

MOBILITY INNOVATION TOUR 2019

**La transizione energetica nelle città:
un progetto integrato e sostenibile
per il TPL elettrico**

Sonia Sandei, Head of Strategic Development
Enel X

Genova, 31/05/2019

The evolution of the energy sector

Decarbonization



Decarbonization



***Renewables penetration by
2040: 60%***

Electrification



*By 2040, electricity will be the
first source of energy
consumption: share of 38%*

Digitalization



*Digital electricity infrastructure
investments: +45% between 2014
and 2016*

New customer needs



*New customer needs lead to
customized services development
with sustainable approaches*

**The energy sector is experimenting a deep transformation
Digitalization and customer centricity will change the sector paradigm**

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A new Global Business Line: Enel X

Our portfolio of solutions in the 4 Global Product Lines



e-Industries

Consulting and auditing service

Distributed generation on/off site

Energy efficiency

Demand response and demand side management



e-Mobility

Charging infrastructure (public & private)

Maintenance and other services

OEM back-end integration

Vehicle Grid Integration



e-Home

Installation, maintenance and repair services

Automated home management

Financial services

Home 2 Grid



e-City

Smart lighting

Fiber optic wholesale network

Distributed generation & energy services

Demand response and demand side management

Flexibility

Our Recent Acquisitions

Targeted M&A operations to deliver in the new energy ecosystem



Acquisition of Demand Energy
and its best in class platform for the
behind-the-meter distributed
resources and storage management



New industry understanding with the
acquisition of EnernNOC, world's
largest provider of demand
response and energy intelligence
software



Acquisition of EMotorWerks,
developer of the market leading smart
EV charging platform – Juice Net – that
interfaces with local utilities & grid
operators to optimise EV charging
costs, reduce peak load and balance
renewables.

