



# Alstom - Green Mobility/ Worldwide experience inspiring Iceland

12 Oct 2023

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MD Norway & Iceland

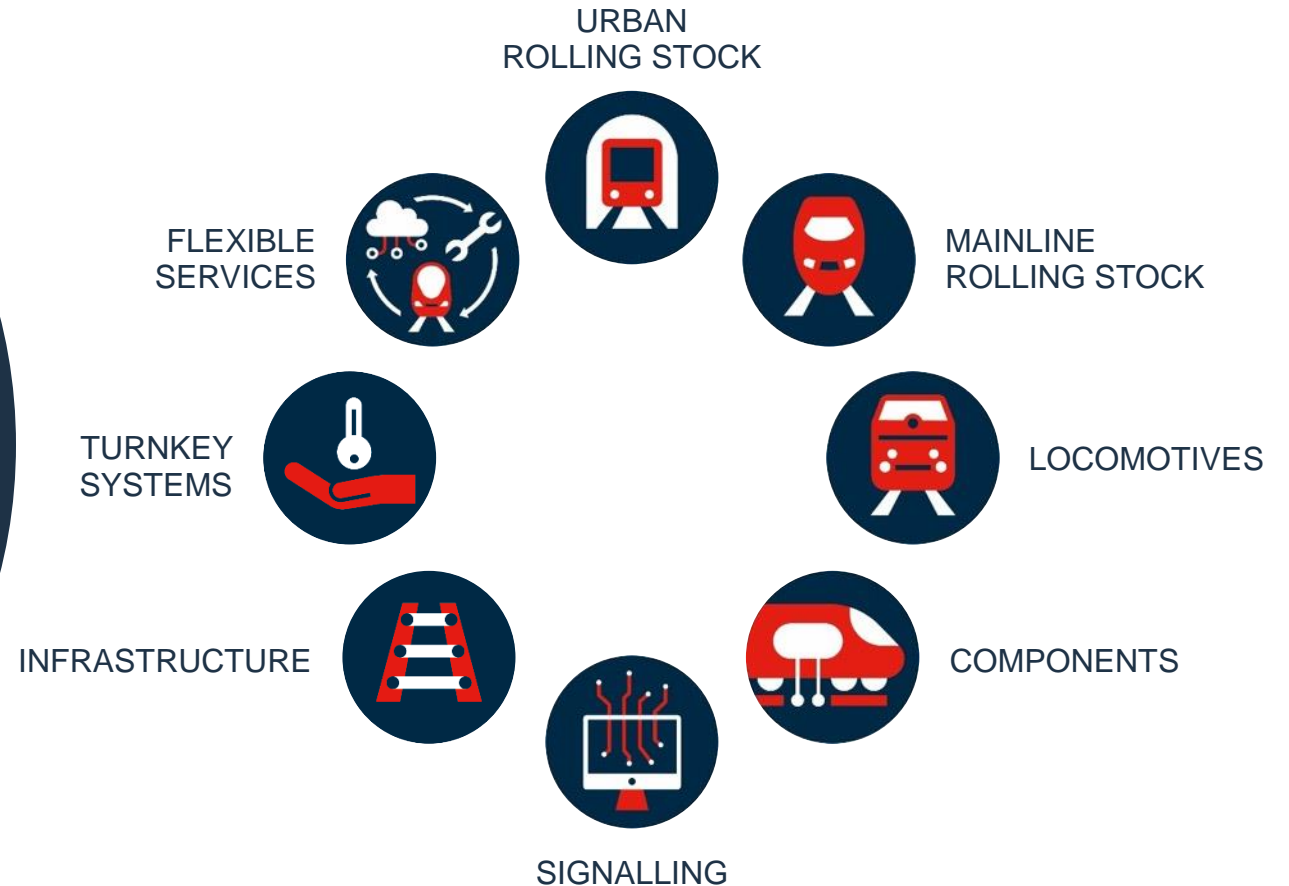
**At Alstom, we are committed to creating mobility solutions that people enjoy riding, and lead societies to a low carbon future.**



# A dedicated player and global leader in rail mobility

Alstom develops and markets mobility solutions that provide sustainable foundations for the future of transportation.

