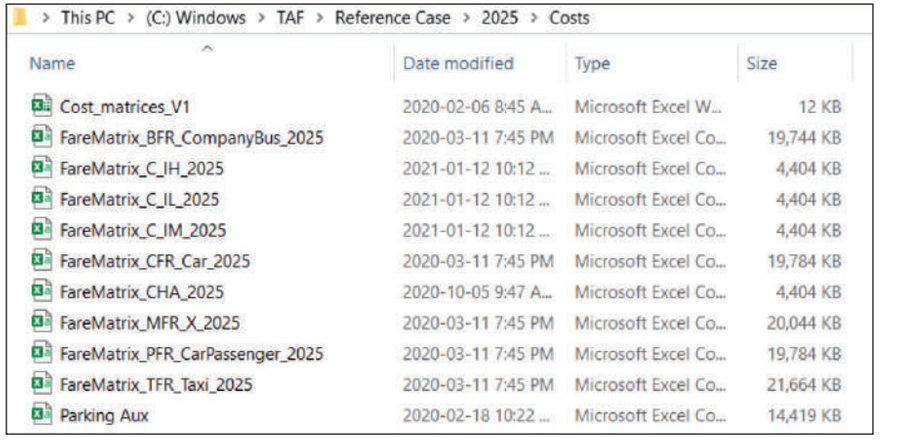


Where:

- Cost folder includes the files related to QSTM2.0 user costs.
- Matrices folder includes the files related to QSTM2.0 demand, purpose and skim matrices.
- Network folder includes the files related to QSTM2.0 link level and route level statistics.

C:\TAF\Scenario\Year\Costs

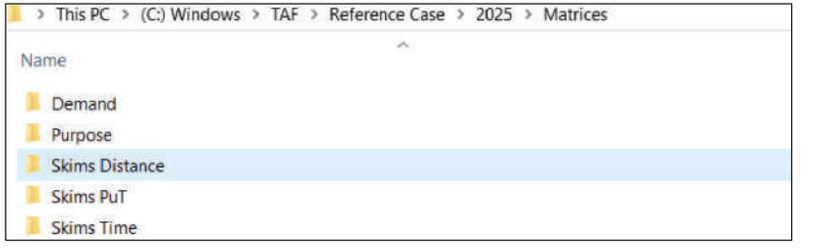
Figure 3.7 - Data Processor Cost Folder



The folder contains the main QSTM2.0 model fare matrices by mode. The file Cost_matrices_V1 contains general information regarding the assumptions used in the QSTM2.0 to estimate the fare matrices.

C:\TAF\Scenario\Year\Matrices

Figure 3.8 - Data Processor Matrices Folder



Where:

- Demand folder includes the files related to QSTM2.0 demand matrices (passenger and vehicle).
- Purpose folder includes the files related to QSTM2.0 purpose matrices.
- Skims Distance folder includes the files related to QSTM2.0 distance skim matrices except PuT matrices.
- Skims PuT folder includes all the files related to QSTM2.0 public transport skim matrices.
- Skims Time folder includes the files related to QSTM2.0 time skim matrices except PuT matrices.

C:\TAF\Scenario\Year\Matrices\Demand

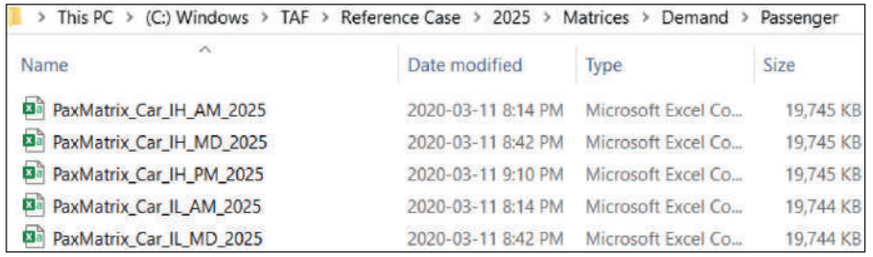
Figure 3.9 - Data Processor Demand Folder

Where:

- Passenger folder includes the files related to QSTM2.0 passenger matrices.
- Vehicle folder includes the files related to QSTM2.0 vehicle matrices.

C:\TAF\Scenario\Year\Matrices\Demand\Passenger

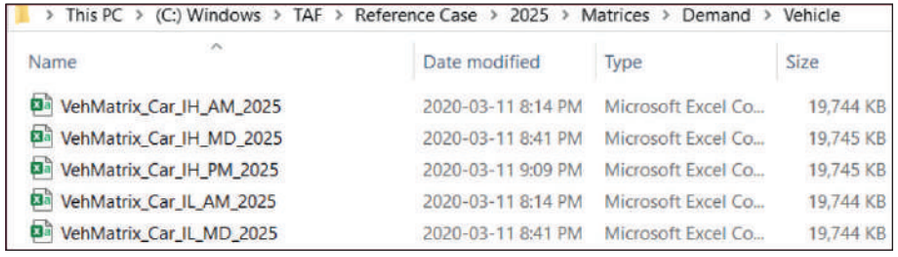
Figure 3.10 - Data Processor Passenger Folder



This folder contains QSTM2.0 passenger demand matrices. The files follow a standard naming convention which shall remain the same in order to run the Data Processor scripts.

C:\TAF\Scenario\Year\Matrices\Demand\Vehicle

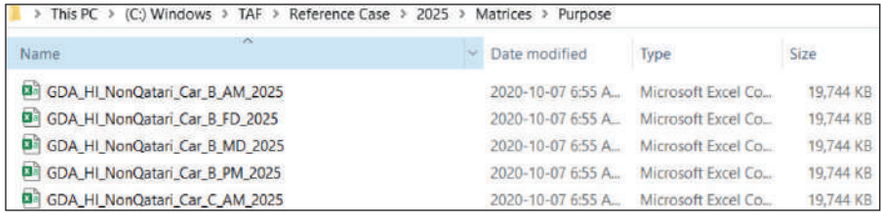
Figure 3.11 - Data Processor Vehicle Folder



This folder contains QSTM2.0 vehicle demand matrices. The files follow a standard naming convention which shall remain the same in order to run the Data Processor scripts.

C:\TAF\Scenario\Year\Matrices\Purpose

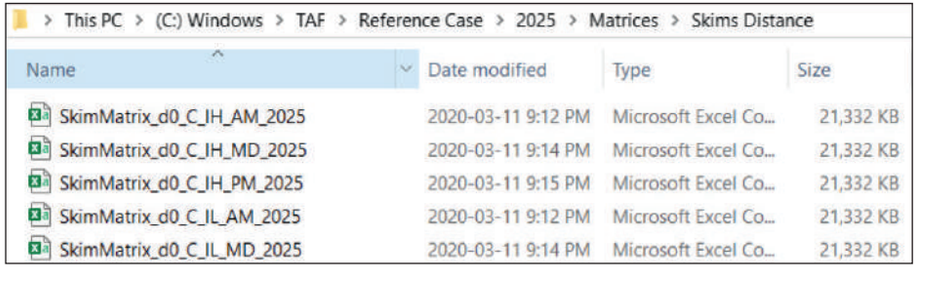
Figure 3.12 - Data Processor Purpose Folder



This folder contains QSTM2.0 purpose demand matrices. The files follow a standard naming convention which shall remain the same in order to run the Data Processor scripts.

C:\TAF\Scenario\Year\Matrices\Skims Distance

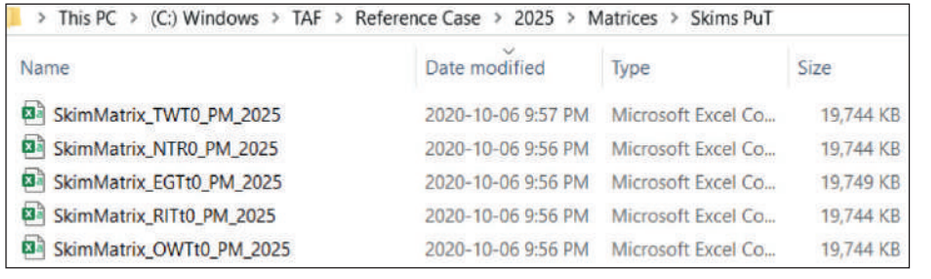
Figure 3.13 - Data Processor Skims Distance Folder



This folder contains QSTM2.0 distance skim matrices. The files follow a standard naming convention which shall remain the same in order to run the Data Processor scripts. The distance skim matrices must use kilometers as the standard unit for distance.

C:\TAF\Scenario\Year\Matrices\Skims PuT

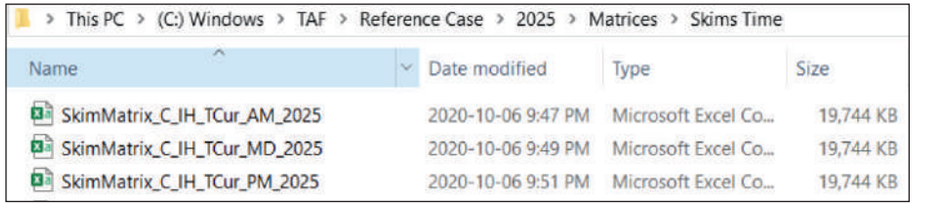
Figure 3.14 - Data Processor Skims PuT Folder



This folder contains QSTM2.0 public transport skim matrices. The files follow a standard naming convention which shall remain the same in order to run the Data Processor scripts. The PuT skim matrices must use hours and kilometers as standard units for time and distance.

C:\TAF\Scenario\Year\Matrices\Skims Time

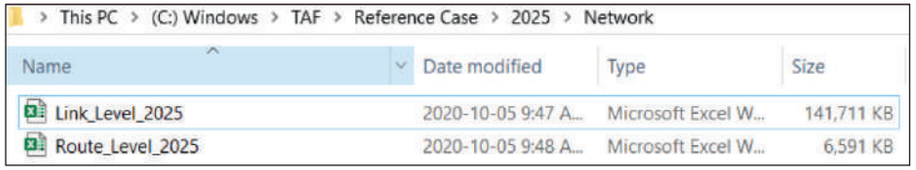
Figure 3.15 - Data Processor Skims Time Folder



This folder contains QSTM2.0 time skim matrices. The files follow a standard naming convention which shall remain the same in order to run the Data Processor scripts. The time skim matrices must use hours as the standard unit for time.

C:\TAF\Scenario\Year\Network

Figure 3.16 - Data Processor Network Folder



This folder contains QSTM2.0 both route-level and link-level statistics. The files follow a standard naming convention which shall remain the same in order to run the Data Processor scripts. The files must contain the peak hour information in three separate sheets: AM, MD and PM.

The route-level statistics file must use the following standard units:

- seconds for time
- kilometers for distance.

The link-level statistics file must use the following standard units:

- kilometer/hour for speed
- seconds for time
- kilometers for distances.

Both files should include an introduction sheet '*Meta*' which includes the measurement unit used for each QSTM2.0 attribute.

The example below shows the usual information that should be included in the '*Meta*' sheet.

Figure 3.17 - Example of Meta Sheet in Link-Level Statistics File

Attribute	Example	Units
$LINK:NO	1	
FROMNODENO	1	
TONODENO	45	
TYPENO	72	
TSYSSET	B,C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	
LENGTH	0.054	Kilometers
NUMLANES	1	
CAPPRT	1500	
V0PRT	60.000km/h	
VOLVEHPRT(AP)	0	
VEHHOURTRAVT0(AP)	0h	
VEHHOURTRAVTCUR(AP)	0h	
VEHKMTRAVPRT(AP)	0.000km	
V0_PRTSYS(C_IH)	60.000km/h	

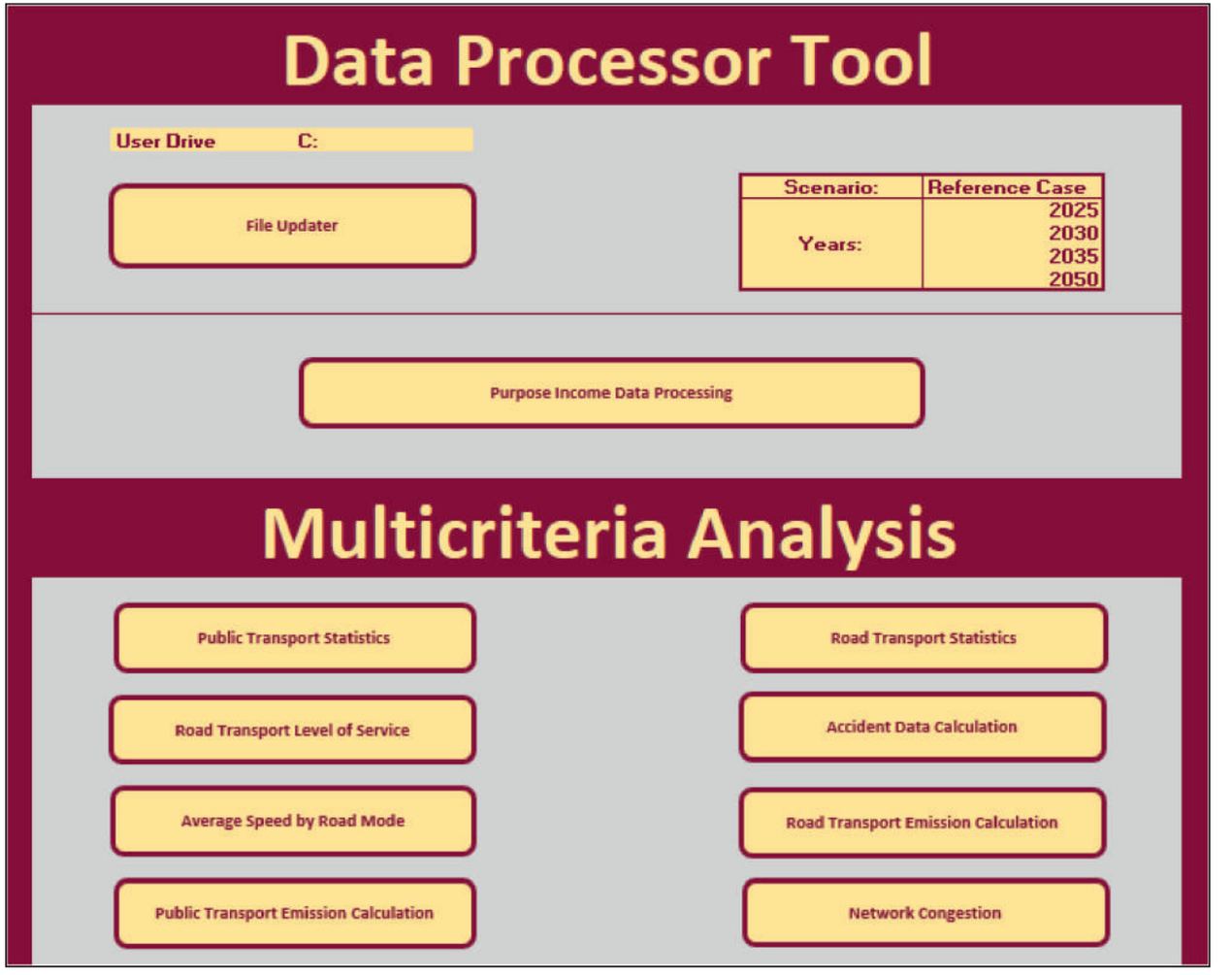
3.3 DATA PROCESSOR – QUICK GO THROUGH

The Data Processor Tool includes a user-friendly interface that allows running the different scripts for processing QSTM2.0 model outputs. Within the "*Intro*" section of the Data Processor, the user can access this interface by selecting the Data Processor Tool sheet.

The files must be saved following the folder structure defined in the previous section before running the Tool.

Figure 3.18 below shows an overview of the Data Processor Tool interface.

Figure 3.18 - Data Processor Tool Interface - Overview

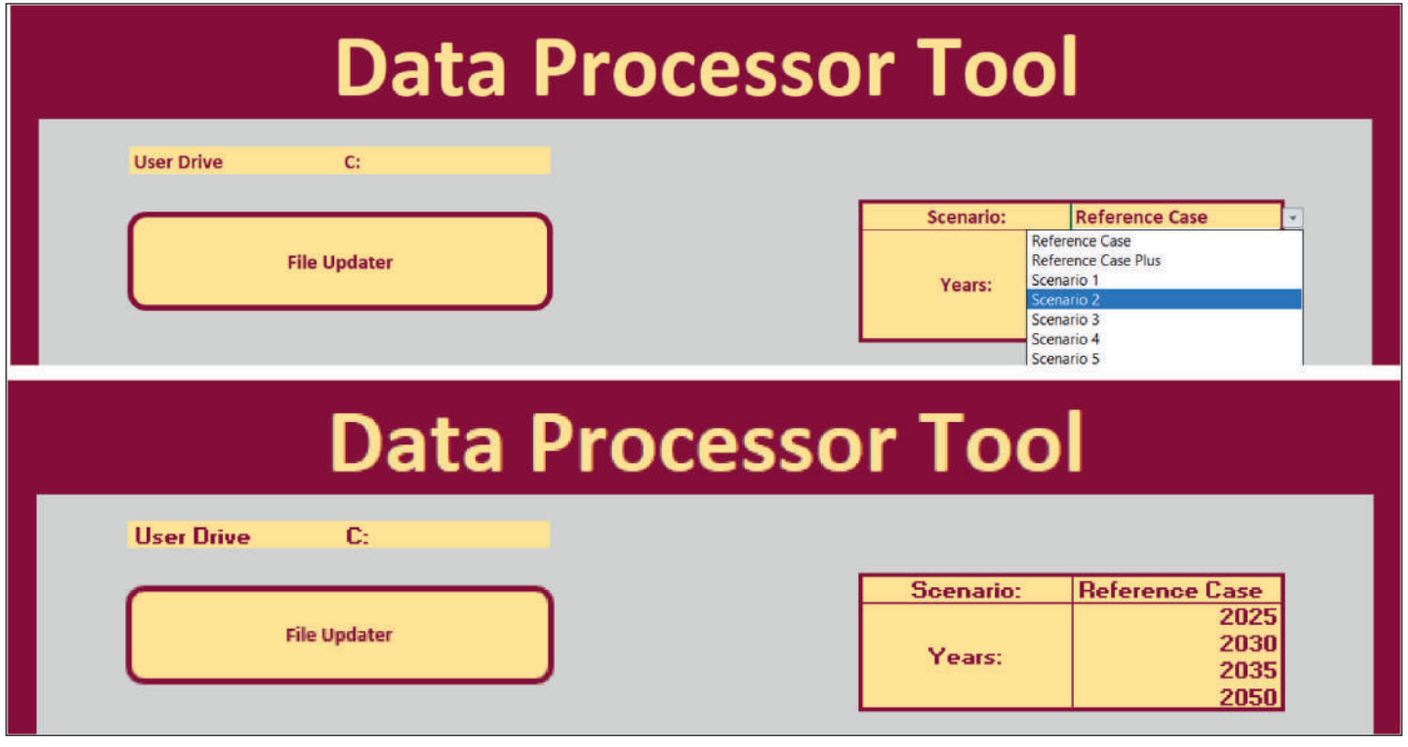


The user interface includes 3 main menus: "*Multicriteria Analysis*", "*Scheme Prioritization*" and "*Cost Benefit Analysis*" with buttons that allow running specific scripts for each section. At the top of the Data Processor Tool Menu there is a section which allows the User to modify the run settings such as the User Drive, Scenario and Horizon Years.

The **Run Settings** menu, shown in Figure 3.19, allows:

- Selecting the User Drive. This must include ':' after the local drive where the QSTM2.0 files are saved.
- The User must choose one of the scenarios included in the drop-down list to the right of the Scenario cell.
- The User must indicate the HYs used by the Data Processor within the box under the selected Scenario. The current Data Processor allows for running up to 53 different scenarios.

Figure 3.19 - Data Processor Tool Interface – Running Settings



Although the TAF Toolkit uses the TMPQ scenarios and HYs, the Toolkit can be modified to process information of new scenarios and HYs.

To include a new scenario, the User needs to insert the scenario name within the range '*U21:U73*' in the Data Processor Tool tab. If the new scenario considers a different set of HYs, the User must change the range '*V21:V24*' and the QSTM2.0 model outputs must be saved within the new scenario folder using the new HYs. The current TAF Data Processor set up includes more than 53 different scenarios and up to 4 horizon years.

