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Electric Systems for Mobility - Project Presentation

Olympic Games 2026: New Integrated and Sustainable Connections from Milano to Livigno

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POLITECNICO
MILANO 1863

FLOW OF PRESENTATION

- ① INTRODUCTION
- ② CASE STUDY and PROPOSAL
- ③ TRANSPORT OPTIONS
- ④ MOBILITY HUBS
- ⑤ CONCLUSIONS



1

INTRODUCTION



The **Milano-Cortina 2026 Winter Olympics** will be a major event and will extend over several locations in northern Italy, presenting unique challenges and opportunities for **transport** and **connectivity**.

Goal: Develop an Integrate and Sustainable **Mobility Network** connecting key locations for Milano-Cortina 2026, including **Electric Solutions**.



Why did we choose Valtellina Area?



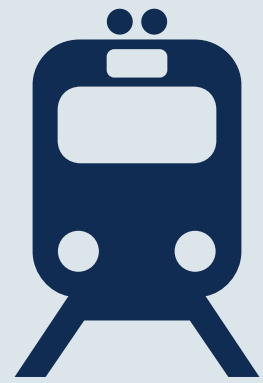
- **Top Skiing Destination**
- **Public Transport Challenge**
- **Impact During Global Events**



2

PROJECT PROPOSAL

To provide an Environmentally Friendly, Efficient and Integrated transport solutions, improving connectivity between key locations while supporting Sustainability Goals, the project proposes:



Extension of the **Railway Line** from Tirano to Bormio



Electric Shuttle Bus Service from Bormio to Livigno

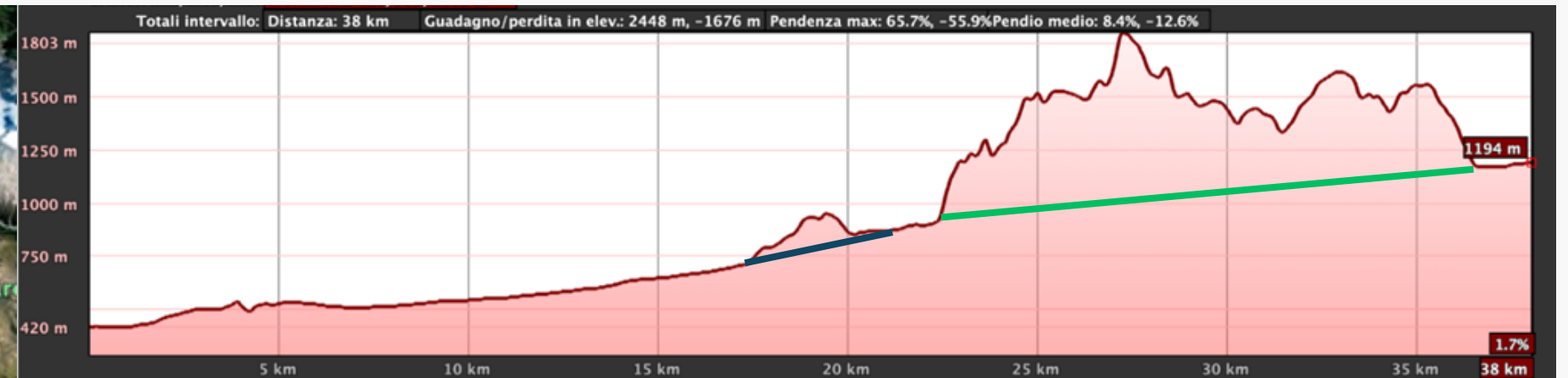


Integration of **eVTOL** Services between Milano, Bormio and Livigno



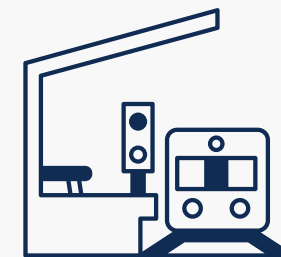
3 *TRAIN: Route Definition*

Tirano - Bormio Altimetric Plan



- **Line Total Length:** 37,3 km
- **New Stations** on the route:

- Lovero
- Grosio
- Sondalo
- Bormio



- **Tunnel** on the route:
- Tirano (New Underground Station)
- Tiolo (4,5 km Constant Slope)
- Bormio (12 km Constant Slope)



Railway extension

3

TRAIN: Rolling Stocks



ETR 104 (Alstom Coradia Stream)