Our comprehensive product portfolio ranges from high-speed trains, metros, monorail and trams, to turnkey systems, services, infrastructure, signalling and digital mobility solutions.





# We are where mobility is needed

Over  
**80,000**  
employees

from  
**175**  
nationalities

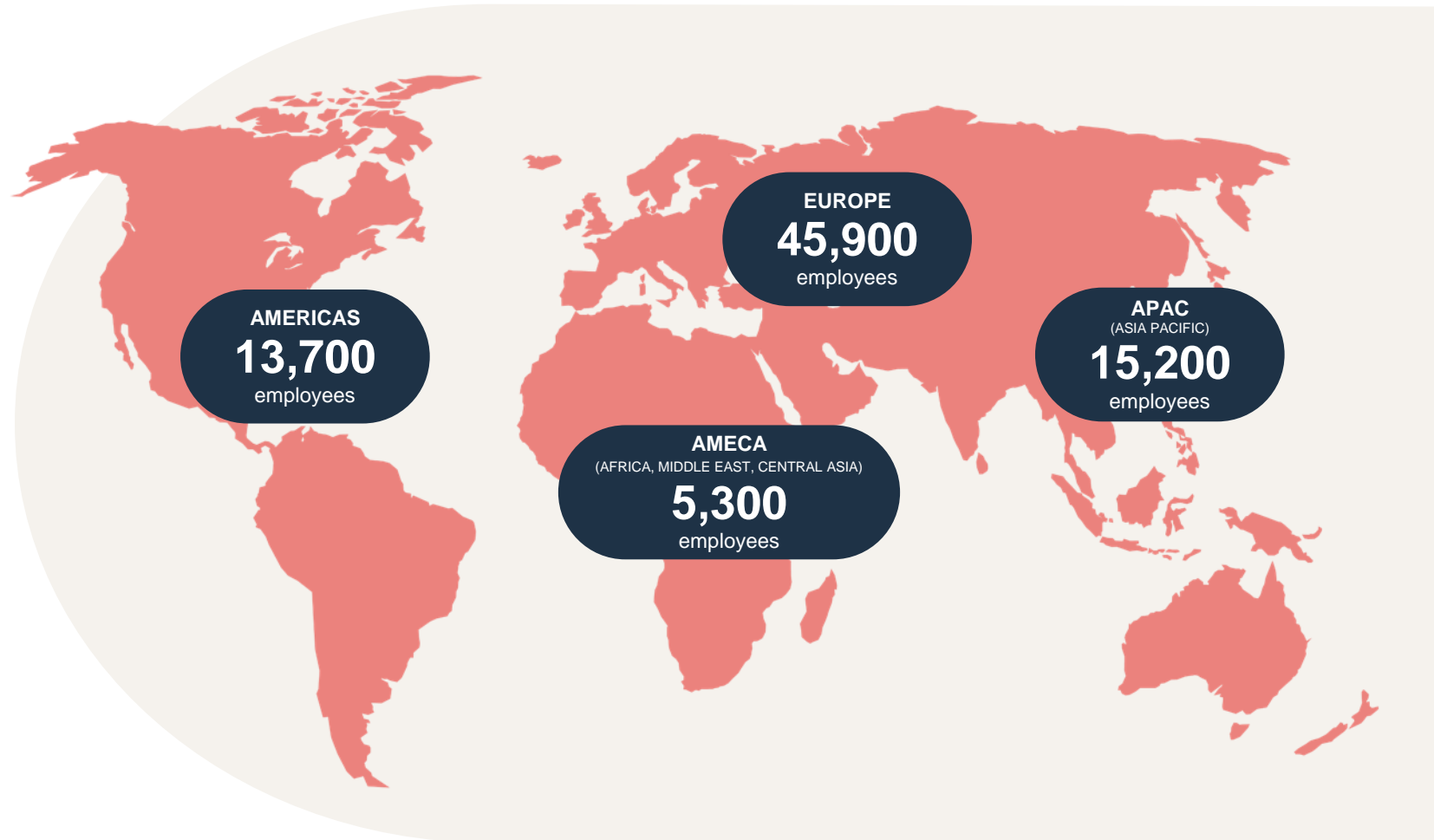
Over  
**250**  
sites

**63**  
countries

Over  
**22,000**  
engineers

Over  
**10,000**  
patents

Partner to over  
**300**  
cities



As of 31 March 2023



Alstom zero emission  
solutions for non-electrified  
lines

**ALSTOM**  
• mobility by nature •

# Green traction solutions – an eventful year for Alstom



**World's 1<sup>st</sup> two hydrogen powered fleets** went into commercial service in August / December 2022 in Germany

**Coradia iLint™ distance record of 1,175 km** without refueling



**Prima H3™ refurbishment programme**  
Presentation of the hydrogen refurbished shunting locomotive



**IPCEI development supported by EU** boosting the development of hydrogen freight solutions



**Battery electric multiple unit in passenger operation** in Germany

**Coradia iLint™ serial train travel on commercial line at InnoTrans** in Berlin



Alstom is successfully offering the entire scope of green traction solutions and in-house fuel cell technology to meet the challenge of sustainable mobility.



# Zero direct emissions with battery and hydrogen solutions



**New build:**  
battery electric multiple unit,  
Dublin, Ireland

**Modernisation:**  
Re-traction diesel-electric unit to a  
battery-electric train leading to zero  
direct emission service



**New build:**  
battery electric multiple unit,  
Leipzig, Germany

**Modernisation:**  
Re-traction electric multiple unit to  
a battery electric unit  
Allowing services on more lines with  
just one train type, bridging non-  
electrified sections with battery power



**New build:**  
Fuel-cell multiple unit for Milano,  
Italy  
Fast refuelling to travel 600 km in the  
Italian Alps region

**New build:**  
World's 1st serial produced  
hydrogen train, two fleets in  
commercial service in August and  