In addition, if the HYs set is different, if will be required to change the HYs in the name of the following sheets:

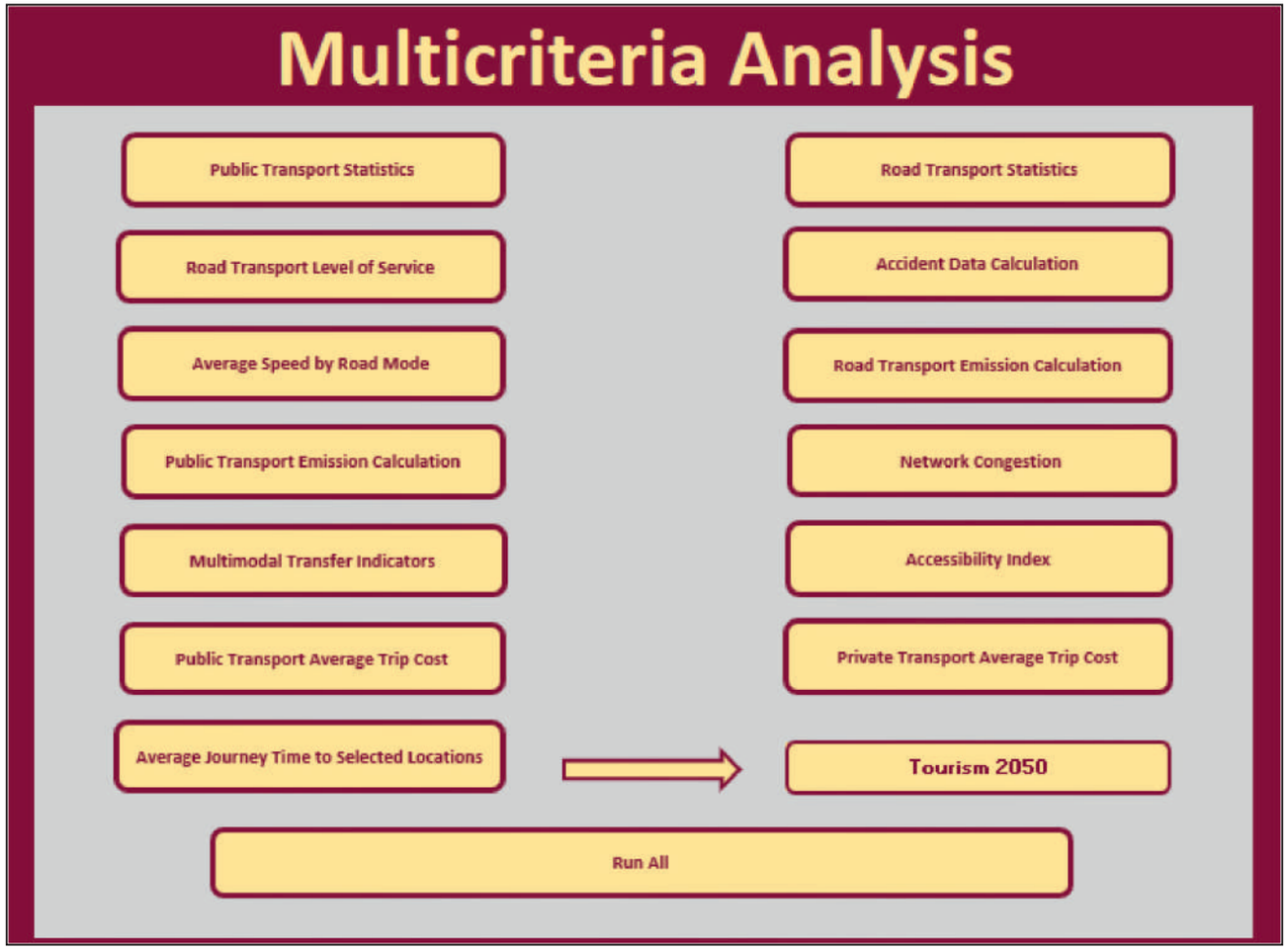
- Port Airport Goods 2025/2030/2035/2050.
- Business Airport 2025/2030/2035/2050.
- Tourism 2025/2030/2035/2050.

Once the **Run Settings** are defined, the User can either run the scripts one-by-one or instead run the whole set of scripts corresponding to one of the three different sections of the Data Processor (Multicriteria Analysis, Scheme Prioritization or Cost-Benefit Analysis). The Data Processor also allows running the Multicriteria and Cost-Benefit Analysis together.

If the User prefers running the scripts one-by-one, then it is required to run firstly the '***File Updater***' script and secondly the '***Purpose Income Data Processing***'. Although these scripts are described in detail in the following sections of the TAF Tool User Manual, the first one produces a list of the files required to run the TAF and their location within the folder structure (***Section 2.6.1 FILE UPDATER SCRIPTS***). These files are automatically allocated in each sheet of the Data Processor. The second script reads the purpose-wise matrices and obtains overall rates for the split between car and taxi as well as the market share by mode and GDA/ not GDA sector (***Section 2.6.3.6 Purpose Income***). The remaining scripts of the Data Processor Tool menu can be run in any order.

On the other hand, if the User prefers running a whole set of scripts, then after the **Run Settings** are defined, the User can click on the '***Run All***' button in each section of the Data Processor and the section scripts will be run in the required order.

Figure 3.20 - Data Processor Tool Interface – Multicriteria Analysis Section



The Multicriteria Analysis section requires running the '***File Updater***' and '***Purpose Income Calculation***' scripts before running the other calculations. Alternatively, the User can click on '***Run All***' and both scripts will be run at the beginning of the calculation process.

The Multicriteria calculations shown in the figure above allows processing the QSTM2.0 model outputs and produce a list of indicators as required by TAF. Some of the processed information obtained after running the Multicriteria section scripts such as the vehicle-kilometers, emissions and accidents are also used in the Cost-Benefit Assessment.

The '***Average Journey Time to Selected Locations***' script requires selecting one of the choices shown in the drop-down list to the right of the script button. If the User instead clicks on '***Run All***', the script will automatically calculate the '***Average Journey Time to Selected Locations***' for all the locations considering the HYs defined in the **Run Settings** menu.

Figure 3.21 - Data Processor Tool Interface – Average Journey Time to Selected Locations

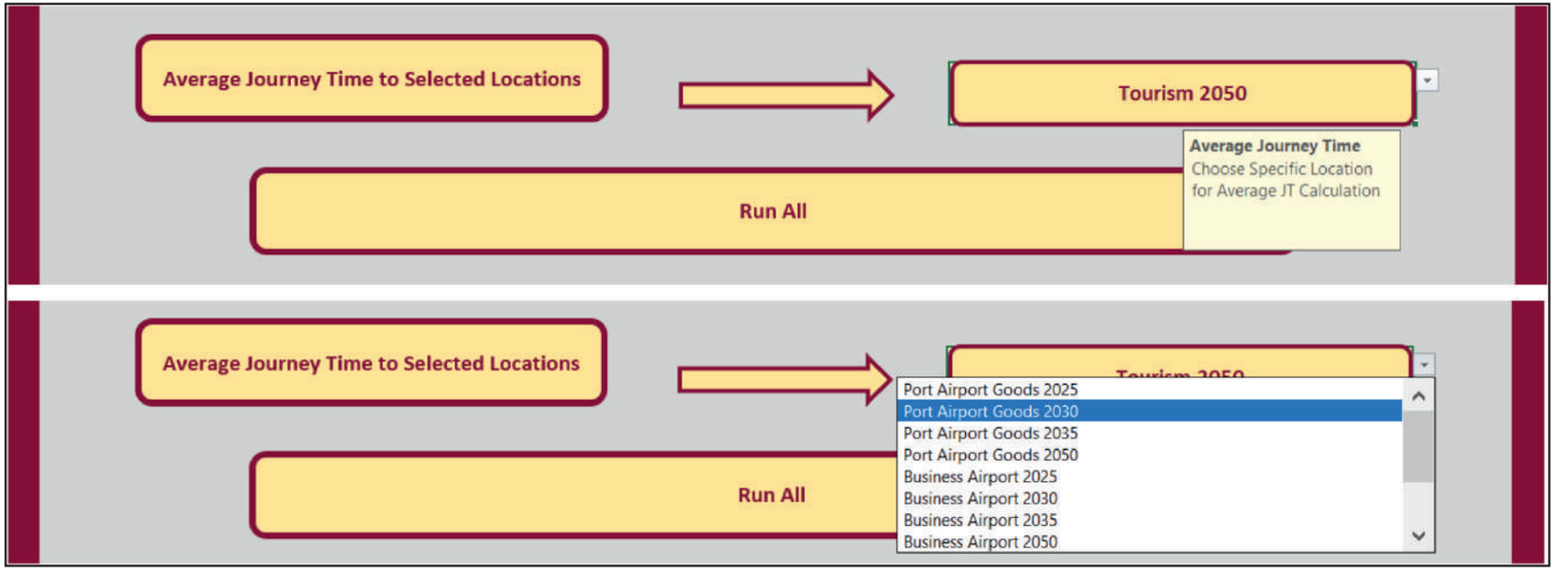
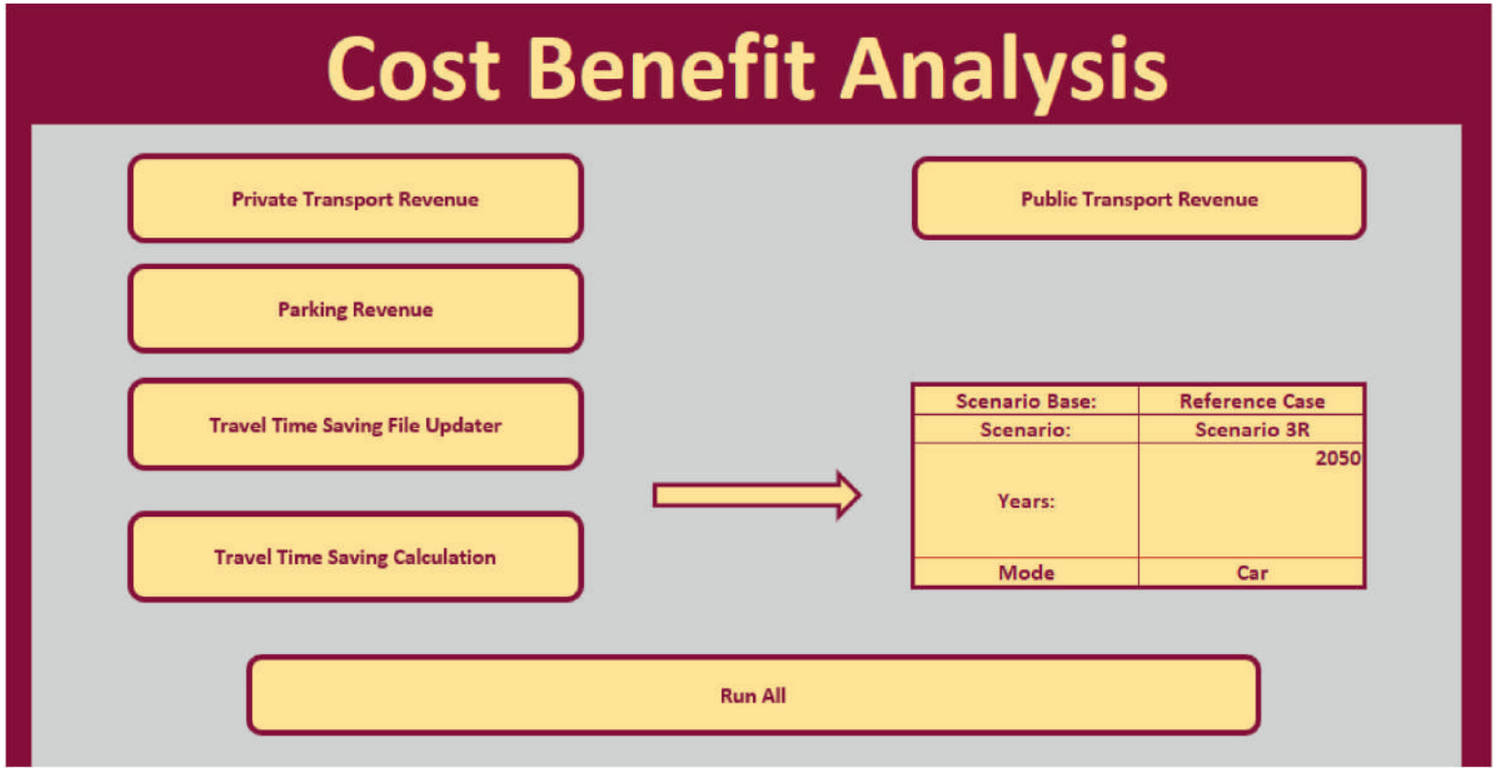


Figure 3.22 - Data Processor Tool Interface – Scheme Prioritization Section

The Scheme Prioritization section includes calculations that support the Scenario Development process. The User needs to click on each button to run the '***Public Transport Scheme Performance***' and '***Road Transport Scheme Performance***' to obtain scheme performance statistics or alternatively click on '***Run All***' to run both calculations.

Figure 3.23 - Data Processor Tool Interface – Cost-Benefit Assessment Section



The final calculation menu in the Data Processor Tool Sheet covers the Cost Benefit Assessment section. It includes specific scripts such as the '***Private Transport Revenue***', '***Public Transport Revenue***'. '***Parking Revenue***' and '***Travel Time Saving Calculation***' which are required to produce the inputs for the Cost-Benefit analysis.

The User must complete the **CBA Settings** in the menu to the right of the '***Travel Time Saving File Updater***' and '***Travel Time Saving Calculation***'.

- Scenario Base. Usually the Reference Case or any other Do Minimum Scenario. For the TMPQ project the Do Minimum is effectively the Reference Case.
- Scenario. Any proposed scenario by the User. These can be selected using the drop-down list under the Scenario Base. For the TMPQ these are:
  - Scenario 1 (Predict & Provide),

- Scenario 2 (Moderated Predict & Provide),
- Scenario 3 (Balance Approach),
- Scenario 4 (Sustainable) and
- Scenario 5 (Highly Sustainable).
- Scenario 3R (Preferred Scenario)

- Years: Any of the proposed HYs. For the TMPQ these are:
  - 2025,
  - 2030,
  - 2035 and
  - 2050.
- Mode: QSTM2.0 mode for which the travel time saving calculation will be run. These can be selected using the drop-down list under the HYs section. For the TMPQ these are:
  - Company Bus,
  - Car,
  - Public Transport,
  - LGV and
  - HGV (including both heavy restricted and permitted).

The User can add new scenarios by including them in the range '*U21:U73*'. A new set of HYs can be also included by changing the range '*V21:V24*' as well as adding new modes by modifying the range '*W21:W25*'. Further explanations on how new modes can be included within the Data Processor CBA section are provided in subsequent sections of the User Manual.

The User can choose running the scripts one-by-one or the whole set of scripts by clicking on '***Run All***'.

If the User prefers running the scripts one-by-one then it requires running the '***File Updater***' and '***Purpose Income Calculation***' scripts on the top of the Data Processor Tool menu, complete the CBA Settings for the travel time saving calculation and click on '***Travel Time Saving File Updater***'. These two scripts will automatically update the list of files required to run the CBA section of the Data Processor. The '***Travel Time Saving Calculation***' script requires changing the mode every time the calculation for a specific mode is completed.

On the other hand if the User prefers running the scripts together, then by clicking on '***Run All***' button all the required scripts by the CBA section will be run and the '***Travel Time Saving Calculation***' will automatically change the mode every time the calculation is finished until it is completed for all the modes.

It is worth mentioning the Data Processor creates an auto-copy of the file inside the Scenario folder (Reference Case or the Scenarios) every time a script calculation is completed.

Figure 3.24 - Data Processor Tool Interface – MCA & CBA Run All Section

Additionally, the Data Processor has the capability to run both the Multicriteria Analysis and Cost-Benefit Assessment sections together by click on the '*Run All*' button on the bottom of the Data Processor Tool Interface.

3.4 DATA PROCESSOR – STANDARD PARAMETERS

The Data Processor uses a set of standard parameters to undertake certain calculations such as emissions and accident calculations. Standard Parameter section of the Data Processor contains accident rates and emission and fuel consumption rates based on both the current road infrastructure in Qatar and the vehicle fleet. These standard parameters are defined in Technical Report 2 of the Updated TMPQ.

Including new transportation modes or a different set of HYs will require further modification of both 'Accident Rates' and 'Emission Rates' sheets. Major changes in the structure of these two sheets could lead to further modifications in the scripts used in the Data Processor.

3.5 DATA PROCESSOR – TAF PROCESSOR INPUTS SECTION

The TAF Processor Inputs section is comprised of three sheets corresponding to each of the QSTM2.0 modelled peak (AM, MD and PM). These sheets break down the peak hour results by Horizon Year (HY) for the selected scenario in the Data Processor Tool Settings Menu. Once the Data Processor Tool scripts are run, the results are updated and shown in each of the peak hour sheets.

Figure 3.25 - TAF Processor Inputs Section – Example of Contents

9	Number Of Goods Vehicle-Hours under Congested and Uncongested Conditions			Specific Objective 1.3	Indicator 1 & 2
9.1	**Freight Vehicles Congested (Veh-Hours)**	**2025**	**2030**	**2035**	**2050**
LGV	LGV	4,142	4,692	5,256	8,793
HR	HGV - Restricted	186	220	258	515
HP	HGV - Permitted	2,554	2,953	3,305	5,436
	HGV	**2,740**	**3,173**	**3,563**	**5,951**
	Total Freight	**6,882**	**7,865**	**8,819**	**14,743**
9.2	**Freight Vehicles Uncongested (Veh-Hours)**	**2025**	**2030**	**2035**	**2050**
LGV	LGV	4,279	4,154	4,073	4,792
HR	HGV - Restricted	232	220	211	248
HP	HGV - Permitted	2,450	2,440	2,440	2,886
	HGV	**2,683**	**2,661**	**2,652**	**3,135**
	Total Freight	**6,962**	**6,815**	**6,725**	**7,927**

The summary contained in each sheet of the TAF Processor Inputs section relates to annual results that feed both into the TAF Multicriteria Assessment and the TAF Cost Benefit Analysis. These summaries contain the links to calculation sheets such as '***Public Transport***' and '***LOS Private***' in the MCA section or '***Public Revenue***' and '***Private Revenue***' in the CBA Section of the Data Processor. The various sheets forming the overall TAF Data Processor Inputs section are named as Peak_Variable, where Peak refers to AM, MD or PM.

The information within these three sheets are collected and processed by the TAF Tool to produce annual data that feeds into the Multicriteria Analysis and Cost-Benefit Assessment. Further details on how the TAF Tool reads information from the Data Processor is explained in Section 4 of this manual.

3.6 DATA PROCESSOR – SCRIPTS & CALCULATION SHEETS

This section of the User Manual covers the description of the different scripts included within the TAF Data Processor MCA and CBA sections as well as the required inputs from QSTM2.0.

3.6.1 FILE UPDATER SCRIPTS

The Data Processor Tool includes a set of two scripts which mission consist of providing the list of files required to run the different calculations: '***File Updater***' and '***Travel Time Saving File Updater***'. Both scripts just require setting up the **Run Settings** and **CBA Settings** following the instructions given in Section 3.3 of this manual. After the settings are defined, it is possible to run the script by clicking on their respective buttons or rather

by clicking on the '***Run All***' button in each section of the Data Processor Tool menu.

3.6.2 CALCULATION SHEETS FORMAT

This sub-section provides an overview of the format of the calculation sheets included in the Data Processor. The calculation sheets included within the MCA, Scheme Prioritization and CBA sections of the Data Processor follows the same structure and format.

- On the left side of each calculation sheet the '***Inputs Area***' is shown. It consists of a list of the QSTM2.0 files as well as any other required information to run the scripts such as the transport mode or VISUM attributes to be read by the script among others.

  The list of QSTM2.0 files are automatically updated after running the '***File Updater***' script or alternatively, after running the '***Run All***' script in each section of the Data Processor Tool sheet.
- On the right side of each calculation sheet the '***Output Area***' is shown. It includes the results after the script is run

Figure 3.26 - Data Processor Calculation Sheets – Example of Input Area

FileFinisher	Demand	Sheet Name	Mode/Service	VISUM Code
3	C:\TAF\Reference Case\2025\Network\Route_Level_2025.xlsx	AM	Bus	B_FB
SheetFinisher	C:\TAF\Reference Case\2030\Network\Route_Level_2030.xlsx	MD	Bus	B_IU
2	C:\TAF\Reference Case\2035\Network\Route_Level_2035.xlsx	PM	Bus	B_RS
ServiceFinisher	C:\TAF\Reference Case\2050\Network\Route_Level_2050.xlsx		Bus	B_LS
11			Bus	B_TR
			LRT	04_LRT

Figure 3.27 - Data Processor Calculation Sheets – Example of Output Area

Scenario	Year	Period	VehType	Mode	Passengers	Passengers-Km	Veh-Km	Vehicles	Pax-Hours
Reference Case	2025	AM	Bus	B_FB	60,384	71,984	7,223	718	29,938
Reference Case	2025	AM	Bus	B_IU	20,785	112,692	2,521	66	28,339
Reference Case	2025	AM	Bus	B_RS	1,889	6,266	223	3	2,757
Reference Case	2025	AM	Bus	B_LS	31,723	53,490	3,326	130	26,747
Reference Case	2025	AM	Bus	B_TR	20,233	39,238	2,329	84	18,986
Reference Case	2025	AM	LRT	04_LRT	2,630	3,855	554	84	679
Reference Case	2025	AM	LRT	05_LRT	67	28	34	20	1
Reference Case	2025	AM	LRT	05_PME	0	0	29	12	0
Reference Case	2025	AM	Rail	Rail	0	0	0	0	0
Reference Case	2025	AM	Metro	03_PT_Prim	40,159	125,666	2,712	160	14,848

All the scripts defined in the Data Processor follows the structure shown in the figures above.

3.6.3 MULTICRITERIA ANALYSIS SECTION SCRIPTS

The MCA section of the Data Processor includes all the calculation sheets required to carry out the **Multicriteria Analysis** based on the quantitative indicators derived from the QSTM2.0. These calculations follow the same methodology defined in the Technical Report 2 of the Updated TMPQ. The calculation sheets of the MCA section follow a green-color pattern and include the following sheets:

1. Public Transport
2. LoS Private
3. Accident Data
4. Average Speed
5. Pax Distances
6. Purpose Income
7. Emission Calculation
8. Emission Calculation Bus
9. Congestion
10. PuT Transfers
11. Accessibility Index
12. PuT Average Costs
13. Private Average Costs
14. Port Airport Goods, Business Airport and Tourism for 2025/2030/2035/2050.

This section describes the required inputs and obtained outputs after running the different scripts included in the Data Processor.

3.6.3.1 Public Transport

Public Transport calculation sheet covers the data processing to obtain public transport statistics. The script used to calculate these statistics is '***PuTStatistic***' which can be found within the '***Visual Basic***' menu in the '***Developer***' tools of Excel, or under Macro in the View tab.

The calculation is run by clicking on the '***Public Transport Statistics***' button in the Data Processor Tool menu or alternatively by clicking on '***Run All***' button in the MCA section.

Input Area

Figure 3.28 - Data Processor MCA Calculation Sheets – Public Transport Input Area

FileFinisher	Demand	Sheet Name	Mode/Service	VISUM Code
3	C:\TAF\Reference Case\2025\Network\Route_Level_2025.xlsx	AM	Bus	B_FB
SheetFinisher	C:\TAF\Reference Case\2030\Network\Route_Level_2030.xlsx	MD	Bus	B_IU
2	C:\TAF\Reference Case\2035\Network\Route_Level_2035.xlsx	PM	Bus	B_RS
ServiceFinisher	C:\TAF\Reference Case\2050\Network\Route_Level_2050.xlsx		Bus	B_LS
11			Bus	B_TR

The input area contains a set of files and parameters required to run the script.