- 4 Traction Motors
- Top speed: 160 km/h
- Maximum acceleration: 1,5 m/s²



- 321 seats
- 188 standing
- 8 bike spaces

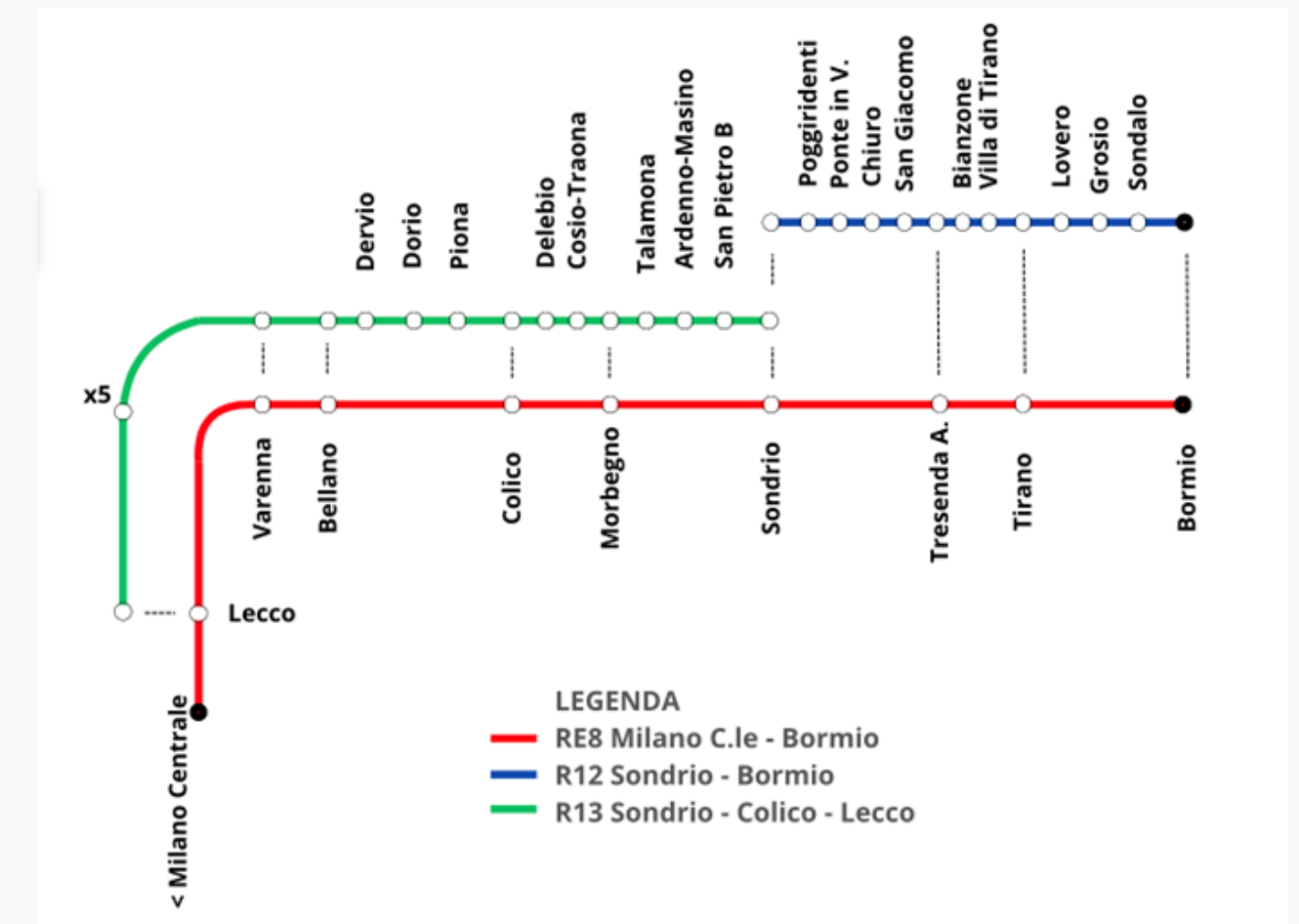
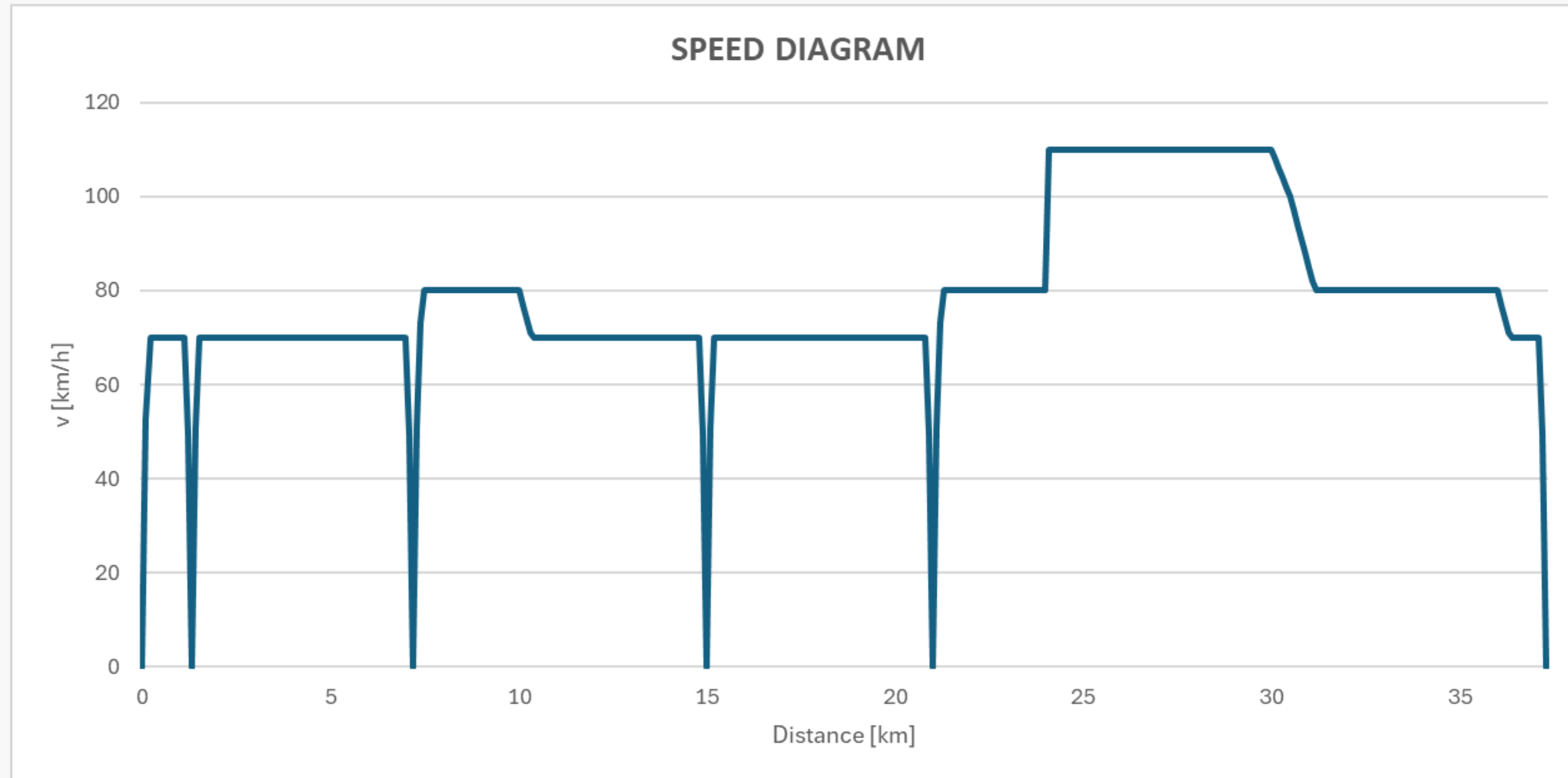


