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WHITE PAPER

IDENTIFYING POTENTIAL IMPACT AND CONTRIBUTION OF GoF4R PROJECT TO RESOURCE EFFICIENCY AND SUSTAINABILITY-RELATED POLICY IN THE UK, EU, AND INTERNATIONALLY.

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“Integration of environment and development concerns and greater attention to them will lead to the fulfilment of basic needs, improved living standards for all, better protected and managed ecosystems and a safer, more prosperous future. No nation can achieve this on its own; but together we can - in a global partnership for sustainable development.”

Agenda 21. UN conference on environment and development. Rio de Janeiro, Brazil, 3-14 June 1992

Transport matters. In the history, transport and transportation have always played a pivotal role for the evolution of the human society. Providing the mobility infrastructure for passengers and goods, transport is important for establishing trade flow and connections on the local and global supply

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chains. Transport and its infrastructure should be regarded as a resource for the European integration. Integration and extension of the common market especially in the EU have led to increased complexity and volume of the traffic flow. The benefits from economic relations and social integration as a result of integrated transport system are outstanding, but their environmental impact such as air pollution, noise, and emission of greenhouse gases negatively affects environment and local communities. Hence, improvement towards sustainable transportation system to achieve better sustainability and recourses efficiency are paramount.

SUSTAINABILITY AND RESOURCE-EFFICIENCY - GOALS AND TARGETS

INTERNATIONAL LEVEL

The blueprint for sustainability in the 21st century, Agenda 21, established by the UN 'Earth Summit' in 1992, draws attention to the urgent need for nations to collaborate with the aim to achieve sustainable development and prosperity for all. The targets for action established by the Agenda 21 and accepted as a guideline by the vast majority of the UN countries combine economic development and environmental protection. By acknowledging the importance of the Agenda 21 for formulating the central sustainability goals and encouraging the nations to promote these goals on the local and regional levels, by no means all these goals have been achieved. Therefore, still there is a potential to work towards implementing the goals of sustainable development worldwide more efficiently.

Drawing on the targets formulated during the 'Earth Summit', 17 Sustainable Development Goals (SDGs) were set up in 2015 by the Heads of State and Government at a special UN summit. These SDGs are included in the 2030 Agendaⁱⁱ (Picture 1: 2). Our research can contribute to SDGs 11, 12 and 13.

Increased population and migration of citizens to cities, coupled with intensive reliance and consumption of natural resources have created the perfect storm for increasingly dense and highly polluted and congested transport networks in cities, especially mega cities. This not only violates the Clean Air Act, but further deteriorates human health due to worsen air quality as a result of highly concentrated negative particulate in the wider eco-system. Our research can make an impact in contributing to an improved governance structure that aims to integrate seamless flow of information, passenger and goods, hence improving efficiency, reducing waste and hence constructing a more sustainable integrated transport system that propels prosperity, sustainability and resource efficiency.

Rail is a key transport infrastructure for commerce and public. The strategy of modal shift to rail allows increased utilization of such an infrastructure, improving trade and passenger flows and reducing congestion. In the international landscape, this fits strategically well with the New Silk Road. The New Silk Road is a contemporary overland and maritime trade network spearheaded by the Chinese government's "One Belt, One Road" initiative, announced in 2013 to promote economic corporation between China and Europe, Middle East and Central Asia. With a \$40 billion Silk Road Fund, China aims to invest in an infrastructure network of rail links, high ways, shipping routes and also oil and gas pipelines across the Eurasian continent.

Picture 1: UN 2030 Agenda presenting the Sustainable Development Goals



EUROPEAN LEVEL

At the EU level, member-countries working towards implementation of 2030 Agenda to achieve the SDGs on the domestic, European, and international levels. The European Sustainable Development Strategyⁱⁱⁱ formulated seven principal sustainable development challenges facing the EU:

- climate change and green energy;
- sustainable transport;
- sustainable consumption and production;
- threats to public health;
- social exclusion, demographics, and migration;
- conservation and management of natural recourse;
- the war on poverty in the world.

The implementation of the European Sustainable Development Strategy^{iv} is being monitored and reported by the Eurostat, launched by the European Commission. The last Eurostat report^v reveals which SDGs has been most successfully implemented in the EU. With regard to the implementation of the second principle – sustainable transport, the report^{vi} reveals that “energy consumption of transport per GDP (Unit of Gross Domestic Product) in the EU has fallen in the long term since 2000”. However, the strongest decline was noticed after the economic crisis from 2008. Therefore, it can be assumed that economic recovery will lead to increase of the energy consumption of transport. The

table 1 presents the evaluation of changes for transport-related sustainability in the EU. Although the evaluation has shown some encouraging results in the short term from more sustainable transport, more research, innovation, implementation and policy impact are required to ensure continuous sustainability to meet the key indicators outlined. Here, the shift to rail strategy can contribute towards meeting some of these targets.

In addition, the data interoperability and governance structure research for rail services integration across Europe can provide a new dimension to future travel that may lead to open Cloud network / platform and new service delivery from providers and new business model, ownership and governance structure. This can impact on cyber security regulation and its policy in which standards are formed to protect sensitive data. It must be recognised that technology is advanced and available to enable this digital transformation, whilst more need to be understood on the business model and governance structure.