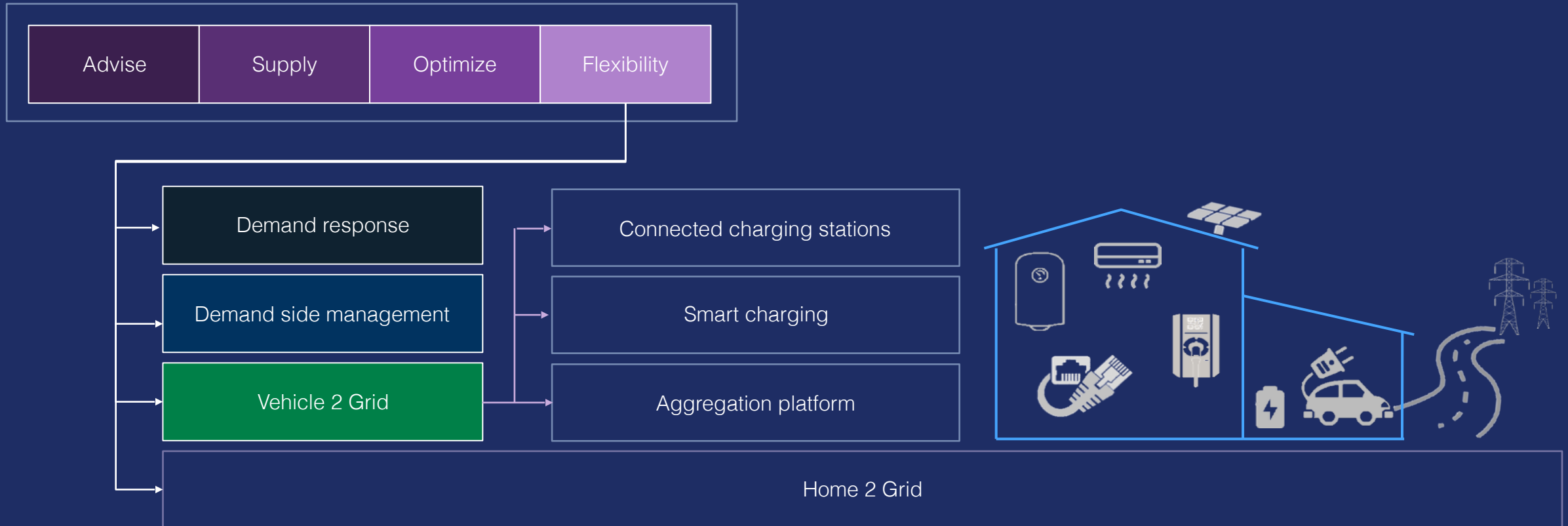


The energy ecosystem we want to build

Flexibility throughout the entire energy system



The Energy as a Service value chain



Best positioned to serve new customers' needs

e-Mobility

How electric cars can help us in bulding the new energy ecosystem



Energy 2 Grid

Return of energy from the car battery to the electricity grid **can allow the supply of portions of the network in emergency conditions or participate in the wholesale energy markets.**

Ancillary services through Vehicle 2 Grid

Return of power from car battery to the network; it is used for frequency regulation. Each car contributes with the power that the **bidirectional** charging station makes available.

Ancillary services through Vehicle 1 Grid

