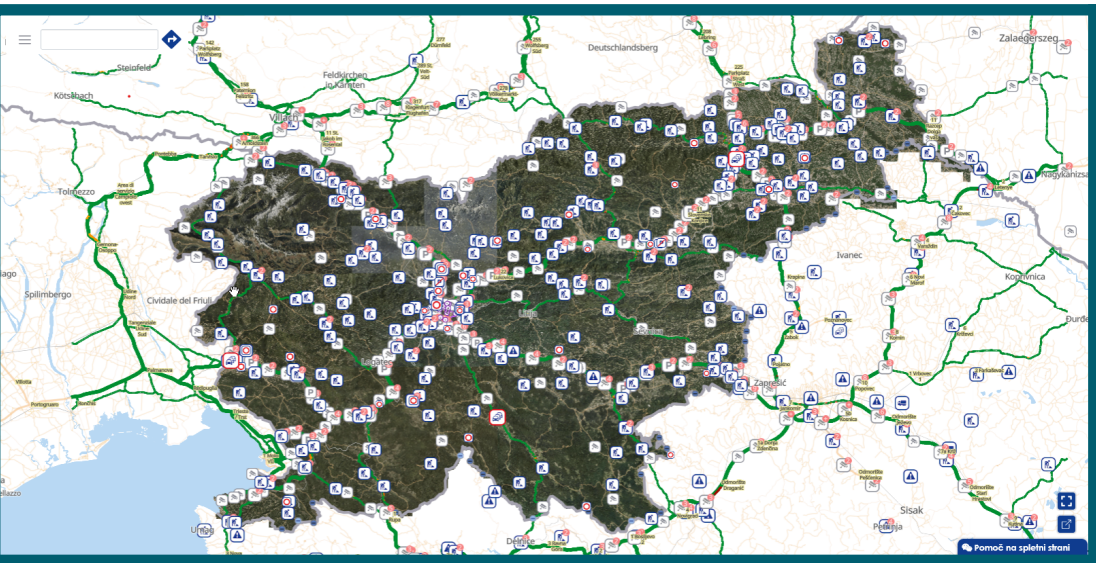
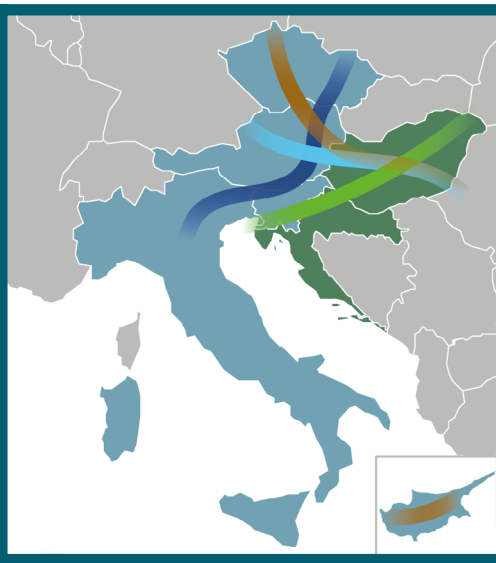
the crocodile corridor

COOPERATION AS A SOLUTION TO EUROPEAN CROSS-BORDER TRAFFIC

RESULTS OF THE CROCODILE 3 PROJECT





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ABOUT CROCODILE 3

- **7 partners** (Austria, Cyprus, Czech Republic, Italy, Slovenia as well as the cohesion partners Croatia and Hungary)
- **4 observers** (Albania, Greece, Poland, Romania)
- **Duration:** 01/01/2018 – 31/12/2022
- **Focus:** data exchange, adapt services, traffic management plans (TMPs)
- **Budget:** € 13,755,000.00
- **EU contribution:** € 2,751,000.00
- **Cohesion budget:** € 2,095,202.00 (HU) + € 4,859,000.00 (HR)
- **EU cohesion contribution:** € 1,780,921.70 (HU) + € 4,161,600.00 (HR)

In the past, major traffic events, either on a regular (e.g. holiday season) or exceptional basis (e.g. COVID-19 regulations), have repeatedly led to congestion and traffic breakdown in Central and East European cross-border areas. Especially as this region is comprised by several smaller countries (most of them having different languages) and lots of cross-border traffic, cooperation and information exchange are of vital importance in order to enable harmonised and efficient traffic flows.