97% Recyclable, has achieved a 30% Reduction in Energy Consumption compared to the previous generation



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TRAIN: Performance and Service



RE8 Direct line:



29 minutes



Every 60 minutes



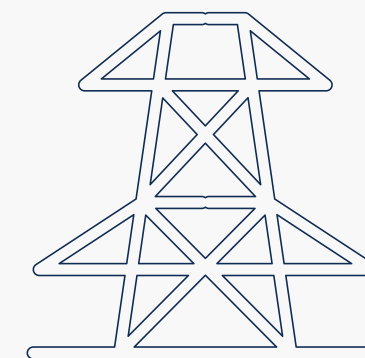
1,37 MWh

R12 Stops line:

37 minutes

Every 45 minutes

1,41 MWh



TPSS

Lovero: 2 x 5,4 MW

Sondalo: 2 x 5,4 MW

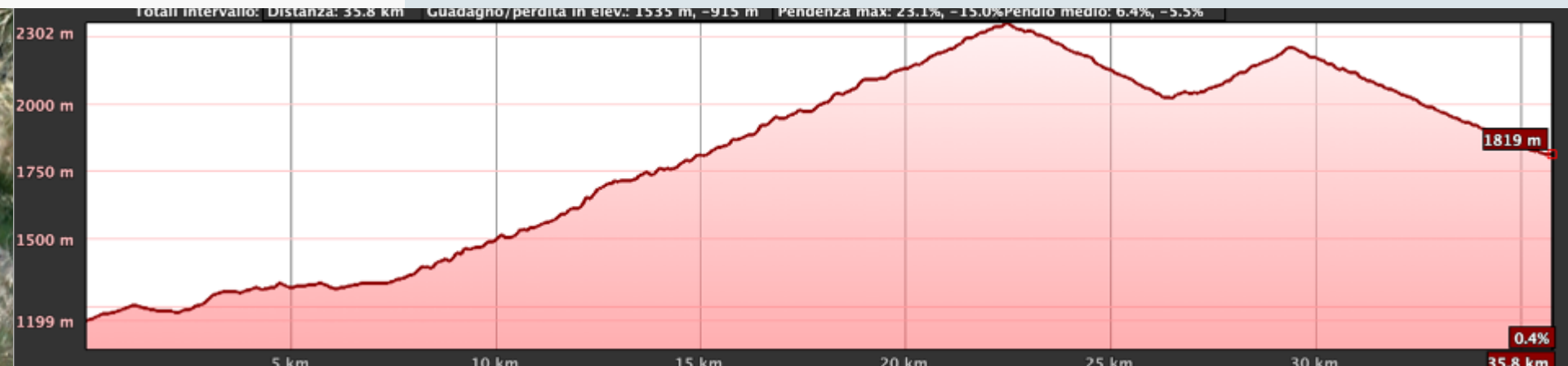


3

e-BUS: Route Definition



e-bus Path



Bormio – Livigno Altimetric Plan



- **Path total length:** 36 km
- **Altimetric Plan:** Route is constantly uphill, Slope varies from 23% to -15%, with an average value of 6,3%.
- **Objective:** Ensuring a Fast, Sustainable and Efficient Connection to Olympic Destinations



3 *e-BUS: Characteristics*



BYD C9



- Battery Capacity: 324 kWh
- Charging: 220 kw (DC), 80 kW (AC)
- Max Power: 360 kW