Table 1. Evaluation of changes in the sustainable transport theme, EU-28⁽¹⁾

Indicator	Long-term evaluation (since 2000)	Short-term evaluation (last five-year period)
Energy consumption of transport relative to GDP		
Transport and mobility		
Modal split of freight transport	⁽²⁾	⁽²⁾
Volume of freight transport relative to GDP	⁽²⁾	⁽²⁾
Modal split of passenger transport		
Volume of passenger transport relative to GDP		
Transport impacts		
Greenhouse gas emissions from transport		
People killed in road accidents		
Average CO ₂ emissions per kilometre from new passenger cars	:	⁽²⁾
Emissions of ozone precursors from transport		
Emissions of particulate matter from transport		

⁽¹⁾ An explanation of the evaluation method and the meaning of the weather symbols is given in the Introduction and in Annex III.

⁽²⁾ Evaluation based on EU-27.

NATIONAL LEVEL – THE UK

The UK Sustainable Development Strategy^{vii} recognises the need to establish a new approach to growth and development with attention paid to the efficient use of resources and reduced environmental impact. The UK Sustainable Development Strategy highlights three areas as especially important for achieving sustainable development in the UK. These areas are transport, waste management, and energy production. By recognising the importance of continuing economic growth and development in the country, the UK government is concerned with achieving this growth but more sustainably, by regarding the potential environmental and social costs.

In the UK, such policy is championed by BEIS (Business, Industry, and Industrial Strategy) at the national level, and by the local enterprise partnerships in the regional and local levels. The UK Industrial Strategy, European Commission White and Green papers, HS2 and the Transport for the North bringing together planning across the region to develop plans for a west-east rail link can be informed and hence impacted from our research^{viii}.

SHIFT2RAIL PROGRAM

Shift2Rail (Shift to Rail) contributes to smart and sustainable growth through its action to foster innovation and research in the railway sector. The Shift2Rail program aims, first, to achieve the Single European Railway Area through removing of remaining technical obstacles holding back the rail sector in terms of interoperability². Second, the attractiveness and competitiveness of the European Railways should be enhanced through implementation of the Shift2Rail program. Finally, the program is supposed to help the European industry retain and consolidate its leadership in the global market for rail products and services.

Shift2Rail should tackle the ongoing challenges that the European Union and the world face, such as climate change, rising traffic demand, congestion and security of energy supply. To tackle these challenges, the European Railway will be required to take on a larger share of transport demand in the next few decades. In order to allow the modal shift from road to rail, the European rail and transportation system should become more competitive and resource-efficient. Several improvements should be implemented to increase the competitiveness of the European rail.

The European Rail should:

- become more user-friendly;
- become interconnected within and between the European countries;
- use the resources and the infrastructure available more efficiently;
- become more convenient by allowing seamless door-to-door mobility for passengers and businesses.

Shift2Rail will provide research-based evidence and develop a roadmap detailing how to implement these improvements.

GOF4R PROJECT

GoF4R (Governance of the Interoperability Framework for Rail and Intermodal Mobility) project is an integrated part of the Shift2Rail program. GoF4R aims to establish a good governance structure of the semantic interoperability technology (SIT)³, which should be implemented to connect the Single European Railway Area under the Shift2Rail program. GoF4R aims to design an efficient governance structure for the data exchange technology, which will consider the interests of different transport service providers across Europe and satisfy the end-user needs. Moreover, the GoF4R project will ascertain the required skills and explore the skill gaps for developing and implementing the SIT.

² Interoperability is the ability of different information technology systems and software to communicate, to share and exchange data, and to use the information that has been exchanged.

³ Semantic interoperability technology (SIT) provides a framework for integrating and sharing data across disparate transportation operators.

The governance structure is crucial for making the data exchange technology work successfully because different often competitive interests of a large number of actors are in play. GoF4R will provide research-based evidence on how to design the governance structure efficiently by having explored:

1. What are the needs expectations of the end-users (passengers and businesses) from the improved Single European Railway Area?
2. Which data actors, private companies, governmental bodies, and organisations operating within the Railway system in Europe are willing to share and exchange?
3. Which data requires high confidentiality and, therefore, cannot be exchanged and shared by the actors involved?
4. How to motivate the actors operating within the Railway system in Europe to collaborate and to be willing to exchange data by designing an efficient governance structure of the SIT.
5. What are the formats of data (such as anonymized or aggregated data), which organisations and businesses involved in the transportation are more likely to share?

Expected results of the GoF4R project and Shift2Rail program are:

- Cutting the life-cycle costs of railway transport (i.e. costs of building, operating, maintaining, and renewing infrastructure and rolling stock) by as much as 50%;
- Doubling the railway capacity;
- Increasing reliability and punctuality by as much as 50%.

By reaching its rigorous aims, GoF4R project under the Shift2Rail program will make a considerable contribution towards improved transportation system in Europe to make it more sustainable, resource-efficient, and user-oriented.

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