Januar 2024

Rapport fra Økonomi- og erhvervsudvalgets studietur til Madrid

14. - 17. november 2023

DELTAGERE

MEDLEMMER AF ØKONOMI- OG ERHVERVSUDVALGET

Polly Dutschke	Næstformand, Socialdemokratiet
Jesper Kjeldsen	Socialdemokratiet
Mette Skautrup	Det Konservative Folkeparti
Christian Baller	Det Konservative Folkeparti
Bünyamin Simsek	Venstre

EMBEDSMÆND

Martin Østergaard Christensen	Stadsdirektør
Eddie Dydensborg	Økonomidirektør
Lars Mattson	Erhvervskonsulent Erhverv & Kommunikation
Mia Brix Jensen	Sektionsleder for Borgmestersekretariatet
Anne Arndt Nielsen	Udvalgssekretær

INTRODUKTION

Økonomi- og Erhvervsudvalget var i november 2023 på studietur til Madrid i Spanien.

Formålet med studieturen var at få inspiration til det fremtidige arbejde i udvalget med fokus på erhverv, mobilitet og bæredygtighed. Hensigten med at besøge Madrid var at samle inspiration til den fremtidige udvikling af Aarhus.

Økonomi- og Erhvervsudvalget havde et ønske om at blive inspireret specielt med hensyn til grøn omstilling – både inden for elektrificering af trafik og udnyttelse af renovation, samt et fokus på, hvordan man i Madrid håndterer

tiltrækning og fastholdelse af international arbejdskraft. Endvidere ønskede man indblik i hvordan ligestilling og diversitet håndteres via specifikke tiltag både i Madrid, men også generelt i Spanien.

I samarbejde med den Danske Ambassade blev der derfor afholdt møder både med repræsentanter fra Madrids bystyre samt med private aktører inden for mobilitet og rekruttering.

PROGRAM

TIRSDAG D. 14. NOVEMBER 2023

- Transport fra Aarhus til Madrid

ONSDAG D. 15. NOVEMBER 2023

- Velkomst og ambassadørbriefing
- Møder med Madrids Kommune
- Besøg på Crea Madrid Nuevo Norte

VELKOMST OG AMBASSADØRBRIEFING

Den danske ambassadør i Spanien Michael Braad præsenterede udvalget for den aktuelle situation i Spanien og arbejdet på den danske ambassade i Madrid. En del af ambassadens arbejde består i at åbne øjnene hos danske virksomheder for potentialet i Spanien. De største danske virksomheder har længe haft en repræsentation i regionen, og der er på nuværende tidspunkt et særligt fokus på små og mellemstore virksomheder.

Herefter introducerede ambassaderåd Tue Krarup-Pedersen udvalget for emner, som udvalget blandt andet ønskede at have fokus på herunder ligestilling, tiltrækning af arbejdskraft, den aktuelle politiske situation i forbindelse med regeringsdannelsen og bilaterale relationer mellem Danmark og Spanien.

LIGESTILLING

Spanien er rykket op på fjerdepladsen i EU's ligestillingsindeks i 2023 efter at have forbedret kvinders ligestilling på en række områder. Danmark har tredjepladsen.

Den tidligere spanske regering fik vedtaget flere tiltag der skal forbedre kvinders position på en lang række forskellige områder. Eksempelvis er menstruationssundhed nu tilføjet som en grundlæggende sundhedsrettighed i spansk lov. Spanien er det første land i Europa, der har indført betalt sygefravær til kvinder med kraftige menstruationssmerter.

I Spanien er det nu lovkrav om ligelig kønssammensætning i den politiske sfære, i administrationen og i virksomheder. Eksempelvis skal begge køn skal være repræsenteret med minimum 40 pct ved udnævnelsen af vicepræsidenter og ministre. Alle offentlige statslige instanser skal leve op til princippet inden fem år. Ved valg til det nationale parlament, EU-parlamentet samt regional- og kommunalvalg er det obligatorisk at opstille såkaldte "lynlås-lister", hvor mandlige og kvindelige kandidater skiftevis fremgår af valglisterne.

Kravet om minimum 40 pct repræsentation gælder fx også for bestyrelser i børsnoterede selskaber og virksomheder med over 250 ansatte eller en årlig omsætning på mindst 50 mio. euro.

ARBEJDSKRAFT

Arbejdsløshed i Spanien har længe været et strukturelt problem. Dog har arbejdsløsheden været faldende siden primo 2021. I andet kvartal 2023 lå arbejdsløsheden på 11,6 %. Arbejdsløshed blandt kvinder er 14,9%, hvilket er højere end i resten af EU-landende, hvor gennemsnit er 6,6 %. Ungdomsarbejdsløsheden er på 27,1 % hvilket er den højeste i EU. Mange unge spaniere søger til fx Danmark, da Norden er attraktiv for dem, bl.a. pga. højere lønninger.

På trods af arbejdsløsheden er der en vis mangel på arbejdskraft i nogle sektorer, fx byggesektoren, transportsektoren, og restaurationssektoren (der er op mod ca. 150.000 ubesatte stillinger). Den grønne og digitale omstilling forventes at øge mangel på arbejdskraft. Manglen på arbejdskraft vurderes at hæmme den økonomiske udvikling.

Der er en vis uoverensstemmelse mellem uddannelsestilbud og arbejdsmarkedet i Spanien. Derfor er der stort fokus på uddannelse, særligt på at øge optaget på erhvervsuddannelserne. Der er eksempelvis oprettet 31 nye uddannelses- og specialiseringslinjer der sigter mod de sektorer, der oplever mangel på arbejdskraft. Siden 2018 er tilstrømningen til erhvervsuddannelserne er steget med 20 %.

Regeringen har derudover bl.a. indført nemmere adgang til det spanske arbejdsmarked for immigranter uden lovlig opholdsgrund i Spanien, hvis de fx uddanner sig inden for et område med mangel på arbejdskraft.

BILATERALE RELATIONER

Spanien har på flere områder samme grundlæggende værdier og politiske prioriteter som Danmark. Det gælder fx grøn omstilling, klima, energi-infrastruktur, industripolitik, indre marked og ligestilling.

Den danske eksport til Spanien vokser med tocifrede vækstrater, hvor særligt eksporten af medicinalvarer og sundhedsteknologi fylder. Grøn energi er et samarbejdsfelt med potentiale – både politisk og kommercielt. De to regeringschefer underskrev en bilateral erklæring om styrket grønt samarbejde på deres møde i København i marts i 2023.

MØDER MED MADRIDS KOMMUNE

Økonomi- og Erhvervsudvalget besøgte rådhuset i Madrid og afholdte møder med embedsmænd fra Madrids Kommune. Der bor 3,3 millioner mennesker i Madrids Kommune. Besøget var opdelt i tre emner:

- Elektrisk mobilitet
- Genanvendelse af affald
- Handleplan for klimaneutralitet i 2050

ELEKTRISK MOBILITET

Oplæg v. Roberto Corchero García, leder af afdelingen for projektkoordinering, og Iván López de la Casa, leder af afdelingen for elektrisk infrastruktur

Kommunen har oprettet et tværfagligt udvalg for elektrisk mobilitet med deltagelse af kommunens afdelinger for transport, industri, energi og miljø. Formålet er at fremskynde indførelsen af elektriske køretøjer i kommunen ud fra et helhedsorienteret perspektiv. Udvalget har tre arbejdsgrupper: Infrastruktur til elbiler, incitamenter til køb af elbiler samt bevidstgørelseskampagner.

Bilag: Oplæg om elektrisk mobilitet

GENANVENDELSE AF AFFALD

Oplæg v. Jose Luis Cifuentes Sastre, leder af afdelingen for innovation, markedsføring og information.

Parque Tecnológico de Valdemingómez er en teknologisk park til behandling af de 4.000 tons affald, der dagligt genereres i Madrid. Der arbejdes ud fra kriteriet om at genvinde alt materiale og energi indeholdt i affaldet: genvinding af genanvendelige materialer, omdannelse til energi samt omdannelse af organisk affald til biogas og kompost.

Bilag: Oplæg om genanvendelse af affald

HANDLEPLAN FOR KLIMANEUTRALITET I 2050

Oplæg v. Irene Garcia, leder af afdelingen for klimaforandringer

Madrids 360° er Madrids strategi for miljøbæredygtighed til nedbringelse af forurenende emissioner med 65 pct. i 2030. Handlingsplanen for opnåelse af klimaneutralitet i 2050: Planen fastsætter de mest forurenende sektorer og angiver tiltag, der skal bidrage til nedbringelse af forurenende emissioner.

Bilag: Oplæg om klimaneutralitet

BESØG PÅ CREA MADRID NUEVO NORTE

Oplæg v. Alberto Manzano, chefarkitekt for Madrid Nuevo Norte

Hjemmeside: https://creamadridnuevonorte.com/en/

Crea Madrid Nuevo Norte er et stort byfornyelsesprojektet, hvor både byråd, kommune og private investorer indgår. Crea Madrid Nuevo Norte er en 100 procent. bæredygtig bydel med særligt fokus på vandforvaltning, ikke-forurenende energikilder, bæredygtigt bymiljø samt klimaforanstaltninger.

Madrids store byfornyelsesprojekt vil udfylde tomrummet skabt af togskinnerne og give nyt liv til nedlagte arealer i hjertet af hovedstaden ved at omdanne det til et innovativt bymiljø centreret omkring mennesker, der respekterer byens identitet. Byfornyelsesprojektet samler bydele i Madrid, som tidligere har været fysisk adskilt. Da området udvikles som ét stort projekt, er det muligt at tage hensyn til de personer, der skal bo og arbejde i forhold til bæredygtig transport, boliger, grønne, offentlige områder mm.

Projektet arbejder på at skabe en ny by model med fokus på Madrids borgeres velbefindende. Projektet vil også have en væsentlig betydning for den regionale og nationale økonomi, hvilket forventes at udmønte sig i flere muligheder og en bedre livskvalitet for alle borgere.

Denne vedvarende påvirkning over tid vil ikke være begrænset til byen Madrid; projektet forventes at have en indvirkning på regionen og landet som helhed og fremme økonomisk genopretning.

Projektet strækker sig over 5,6 km og dækker 2,3 millioner m2. Der bliver bygget 10.500 boliger, og det forventes at projektet vil skabe 350.000 nye jobs regionalt og nationalt.

Beslutningen om at udvikle Crea Madrid Nuevo Norte blev taget i 2017 og projektet forventes at tage mellem 30-35 år.

TORSDAG 16. NOVEMBER 2023

- Ordinært udvalgsmøde i Økonomi- og Erhvervsudvalget
- Oplæg om og demonstration af Guppy Mobility as a service
- Besøg ved virksomheden Pasiona
- Oplæg om Zunder – ladestationsoperatør
- Oplæg om AEDIVE, Privat/offentligt samarbejde omkring mobilitet i Spanien
- Gåtur rundt i Madrid
- Netværksmiddag med repræsentanter fra dagens program

ORDINÆRT UDVALGSMØDE I ØKONOMI- OG ERHVERVSUDVALGET

Økonomi- og Erhvervsudvalget afholdt ordinært udvalgsmøde på den danske ambassade i Madrid med digital deltagelse af udvalgsmedlemmer, foretræder og embedsmænd fra Danmark.

OPLÆG OM OG DEMONSTRATION AF GUPPY MOBILITY AS A SERVICE

Oplægsholder: Pablo Campos-Ansó Fernández (Guppy)

Hjemmeside: https://www.guppy.es/en/

Guppy er den første delebilstjeneste i provinserne Asturien og Cantabrien samt i Bilbao og Madrid.

Via en app får brugeren adgang til en omfattende bæredygtig mobilitetsservice, baseret på en flåde af 100% elektriske køretøjer til udlejning, med en takst tilpasset det kørte kilometertal. Bilerne kan reserveres med 20 minutters varsel og oplades med el fra solenergi. Derudover tilbyder Guppy eksklusive parkeringspladser overvåget i realtid. Alt bookes og administreres via deres app, og der afregnes udelukkende efter forbrug.

Bilag: Oplæg om Guppy Mobility

BESØG VED VIRKSOMHEDEN PASIONA OMKRING REKRUTTERING AF INTERNATIONAL ARBEJDSKRAFT

Oplægsholdere: José Luis Martínez Río (Salgsdirektør hos Pasiona)

Hjemmeside: [Microsoft Partner. Technology consultant (pasiona.com)]

Pasiona er et konsulentfirma med speciale i it-talentstyring og projektudvikling inden for områderne

Web, Mobile, UX/UI, Accessibility, Agile Methodology, Innovation, Cybersecurity, AI og Cloud Computing.

Udvalget blev præsenteret for, hvordan firmaet rekrutterer og fastholder medarbejdere i et tech-miljø, der er præget af, at mange søger arbejde i Frankrig, Tyskland og Storbritannien, hvor lønningerne og arbejdsforholdene er bedre end i Spanien.

OPLÆG OM ZUNDER – LADESTATIONSOPERATØR

Oplægsholder: Ignasi Crespo Farras (Head of International Business - Zunder)

Hjemmeside: https://www.zunder.com/en/

Zunder er den førende netværksudbyder af ultrahurtige ladestationer til elbiler i Sydeuropa.

Løsningen er proprietær og alt styres via en app eller via Apple Watch.

Aktuelt har Zunder 80+ medarbejdere og over 200

Bilag: Oplæg om Zunder

OPLÆG OM AEDIVE, PRIVAT/OFFENTLIGT SAMARBEJDE OMKRING MOBILITET I SPANIEN

Oplægsholder: Arturo Perez de Lucia Gonzalez (Direktør - AEDIVE)

Hjemmeside: https://aedive.es/

AEDIVE (The Iberian Association for Electromobility) blev oprettet i 2010. Det er en nonprofitorganisation, der fremmer elektromobilitet og samler den industrielle, teknologiske og servicemæssige værdkæde af markedet i Spanien og Portugal med over 250 større virksomheder, SMV'er samt små virksomheder. AEDIVE omfatter også over 100 institutionelle medlemmer (byråd, energiagenturer osv.) med henblik på at fremme offentlig-privat samarbejde. AEDIVE er den spanske regerings og de regionale og lokale forvaltningers foretrukne sparringspartner indenfor ethvert spørgsmål relateret til elbilsmarkedet.

Derudover omfatter AEDIVEs netværk EV-brugere, NGO'er, handelsforeninger, interesseorganisationer, offentlige institutioner samt forskning & Udviklingscentre.

GÅTUR RUNDT I MADRID

Repræsentanter fra den danske ambassade i Madrid guidede udvalget rundt i Madrid og fortalte om byens udvikling og de forskellige bydele.

Madrids Rådhus

NETVÆRKSMIDDAG MED REPRÆSENTANTER FRA DAGENS PROGRAM

Økonomi- og Erhvervsudvalget afholdt netværksmiddag med repræsentanter fra den danske ambassade og med oplægsholdere fra dagens program.

FREDAG D. 17. NOVEMBER

- Transport fra Madrid til Aarhus.

UDVALGTE LÆRINGSPUNKTER FRA TUREN

OM ELBILER OG LADEINFRASTRUKTUR

- Madrid arbejder på flere fronter med at fremme udbredelse af elbiler, delemobiltiet og ladeinfrastruktur.
- Byen prioriterer blandt andet en elektrificering af bilparken. Eksempelvis er der et samarbejde mellem offentlige myndigheder og delebilsudbydere, hvor borgerne kan benytte delebilerne fra deres hjem til deres arbejde i byen, hvorefter bilerne anvendes af offentligt ansatte medarbejdere i dagtimerne. Om aftenen kan borgerne igen benytter delebilerne som transport til eget hjem.
- Derudover investerer Madrid i at elektrificere den kollektive trafik. Der ydes desuden et markant tilskud til billetpriserne. Nogle busser er gratis for borgerne.
- Der er flere paralleller til den grønne omstilling i Aarhus. Om end Aarhus er en mindre by.

BYFORNYELSE

- Madrid har en ambitiøs plan for bæredygtig byfornyelse. Bygger en helt ny bydel med 10.500 boliger.
- Projektet Crea Madrid Nuevo Norte er et offentligt privat partnerskab, der i løbet af 30-35 år skal etablere denne helt nye bydel.

RENOVATION

- Madrid er ved at implementere sortering af affald i 4 fraktioner. Aarhus er langt fremme på denne dagsorden.

INTERNATIONAL ARBEJDSKRAFT

- Madrid har en stor tilstrømning af international arbejdskraft primært fra Latinamerika.
- De har fokus er på at fastholde kvalificeret arbejdskraft ikke forlader landet.
- De arbejder på at tilbyde bedre arbejds- og lønvilkår herunder sociale goder for at fastholde medarbejdere.
- Snitfladerne til Aarhus' udfordringer er begrænset

REGNSKAB

Udgift	**Beløb**
Fly	51.415,00 kr.
Hotel	31.862,22 kr.
Transport	6.754,84 kr.
Forplejning	18.615,07 kr.
Gaver	770,00 kr.
Bistand Udenrigsministeriet	52.800,00 kr.
Totalt	**162.217,13 kr.**
Pr. person	**16.221,72 kr.**

Empresa Municipal de Transportes de Madrid

75 years of Innovation, November 15th 2023

1

What is EMT Madrid?

EMT Madrid

Main figures

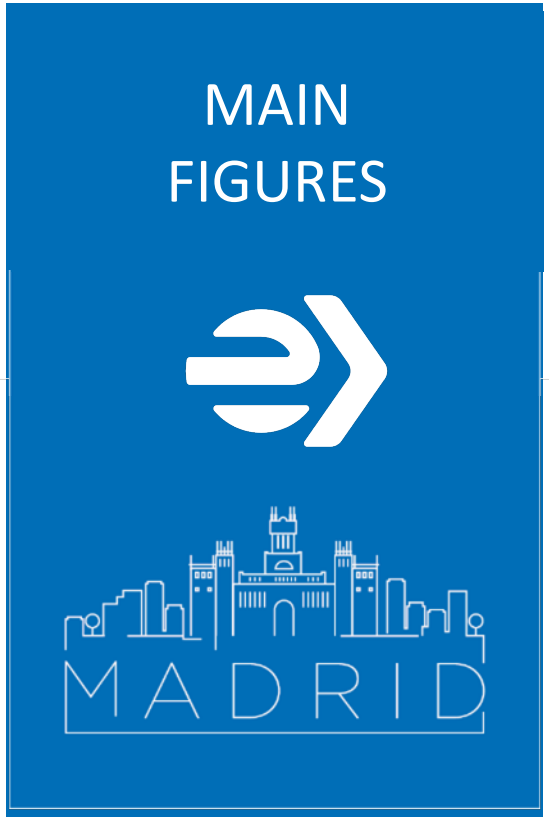
EMT is the reference of surface mobility in the city of Madrid. It counts with 9.833 workers, 7 business lines and 5 Bus Depots that enable the company to provide integrated and client-oriented services that foster a sustainable and efficient mobility.

9.833 employees

220 lines

2.090 buses (100% clean fleet)
5 Operation Centers

373 million clients in 2022
1.200.000 trips per day (working day)



855 M€ Budget in 2023

80 cranes in 7 depots
66.214 operations in 2021

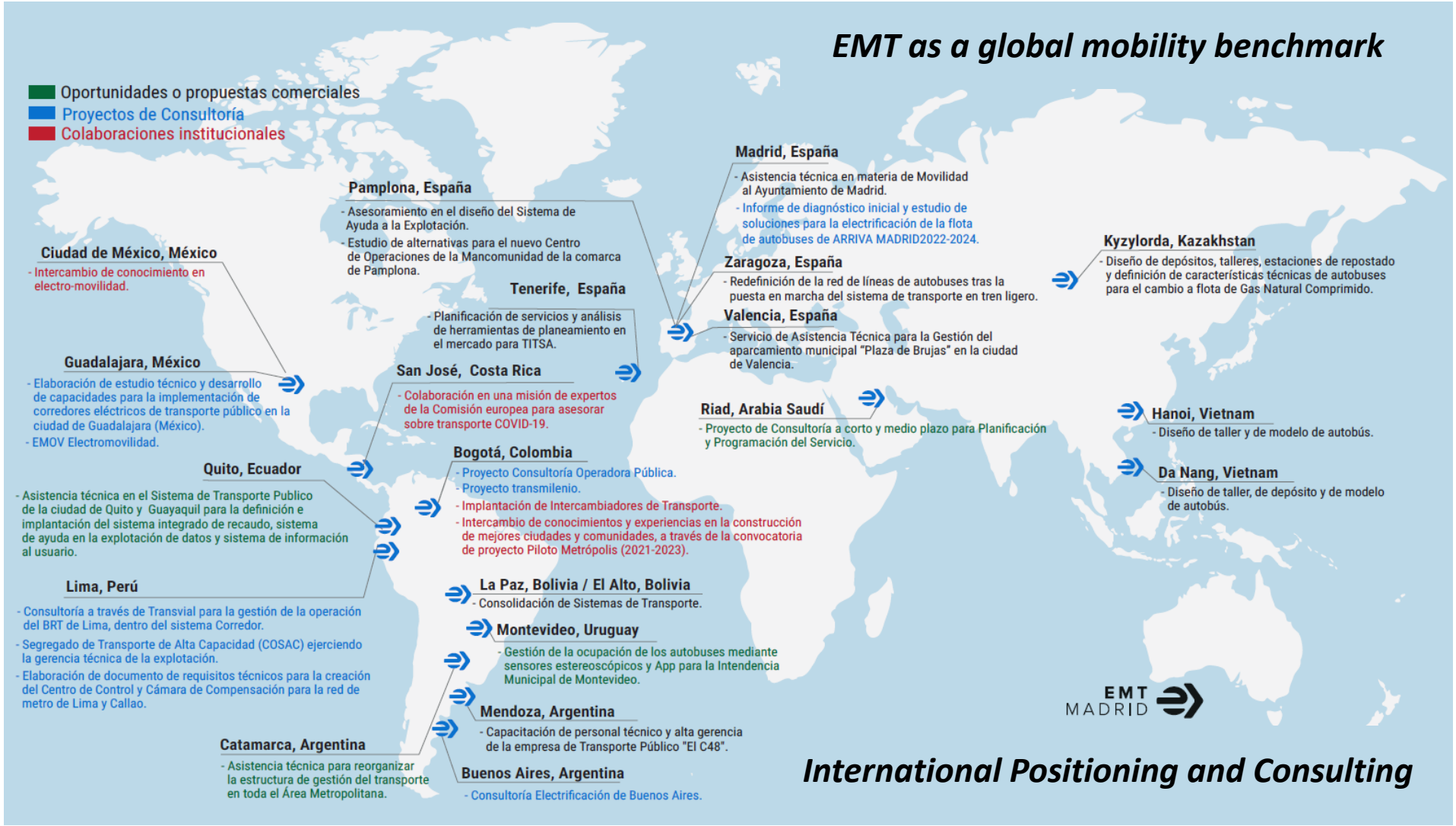
6.499 electric bikes in 472 stations

12.451 spaces in 28 Parking lots

80 cabins in Teleférico
Touristic service

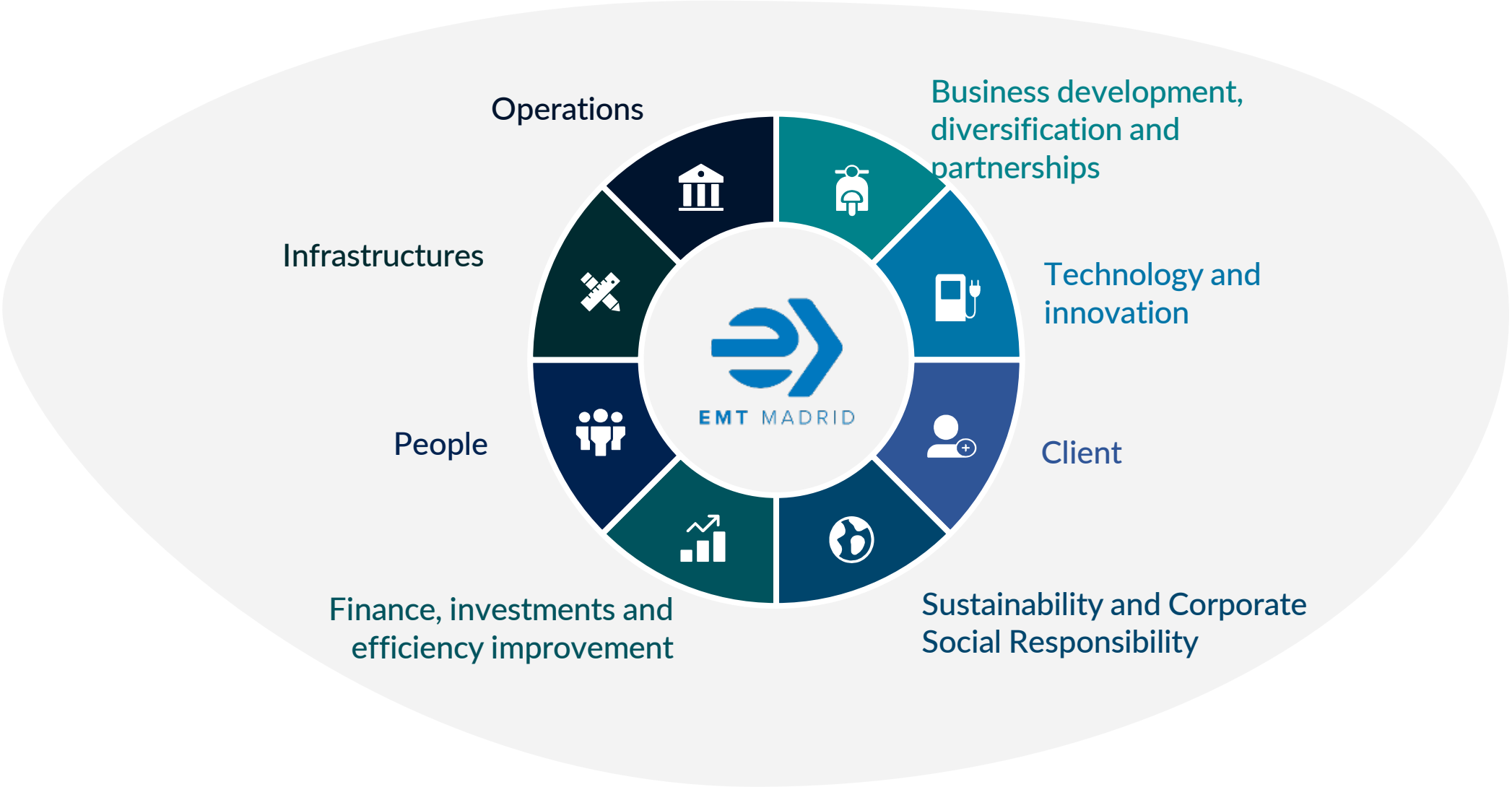
Consulting Services

Sharing knowledge



Strategic Framework for EMT Madrid

Strategic Axes



Forecasted investments

For the execution of the strategic plan, EMT proposes one of the company's most ambitious investment plans: 1.000 M€ over the next 5 years.

534 M€
Acquisition of buses

131 M€
Construction

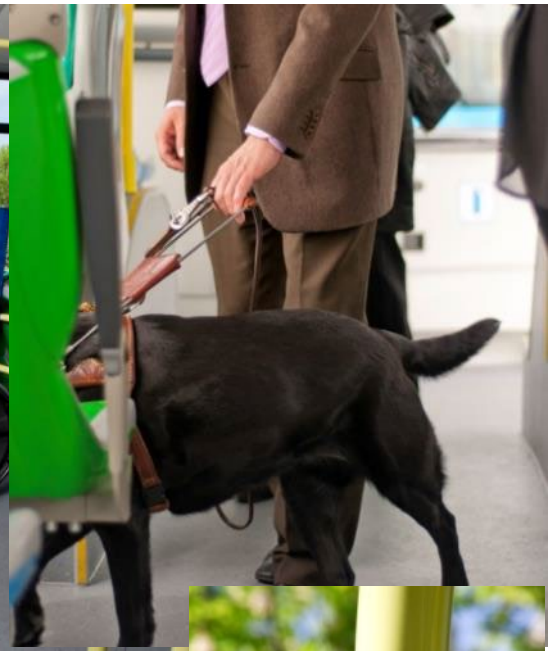
158 M€
Technical Installations

177 M€
Other investments

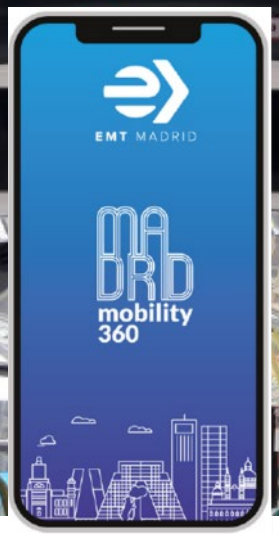
	2021	2022	2023	2024	2025	TOTAL
Acquisition of buses	112.132.900	108.584.200	81.403.900	116.284.200	116.284.200	534.689.400
Construction	200.000	17.692.900	45.155.800	52.655.800	16.050.000	131.754.500
Technical Installations	4.124.744	29.523.188	50.675.800	55.255.800	18.650.000	158.229.532
Other investments	25.362.310	59.719.861	45.038.420	23.000.495	24.064.208	177.185.292
TOTAL INVESTMENT	141.819.954	215.520.148	222.273.920	247.196.295	175.048.408	1.001.858.724

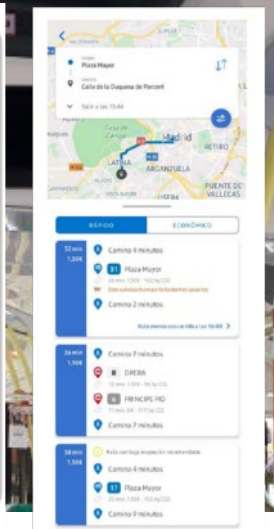
Values for excellence

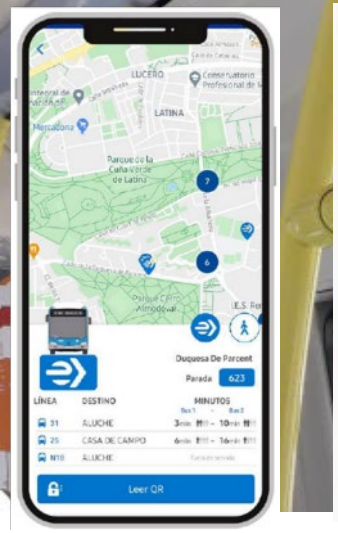
Excelence in accessibility



Excelence in digitalization







EMT MADRID

Excelence for people

2

Electrification at
EMT Madrid

Bus Service Transformation

Electrification Strategy

Comply the City Strategies

A **Sustainable Mobility Ordinance of the City of Madrid:**

- Measure: Establishment of 3 Low Emission Zones.

