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Opportunities and Challenges for the Tolling Industry in a Connected and Automated World

Robert YEN, Rapp Trans
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Main Drivers for the Tolling Business in Mid- & Long-Term Future

- The Paris Agreement of 2015 and the EC White Paper on Transport
- Changes of the legal framework in Europe
- New Services and Technological developments

Main Aspects of the Paris Agreement 2015

*„Long-term temperature goal (Art.2) -
...limiting global temperature increase
to well below 2 degrees Celsius, while
pursuing efforts to limit the increase to
1.5 degrees.“*

EC White Paper on Transport 2011

„A reduction of at least 60 % of GHGs by 2050 with respect to 1990 is required.“

Ten Goals for a Competitive and Resource-efficient Transport System

- „1.) Halve the use of ‘conventionally fuelled’ cars in urban transport by 2030; phase them out in cities by 2050;
- 3.) Thirty per cent of road freight over 300 km should shift to other modes ... by 2030 and more than 50 % by 2050,
- 5.) A fully functional and EU-wide multimodal TEN-T ‘core network’ by 2030,
- 8) By 2020, establish the framework for a European multimodal transport information, management and payment system.
- 10.) ... full application of ‘user pays’ and ‘polluter pays’ principles“

Changes Eurovignette Directive (EC Proposal)

- Scope extension to all 4-wheel vehicles
- Phasing out vignettes for HDV (2027) and cars (2023)
- HDV tolls - variation acc. to CO2 inst. of EURO classes
- LV tolls – variation acc. to CO2 and real-life pollutant emissions
- Gradual removal of min. vehicle tax
- Mandatory ext. cost charges (in environmentally fragile areas); optional "true" congestion charges
- Regular reporting on use of revenues

Changes EETS Directive (EC Proposal)

- Separation of EETS-HDV and EETS-LV
- Right to fair remuneration + transparency of accounts of vertically integrated entities
- Less stringent EETS coverage requirements
- EETS providers' accreditation from Day-1
- Cross-border exchange of info on the identity of toll offenders using EUCARIS
- Scope of EETS extended to ANPR-based systems

New Services & Technological Drivers

- Platooning of HDVs
- New propulsion concepts (H with fuel cells, electric power from accumulators or trolley systems)
- Semi-automated or full automated vehicles
- Mobility as a Service
- New logistic infrastructure
- New communication / data networks (ITS-G5 or 5G and a growing vehicle fleet with RLAN)

Truck Platooning

- Up to 7% less fuel consumption and nearly half of space needed
- In a lot of European countries distance between motorway on-ramps and exits is too short for efficient platooning
 - Dedicated lanes for platoons with motorway on-ramps and exits near to logistic hubs
 - Platforms to meet and build the platoon
 - New tariff models



New Propulsion Concepts

- Electric engines powered by hydrogen with fuel cells, accumulators or trolley systems
 - Charging and hydrogen stations
 - New additional infrastructure for trolley systems
 - New business models and new services with new tariff models



Semi- and Fully Automated Driving

- Fully automated driving on all roads will take longer than announced by industry
- Partly automated vehicles are increasingly in operation
- Fully automated public transport on dedicated networks is possible in near future
 - Provision of dedicated networks/lanes for public transport
 - Provision of roadside sensors for fully automated vehicles on all roads in cities
 - New business models and new services with new tariff models



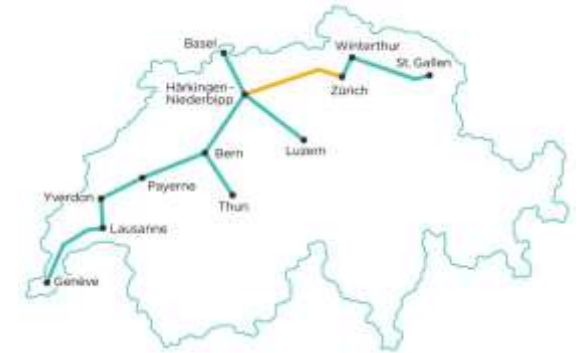
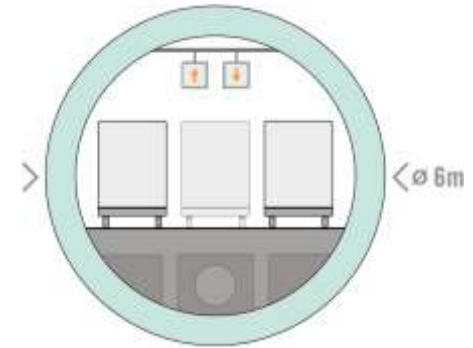
Mobility as a Service