- FileFinisher, SheetFinisher and ServiceFinisher are counters whose values are automatically updated after populating the Demand, Sheet Name, Mode/Service and VISUM Code columns.
- Demand column includes the name of the QSTM2.0 route level files. These are automatically updated after running the '***File Updater***' script or alternatively after clicking on '***Run All***' button in the Data Processor Tool menu.
- Sheet Name column includes the sheet names of the Route Level files (AM, MD and PM).
- Mode/Service column includes the mode names as defined by the User. For the TMPQ project these are bus, LRT, rail, metro, BRT and Water Taxi.
- VISUM Code column includes the Transport System names used by the QSTM2.0 model. For the TMPQ project these are B_FB, B_IU, B_RS, B_LS, B_TR, 04_LRT, 05_LRT, 05_PME, Rail, 03_PT_Prim, BRT, PT_Water.

The Mode/Service column should reflect the name of the corresponding Transport System name under the VISUM Code column.

Output Area

Figure 3.29 - Data Processor MCA Calculation Sheets – Public Transport Output Area

Scenario	Year	Period	VehType	Mode	Passengers	Passengers-Km	Veh-Km	Vehicles	Pax-Hours	LoS A	LoS B	LoS C	LoS D	LoS E	LoS F	(Km/h)
Reference Case	2025	AM	Bus	B_FB	60,384	71,984	7,223	718	29,938	918	42	44	33	19	255	39
Reference Case	2025	AM	Bus	B_IU	20,785	112,692	2,521	66	28,339	664	64	81	9	9	472	44
Reference Case	2025	AM	Bus	B_RS	1,889	6,266	223	3	2,757	13	6	4	16	13	96	46
Reference Case	2025	AM	Bus	B_LS	31,723	53,490	3,326	130	26,747	665	41	35	44	29	280	38
Reference Case	2025	AM	Bus	B_TR	20,233	39,238	2,329	84	18,986	195	39	22	16	43	350	39
Reference Case	2025	AM	LRT	04_LRT	2,630	3,855	554	84	679	47	0	0	0	0	0	30
Reference Case	2025	AM	LRT	05_LRT	67	28	34	20	1	3	0	0	0	0	0	50
Reference Case	2025	AM	LRT	05_PME	0	0	29	12	0	10	0	0	0	0	0	50
Reference Case	2025	AM	Rail	Rail	0	0	0	0	0	0	0	0	0	0	0	0
Reference Case	2025	AM	Metro	03_PT_Prim	40,159	125,666	2,712	160	14,848	205	4	0	0	3	14	56
Reference Case	2025	AM	BRT	BRT	0	0	0	0	0	0	0	0	0	0	0	0

The output area contains the data processed after running the script. The results are:

- Number of passengers by mode
- Passengers-km by mode
- Veh-km by mode
- Number of public transport services by mode
- Passenger-hours by mode
- Number of kilometers operating under a certain level of service by mode
- Average Speed by mode

3.6.3.2 LoS Private

LoS Private calculation sheet covers the data processing to obtain private transport statistics related to the Level of Service (LoS). The script used to calculate these statistics is '***LoSPrivateNetwork***' which can be found within the '***Visual Basic***' menu in the '***Developer***' tools of Excel.

The calculation is run by clicking on the '***Road Transport Level of Service***' button in the Data Processor Tool menu or alternatively by clicking on '***Run All***' button in the MCA section.

Input Area

Figure 3.30 - Data Processor MCA Calculation Sheets – LoS Private Input Area

FileFinisher	Demand	Sheet Name
3	C:\TAF\Reference Case\2025\Network\Link_Level_2025.xlsx	AM
SheetFinisher	C:\TAF\Reference Case\2030\Network\Link_Level_2030.xlsx	MD
2	C:\TAF\Reference Case\2035\Network\Link_Level_2035.xlsx	PM
	C:\TAF\Reference Case\2050\Network\Link_Level_2050.xlsx	

The input area contains a set of files and parameters required to run the script.

- FileFinisher and SheetFinisher are counters whose values are automatically updated after populating the Demand and Sheet Name columns.
- Demand column includes the name of the QSTM2.0 link level files. These are automatically updated after running the '***File Updater***' script or alternatively after clicking on '***Run All***' button in the Data Processor Tool menu.
- Sheet Name column includes the sheet names of the Link Level files under the column demand. These are AM, MD and PM.

Output Area

Figure 3.31 - Data Processor MCA Calculation Sheets – LoS Private Output Area

Scenario	Year	Period	LoS A	LoS B	LoS C	LoS D	LoS E	LoS F	Total
Reference Case	2025	AM	16,281	358	261	163	93	91	17,248
Reference Case	2025	MD	16,291	367	270	161	62	96	17,248
Reference Case	2025	PM	17,014	122	57	22	18	15	17,248
Reference Case	2030	AM	16,091	435	301	182	113	125	17,248
Reference Case	2030	MD	16,156	413	282	190	83	124	17,248
Reference Case	2030	PM	16,960	159	62	28	18	20	17,248

The output area contains the data processed after running the script. The results are:

- Number of kilometers of private transport network operating under a certain level of service.

The calculation is carried out for the main network links based on QSTM link types. Nonetheless the Data Processor allows modifying the main network links to be considered in the calculation. In order to make changes in the links selected for the calculation the user needs to change the column R of the Standard Parameter sheet named '***Accident Rates***' as explained below:

Figure 3.32 - Data Processor Standard Parameters – Accident Rates

$LINKTYPE:NO	NAME	STRICT	RANK	TSYSSET	NUMLANES	CAPPRT	VOPRT	Crash Road Type	Main Network LOS Private
0	closed road	0.00	99.00		0.00	0.00	0km/h		No
1	closed road	0.00	99.00		0.00	0.00	0km/h		No
2		0.00	2.00		1.00	99,999.00	0km/h		No
3	1_7L_100_Freeway	0.00	3.00	C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	7.00	14,000.00	100km/h	Dual 3+ (> 60 kph)	Yes
4	1_6L_120_Freeway	0.00	4.00	C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	6.00	12,000.00	120km/h	Dual 3+ (> 60 kph)	Yes
5	1_5L_120_Freeway	0.00	5.00	C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	5.00	10,000.00	120km/h	Dual 3+ (> 60 kph)	Yes
6	1_4L_120_Freeway	0.00	6.00	C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	4.00	8,000.00	120km/h	Dual 3+ (> 60 kph)	Yes
7	1_3L_120_Freeway	0.00	7.00	C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	3.00	6,000.00	120km/h	Dual 3+ (> 60 kph)	Yes
8	1_2L_120_Freeway	0.00	8.00	C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	2.00	4,000.00	120km/h	Dual 2 (> 60 kph)	Yes
9	1_6L_100_Freeway	0.00	9.00	C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	6.00	12,000.00	100km/h	Dual 3+ (> 60 kph)	Yes
10	1_5L_100_Freeway	0.00	10.00	C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	5.00	10,000.00	100km/h	Dual 3+ (> 60 kph)	Yes
11	1_4L_100_Freeway	0.00	11.00	C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	4.00	8,000.00	100km/h	Dual 3+ (> 60 kph)	Yes
12	1_3L_100_Freeway	0.00	12.00	C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	3.00	6,000.00	100km/h	Dual 3+ (> 60 kph)	Yes
13	1_2L_100_Freeway	0.00	13.00	C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	2.00	4,000.00	100km/h	Dual 2 (> 60 kph)	Yes
14	1_4L_80_Freeway	0.00	14.00	C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	4.00	8,000.00	80km/h	Dual 3+ (> 60 kph)	Yes

The User needs to change the '***Main Network LOS Private***' column to define the link types to be considered in the LOS calculation.

3.6.3.3 Accident Data

Accident Data calculation sheet covers the data processing to obtain accident statistics. The script used to calculate these statistics is '***AccidentsCalculation***' which can be found within the '***Visual Basic***' menu in the '***Developer***' tools of Excel.

The calculation is run by clicking on the '***Accident Data Calculation***' button in the Data Processor Tool menu or alternatively by clicking on '***Run All***' button in the MCA section.

Input Area

Figure 3.33 - Data Processor MCA Calculation Sheets – Accident Data Input Area

FileFinisher	Demand	Sheet Name	VISUM Code Veh-Km	RoadType
3	C:\TAF\Reference Case\2025\Network\Link_Level_2025.xlsx	AM	VEHKMTRAVPRT(AP)	Expressway
SheetFinisher	C:\TAF\Reference Case\2030\Network\Link_Level_2030.xlsx	MD		Single Carriageway (< 60 kph)
2	C:\TAF\Reference Case\2035\Network\Link_Level_2035.xlsx	PM		Single Carriageway (> 60 kph)
AttributeFinisher	C:\TAF\Reference Case\2050\Network\Link_Level_2050.xlsx			Dual 2 (< 60 kph)
0				Dual 2 (> 60 kph)
RoadTypeFinisher				Dual 3+ (< 60 kph)
6				Dual 3+ (> 60 kph)

The input area contains a set of files and parameters required to run the script.

- FileFinisher, SheetFinisher, AttributeFinisher and RoadTypeFinisher are counters whose values automatically update after populating the Demand, Sheet Name, VISUM Code Veh-Km and RoadType columns.
- Demand column includes the name of the QSTM2.0 link level files. These are automatically updated after running the '***File Updater***' script or alternatively after clicking on '***Run All***' button in the Data Processor Tool menu.
- Sheet Name column includes the sheet names of the Link Level files under the column demand. These are AM, MD and PM.
- VISUM Code Veh-Km column includes the name of the Veh-Km VISUM attribute in the Link Level spreadsheet.
- RoadType column includes the infrastructure category for accident calculation as defined in Technical Report 2 of the Updated TMPQ. The relation between the Road Types and Link Types in the QSTM2.0 is defined within the Standard Parameters section in the '***Accident Rates***' sheet

Output Area

Figure 3.34 - Data Processor MCA Calculation Sheets – Accident Data Output Area

Scenario	Year	Period	RoadType	VehKm	Fatalities	Serious Crashes	Minor Crashes
Reference Case	2025	AM	Expressway	2,337,254	0.00	0.02	0.29
Reference Case	2025	AM	Single Carriageway (< 60 kph)	603,633	0.00	0.06	0.56
Reference Case	2025	AM	Single Carriageway (> 60 kph)	248,526	0.00	0.01	0.07
Reference Case	2025	AM	Dual 2 (< 60 kph)	721,969	0.00	0.05	0.67
Reference Case	2025	AM	Dual 2 (> 60 kph)	521,059	0.00	0.01	0.07
Reference Case	2025	AM	Dual 3+ (< 60 kph)	269,356	0.00	0.02	0.22
Reference Case	2025	AM	Dual 3+ (> 60 kph)	4,060,253	0.01	0.06	0.60

The output area contains the data processed after running the script. The results are:

- Vehicle-Km by Road Type.
- Number of fatalities by Road Type.
- Number of serious crashes by Road Type.
- Number of minor crashes by Road Type.

3.6.3.4 Average Speed

Average Speed calculation sheet covers the data processing to obtain average speed statistics. The script used to calculate these statistics is '***AverageSpeedCalculation***' which can be found within the '***Visual Basic***' menu in the '***Developer***' tools of Excel.

The calculation is run by clicking on the '***Average Speed by Road Mode***' button in the Data Processor Tool menu or alternatively by clicking on '***Run All***' button in the MCA section.

Input Area

Figure 3.35 - Data Processor MCA Calculation Sheets – Average Speed Input Area

Count	Demand	Demand Sheet Name	Time Skim	Time Skim Sheet Name	Distance Skim	Distance Skim Sheet Name
95	C:\TAF\Reference Case\2025\Matrice	VehMatrix_Car_IH_AM_2025	C:\TAF\Reference Case\2025\Matrice	SkimMatrix_C_IH_TCur_AM_2025	C:\TAF\Reference Case\2025\Matrice	SkimMatrix_dcur_C_IH_AM_2025
	C:\TAF\Reference Case\2025\Matrice	VehMatrix_Car_IH_MD_2025	C:\TAF\Reference Case\2025\Matrice	SkimMatrix_C_IH_TCur_MD_2025	C:\TAF\Reference Case\2025\Matrice	SkimMatrix_dcur_C_IH_MD_2025
	C:\TAF\Reference Case\2025\Matrice	VehMatrix_Car_IH_PM_2025	C:\TAF\Reference Case\2025\Matrice	SkimMatrix_C_IH_TCur_PM_2025	C:\TAF\Reference Case\2025\Matrice	SkimMatrix_dcur_C_IH_PM_2025
	C:\TAF\Reference Case\2025\Matrice	VehMatrix_Car_IL_AM_2025	C:\TAF\Reference Case\2025\Matrice	SkimMatrix_C_IL_TCur_AM_2025	C:\TAF\Reference Case\2025\Matrice	SkimMatrix_dcur_C_IL_AM_2025
	C:\TAF\Reference Case\2025\Matrice	VehMatrix_Car_IL_MD_2025	C:\TAF\Reference Case\2025\Matrice	SkimMatrix_C_IL_TCur_MD_2025	C:\TAF\Reference Case\2025\Matrice	SkimMatrix_dcur_C_IL_MD_2025
	C:\TAF\Reference Case\2025\Matrice	VehMatrix_Car_IL_PM_2025	C:\TAF\Reference Case\2025\Matrice	SkimMatrix_C_IL_TCur_PM_2025	C:\TAF\Reference Case\2025\Matrice	SkimMatrix_dcur_C_IL_PM_2025

The input area contains a set of files and parameters required to run the script.

- Count is a counter whose value automatically update after populating the Demand column.
- Demand column includes the name of the QSTM2.0 matrix files.
- Demand Sheet Name column includes the name of the sheet of the Demand file.
- Time Skim column includes the name of the QSTM2.0 matrix files.
- Time Skim Sheet Name column includes the name of the sheet of the Demand file.
- Distance Skim column includes the name of the QSTM2.0 matrix files.
- Distance Skim Sheet Name column includes the name of the sheet of the Demand file.

Demand, Time Skim and Distance Skim columns are automatically updated after running the '***File Updater***' script or alternatively after clicking on '***Run All***' button in the Data Processor Tool menu. Demand, Time Skim and Distance Skim Sheet names are automatically updated when the script is run.

Output Area

Figure 3.36 - Data Processor MCA Calculation Sheets – Average Speed Output Area

Scenario	Year	Period	VehType	Average Speed (Km/h)
Reference Case	2025	AM	Car IH	29.74
Reference Case	2025	MD	Car IH	29.20
Reference Case	2025	PM	Car IH	30.11
Reference Case	2025	AM	Car IL	32.86
Reference Case	2025	MD	Car IL	31.26
Reference Case	2025	PM	Car IL	28.62
Reference Case	2025	AM	Car IM	30.10
Reference Case	2025	MD	Car IM	28.91

The output area contains the data processed after running the script. The results are:

- Average Speed by Mode.

3.6.3.5 Pax Distances

Pax Distances calculation sheet covers the data processing to obtain a wide range of network performance statistics. The script used to calculate these statistics is '***VehPaxDistanceHours***' which can be found within the '***Visual Basic***' menu in the '***Developer***' tools of Excel.

The calculation is run by clicking on the '***Road Transport Statistics***' button in the Data Processor Tool menu or alternatively by clicking on '***Run All***' button in the MCA section.

Input Area

Figure 3.37 - Data Processor MCA Calculation Sheets – Pax Distances Input Area

Count	Demand	Demand Sheet Name	Time Skim	Time Skim Sheet Name	Distance Skim	Distance Skim Sheet Name
143	C:\TAF\Reference Case\2025\Matrices\De	PaxMatrix_Car_IH_AM_2	C:\TAF\Reference Case\2025\Matrices\Sk	SkimMatrix_C_IH_TCur_AM	C:\TAF\Reference Case\2025\Matrices\Sk	SkimMatrix_dcur_C_IH_AM_20
	C:\TAF\Reference Case\2025\Matrices\De	PaxMatrix_Car_IH_MD_2	C:\TAF\Reference Case\2025\Matrices\Sk	SkimMatrix_C_IH_TCur_MD	C:\TAF\Reference Case\2025\Matrices\Sk	SkimMatrix_dcur_C_IH_MD_20
	C:\TAF\Reference Case\2025\Matrices\De	PaxMatrix_Car_IH_PM_2	C:\TAF\Reference Case\2025\Matrices\Sk	SkimMatrix_C_IH_TCur_PM	C:\TAF\Reference Case\2025\Matrices\Sk	SkimMatrix_dcur_C_IH_PM_20
	C:\TAF\Reference Case\2025\Matrices\De	PaxMatrix_Car_IL_AM_2	C:\TAF\Reference Case\2025\Matrices\Sk	SkimMatrix_C_IL_TCur_AM	C:\TAF\Reference Case\2025\Matrices\Sk	SkimMatrix_dcur_C_IL_AM_202

The input area contains a set of files and parameters required to run the script.

- Count is a counter whose value is automatically updated after populating the Demand column.
- Demand column includes the name of the QSTM2.0 matrix files.
- Demand Sheet Name column includes the name of the sheet of the Demand file.
- Time Skim column includes the name of the QSTM2.0 matrix files.
- Time Skim Sheet Name column includes the name of the sheet of the Demand file.
- Distance Skim column includes the name of the QSTM2.0 matrix files.
- Distance Skim Sheet Name column includes the name of the sheet of the Demand file.

Demand, Time Skim and Distance Skim columns are automatically updated after running the '***File Updater***' script or alternatively after clicking on '***Run All***' button in the Data Processor Tool menu. Demand, Time Skim and Distance Skim Sheet names are automatically updated when the script is run

Output Area

Figure 3.38 - Data Processor MCA Calculation Sheets – Pax Distances Output Area

Scenario	Year	Period	VehType	Veh/Pax	Total Veh/Pass-Hours	Total Veh/Pass-Km	Average Distance per Veh/Pass (Km)	Average Time per Veh/Pass (Hours)	Total Demand
Reference Case	2025	AM	Car IH	Pax	149,692	4,945,082	18.5	0.6	267,945
Reference Case	2025	MD	Car IH	Pax	164,891	5,505,400	18.2	0.5	303,285
Reference Case	2025	PM	Car IH	Pax	48,562	2,121,011	10.1	0.2	210,625
Reference Case	2025	AM	Car IL	Pax	65,406	2,157,562	25.6	0.8	84,240
Reference Case	2025	MD	Car IL	Pax	58,189	2,023,346	21.6	0.6	93,643
Reference Case	2025	PM	Car IL	Pax	33,298	1,634,979	9.8	0.2	167,327
Reference Case	2025	AM	Car IM	Pax	161,415	5,334,898	19.4	0.6	274,982
Reference Case	2025	MD	Car IM	Pax	151,073	5,066,203	17.6	0.5	288,308
Reference Case	2025	PM	Car IM	Pax	83,093	3,626,093	9.2	0.2	395,376
Reference Case	2025	AM	CB	Pax	109,938	3,617,358	33.4	1.0	108,399
Reference Case	2025	MD	CB	Pax	91,615	3,352,121	30.0	0.8	111,813
Reference Case	2025	PM	CB	Pax	33,050	1,783,794	16.8	0.3	106,327
Reference Case	2025	AM	HP	Veh	5,005	184,243	24.7	0.7	7,473

The output area contains the data processed after running the script. The results are:

- Total vehicle-hours and passenger-hours by mode.
- Total vehicle-km and passenger-km by mode.
- Average vehicle and passenger distance by mode.
- Average vehicle and passenger journey time by mode.
- Total demand by mode.

3.6.3.5 Purpose Income

Purpose Income calculation sheet covers the data processing to obtain demand statistics. The script used to calculate these statistics is '***PurposeIncomeCalculation***' which can be found within the '***Visual Basic***' menu in the '***Developer***' tools of Excel.

The calculation is run by clicking on the '***Purpose Income Data Processing***' button in the Data Processor Tool menu or alternatively by clicking on '***Run All***' button in the MCA section.

Input Area

Figure 3.39 - Data Processor MCA Calculation Sheets – Purpose Income Input Area

Count	Demand	Demand Sheet Name
2879	C:\TAF\Reference Case\2025\Matrices\Purpose\GDA_HI_NonQatari_CarPassenger_B_AM_2025.csv	GDA_HI_NonQatari_CarPassenger_B
	C:\TAF\Reference Case\2025\Matrices\Purpose\GDA_HI_NonQatari_CarPassenger_B_FD_2025.csv	GDA_HI_NonQatari_CarPassenger_B
	C:\TAF\Reference Case\2025\Matrices\Purpose\GDA_HI_NonQatari_CarPassenger_B_MD_2025.csv	GDA_HI_NonQatari_CarPassenger_B
	C:\TAF\Reference Case\2025\Matrices\Purpose\GDA_HI_NonQatari_CarPassenger_B_PM_2025.csv	GDA_HI_NonQatari_CarPassenger_B
	C:\TAF\Reference Case\2025\Matrices\Purpose\GDA_HI_NonQatari_CarPassenger_C_AM_2025.csv	GDA_HI_NonQatari_CarPassenger_C
	C:\TAF\Reference Case\2025\Matrices\Purpose\GDA_HI_NonQatari_CarPassenger_C_FD_2025.csv	GDA_HI_NonQatari_CarPassenger_C
	C:\TAF\Reference Case\2025\Matrices\Purpose\GDA_HI_NonQatari_CarPassenger_C_MD_2025.csv	GDA_HI_NonQatari_CarPassenger_C

The input area contains a set of files and parameters required to run the script.

- Count is a counter whose value automatically update after populating the Demand column.
- Demand column includes the name of the QSTM2.0 matrix files.
- Demand Sheet Name column includes the name of the sheet of the Demand file.

Demand column is automatically updated after running the '***File Updater***' script or alternatively after clicking on '***Run All***' button in the Data Processor Tool menu. Demand Sheet Name is automatically updated when the script is run.