B **Madrid 360 - Environmental Sustainability Strategy:**

- Meets EU air quality objectives.
- Measure: Zero Lines: zero cost, no emissions, only electric vehicles.

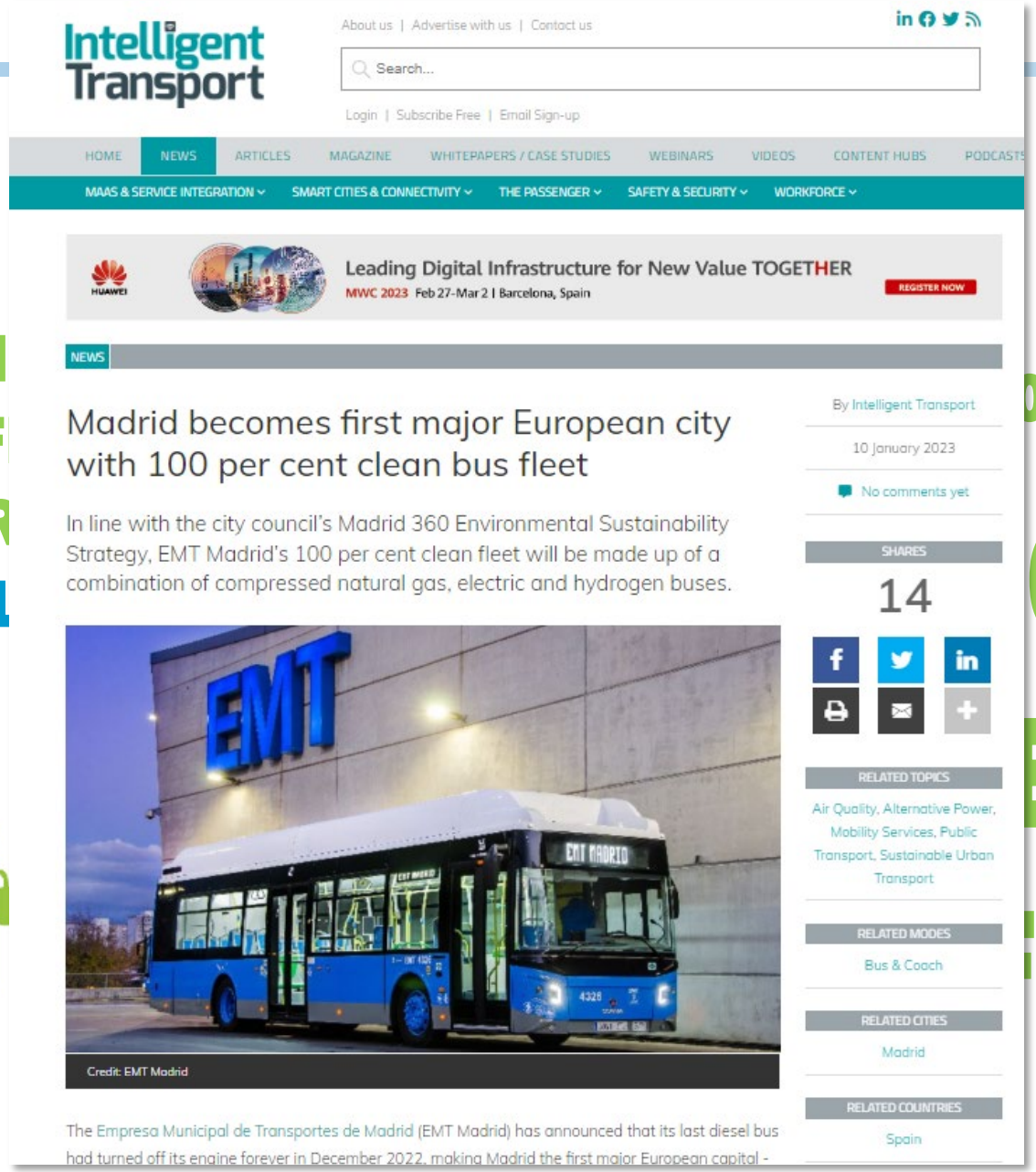
Energy transition. Fleet Transfomation

Forecast by fuel type

Fuel	2020	2021	2022	2023	2024	2025	2026	2027
Diesel	388	196						
CNG	1.552	1.678	1.829	1.744	1.661	1.561	1.451	1.351
Hybrid	47	47	17	17				
Hydrogen				10	10	10	20	20
Electric	81	179	254	329	429	529	629	729
Total	2.068	2.100	2.100	2.100	2.100	2.100	2.100	2.100
% CNG fleet	**77,3%**	**82,1%**	**87,9%**	**84,3%**	**79,6%**	**74,8%**	**70,0%**	**65,3%**
% ELECTRIC fleet	**3,9%**	**8,5%**	**12,1%**	**15,7%**	**20,4%**	**25,2%**	**30,0%**	**34,7%**

Evolution of the composition of the EMT bus fleet at the end of the year (units). Source: EMT Madrid.

2023 GOAL ACHI
100% CLEAN F
CNG+ ELECTR
DIESEL FREE FL



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NEWS

Madrid becomes first major European city with 100 per cent clean bus fleet

By Intelligent Transport

10 January 2023

No comments yet

In line with the city council's Madrid 360 Environmental Sustainability Strategy, EMT Madrid's 100 per cent clean fleet will be made up of a combination of compressed natural gas, electric and hydrogen buses.

Credit: EMT Madrid

SHARES

14

RELATED TOPICS

Air Quality, Alternative Power, Mobility Services, Public Transport, Sustainable Urban Transport

RELATED MODES

Bus & Coach

RELATED CITIES

Madrid

RELATED COUNTRIES

Spain

The Empresa Municipal de Transportes de Madrid (EMT Madrid) has announced that its last diesel bus had turned off its engine forever in December 2022, making Madrid the first major European capital -

033 GOAL:
00%
ECTRIC
LEET

Electrification Strategy: Current e-bus fleet
(222 units – 10th june 2023)

E-microbuses

- Model: Tecnobus Gulliver (already removed from service, except one unit for research purposes-SHOW project)
- 2007-2020

- Model: Wolta-Rampini
- 24 units

Standard e-buses

- Tempus Castrosua (5 units)
- Retrofit of 5 hybrid-CNG buses for full electrification with induction charging (line 76).
- Pilot project developed by EMT

- Irizar i2ebus (85 units)
- Model i2e (2017): first 15 units (charging 5 hours) (currently upgraded)
- ieBus model (2019): charge 3.5h

- Irizar ietram
- 9 units out of 10
- For the BRT service

- BYD (65 units)
- Model K9UB: first 15 units in 2020, charged in 3h

- Solaris Urbino
- 33 units out of 57

Electrification Strategy: Choice of Rolling Stock

Drafting of Bid

- ✓ Identification of needs
- ✓ Definition of requirements with actual operating and testing criteria

Bidding and awarding phase

- ✓ Requirement of **prototypes** to verify the specifications of the bidding process. Dynamic simulation test to verify consumption and autonomy.

present throughout the **manufacturing phase**

Unit Delivery Phase

- ✓ **Validation of all units delivered** and verification of compliance with specifications

Receipt and start of warranty

- ✓ **Warranty of batteries**

EMT MADRID

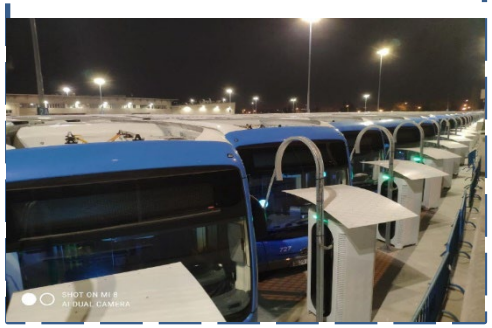
Charging e-volution

WIRED CHARGING

143 Chargers

Since 2007 minibuses (25)

Since 2018 standard (118)



INDUCTION OPPORTUNITY CHARGING

5 Vehicles

Since 2018

Opportunity charging on final lane

INVERTED PANTOGRAPH

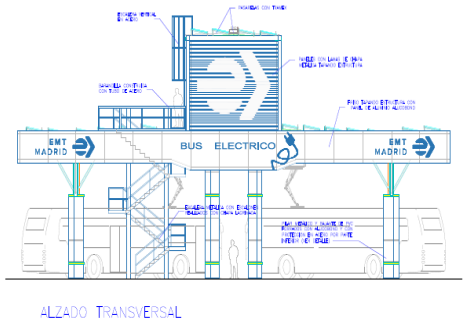
234 pantographs

4 in test project

52 in 2022

118 in 2023

60 in 2024



ALZADO TRANSVERSAL

SMART CHARGING & NEW DEPOT

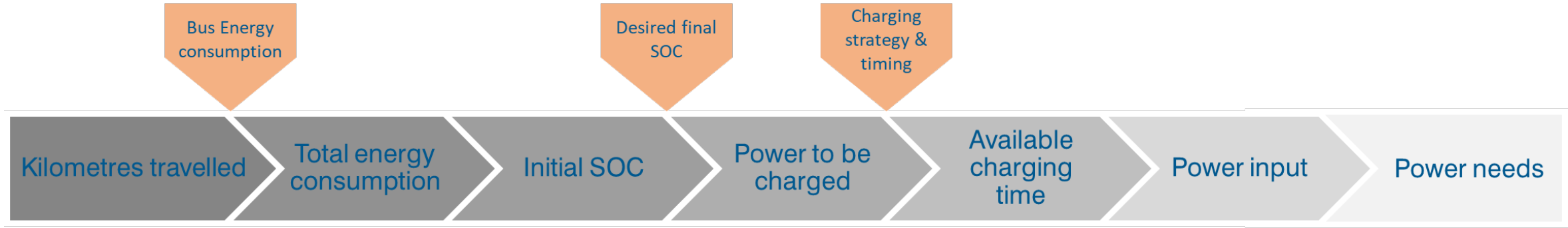
2 x New Depot

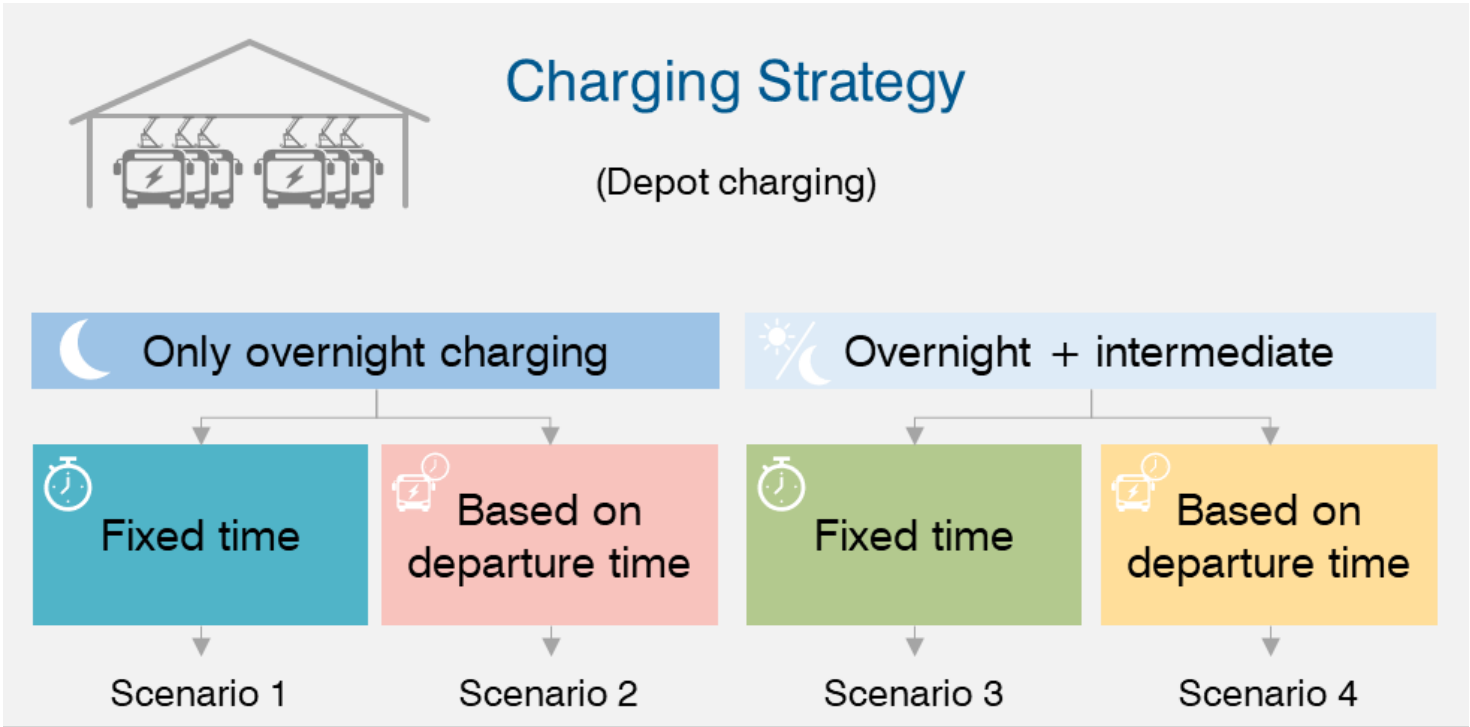
318 + 500 inverted pantographs + ebuses

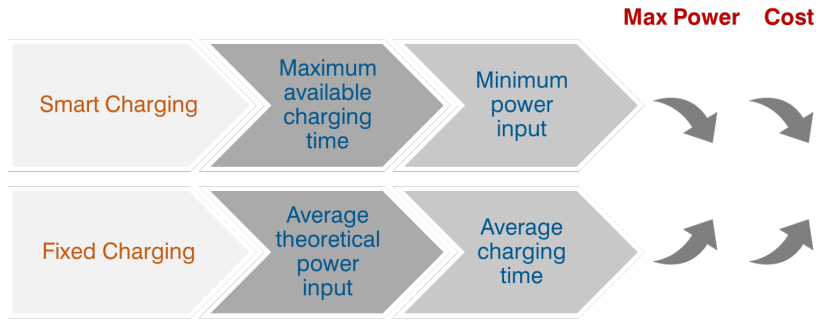
Smart Charging

Optimizing charging power and cost

EMT Charging Strategy





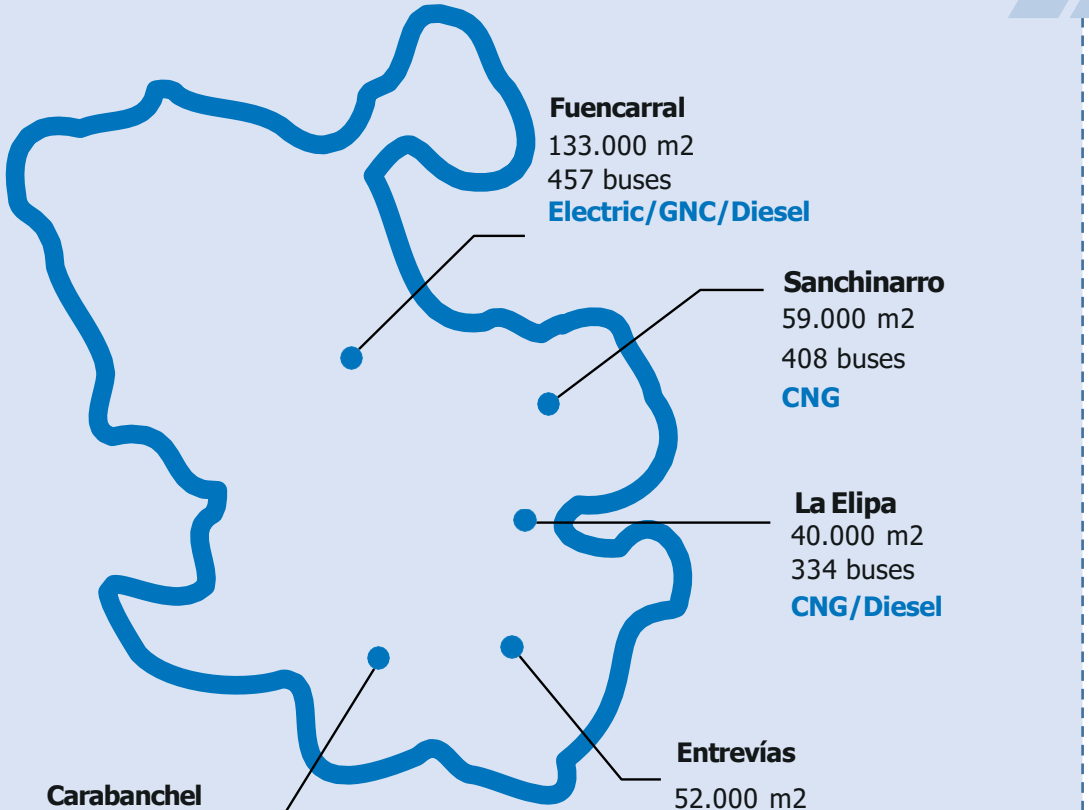


3

Sustainable infrastructures

Infrastructure's Transformation

2021



Fuencarral
133.000 m2
457 buses
Electric/GNC/Diesel

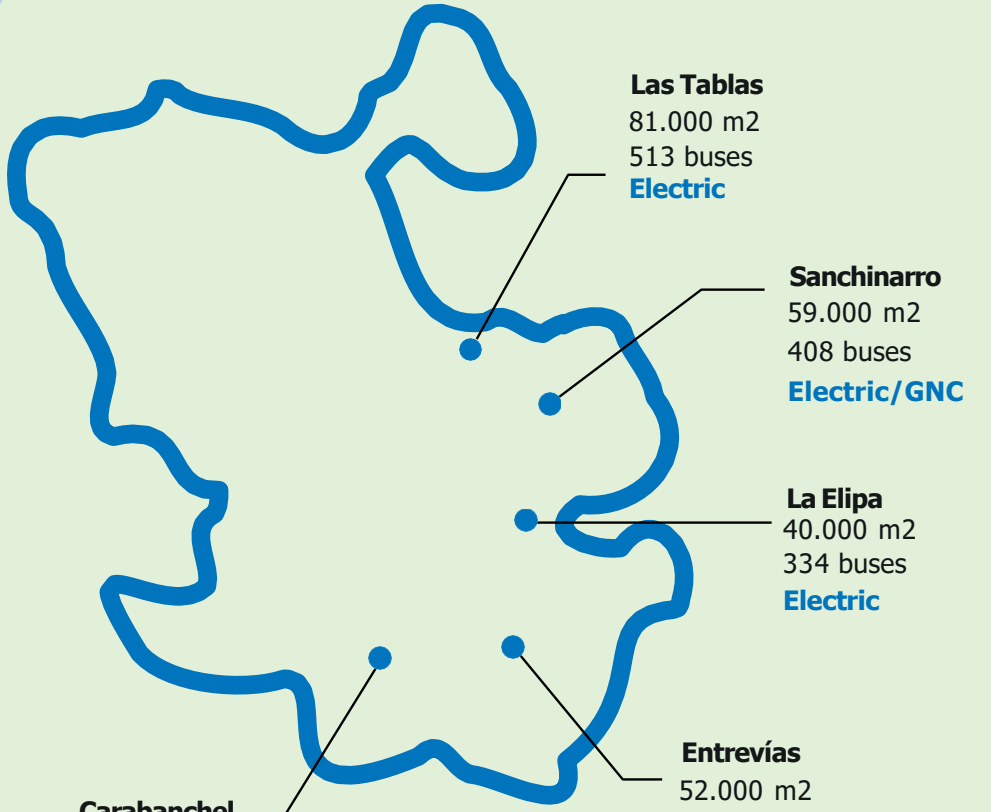
Sanchinarro
59.000 m2
408 buses
CNG

La Elipa
40.000 m2
334 buses
CNG/Diesel

Entrevías
52.000 m2
413 buses
CNG/Diesel

Carabanchel
65.000 m2
445 buses
Electric/GNC/Diesel

2025



Las Tablas
81.000 m2
513 buses
Electric

Sanchinarro
59.000 m2
408 buses
Electric/GNC

La Elipa
40.000 m2
334 buses
Electric

Entrevías
52.000 m2
413 buses
Electric/CNG/Hydrogen

Carabanchel
65.000 m2
445 buses
Electric/CNG

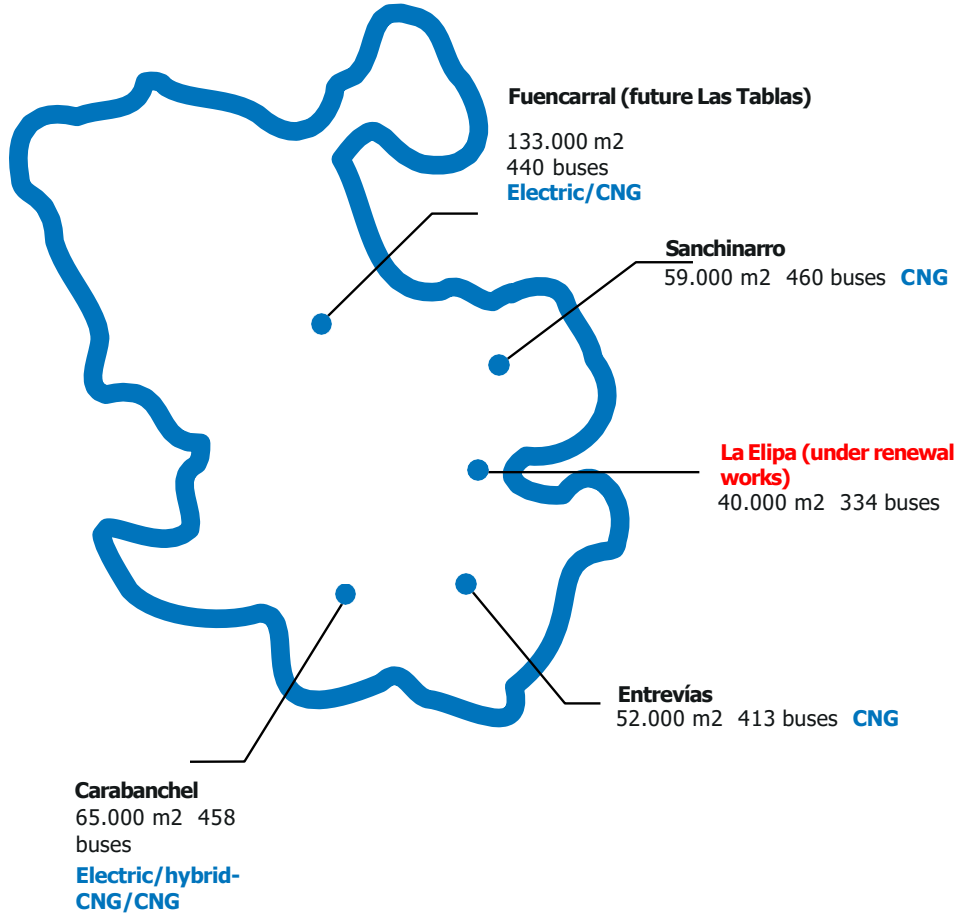
Bus depot adaptations

We have already talked about e-buses, but…

How are we charging them?

EMT Madrid Depots (5)

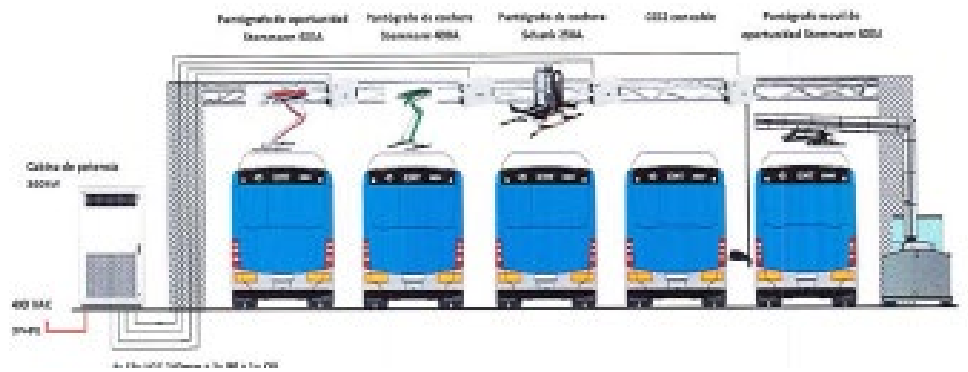
- Carabanchel: Testing bench/Pioneer
- La Elipa: First 100% electric bus depot (same location)
- Entrevías: GNC->Hydrogen+ Electric
- Sanchinarro: GNC -> Electric
- Fuencarral -> Las Tablas (new depot 100% electric, new location)



Wired charging

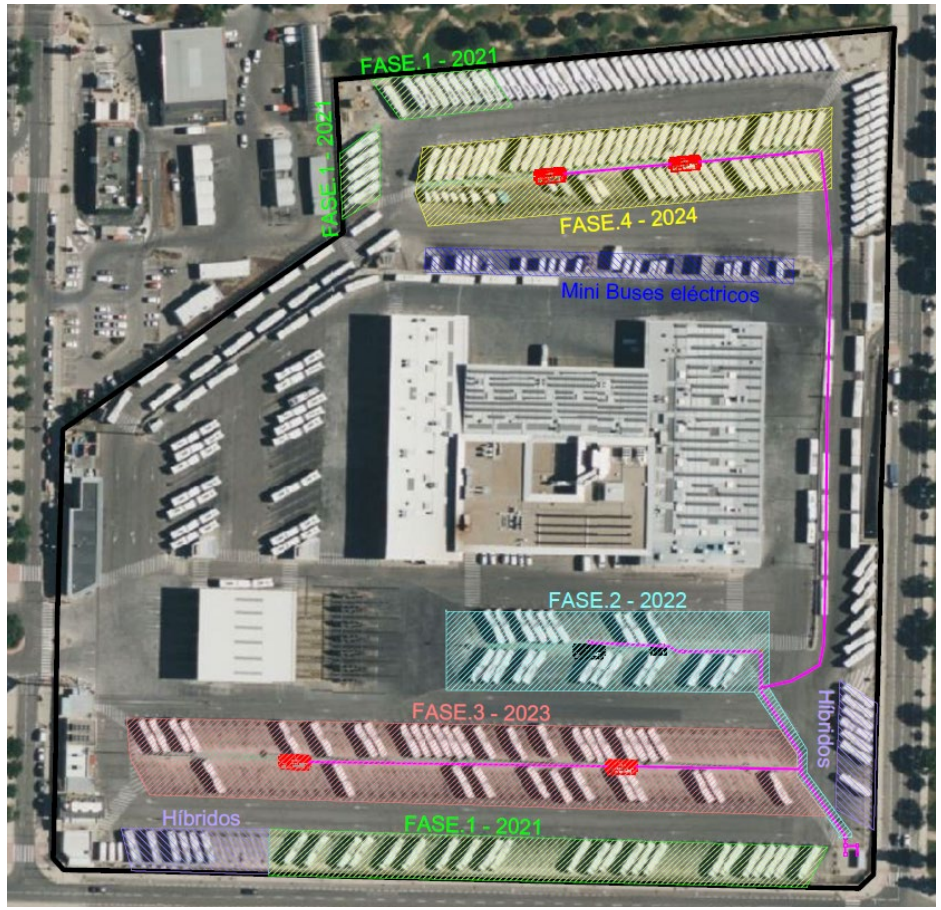
- Since 2007
- 143 chargers
- 25 with 80 kW of power for minibuses
- 118 between 80 and 120 kW of power for standard buses

Inverted Pantographs (Test Project)



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 875041

Scaling up: CARABANCHEL BUS DEPOT

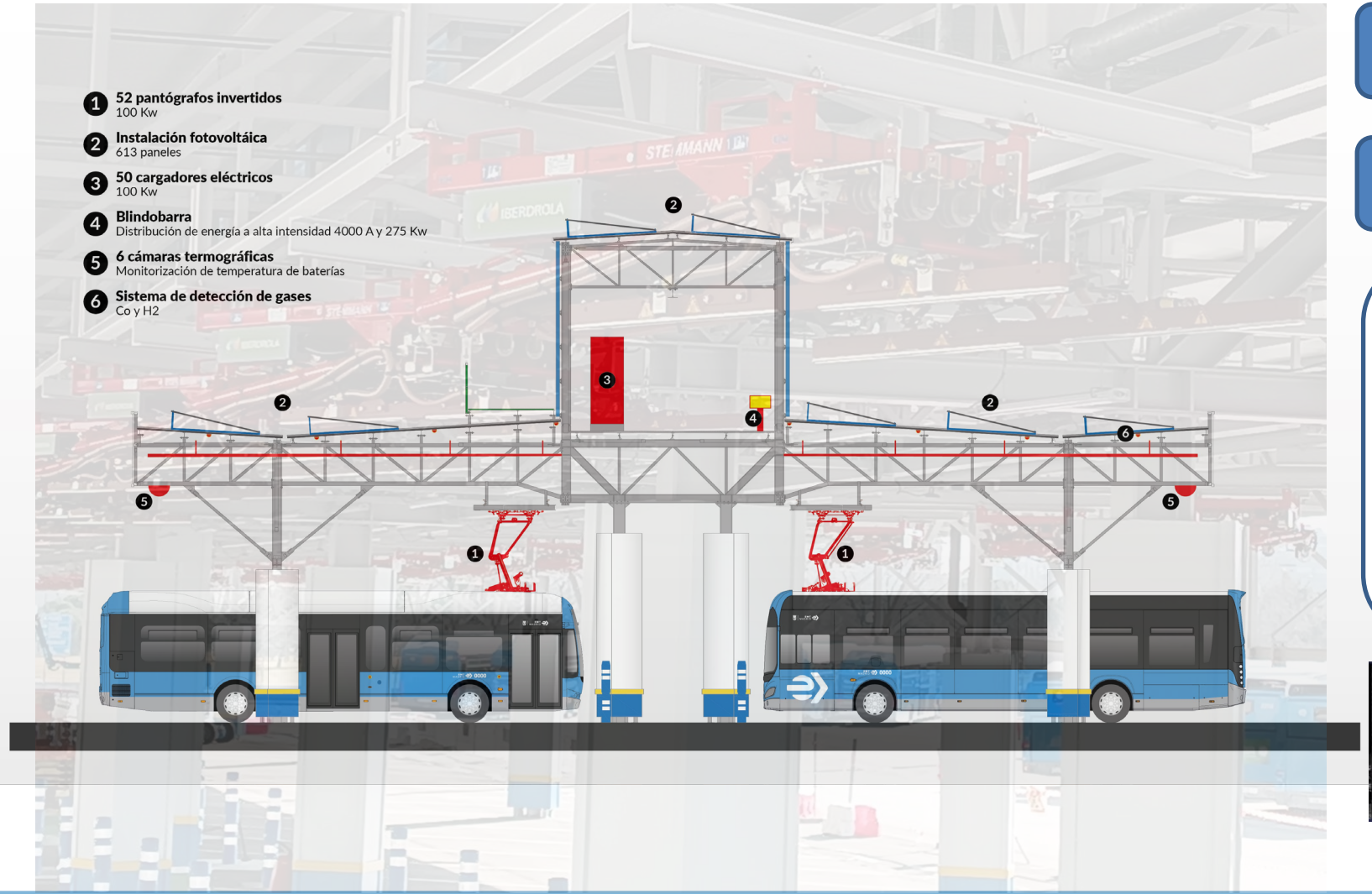


2021	Double connection (2x7,5 MW) 65 plug-in chargers
2022	52 Pantograph chargers (100 kW)
2023	118 Pantograph chargers (360 kW)
2024	60 Pantograph chargers (360 kW)