- Intermodal transport services
 - New business models
 - New services with new tariff models which are able to perform a comfortable and seamless usage experience
 - Tariff is differentiated according to time, place, transport mode, traffic, impact to the environment
- Mobility Pricing in Switzerland to initiate a shift of transport

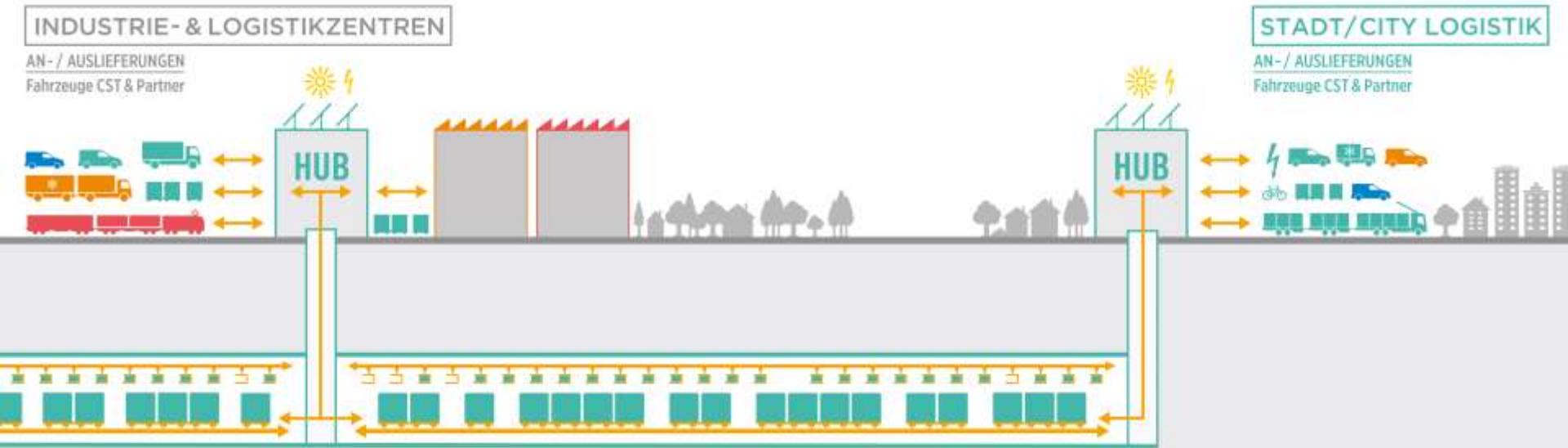


New Logistic Infrastructure

- Cargo Sous Terrain – underground network for autonomic cargo vehicles between logistic hubs
- Constructed under motorways during new construction respectively when motorways have to be renewed
 - Using the same space (below the motorway)
 - Interurban networks
 - New services



Cargo Sous Terrain



New Communication Technologies

- ITSG5 versus 5G
 - ITSG5 seems to come for security and safety applications
 - New services and corresponding business models have to be defined
- RLAN and WIFI within cars on 5.8 GHz
 - impact on the performance of the CEN 5.8 GHz DSRC-tolling-systems:
 - ✘ existing applications are legally protected by EU-Directive and national laws
 - no impact on US tolling systems (using 915 MHz)



Opportunities for the Tolling Business

- New Services based on new types of infrastructure (dedicated lanes, trolley systems, underground tubes for logistics,...)
- Intermodal mobility pricing: time, place and transport modes are differentiated – shift of demand; reduction of ecological impact
- New roles as service providers: new business models for new services based on communication networks and IT-platforms (e.g. meeting platform for platooning,...)