December 2022



# Alstom's green mobility solutions for non-electrified lines

*Electrification is the most efficient solution, but how to decarbonize non-electrified lines?*

## Reduced emission



**Bi-mode (Diesel + EMU) /  
Hybrid (Diesel + energy storage)**

- Bi-mode: Make use of catenary when operating on **electrified sections**.
- Hybrid: Energy storage, **reduction of energy consumption**, boost during acceleration. Plug-in option for full electric autonomy.



*Illustration with X'trapolis™ Tren Maya*

## Zero direct CO<sub>2</sub> emissions



**Battery  
(BEMU)**

- Current range of **80-120 km on batteries**
- Suited for **catenary-free operations** with **recharging** in electrified sections and stations
- **Kinetic energy recovery** during braking



*Coradia™ Continental BEMU*



**Hydrogen  
(FCMU)**

- Current range **up to 1000 km**
- **Performance equivalent to diesel trains**
- Suited for **catenary-free operations** with requirement of **hydrogen refueling station**



*Coradia iLint™ & Coradia Stream™ FCMU*





# New Mobility in Iceland – Airport Link to Keflavik

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# The Airport Link



- **High quality passenger service**
  - Direct trains from Keflavik to Reykjavik
  - Trip time 30 min
  - Optimal comfort
  - Interconnection with Borgarlinan
- **Icelandic energy**
  - Trains powered by Icelandic Hydrogen
  - Green traction, no pollution, silent
- **Journey immersed with Icelandic landscape**
  - Provide also direct access to Blue Lagoon
  - An unique scenery journey



**ICELANDIC ENERGY :**  
GREEN TRACTION, NO POLLUTION, SILENT

# Who will use the Airport Link?



- Foreign tourists travelling to and from the country



- Immersion in the Icelandic landscape
- Direct link to city center but also to other touristic attractions

- Icelanders travelling to and from the country
- Domestic, general passengers



- Express service with short trip time
- Reliable and efficient

- Transit passengers



- Touristic attraction itself
- Hydrogen train at the heart of Icelandic environmental friendly spirit