As a continuation of the first two CROCODILE corridor projects, CROCODILE 3 has pushed the harmonised exchange of traffic information across borders. Efforts are being pursued in accordance with the EU ITS Directive and its supplementing Delegated Regulations. This encompasses coordination on an organisational level, the technical implementation of standards as well as the enhancement of management strategies and end-user services. The latter are being improved so that road users can obtain more and better information through channels (e.g. websites, apps) they are used to, thereby adding to the continuity of services as defined in the EU ITS Directive.

OBJECTIVES

- Implementation of **European legislation** (EU ITS Directive and supplementing Delegated Regulations)
- Finalisation of DATEX II nodes for **data availability** and **exchange**
- Improvement of **cross-border information services**
- Enlargement of **cooperation** between corridor projects
- Continuation of **strategic** and **technical work** as well as use of CROCODILE 3 as a stakeholder forum of high relevance and visibility

I. THE CROCODILE 3 CORRIDOR: THE EVOLUTION OF THE CROCODILE PROJECT

Ever since its beginning, the main focus of the CROCODILE corridor was to exchange accurate and reliable data in the best quality available between road operators, private stakeholders and administrations in order to support the pan-European vision of a free movement of people and goods.

In the past, activities by the involved ministries, police and operators often focussed on quickly restoring traffic flow after heavy weather conditions. This was merely about combating the symptoms rather than properly addressing the core of the problem, which was a lack of cross-border coordination and appropriate access to data and information.

The need for closer collaboration became evident, especially for cross-border traffic management. Therefore, the establishment of the CROCODILE corridor was a confident statement for initialising large-scale cooperation in 2013, funded in the course of the TEN-T programme, to ensure close coordination on various levels and harmonised information exchange between the involved Member States. Since then, two successors have been realised and co-financed by the Connecting Europe Facility (CEF) of the European Union in order to address the evolving challenges of European transport.

From 2018 until 2022, the CROCODILE 3 corridor has been a cooperation between public authorities, road administrations and traffic information service providers. Seven European Member States (AT, CY, CZ, IT, SI and the cohesion partners HR, HU) have committed themselves to cross-border data exchange and harmonisation on different layers by elaborating a common process for the coordination of traffic management plans (TMPs), the implementation of standards as well as an added value for end-user applications.

The corridor involves Central South Eastern European (CSEE) countries, thereby ensuring coordinated traffic management and control resulting in high-quality traveller information services along the most important road corridors in an enlarged Europe.
While acknowledging the efforts of the previous phases, CROCODILE 3 has further pushed the harmonised exchange of traffic information across borders in accordance with the EU ITS Directive and its supplementing Delegated Regulations. This encompasses implementing harmonised and synchronised ITS applications, the alignment of topics such as National Access Points (NAPs), DATEX II profiles as well as traffic information and the management at cross-border level, thereby focusing on end users and adding to the continuation of improved services (web service, application…) as well as on improving the channels for the actual end users in order to provide them with valuable information of high quality.

CROCODILE covers three main TEN-T core network corridors and an additional one (Mediterranean) to fill the gaps:

Baltic – Adriatic, Rhine – Danube, Orient/East-Med, Mediterranean

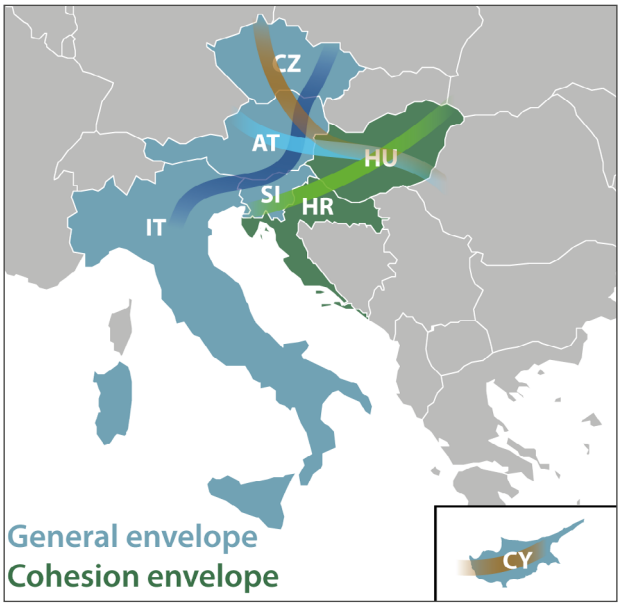

Figure 1: CROCODILE covers a comprehensive set of TEN-T corridors

II. SUCCESS STORIES

DATEX II DEPLOYMENT

The first signed Memorandum of Understanding (MoU) between AT-HR-HU-IT-SI in 2014 can be seen as a starting point for cross-border data exchange. At that time, CROCODILE Member States were still on differing levels in terms of DATEX II maturity and none had a final solution for cross-border data exchange. Therefore, it was decided to set up a dedicated working group within CROCODILE to work on a common CROCODILE DATEX II solution to be implemented and used. In this context, the main aim of the CROCODILE data exchange specification was to define a minimum reference data set that would enable a translation of variably used situation publication types between differently implemented national DATEX II profiles and thus avoiding exchange limitations.

A so-called middleware solution was elaborated, facilitating harmonised data exchange of safety-related traffic information (priority action c) of the EU ITS Directive and truck parking information (priority action e). The middleware solution itself provides a systematic and structured way of defining and exchanging preselected and prioritised data types (available in DATEX II as enumeration data types).

Based on that, the first cross-border information (e.g. camera data) was already exchanged during the first phase of CROCODILE. As of 2017, cooperation was enlarged and intensified in the course of CROCODILE 2 and the implementation of the aforementioned CROCODILE middleware solution. Austrian motorway operator ASFINAG and Slovenian motorway operator DARS have been exchanging traffic data about road works and events (such as accidents or road closures) as well as webcam feeds since summer 2017. All exchanged data are fully integrated into the management and decision-making tools of the traffic management centres. Web-cam pictures are directly available to the end user in online portals and smartphone apps. Slovenia was the first CROCODILE Member State to integrate data from all neighbouring countries into its own system using DATEX II.