Output Area

Figure 3.40 - Data Processor MCA Calculation Sheets – Purpose Income Output Area

Scenario	Year	Period	Veh Type	GDA/NotGDA	TAF Purpose	Income	Qatari/Non Qatari	Totals (Person)
Reference Case	2025	AM	CarPassenger	GDA	B	HI	NonQatari	1495.09
Reference Case	2025	FD	CarPassenger	GDA	B	HI	NonQatari	19189.46
Reference Case	2025	MD	CarPassenger	GDA	B	HI	NonQatari	1965.62
Reference Case	2025	PM	CarPassenger	GDA	B	HI	NonQatari	1545.79
Reference Case	2025	AM	CarPassenger	GDA	C	HI	NonQatari	8956.54
Reference Case	2025	FD	CarPassenger	GDA	C	HI	NonQatari	76526.79
Reference Case	2025	MD	CarPassenger	GDA	C	HI	NonQatari	7900.48
Reference Case	2025	PM	CarPassenger	GDA	C	HI	NonQatari	3965.47
Reference Case	2025	AM	CarPassenger	GDA	R	HI	NonQatari	158.01
Reference Case	2025	FD	CarPassenger	GDA	R	HI	NonQatari	46138.70

The output area contains the data processed after running the script. The results are:

- Total passenger trips by mode, level of income, population group and geographic area (GDA/not GDA).

The results are used in the same calculation sheet of the Data Processor to produce the Car/Taxi split rates and the market share by mode and socio-economic population group.

3.6.3.7 Emission Calculation

Emission Calculation sheet covers the data processing to obtain emission and fuel consumption statistics for road transport modes. The script used to calculate these statistics is '***EmissionCalculation***' which can be found within the '***Visual Basic***' menu in the '***Developer***' tools of Excel.

The calculation is run by clicking on the '***Road Transport Emission Calculation***' button in the Data Processor Tool menu or alternatively by clicking on '***Run All***' button in the MCA section.

Input Area

Figure 3.41 - Data Processor MCA Calculation Sheets – Emission Calculation Input Area

FileFinisher	Demand	Sheet Name	VISUM Attribute Veh-Km	VISUM Attribute Speed	Vehicle Type	Vehicle
3	C:\TAF\Reference Case\2025\Network\Link_Level_2025.xlsx	AM	VEHKMTRAVPRT_DSEG(C_IM,AP)	VCUR_PRTSYS(C_IH)	Car Petrol 1	Car
SheetFinisher	C:\TAF\Reference Case\2030\Network\Link_Level_2030.xlsx	MD	VEHKMTRAVPRT_DSEG(C_IL,AP)	VCUR_PRTSYS(C_IH)	Car Petrol 1	Car
2	C:\TAF\Reference Case\2035\Network\Link_Level_2035.xlsx	PM	VEHKMTRAVPRT_DSEG(C_IH,AP)	VCUR_PRTSYS(C_IH)	Car Petrol 1	Car
AttributeFinisher	C:\TAF\Reference Case\2050\Network\Link_Level_2050.xlsx		VEHKMTRAVPRT_DSEG(C_IH,AP)	VCUR_PRTSYS(C_IH)	Car Petrol 2	Car
35			VEHKMTRAVPRT_DSEG(C_IM,AP)	VCUR_PRTSYS(C_IH)	Car Petrol 2	Car
VehicleTypeFinisher			VEHKMTRAVPRT_DSEG(C_IL,AP)	VCUR_PRTSYS(C_IH)	Car Petrol 2	Car
35			VEHKMTRAVPRT_DSEG(C_IH,AP)	VCUR_PRTSYS(C_IH)	Taxi Petrol	Taxi
ContaminantFinisher			VEHKMTRAVPRT_DSEG(C_IM,AP)	VCUR_PRTSYS(C_IH)	Taxi Petrol	Taxi
5			VEHKMTRAVPRT_DSEG(C_IL,AP)	VCUR_PRTSYS(C_IH)	Taxi Petrol	Taxi
Car/Taxi Split			VEHKMTRAVPRT_DSEG(C_IH,AP)	VCUR_PRTSYS(C_IH)	Taxi Diesel	Taxi
0.97			VEHKMTRAVPRT_DSEG(C_IM,AP)	VCUR_PRTSYS(C_IH)	Taxi Diesel	Taxi

The input area contains a set of files and parameters required to run the script.

- FileFinisher, SheetFinisher, AttributeFinisher, VehicleTypeFinisher and ContaminantFinisher are counters whose values are automatically updated after populating the Demand, Sheet, VISUM Attribute Veh-Km and Vehicle Type columns.
- Car/Taxi Split is an alternative split used when the Purpose Income script has not been run. The split is based on the average Car/Taxi split across the HYs and Peaks for the Reference Case.
- Demand column includes the name of the QSTM2.0 link level files. These are automatically updated after running the '***File Updater***' script or alternatively after clicking on '***Run All***' button in the Data Processor Tool menu.
- Sheet Name column includes the sheet names of the Link Level files under the column demand, for the AM, MD and PM.
- VISUM Code Veh-Km column includes the name of the Veh-Km VISUM mode attribute in the Link Level spreadsheet.
- VISUM Attribute Speed column includes the name of the Speed VISUM mode attribute in the Link Level spreadsheet.
- Vehicle Type column includes the transport mode, fuel consumption type and vehicle characteristics as defined in the Technical Report 2 of the Updated TMPQ. The relation of these Vehicles Types and the Qatar's fleet is defined within the Standard Parameters section in the '***Emission Rates***' sheet.
- Vehicle column includes the main transport mode (Car, Taxi, LGV, HGV and Contract Bus).

Output Area

Figure 3.42 - Data Processor MCA Calculation Sheets – Emission Calculation Output Area

Scenario	Year	Period	VehType	CO	HC	NOx	PM	CO2	FC	Vehicle
Reference Case	2025	AM	Car Petrol 1	47,904	44,044	47,904	3,122	232,598,041	97,621	Car
Reference Case	2025	AM	Car Petrol 1	19,508	19,547	19,508	1,306	96,063,191	40,317	Car
Reference Case	2025	AM	Car Petrol 1	44,231	40,181	44,231	2,825	214,130,944	89,870	Car
Reference Case	2025	AM	Car Petrol 2	511,868	12,076	65,383	7,541	271,647,082	114,009	Car
Reference Case	2025	AM	Car Petrol 2	574,583	13,362	71,137	8,290	294,895,858	123,767	Car
Reference Case	2025	AM	Car Petrol 2	247,273	5,563	30,015	3,454	121,792,583	51,116	Car
Reference Case	2025	AM	Taxi Petrol	498	452	498	32	2,411,245	1,012	Taxi
Reference Case	2025	AM	Taxi Petrol	549	505	549	36	2,664,771	1,118	Taxi
Reference Case	2025	AM	Taxi Petrol	605	606	605	41	2,980,430	1,251	Taxi

The output area contains the data processed after running the script. The results by main mode and vehicle type as defined in the Input Area are:

- Emissions (CO, HC, NOx, PM and CO_2) in grams, and
- Fuel Consumption in liters.

3.6.3.8 Emission Calculation Bus

Emission Calculation Bus sheet covers the data processing to obtain emission and fuel consumption statistics for public transport modes. The main reason to calculate the emission calculation for public transport using a different script is due to road vehicles and public transport vehicles using a separate network in the QSTM2.0 model.

The script used to calculate these statistics is '***EmissionCalculationBus***' which can be found within the '***Visual Basic***' menu in the '***Developer***' tools of Excel.

The calculation is run by clicking on the '***Public Transport Emission Calculation***' button in the Data Processor Tool menu or alternatively by clicking on '***Run All***' button in the MCA section.

Input Area

Figure 3.43 - Data Processor MCA Calculation Sheets – Emission Calculation Bus Input Area

FileFinisher	Demand	Sheet Name	Mode/Service	VISUM Code	Vehicle Type
3	C:\TAF\Reference Case\2025\Network\Route_Level_2025.xlsx	AM	Bus	B_FB	Bus Diesel 1
SheetFinisher	C:\TAF\Reference Case\2030\Network\Route_Level_2030.xlsx	MD	Bus	B_IU	Bus Diesel 1
2	C:\TAF\Reference Case\2035\Network\Route_Level_2035.xlsx	PM	Bus	B_RS	Bus Diesel 1
ServiceFinisher	C:\TAF\Reference Case\2050\Network\Route_Level_2050.xlsx		Bus	B_LS	Bus Diesel 1
25			Bus	B_TR	Bus Diesel 1
VehicleTypeFinisher			Bus	B_FB	Bus Diesel 2
25			Bus	B_IU	Bus Diesel 2
ContaminantFinisher			Bus	B_RS	Bus Diesel 2
5			Bus	B_LS	Bus Diesel 2

The input area contains a set of files and parameters required to run the script.

- FileFinisher, SheetFinisher, ServiceFinisher, VehicleTypeFinisher and ContaminantFinisher are counters whose values are automatically updated after populating the Demand, Sheet, VISUM Attribute Veh-Km and Vehicle Type columns.
- Demand column includes the name of the QSTM2.0 route level files. These are automatically updated after running the '***File Updater***' script or alternatively after clicking on '***Run All***' button in the Data Processor Tool menu.
- Mode/Service column includes the mode names as defined by the User. For the TMPQ project these are bus, LRT, rail, metro, BRT and Water Taxi.
- VISUM Code column includes the Transport System names used by the QSTM2.0 model. For the TMPQ project these are B_FB, B_IU, B_RS, B_LS, B_TR, 04_LRT, 05_LRT, 05_PME, Rail, 03_PT_Prim, BRT, PT_Water.
- Vehicle Type column includes the transport mode, fuel consumption type and vehicle characteristics as defined in the Technical Report 2 of the Updated TMPQ. The relation of these Vehicles Types and the Qatar's fleet is defined within the Standard Parameters section in the '***Emission Rates***' sheet.

Output Area

Figure 3.44 - Data Processor MCA Calculation Sheets – Emission Calculation Bus Output Area

Scenario	Year	Period	VehType	CO	HC	NOx	PM	CO2	FC	VISUM Code	Mode
Reference Case	2025	AM	Bus Diesel 1	10,838	1,401	185,261	2,344	53,978,950	19,990	B_FB	Bus
Reference Case	2025	AM	Bus Diesel 1	1,087	144	19,404	237	5,799,277	2,148	B_IU	Bus
Reference Case	2025	AM	Bus Diesel 1	6	1	116	1	35,292	13	B_RS	Bus
Reference Case	2025	AM	Bus Diesel 1	2,798	354	46,186	602	13,182,637	4,882	B_LS	Bus
Reference Case	2025	AM	Bus Diesel 1	1,140	142	18,495	245	5,221,375	1,934	B_TR	Bus
Reference Case	2025	AM	Bus Diesel 2	38,397	4,781	654,766	8,072	188,863,137	69,940	B_FB	Bus
Reference Case	2025	AM	Bus Diesel 2	3,813	480	68,802	808	20,147,212	7,461	B_IU	Bus
Reference Case	2025	AM	Bus Diesel 2	22	3	415	5	122,489	45	B_RS	Bus
Reference Case	2025	AM	Bus Diesel 2	9,892	1,213	162,584	2,076	46,261,141	17,131	B_LS	Bus
Reference Case	2025	AM	Bus Diesel 2	4,032	490	65,000	845	18,359,496	6,799	B_TR	Bus
Reference Case	2025	AM	Bus Diesel 3	54,619	5,703	933,307	10,336	271,864,112	100,677	B_FB	Bus

The output area contains the data processed after running the script. The results by main mode and vehicle type as defined in the Input Area are:

- Emissions (CO, HC, NOx, PM and CO_2) in grams, and
- Fuel Consumption in liters.
- Energy Consumption in Kwh.

The TMPQ scheme which assumed a change in the bus fleet from internal combustion to electric engines has been allocated to Scenario 3, Scenario 3R, Scenario 4 and Scenario 5 only. For these scenarios, the electrification of the bus fleet is assumed to occur between 2020 and 2030 hence, in 2025 the electric bus fleet is considered the 37.5% of the total bus fleet while internal combustion bus fleet is the 62.5%.

Input Area

3.6.3.9 Congestion

Congestion calculation sheet covers the data processing to obtain network congestion statistics. The script used to calculate these statistics is '***CongestionCalculation***' which can be found within the '***Visual Basic***' menu in the '***Developer***' tools of Excel.

The calculation is run by clicking on the '***Network Congestion***' button in the Data Processor Tool menu or alternatively by clicking on '***Run All***' button in the MCA section.

Figure 3.45 - Data Processor MCA Calculation Sheets – Congestion Input Area

Count	Demand Path	Demand Sheet	Congested Time Skim	Time Skim Sheet Name	Uncongested Time Skim	Uncongested Time Sheet Name
83	C:\TAF\Reference Case\2025	VehMatrix_HP_AM_2025	C:\TAF\Reference Case\2025	SkimMatrix_HP_TCur_AM_2(	C:\TAF\Reference Case\2025	SkimMatrix_HP_TT0_AM_20
	C:\TAF\Reference Case\2025	VehMatrix_HP_MD_2025	C:\TAF\Reference Case\2025	SkimMatrix_HP_TCur_MD_2(	C:\TAF\Reference Case\2025	SkimMatrix_HP_TT0_MD_20
	C:\TAF\Reference Case\2025	VehMatrix_HP_PM_2025	C:\TAF\Reference Case\2025	SkimMatrix_HP_TCur_PM_2(	C:\TAF\Reference Case\2025	SkimMatrix_HP_TT0_PM_20
	C:\TAF\Reference Case\2025	VehMatrix_HR_AM_2025	C:\TAF\Reference Case\2025	SkimMatrix_HR_TCur_AM_2(	C:\TAF\Reference Case\2025	SkimMatrix_HR_TT0_AM_20
	C:\TAF\Reference Case\2025	VehMatrix_HR_MD_2025	C:\TAF\Reference Case\2025	SkimMatrix_HR_TCur_MD_2(	C:\TAF\Reference Case\2025	SkimMatrix_HR_TT0_MD_20
	C:\TAF\Reference Case\2025	VehMatrix_HR_PM_2025	C:\TAF\Reference Case\2025	SkimMatrix_HR_TCur_PM_2(	C:\TAF\Reference Case\2025	SkimMatrix_HR_TT0_PM_20
	C:\TAF\Reference Case\2025	VehMatrix_LGV_AM_2025	C:\TAF\Reference Case\2025	SkimMatrix_LGV_TCur_AM_2	C:\TAF\Reference Case\2025	SkimMatrix_LGV_TT0_AM_2(

The input area contains a set of files and parameters required to run the script.

- Count is a counter whose value is automatically updated after populating the Passenger column.
- Demand column includes the name of the QSTM2.0 demand matrix files.
- Demand Sheet column includes the name of the sheet of the demand file.
- Congested Time Skim column includes the name of the QSTM2.0 TCur skim matrix files.
- Time Skim Sheet Name column includes the name of the sheet of TCur skim matrix file.
- Uncongested Time Skim column includes the name of the QSTM2.0 T0 skim matrix files.
- Uncongested Time Sheet Name column includes the name of the sheet of the T0 skim matrix file.

Demand, Congested and Uncongested Skim columns are automatically updated after running the '***File Updater***' script or alternatively after clicking on '***Run All***' button in the Data Processor Tool menu. Demand Sheet, Time Skim Sheet and Uncongested Time Sheet names are automatically updated when the script is run.

Output Area

Figure 3.46 - Data Processor MCA Calculation Sheets – Congestion Output Area

Scenario	Year	Peak	VehType	Vehicles Congested	Vehicles Uncongested	Vehicles Total	Percentage Congested
Reference Case	2025	AM	HP	2,554	2,450	5,005	51.04%
Reference Case	2025	MD	HP	2,238	2,165	4,403	50.84%
Reference Case	2025	PM	HP	1,266	2,614	3,880	32.63%
Reference Case	2025	AM	HR	186	232	419	44.50%
Reference Case	2025	MD	HR	160	205	365	43.81%
Reference Case	2025	PM	HR	78	248	326	23.97%
Reference Case	2025	AM	LGV	4,142	4,279	8,421	49.18%
Reference Case	2025	MD	LGV	3,661	3,804	7,465	49.04%

The output area contains the data processed after running the script. The results are:

- Vehicle-hours under congested conditions by mode.
- Vehicle-hours under uncongested conditions by mode.
- Total Vehicle-hours by mode.
- % of Congestion by mode.

3.6.3.10 PuT Transfers

PuT Transfer calculation sheet covers the data processing to obtain public transport statistics. The script used to calculate these statistics is '***PublicTransportTransfers***' which can be found within the '***Visual Basic***' menu in the '***Developer***' tools of Excel.

The calculation is run by clicking on the '***Multimodal Transfer Indicators***' button in the Data Processor Tool menu or alternatively by clicking on '***Run All***' button in the MCA section.

Input Area

Figure 3.47 - Data Processor MCA Calculation Sheets – PuT Transfers Input Area

Count Pax	Passenger	PuT Sheet Name	Number of Transfers Skim	Number of Transfers Skim Sheet Name	Waiting Time in Transfers Skim	Times Skim Sheet Name
11	C:\TAF\Reference Case\2025\M	PaxMatrix_PuT_AM_2025	C:\TAF\Reference Case\2025\M	SkimMatrix_NTR_AM_2025	C:\TAF\Reference Case\2025\Matrice	SkimMatrix_TWT_AM_2025
	C:\TAF\Reference Case\2025\M	PaxMatrix_PuT_MD_2025	C:\TAF\Reference Case\2025\M	SkimMatrix_NTR_MD_2025	C:\TAF\Reference Case\2025\Matrice	SkimMatrix_TWT_MD_2025
	C:\TAF\Reference Case\2025\M	PaxMatrix_PuT_PM_2025	C:\TAF\Reference Case\2025\M	SkimMatrix_NTR_PM_2025	C:\TAF\Reference Case\2025\Matrice	SkimMatrix_TWT_PM_2025
	C:\TAF\Reference Case\2030\M	PaxMatrix_PuT_AM_2030	C:\TAF\Reference Case\2030\M	SkimMatrix_NTR_AM_2030	C:\TAF\Reference Case\2030\Matrice	SkimMatrix_TWT_AM_2030
	C:\TAF\Reference Case\2030\M	PaxMatrix_PuT_MD_2030	C:\TAF\Reference Case\2030\M	SkimMatrix_NTR_MD_2030	C:\TAF\Reference Case\2030\Matrice	SkimMatrix_TWT_MD_2030
	C:\TAF\Reference Case\2030\M	PaxMatrix_PuT_PM_2030	C:\TAF\Reference Case\2030\M	SkimMatrix_NTR_PM_2030	C:\TAF\Reference Case\2030\Matrice	SkimMatrix_TWT_PM_2030
	C:\TAF\Reference Case\2035\M	PaxMatrix_PuT_AM_2035	C:\TAF\Reference Case\2035\M	SkimMatrix_NTR_AM_2035	C:\TAF\Reference Case\2035\Matrice	SkimMatrix_TWT_AM_2035

The input area contains a set of files and parameters required to run the script.

- Count Pax is a counter whose value is automatically updated after populating the Passenger column.
- Passenger column includes the name of the QSTM2.0 demand matrix files.
- PuT Sheet Name column includes the name of the sheet of the Passenger demand file.
- Number of Transfers Skim column includes the name of the QSTM2.0 number of transfers skim matrix files.
- Number of Transfers Skim Sheet Name column includes the name of the sheet of the number of transfers skim matrix file.
- Waiting Time in Transfers Skim column includes the name of the QSTM2.0 waiting time skim matrix files.
- Times Skim Sheet Name column includes the name of the sheet of the waiting time skim matrix file.

Passenger, Number of Transfers Skim and Waiting Time in Transfers Skim columns are automatically updated after running the '***File Updater***' script or alternatively after clicking on '***Run All***' button in the Data Processor Tool menu. PuT Sheet, Number of Transfers Skim Sheet and Times Skim Sheet names are automatically updated when the script is run.

Output Area

Figure 3.48 - Data Processor MCA Calculation Sheets – PuT Transfers Output Area

Scenario	Year	Peak	VehType	Total Trips than entail more than 1 transfers	Total number of transfers	Average Number of Transfers	Average Time Spent in Transfers
Reference Case	2025	AM	PuT	93,184	81,975	0.88	0.12
Reference Case	2025	MD	PuT	98,533	84,699	0.86	0.12
Reference Case	2025	PM	PuT	130,294	87,631	0.67	0.13
Reference Case	2030	AM	PuT	94,715	83,773	0.88	0.12
Reference Case	2030	MD	PuT	100,565	86,403	0.86	0.12
Reference Case	2030	PM	PuT	133,072	88,671	0.67	0.13
Reference Case	2035	AM	PuT	97,403	87,117	0.89	0.12

The output area contains the data processed after running the script. The results are:

- Total number of trips that entail more than 1 transfer.
- Total number of transfers.
- Average number of transfers.
- Average time spent in transfers.

3.6.3.11 Accessibility Index

Accessibility Index calculation sheet covers the data processing to obtain accessibility index statistics. The script used to calculate these statistics is '***AccessibilityIndexes***' which can be found within the '***Visual Basic***' menu in the '***Developer***' tools of Excel.

The calculation is run by clicking on the '***Accessibility Index***' button in the Data Processor Tool menu or alternatively by clicking on '***Run All***' button in the MCA section.

Input Area

Figure 3.49 - Data Processor MCA Calculation Sheets – Accessibility Index Input Area

Count	Demand	Skim Time	Planning Interface
3	C:\TAF\Reference Case\2025\Matrices\Demand\Passe	C:\TAF\Reference Case\2025\M	C:\TAF\Reference Case\Popu
	C:\TAF\Reference Case\2025\Matrices\Demand\Passe	C:\TAF\Reference Case\2025\Matrices\Skims Time\SkimMatr	
	C:\TAF\Reference Case\2025\Matrices\Demand\Passe	C:\TAF\Reference Case\2025\Matrices\Skims Time\SkimMatr	
	C:\TAF\Reference Case\2025\Matrices\Demand\Passe	C:\TAF\Reference Case\2025\Matrices\Skims PuT\SkimMatrix	
	C:\TAF\Reference Case\2030\Matrices\Demand\Passe	C:\TAF\Reference Case\2030\M	C:\TAF\Reference Case\Popu
	C:\TAF\Reference Case\2030\Matrices\Demand\Passe	C:\TAF\Reference Case\2030\Matrices\Skims Time\SkimMatr	

The input area contains a set of files and parameters required to run the script.