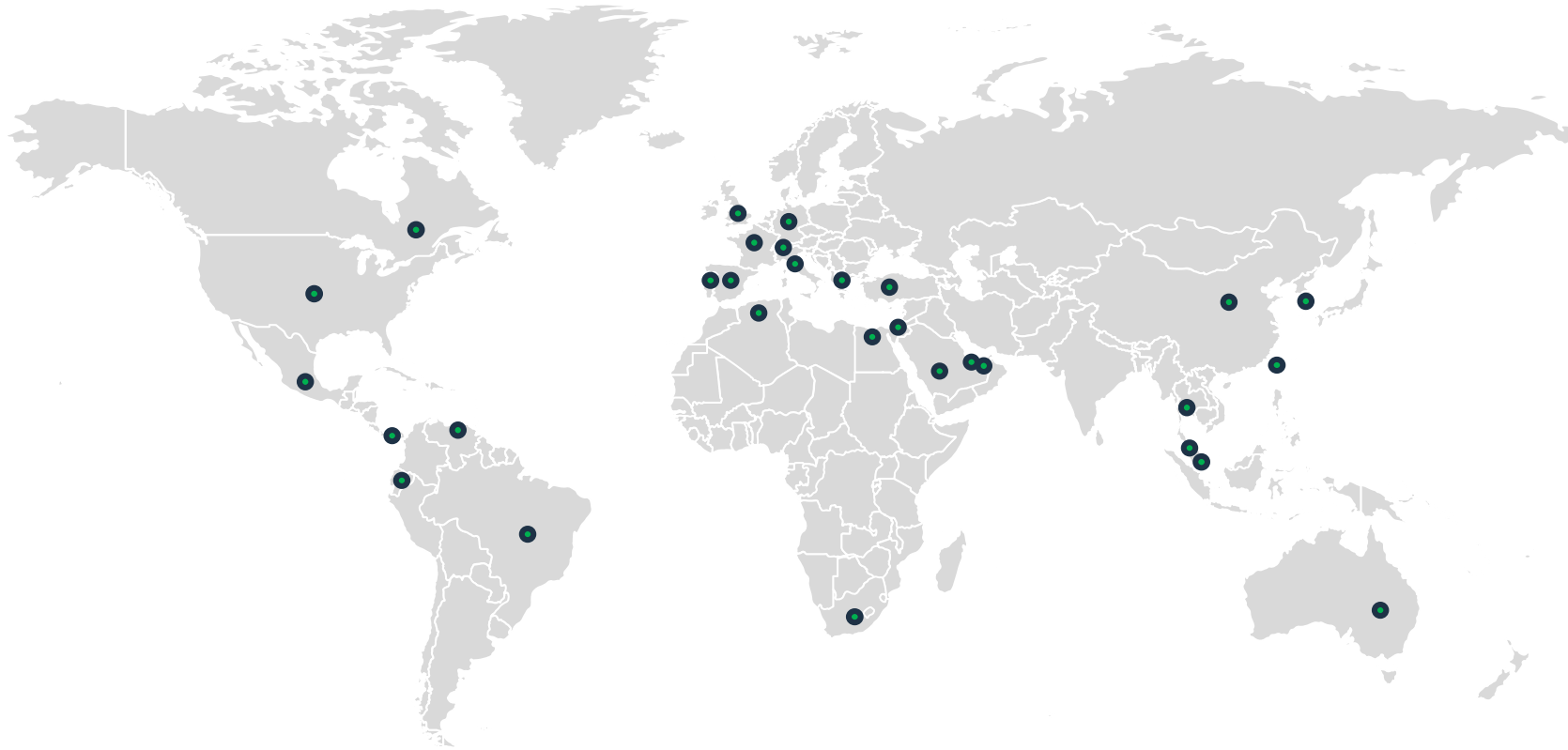




# Turnkey projects & Financing

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# Alstom leadership in Turnkey solutions, #1 worldwide