Total Chargers (Dec .2024) : 295 units

Infrastructure's Transformation

Carabanchel Bus Depot Electrification: Phase 2 – 52 Inverted Pantograhs

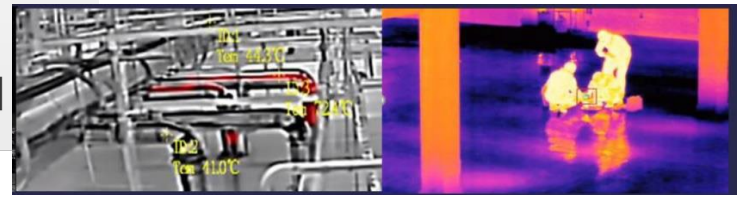


52 Inverted Pantographs – up to 450 kW

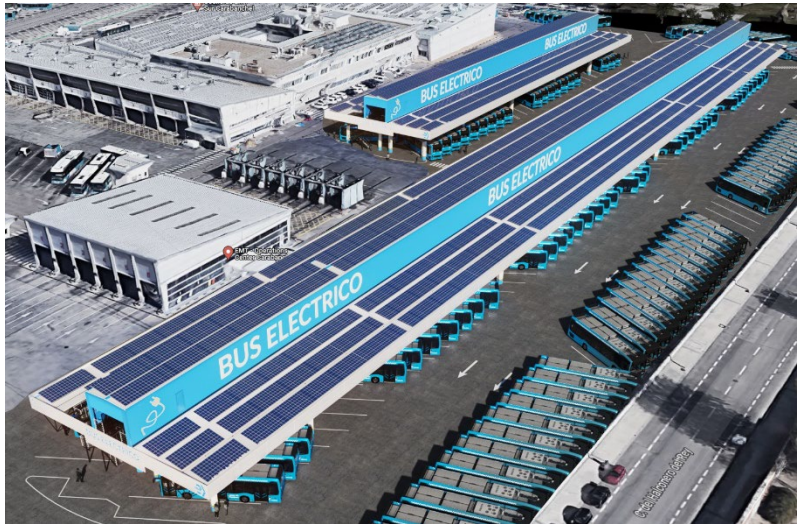
300 kW Installed Power Capacity

Essential: Fire protection:

- ❑ Hydrants, Fire Extinguishers and Fire Alarm Activators
- ❑ Conventional detection (methane/ethylene, CO) & HeatProThermical Cam



CARABANCHEL: Inverted pantographs

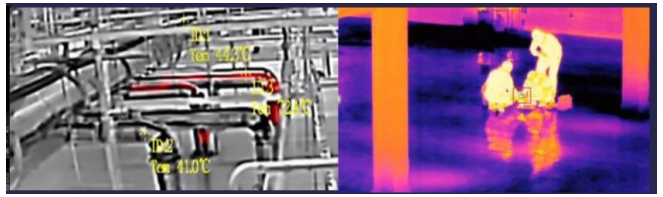


230 Inverted Pantographs – up to 450 kW

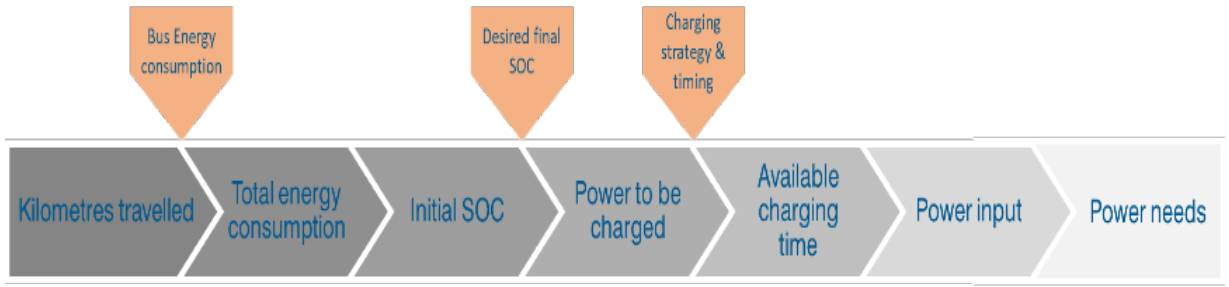
1250 kW Instaled Power Capacity

Essential: Fire protection:

- Hydrants, Fire Extinguishers and Fire Alarm Activators
- Conventional detection (methane/ethylene, CO) & HeatProThermical Cam



Carabanchel Depot – Smart Charging

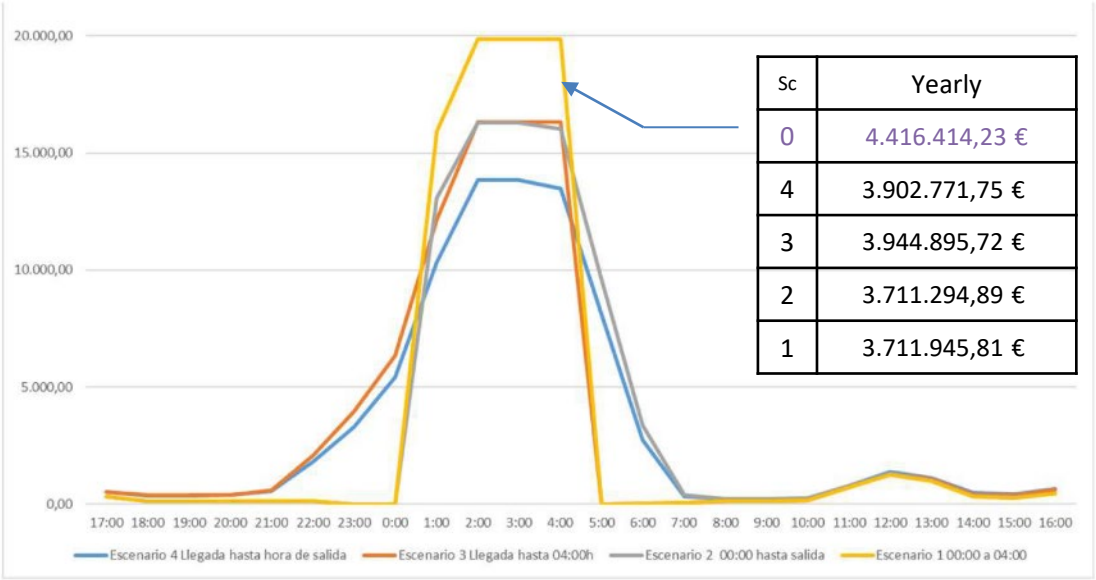


Charging Strategy – In Depot Charging

- 100% Overnight
  - Fixed Schedule — 1st Scenario
  - Based on Departure Time — 2nd Scenario
- Arrival Time+ Overnight
  - Fixed Schedule — 3rd Scenario
  - Based on Departure Time — 4th Scenario

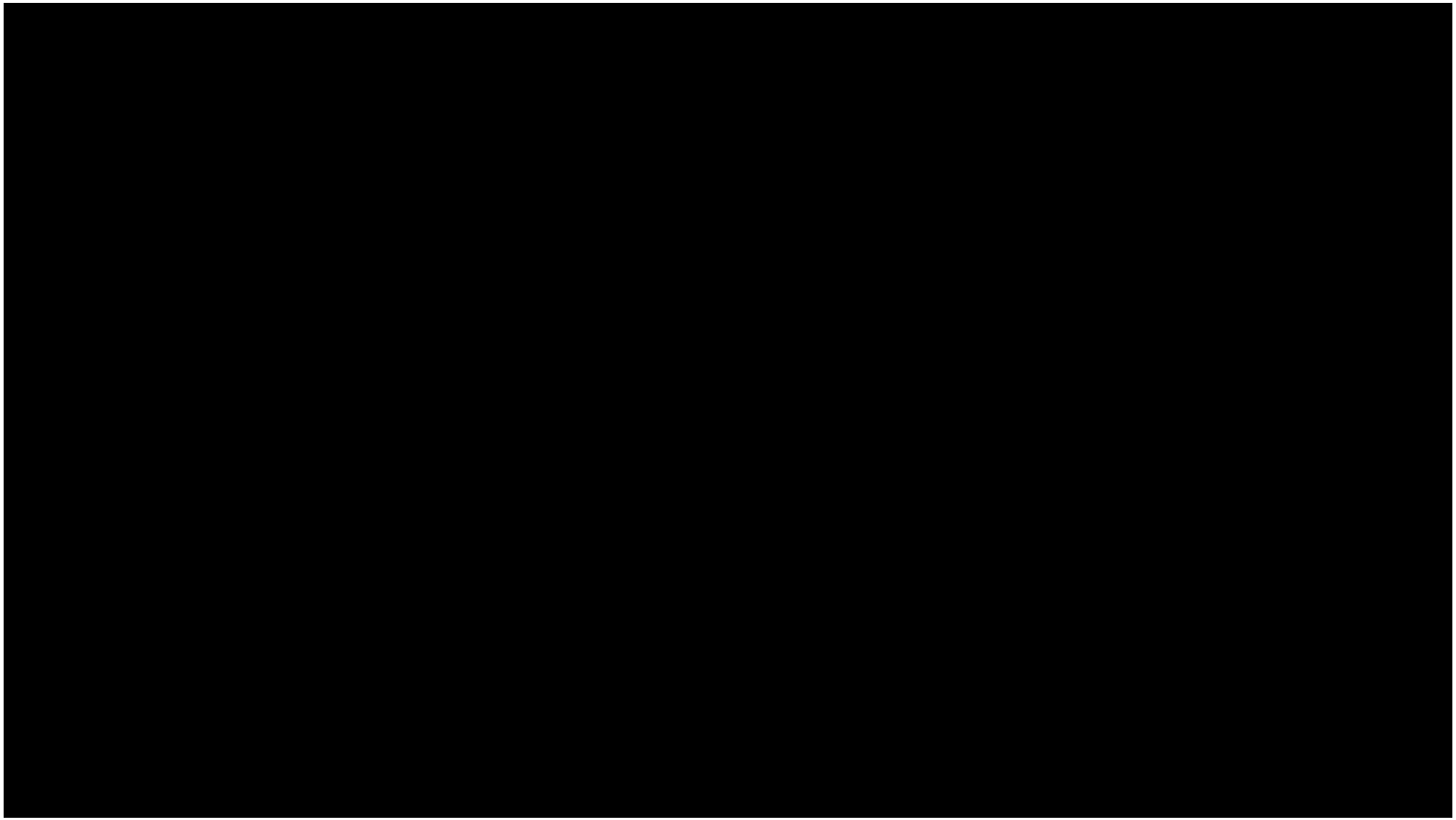
Charging stations

Name	Location	Socket Power	Voltage	Status
EMTCAR001	EMT-Carabanchel	75 kW	600 V	S1 connecting
EMTCAR002	EMT-Carabanchel	75 kW	600 V	S1 available
EMTCAR003	EMT-Carabanchel	75 kW	600 V	S1 finishing
EMTCAR004	EMT-Carabanchel	75 kW	600 V	S1 connecting



Sc	Yearly
0	4.416.414,23 €
4	3.902.771,75 €
3	3.944.895,72 €
2	3.711.294,89 €
1	3.711.945,81 €

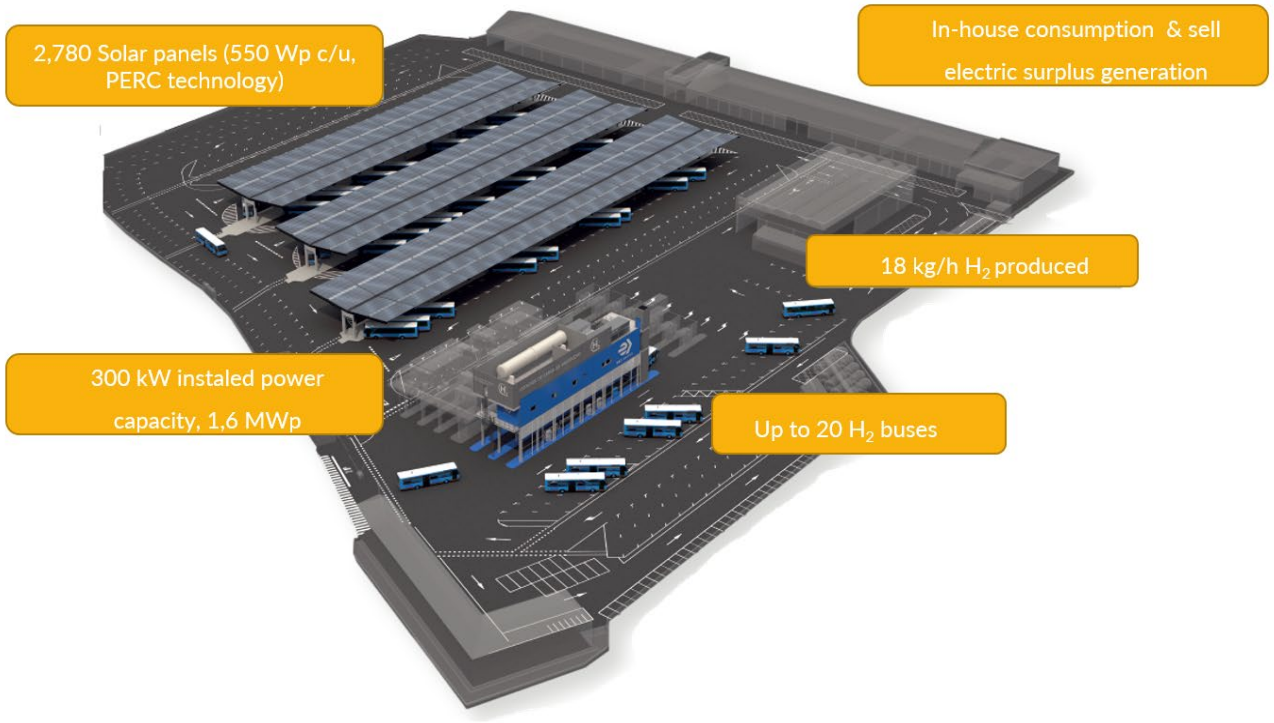
Carabanchel bus depot: PHASE II



Short term: H_2 in Entrevías Bus depot

Previous experiences

2002	City Cell	2005	HyFleet:CUTE



Comprehensive project EMT green hydrogen: sizing

1.- Energy supply

Installation of photovoltaic panels on existing roofs for the generation of Green Hydrogen - Production of 1,6 MW

2.- Hydrogen station

Dimensioned for a production of 440 kg H2/day (up to 20 H2 buses)

Storage system with a maximum capacity of about 600 kg of hydrogen (2 tanks at 300 and 500 bar)

3 Compressors

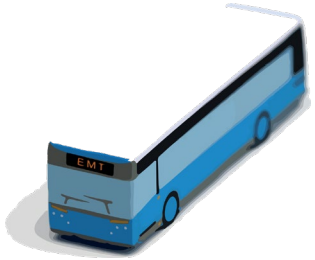
- one compressor operating at 30 bar and two compressors operating up to 500 bar.

Fueling station:

- 2 dispensers at 350 bar.

3.- H2 Buses

Purchase of 10 H2 buses in 2023 and 10 additional H2 buses in 2026



4.- Funding

European Regional Development Fund - ERDF
"A way of making Europe"

2.13 M€ funding (out of a total of 4.8 M€) for the H2 fueling station

Financiado por la Unión Europea NextGenerationEU

2.5 M€ funding (out of a total of 6.4 M€) for H2 buses

More to come…Short term: La Elipa

From scracht!

318	Inverted Pantographs
318	Electric buses
34,000	m^2 solar panels
	Near Zero Emissions Building
	20 MW electrical power supply

...Mid-term: Las Tablas

Madrid Nuevo Norte: urban redevelopment programme will reshape 2.65 million m^2

100% ELECTRIC

500 e-buses fleet

Infrastructure's Transformation

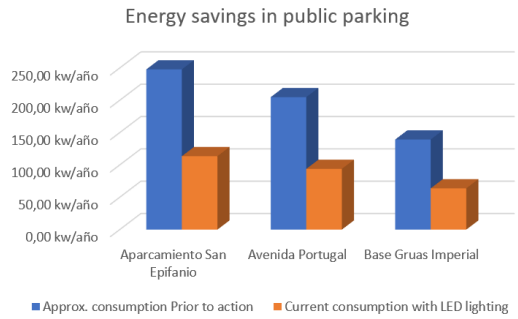
EMT is committed to the use of renewable energies and energy efficiency

Renewable energy

- Total covered área
  + 97.000 m2
- Total power installed
  +5.500 kW

Photovoltaic Installations

Energy efficiency



LED lighting

Green Hydrogen

Biogas

- Public Parking
- Cable Car

Infrastructure rehabilitation

4

Greening existing CNG buses

Biogas Project at EMT Madrid

Production and use of landfill biomethane injected into the gas pipeline for municipal passenger transport

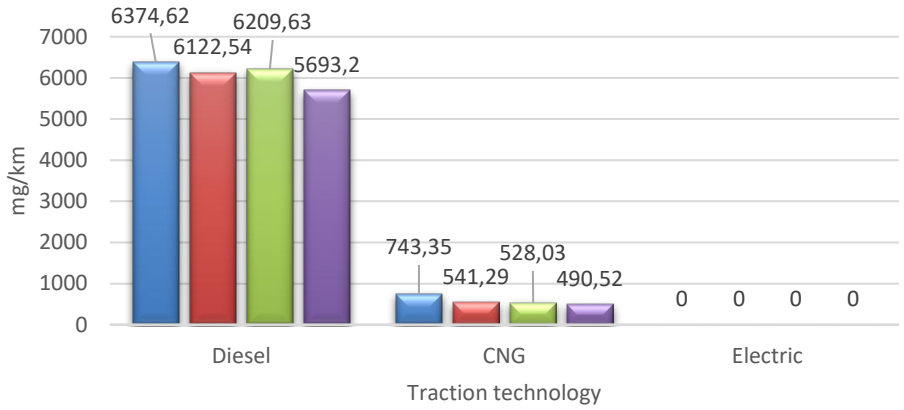
- EMT Agreement Madrid – Valdemingómez Technology Park
  - EMT Madrid acquires renewable gas
  - **6 GWh** of biomethane/year
  - Use in EMT's CNG fleet.
  - Supply enough to run the **circular line C1**
    - **20** buses
    - **1 million kilometers** traveled
    - **4,43 million passengers** transported in 2021
- **Circular economy** project: energy supplied to buses is generated from organic waste

1st Award: PublicPrivateProject foritsCircular EconomyPurposein the*Green Gas MobilitySummit 2022 (September, 2022)*

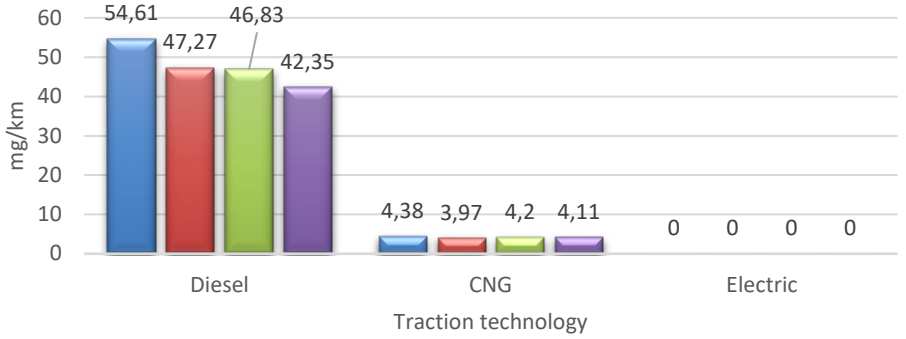
Electrification is worthwhile

Comparison of emissions

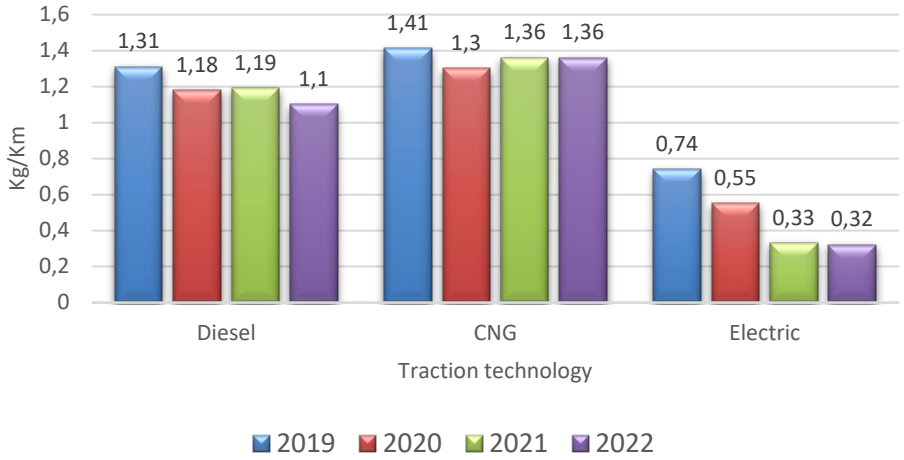
NOx per km (mg/km)



Particulate matter (PM10) per km (mg/km)

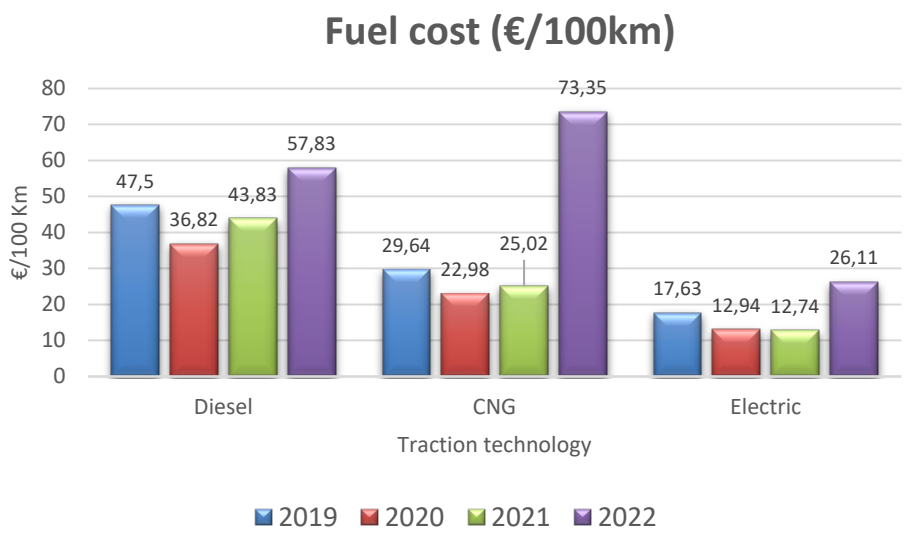


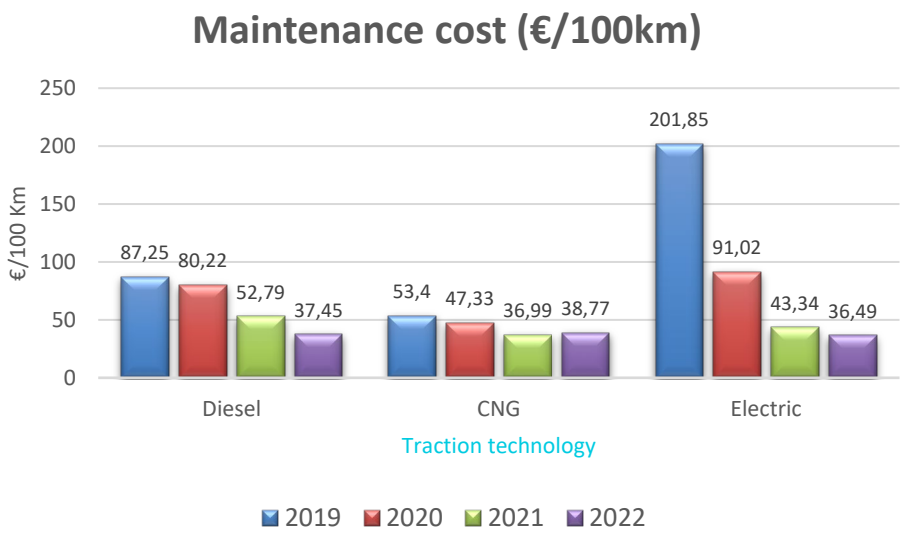
CO2 per km (kg/km)



Electrification is worthwhile

Comparison of costs



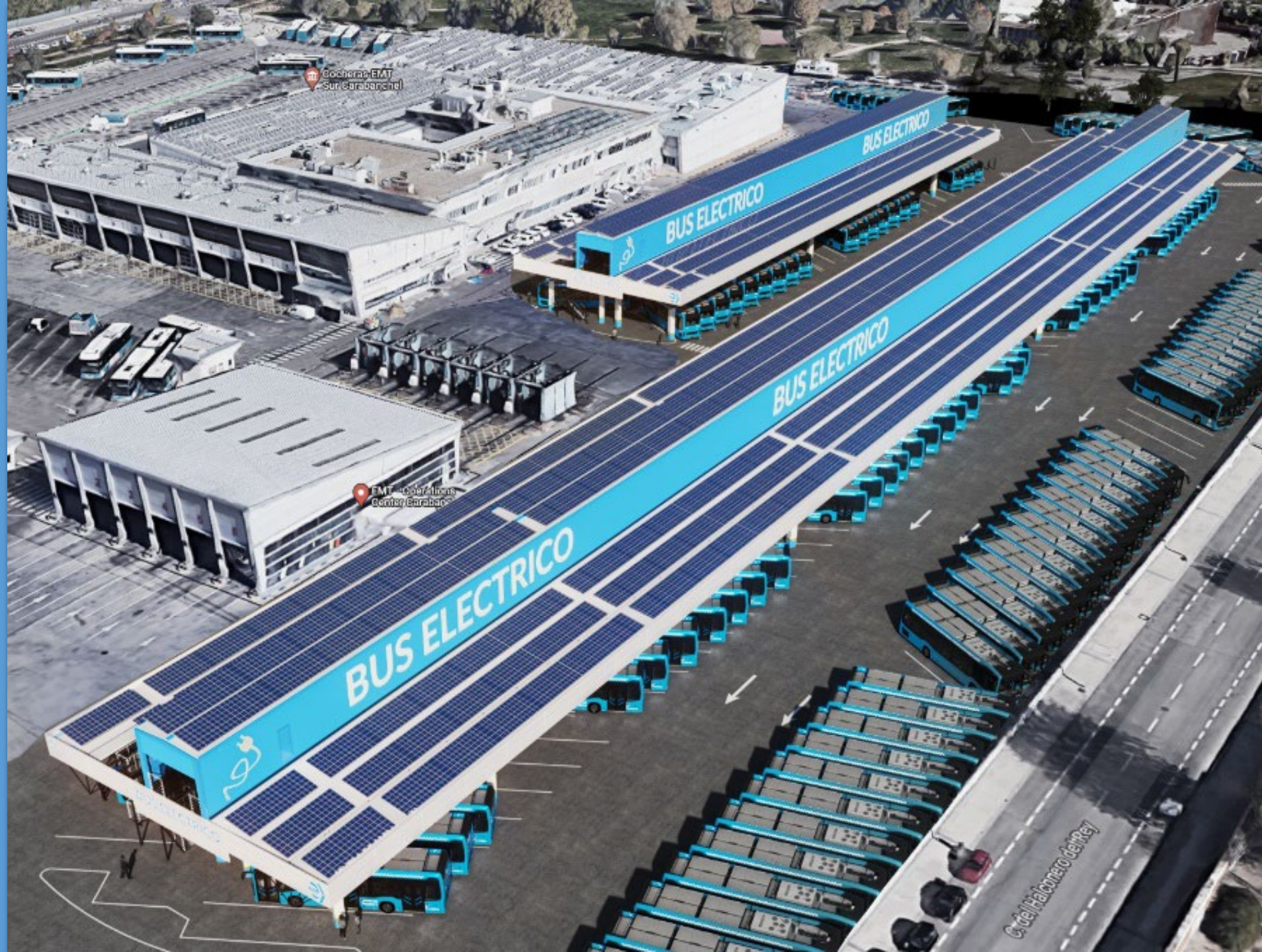


**Fuel Price 2022*

- *Diesel: 1.1739 €/litre*
- *CNG: 96.6 €/MWh*
- *Electricity: 158.6 €/MWh*

5

Next steps and conclusions



Next steps

- Further increase of H2 use (up to 20 buses)
- Increasing biomethane consumption over the total conventional CNG (currently 6 GWh):
  - First objective: reaching 75 GWh consumption in 2025

  How ?

  - Purchasing biomethane at MIBGAS (Iberian gas market)
  - BPAs : Agreements with biogas producers in Spain and Europe
- Aim: full electrification in 2033

Conclusions

Future vision of the urban bus at EMT Madrid

At EMT Madrid we are committed to the **transformation of our BUS service**, which is essential to achieve the connected, electric, shared, safe and sustainable mobility set out in the roadmaps.

- **Fleet transformation**: the electrification of the BUS will be the solution in the medium term, but renewable alternatives (H2, biogas) must be explored.
- **Transformation of associated infrastructure**.
- This transformation needs financing: in Europe the **Next Generation Funds** are driving it.