- Count Pax is a counter whose value automatically update after populating the Demand column.
- Demand column includes the name of the QSTM2.0 demand matrix files.
- Skim Time column includes the name of the QSTM2.0 TCur skim matrix files.
- Planning Interface column includes the name of QSTM2.0 Planning Interface.

Demand, Skim Time and Planning Interface columns are automatically updated after running the '***File Updater***' script or alternatively after clicking on '***Run All***' button in the Data Processor Tool menu.

Output Area

Figure 3.50 - Data Processor MCA Calculation Sheets – Accessibility Index Output Area

Scenario	Year	Period	PT_Health	PrT_Health	PT_Education	PrT_Education	PT_Business	PrT_Business
Reference Case	2025	AM	0.01	0.01	0.01	0.01	0.02	0.02
Reference Case	2030	AM	3.13	8.25	2.26	8.40	2.20	8.00
Reference Case	2035	AM	3.10	8.03	2.10	8.02	2.06	7.46
Reference Case	2050	AM	3.04	7.86	1.77	7.45	1.78	6.75

The output area contains the data processed after running the script. The results are:

- Public transport overall accessibility index to health.
- Private transport overall accessibility index to health.
- Public transport overall accessibility index to education
- Private transport overall accessibility index to education.
- Public transport overall accessibility index to employment.
- Private transport overall accessibility index to employment.

In addition, the script produces separate files for each horizon year with the zone level accessibility index to the locations above which are combined with GIS to generate the accessibility maps. These files are automatically saved under the scenario folder using the following naming convention: Scenario_AM_HY.

3.6.3.12 PuT Average Costs

PuT Transfer calculation sheet covers the data processing to obtain public transport statistics. The script used to calculate these statistics is '***AveragePublicCost***' which can be found within the '***Visual Basic***' menu in the '***Developer***' tools of Excel.

The calculation is run by clicking on the '***Public Transport Average Trip Cost***' button in the Data Processor Tool menu or alternatively by clicking on '***Run All***' button in the MCA section.

Input Area

Figure 3.51 - Data Processor MCA Calculation Sheets – PuT Average Costs Input Area

FileFinisher	Demand	Demand Sheet Name	Costs	Costs Sheet Name	Demand Filter	Demand Filter Sheet Name
11	C:\TAF\Reference Case\2025\	PaxMatrix_PuT_AM_2025	C:\TAF\Reference Case\2025\	FareMatrix_MFR_X_2025	C:\TAF\Reference Case\AuxM	Tourism
	C:\TAF\Reference Case\2025\	PaxMatrix_PuT_MD_2025	C:\TAF\Reference Case\2025\	FareMatrix_MFR_X_2025	C:\TAF\Reference Case\AuxM	Tourism
	C:\TAF\Reference Case\2025\	PaxMatrix_PuT_PM_2025	C:\TAF\Reference Case\2025\	FareMatrix_MFR_X_2025	C:\TAF\Reference Case\AuxM	Tourism
	C:\TAF\Reference Case\2030\	PaxMatrix_PuT_AM_2030	C:\TAF\Reference Case\2030\	FareMatrix_MFR_X_2030	C:\TAF\Reference Case\AuxM	Tourism
	C:\TAF\Reference Case\2030\	PaxMatrix_PuT_MD_2030	C:\TAF\Reference Case\2030\	FareMatrix_MFR_X_2030	C:\TAF\Reference Case\AuxM	Tourism
	C:\TAF\Reference Case\2030\	PaxMatrix_PuT_PM_2030	C:\TAF\Reference Case\2030\	FareMatrix_MFR_X_2030	C:\TAF\Reference Case\AuxM	Tourism
	C:\TAF\Reference Case\2035\	PaxMatrix_PuT_AM_2035	C:\TAF\Reference Case\2035\	FareMatrix_MFR_X_2035	C:\TAF\Reference Case\AuxM	Tourism
	C:\TAF\Reference Case\2035\	PaxMatrix_PuT_MD_2035	C:\TAF\Reference Case\2035\	FareMatrix_MFR_X_2035	C:\TAF\Reference Case\AuxM	Tourism

The input area contains a set of files and parameters required to run the script.

- FileFinisher is a counter whose is value automatically updated after populating the Demand column.
- Demand column includes the name of the QSTM2.0 demand matrix files.
- Demand Sheet Name column includes the name of the sheet of the demand file.
- Costs column includes the name of the QSTM2.0 PuT fare skim matrix files.
- Costs Sheet Name column includes the name of the sheet of the fare skim file.

- Demand Filter column includes the name of the file used to filter touristic OD pairs.
- Demand Filter Sheet Name column includes the name of the sheet of the demand filter file.

Demand, Costs and Demand Filter columns are automatically updated after running the '***File Updater***' script or alternatively after clicking on '***Run All***' button in the Data Processor Tool menu. Demand Sheet, Cost Sheet and Demand Filter Sheet names are automatically updated when the script is run.

Output Area

Figure 3.52 - Data Processor MCA Calculation Sheets – PuT Average Costs Output Area

Scenario	Year	Period	VehType	Average Cost (QAR)	Total Cost (QAR)	Total Demand	Average Cost Tourist (QAR)	Total Cost Tourist (QAR)	Total Tourist Demand
Reference Case	2025	AM	PuT	3.6	334,690	93,173	3.8	11,939	3,138
Reference Case	2025	MD	PuT	3.5	343,554	98,532	3.4	7,821	2,277
Reference Case	2025	PM	PuT	3.0	395,416	130,293	3.0	11,559	3,902
Reference Case	2030	AM	PuT	3.6	343,834	94,705	3.8	14,384	3,778
Reference Case	2030	MD	PuT	3.5	352,550	100,563	3.4	8,585	2,556
Reference Case	2030	PM	PuT	3.0	403,675	133,071	3.0	11,678	3,909
Reference Case	2035	AM	PuT	3.7	360,149	97,394	3.8	17,821	4,647

The output area contains the data processed after running the script. The results are:

- Public transport trips average cost.
- Public transport trips total cost.
- Public transport total demand.
- Public transport trips average cost to touristic locations.
- Public transport trips total costs to touristic locations.
- Public transport demand to touristic locations.

3.6.3.13 Private Average Costs

PuT Transfer calculation sheet covers the data processing to obtain public transport statistics. The script used to calculate these statistics is '***AveragePrivateCost***' which can be found within the '***Visual Basic***' menu in the '***Developer***' tools of Excel.

The calculation is run by clicking on the '***Private Transport Average Trip Cost***' button in the Data Processor Tool menu or alternatively by clicking on '***Run All***' button in the MCA section.

Input Area

Figure 3.53 - Data Processor MCA Calculation Sheets – Private Average Costs Input Area

FileFinisher	Demand	Demand Sheet Nam	Time Skim	Time Skim Sheet Na	Distance Skim	Distance Skim Sheet	Emission Veh Type	Toll Skim	Cost Charging Area	Parking Matrices	Filter
71	C:\TAF\Reference Case	VehMatrix_Car_IH_AM	C:\TAF\Reference Case	SkimMatrix_C_IH_TCur	C:\TAF\Reference Case	SkimMatrix_C_IH_DCu	Car	C:\TAF\Reference Case	C:\TAF\Reference Case	C:\TAF\Reference Case	C:\TAF\Reference Case
	C:\TAF\Reference Case	VehMatrix_Car_IH_MD	C:\TAF\Reference Case	SkimMatrix_C_IH_TCur	C:\TAF\Reference Case	SkimMatrix_C_IH_DCu	Car	C:\TAF\Reference Case	C:\TAF\Reference Case	C:\TAF\Reference Case	C:\TAF\Reference Case
	C:\TAF\Reference Case	VehMatrix_Car_IH_PM	C:\TAF\Reference Case	SkimMatrix_C_IH_TCur	C:\TAF\Reference Case	SkimMatrix_C_IH_DCu	Car	C:\TAF\Reference Case	C:\TAF\Reference Case	C:\TAF\Reference Case\AuxMatrix\Parking Au	
	C:\TAF\Reference Case	VehMatrix_Car_IL_AM	C:\TAF\Reference Case	SkimMatrix_C_IL_TCur	C:\TAF\Reference Case	SkimMatrix_C_IL_DCur	Car	C:\TAF\Reference Case	C:\TAF\Reference Case	C:\TAF\Reference Case\AuxMatrix\Parking Au	
	C:\TAF\Reference Case	VehMatrix_Car_IL_MD	C:\TAF\Reference Case	SkimMatrix_C_IL_TCur	C:\TAF\Reference Case	SkimMatrix_C_IL_DCur	Car	C:\TAF\Reference Case	C:\TAF\Reference Case\2025\Costs\FareMatrix_CHA_2025.csv		
	C:\TAF\Reference Case	VehMatrix_Car_IL_PM	C:\TAF\Reference Case	SkimMatrix_C_IL_TCur	C:\TAF\Reference Case	SkimMatrix_C_IL_DCur	Car	C:\TAF\Reference Case	C:\TAF\Reference Case\2025\Costs\FareMatrix_CHA_2025.csv		
	C:\TAF\Reference Case	VehMatrix_Car_IM_AM	C:\TAF\Reference Case	SkimMatrix_C_IM_TCu	C:\TAF\Reference Case	SkimMatrix_C_IM_DCu	Car	C:\TAF\Reference Case	C:\TAF\Reference Case\2025\Costs\FareMatrix_CHA_2025.csv		
	C:\TAF\Reference Case	VehMatrix_Car_IM_MD	C:\TAF\Reference Case	SkimMatrix_C_IM_TCu	C:\TAF\Reference Case	SkimMatrix_C_IM_DCu	Car	C:\TAF\Reference Case	C:\TAF\Reference Case\2025\Costs\FareMatrix_CHA_2025.csv		

The input area contains a set of files and parameters required to run the script.

- FileFinisher is a counter whose value is automatically updated after populating the Demand column.
- Demand column includes the name of the QSTM2.0 demand matrix files.
- Demand Sheet Name column includes the name of the sheet of the demand file.
- Time Skim column includes the name of the QSTM2.0 TCur skim matrix files.
- Time Skim Sheet Name column includes the name of the sheet of the TCur skim matrix.
- Distance Skim column includes the name of the QSTM2.0 distance skim matrix files.
- Distance Skim Sheet Name column includes the name of the sheet of the distance skim matrix.
- Emission vehicle type column refers to the vehicle type used for the fuel consumption calculation which is car or taxi for this script.
- Toll Skim column includes the name of the QSTM2.0 toll skim matrix files.
- Costs Charging Area column includes the name of the QSTM2.0 cost charging skim matrix files.
- Parking Matrices column includes the name of the supporting files for parking cost calculation.
- Filter column includes the name of the supporting files for filtering airport and touristic trips.

Demand, Time Skim, Distance Skim, Toll Skim, Cost Charging Area, Parking Matrices and Filter columns are automatically updated after running the '***File Updater***' script or alternatively after clicking on '***Run All***' button in the Data Processor Tool menu. Demand Sheet, Time Skim Sheet and Distance Skim Sheet names are automatically updated when the script is run.

Output Area

Figure 3.54 - Data Processor MCA Calculation Sheets – Private Average Costs Output Area

Scenario	Year	Period	VehType	Average Cost (QAR)	Total Cost (QAR)	Total Demand	Average Cost Tourist (QAR)	Total Cost Tourist (QAR)	Total Tourist Demand
Reference Case	2025	AM	Car IH	3.5	612377.8	172634.5	3.9	18582.9	4755.5
Reference Case	2025	MD	Car IH	3.5	677707.7	195230.0	3.2	11667.4	3683.1
Reference Case	2025	PM	Car IH	1.7	233254.0	135006.1	1.8	4319.0	2385.7
Reference Case	2025	AM	Car IL	5.0	265085.3	53542.7	6.0	9542.4	1578.8
Reference Case	2025	MD	Car IL	4.1	236292.3	57948.0	3.8	2924.9	772.6
Reference Case	2025	PM	Car IL	1.6	158502.8	97935.2	2.1	2208.4	1063.4
Reference Case	2025	AM	Car IM	3.7	661513.3	177144.6	4.4	26547.9	6012.4
Reference Case	2025	MD	Car IM	3.4	623716.8	185581.9	3.1	10237.2	3279.7
Reference Case	2025	PM	Car IM	1.6	398646.4	252835.6	1.7	8113.3	4797.4

The output area contains the data processed after running the script. The results are:

- Private transport trips average cost.
- Private transport trips total cost.
- Private transport total demand.
- Private transport trips average cost to touristic locations.
- Private transport trips total costs to touristic locations.
- Private transport demand to touristic locations.

The script considers a minimum stay of 2.5 hours for private vehicles in the parking cost calculation.

3.6.3.14 Port Airport Goods / Business Airport / Tourism 2025/2030/2035/2050

This set of calculation sheets cover the data processing to obtain average journey time to selected location statistics. The script used to calculate these statistics is '***AverageTimeToSelectedLocation***' which can be found within the '***Visual Basic***' menu in the '***Developer***' tools of Excel.

The calculation is run by clicking on the '***Average Journey Time***' button in the Data Processor Tool menu and selecting the specific location in the menu on the right of the button. Alternatively, by clicking on '***Run All***' button in the MCA section the script is run for all the locations.

Input Area

Figure 3.55 - Data Processor MCA Calculation Sheets – Average Travel Time to Selected Locations Input Area

Count	Vehicles	Vehicles Sheet Name	Filter Demand	Filter Name	Congested Time Skim	Time Skim Sheet Name
20	C:\TAF\Reference Case\	VehMatrix_Car_IH_AM_	C:\TAF\Reference Case\	Goods	C:\TAF\Reference Case\2(	SkimMatrix_C_IH_TCur_AM
Port Airport Goods 2(	C:\TAF\Reference Case\	VehMatrix_Car_IH_MD_	C:\TAF\Reference Case\	Goods	C:\TAF\Reference Case\2(	SkimMatrix_C_IH_TCur_MD
	C:\TAF\Reference Case\	VehMatrix_Car_IH_PM_:	C:\TAF\Reference Case\	Goods	C:\TAF\Reference Case\2(	SkimMatrix_C_IH_TCur_PM
	C:\TAF\Reference Case\	VehMatrix_Car_IL_AM_2	C:\TAF\Reference Case\	Goods	C:\TAF\Reference Case\2(	SkimMatrix_C_IL_TCur_AM
	C:\TAF\Reference Case\	VehMatrix_Car_IL_MD_2	C:\TAF\Reference Case\	Goods	C:\TAF\Reference Case\2(	SkimMatrix_C_IL_TCur_MD
	C:\TAF\Reference Case\	VehMatrix_Car_IL_PM_2	C:\TAF\Reference Case\	Goods	C:\TAF\Reference Case\2(	SkimMatrix_C_IL_TCur_PM
	C:\TAF\Reference Case\	VehMatrix_Car_IM_AM_	C:\TAF\Reference Case\	Goods	C:\TAF\Reference Case\2(	SkimMatrix_C_IM_TCur_AM

The input area contains a set of files and parameters required to run the script.

- Count is a counter whose value is automatically updated after populating the Vehicles column.
- Vehicles column includes the name of the QSTM2.0 demand matrix files.
- Vehicles Sheet Name column includes the name of the sheet of the demand file.
- Filter Demand column includes the name of the supporting files for filtering the trips to selected locations.
- Filter Name columns includes the name of the sheet of the filter file.
- Congested Time Skim column includes the name of the QSTM2.0 TCur skim matrix files.
- Time Skim Sheet Name column includes the name of the sheet of the TCur skim matrix.

Demand, Congested Time Skim and Filter Demand columns are automatically updated after running the '***File Updater***' script or alternatively after clicking on '***Run All***' button in the Data Processor Tool menu. Vehicle Sheet, Filter and Time Skim Sheet names are automatically updated when the script is run.

Output Area

Figure 3.56 - Data Processor MCA Calculation Sheets – Average Travel Time to Selected Locations Output Area

Scenario	Year	Peak	VehType	Average Time (h)	Demand
Reference Case	2025	AM	Car IH	0.68	6,472
Reference Case	2025	MD	Car IH	0.79	5,995
Reference Case	2025	PM	Car IH	0.26	3,103

The output area contains the data processed after running the script. The results are:

- Average time to selected locations by mode in hours.
- Demand to selected locations by mode.

3.6.4 SCHEME PRIORITIZATION SECTION

3.6.4.1 PuT Schemes

PuT Schemes calculation sheet covers the data processing to obtain public transport statistics that support the quantitative criteria in the Scenario Development process. The script used to calculate these statistics is '***PublicSchemePerformance***' which can be found within the '***Visual Basic***' menu in the '***Developer***' tools of Excel.

The calculation is run by clicking on the '***Public Transport Scheme Performance***' button in the Data Processor Tool menu or alternatively by clicking on '***Run All***' button in the MCA section.

Input Area

Figure 3.57 - Data Processor Scheme Prioritization Calculation Sheets – PuT Schemes Input Area

FileFinisher	Demand	Sheet Name	Schemes	Schemes Title
0	C:\TAF\Scenario 5\2050\Network\Route_Level_2050.xlsx	AM	BU-01	$LINEROUTEITEM:LINENAME
SheetFinisher		MD	BU-03	
2		PM	BU-04	
SchemeFinisher			BU-05	
43			BU-15	
			BU-16	

The input area contains a set of files and parameters required to run the script.

- FileFinisher, SheetFinisher and SchemeFinisher are counters whose values are automatically updated after populating the Demand, Sheet Name and Schemes columns.
- Demand column includes the name of the QSTM2.0 Scenario route level file. For the Scheme Allocation process the selected scenario is 2050 Scenario 5.
- Sheet Name column includes the sheet names of the route level file under the column demand, for the AM, MD and PM.
- Scheme column includes the scheme names as defined by the User.
- Schemes Title column includes the VISUM attribute used to identify the scheme in the route level file.

Output Area

Figure 3.58 - Data Processor Scheme Prioritization Calculation Sheets – PuT Schemes Output Area

Scenario	Year	Period	VehType	Schemes	Passengers	Passengers-Km	Veh-Km	Vehicles	Pax-Hours	LoS A	LoS B	LoS C	LoS D	LoS E	LoS F	(Km/h)	Total Score
Scenario 5	2050	AM	B_IU	BU-01	1,592	10,094	552	20	346,248	9	27	4	0	0	187	48	4.11
Scenario 5	2050	AM	B_LS	BU-03	9,575	9,263	341	20	7,309,440	19	0	0	0	0	91	41	3.22
Scenario 5	2050	AM	B_IU	BU-04	281	404	93	20	19,270	9	0	0	0	0	0	39	1.00
Scenario 5	2050	AM	B_IU	BU-05	508	1,403	361	10	761,720	27	0	28	0	0	0	47	1.52
Scenario 5	2050	AM	B_LS	BU-15	4,961	10,683	668	20	899,250	35	24	16	1	9	74	45	2.39
Scenario 5	2050	AM	B_IU	BU-16	193	705	200	10	20,631	20	0	0	0	0	0	45	1.00
Scenario 5	2050	AM	B_LS	BU-17	1,304	4,367	289	20	378,420	25	0	0	0	12	6	47	1.52
Scenario 5	2050	AM	B_FB	Doha Exhil	1,841	1,259	149	22	290,418	2	8	0	0	0	50	35	4.21
Scenario 5	2050	AM	B_FB	Economic	383	778	258	45	0	23	0	0	0	0	0	46	1.00
Scenario 5	2050	AM	B_FB	Education	1,720	2,042	197	20	484,000	10	5	0	6	10	23	41	2.71

The output area contains the data processed after running the script. The results are:

- Passengers by mode and scheme.
- Passengers-km by mode and scheme.
- Veh-km by mode and scheme.
- Vehicles by mode and scheme.
- Passenger-hours by mode and scheme.
- Number of kilometers operating under a certain level of service by mode and scheme.
- Speed by mode and scheme.
- Total score.

These outputs feed the Scenario Development process, supporting the allocation of each scheme within one of the five proposed scenarios in the TMPQ. It can be also used to assess the performance of specific public transport schemes in different scenarios.

3.6.4.2 Highway Schemes

Highway Schemes calculation sheet covers the data processing to obtain highway schemes performance statistics that support the quantitative criteria in the Scenario Development process. The script used to calculate these statistics is '***HighwaySchemePerformance***' which can be found within the '***Visual Basic***' menu in the '***Developer***' tools of Excel.

The calculation is run by clicking on the '***Road Transport Scheme Performance***' button in the Data Processor Tool menu or alternatively by clicking on '***Run All***' button in the MCA section.

Input Area

Figure 3.59 - Data Processor Scheme Prioritization Calculation Sheets – Highway Schemes Input Area

FileFinisher	Demand	Sheet Name	Schemes	Schemes Title
0	C:\TAF\Scenario 1\2050\Network\Link_Level_2050.xlsx	AM	HW-28	LINKS_ADDED
SheetFinisher		MD	HW-23	
2		PM	HW-29	
SchemeFinisher			HW-44	
60			HW-43	
			HW-33	

The input area contains a set of files and parameters required to run the script.

- FileFinisher, SheetFinisher and SchemeFinisher are counters whose values automatically update after populating the Demand, Sheet Name and Schemes columns.
- Demand column includes the name of the QSTM2.0 Scenario link level file. For the Scheme Allocation process the selected scenario is 2050 Scenario 1.
- Sheet Name column includes the sheet names of the link level file under the column demand, for the AM, MD and PM.
- Scheme column includes the scheme names as defined by the User.
- Schemes Title column includes the attribute used to identify the scheme in the link level file.