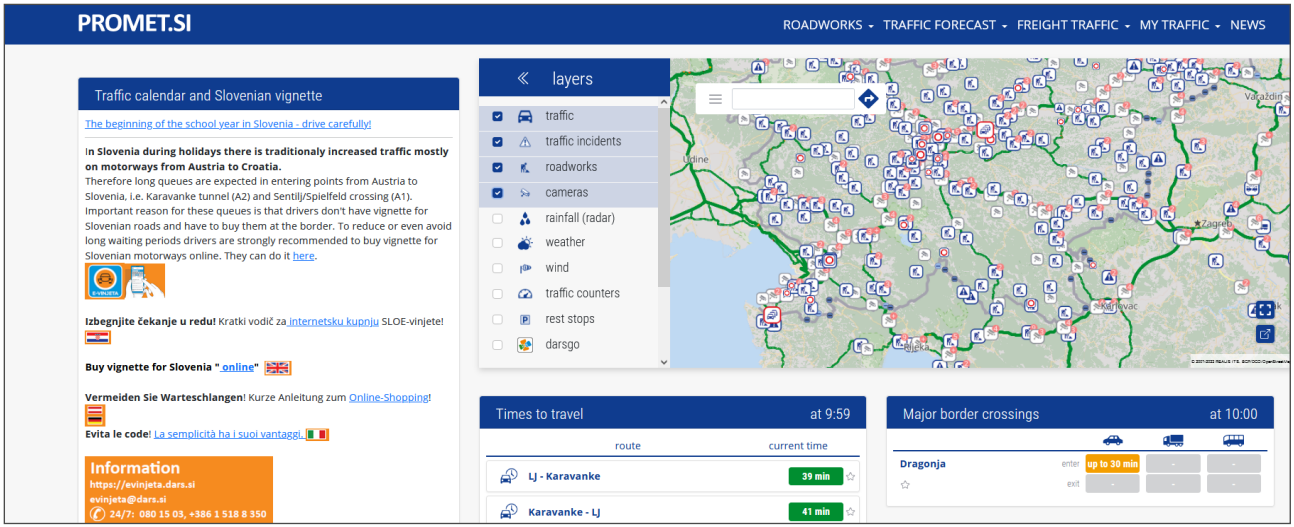

Figure 2: Map of Slovenian road operator DARS in 2022 available via promet.si

THE CHALLENGE OF MATCHING PROFILES AND CLOSING THE GAP

In phase 1 and phase 2 of the CROCODILE corridor, preliminary work was done on joint DATEX II profiling concerning the European Commission's Delegated Regulations. This work is considered a reference approach for the development of comprehensive DATEX II profile specification fulfilling priority action b), c) and e) requirements. The developed profiles depict a basis for harmonised alignment in the DATEX II data exchange chain between the CROCODILE Member States. In order to support such an alignment of DATEX II profiles which are usually independently developed by the Member States, the so-called DATEX II RAV Testcenter (Reference Advice and Validation Tool)[1] was introduced in CROCODILE 3 to allow DATEX II users to check their profiles against specified reference profiles derived from data categories of the EU Delegated Regulations. Along with the RAV Testcenter, DATEX II reference profiles for priority action c) and e) were made available for testing against user-generated profiles.

This allows for the harmonisation of individual DATEX II profiles developed under different national frameworks whilst having implemented a universal set of data elements for exchanging information.
In addition, this tool supports the validation process and facilitates the respective implementation progress. The first validation cycle already showed good results with a high degree of harmonisation between the Member States.

Achievements like those mentioned above lead to an overall increase of safety and efficiency of road transport in the motorway network. On a political level throughout Europe, it is strongly believed that a major impact on traffic flow will be achieved by high quality pre-trip and on-trip information.

TRAFFIC MANAGEMENT PLANS (TMP)

Together with DATEX II and the exchange of event information concerning road conditions in other countries, cross-border Traffic Management Plans have become one of the three pillars of transnational coordination pursued in the CROCODILE corridor.
Although a mature status on TMPs on national level had already existed before CROCODILE 3, a connection on transnational level was needed. Besides the obvious language barriers, missing automatisms and the lack of a unified way of displaying information (both internally and to drivers) were major obstacles when updating existing TMPs or adding new ones.

Even though important foundations were laid in 2014 with the signing of the MoU, a whole new level of coordination was introduced in 2019: a dedicated TMP project was brought into place by Member State Slovenia with the goal to create, upgrade and digitalise international TMPs in five TEN-T corridors. The core element was the development, testing and implementation of a dedicated application for cross-border TMP handling. Each of the road operators has access to the app via Application Programming Interface which was integrated into the respective traffic management systems.

Starting with a common denominator, only the most relevant information was considered. This required information from all partners on how data flow is handled in their specific Traffic Management Center (TMC) system (i.e. how the information is passed on by the source to the dispatchers and onwards to the drivers).
Subsequent activities focussed on the coordination and harmonisation of attributes and metadata information.
Eventually, the representatives of the project partners agreed on using the TMP application as a unified way of communication between different TMCs. There will no longer be any need for direct communication via mail or phone although it will be maintained for information purposes.

1 See datex2.eu/support/tooling

THE CROCODILE TMP APPLICATION

The TMP application[2] consists of an interactive map where users can see TMPs and active events for the CROCODILE corridor region. Events can be added if the section is covered by a TMP, and then according information, e.g. type of event and duration, is added. For already existing events, all involved parties will receive a notification and are also able to select TMPs and rerouting strategies. For every event only one strategy can be selected. Parties not involved in the certain plan or strategy can view them but not select or edit.

Nevertheless, it is the acceptance by customers that finally determines the success or failure, e.g. it can make drivers act in the way that a TMP intends them to. Therefore dissemination is another crucial element in the value chain of working with cross-border TMP implementation.