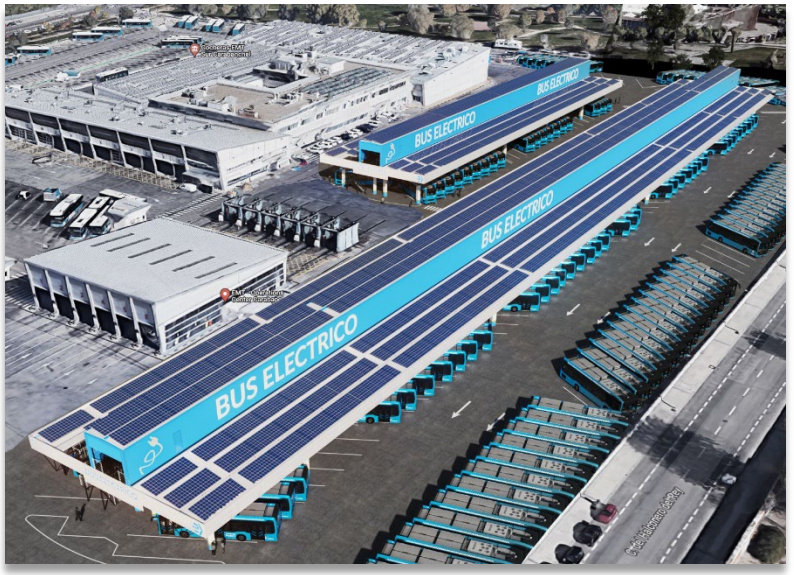
Conclusions

Future vision of the urban bus at EMT Madrid

Energy transition is not just buying a bus (or machine) with new technology: it requires a **change in the whole chain** (infrastructure, processes, procurement, etc.).

- Transitions are long:
  - 1994 to 2022 Transition Diesel to CNG 100%!
  - 2007 to 2035 Transition from CNG to Electric. Today at 12%: 2027 at 34%.

Electric infrastructures are 10% (approx.) **of the rolling stock investment** (excluding operating and energy costs).




EMT
Atención al Cliente
EMT
Atención al Cliente
75 años
EMT MADRID
1947 - 2022
Thank you

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área delegada de limpieza y zonas verdes | MADRID

Valdemingómez Technology Park

Innovation and Circular Economy in the city of Madrid

1960 Recogida de basuras en camión

Archivo Regional de la Comunidad de Madrid,
Fondo Fotográfico M. Santos Yubero

PART I

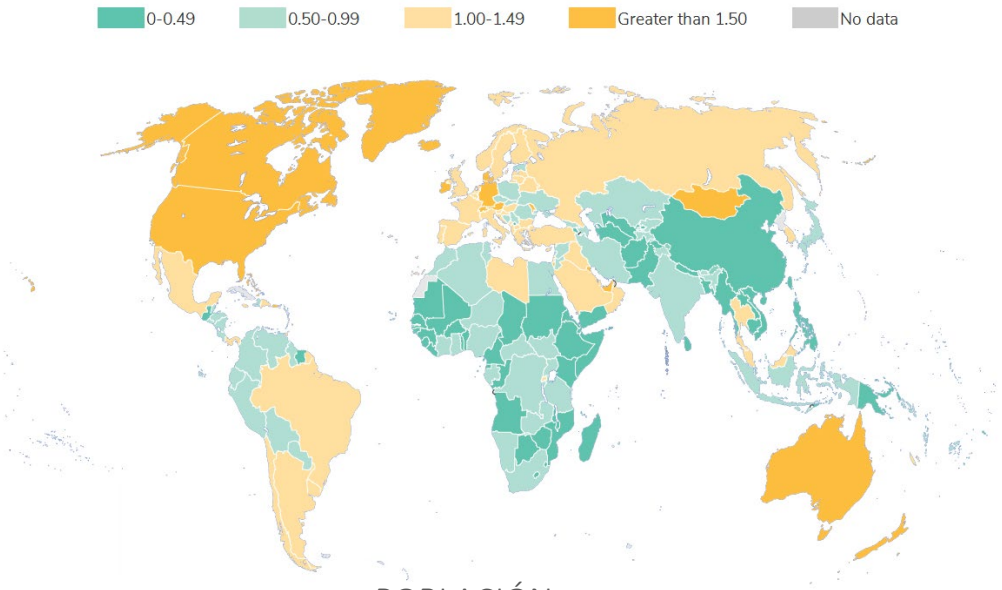
FIGURES AND DATA ON WASTE PRODUCTION IN THE CITY OF MADRID

Historical data

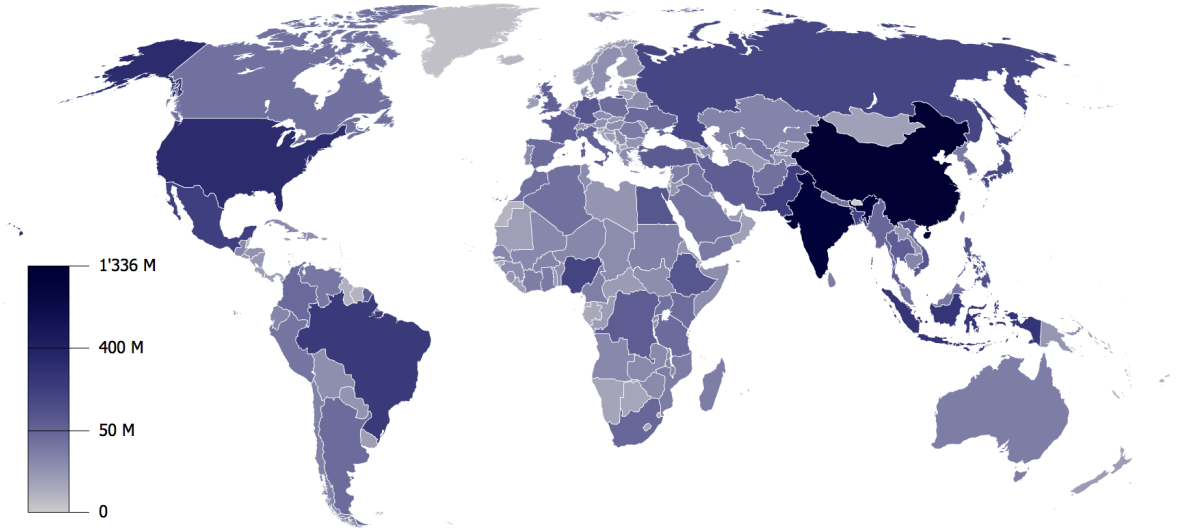
World Vision

World Bank Dataset – 2050 vision

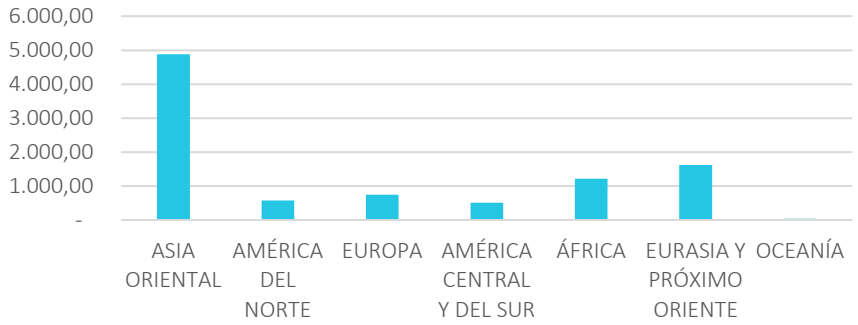
Annual municipal solid waste generated per capita (kilograms/capita/day)



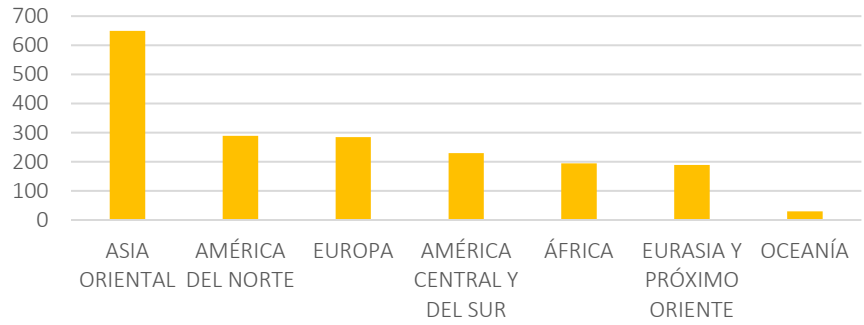
Population per country (millions of inhab.)



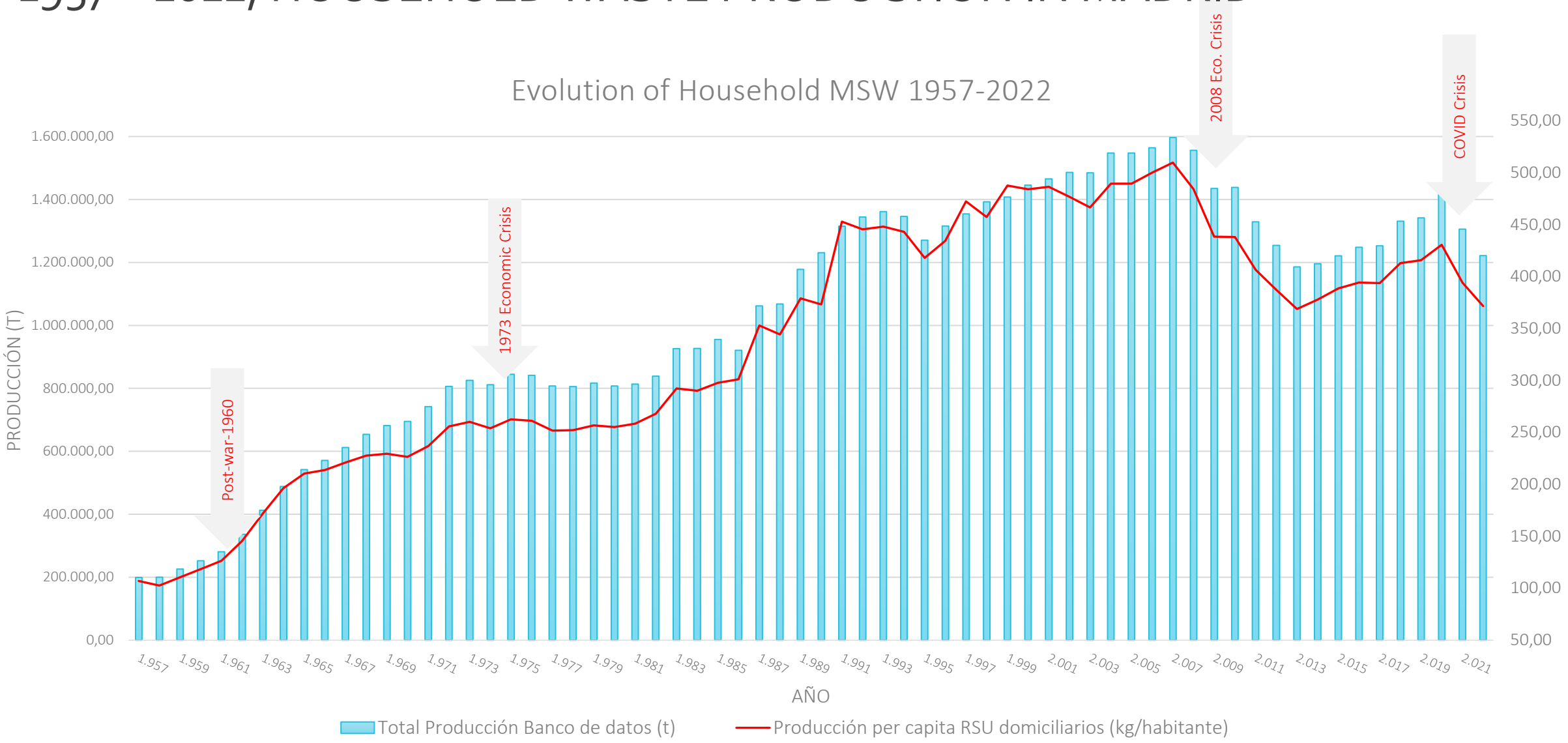
POBLACIÓN
(millones de hab.)



PRODUCCIÓN DE RESIDUOS
(millones de t/año)



1957 – 2022, HOUSEHOLD WASTE PRODUCTION IN MADRID



WASTE MANAGEMENT IN THE HISTORY OF MADRID

1930 1960 1965 1970 … 2018

1930 1940 1950 1955 … 2000 2010 … 2018

1930 1935 1978 … 2018

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área delegada de limpieza y zonas verdes
MADRID

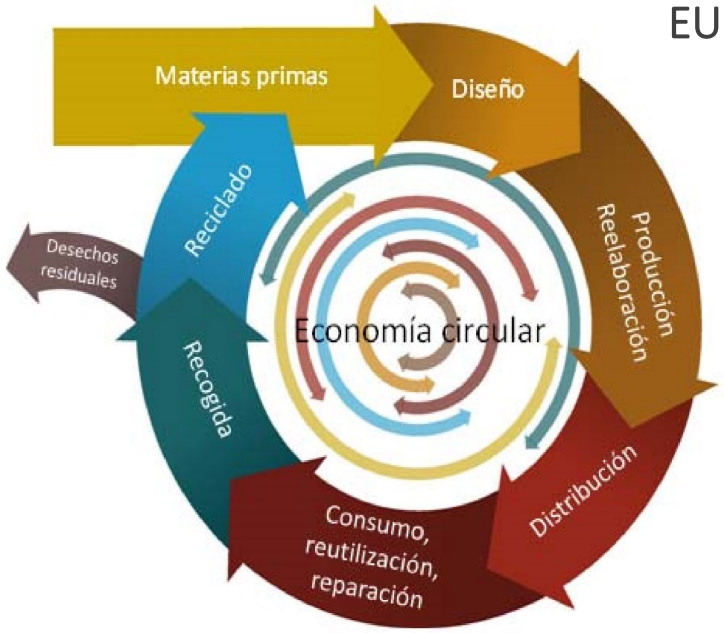
PART II

WASTE TREATMENT IN THE CITY OF MADRID

WASTE MANAGEMENT MODEL

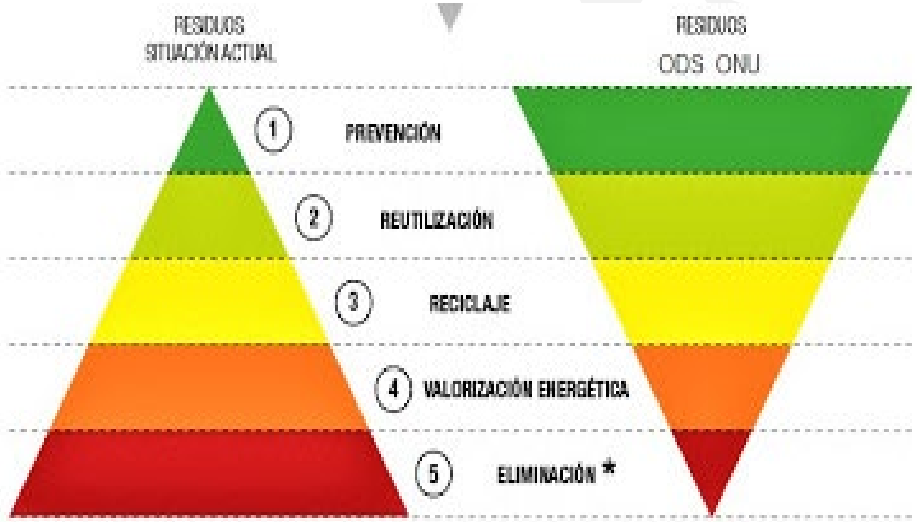
CIRCULAR ECONOMY AND THE MANAGEMENT MODEL

WASTE MANAGEMENT IN MADRID: CIRCULAR ECONOMY



EU CIRCULAR ECONOMY PACKAGE

- Amendment of directives (waste, packaging, landfills)
- Principle of Prevention
- Recycling target for Packaging Waste: 70% by 2030
- Separate collection of biowaste by 2023
- Landfill disposal: <10% waste, by 2035
- Municipal Waste Recycling Target: 60% by 2030
- Waste Act 7/2022: landfill and incineration taxes.



VTP Goals:

Reversal of the waste management hierarchy, fight to increase recycling and reduce landfilling.
In order to meet the increasingly demanding waste management targets, it is necessary to:

CHANGE THE ECONOMIC MODEL FROM LINEAR TO CIRCULAR.

Achievement of Recycling and Disposal Targets - Madrid

OBJETIVOS	2020	2025	2030	2035
Recycling of municipal waste(%)	50	55	60	65
Municipal waste landfilled (%)		<40	<20	<10

HOUSEHOLD AND COMMERCIAL WASTE MANAGED AT THE PTV	
2021	
% OF PREPARATION FOR REUSE AND RECYCLING	27%
% ENERGY RECOVERY	23%
% LANDFILLING	49%

+ Waste managed by the City Council at the **VTP**

DOMESTIC AND COMMERCIAL WASTE MANAGED BY MADRID CITY COUNCIL	
2021	
% OF PREPARATION FOR REUSE AND RECYCLING	34%
%ENERGY RECOVERY	19-22%
% LANDFILLING	44-47%

+ Waste that is managed by the City Council in **the VTP and OUTSIDE the VTP:** Cardboard Paper, CDW, pruning in Hot Crumbs, Batteries, Clean Points, WEEEs, Vegetable Oil, Clothing

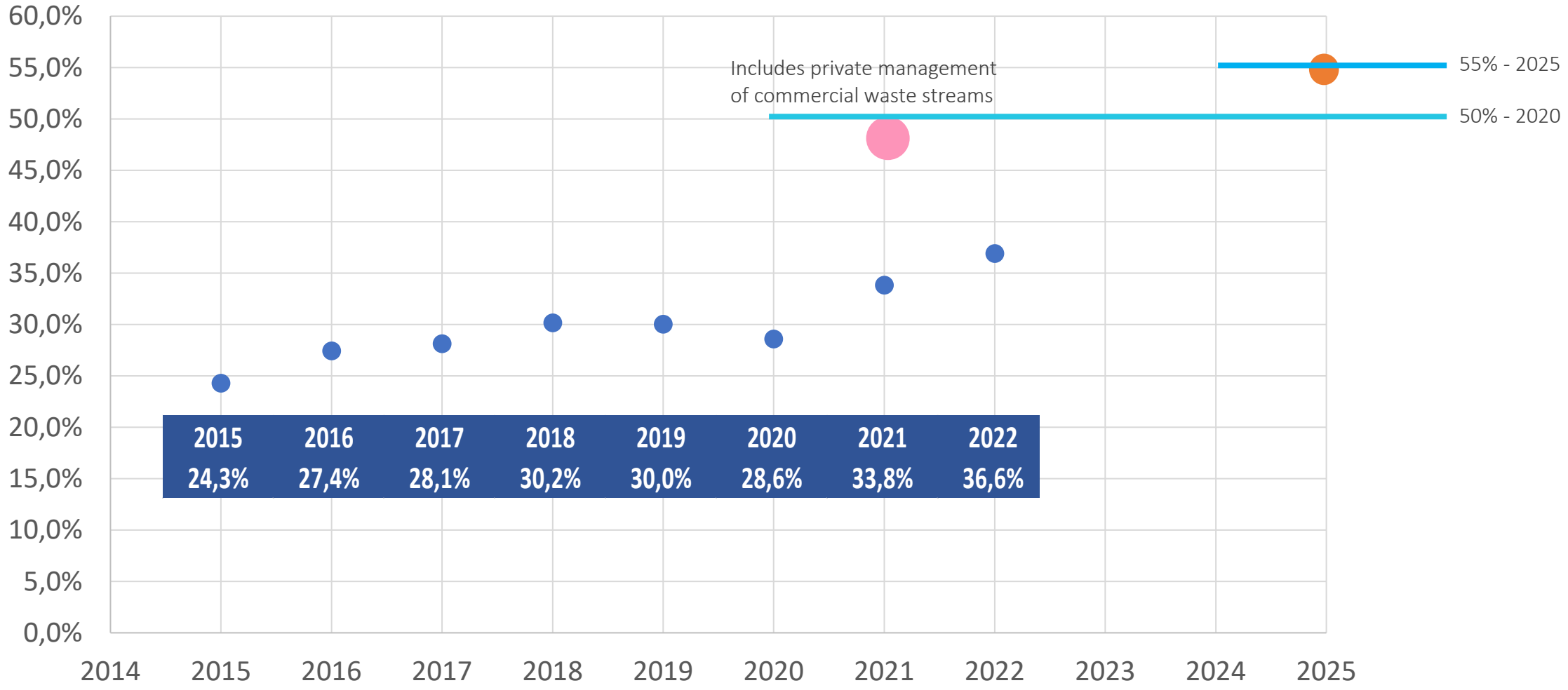
DOMESTIC AND COMMERCIAL WASTE MANAGED BY THE MADRID CITY COUNCIL AND COMMERCIAL WASTE MANAGED PRIVATELY	
2021	
% OF PREPARATION FOR REUSE AND RECYCLING	49%
% ENERGY RECOVERY	15-18%
% LANDFILLING	33-36%

+ Household and commercial waste that is managed through private managers

TARGETS
50
<40

EVOLUTION OF THE % OF PREPARATION FOR REUSE AND RECYCLING

(Not including data on privately managed commercial waste)



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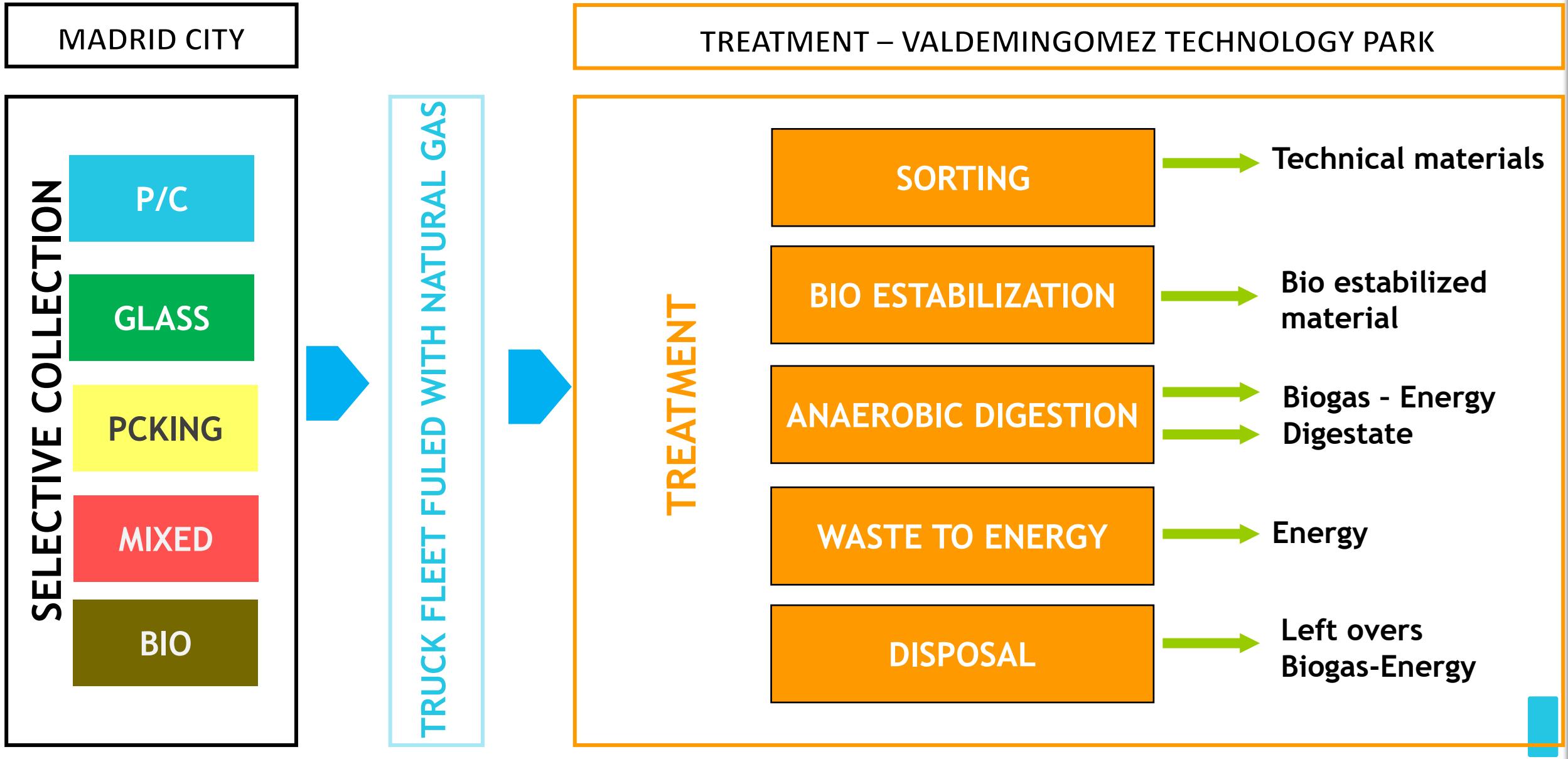
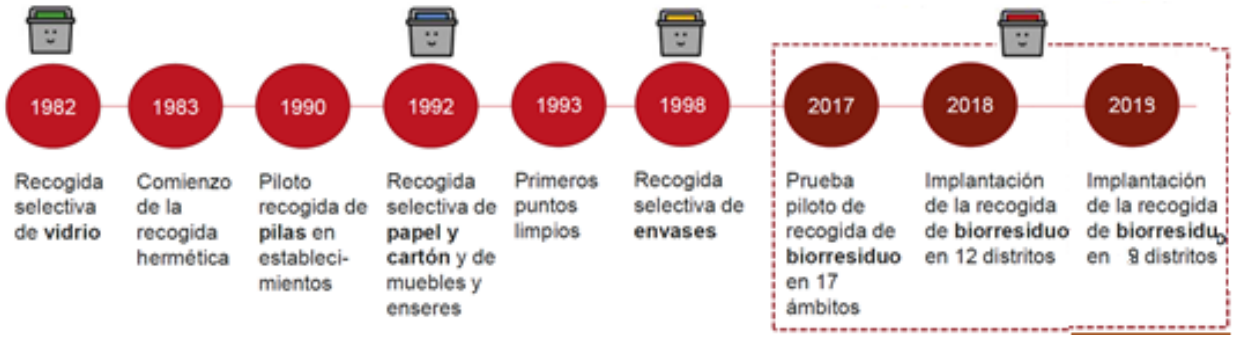
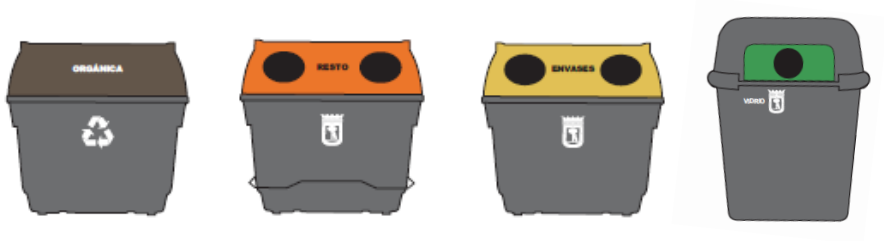
9

Waste Management System: Mainstreams



Waste Management Model of the City of Madrid-II





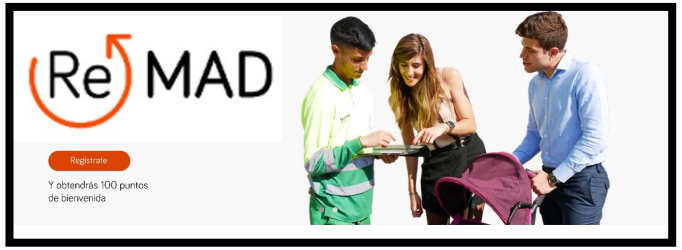
VEHICLES OF THE CONTAINERIZATION AND COLLECTION SERVICE.

GNC 664 36 5






MONITORING OF THE FLEET OF VEHICLES AND CONTAINERS.



WASTE COLLECTION SITES:

- 16 ON-SITE COLLECTION POINTS, 70
- 70 PROXIMITY COLLECTION SITES
- 350 MOBILE COLLECTION SITES

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Waste Management Model of the City of Madrid-III

Medium-Term Challenges:

- Increase in selective collection at source, in order to achieve European objectives.
- Reduce the impact of the service on the city and its inhabitants.
- Implementation of technology to optimize management.
- Participation and awareness-raising to improve citizens' perception of the service.

www.Madrid.es/valdemingomez

- Environmental sustainability.
- Improve waste treatment by renewing processes and building new plants.