Output Area

Figure 3.60 - Data Processor Scheme Prioritization Calculation Sheets – Highway Schemes Output Area

Scenario	Year	Period	Scheme	Volume	Veh-Km	LoS A	LoS B	LoS C	LoS D	LoS E	LoS F	LoS Score	Veh-Km HV	LoS Sum Km
Scenario 1	2050	AM	HW-28	9,814	14,591	71.15	0.00	0.00	0.00	0.00	0.00	1.00	331	71
Scenario 1	2050	AM	HW-23	11,474	22,909	103.88	0.00	0.00	0.00	0.00	0.00	1.00	1,133	104
Scenario 1	2050	AM	HW-29	22,676	46,048	226.62	0.00	0.00	0.00	0.00	0.00	1.00	1,372	227
Scenario 1	2050	AM	HW-44	73,528	31,729	24.51	0.11	0.03	0.00	0.23	0.17	1.08	60	25
Scenario 1	2050	AM	HW-43	7,687	57,937	148.92	0.00	0.00	0.00	0.00	0.00	1.00	849	149
Scenario 1	2050	AM	HW-33	30,388	59,756	208.05	0.00	0.00	0.00	0.00	0.00	1.00	228	208
Scenario 1	2050	AM	HW-54	7,011	12,897	40.49	0.00	0.00	0.00	0.00	0.00	1.00	86	40
Scenario 1	2050	AM	HW-15	552,839	72,563	50.79	3.79	2.59	3.90	0.83	0.65	1.44	2,116	63
Scenario 1	2050	AM	HW-50	24,516	3,304	5.79	0.00	0.00	0.00	0.00	0.00	1.00	45	6

The output area contains the data processed after running the script. The results are:

- Traffic volume by scheme
- Vehicle-Km by scheme
- Number of scheme kilometers operating under a certain level of service.
- Level of service score.
- Number of freight vehicle-km by scheme.
- Total kilometers by scheme.

These outputs feed the Scenario Development process, supporting the allocation of each scheme within the five proposed scenarios in the TMPQ. It can be also used to assess the performance of specific road transport schemes in different scenarios.

3.6.5 COST-BENEFIT ANALYSIS SCRIPTS

The CBA section of the Data Processor includes all the calculation sheets required to carry out the **Cost-Benefit Assessment** based on the quantitative indicators derived from the QSTM2.0. These calculations follow the same methodology defined in the Technical Report 2 of the Updated TMPQ. The calculation sheets of the MCA section follow a green-color pattern and includes the following sheets:

1. Travel Time Saving Calculation Sheets
   a. CompanyBus
   b. Car
   c. PuT
   d. LGV
   e. HGV

2. Revenue Calculation Sheets
    a. Private Revenue
    b. Public Revenue
    c. Parking Revenue
    d. Revenue Support

This section describes the required inputs and obtained outputs after running the different scripts included in the Data Processor.

3.6.5.1 Travel Time Saving Calculation Sheets

This set of calculation sheets cover the data processing to obtain the travel time saving by mode and socioeconomic population group. Due to the differences in the number of assigned matrices by mode and the amount of data required to run the script, the travel time saving calculation is split into the following sheets:

- CompanyBus
- Car
- PuT
- LGV
- HGV (including both heavy permitted and restricted).

The travel time saving calculation for company bus, car and PuT modes uses the purpose mode wise matrices to support the calculation and obtain the time savings classified by socioeconomic population group and trip purpose. These socioeconomic population groups are:

- Qatari High Income
- Non-Qatari High Income
- Non-Qatari Medium Income
- Non-Qatari Low Income
- Non-Qatari Laborer

The following purposes are considered in the calculation:

- Commuting
- Business
- Other

On the other hand, the LGV and the HGV matrices are '***fixed***' matrices and not part of the QSTM2.0 demand model. Hence, it is not possible to use purpose wise matrices to support the travel time saving calculation and it is assumed that all these trips fall within the '***Non-Qatari Low Income***' socioeconomic group and '***Business***' trip purpose.

The script used to calculate these statistics is '***TTS_General***' which can be found within the '***Visual Basic***' menu in the '***Developer***' tools of Excel.

Before running the travel time saving script, it is required to update the required files to carry out the calculation by clicking on the 'Travel Time Saving File Updater'. Once the files are updated, the calculation can be run for the selected mode by clicking on the '***Travel Time Saving Calculation***' button in the Data Processor Tool menu.

Alternatively, the calculation can be undertaken by clicking on '***Run All***' button in the CBA section. In this situation the required files are automatically updated and the calculation run across all the modes and defined HYs.

Input Area

Figure 3.61 - Data Processor Cost-Benefit Calculation Sheets – Travel Time Saving Sheets Input Area

Inner Iteration	Input Purpose Data	Input Demand Reference Case	Input TCur Reference Case	Input Demand Scenario	Input TCur Scenario
30	C:\TAF\Reference Case\2050\Matrices\Purpose\GDA_HI_NonQatari_CompanyBus_	C:\TAF\Reference Case\2050\Matrice	C:\TAF\Reference Case\2050\Matrice	C:\TAF\Scenario 5\2050\Matrices\Der	C:\TAF\Scenario 5\2050\Matrices\Ski
Mode	C:\TAF\Reference Case\2050\Matrices\Purpose\GDA_HI_NonQatari_CompanyBus_	C:\TAF\Reference Case\2050\Matrice	C:\TAF\Reference Case\2050\Matrice	C:\TAF\Scenario 5\2050\Matrices\Der	C:\TAF\Scenario 5\2050\Matrices\Ski
Other	C:\TAF\Reference Case\2050\Matrices\Purpose\GDA_HI_NonQatari_CompanyBus_	C:\TAF\Reference Case\2050\Matrice	C:\TAF\Reference Case\2050\Matrice	C:\TAF\Scenario 5\2050\Matrices\Der	C:\TAF\Scenario 5\2050\Matrices\Ski
External Iteratior	C:\TAF\Reference Case\2050\Matrices\Purpose\GDA_HI_Qatari_CompanyBus_B_A	0	0	0	0
2	C:\TAF\Reference Case\2050\Matrices\Purpose\GDA_HI_Qatari_CompanyBus_C_A	0	0	0	0
Demand Iteratio	C:\TAF\Reference Case\2050\Matrices\Purpose\GDA_HI_Qatari_CompanyBus_R_A	0	0	0	0
0	C:\TAF\Reference Case\2050\Matrices\Purpose\GDA_LBR_NonQatari_CompanyBu:	0	0	0	0
CompanyBus	C:\TAF\Reference Case\2050\Matrices\Purpose\GDA_LBR_NonQatari_CompanyBu:	0	0	0	0
CountData	C:\TAF\Reference Case\2050\Matrices\Purpose\GDA_LBR_NonQatari_CompanyBu:	0	0	0	0
45	C:\TAF\Reference Case\2050\Matrices\Purpose\GDA_LI_NonQatari_CompanyBus_	0	0	0	0

The input area contains a set of files and parameters required to run the script.

- Inner Iteration, External Iteration, Demand Iteration and CountData are counters whose values are automatically updated after populating the columns to the right.
- Mode is a variable that considers whether the travel time saving calculation is run specifically for Car or other modes.
- Input Purpose Data column includes the name of the QSTM2.0 purpose wise matrices
- Input Demand Reference Case includes the name of the QSTM2.0 Reference Case demand matrices.
- Input TCur Reference Case includes the name of the QSTM2.0 Reference Case TCur skim matrices.
- Input Demand Scenario includes the name of the QSTM2.0 Scenario demand matrices.
- Input TCur Scenario includes the name of the QSTM2.0 Scenario TCur skim matrices.

Input Purpose Data, Input Demand Reference Case, Input TCur Reference Case, Input Demand Scenario and Input TCur Scenario columns are automatically updated after running the '***Travel Time Saving File Updater***' script or alternatively by clicking on the '***Run All***' button in the CBA section of the Data Processor Tool sheet.

Output Area

Figure 3.62 - Data Processor Cost-Benefit Calculation Sheets – Travel Time Saving Sheets Output Area

Scenario	Peak	Year	Population Group	Purpose	Mode	TTS	RC Demand	RC Demand Check	Scenario Demand	Scenario Demand Check	Purpose Demand	Purpose Demand Check
Scenario 5	AM	2050	NonQatari HI	B	CompanyBus	160	55	122,791	60	123,577	55	122,797
Scenario 5	AM	2050	NonQatari HI	C	CompanyBus	3	964		1,158		960	
Scenario 5	AM	2050	NonQatari HI	R	CompanyBus	146	312		504		285	
Scenario 5	AM	2050	Qatari HI	B	CompanyBus	0	0		0		0	
Scenario 5	AM	2050	Qatari HI	C	CompanyBus	0	0		0		0	
Scenario 5	AM	2050	Qatari HI	R	CompanyBus	0	0		0		0	
Scenario 5	AM	2050	NonQatari LBR	B	CompanyBus	1,615	1,113		1,155		1,092	
Scenario 5	AM	2050	NonQatari LBR	C	CompanyBus	69	17,230		15,822		17,341	
Scenario 5	AM	2050	NonQatari LBR	R	CompanyBus	9,109	54,306		55,400		54,371	

The output area contains the data processed after running the script. The results are:

- Travel time saving in hours by mode and socioeconomic group.
- Reference Case demand by mode and socioeconomic group.
- Total Reference Case demand check.
- Scenario demand by mode and socioeconomic group.
- Total Scenario demand check.
- Purpose wise matrices demand by mode and socioeconomic group.
- Total Purpose demand check.

3.6.5.2 Private Revenue Calculation Sheet

This calculation sheet covers the data processing to obtain the private transport revenue from tolls and cost charging area schemes.

The script used to calculate these statistics is '***RevenuePrivate***' which can be found within the '***Visual Basic***' menu in the '***Developer***' tools of Excel.

The calculation is run by clicking on the '***Private Transport Revenue***' button in the Data Processor Tool menu or alternatively by clicking on '***Run All***' button in the CBA section.

Input Area

Figure 3.63 - Data Processor Cost-Benefit Calculation Sheets – Private Revenue Input Area

FileFinisher	Demand	Toll Skim	Cost Charging Area Skim
20	C:\TAF\Scenario 3R\2050\Matrices\Demand\Vehicle\VehMatrix_Car_IH_AM_2050.csv	C:\TAF\Scenario 3R\2050\Costs\FareMatrix_C_IH_2050.csv	C:\TAF\Scenario 3R\2050\Costs\FareMatrix_CHA_2050.csv
	C:\TAF\Scenario 3R\2050\Matrices\Demand\Vehicle\VehMatrix_Car_IH_MD_2050.csv	C:\TAF\Scenario 3R\2050\Costs\FareMatrix_C_IH_2050.csv	C:\TAF\Scenario 3R\2050\Costs\FareMatrix_CHA_2050.csv
	C:\TAF\Scenario 3R\2050\Matrices\Demand\Vehicle\VehMatrix_Car_IH_PM_2050.csv	C:\TAF\Scenario 3R\2050\Costs\FareMatrix_C_IH_2050.csv	C:\TAF\Scenario 3R\2050\Costs\FareMatrix_CHA_2050.csv
	C:\TAF\Scenario 3R\2050\Matrices\Demand\Vehicle\VehMatrix_Car_IL_AM_2050.csv	C:\TAF\Scenario 3R\2050\Costs\FareMatrix_C_IL_2050.csv	C:\TAF\Scenario 3R\2050\Costs\FareMatrix_CHA_2050.csv
	C:\TAF\Scenario 3R\2050\Matrices\Demand\Vehicle\VehMatrix_Car_IL_MD_2050.csv	C:\TAF\Scenario 3R\2050\Costs\FareMatrix_C_IL_2050.csv	C:\TAF\Scenario 3R\2050\Costs\FareMatrix_CHA_2050.csv
	C:\TAF\Scenario 3R\2050\Matrices\Demand\Vehicle\VehMatrix_Car_IL_PM_2050.csv	C:\TAF\Scenario 3R\2050\Costs\FareMatrix_C_IL_2050.csv	C:\TAF\Scenario 3R\2050\Costs\FareMatrix_CHA_2050.csv

The input area contains a set of files and parameters required to run the script.

- FileFinisher is a counter whose value automatically update after populating the columns Demand.
- Demand column includes the name of the QSTM2.0 demand matrices.
- Toll Skim column includes the name of the QSTM2.0 toll skim matrices.
- Cost Charging Area column includes the name of the QSTM2.0 cost charge skim matrices.

Demand, Toll Skim and Cost Charging are automatically updated after running the '***File Updater***' script or alternatively by clicking on the '***Run All***' button in the CBA section of the Data Processor Tool sheet. The current version of the QSTM 2.0 model does not provide skim matrices for tolls and cost charging area separately. However, the script was written considering the future possibility to provide two different sets of matrices to calculate the revenues.

Output Area

Figure 3.64 - Data Processor Cost-Benefit Calculation Sheets – Private Revenue Output Area

Scenario	Year	Period	Mode	Toll Revenue (QAR)	Cost Charging Revenue (QAR)	Total Demand
Scenario 3R	2050	AM	Car IH	1,028,309	0	234,108
Scenario 3R	2050	MD	Car IH	1,277,401	0	263,089
Scenario 3R	2050	PM	Car IH	531,044	0	206,638
Scenario 3R	2050	AM	Car IL	69,405	0	41,660
Scenario 3R	2050	MD	Car IL	95,924	0	44,754
Scenario 3R	2050	PM	Car IL	57,226	0	83,381
Scenario 3R	2050	AM	Car IM	814,066	0	227,081

The output area contains the data processed after running the script. The results are:

- Toll revenue in QAR by mode.
- Cost Charging Area Revenue in QAR by mode.
- Total demand by mode.

3.6.5.3 Public Revenue Calculation Sheet

This calculation sheet covers the data processing to obtain the public transport revenue. The script used to calculate these statistics is '***RevenuePublic***' which can be found within the '***Visual Basic***' menu in the '***Developer***' tools of Excel.

The calculation is run by clicking on the '***Public Transport Revenue***' button in the Data Processor Tool menu or alternatively by clicking on '***Run All***' button in the CBA section.

Input Area

Figure 3.65 - Data Processor Cost-Benefit Calculation Sheets – Public Revenue Input Area

FileFinisher	Demand	Costs	Demand Filter
47	C:\TAF\Reference Case\2025\	C:\TAF\Reference Case\2025\	C:\TAF\Reference Case\AuxM
	C:\TAF\Reference Case\2025\	C:\TAF\Reference Case\2025\Costs\FareMatrix_MFR_X_2025	
	C:\TAF\Reference Case\2025\	C:\TAF\Reference Case\2025\Costs\FareMatrix_MFR_X_2025	

The input area contains a set of files and parameters required to run the script:

- FileFinisher is a counter whose value automatically update after populating the columns Demand.
- Demand column includes the name of the QSTM2.0 demand matrices.
- Costs column includes the name of the QSTM2.0 public transport fare skim matrices.
- Demand Filter column includes the name of the supporting file to filter airport trips.

Demand, Costs and Demand Filter columns are automatically updated after running the '***File Updater***' script or alternatively by clicking on the '***Run All***' button in the CBA section of the Data Processor Tool sheet.

Output Area

Figure 3.66 - Data Processor Cost-Benefit Calculation Sheets – Public Revenue Output Area

Scenario	Year	Period	Mode	Fare Revenue (QAR)	Total Demand
Reference Case	2025	AM	PuT	334,856	93,184
Reference Case	2025	MD	PuT	343,577	98,533
Reference Case	2025	PM	PuT	395,424	130,294
Reference Case	2025	AM	Taxi IH	33,385	1,356
Reference Case	2025	MD	Taxi IH	41,459	1,708

The output area contains the data processed after running the script. The results are:

- Fare Revenue in QAR by mode.
- Total demand by mode.

3.6.5.4 Parking Revenue Calculation Sheet

This calculation sheet covers the data processing to obtain the parking revenue. The script used to calculate these statistics is '***OnStreetParkingRevenue***' which can be found within the '***Visual Basic***' menu in the '***Developer***' tools of Excel.

The calculation is run by clicking on the '***Parking Revenue***' button in the Data Processor Tool menu or alternatively by clicking on '***Run All***' button in the CBA section.

The revenue calculation uses an additional sheet named '***Revenue Support***' which includes the following information:

- On street parking schemes and parking fee in QAR/h.
- Average Parking Stay by HY in hours.
- Number of individual legal on street parking lots by TAZ and HY.
- On street parking scheme allocation to TAZ.
- On street parking fees in QAR/h by TAZ.
- % of parking users to be charged by TAZ.

The percentage of parking users to be charged by TAZ is only applied when the parking capacity is not the main constraint. In those situations, the script considers that education and home trips are not charged. The percentage is obtained by each TAZ from the QSTM2.0 Planning Interface.

In addition, the revenue support also considers the possibility to include company buses in the calculation if the on street parking regulations change in the future. In this situation, the calculation considers that only laborer company buses will be charged. The assumed rates for the split of education school buses and laborer company buses is 35% and 65% respectively.

Further information regarding the '***Revenue Support***' sheet is provided in the section REVENUE SUPPORT ASSUMPTIONS of this manual.

Input Area

Figure 3.67 - Data Processor Cost-Benefit Calculation Sheets – Parking Revenue Input Area

External Iterarion	Demand
2	C:\TAF\Scenario 3R\2050\Matrices\Demand\Vehicle\VehMatrix_Car_IH_AM_2050.csv
Inner Iteration	C:\TAF\Scenario 3R\2050\Matrices\Demand\Vehicle\VehMatrix_Car_IL_AM_2050.csv
3	C:\TAF\Scenario 3R\2050\Matrices\Demand\Vehicle\VehMatrix_Car_IM_AM_2050.csv
	C:\TAF\Scenario 3R\2050\Matrices\Demand\Vehicle\VehMatrix_Car_IH_MD_2050.csv
	C:\TAF\Scenario 3R\2050\Matrices\Demand\Vehicle\VehMatrix_Car_IL_MD_2050.csv

The input area contains a set of files and parameters required to run the script:

- External Iteration is counter whose value is automatically updated after populating the columns Demand while the Inner Iteration takes into account the number of private vehicle matrices to be selected for the calculation by peak period.
- Demand column includes the name of the QSTM2.0 demand matrices.

Demand, Costs and Demand Filter columns are automatically updated after running the '***File Updater***' script or alternatively by clicking on the '***Run All***' button in the CBA section of the Data Processor Tool sheet.

Output Area

Figure 3.68 - Data Processor Cost-Benefit Calculation Sheets – Parking Revenue Output Area

Scenario	Year	Period	Mode	Parking Revenue (QAR)	Total Demand
Scenario 3R	2050	AM	Car	387,879	348,435
Scenario 3R	2050	MD	Car	369,935	445,906
Scenario 3R	2050	PM	Car	431,064	456,275

The output area contains the data processed after running the script. The results are:

- Parking Revenue in QAR by mode.
- Total demand by mode.

3.7 DATA PROCESSOR – RATES & CALCULATION ASSUMPTIONS

The TAF Data Processor uses a set of assumptions in the calculation of some specific indicators such as the emission and accident rates. These assumptions are summarized below:

3.7.1 CAR/TAXI SPLIT ASSUMPTIONS

The QSTM2.0 model does not assign different matrices for Car and Taxi modes thus, it is required to calculate the split between these two modes in order to undertake the following calculations:

1. Emission Calculation (Link Level)
2. Private Average Cost Calculation (Matrix Level)
3. Private Revenue Calculation (Matrix Level)
4. Public Revenue Calculation (Matrix Level)
5. Parking Revenue Calculation (Matrix Level)

Since the Purpose Wise matrices provide information with regards to the mode, population groups, level of income and geographic area (GDA/not GDA) the Purpose Income script is used to obtain overall rates to split the Car and Taxi demands across the horizon years for each modelled peak taking into account the level of income.

Once the Purpose Income script is run, the overall split between Car/Taxi is automatically calculated on the right section of the Purpose Income sheet.

- High Income Car/Taxi rates in cells '*AQ29:AX31*'
- Medium Income Car/Taxi rates in cells '*AQ47:AX49*'
- Low Income Car/Taxi rates in cells '*AQ65:AX67*'

Figure 3.69 - Data Processor Car/Taxi Rates – Calculation Example

			Car/Taxi Split	Veh				Passengers			
Scenario	Period	VehType	Income	2025	2030	2035	2050	2025	2030	2035	2050
Reference Case	AM	Taxi	LI	409	433	462	502	778	823	878	954
Reference Case	MD	Taxi	LI	1,242	1,326	1,421	1,576	2,360	2,519	2,700	2,994
Reference Case	PM	Taxi	LI	8,476	9,071	9,750	10,892	16,105	17,234	18,525	20,696
Reference Case	AM	Car	LI	8,511	8,934	9,344	9,757	13,107	13,758	14,390	15,026
Reference Case	MD	Car	LI	11,218	11,741	12,278	13,058	17,275	18,081	18,907	20,109
Reference Case	PM	Car	LI	34,530	35,897	37,496	41,420	53,176	55,281	57,744	63,786
Reference Case	AM	CarPassenger	LI	10,407	10,921	11,420	11,931	16,027	16,819	17,587	18,374
Reference Case	MD	CarPassenger	LI	13,954	14,605	15,267	16,404	21,490	22,491	23,510	25,261
Reference Case	PM	CarPassenger	LI	42,913	44,666	46,639	51,503	66,086	68,786	71,824	79,315
Reference Case	AM	CarPassenger	LI	53.84%	53.83%	53.80%	53.77%	53.58%	53.56%	53.53%	53.48%
Reference Case	MD	CarPassenger	LI	52.83%	52.78%	52.71%	52.85%	52.25%	52.19%	52.11%	52.23%
Reference Case	PM	CarPassenger	LI	49.95%	49.83%	49.68%	49.61%	48.82%	48.68%	48.50%	48.42%
Reference Case	AM	Car %	LI	97.88%	97.87%	97.82%	97.74%	97.40%	97.38%	97.33%	97.22%
Reference Case	MD	Car %	LI	95.30%	95.21%	95.09%	94.92%	94.26%	94.15%	94.02%	93.81%
Reference Case	PM	Car %	LI	90.13%	89.88%	89.61%	89.51%	88.10%	87.80%	87.49%	87.37%

These rates are applied on link level and matrix level depending on the calculation as shown in the list shown above. These rates are automatically updated in the '*Emission Rates*' sheet of the Data Processor for their use in the different calculations

Figure 3.70 - Data Processor Car/Taxi Rates – Emission Rates Sheet

Income	Car/Taxi Split	2025AM	2030AM	2035AM	2050AM	2025MD	2030MD	2035MD	2050MD	2025PM	2030PM	2035PM	2050PM
IH	VEHKMTRAVPRT_DSEG(C_IH,AP)	99.22%	99.23%	99.23%	99.24%	99.13%	99.14%	99.14%	99.11%	98.71%	98.69%	98.67%	98.66%
IM	VEHKMTRAVPRT_DSEG(C_IM,AP)	99.21%	99.20%	99.19%	99.18%	99.13%	99.12%	99.11%	99.10%	98.48%	98.45%	98.42%	98.36%
IL	VEHKMTRAVPRT_DSEG(C_IL,AP)	97.88%	97.87%	97.82%	97.74%	95.30%	95.21%	95.09%	94.92%	90.13%	89.88%	89.61%	89.51%

3.7.2 QSTM2.0 LINK TYPE ASSUMPTIONS

Some calculations such as the accident calculation and the road network LoS calculation require some assumptions. These assumptions are made to develop:

- A relationship between the QSTM2.0 Link Types and the road types used in the accident calculations
- To filter out those links not included in the main network such as local roads for the road network LoS calculation.