**50 Years experience - Over 80 lines in-revenue service in 30 countries**

# Alstom's global references for PPP projects (selection)



**Edmonton, Canada**  
Valley Line LRT



**Barcelona, Spain**  
2 Tramway lines



**Gold Coast, Australia**  
Gold Coast Rapid Transit



**Nîmes Montpellier, France**  
HSR



**Yongin, South Korea**  
Ever Line



**Alicante-Albacete, Spain**  
HSR



**Las Vegas, USA**  
Las Vegas Monorail



**Jerusalem, Israel**  
LRT

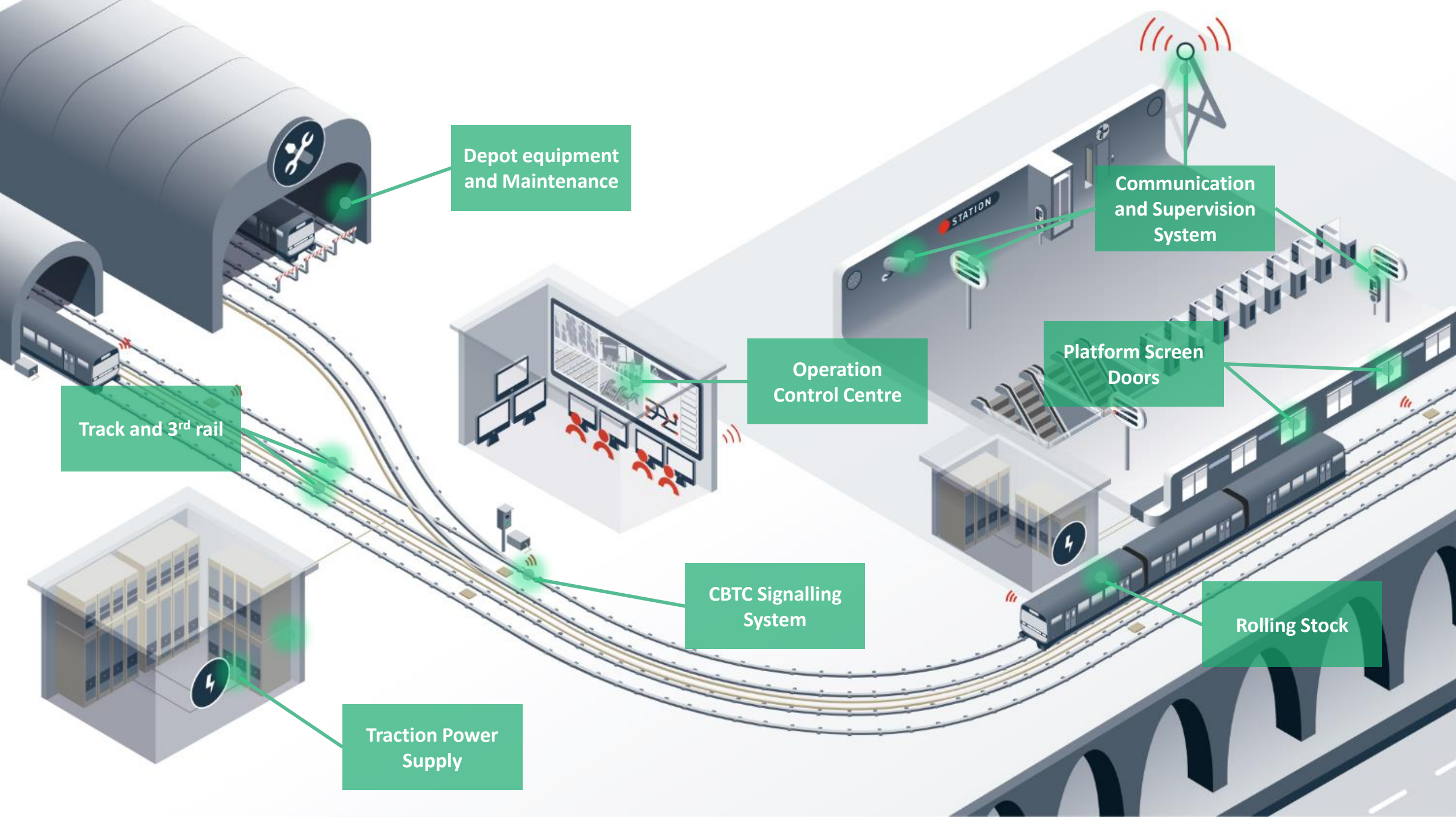


**Croydon, UK**  
Tramlink



**Milan, Italy**  
Metro Line 5 and extension





Depot equipment and Maintenance

Track and 3<sup>rd</sup> rail