- 49+1 seats
- Spacious trunk
- Comfort and Silence on Board

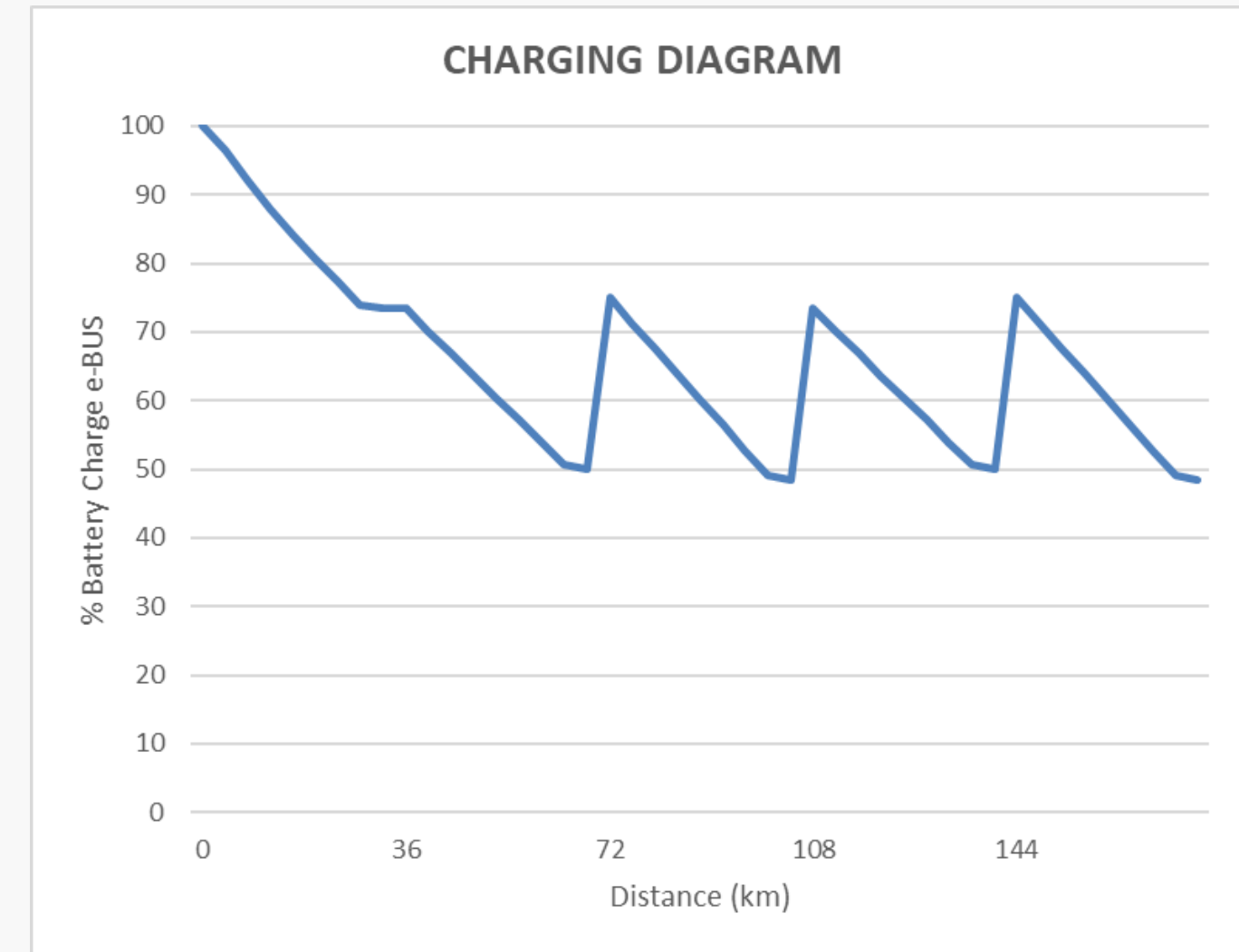
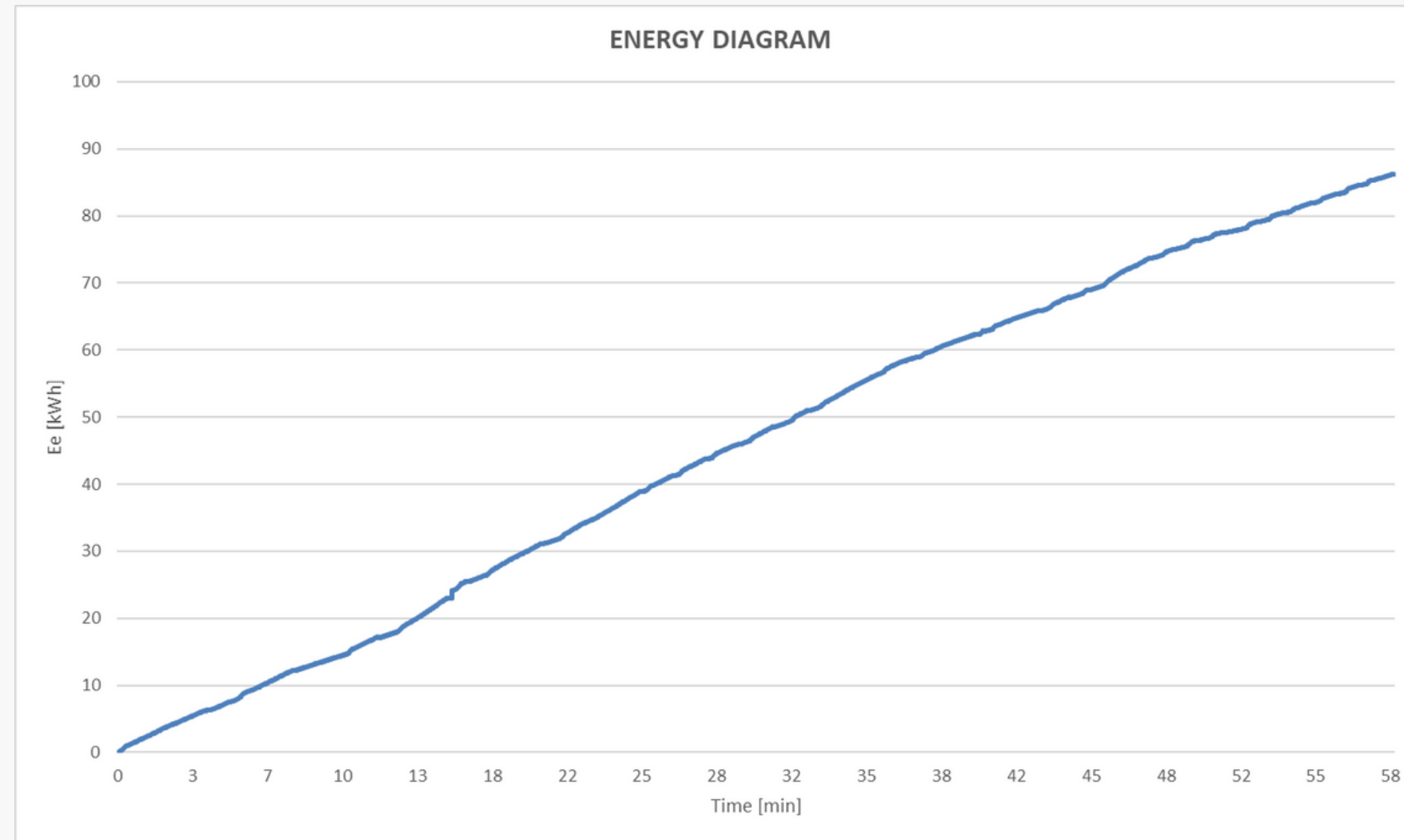