Potential Business Model - Mobility Pricing

Tolling industry

Services: Provision of IT-platforms & safety applications

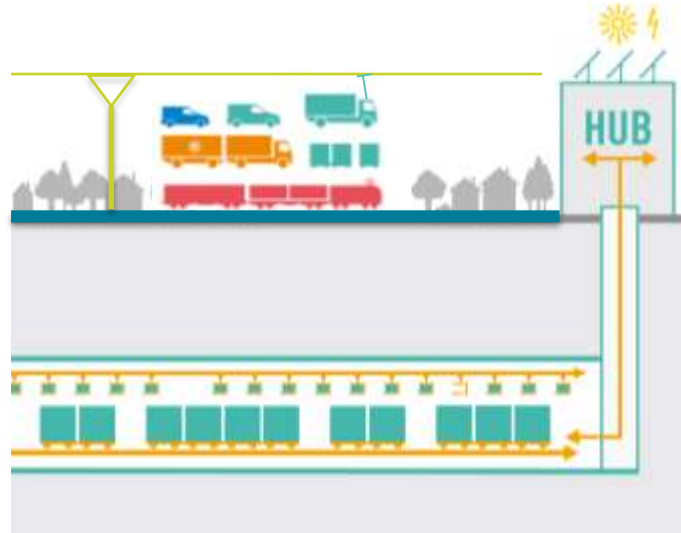
Services: Provision of electric power

Services: Operating of tolling/mobility pricing schemes/systems

Infrastructure: ITSG5 roadside infrastructure

Infrastructure: Trolley system, charging stations

Infrastructure: Logistic underground tube



Other infrastructure and service providers

Services: 5G applications

Services: Distribution of goods / city logistics

Services: Provision of transport services, car sharing,...

Services: Operator of systems like Cargo Sous Terrain

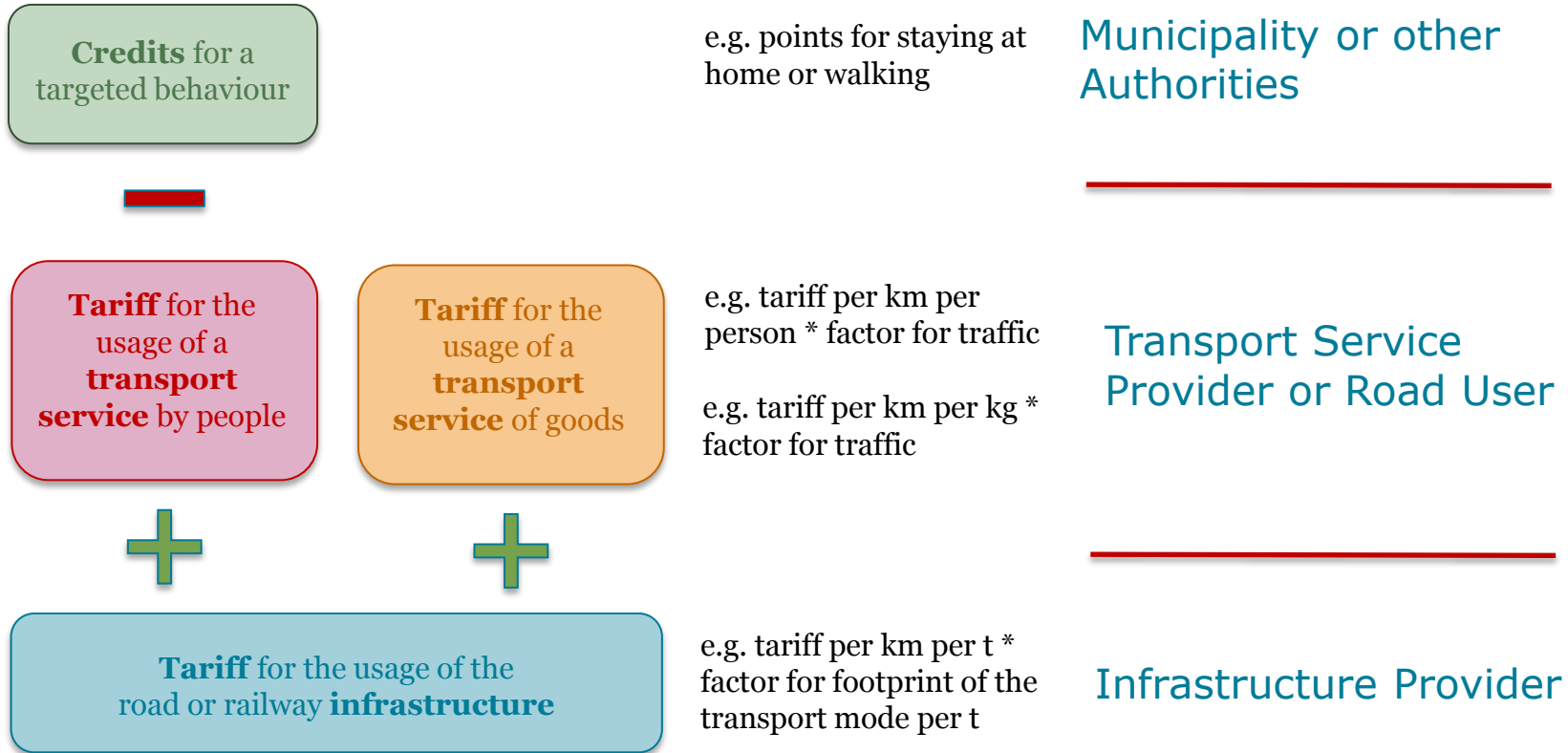
Infrastructure: 5G network infrastructure