Modulation of a charging session in order to provide frequency regulation services. It increases the flexibility of the network and helps mitigate overload risks or increase the capacity of renewables.

Demand Response

Interruption of a charging session in progress **or deferred startup** of the charging session; **aggregation** of each single start and stop is equivalent to the contribution of an interruptible heavy energy consumer.

Car manufacturers



Product developments



We are pushing ahead because...

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Secured partnerships with key committed
carmakers and stakeholders

e-Mobility as an **opportunity of industrial
development** in Italy

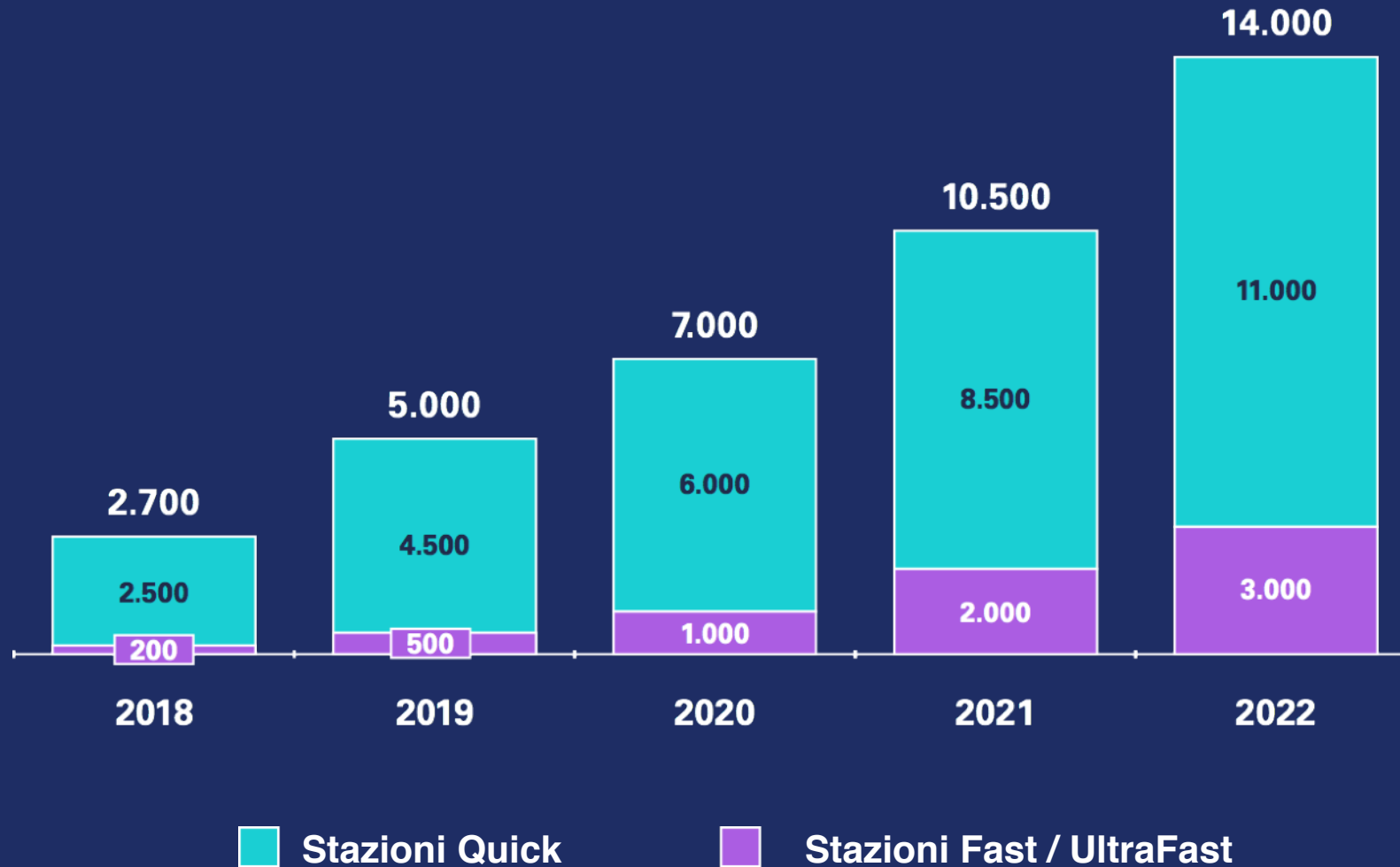
First mover in the e-Mobility
Revolution