Traction Power Supply

Operation Control Centre

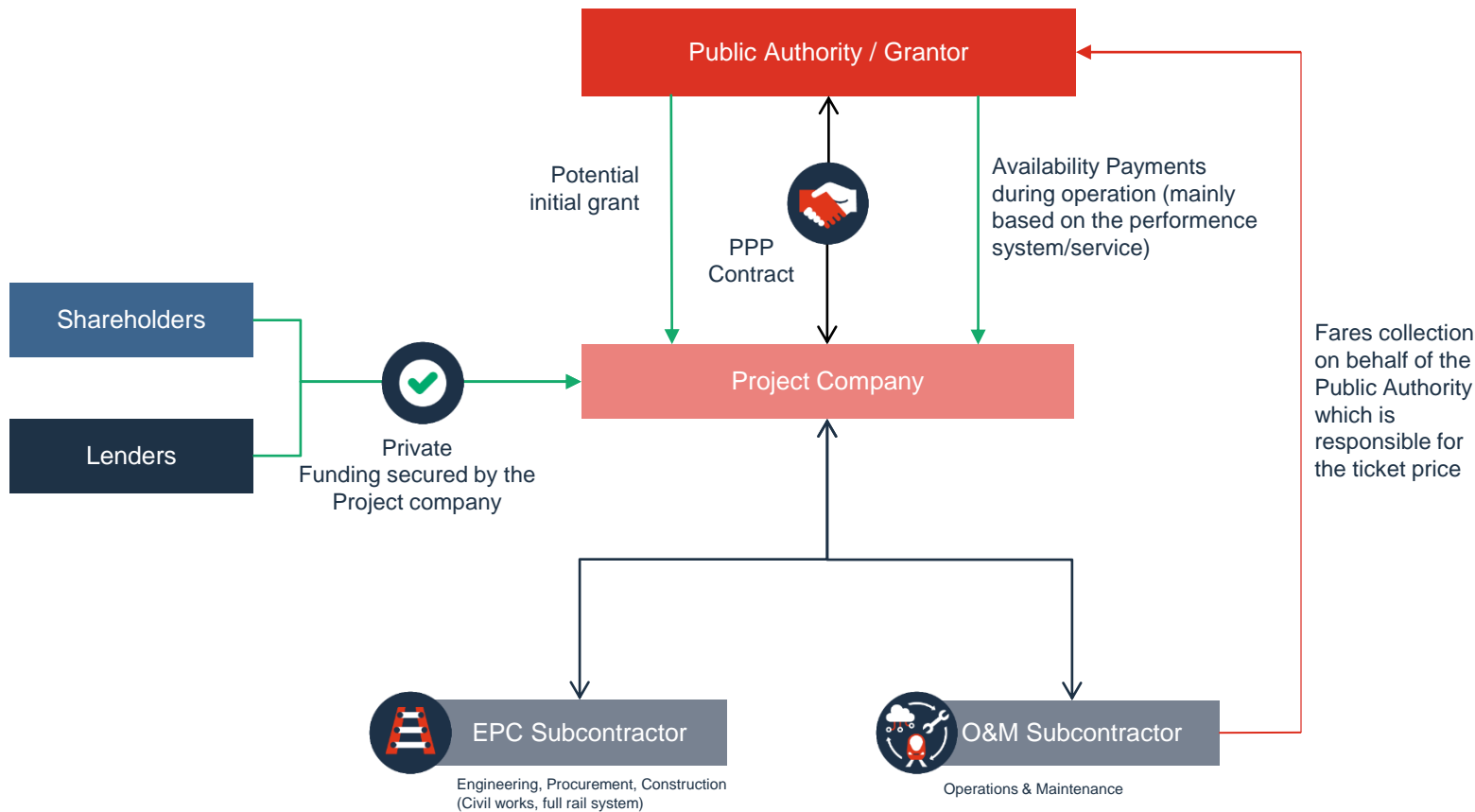
CBTC Signalling System

Communication and Supervision System

Platform Screen Doors

Rolling Stock

# Standard PPP Structure



A rail transport system project in PPP is a **long term contract (25-30 years)**

- for the **design and construction** of the infrastructure and the system (The EPC is Joint and several)
- for the **financing** of all or part of the construction by the private sector (an initial grant could participate to the financing)
- for the **operation and/or maintenance** of the system until the end of the contract