BOOSTING THE NUMBER OF CLEAN POINTS (CP)

N° of visits CP - 2020: 602.348 visitas.
Tonnes collected in CP - 2020: 20,002 t

REUSE – REMAD

Exchange platform.
5,259 people discharged (2021 data):

- Items uploaded: 21,288
- Items traded: 17,443 (82%)

ReMAD
Reutiliza, Reduce, Recicla Residuos en Madrid
www.remad.es

COMMUNICATION AND AWARENESS-RAISING CAMPAIGNS

- When I recycle, I get it right
- Get it right with the Orgnánica, Con Erre de...
- Visits to the Valdemingómez Technology Park

Waste Management Model of the City of Madrid-IV

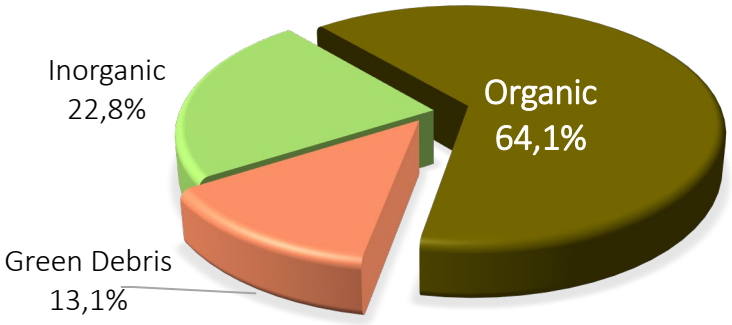
Selective Collection of Biowaste

Overview

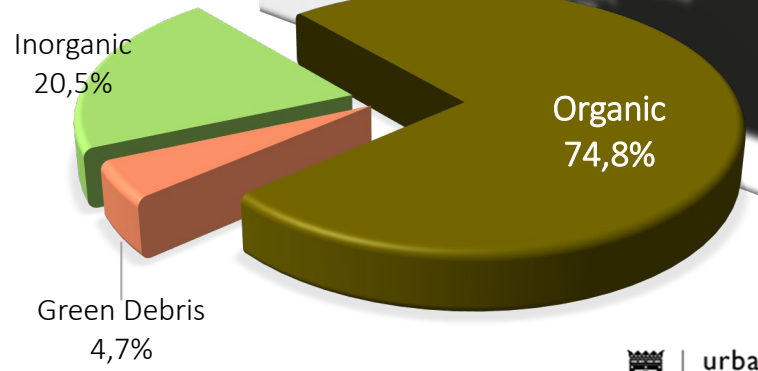
A few facts:

- Start: November, 2017.
- 100% of the city.
- 700 tons/day collected.
- Treatment: Anaerobic digestion for biogas production and digest composting.
- Pollution rate: 20-25%

2020



2021

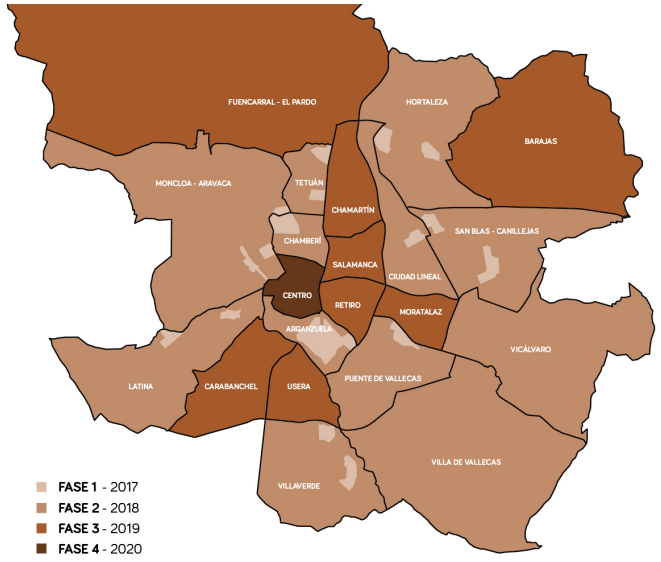


Waste Management Model of the City of Madrid-V

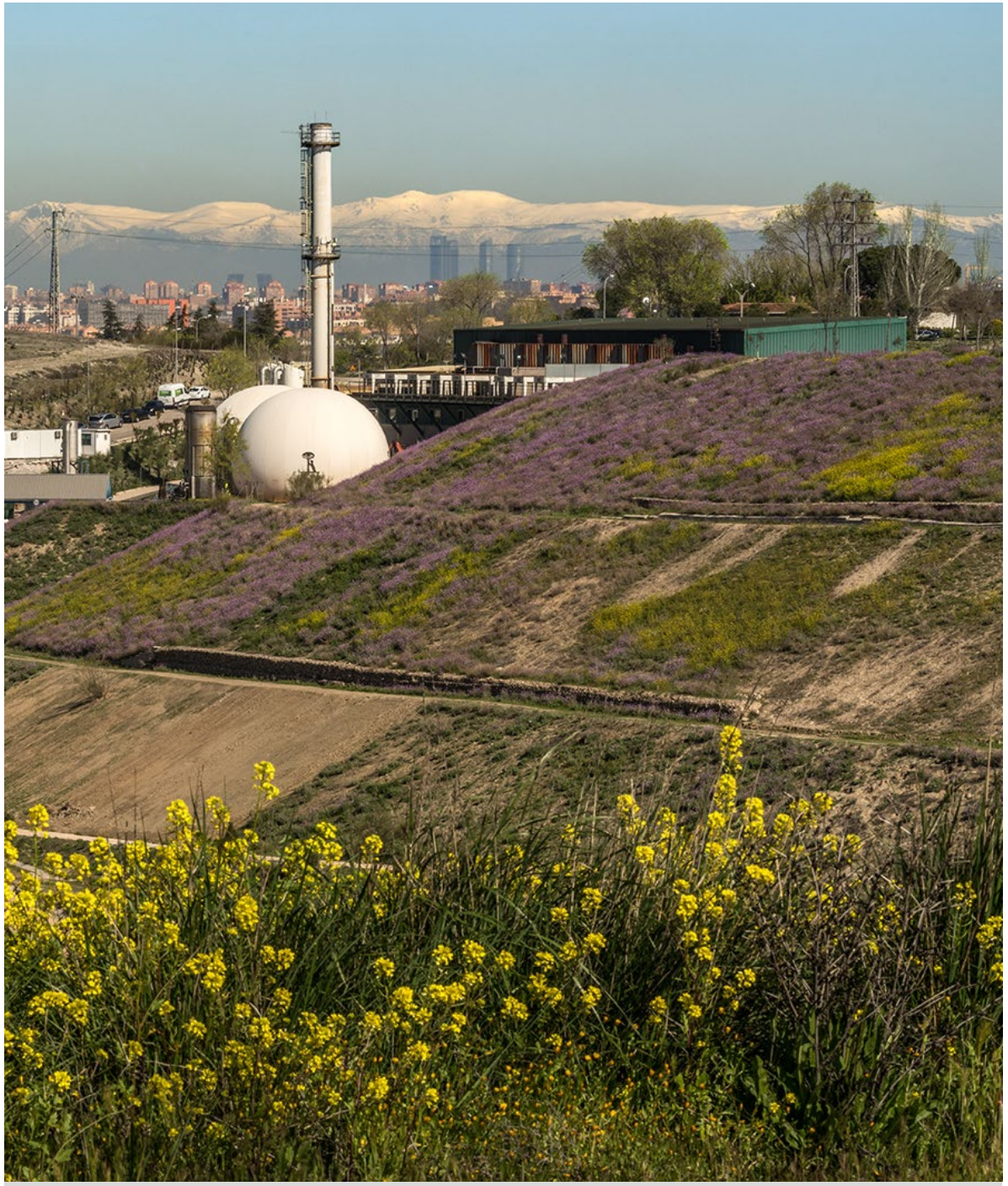
Selective Collection of Biowaste

- **CAMPAIGN** → ***"ACIERTA CON LA ORGÁNICA"***

PHASE 4 OF THE 2020-2021 CAMPAIGN:



- **21** districts in Madrid
- **3,223,334** inhabitants (INE, 2018)
- **1,663,195** homes (City Council Statistics Department, 2019)
- **144,515** residential buildings (Dept. of Statistics City Council, 2019)
- **175,621** businesses (INE, 2019)
- **Impact:**
  - Direct actions: more than 43,000 citizens
  - Indirect actions: 2.9 million citizens
  - Budget Phase 4: €897,270

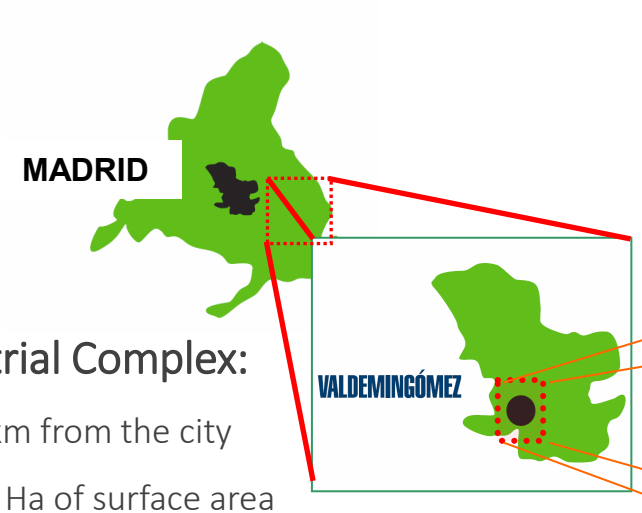


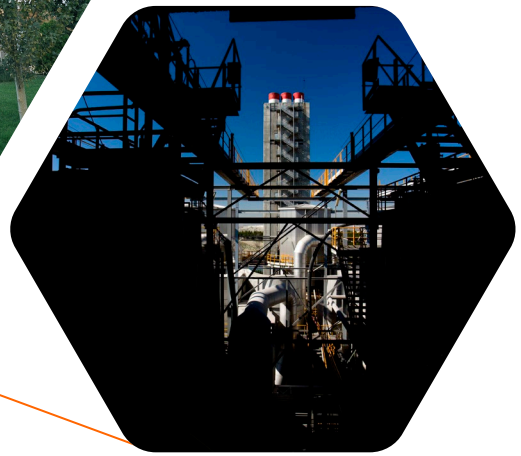
Part III – Valdemingómez Technology Park

I. Facilities

The city and the Technology Park - location

Waste treatment complex in the city of Madrid – Valdemingómez Technology Park





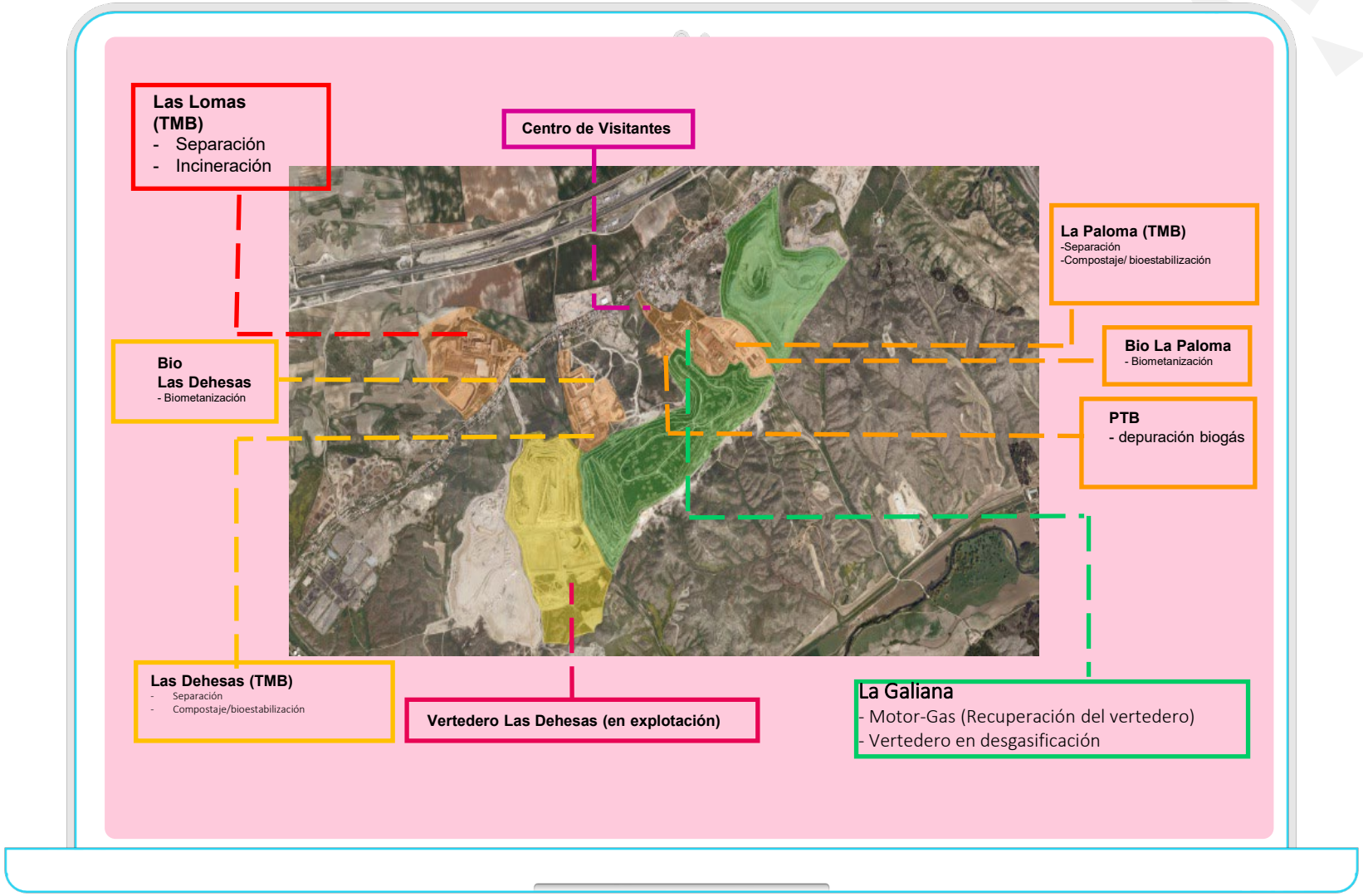
Industrial Complex:

- 14 km from the city
- 280 Ha of surface area
- 7 industrial treatment plants+1 under construction
- More than 1.4 million tonnes of waste treated (2020)
- almost 400 kg/inhabitant per year
- More than 72,000 tons of technical materials recovered.
- Almost 14,000 tons of compost and biostabilized material produced
- 312,072.92 MWh of electricity produced
- 103,476.38 MWht of energy injected into the transport Gas Grid System of Spain.
- 16,000 visitors per year
- Annual cost: €86.5 million

WASTE MANAGEMENT IN MADRID: PRESENT, THE VALDEMINGÓMEZ TECHNOLOGY PARK

7 treatment plants:

- 3 Sorting Plants
- 2 composting plants
- 2 biomethanisation plants
- 1 plant for the energy recovery of treatment rejects
- 1 cogeneration plant that converts landfill biogas into energy
- 1 biogas treatment plant
- 1 landfill of 87 Ha
- 1 automated composting plant for FORS digest (under construction)



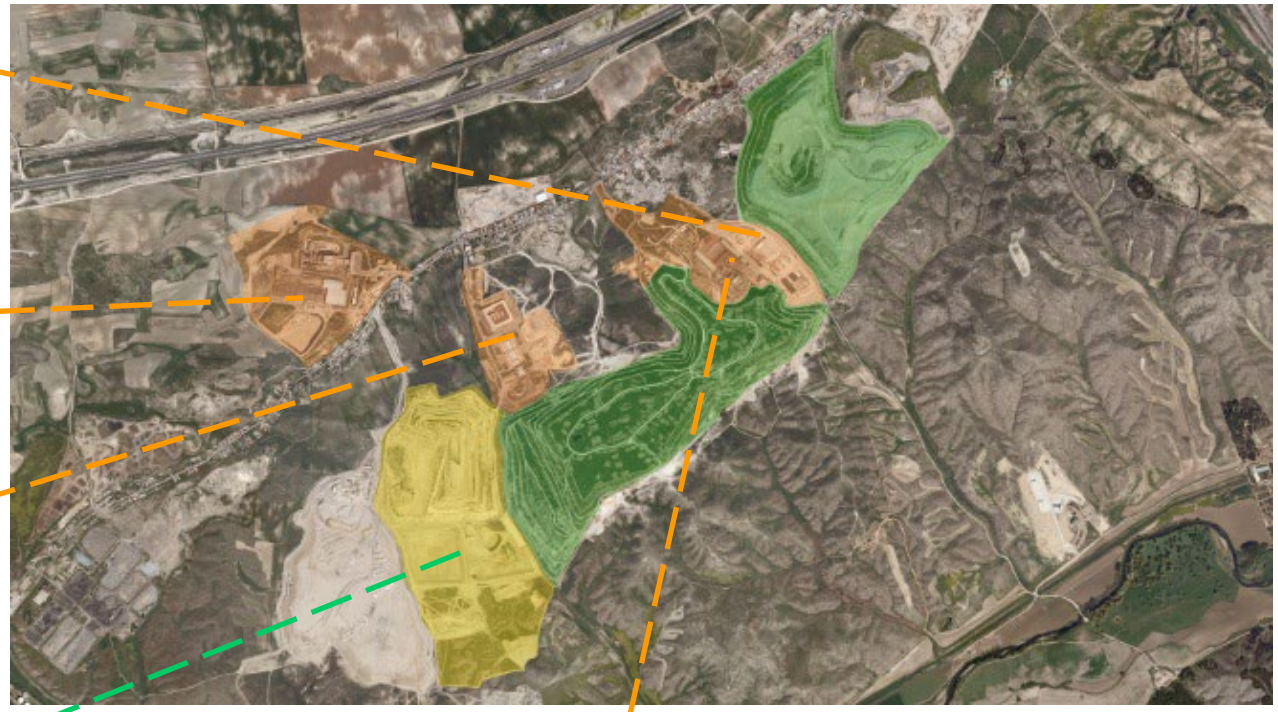
Treatment I: Mechanical Biological and Landfill

La Paloma
- Packaging Sorting: **36,500 t/year**
- Mixed Waste Sorting: **219,000 t/year**
- Composting: **131,000 t/year**

Las Lomas
- Mixed Waste Sorting: **360.000 t/year**

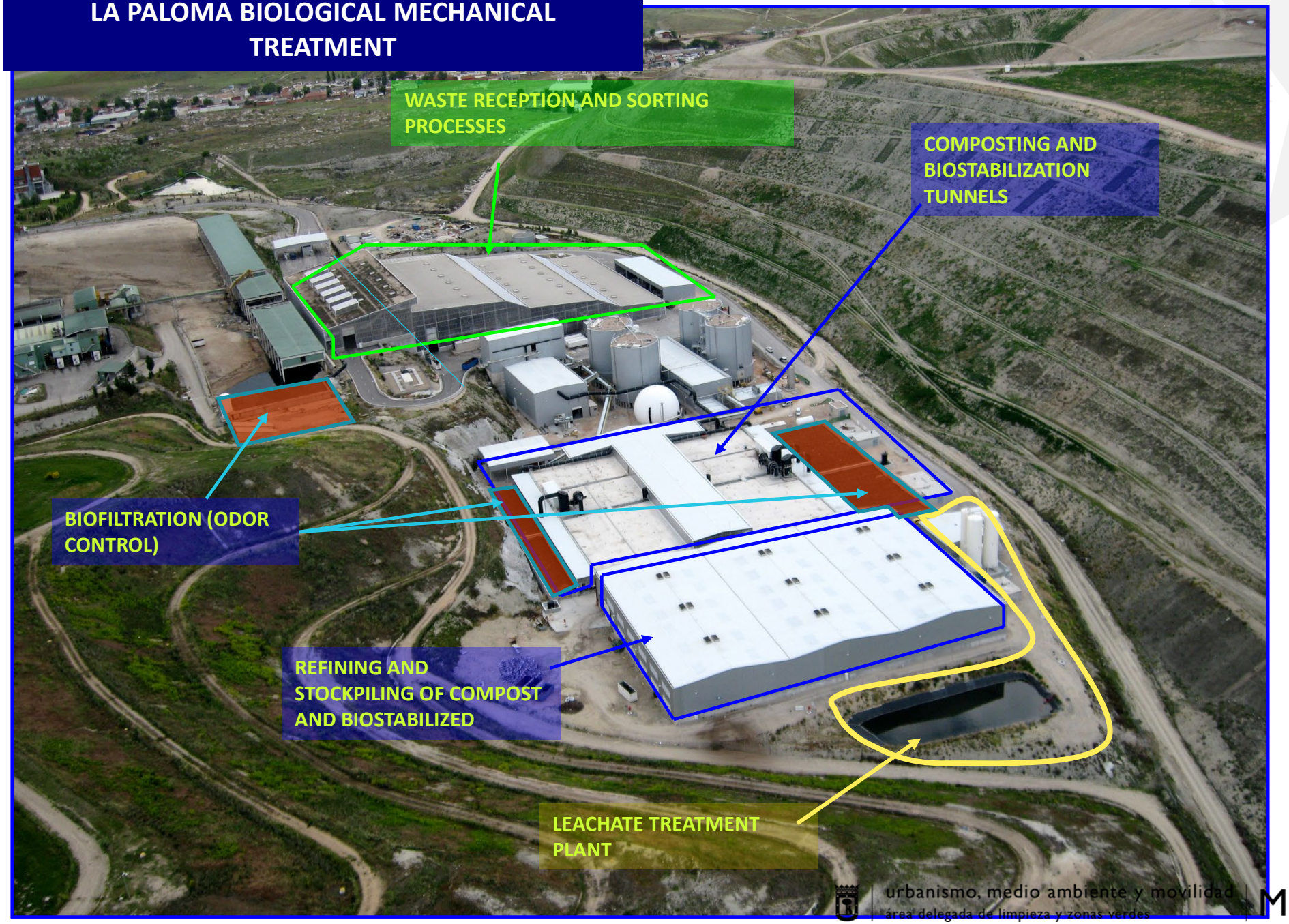
Las Dehesas
- Packaging Sorting: **50.000 t/year**
- Mixed Waste Sorting: **408.000 t/year**
- Composting: **200.000 t/year**

Landfil
- Capacity: **22.700.000 m^3**

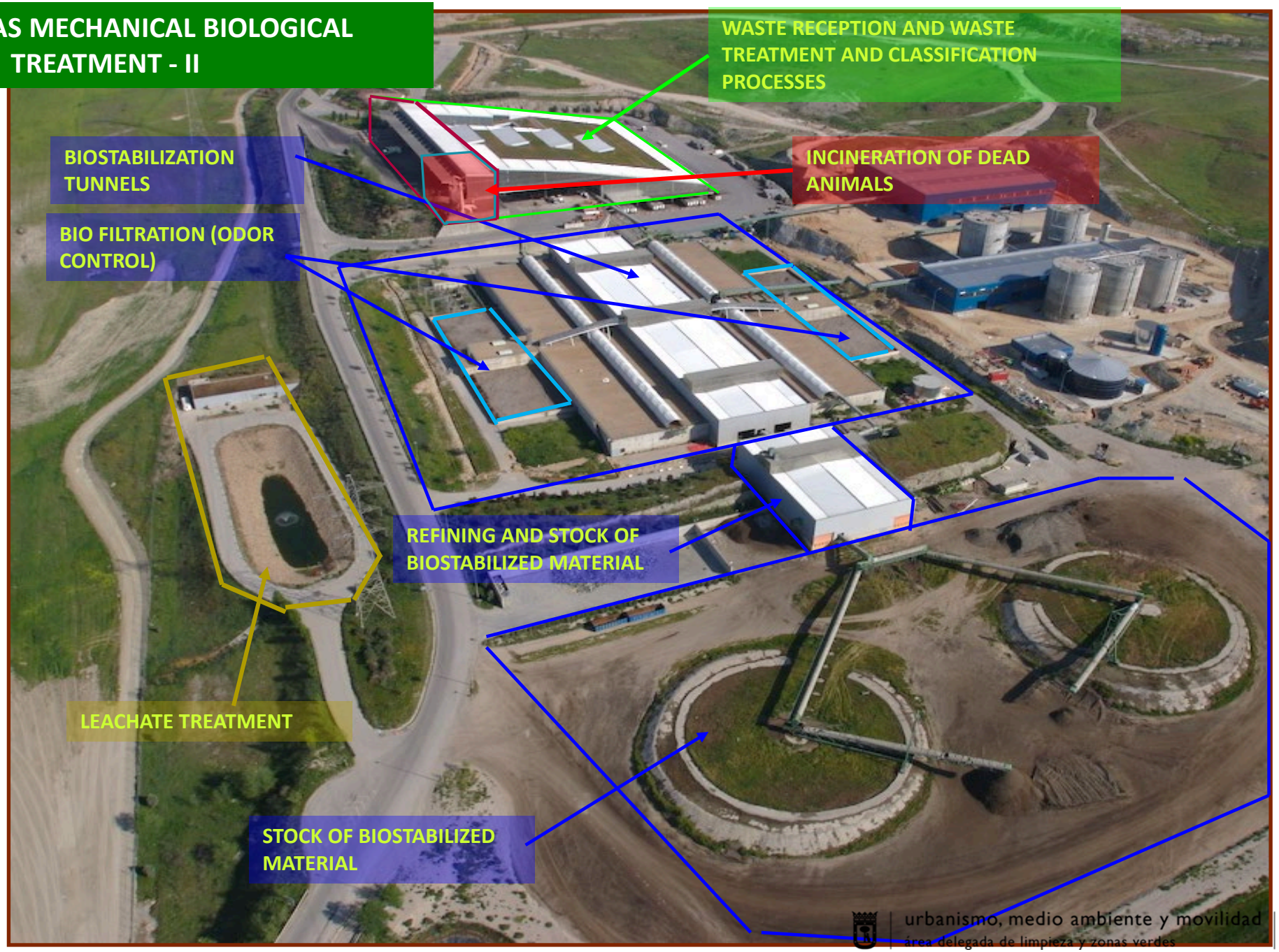


New Automated Composting Plant:
- Organic Fraction Digestate: **82.000 t/year**
- Green Debris: **14.000 t/year**

LA PALOMA BIOLOGICAL MECHANICAL TREATMENT



LAS DEHESAS MECHANICAL BIOLOGICAL TREATMENT - II



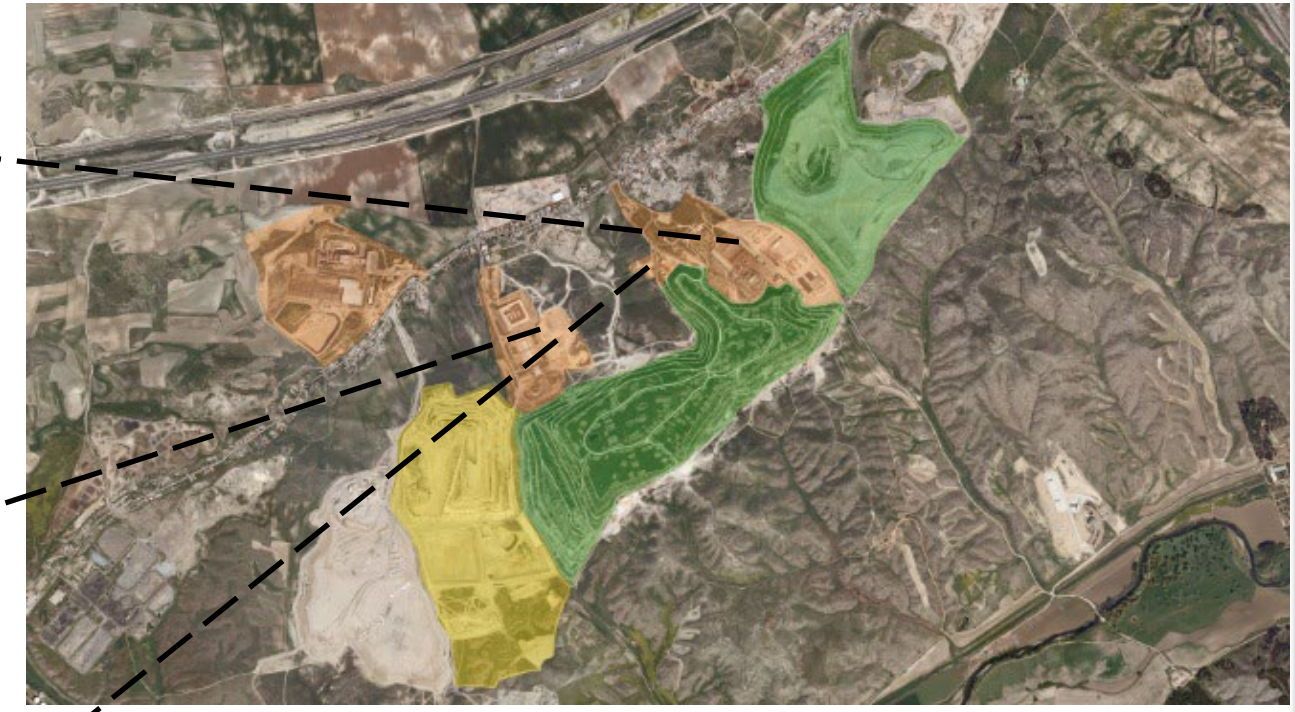
LAS DEHESAS MECHANICAL BIOLOGICAL TREATMENT AND LANDFILLING - I

Treatment II: Biomethanization and Biogas Treatment

Anaerobic Digestion (AD) La Paloma
- Pretreatament: **151.000 t/year**
- AD Capacity: **108.185 t/year**
- Biogas production: **13.700.000 Nm³/year**

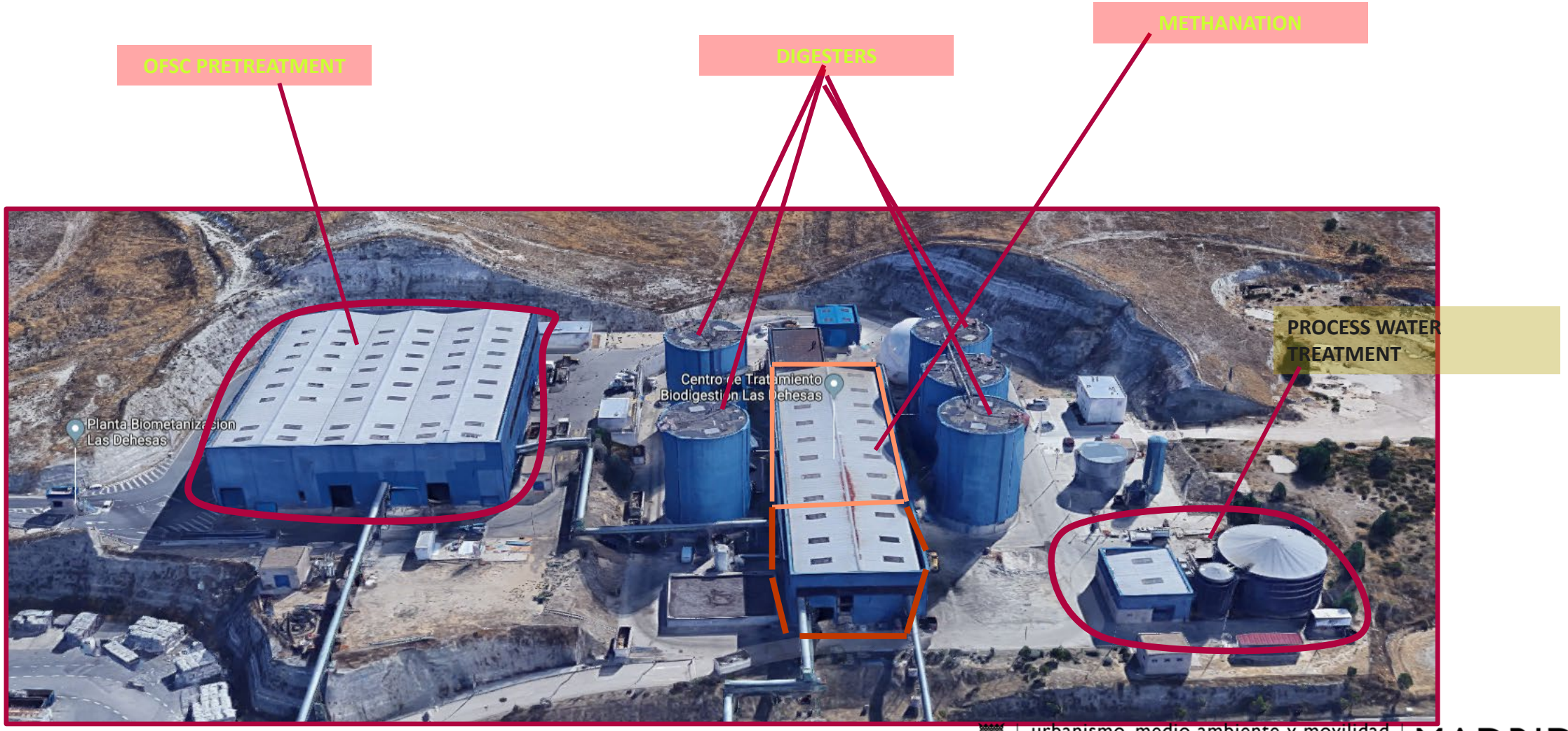
Anaerobic Digestion Las Dehesas (OFSC)
- Pretreatament: **232.000 t/year**
- AD Capacity: **161.000 t/year**
- Biogas Production: **20.300.000 Nm³/year**