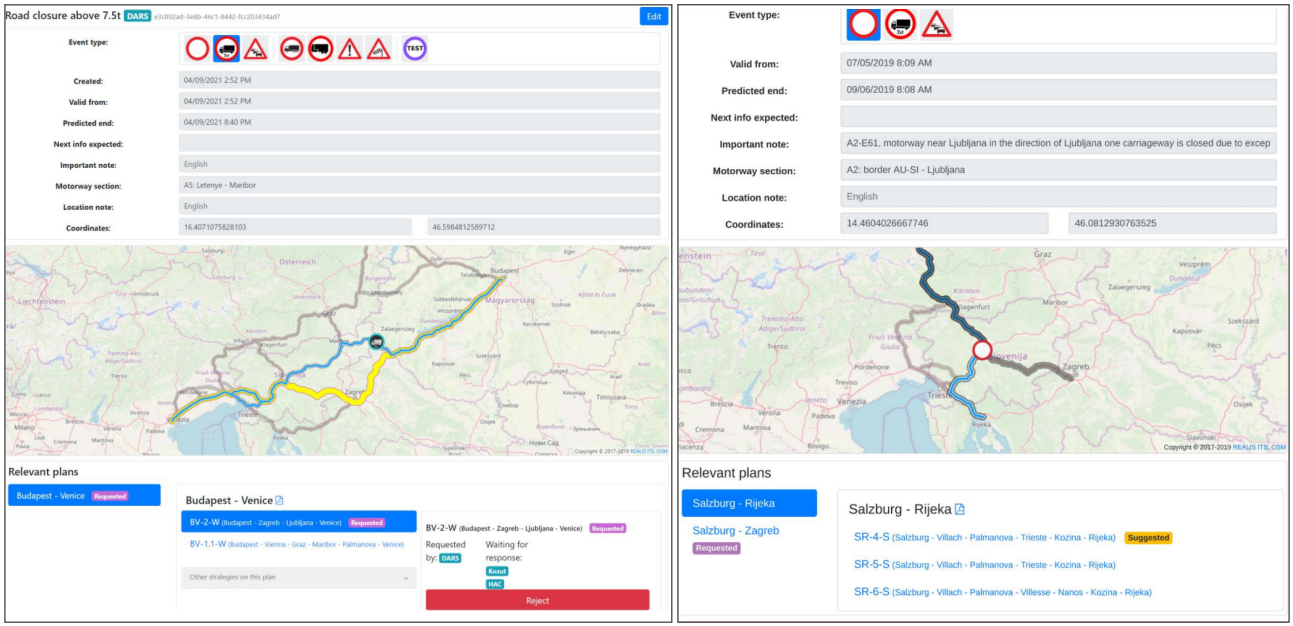

Figure 3: Screenshots of TMP application

2 See tmp.dars.si/tmp/app/default

CROSS-CORRIDOR COOPERATION AND DISSEMINATION

In CROCODILE 3, cross-corridor cooperation was explicitly outlined from the beginning, including a strong collaboration with the former European ITS Platform (EU EIP) until the end of 2021 and other ITS deployment corridors in this matter: on the one hand, by disseminating information on project findings and events through embedding the CROCODILE website[3] in the EU EIP environment and raising awareness within the end user community through press releases and press campaigns, giving it a broader outreach and more opportunities for synergies; on the other hand, by pursuing active knowledge exchange and the elaboration of common solutions through direct cooperation with other corridor projects and European initiatives as well as joint meetings on relevant ITS deployment actions.

TECHNICAL WORKSHOPS

In this spirit of consultation and cooperation, CROCODILE also organised numerous "Technical Workshops" as a forum to support the exchange between the corridor participants and interested externals. The aim was to highlight the progress of cross-border coordination in Europe along with European legislation (ITS Directive and its supplementing Delegated Regulations) to relevant stakeholders on both the public and private sector side.
Various topics as well as CROCODILE findings were presented and discussed:

Joint Event of CROCODILE 3, FRAME NEXT and OJP4Danube

The event was held to further foster common solutions and synergies in ITS as well as share knowledge between the projects FRAME NEXT and OJP4Danube. Three different perspectives of mobility and ITS deployment were presented with an overview of DATEX II implementation within the project CROCODILE 3, the development of an ITS Architecture in the project FRAME NEXT and the linking of public transport information services with a special focus on rail and bicycle transport.

Traffic Management Plans

As the CROCODILE TMP application was tested comprehensively throughout 2020/21, it received broad interest among operators within and beyond the CROCODILE corridor. A paper was developed that served as the basis for the workshop, which gave in-depth insights into the TMP application from an operator's viewpoint, with live demonstration, highlighting the specific challenges and benefits, allowing for detailed questions.

NAPs and Multi-Modal Transport Information Services

After National Access Points were implemented in all CROCODILE Member States, especially the strategic importance of the integration of priority action a) was highlighted by best practice examples of implementation throughout Europe. In addition, the future perspective of the harmonisation of National Access Points and National Bodies within the NAPCORE project were presented.