By 2022 14,000 infrastructures installed



By 2022 14,000 infrastructures installed

Up to 300 M€ CAPEX by 2022



FROM THE BUS TO THE SMART CITY

THE SANTIAGO CASE AND BEYOND



PUBLIC TRANSPORT AS BACKBONE OF THE CITY

PASSENGER-KILOMETERS TRAVELED PER
YEAR, INDEX: CURRENT DEMAND=100



1980



39%

1.731
billion

2015



54%

3.968
billion

2050



66%

6.419
billion



2. HIGH PERCENTAGE OF PEOPLE TRAVEL
TIME IN PRIVATE CARS AND FEW IN PUBLIC
TRANSPORT

1. INCREASING URBANIZATION

3. INCREASING CITY CONGESTION
AND POLLUTION

PUBLIC TRANSPORT AS BACKBONE OF CITY SERVICES

Citizen engagement
Urban Services

An efficient and sustainable Public Transport
System that opens a window of opportunity in
urban development

CHILE

CONTEXT

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18.7 OF CITIZENS

POPULATION WITH 16 REGIONS

GDP
(USD 305.556 MILLION)

CHILE'S ECONOMY RANKS 5TH IN LATIN AMERICA,
BASED ON THE REGION'S GDP

MAIN INDUSTRIES

MINING | AGRICULTURE | AQUACULTURE
FINANCE | FOREST | TOURISM

BIGGEST PRODUCERS

OF COPPER, LITHIUM AND
NON-CONVENTIONAL
RENEWABLE ENERGIES

CHILEAN TRENDS

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ENVIRONMENTAL AWARENESS

REDUCE CO2 IN THE CITIES.

DIGITALIZATION

CUSTOMERS WITH MORE INFORMATION AND TECHNOLOGY ACCESS.

CUSTOMER CENTRICITY

EMPOWERED AND DEMANDING USERS

QUALITY OF LIFE

HIGHER DEMAND FROM PEOPLE IN MORE AND BETTER PUBLIC AND PRIVATE SERVICES



ENEL X CAPTURES

THESE TRENDS AND TRANSFORMED THEM INTO A NEW TRANSPORT SYSTEM

THAT CONNECTS ALL SERVICES RELATED TO A **SMART CITY**

● SUPPORTED BY:

CHILE'S GOVERNMENT
ELECTROMOBILITY STRATEGY
GROWTH OF DIGITALIZATION AS THE CORE
CONNECTION OF SMART CITIES
THE GROWING NEED TO REDUCE CITY POLLUTION

● GOAL BY 2040:

TURNING CHILE'S ENTIRE PUBLIC TRANSPORT
SYSTEM INTO 100% ELECTRIC FLEETS



ENEL X TOOK THE CHALLENGE

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OF BEING A RELEVANT
PARTNER IN URBAN DEVELOPMENT

SANTIAGO PUBLIC TRANSPORT SYSTEM

AN OPPORTUNITY FOR CHANGE

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6.627

BUS FLEETS INSERTED IN TRANSANTIAGO.