Biogas Treatment Plant.
Upgrading Capacity: **37.000.000 Nm³/year (6.500 m3/h)**



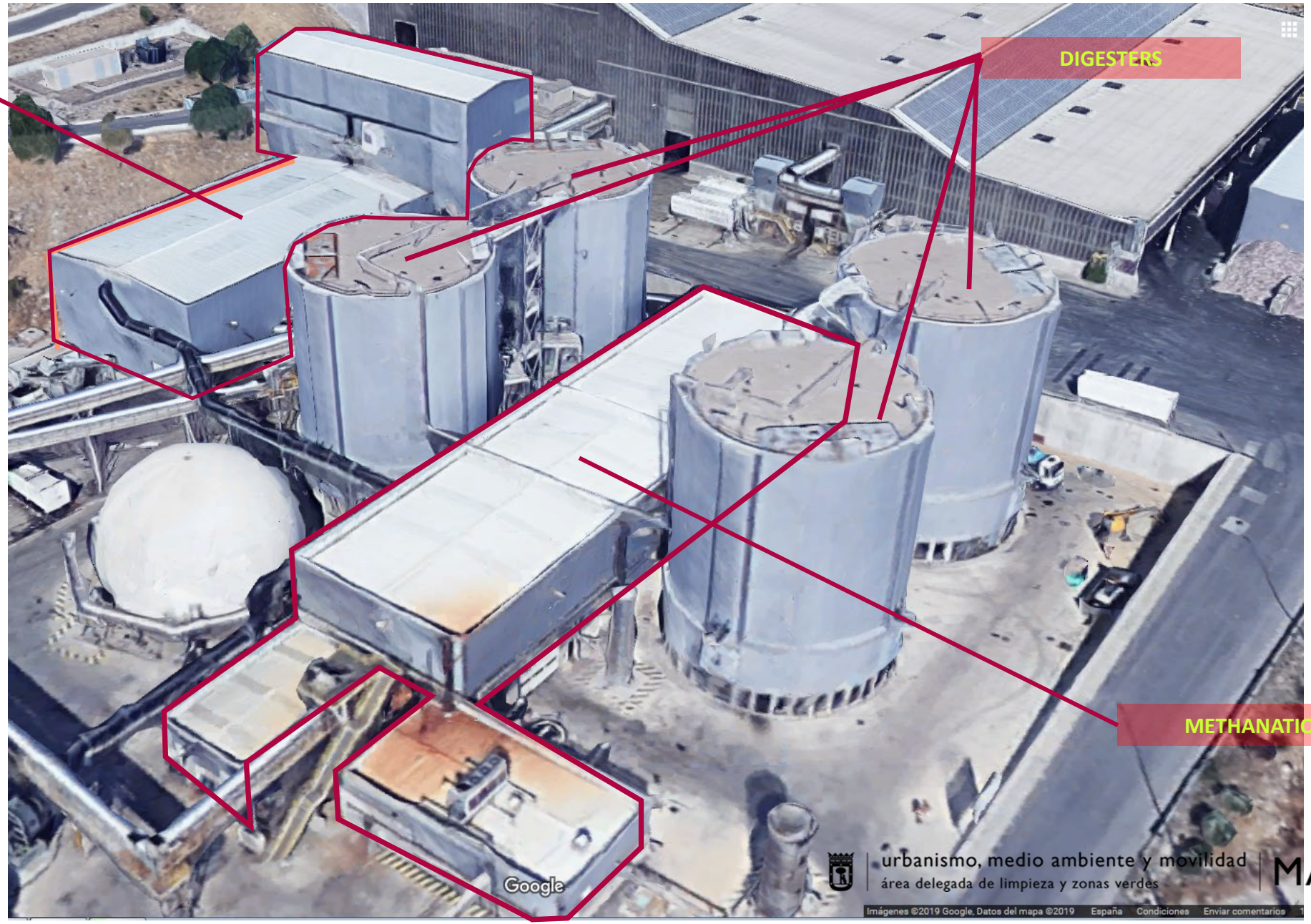
LAS DEHESAS, ANAEROBIC DIGESTION OF FORS - I

THE DEHESAS ANAEROBIC DIGESTION OF FORS - II



LA PALOMA, ANAEROBIC DIGESTION OF SEPARATED ORGANIC MATTER - I

LA PALOMA, ANAEROBIC DIGESTION OF ORGANIC MATTER SEPARATED FROM THE MIXED WASTE FRACTION - I I



BIOGAS TREATMENT PLANT - (UPGRADING)

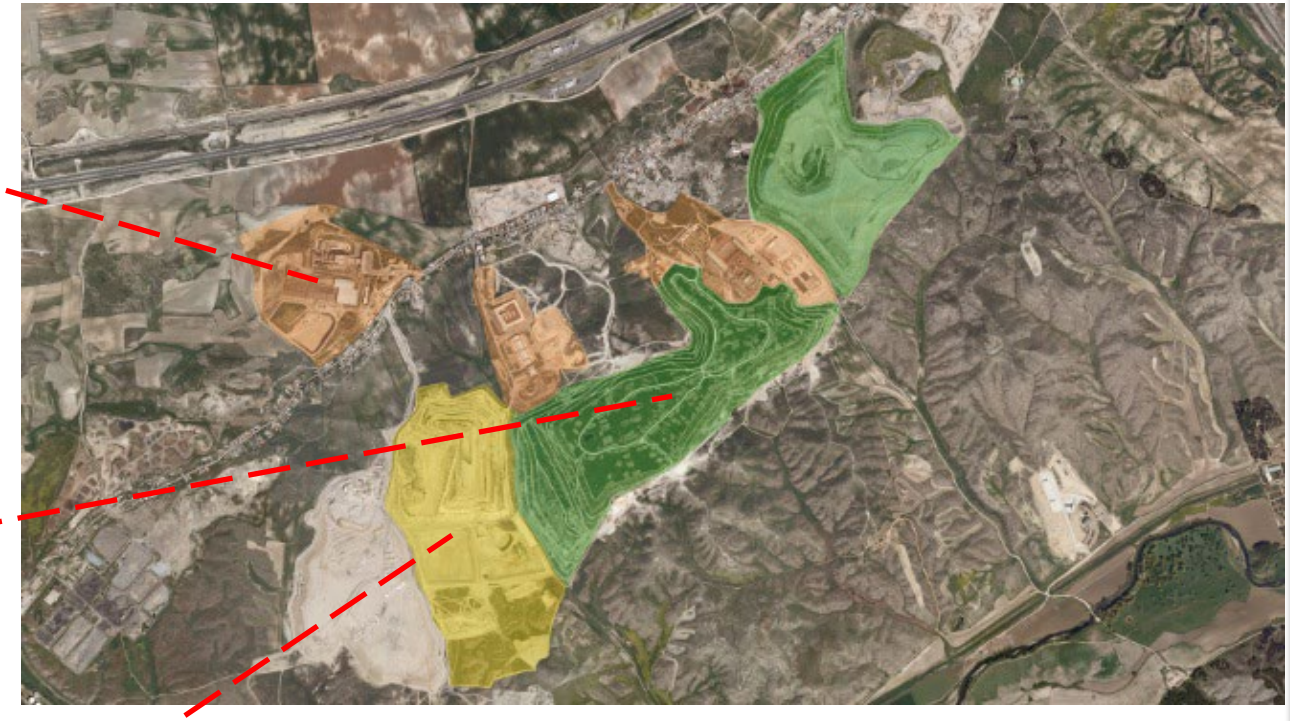
Treatment III: Valorization

Las Lomas (Waste to Energy)
- Incineration Capacity: **320.000 t/year**
- Installed Power: **29,01 MW**
- Energy Production: **220.000 MWh/year**

La Galiana (Landfill biogas to power)
- Biogas Extraction: **28.866.000 Nm³/year**

- **Landfill biogas to power:**
- Installed Power: **18,9 MW**
- Max. Energy Production: **160.000 MWh/Año**

Las Dehesas (Landfill biogas to power)
- Biogas Extraction: **6.132.000 Nm³/year**
- Installed Power: **3,8 MW**
- Energy Production: **31.624 MWh/year**



LAS LOMAS, TECHNICAL MATERIAL SORTING AND ENERGY RECOVERY FROM WASTE (RDF) - I

SORTING PLANT

ENERGY RECOVERY PLANT FOR SORTING REFUSE MATERIALS- POWER PLANT

LAS LOMAS, TECHNICAL MATERIAL SORTING AND ENERGY RECOVERY FROM WASTE (RDF) - II

LA GALIANA, DEGASSING OF THE VALDEMINGÓMEZ LANDFILL AND ENERGY RECOVERY OF BIOGAS - I

LA GALIANA, DEGASSING OF THE VALDEMINGÓMEZ LANDFILL AND ENERGY RECOVERY OF BIOGAS - II

BIOGAS ENERGY RECOVERY PLANT FROM THE VALDEMINGOMEZ LANDFILL

VALDEMINGOMEZ FOREST PARK AND LANDFILL

LA GALIANA, DEGASSING OF THE VALDEMINGÓMEZ LANDFILL AND ENERGY RECOVERY OF BIOGAS - III

COGENERATION PLANT WITH BOTTOMING CYCLE

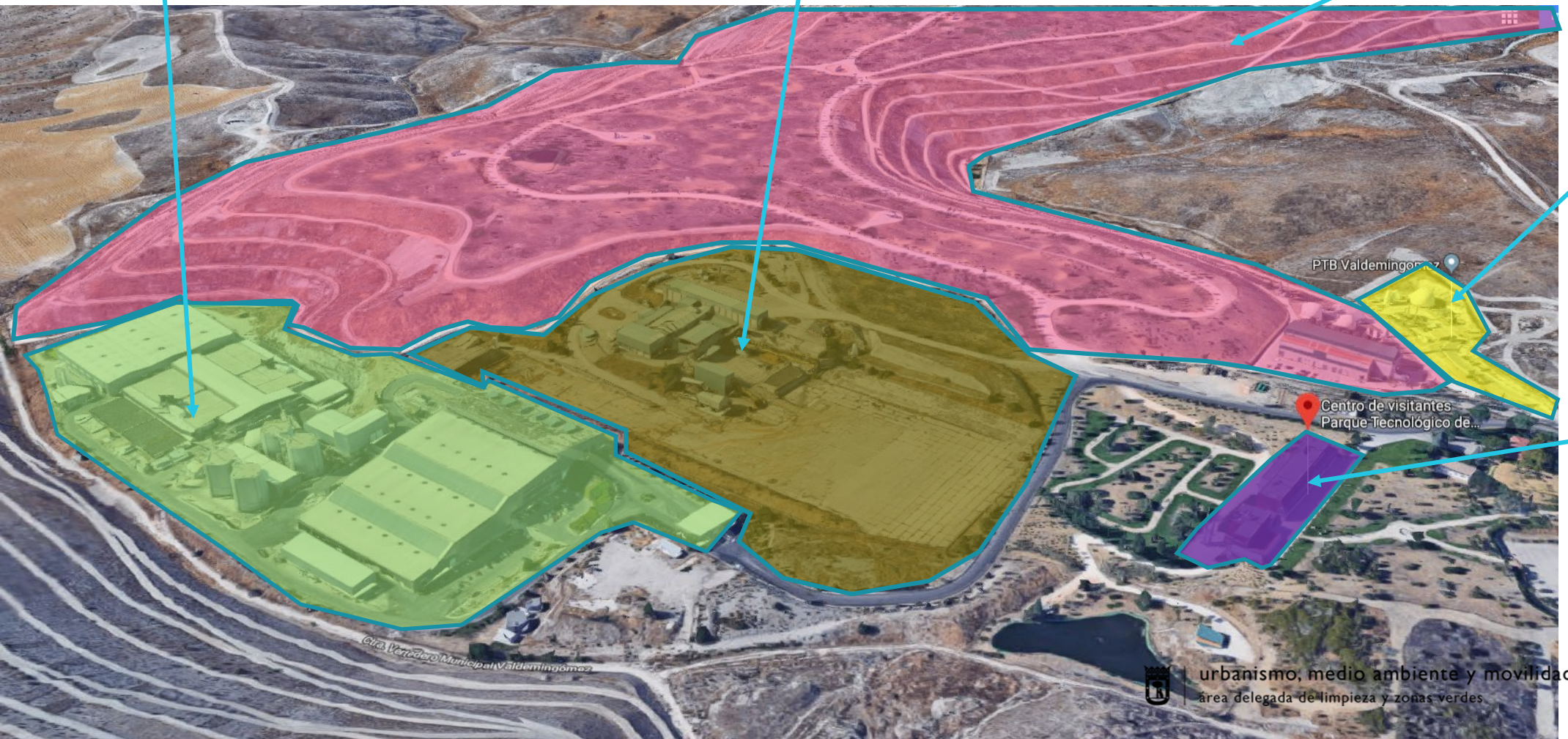
GASOMETERS

SAFETY TORCHES

LA GALIANA, DEGASSING OF THE VALDEMINGÓMEZ LANDFILL AND ENERGY RECOVERY OF BIOGAS - IV

NEW AUTOMATED COMPOSTING PLANT - I

DIGESTATE TREATMENT FROM ORGANIC FRACTION OF SELECTIVE COLLECTION (OFSC) AND GREEN DEBRIS



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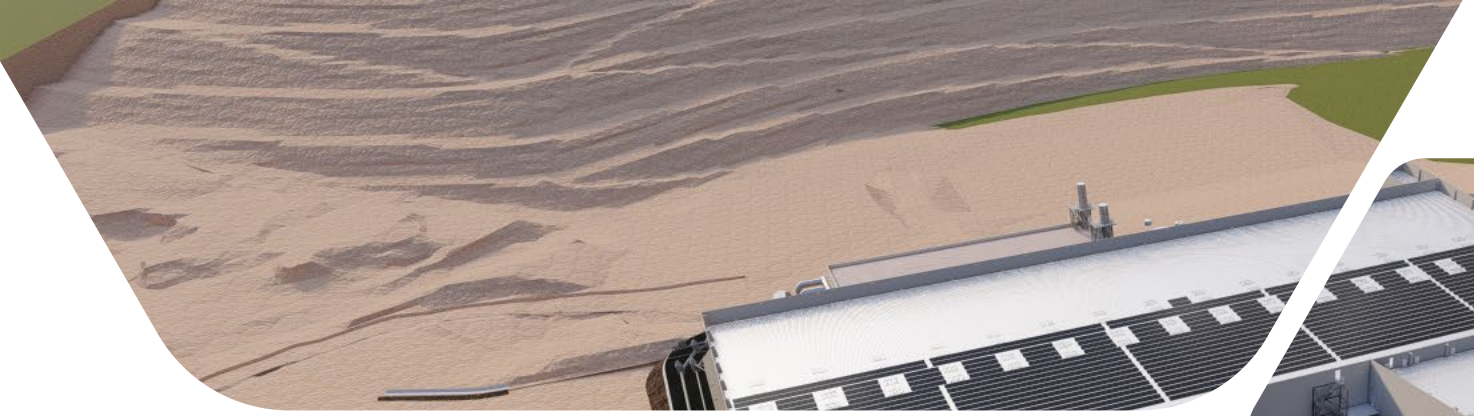
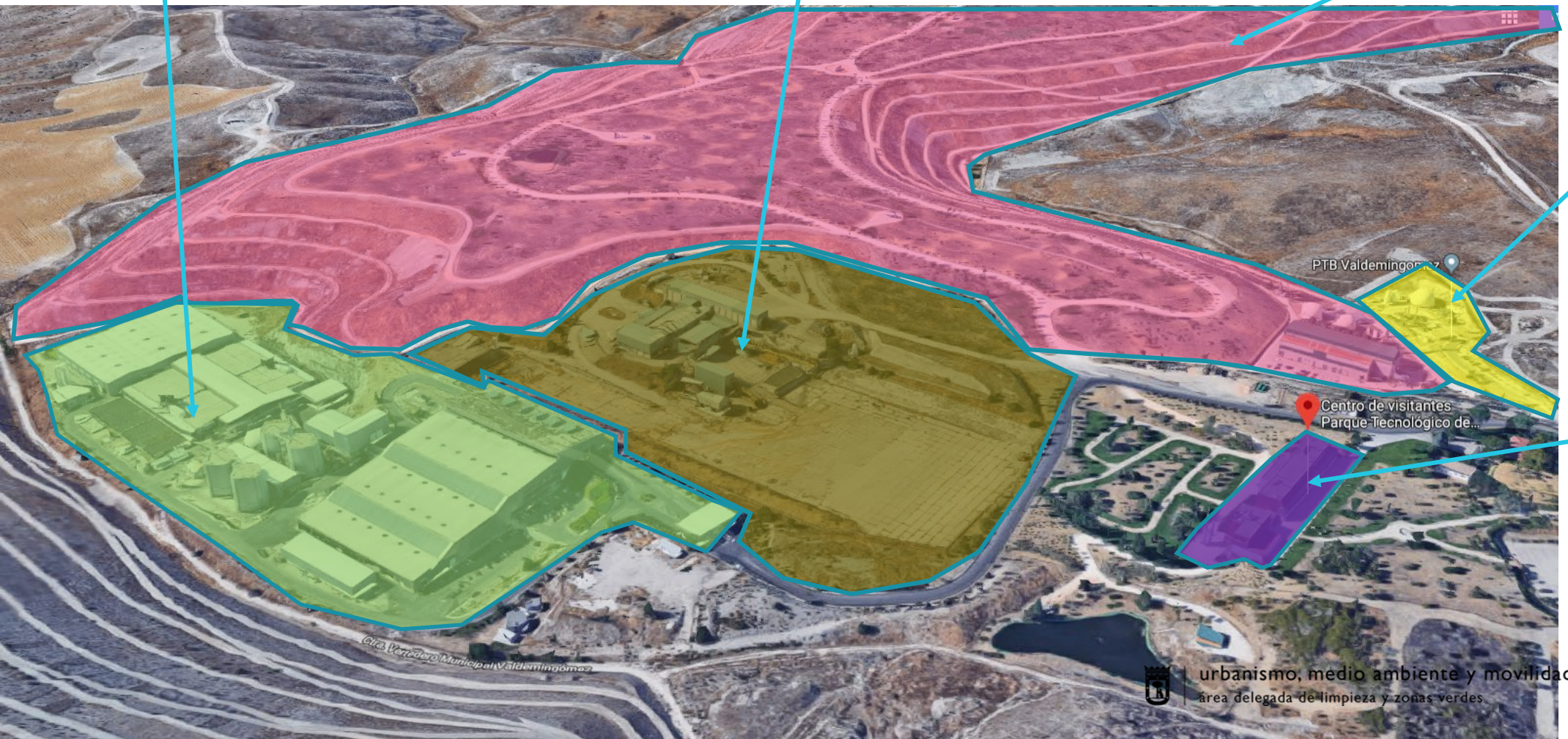


Part V – New Automated Composting Plant Los Cantiles

NEW AUTOMATED COMPOSTING PLANT - I

DIGESTATE TREATMENT FROM ORGANIC FRACTION OF SELECTIVE COLLECTION (OFSC) AND GREEN DEBRIS



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área delegada de limpieza y zonas verdes

MADRID

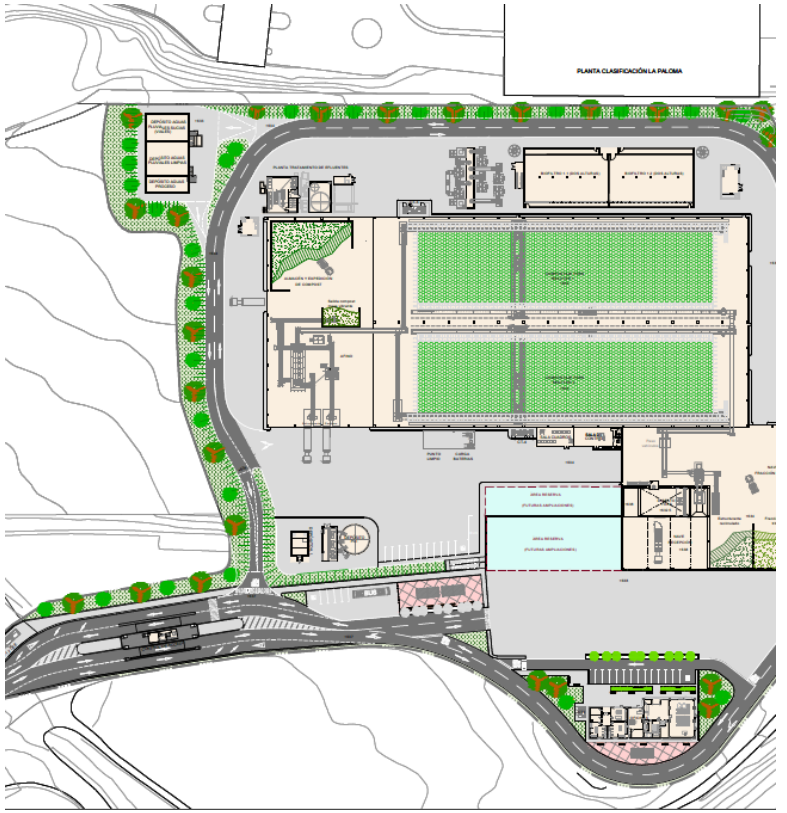
New OFSC digest treatment plant

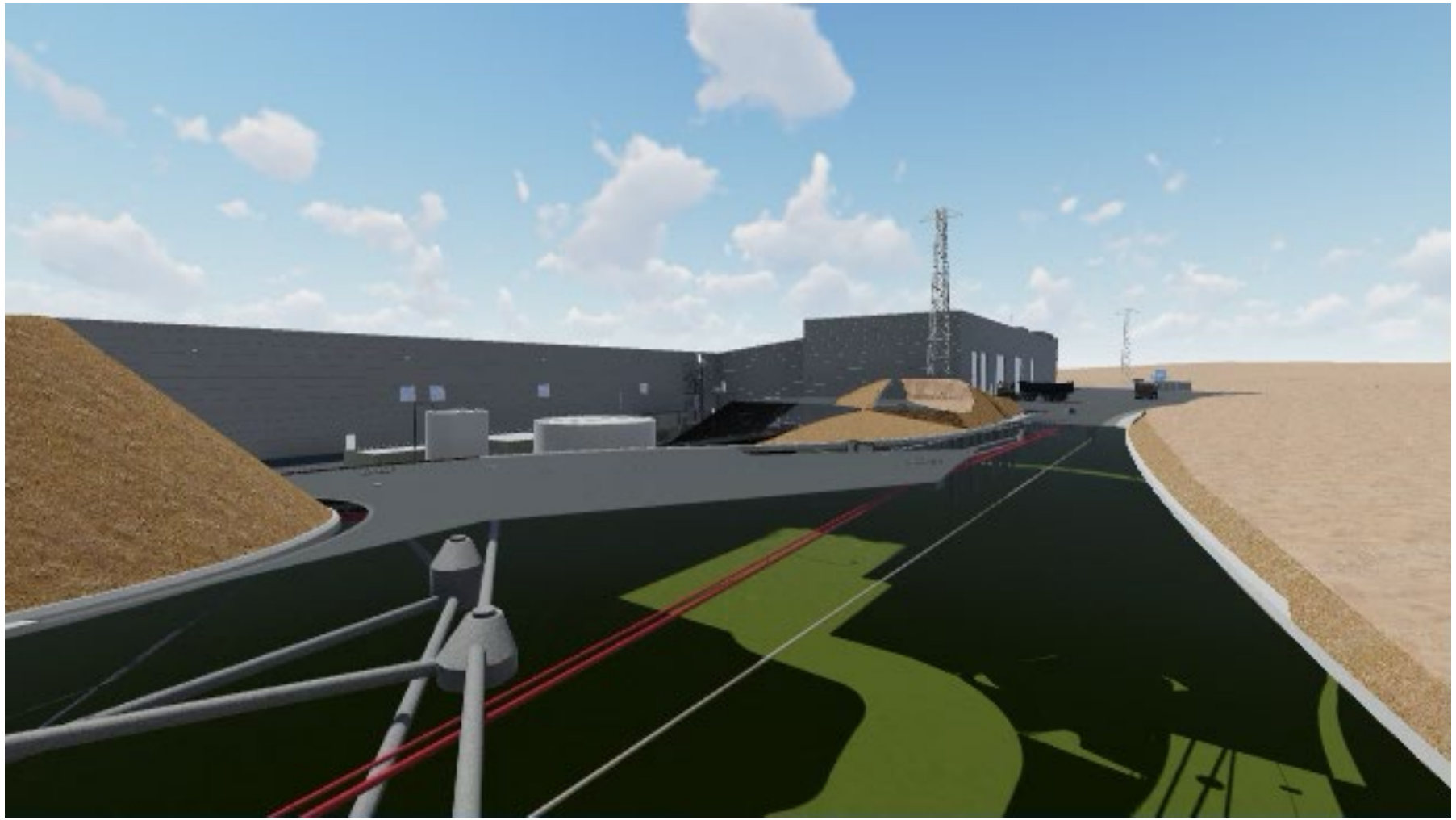
BASIC FACTS-I

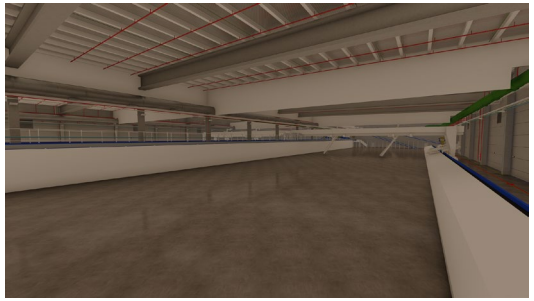
- Design Capability:
  - 82.490 t/year of digestate
  - 23.910 t/year green debris
- Production Target:
  - 37.240 t/year of high quality compost production
- Deadlines:
  - Signing of the contract: 17/08/2021
  - Beginning of the work: 15/06/2022
  - Construction timeline: 21 meses →16/03/2024
  - Start-up: 2 meses→17/05/2024
  - Operation: 3+2 años
- Investment:
  - 31.035.587,43 € incl. VAT

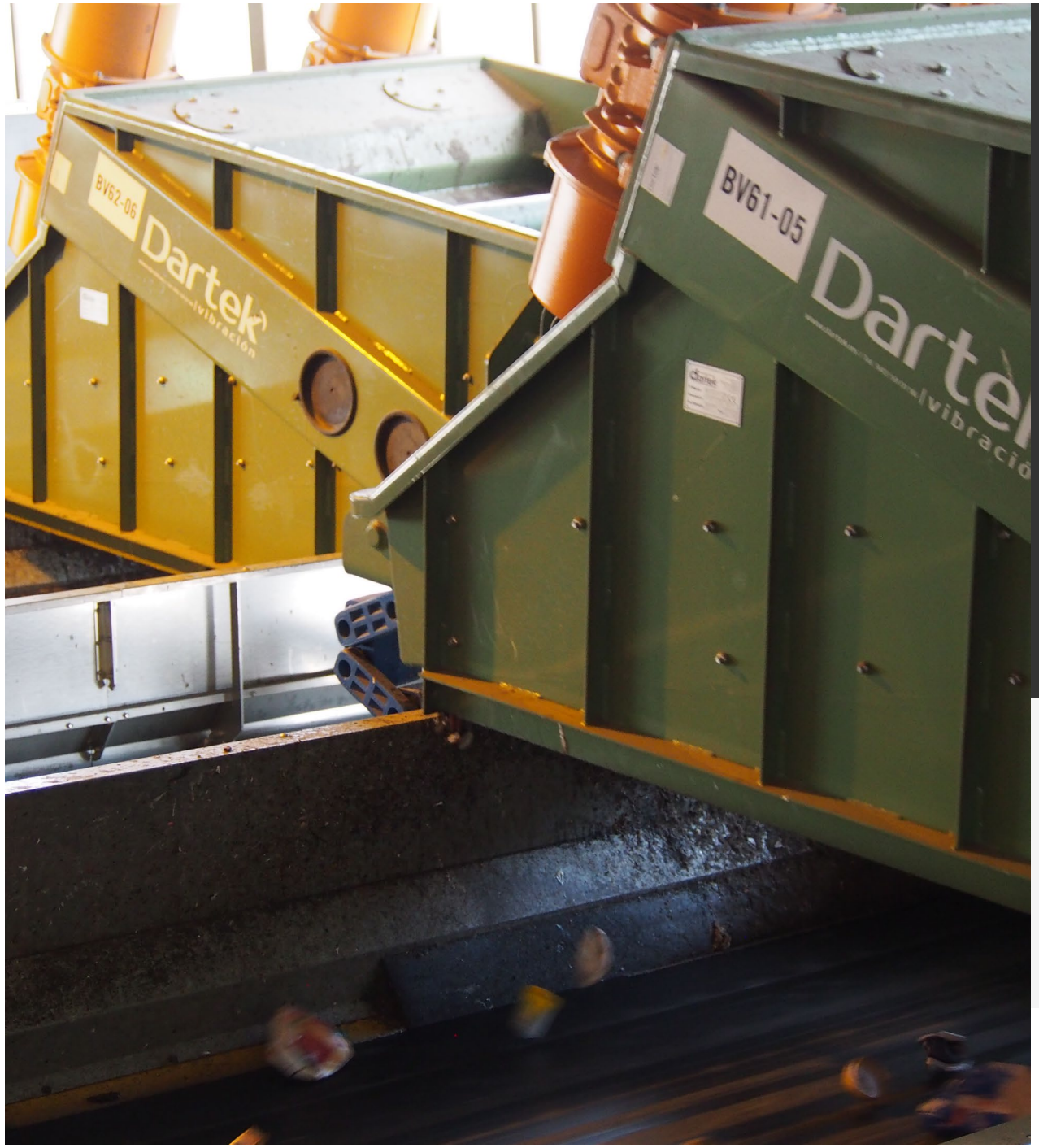
BASIC FACTS-II

- **Work-Service contract:**
  Construction and operation of an automated composting plant.
- **Targets:**
  - Recycling of organic material through the production of quality compost for soils.
  - Avoid the emission of greenhouse gases and bad odors into the atmosphere.
  - Reduction of landfill.
- **Construction project parameterized in BIM.**
- **Innovation:**
  - laboratory
  - area to carry out R+D projects
  - €125,000 annual allocation for R+D+i projects
- **Maximum impact reduction.**
- **Complete sensorization of the production process.**
- **Performance monitoring through AI processes.**
- **EERR: 0.9 Mwh photovoltaic solar plant**