3 See its-platform.eu/its-corridors/crocodile

MEMBER STATES ACHIEVEMENTS

The participant countries have committed themselves to cross-border data exchange as the main part of the TEN-T Network is covered by real-time and safety-related traffic information services. This implies harmonisation on different levels (legislation, data formats and cross-border services) by elaborating a common process for the coordination of Traffic Management Plans, the implementation of standards as well as an added value for end user applications.

The specific measures taken and the results achieved in the CROCODILE 3 project by each Member State are elaborated in the following sections.

Austria

In Austria, harmonisation has been pursued related to the interoperability of the National Access Points (NAP) and National Bodies of other countries. The Austrian NAP (mobilitydata.gv.at) has been improved regularly and preparatory work related to priority action a) was done. In addition, a new ASFINAG DATEX II content portal and the smartphone application "Unterwegs" were created. Furthermore, the web service got modified.

Cyprus

Besides expanding the traffic monitoring and management platform OMNIA-MISTIC, a NAP was developed (traffic4cyprus.org.cy). Additionally, Cyprus is now capable of sharing information with third parties through 17 different Application Programming Interfaces (APIs).

Czech Republic

In the Czech Republic, new sources (especially Floating Car Data) and their updated versions, including car and truck differentiation, dynamic and static truck parking information and alternative fuel information, were introduced. All information categories defined in the Delegated Regulations are covered by the National Traffic Information Centres (dopravniinfo.cz). Furthermore, the existing feeds were upgraded to the latest versions of DATEX II. Another achievement was the installation of a Traffic Management Centre in Ostrava. In the Czech Republic, not only the TEN-T Network is covered by real-time and road safety traffic information services but also motorways and 1st class roads (in total 55,838km) as well as selected local roads and urban streets.

Italy

In Italy, a common platform for data exchange and a web solution for implementing the TMPs on an international level has been set up. For Italy, the DATEX II node, profiles and the extension for exchange of information related to priority action b) and c) were improved and harmonised during the CROCODILE project.

Slovenia

In addition to the instalment of new variable message signs and the upgrade of the existing TMPs, 10 new TMPs were implemented in Slovenia. The Traffic Management Centre Ljubljana was improved on a technical level for more efficient work, including an interactive simulator with visualisation for traffic manager training. Video surveillance was integrated into a unified system and an ADR (Agreement of Dangerous Goods) recognition system was set up.

Croatia

In the course of the CROCODILE project, a Croatian NAP was established which enabled the conclusion of cross-border agreements between the Republic of Croatia and neighbouring countries. As in other member countries as well, the DATEX II standard for the exchange of traffic information was implemented and the Traffic Management Centre Dubrovnik was upgraded. In total, 24 new sensors and 8 new cameras with sensors for vehicle detection, movement detection and license plate recognition were implemented.

Hungary

In Hungary, a national Traffic Management Centre study plan and Traffic Models (static and dynamic) were created in order to gain traffic forecasts. The Traffic Management Centre in Budapest was upgraded and TMPs were introducted in urban road networks, which are directly connected to the TEN-T Network in Budapest. Also the Hungarian NAP was upgraded related to DATEX II and priority action a). Furthermore, end user applications and services were developed.

III. NEXT STEPS

While acknowledging the efforts of the previous CROCODILE corridor projects, the need for further development of common initiatives reaching beyond borders and beyond motorways is still present in order to include real-time events and information that could reach drivers, commuters or tourists equally.

The most pressing issues are ongoing coordination and harmonisation on both a technical and organisational level in accordance with European legislation. This way, operators and service providers can draw from improved access to data and offer the best possible services to end users. Due to different stakeholders (public/private motorway operators, public authorities and other infrastructure operators) being responsible for their respective infrastructure segments, a special focus must be put on addressing and harmonising the link between high-level corridors and adjacent infrastructure (urban areas, secondary road network, multi-modal nodes etc.).

Other issues include the harmonised implementation of the ITS Directive and its supplementing Delegated Regulations. While basic principles are set out as mandatory provisions, the technical and organisational details often remain unclear and subject to Member-State-specific approaches. To ensure a common European and corridor-based strategy, it is essential to further foster the alignment of the previously mentioned topics such as National Access Points, DATEX II profiles as well as traffic information and management on a cross-border level. This approach has been successful in the past with previous phases of CROCODILE and needs to be pursued further for sustainable and long-term corridor benefits.