Produce ZERO Emissions, eliminates the need for particulate traps and makes oil changes and other polluting consumables a thing of the past



3

e-BUS: Performance and Service



Bormio - Livigno:



58 minutes



Every 30 minutes



~ 27% Battery used

Livigno - Bormio:

58 minutes

Every 30 minutes

~ 23% Battery used



ABB Terra 184 DC

4 in Bormio: 180 kW DC

2 in Livigno: 180 kW DC



3 *An Alternative Connection: eVTOL*



Produces Zero Emissions and significantly Reduces Noise Pollution

Joby S4



- Battery Capacity: 160 kWh
- Charging: 180kW (DC)



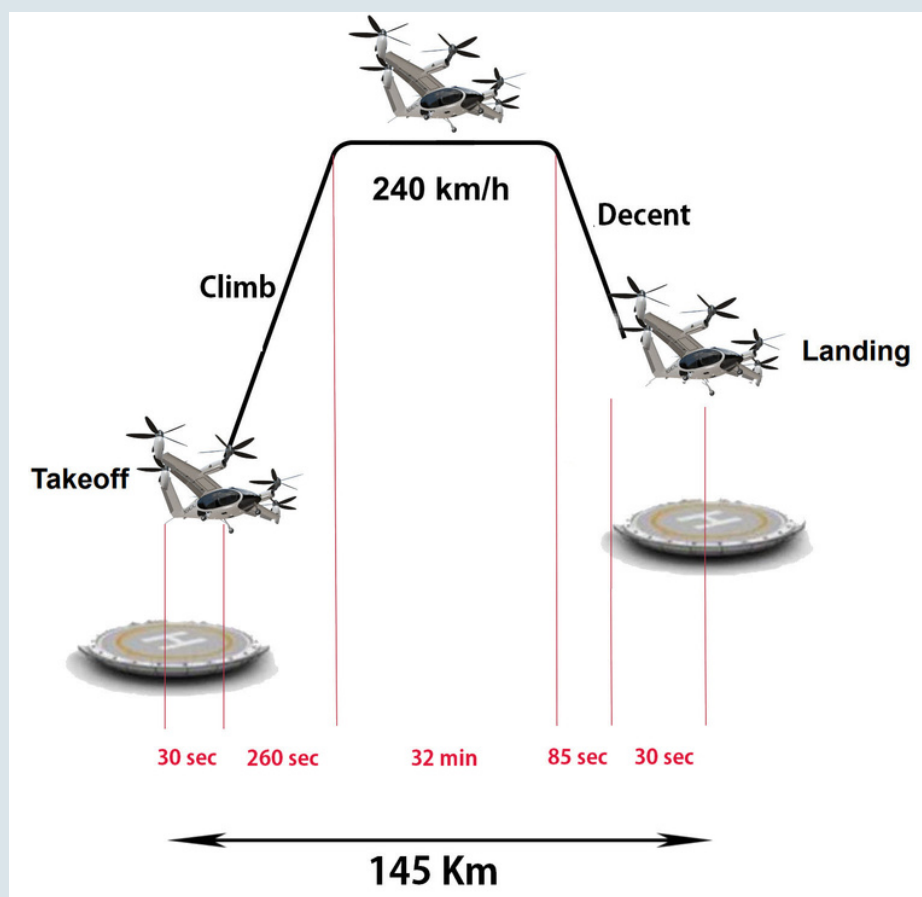
- 1 Pilot
- 4 Passengers



- Take-off, Navigate and Land Autonomously without human intervention
- Auto Detection and Avoidance of Obstacles
- Embedded Systems for Performance Monitoring and Adjustments