The table below shows the assumptions made to undertake these calculations:

Figure 3.71 - Data Processor Accident Rates Sheet - QSTM2.0 Link Types Example

$LINKTYPE:N	NAME	STRICT	RANK	TSYSSET	NUMLANES	CAPPRT	V0PRT	Crash Road Type	Main Network LOS Private
0	closed road	0.00	99.00		0.00	0.00	0km/h		No
1	closed road	0.00	99.00		0.00	0.00	0km/h		No
2		0.00	2.00		1.00	99,999.00	0km/h		No
3	1_7L_100_Freeway	0.00	3.00	C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	7.00	14,000.00	100km/h	Dual 3+ (> 60 kph)	Yes
4	1_6L_120_Freeway	0.00	4.00	C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	6.00	12,000.00	120km/h	Dual 3+ (> 60 kph)	Yes
5	1_5L_120_Freeway	0.00	5.00	C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	5.00	10,000.00	120km/h	Dual 3+ (> 60 kph)	Yes
6	1_4L_120_Freeway	0.00	6.00	C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	4.00	8,000.00	120km/h	Dual 3+ (> 60 kph)	Yes
7	1_3L_120_Freeway	0.00	7.00	C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	3.00	6,000.00	120km/h	Dual 3+ (> 60 kph)	Yes
8	1_2L_120_Freeway	0.00	8.00	C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	2.00	4,000.00	120km/h	Dual 2 (> 60 kph)	Yes
9	1_6L_100_Freeway	0.00	9.00	C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	6.00	12,000.00	100km/h	Dual 3+ (> 60 kph)	Yes
10	1_5L_100_Freeway	0.00	10.00	C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	5.00	10,000.00	100km/h	Dual 3+ (> 60 kph)	Yes
11	1_4L_100_Freeway	0.00	11.00	C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	4.00	8,000.00	100km/h	Dual 3+ (> 60 kph)	Yes
12	1_3L_100_Freeway	0.00	12.00	C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	3.00	6,000.00	100km/h	Dual 3+ (> 60 kph)	Yes
13	1_2L_100_Freeway	0.00	13.00	C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	2.00	4,000.00	100km/h	Dual 2 (> 60 kph)	Yes
14	1_4L_80_Freeway	0.00	14.00	C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	4.00	8,000.00	80km/h	Dual 3+ (> 60 kph)	Yes
15	1_3L_80_Freeway	0.00	15.00	C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	3.00	6,000.00	80km/h	Dual 3+ (> 60 kph)	Yes
16	1_2L_80_Freeway	0.00	16.00	C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	2.00	4,000.00	80km/h	Dual 2 (> 60 kph)	Yes
17	4_7L_80_Arterial	0.00	44.00	B,C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	7.00	12,600.00	80km/h	ngle Carriageway (> 60 kph)	Yes
18	1_3L_70_Tunnel	0.00	18.00	B,C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	3.00	6,000.00	70km/h	Dual 3+ (> 60 kph)	Yes
19	1_5L_80_Expressway	0.00	30.00	B,C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	5.00	10,000.00	80km/h	Expressway	Yes
20	1_5L_120_Expressway	0.00	20.00	B,C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	5.00	10,000.00	120km/h	Expressway	Yes
21	1_4L_120_Expressway	0.00	21.00	B,C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	4.00	8,000.00	120km/h	Expressway	Yes
22	1_3L_120_Expressway	0.00	22.00	B,C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	3.00	6,000.00	120km/h	Expressway	Yes
23	1_2L_120_Expressway	0.00	23.00	B,C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	2.00	4,000.00	120km/h	Expressway	Yes
24	1_1L_120_Expressway	0.00	24.00	B,C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	1.00	1,800.00	120km/h	Expressway	Yes
25	1_5L_100_Expressway	0.00	25.00	B,C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	5.00	10,000.00	100km/h	Expressway	Yes
26	1_4L_100_Expressway	0.00	26.00	B,C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	4.00	8,000.00	100km/h	Expressway	Yes
27	1_3L_100_Expressway	0.00	27.00	B,C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	3.00	6,000.00	100km/h	Expressway	Yes
28	1_2L_100_Expressway	0.00	28.00	B,C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	2.00	4,000.00	100km/h	Expressway	Yes
29	1_1L_100_Expressway	0.00	29.00	B,C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	1.00	1,800.00	100km/h	Expressway	Yes
30	1_4L_80_Expressway	0.00	30.00	B,C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	4.00	8,000.00	80km/h	Expressway	Yes
31	1_3L_80_Expressway	0.00	31.00	B,C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	3.00	6,000.00	80km/h	Expressway	Yes
32	1_2L_80_Expressway	0.00	32.00	B,C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	2.00	4,000.00	80km/h	Expressway	Yes
33	1_1L_80_Expressway	0.00	33.00	B,C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	1.00	1,800.00	80km/h	Expressway	Yes
34	1_3L_60_Expressway	0.00	34.00	B,C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	3.00	5,400.00	60km/h	Expressway	Yes
35	1_2L_60_Expressway	0.00	35.00	B,C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	2.00	3,600.00	60km/h	Expressway	Yes
36	1_1L_60_Expressway	0.00	36.00	B,C,CB,C_IH,C_IL,C_IM,HP,HR,LGV	1.00	1,800.00	60km/h	Expressway	Yes

3.7.3 REVENUE SUPPORT ASSUMPTIONS

As mentioned in '*Section 2.6.5.2 Private Revenue*' of the User Manual the TAF Data Processor Revenue Support Sheet includes a set of assumptions related to the calculation of the revenue for On Street Parking charges and trip purpose split rates for charging users traveling to a zone with parking restrictions.

The On Street Parking charges must be manually inserted by the User using cells '*A2:B100*' of Revenue Support sheet as shown in the figure below:

Figure 3.72 - Data Processor Accident Revenue Support Sheet – On Street Parking Charges

On Street Parking Proposal	Parking Fee QAR/h
DM-13	10.00
DM-12	10.00
DM-10	10.00
DM-09	10.00
DM-16	10.00
DM-15	10.00
DM-11	10.00
DM-14	10.00
No Cost	0.00

The first column must match the Scheme Proposal as defined in Parking Aux 2025, 2030, 2035 and 2050 supporting matrix files. The second column must include the hourly charge in QAR for each specific parking proposal.

The Parking Aux Files must include the name of the On Street Parking schemes allocated in each QSTM2.0 destination zone.

In terms of the Education/Laborer Buses split rates, QSTM2.0 does not allow to split these two types of services. Therefore, some assumptions are required in order to consider that only Laborer Company Buses are affected by on street parking charges.

The User can modify these assumptions by changing the cells '*G2:J7*' in the Revenue Support sheet.

Figure 3.73 - Data Processor Revenue Support Sheet – Company Bus Split

CostLookUp	Company Bus Split	Peak	2025	2030	2035	2050
Not Charged AM	Education	AM	0.35	0.35	0.35	0.35
Not Charged MD	Education	MD	0.35	0.35	0.35	0.35
Not Charged PM	Education	PM	0.35	0.35	0.35	0.35
Charged AM	Laborer	AM	0.65	0.65	0.65	0.65
Charged MD	Laborer	MD	0.65	0.65	0.65	0.65
Charged PM	Laborer	PM	0.65	0.65	0.65	0.65

In addition, the Revenue Support sheet also includes relevant information regarding the calculation parameters and assumptions:

- On street parking schemes and parking fee in QAR/h included in cells '*A2:B100*'.
- Average Parking Stay by HY in hours based on QSTM2.0 data in cells '*D11:E13*'.
- Number of individual legal on street parking lots by TAZ and HY as defined in the QSTM2.0 in cells '*L2:BFD6*'.
- On street parking scheme allocation to TAZ and HY as defined in the TMPQ in cells '*L10:BFD12*'.
- On street parking fees in QAR/h by TAZ and HY as defined in the TMPQ in cells '*L15:BDF18*'.
- % of parking users to be charged by TAZ and HY as defined in the TMPQ and QSTM2.0 based on the Planning Interface in cells '*L21:BFD24*'.

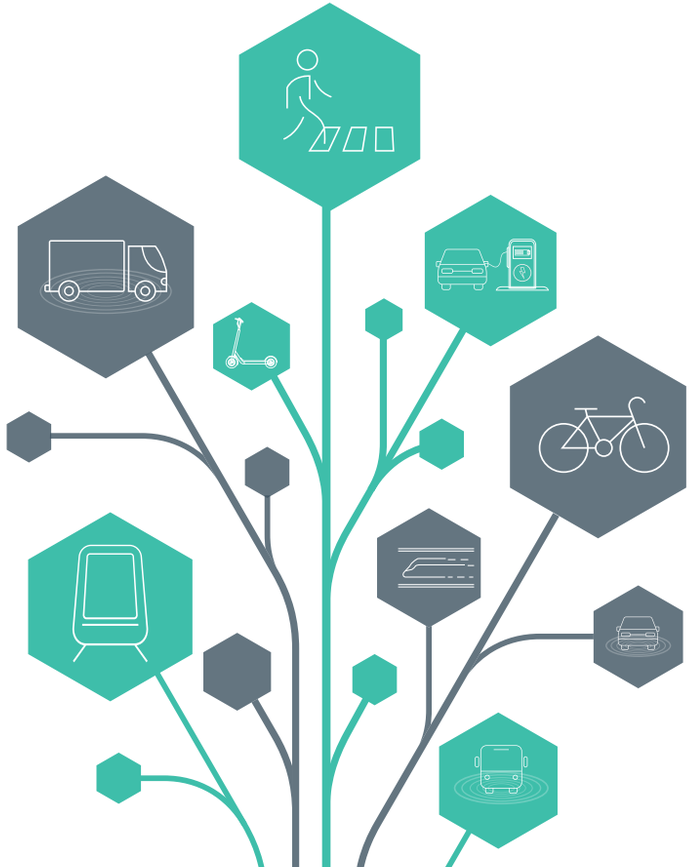
Figure 3.74 - Data Processor Revenue Support Sheet – Calculation Data

TAZ_No	1001001	1001004	1001005	1001006	1001008	1001009	1001010	1001011	1001014	1002001	1002002	1002003	1003001
2025	3	0	0	4	0	0	4	0	5	0	47	0	0
2030	3	0	0	4	0	0	4	0	5	0	47	0	0
2035	3	0	0	4	0	0	4	0	5	0	47	0	0
2050	3	0	0	4	0	0	4	0	5	0	47	0	0
Legal On Street Parking	3	0	0	4	0	0	4	0	5	0	47	0	0

Parking Scheme	1001001	1001004	1001005	1001006	1001008	1001009	1001010	1001011	1001014	1002001	1002002	1002003	1003001
2025	DM-09	DM-09	DM-09	DM-09	DM-09	DM-09	DM-09	DM-09	DM-09	DM-09	DM-09	DM-09	DM-09
2030	DM-09	DM-09	DM-09	DM-09	DM-09	DM-09	DM-09	DM-09	DM-09	DM-09	DM-09	DM-09	DM-09
2035	DM-09	DM-09	DM-09	DM-09	DM-09	DM-09	DM-09	DM-09	DM-09	DM-09	DM-09	DM-09	DM-09
2050	DM-09	DM-09	DM-09	DM-09	DM-09	DM-09	DM-09	DM-09	DM-09	DM-09	DM-09	DM-09	DM-09

Parking Cost	1001001	1001004	1001005	1001006	1001008	1001009	1001010	1001011	1001014	1002001	1002002	1002003	1003001
2025	10	10	10	10	10	10	10	10	10	10	10	10	10
2030	10	10	10	10	10	10	10	10	10	10	10	10	10
2035	10	10	10	10	10	10	10	10	10	10	10	10	10
2050	10	10	10	10	10	10	10	10	10	10	10	10	10

User Rate*	1001001	1001004	1001005	1001006	1001008	1001009	1001010	1001011	1001014	1002001	1002002	1002003	1003001
2025	98%	100%	92%	100%	100%	100%	100%	100%	100%	95%	100%	86%	96%
2030	99%	100%	94%	100%	100%	100%	100%	100%	100%	98%	100%	88%	96%
2035	99%	100%	95%	100%	100%	100%	100%	100%	100%	99%	100%	90%	95%
2050	100%	100%	96%	100%	100%	100%	100%	100%	100%	100%	100%	92%	93%



2050

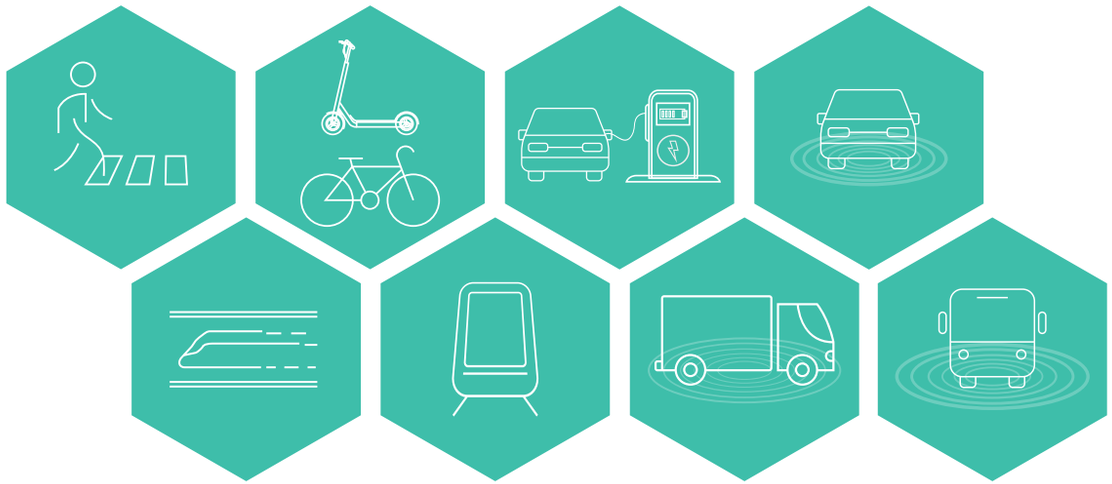
نقـل متكامـل ومسـتدام للجميـع

INTEGRATED & SUSTAINABLE TRANSPORT FOR ALL

2070

SECTION - 04

TAF TOOL

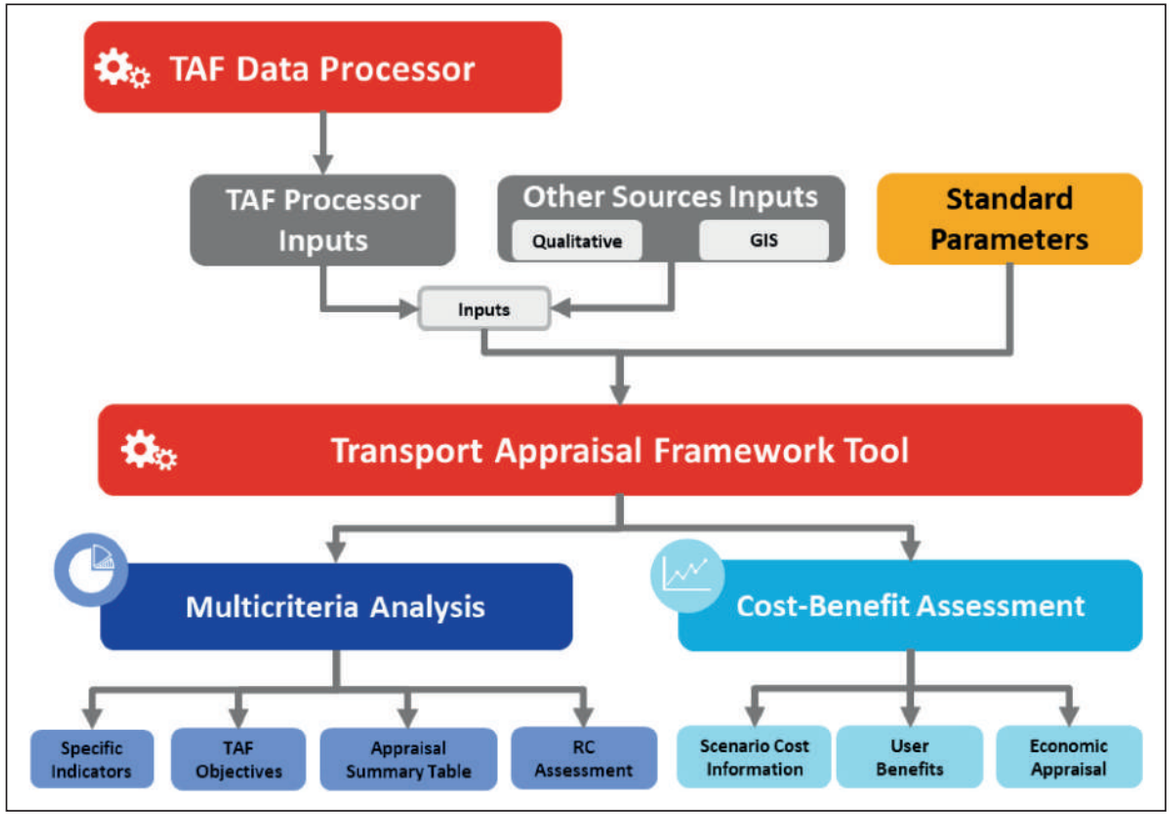


4 TAF TOOL

4.1 TAF TOOL – FILE STRUCTURE

TAF Tool structure is shown in Figure 4.1.

Figure 4.1 - TAF Tool Structure



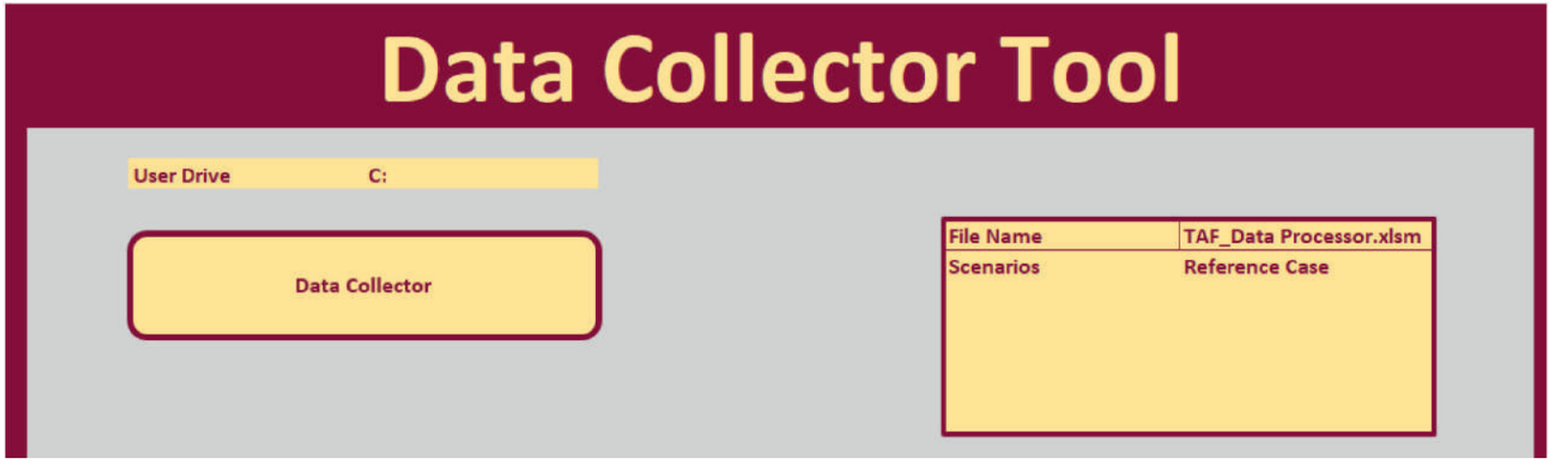
Just like the Data Processor described in the previous section of the TAF Tool User Manual, the TAF Tool workbook is also split into various sections, using a similar color-coding scheme to distinguish between the sections. These sections along with their associated sheets are described next.

While the Data Processor gathers and processes information from the peak hour QSTM2.0 model outputs, the TAF Tool uses the Data Processor as an input to produce annual results to conduct the Multicriteria Assessment and Cost Benefit Analysis.

4.2 TAF TOOL – DATA COLLECTION TOOL

The TAF Tool includes a user-friendly menu in the sheet '***Data Collection Tool***' that allows gathering the peak hour information from the Data Processor for each Scenario and Horizon Year.

Figure 4.2 - Data Collector Tool Interface – Running Settings



The **Run Settings** menu allows:

- Selecting the User Drive. It must include ':' after the local drive where the QSTM2.0 files are saved.
- The User must choose the scenarios included in the drop-down lists under the Data Processor file name.

As mentioned before, the TAF Toolkit uses the TMPQ scenarios and HYs. Nonetheless, the Toolkit can be modified to process information of new scenarios and horizon years.

To include a new scenario, the User needs to insert the scenario name within the range '*O8:O58*' in the Data Collection Tool tab as well as the short name corresponding to the new scenario within the range '*P8:P58*'. Once the new scenario and its short name is added to the list, the User must create the following sheets in the TAF Tool:

- AM_Variable_ShortName
- MD_Variable_ShortName
- PM_Variable_ShortName
- Annual_Variable_ShortName

The Annual_Variable_ShortName must contain calculations that points to the newly created AM, MD and PM sheets. To do so, the User can copy the calculations used in any other of the annual sheets already in the workbook and replace the previous short name by the new one.