Infrastructure: Road infrastructure

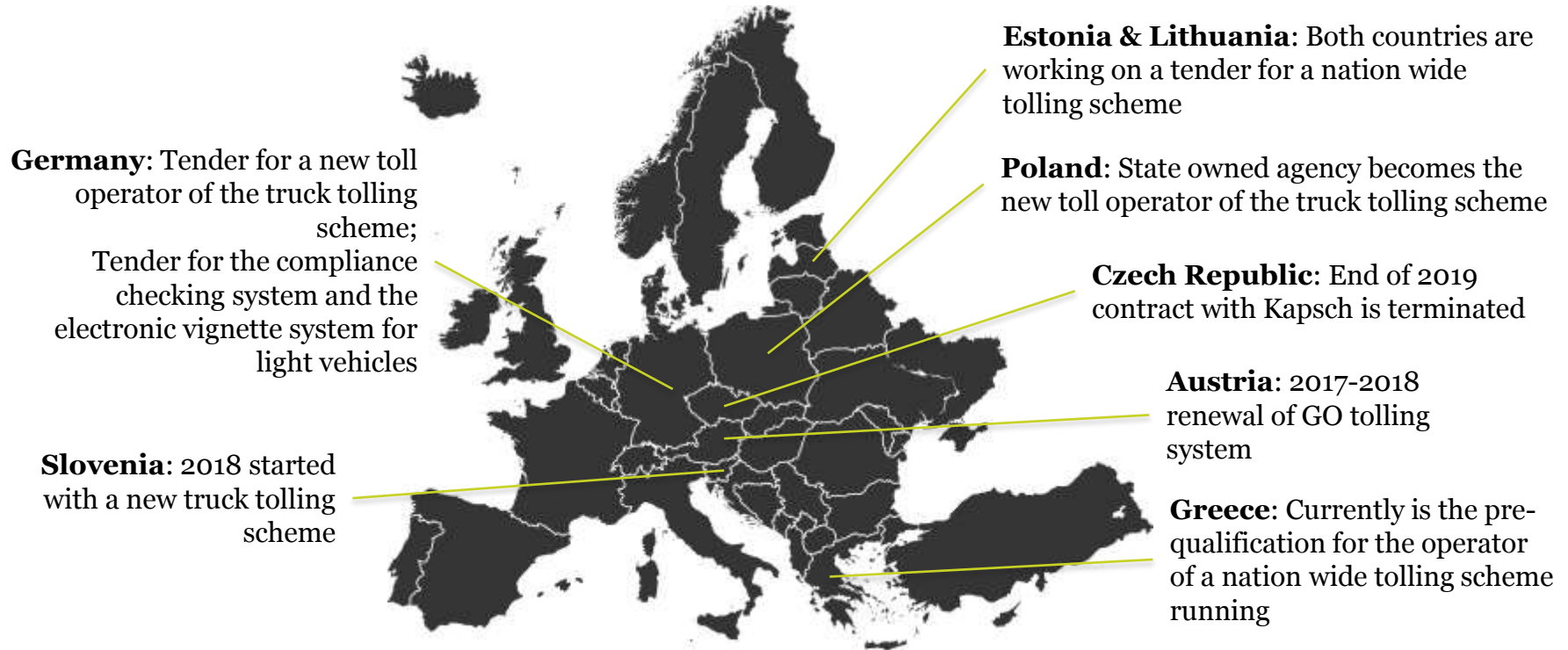
One Tariff Model

Infrastructure: Railway infrastructure

Tariff Model - Mobility Pricing



Electronic Fee Collection in Europe... ...Near Past, Now & Short-Term Future



Thank you for your Attention!

A photograph of two men standing on a city street, looking at a document together. The man on the left is wearing a dark jacket and blue jeans, while the man on the right is wearing a light blue shirt and tan pants. They are standing on a sidewalk next to a street with a crosswalk. In the background, there are modern buildings, including one with a 'fair banking' sign and another with an 'EMPORIO ARMANI' store. A red 'STOP' sign and a blue directional sign are visible on the left. The scene is brightly lit, suggesting daytime.

Rapp Trans
Reinhardtstraße 37
D-10117 Berlin

robert.yen@rapp-trans.de
+49 173 200 26 09