Part IV – The Valdemingómez Technology Park

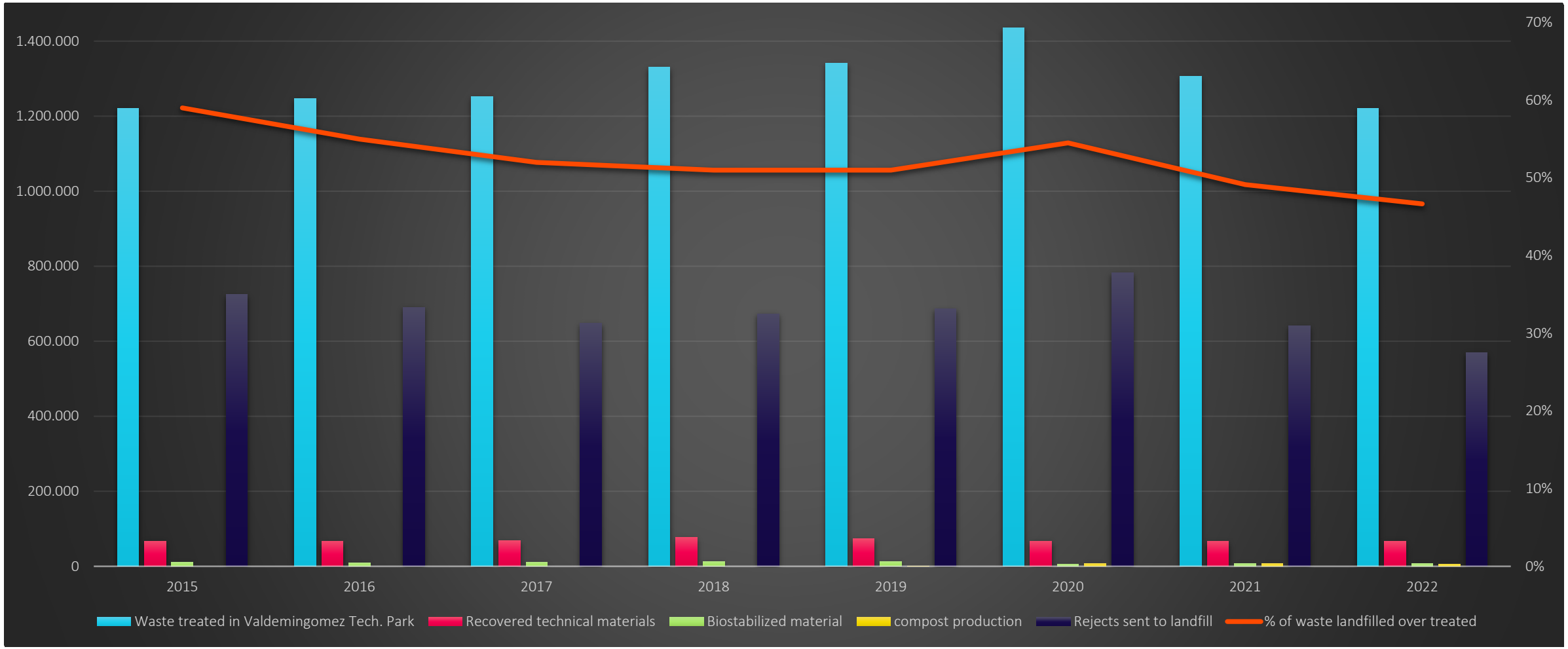
III. Results

Results - I

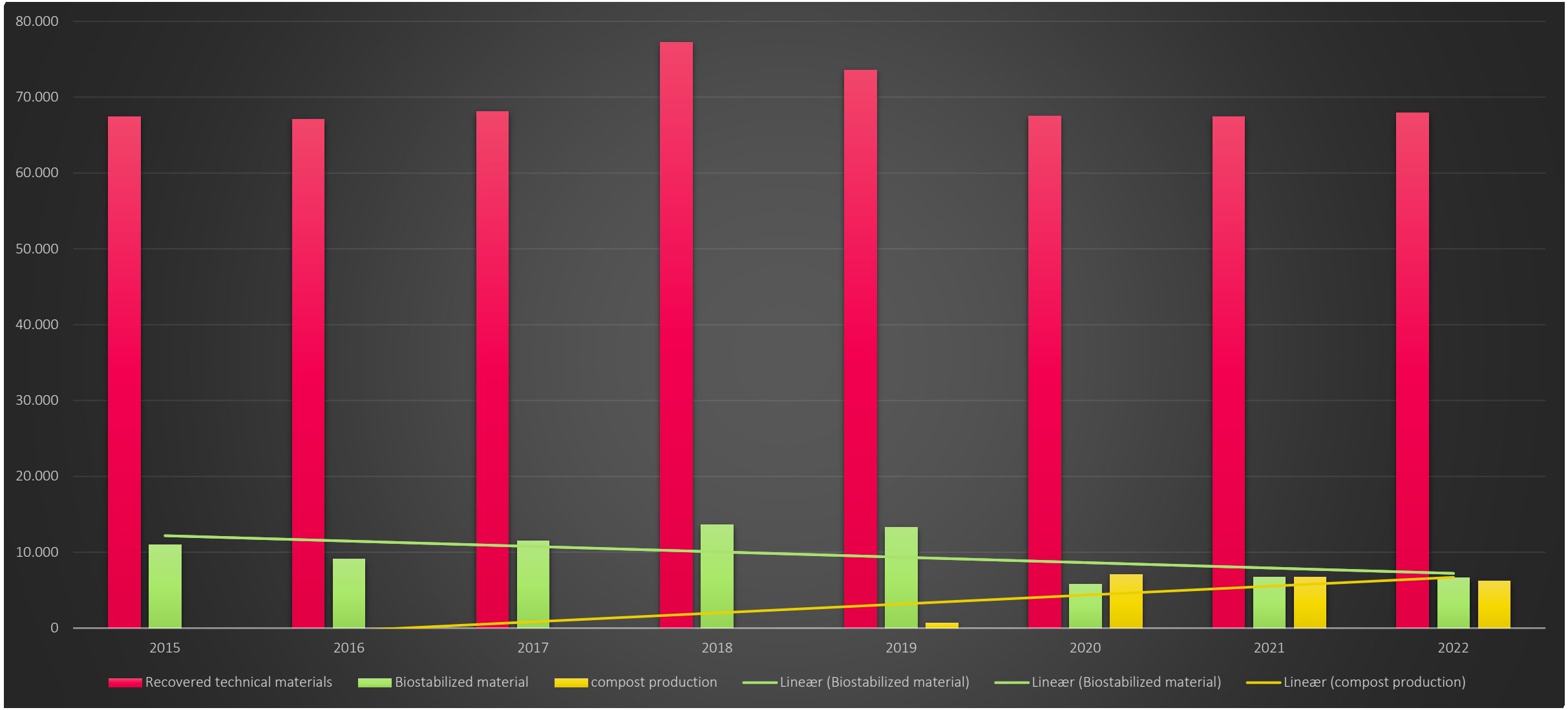
Peso en t.	2015	2016	2017	2018	2019	2020	2021
Waste Treated in the Valdemingómez Technology Park	1.221.236	1.247.047	1.252.443	1.330.877	1.341.450	1.435.921	1.305.646
Recovered technical materials	67.441	67.118	68.167	77.270	73.616	67.540	67.385
Biostabilized Material	10.966	9.068	11.522	13.605	13.275	5.740	6.734
Compost production	-	-	-	-	692	7.015,96	6.674,10
rejects sent to landfill	724.729	690.823	648.044	673.124	686.900	782.757	641.551
% of waste landfilled over treated	59%	55%	52%	51%	51%	55%	49%

MWh.	2015	2016	2017	2018	2019	2020	2021
Electrical Power Generated	233.522	245.314	267.853	303.682	316.394	312.073	303.843
Network-injected biomethane	61.089	74.958	91.857	95.617	100.276	103.476	98.333

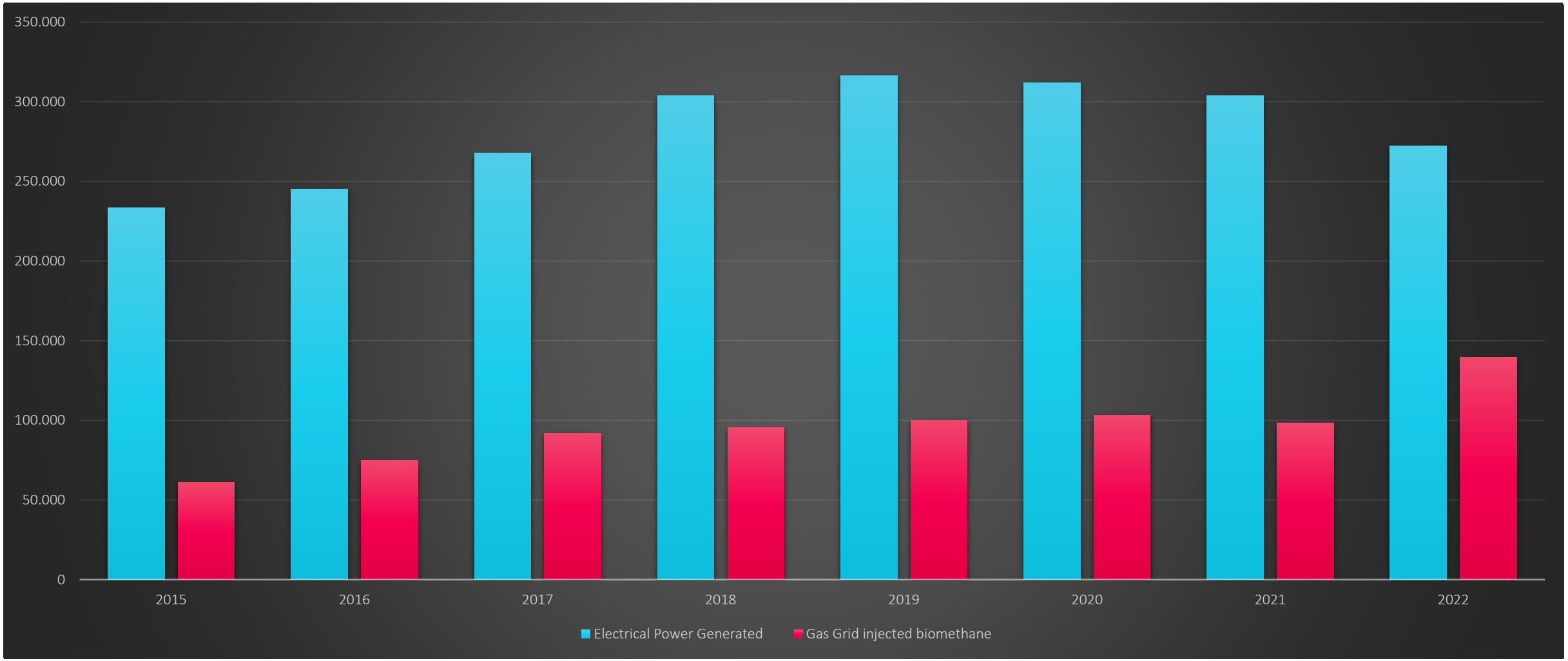
Resultados – II. Materiales I



Results – III. Materials II

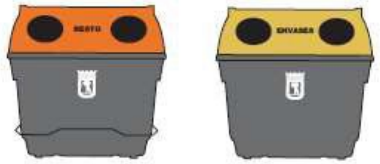


Results – IV. Energy



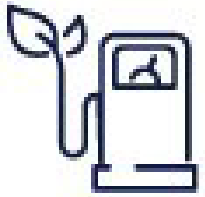
RESULTS-V:
CIRCULAR ECONOMY LINES OF WORK - RESULTS

FERTILISER AND AMENDMENT PRODUCTION: COMPOST + BIOSTABILISED: 12,822 t



RECOVERY OF TECHNICAL MATERIALS: 67.210 t (CARTONS, CANS, P/C, GLASS...)

RESULTS-VI:
CIRCULAR ECONOMY LINES OF WORK - RESULTS



+27.399
Gas Homes

BIOFUEL PRODUCTION: **36.9 million Nm3 BIOGAS AND 139,651 MWh BIOMETHANE**

+ 85.475
Electricity Homes

ELECTRICITY PRODUCTION: **273.521 MWh**

La ciudad de Madrid – Gestión de Residuos 2022

Population Served

3.2 million inhabitants

8 million tourists a year before the pandemic

500,000 commuters before the pandemic

Treated waste

1.2 million tonnes of waste

5 fractions

3,347 t/d

370 Kg/inhabitant. year

Facilities

Technology Park

Industrial Complex

7 treatment facilities

1 under construction

Results

More than 67,000 t of Recovered Materials and 12,800 t of compost and biostabilized

273,521 MWh of electricity

139,651 MWht injected into the Enagas network as biomethane

Emissions balance: -200,000 tCO2e/year

Cost

Management costs:

€80-70 million

66,66 € / ton

Future investment costs:

€46 million

Revenue: 45% of costs

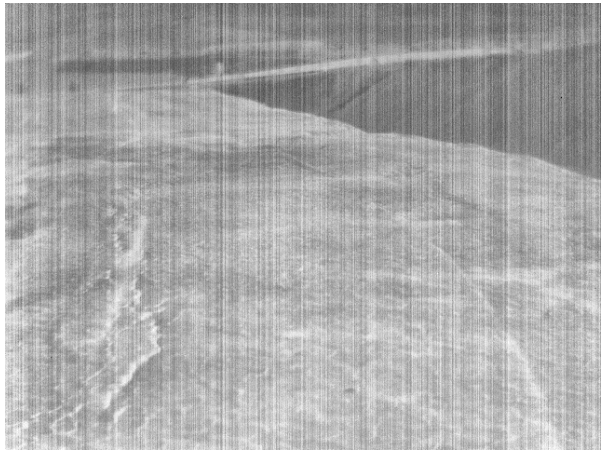
PART V

INNOVATION IN THE MANAGEMENT OF PUBLIC SERVICES – WASTE MANAGEMENT

INNOVATION

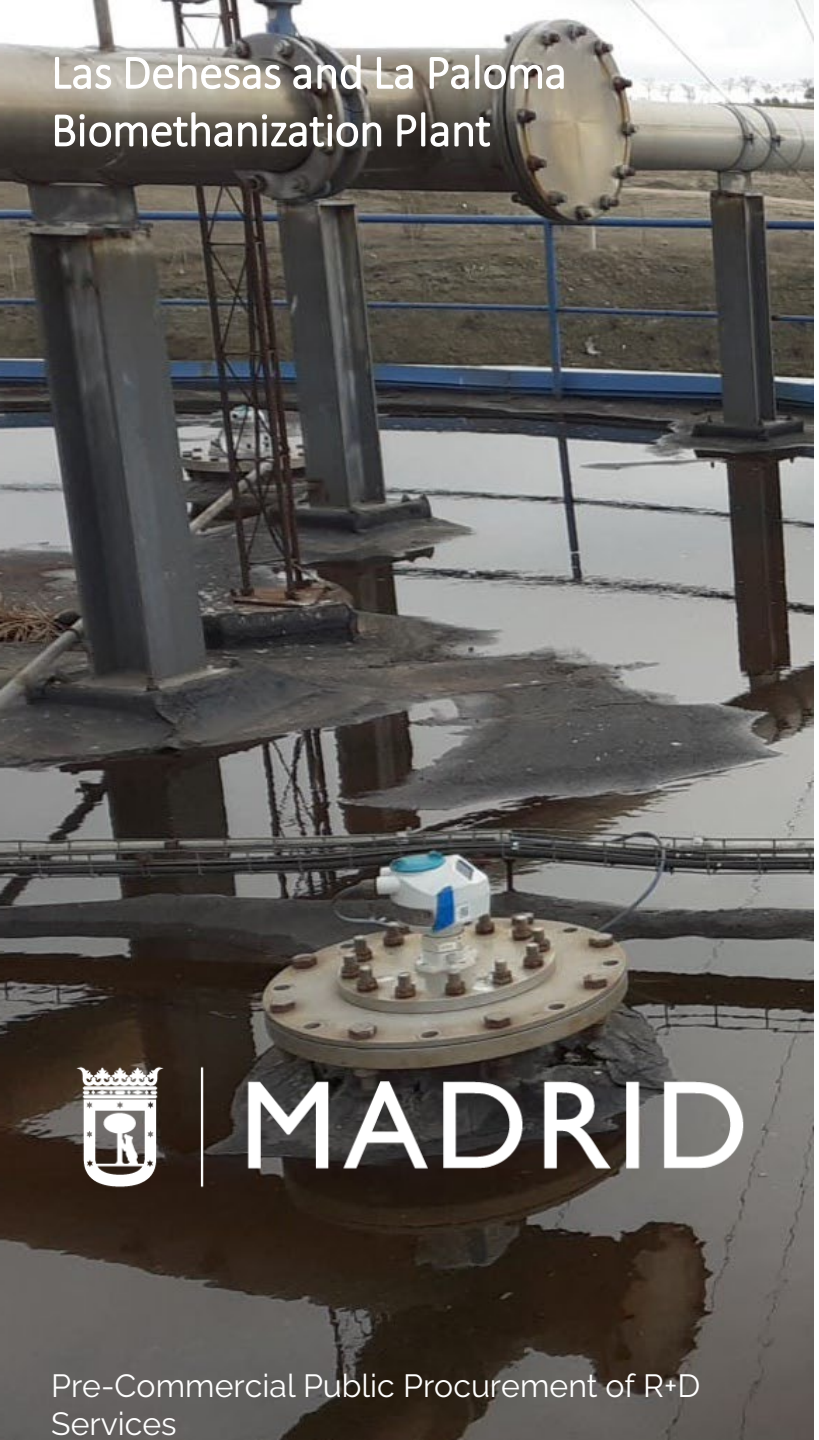
Development and verification of a methodology for the measurement of biogas fugitive emissions in the Valdemingómez Technology Park - II

Pre-Commercial Public Procurement of R+D services. 2020 -2021



Infrared Optical Gas Imaging Technology

WORK METHODOLOGY



Las Dehesas and La Paloma Biomethanization Plant

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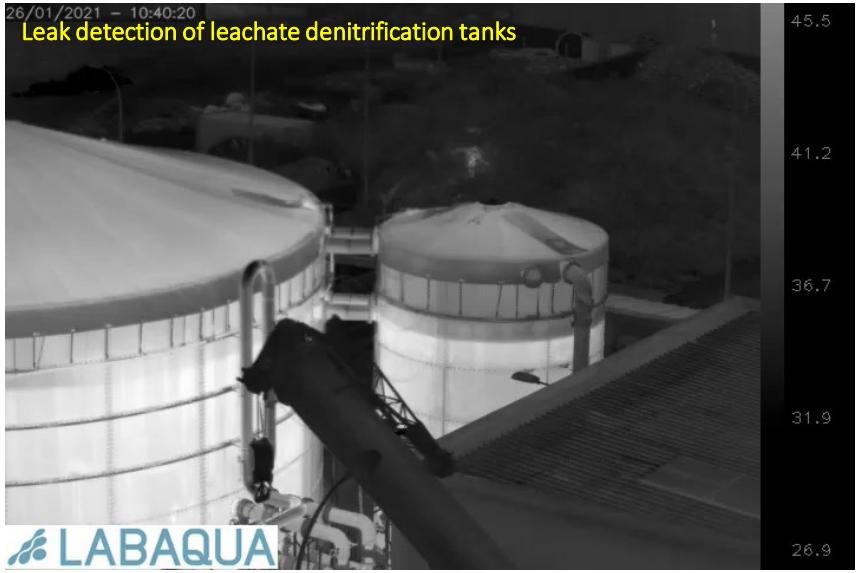
Pre-Commercial Public Procurement of R+D Services

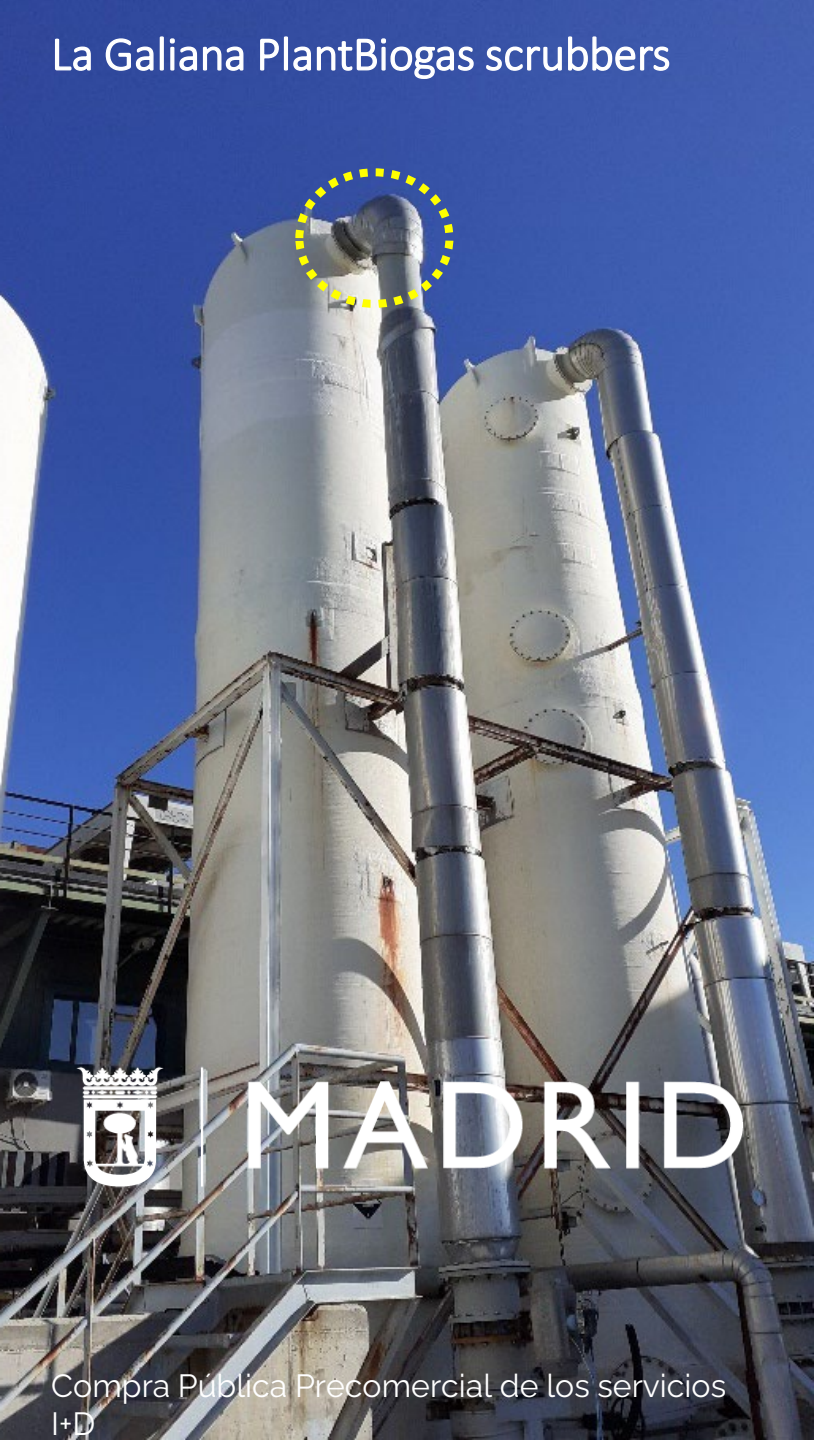
FUGITIVE EMISSIONS DETECTION

Leakage in heat-insulated digester



Leakage in biogas compressor

La Galiana PlantBiogas scrubbers



CONTINUOUS IMPROVEMENT PROCESS

1. Leak Identification

2. Reporting leaks to the operating company

3. Repair of leaking elements

4. Verification of the repair of elements

Las Dehesas landfill

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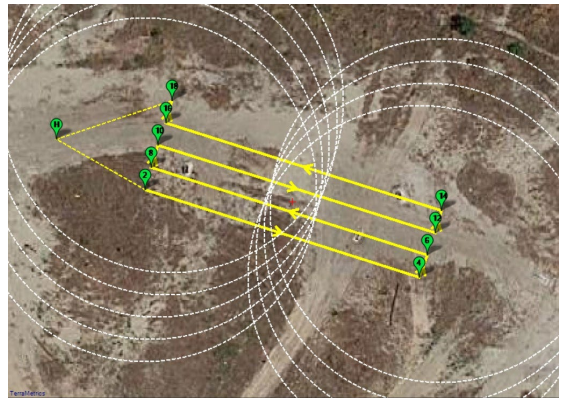
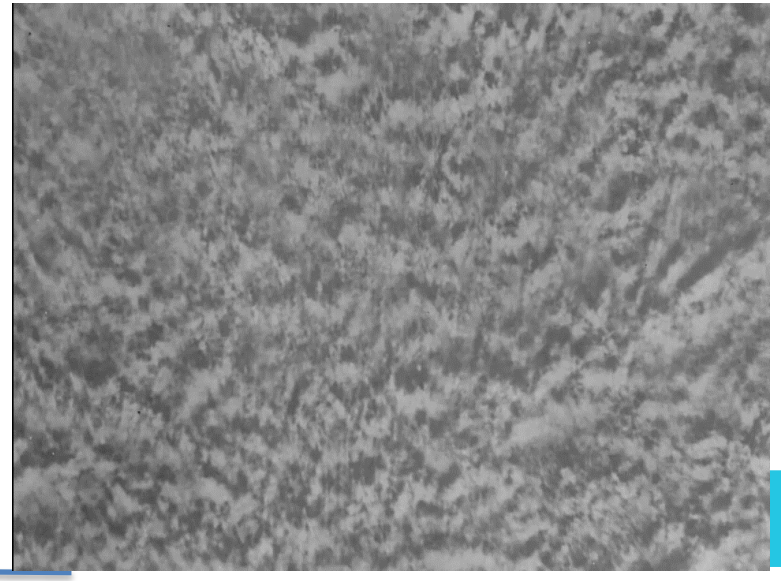
Pre-Commercial Public Procurement of R+D Services

AERIAL DETECTION VALIDATION WORKS

Height 20m



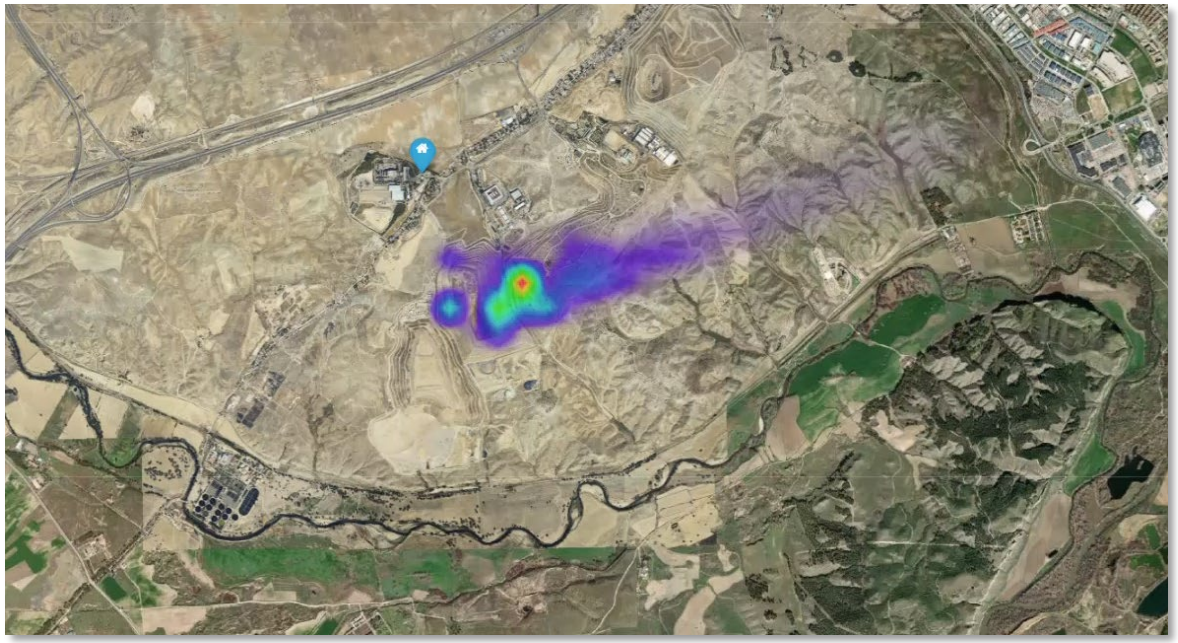


Development and verification of a methodology for the measurement of gaseous emissions in the Valdemingómez Technology Park - III

CONCLUSIONS

- **High fugitive emission detection performance.**
- **Leak Detection and Agile Repair Verification.**
- **Rapid reduction of emissions and odour sources**

t/year CO_{2eq}



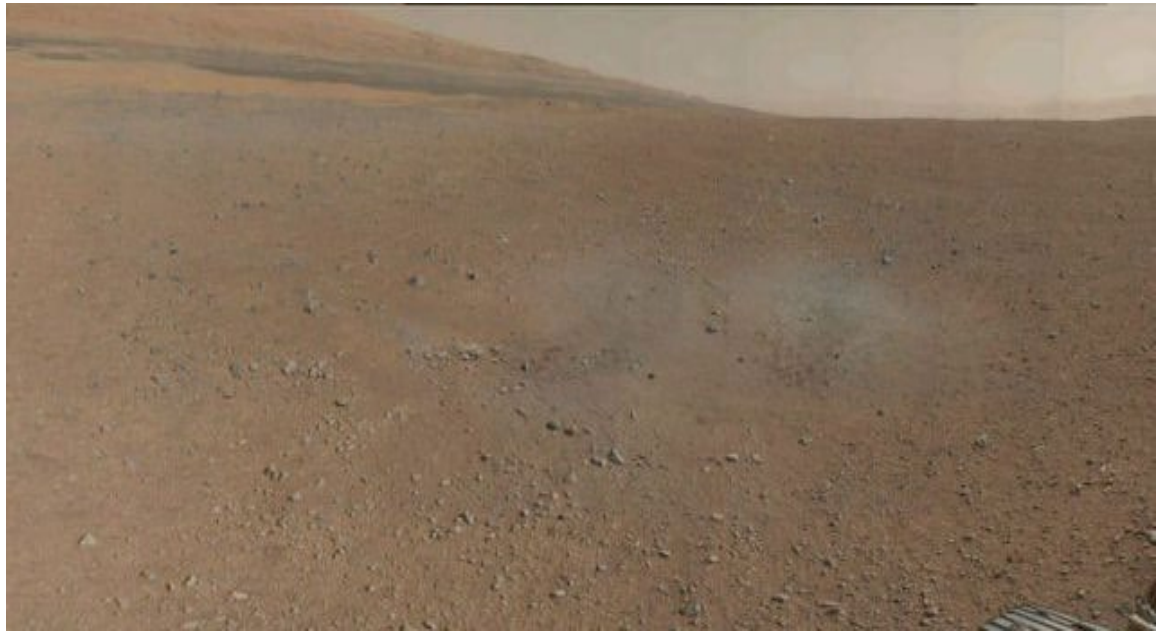
ADDITIONAL

- GHG calculation emissions to determine the carbon footprint
- Application of predictive models of the impact of fugitive emissions

INNOVATION: CPI, CPM

Pre-Market Consultation (PMC): ROBOTIC LANDFILL INSPECTIONS - I

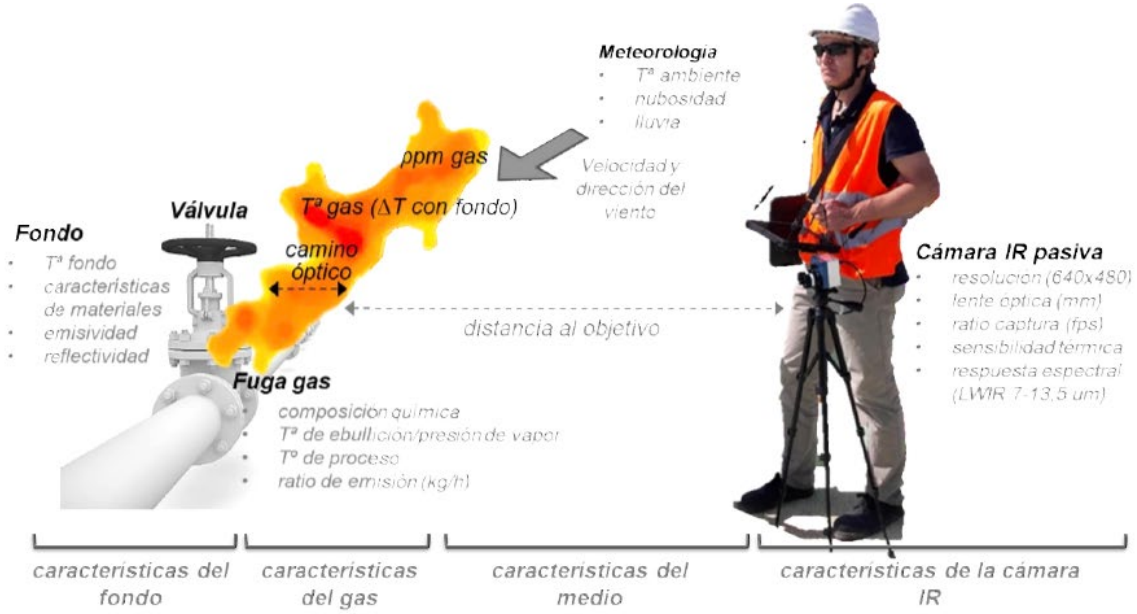
¿Mars or Valdemingómez?