# Balanced risk allocation is the key to success (example)

Risks included in a PPP contracts should always be allocated to the party that is the best placed to manage it in a cost-effective manner

## Public Sector

- Land acquisition
- Right of way
- Utilities relocation
- Environmental
- Political
- Ticket prices and ridership

## Shared

- Force Majeure

## Private Sector

- Construction
- Fixed time
- Fixed cost
- Financing
- Performance of the system
- Lifecycle maintenance



# Queensland New Generation Rollingstock (QNGR)

Australia – Queensland State Government



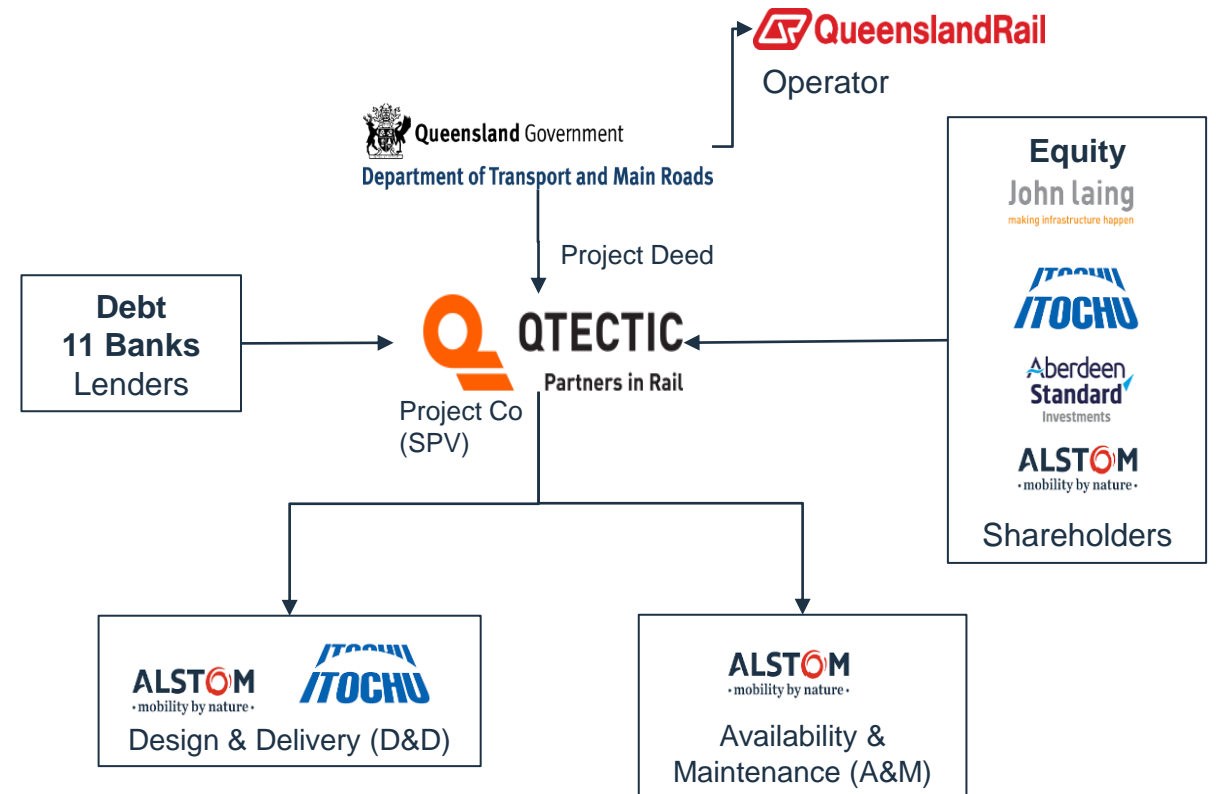
 **DBFM**

## Project Summary

The Queensland New Generation Rollingstock Project is a 32-year availability-based Public Private Partnership (PPP) for the delivery of 72 train services for the Queensland Government and a new purpose-built maintenance centre in Wulkuraka, Ipswich