INTEGRATED PAYMENT SYSTEM

FOR ALL PUBLIC TRANSPORT USERS.

2.9MM

AVERAGE TRANSACTIONS PER USER ON WORKING DAYS.

INFRASTRUCTURE

OF TRUNK LINES AND FEEDERS IN ALL SYSTEMS.



STRATEGY TO TRANSFORM SANTIAGO'S PUBLIC TRANSPORT SYSTEM

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OPPORTUNITIES

TO RENEW THE EXISTING DIESEL-BASED FLEET

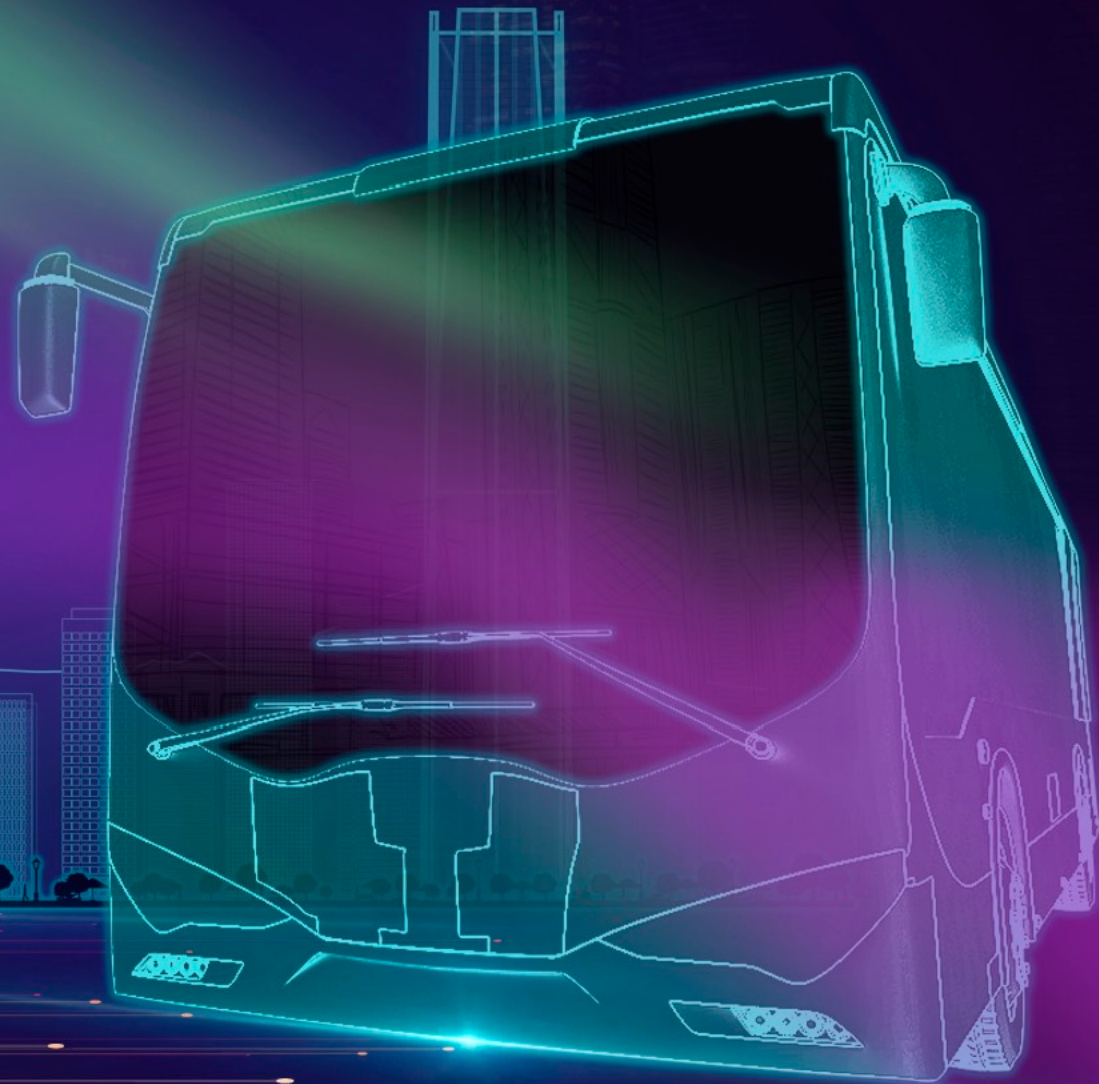
ALLIANCES

WITHIN THE PUBLIC AND PRIVATE SECTORS

ENEL X | METBUS | BYD

INVOLVING

ENEL'S INTERNAL STAKEHOLDERS AND PUBLIC ENTITIES.



SOME GOOD RESULTS

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EMISSION REDUCTION

+15 TONS OF CO₂
PER ELECTRIC BUS

MORE COMFORT A/C, WIFI, NO NOISE

DEVELOPMENT OF
URBAN INFRASTRUCTURE

LOWER EVASION RATES DUE TO BETTER SERVICE

CLIENT SATISFACTION

RANKS 6,3 OUT OF 7 ACCORDING TO THE
LATEST POLLS AND 84% SATISFACTION RATE

QUALITY OF LIFE (ENVIRONMENT)

100 TIMES LESS NOISE POLLUTING
THAN DIESEL BASED BUSES



1ST ELECTRIC BUS TERMINAL IN LATIN AMERICA

Renewable Energy Certificate
Self-generation thanks to a photovoltaic installation
Smart charging stations

TERMINAL 1

37 e-bus chargers (80Kw each)
Smart charging system
1,5MW installed energy

TERMINAL 2

65 e-bus chargers (80Kw each)
Electric charging system
2,7MW installed energy

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IMPLEMENTING E-BUS BUSINESSES