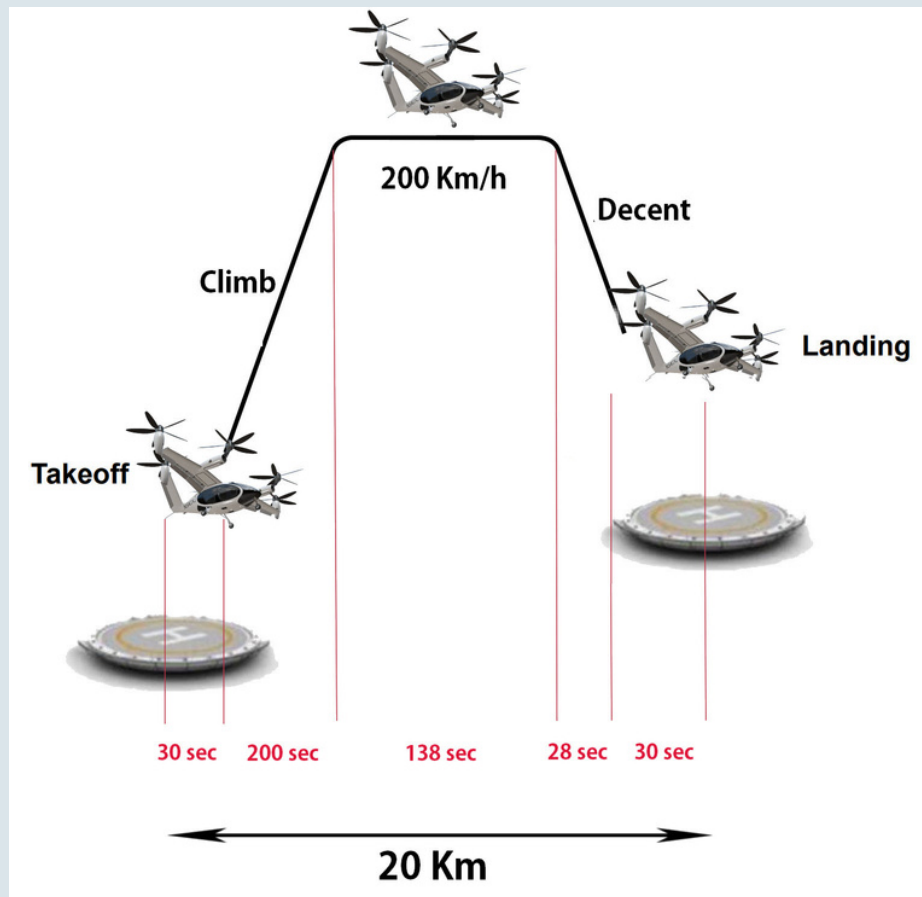


3 *e-VTOL: Mission Design*



Milan to Bormio

- 🕒 39 minutes
- ⚡ 104 kWh
- 🔋 65% Battery used



Bormio to Livigno

- 🕒 7 minutes
- ⚡ 36 kWh
- 🔋 23% Battery used

Height Map of Milan - Bormio Region



Height Map of Bormio - Livigno Region

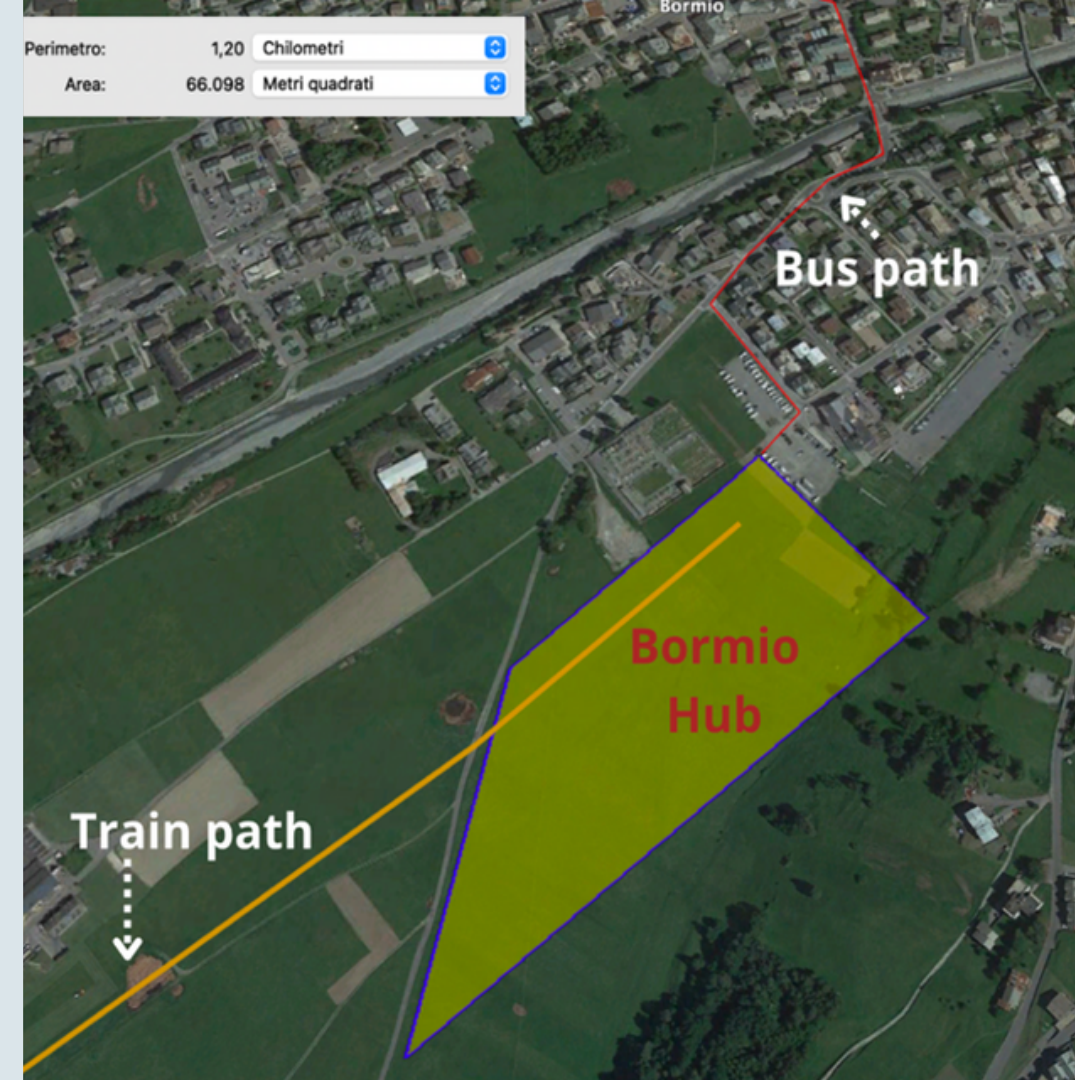


- Hazardous areas are shown by red shading on the map. Missions are designed to avoid these dangerous areas.

4

MOBILITY HUBS

Flat Area designed for
Modern Infrastructure,
ensuring parking spaces for electric
vehicles, waiting rooms and easy
interchanges between public transport



- New Railway, e-bus and Vertiport Terminals
- Covered Charging Stations
- Energy also supplied by Hydroelectric
Power Plant of Grosio



5

CONCLUSIONS

Modal Shift Opportunity:

the introduction of this new options promote a modal shift from cars to trains and e-buses

Fostering Urban Development:

improved transportation infrastructure can stimulate Transit-Oriented Development (TOD) near the stations

Reduced Pollution:

implementing a sustainable service allow the reduction of emissions per passengers

A New Mobility Option:

an upgrading of the current line from Tirano to Livigno will enhance regional connectivity

Touristic Relevance:

given the touristic spirit of the area this improvements can promote local tourism bringing economic benefits to the region



5

LIMITATIONS and CHALLENGES

Part of a Larger Plan:

Big initiative that includes the construction of underground stations and tunnels



Limited Accessibility eVTOLs:

Ticket costs for eVTOL services mainly for VIPs and athletes



High Infrastructure Costs:

The realization of mobility hubs, with fleets of e-buses and charging stations, involves a considerable initial financial effort

Climatic Challenges for e-buses:

Low temperatures can reduce battery efficiency, slowing recharging times, affecting overall performances.



Thank you for attention!

Q & A