In terms of the Standard Parameters, if the User wants to assess a different set of years it is possible as long as the parameters are updated to match the user-defined HYs. For the TMPQ the HYs are 2025, 2030, 2035 and 2050.

4.3 TAF TOOL - STANDARD PARAMETERS

Standard Parameters section cover the Technical Report 2 of the Updated TMPQ information related to rates applicable to the TAF Tool Calculations such as:

- Value of Time
- Operating Cost
- Fuel & Emission Rates
- Fuel/Energy Consumption Rates
- Qatar Fleet Composition
- Monetary Valuation for Emissions/Fuel
- Accident Rates
- Monetary Valuation for Accidents
- Unit Cost for Capital Investment
- O&M Costs
- QSTM2.0 Standard Parameters
- Expansion Factors
- Qualitative Evaluation (Score)
- Economic Appraisal Parameters

4.4 TAF TOOL - TAF PROCESSOR INPUTS

TAF Processor Inputs section summarizes the Data Processor calculations and produce annual results that are fed into the MCA and CBA sections of the tool.

4.5 TAF TOOL – MULTICRITERIA ANALYSIS SECTION

MCA section includes information related to the TAF Specific Indicators, TAF Objectives, MCA Appraisal Summary Table and TAF Reference Case Assessment.

MCA - Specific Indicators

This sub-section includes the TAF Specific Indicators as defined in Technical Report 2 of the Updated TMPQ. The tool is developed in such a way that allows extracting/processing of information for the different scenarios across the horizon years. However, it is worth mentioning that only 2050 is required to carry out the Preferred Option Selection.

TAF MCA section also requires manual entry of both qualitative and GIS specific indicators as they are not collected from the TAF Data Processor. In order to complete the multicriteria analysis the following cells in orange must be manually inserted by the user:

Figure 4.3 - Objective 1.5 – Specific Objective 1.5.4 Qualitative Statement & Score

1.5	Improve Integration Between Different Services and Modes	2025	2030	2035	2050
1.5.1	**Number of trips that entail ≥1 transfers (#)**				
	PuT	101,222,537	102,885,472	105,805,405	122,419,523
1.5.2	**Average number of trips that entail ≥1 transfers (#)**				
	PuT	0.9	0.9	0.9	0.9
1.5.3	**Average time spent in transfers (hours)**				
	PuT	0.1	0.1	0.1	0.1
1.5.4	**Qualitative statements that summarize the extent to which proposed measures are expected to impact in overall levels of network integration between services and modes (both physical improvements and policy based improvements)**				
	Score (-2, 2)				

SECTION 4

Figure 4.4 - Objective 2.1 – Specific Objective 2.1.2 GIS Indicator[1]

2.1	Increase the Availability and Attractiveness of Public Transport	2025	2030	2035	2050
2.1.1	**Market share of Public Transport by mode (%)**				
	Overall				
	Taxi	1.30%	1.28%	1.55%	1.51%
	PuT (Rail, LRT, Bus and Metro)	11.42%	10.82%	10.43%	10.40%
	Contract Bus	12.76%	12.31%	11.89%	11.26%
	DMA				
	Taxi	0.76%	0.75%	0.91%	0.88%
	PuT (Rail, LRT, Bus and Metro)	10.54%	9.94%	9.51%	9.03%
	Contract Bus	5.42%	5.36%	5.28%	5.11%
	Outside DMA				
	Taxi	0.50%	0.49%	0.60%	0.58%
	PuT (Rail, LRT, Bus and Metro)	0.84%	0.84%	0.88%	1.32%
	Contract Bus	7.39%	7.02%	6.68%	6.22%
2.1.2	**Population within a certain distance of a PT service (number of residents)**				
	Overall				
	DMA				
	Outside DMA				

Figure 4.5 - Objective 2.4 – Specific Objective 2.4.3 Qualitative Statement & Score

2.4	Improve Non-Motorized Mobility Options	2025	2030	2035	2050
2.4.1	**Number of trips made by walking & cycling (#)**	404,390,255	410,933,083	417,154,404	380,054,007
2.4.2	**Percentage of trips made by walking & cycling (%)**	8.68%	8.23%	7.85%	6.48%
2.4.3	**Pedestrian and Cycling Activity – qualitative statements that summarize the understanding of the scale and impact of any pedestrian and cycle related improvements**				
	Score (-2, 2)				

Figure 4.6 - Objective 3.2 – Specific Objective 3.2.1 Qualitative Statement & Score

3.2	Ensure Safe and Secure Transportation System	2025	2030	2035	2050
3.2.1	**Qualitative statements that summarize how security and/or personal safety is anticipated to be improved by the proposed measures included in each alternative scenario.**				
	Score (-2, 2)				

1 Indicator 2.1.2 uses 200 meters for Buses, 400 meters for BRT, Metro and LRT and 800 meters for Water Transport

Figure 4.7 - Objective 4.3 – Specific Objective 4.3.1 Qualitative Statement & Score

4.3	Protect the Streetscape and Urban Realm	2025	2030	2035	2050
4.3.1	Qualitative statements that summarize the extent to which the proposed measures scheduled in each alternative scenario would impact sensitive parts of the urban area.				
	Score (-2, 2)				

Figure 4.8 - Objective 4.4 – Specific Objective 4.4.1 Qualitative Statement & Score

4.4	Ensure Sustainable Development	2025	2030	2035	2050
4.4.1	Qualitative statements that summarize the extent to which the proposed measures scheduled in each alternative scenario would contribute to encouraging sustainable development.				
	Score (-2, 2)				

Figure 4.9 - Objective 5.1 – Specific Objective 5.5.1 & 5.5.2 GIS Indicators[2]

5.1	Improve Access to the Workforce	2025	2030	2035	2050
5.1.1	Number of employees located within a predetermined travel time catchment by private vehicles for selected employment locations (#)				
5.1.2	Number of employees located within a predetermined travel time by public transport for selected employment locations (#) (PT including rail, bus, metro, underground, tram and LRT)				

Figure 4.10 - Objective 5.4 – Specific Objective 5.4.1 Qualitative Statement & Score

5.4	Improve Integration between Transportation & Land Use Planning	2025	2030	2035	2050
5.4.1	Qualitative statements that summarize the extent to which integration between the transportation system and land use will be improved and the impacts this may have in generating additional economic activity				
	Score (-2, 2)				

Figure 4.11 - Objective 6.1 – Specific Objective 6.1.1 Qualitative Statement & Score

6.1	Promote Transportation Systems that Enhance Quality of Life	2025	2030	2035	2050
6.1.1	Qualitative statements that summarize the extent to which the proposed measures scheduled in each alternative scenario would contribute to increase the availability of travel options and / or increase traveler comfort and convenience				
	Score (-2, 2)				

2 Indicator 5.1 uses "Active Population" located within a predetermined travel catch of 40 minutes for selected locations in Central Business District of West Bay

Figure 4.12 - Objective 6.2 – Specific Objective 6.2.1 Qualitative Statement & Score

6.2	Promote Transportation Systems that Preserve Qatari Norms and Culture	2025	2030	2035	2050
6.2.1	Qualitative statements that summarize the Qatari based social and cultural impacts associated with any transportation related infrastructure, service and / or policy improvements scheduled in alternative testing scenarios.				
	Score (-2, 2)				

Further details on the process used to extract the GIS indicators can be found under Appendix 3.

Table below provides a summary of the cells whose contents must be added by the User to carry out the Multicriteria Analysis. The values in the below cells represent the score (ranging between -2 and +2) which should be attached to the corresponding Specific Objective. Further details can be found in Technical Report 2 of the Update TMPQ, Section 6.1:

Figure 4.13 - Qualitative and GIS Specific Indicators

Specific Indicator	Cell	User Input Type	TAF Tool Sheets
1.5.4	G89/G90	Description/Numerical	Out_Reference Case Out_SC1 Out_SC2 Out_SC3 Out_SC4 Out_SC5
2.2.1	G115/G116/G117	Numerical	
2.4.3	G115/G156	Description/Numerical	
3.2.1	G211/G212	Description/Numerical	
4.3.1	G310/G311	Description/Numerical	
4.4.1	G315/G316	Description/Numerical	
5.1.1	G322	Numerical	
5.1.2	G324	Numerical	
5.4.1	G347/G348	Description/Numerical	
6.1.1	G354/G355	Description/Numerical	
6.2.1	G359/360	Description/Numerical	

MCA - TAF Objectives

This sub-section includes the TAF Specific Indicators results for 2050 HY and grouped into one of the 6 different TAF Objectives defined in Technical Report 2 of the Updated TMPQ.

MCA - Appraisal Summary Table

This sub-section provides a summary of the full set of indicators and assists in the assessment of the Preferred Option Selection by comparing the 2050 RC results and Scenarios results. The appraisal summary table also includes a graphical assessment that emphasizes the strengths/ weaknesses of the Scenarios when compared to the Reference Case.

MCA – Reference Case Assessment

This sub-section provides an overview of the Specific Indicators of the Reference Case model across the HYs (2025, 2030, 2035 and 2050) grouped by objective. The section also includes an appraisal summary table.

The information is also included in Technical Report 4 of the Updated TMPQ.

4.6 TAF TOOL – COST-BENEFIT ASSESSMENT SECTION

CBA section includes information related to the evaluation of the scenarios such as Scenario Cost Data, TAF Inputs and Economic Appraisal.

CBA – Cost Scenario Data

This subsection includes all the specifications regarding capital and O&M costs.

'*Scheme info*' sheet is meant to allocate all the basic information about the different schemes, including the scenarios each one of them is included in (columns AC-AH) as well as the implementation year (column S).

'*Capital - O&M Costs*' includes a disaggregation of the capital costs of each scheme among Infrastructure, Facilities and Vehicles. This categorization is needed for the different life cycle assumed for each category. Operating and Maintenance costs are provided in columns P-S, also divided in the previous mentioned categories. It is important to note that columns G-K and T (Scenarios and Horizon year) are linked to 'Scheme info' tab, therefore must not be updated.

'*Scenarios Cost Profile*' is a working tab that should remain untouched as it is linked to others so no further input is needed. It takes the information from '*Parameters*' and '*Capital - O&M Costs*' and estimates the annual costs per scenario and category, as well as Residual values.

CBA - TAF Inputs

The CBA-TAF inputs subsection estimates and summarizes the different types of economic and financial benefits. All this section is referenced to other tabs of the spreadsheet and therefore no input is needed.

The benefit estimation is based on the comparison of the scenarios' outputs for the potential modelled years: 2025, 2030, 2035, and 2050, against the Reference Case Scenario. The intermediate years are estimated assuming linear growth between these. In case not all these years are modelled, complementary assumptions are made for estimating the benefits based on another modelled year, as explained further below. Time zero is set as 2020 and the analysis horizon is 40 years, setting 2060 as the last year perceiving benefits. The investments are assumed to start as early as 2022 and the first benefits are expected for the immediate year after the first set of investments is emplaced and the services running: 2025.

'*Travel Time Saving*' and '*TTS Monetization*' estimate the economic benefits of travel time savings. The first one takes the travel time annualized data for each scenario, and the second one multiplies those values by the corresponding value of time, taken from '*Parameters*'.

'*Vehicle Operating Costs*', '*Emission Monetization*' and '*Crash Monetization*' take the annualized indicators per year and scenario and monetize them using the parameters from the '*Parameters*' tab. These estimations are divided into categories, so it is possible to perform a detailed analysis if needed.

'*Revenue*' sheet takes the financial incomes by category directly from the annualized data.

'*Ec Benefits summary*' and '*Fin Benefits summary*' summarize the economic and financial benefits, respectively. This tab compares the monetarized levels of each year-scenario against the selected Do Minimum (Reference Case) and estimates the benefits for the mentioned years (2025, 2030, 2035, and 2050). This tab takes the information from the modelling outputs tabs for the modelled years, and the non-modelled years are estimated using assumptions about the benefits' profile that can be found and modified in the section 5.5 of the '*Parameters*' tab. The spreadsheet is set for estimating the benefits of the non-modelled years' (if any) as a percentage of 2050`s benefits, according to the level of investment expected for each period. That is, the percentage of total capital cost expected to be spent until the year to be estimated is used for estimating its benefits. Given the lack of a more detailed way of estimation, benefits for the period 2050-2060 are assumed to be constant.

'*Ec Ben Profile*' and 'Fin Ben Profile' take the information from the later sheets and organize them in cashflows. Intermediate years (2026-2029, 2031-2034, etc.) are estimated assuming linear interpolation as mentioned before.

CBA – Economic Appraisal

This subsection puts together the costs and benefits previously estimated for analysis and comparison.

In the '*Cash Flow*' tab it is possible to select on cell B10 the scenario to be assessed. Once the scenario is selected, the table shows the estimates for this scenario, for each year and item.

'*PV cash flows*' works in the same with the present values of the various components, discounted at the discount rate provided in the '*Parameters*' tab.

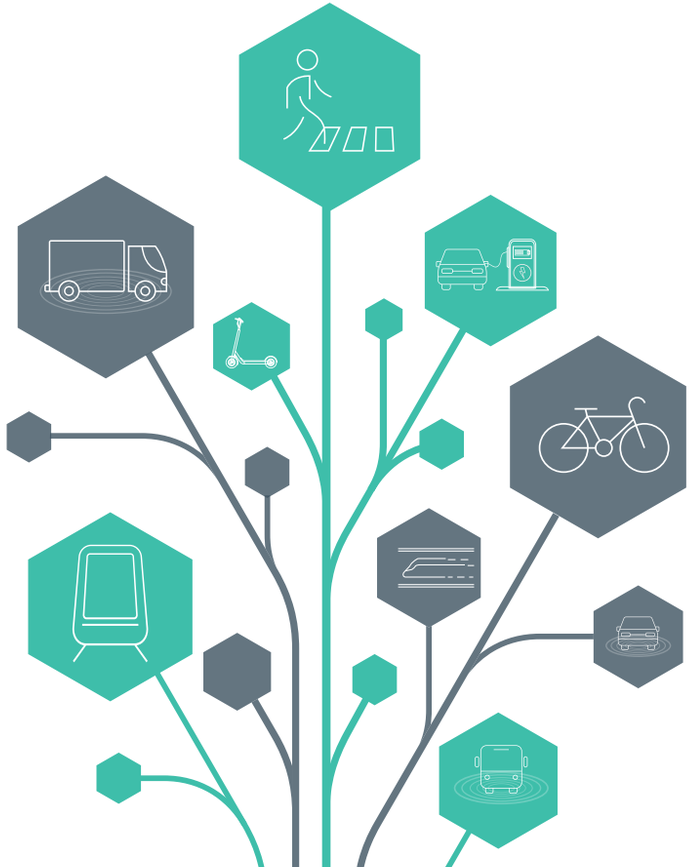
'*PV summary*' shows the aggregated present value costs and benefits for each scenario, for an easy comparison, as well as the CBR.

CBA – Simplified and Full Version of the Cost-Benefit Analysis

TAF Tool allows running two cost-benefit calculations depending on whether the model outputs for the whole set of HYs are available or not. The calculation considers the 2025 the first year for obtaining benefits. The analysis period includes up to 2060 in order to consider the benefits/ disbenefits obtained in 2050. Between 2050 and 2060 the benefits/ disbenefits from the QSTM2.0 are considered to remain constant.

The simplified version of the cost-benefit analysis only 2050 HY model outputs are required. The benefits for 2025, 2030 and 2035 are estimated as a proportion of 2050's benefits. The proportion applied to 2050's benefits depends on the capital infrastructure cost allocated to each year which is defined in column '*S*' of the '*Scheme Info*' tab. Once the HY allocation of each scheme is completed, the '*Non-model Benefits profile*' is updated in section 5.5 of the 'Parameters' tab.

The full version of the cost-benefit analysis considers the model outputs for the whole set of TMPQ's HYs (2025, 2030, 2035 and 2050). In order to run the full version of the CBA, the User must select the HYs whose model outputs will be used to make the calculation. This can be done in section 5.6 of the '*Parameters*' tab by selecting the HYs (Yes/No).



2050

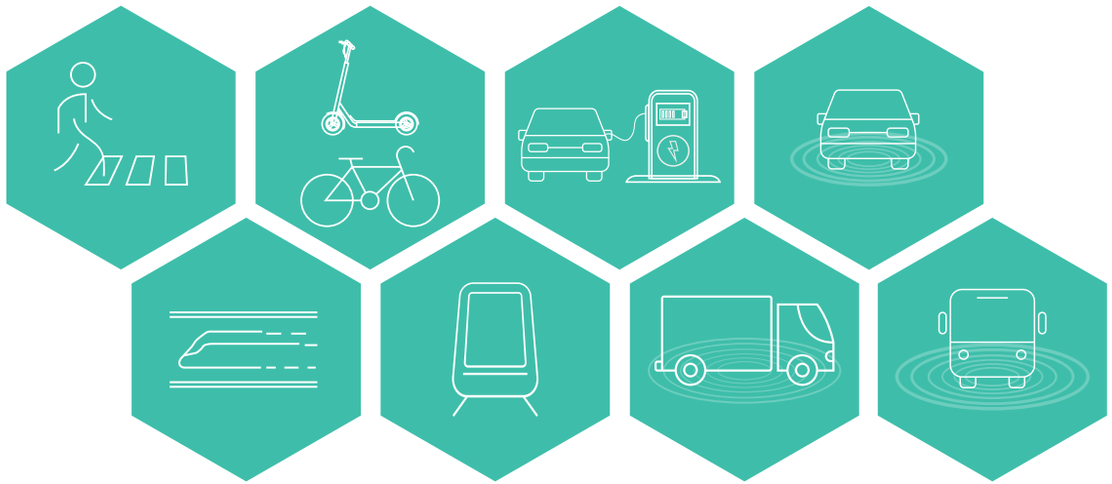
نقـل متكامـل ومسـتدام للجميـع

INTEGRATED & SUSTAINABLE TRANSPORT FOR ALL

2070

APPENDIX 1

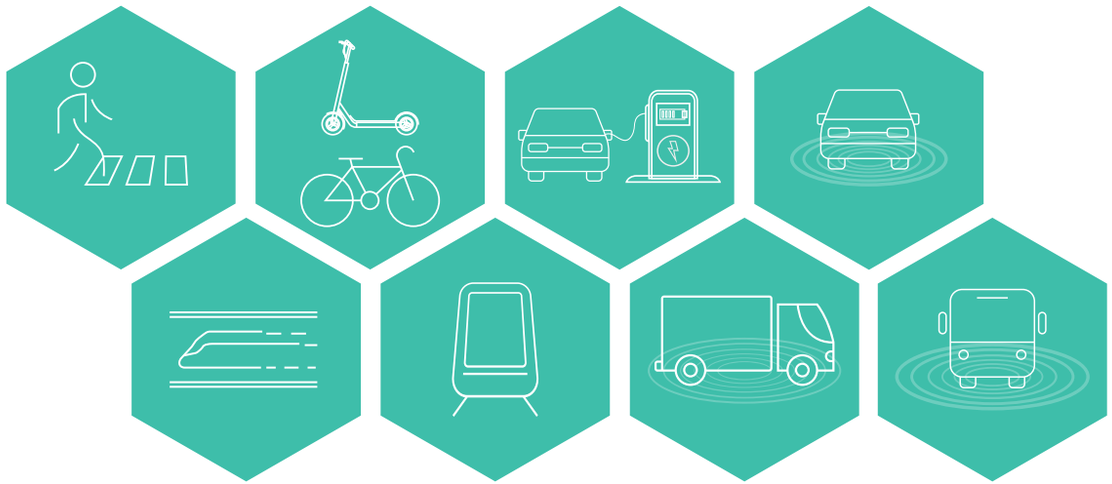
TAF TOOL DATA PROCESSOR – SOFT COPY



2070

APPENDIX 2

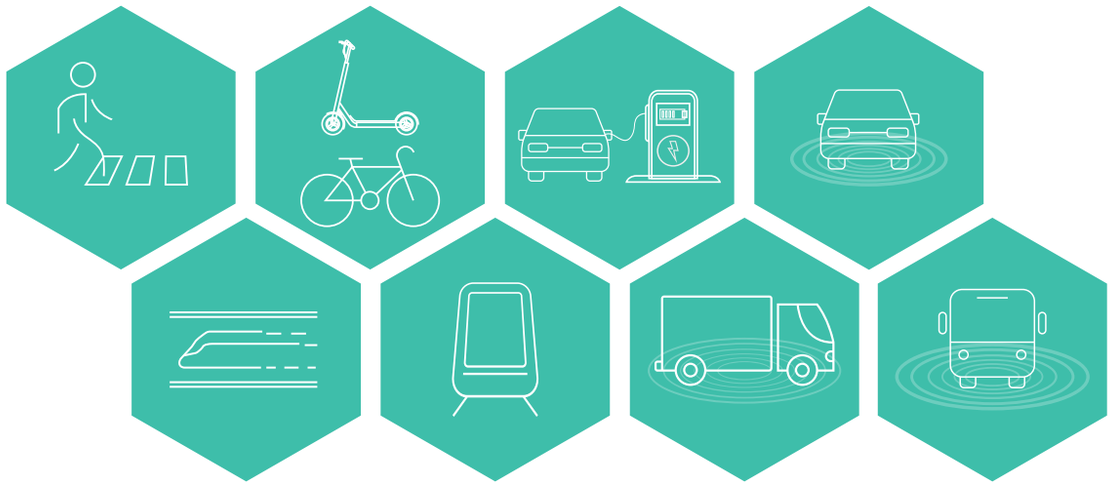
TAF TOOL – SOFT COPY



2050

APPENDIX 3

GIS INDICATOR EXTRACTION - SOFT COPY



وزارة المواصلات
MINISTRY OF TRANSPORT

ص.ب. 24455 P.O.
الدوحة, قطر Doha, Qatar
ت 1111 4045 974+ T
motc.gov.qa

نقل متكامل ومستدام للجميع
INTEGRATED & SUSTAINABLE TRANSPORT FOR ALL