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DIGITAL
SCREENS



AUTOMATIC
PAYMENT



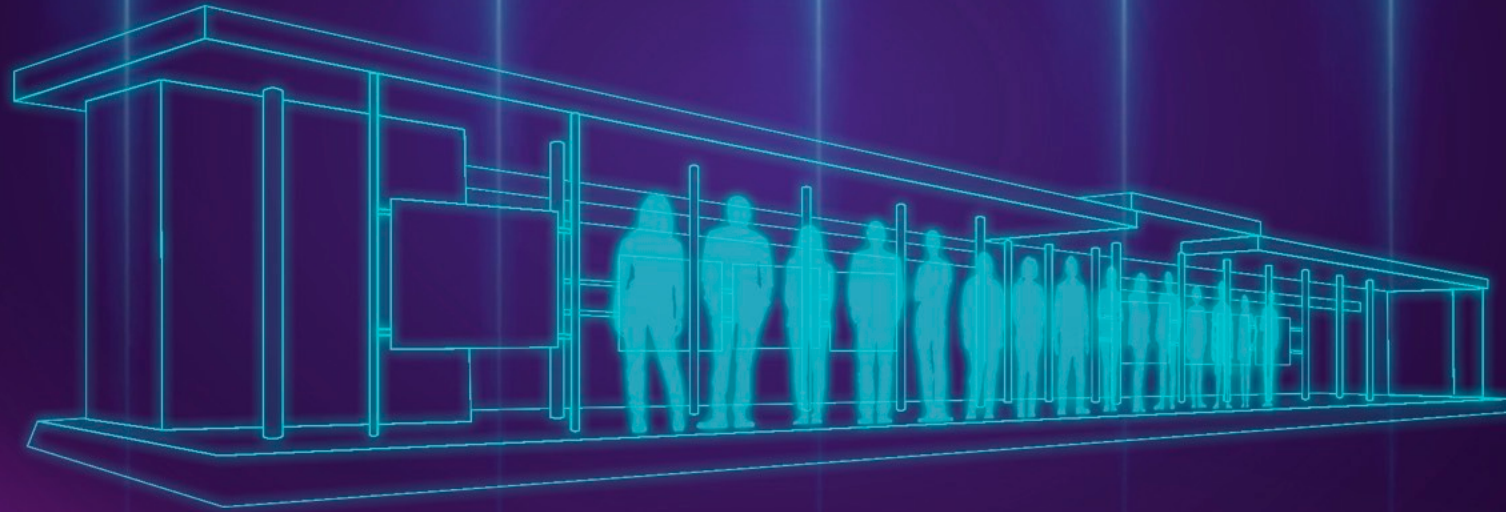
PHOTOVOLTAIC
PANELS



WIFI
NETWORK



VIGILANCE
CAMERAS



AND CHARGING INFRASTRUCTURE

OPENS DIFFERENT BUSINESS OPPORTUNITIES FOR THE DEVELOPMENT OF URBAN INFRASTRUCTURES IN THE CITY, IMPROVING QUALITY OF LIFE FOR CITIZENS.

NOT JUST kWh

GETTING CLOSER TO CITIZENS AND COMMUNITIES

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ILLUMINAZIONE TEMPORIZZATA
INTEGRATA