## Project Funding Structure

- Total investment: 1.1B€
- State Capital Contributions (grants): 461M€
- Private financing: 531M€
  - Debt/Equity 87.5%/12.5% $\times$
  - Alstom holds 10% equity

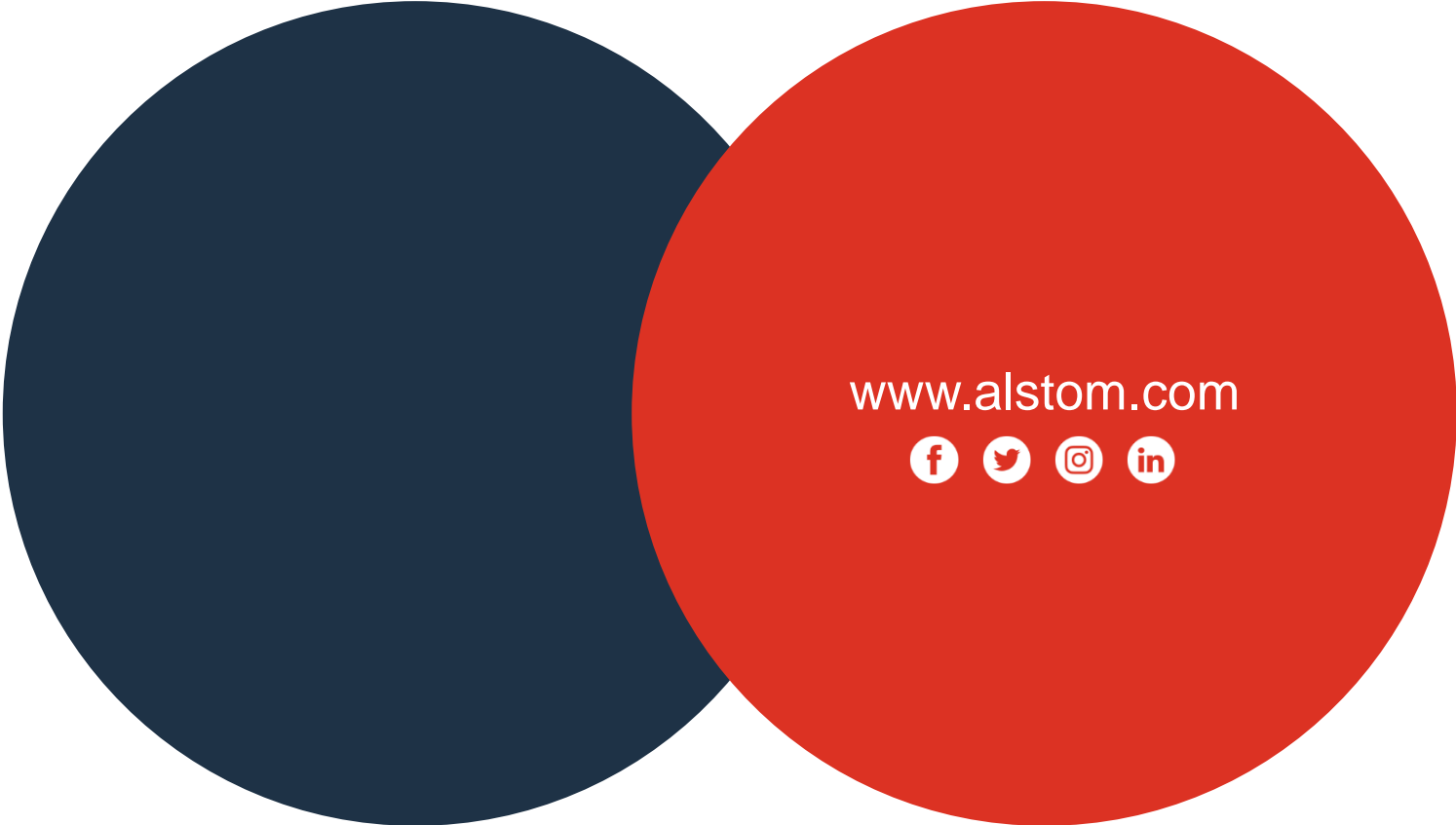


# The Airport Link

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<https://vimeo.com/410198756>



[www.alstom.com](http://www.alstom.com)



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