VIDEOSORVEGLIANZA



DISPLAY TOUCH SCREEN
BUS TIMETABLES



CONTACTLESS PAYMENT



DIFFUSIONE SONORA



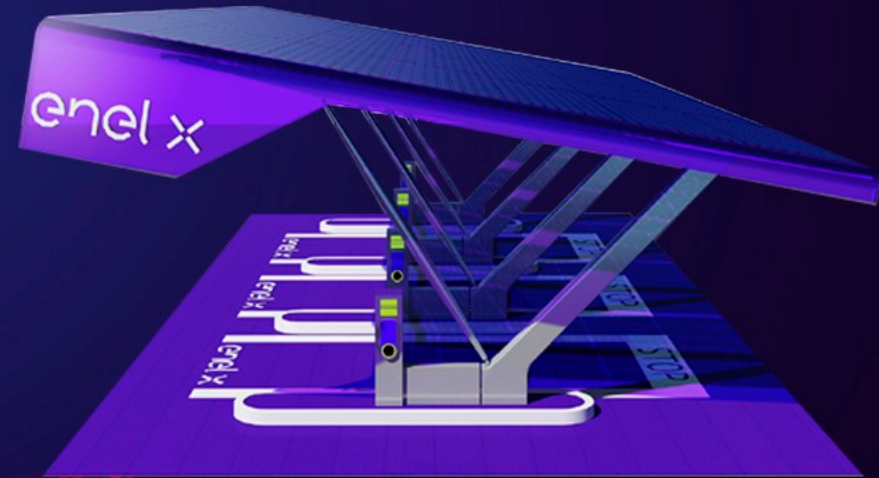
HOTSPOT-WIFI



RICARICA ELETTRICA

SEGNALETICA
DEDICATA

SPOILER BRAND



E-BUS PROJECT RESULTS

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FINANCIAL NUMBERS

5,1 MM €

E- BUSES + INFRASTRUCTURE
GROSS MARGIN

24,7 MM €

CASH OUT

PROJECT DEVELOPMENT

100

E-BUSES

100

CHARGERS

7 GWH

ENERGY / YEAR

2

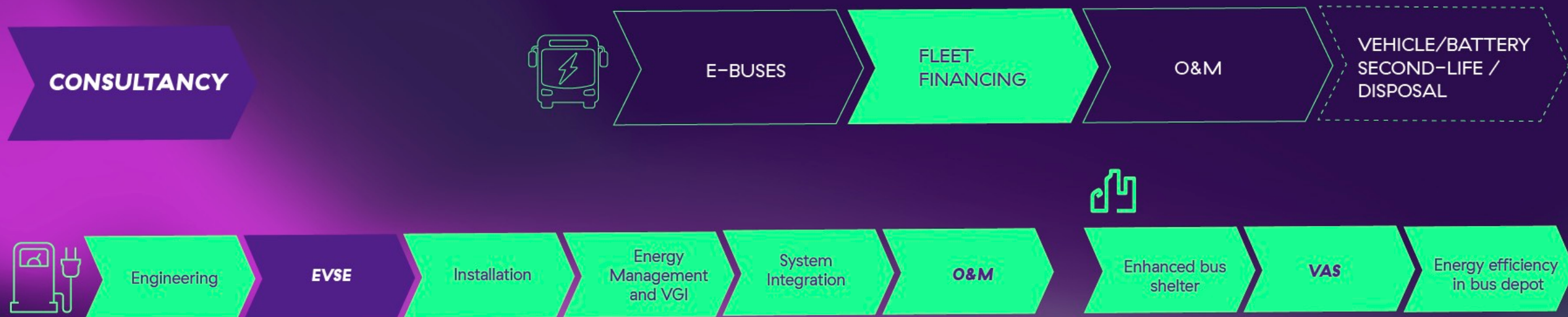
ELECTRIC BUS TERMINALS, ONE OF
THEM WITH PHOTOVOLTAIC SOLUTIONS



ENEL X E-BUS BUSINESS GROWTH AS A PILAR FOR ENEL GROUP



COMPETITIVE ADVANTAGE FOR ENEL X IF INCLUDED IN THE OFFERING, RISK TO BE EVALUATED ACCORDINGLY



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DSO
Network
development

MARKET
Energy
supply

DEVELOPMENT IN LATAM

E-bus drivers:

e-buses cost is competitive with Diesel and does not require additional subsidies.

100 bus fleet has sufficient size to address sceptics concerns over e-bus scalability.

Similarities in transportation models and close cooperation between authorities, facilitates the transfer to other countries.

E-bus in Latam reach 346 Units (112 awarded to Enel)

Awarded: Medellin (64), Buenos Aires (8 w/Enel smart charge), Cali (26), Chile (213 –incl 112 for Enel), Sao Paulo (15, charge in tender process), Ecuador (20)

Tenders in preparation 2019 (529 units):

(Enel X is following all of them)
Chile (208), Sao Paulo (+50), Bogotá (30), Arequipa (76), Cali (135), Uruguay (30)

BARCELONA AN EU FUNDED PROJECT PAVED THE WAY FOR FURTHER DEVELOPMENT IN THE CITY



2017

UNDER THE SCOPE OF THE EUROPEAN FUNDED PROJECT ZEUS.

OVERNIGHT CHARGING IN TMB DEPOTS WITH 50 KW ENEL CHARGER.

OPPORTUNITY CHARGING WITH A 400 KW ULTRAFast CHARGER CONNECTED TO THE BUS WITH A PANTOGRAPH (PRODUCED BY EKOENERGETICA IN ACCORDANCE WITH ENDESA DESIGN).

TWO 18M LONG ARTICULATED SOLARIS URBINO FULL ELECTRIC BUSES.

THE BUS LINE IS H16 WITH A LENGTH OF 12 KM.

2018

6 PANTOGRAPHS INSTALLED IN 2018.

TENDER WON BY ENDESA/ENEL.

DEPOT INSTALLATION FOR AUTOMATING THE CHARGING PROCESS.

50 KW MAX POWER PER PANTOGRAPH.

CHARGERS CONTROLLED BY THE TMB SYSTEMS.



DEVELOPMENT IN EUROPE

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HOW

Italy

Spain

Project Financing

Public Tender

Promote **integrated offering** to Municipalities and Public transport operators

“Lobbying” with relevant stakeholders to push **for full service tenders**

Catch **available funds** to support fleet financing

Final remarks

Diversification of Enel X offering is key to address this market

Think broad on urban services

Export best practices from LatAm to rest of the World

Develop partnerships to keep leadership in LatAm

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A hand is shown with the index finger pointing upwards. A small, white, folded piece of paper is perched on the tip of the index finger, resembling a hat. On the side of the index finger, a simple smiling face is drawn with two dots for eyes and a curved line for a mouth. The background is a blurred image of a person's face, overlaid with a dark purple gradient.

Thank You !