INNOVATION – III: CPI, CPM

PMC: ROBOTIC LANDFILL INSPECTIONS - II

OPERATING CONDITIONS - BEFORE

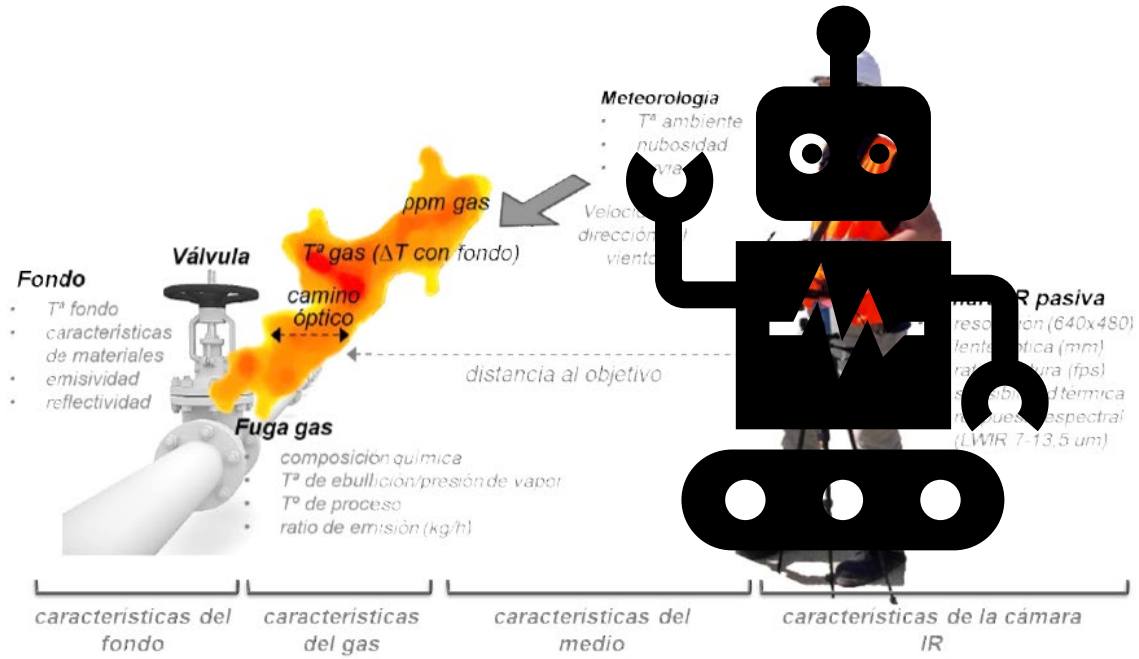


- Environmental factors for detection:
- **Increase in temperatures between the gas to be observed and the background of the image:**
  - distance to target (determines optical resolution)
  - **IR camera spectral resolution**
  - **Gas response in that spectrum band**
  - Volume, pressure and concentration of the gas leak
- Environmental conditions that make measurement difficult:
  - the presence of moderate or strong wind
  - The presence of rain
  - Atmospheric conditions
  - Schedules

INNOVATION – III: CPI, CPM

PMC: ROBOTIC LANDFILL INSPECTIONS - III

OPERATING CONDITIONS - AFTER



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  - Atmospheric conditions
  - Schedules

INNOVATION – III: CPI, CPM

PMC: ROBOTIC LANDFILL INSPECTIONS – IV

NEW CHAIN OF KNOWLEDGE CREATION ABOUT THE LANDFILL

robots
- inspection
- AI

Information platform
- ML
- Data into knowledge

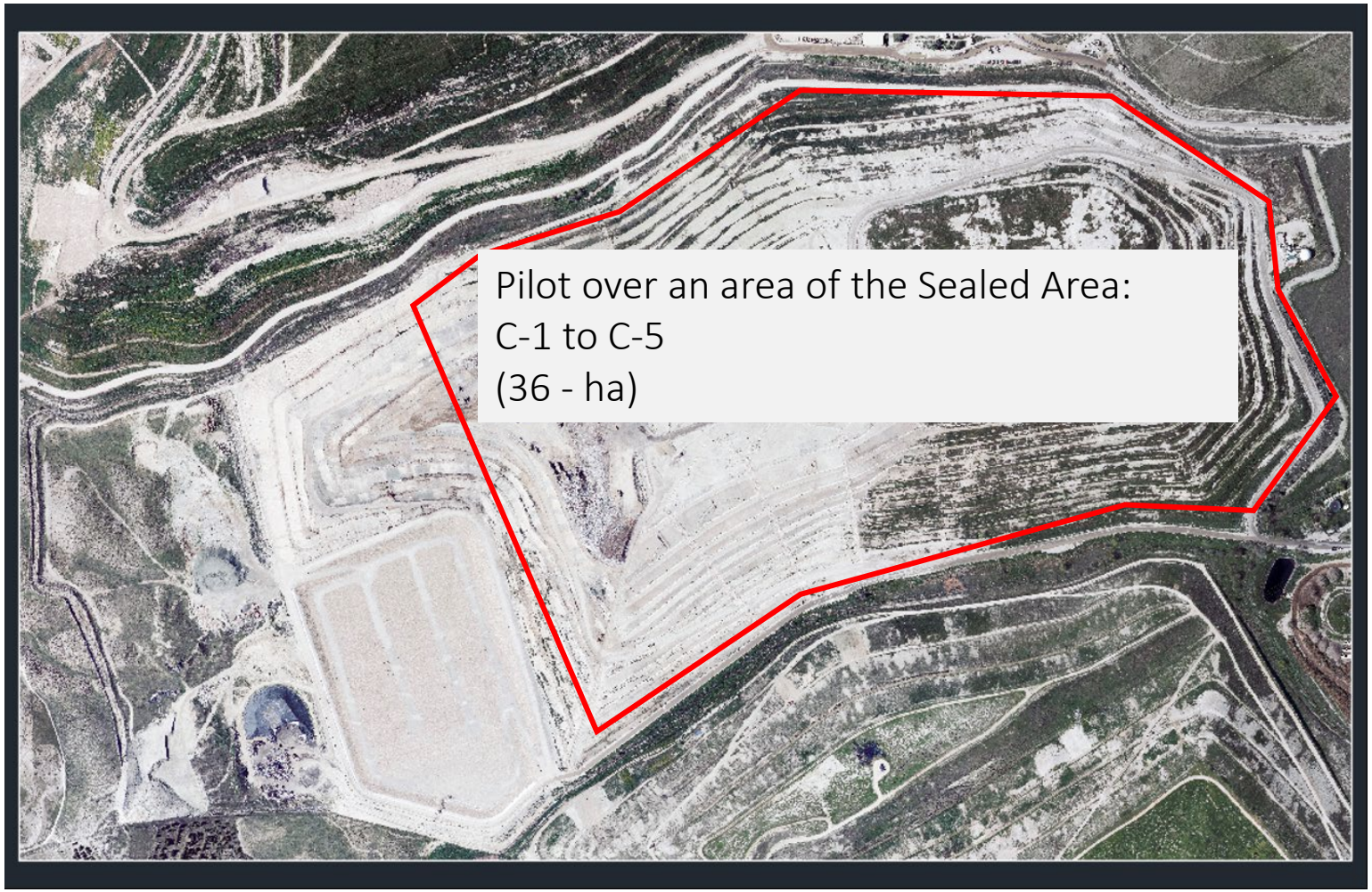
result
- Real-Time
- Correction of leaks

- Using Landfill Robots for Inspections
- **Robots:**
  - They must be **completely autonomous**:
    - On the move
    - Energy
    - Communications
  - **Sensorized:**
    - OGI Cameras to Locate Leaks - AI that allows them to see leaks using OGI cameras
    - Methane, hydrogen sulfide, CO2, etc. sensors to qualify leaks
    - Geolocation and altitude of the leak
- **Information Platform:**
  - Digital Twin
  - Machine Learning Tools
  - Transformation of Data into Knowledge

INNOVATION – III: CPI, CPM

PMC: ROBOTIC LANDFILL INSPECTIONS - V

PROJECTDETAILS

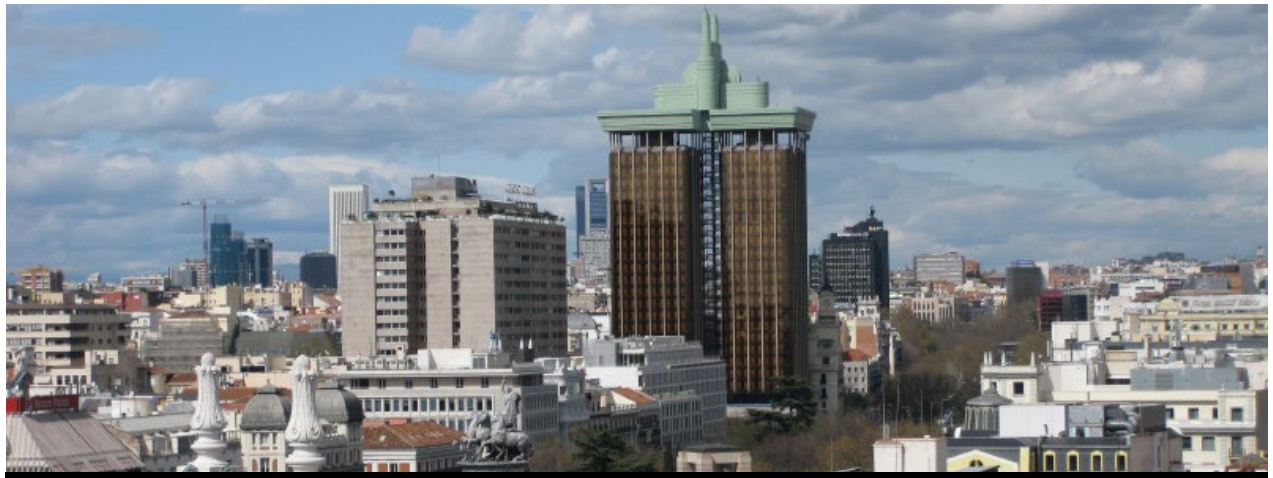


Campaign Objective:

- Avoid human intervention in inspection work.
- Increased security
- Real-time leak detection
- Qualification and quantification of leaks
- Artificial intelligence applied to:
  - The vision and location of leaks
  - Subsequent data management
  - Creating a Digital Twin
- New Landfill Knowledge Creation Chain
- Technology Ecosystem
- Various TRLs

INNOVATION – III: CPI, CPM

PMC: ROBOTIC LANDFILL INSPECTIONS - VI



BENEFITS FOR THE CITY

- Pioneering project at an international level
- Strengthening of the city's technological, innovative and industrial sector
- Attracting Technological Talent
- Positioning the city as a technology hub
- Increased safety in the operation of VTP installations
- Reduction of GHG emissions
- Better use of the methane contained in biogas
- Reduction of Environmental Impact
- Increased Sustainability

Mange Tak
Thank you

Innovation, Promotion and Information Dept.

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Advances for Sustainable Mobility in Madrid

November 15th, 2023

Madrid: 3.3 million inhabitants and 6.8 million at a regional level. 21 districts (128 neighborhoods).

Second most populated Functional Urban area in the European Union.

Key role in the country´s economy (12% of total GDP).

Belonging to 2 TEN-T corridors.

Index

I. Mobility strategies and regulations

Precedent: SUMP 2014 - 2020

Active: Madrid 360 Environmental Sustainability Strategy

Regulations adopted within the Madrid 360 Strategy in the fight against climate change

- Roadmap towards Climate Neutrality (2021)
- Ordinance in Air Quality and Sustainability (2021)
- Ordinance on Sustainable Mobility (2021)
- SUMP 2022 – 2030 (2022)

All regulations and measures are perfectly aligned to transform Madrid into a more environmentally, socially and economically sustainable city

III. Policies for urban planning and mobility

Madrid 360: SUMP 2022 - 2030

The recently published SUMP is perfectly aligned with the Madrid 360 strategy and includes **10 strategic axes**, **32 measures** and **121 actions** to be implemented before 2025. It pursues the transformation of the mobility system towwards a **more sustainable, smart and safe mobility**.

1. More and better public transport
2. Improving transport infrastructure
3. Promoting active mobility
4. Managing parking with sustainable criteria
5. Facilitating modal integration through innovation and intermodality
6. Stimulating the shift to cleaner vehicles
7. Optimising urban freight distribution
8. Promoting technological change, innovation and organisational reformation
9. Moving towards safe mobility
10. Encouraging responsible mobility through information and communication

I. Mobility strategies and regulations

Madrid 360 Environmental Sustainability Strategy

It is the most ambitious strategy that the city of Madrid has attempted, both in terms of its content (200 initiatives that include mitigation and adaptation measures), its scope (it is completely comprehensive, including all districts and sources of emissions) and its execution (it involves the transformation of the city, mobility and the Administration)

City

It aims to **increase energy efficiency** and support **electrification**, improve **infrastructure** management and promote the development of **green areas.**

Mobility

It promotes the use of **micromobilities**, **public transport** optimisation and the shift to **environmentally friendly** vehicles in the city.

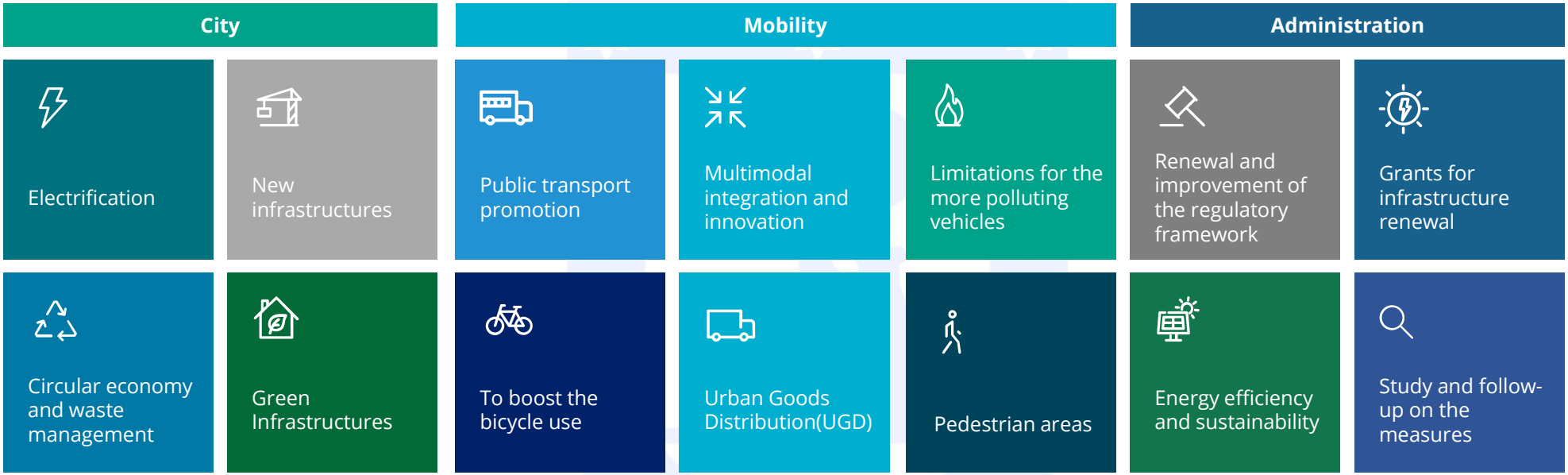
Administration

It encourages the transformation of the administration as an exemplary **leader in sustainability**, by adapting the **regulatory framework** to facilitate the Strategy **implementation**.

I. Mobility strategies and regulations

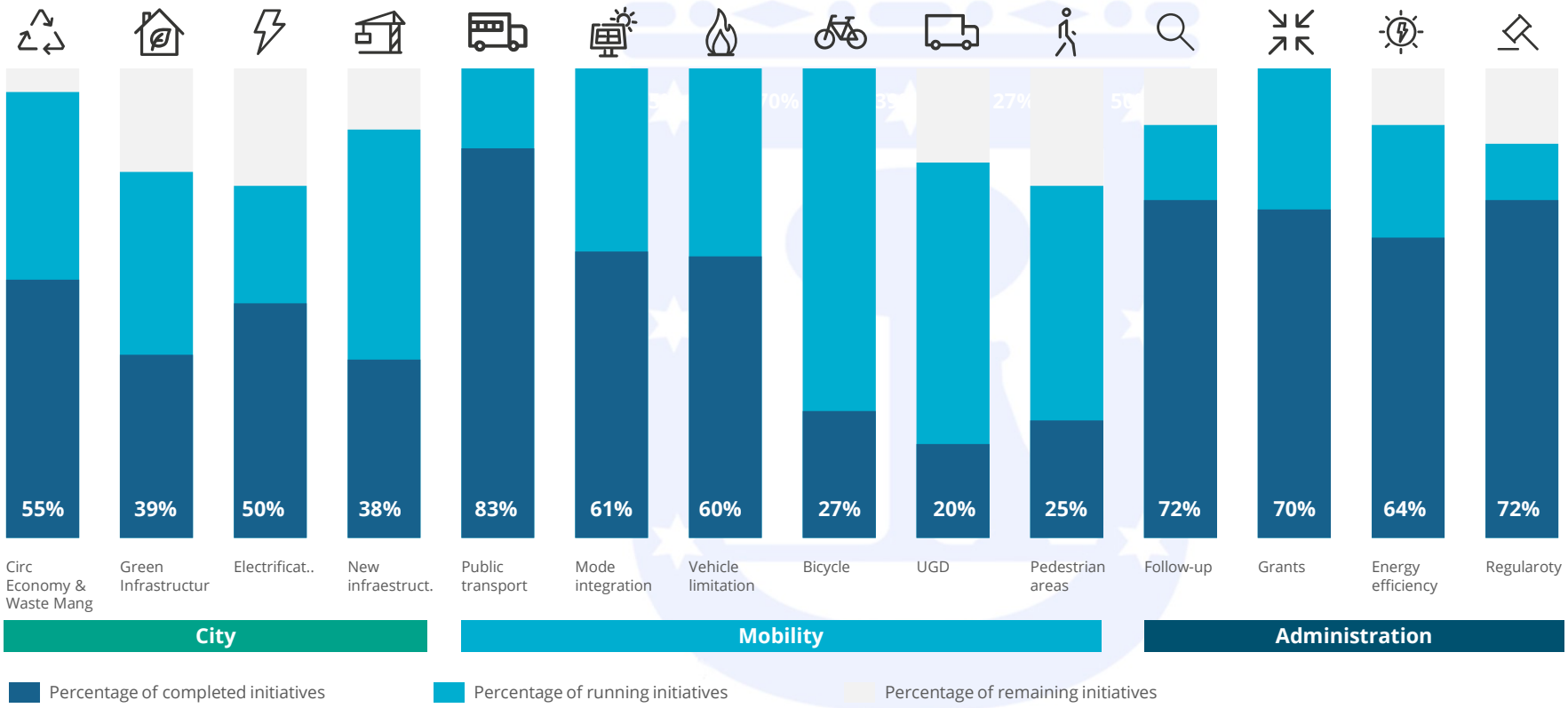
Madrid 360 Environmental Sustainability Strategy

Madrid 360 Strategy vectors and their principal components



I. Mobility strategies and regulations

Madrid 360 Environmental Sustainability Strategy



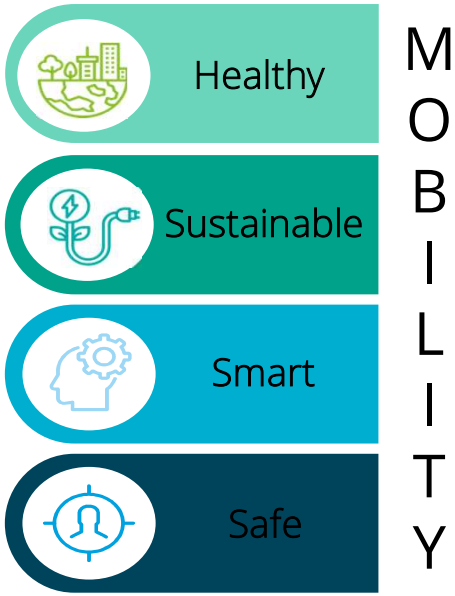
90%
Of initiatives completed or ongoing

60%
Completed

30%
Running

I. Mobility strategies and regulations

Madrid 360: SUMP 2022 - 2030



Objectives:

- Reduction of traffic by 20% - 25% which translates to a significant decrease in **traffic congestion** in the city.
- Reduction of **CO_2 emissions** by 65% in 2030 with respect to 1990, according to what is established by the COP25 agreement.
- Reduction of deaths and victims in **traffic accidents** according to the objectives established by the European Union.

Index

II. Issues and problems of the mobility system

Excessive use of vehicles (private, professional, public) leading to congestion and contamination

Example: Gran Vía
(before LEZ)

II. Issues and problems of the mobility system

Tourist mobility: taxis, Uber, tourist buses, tuk tuks … leading to congestion even after the LEZ

Example: Gran Vía
(after LEZ)


HOTEL ATLANTICO


METRO
GRAN VIA
Madrid Juegos

II. Issues and problems of the mobility system

Deliveries by scooter, bike or e-scooter: Glovo, UberEats, Deliveroo ... are challenging road safety in Madrid


30

II. Issues and problems of the mobility system

Excessive use of vehicles (private, professional, public) leading to parking pressure in residential areas in the compact city

Index

III. Policies for urban planning and mobility

Madrid 360: Grants for Energy Transition

Through the **Strategic Grants Plan**, the Madrid City Council wants to offer **111,5 millions of euros** from 2020 to 2023 by **Ayudas Cambia 360.** This Plan divides the grants in two main lines: One to encourage sustainable mobility and another one for **urban regeneration** and **energy efficiency**.

Until now, a total of 68,5 M€ in grants have been offered within the Madrid 360 scope

Renewal of heating and climatization installations (including balconies without emissions) **31,3 M€**

Renewal of the Urban Distribution of Goods fleet

4 M€

Micromobility promotion

1 M€

Taxi fleet renewal

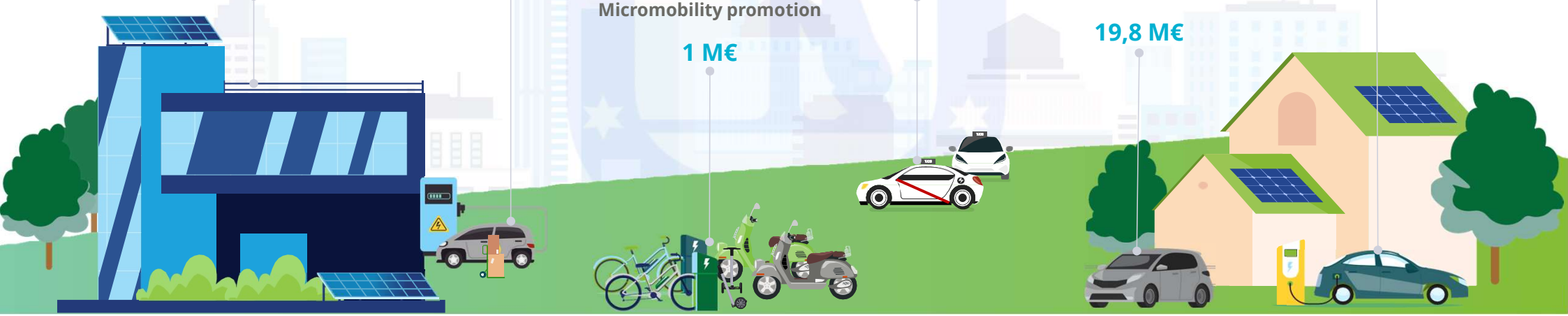
9,4 M€

Private vehicles renewal

19,8 M€

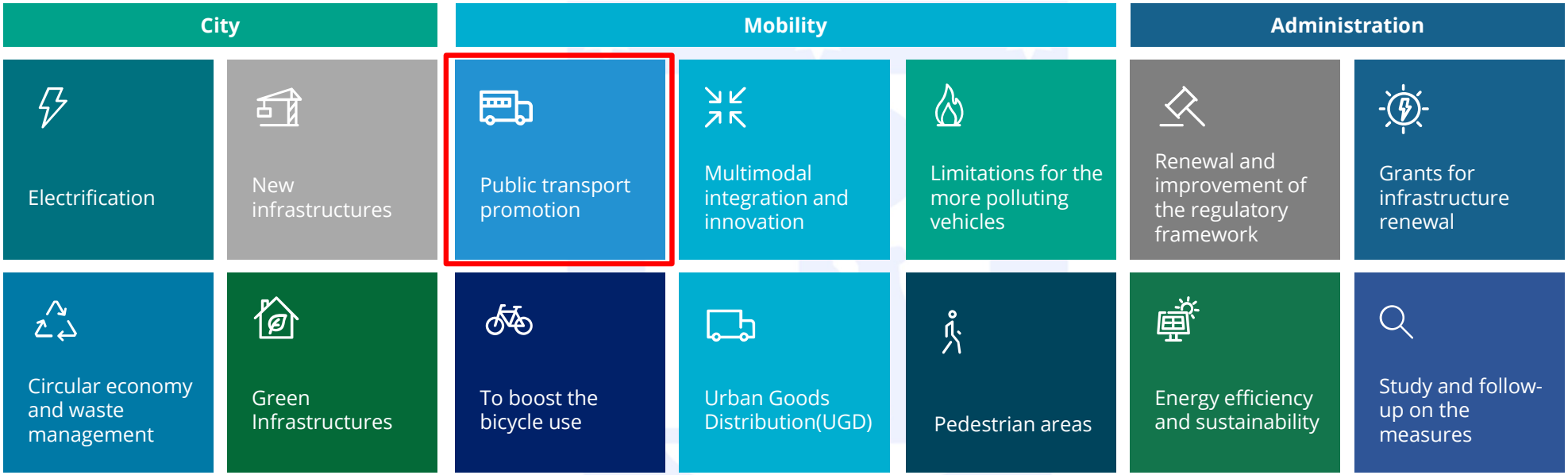
Charging infrastructure

3 M€



Madrid 360 Environmental Sustainability Strategy

Madrid 360 Strategy vectors and their principal components



Public transport promotion

In its decisive promotion of the public transport, the Madrid City Council has approved a Strategic plan for the **Municipal transport Company (EMT),** the development of new routes, new bus exclusive lanes and initiatives to cater for the citizens demand and promote public transport.

+1.000M€ investment

534 M€ for **fleet renewal** and **290 M€** for the construction of **sustainable infrastructures**

New routes

Development of **8 new routes,** among which **3 zero routes** (3 zero emissions routes, 2 of which are free)

New bus exclusive lanes

+66 km

An increase of over **50%** since 2019

EMT free rides

36 "free days" on the EMT buses

+30,7 million passengers in free zero routes and the free bus days

Demand recovery

+99,5%

Demand recovery* (working days)

1,57 million passengers

On the 22nd of November 2022 (Black Friday): was the all-time record on the EMT since the start of the pandemic.

Public transport promotion

Electrification of the bus fleet

With the decommissioning of the last diesel bus, Madrid becomes the first European big city with a 100 % environmentally friendly bus fleet In 2025, 25% of the EMT fleet will be electric and in 2027 at least a third of the city council buses.

Madrid has **19 100% electric routes**, which makes the capital city **the Spanish city with more electric routes and the second in Europe, after Berlin.**

The EMT has **reduced by 45% the NOx emissions** 139,789 kg in 2021 against 76,352 kg in 2022

The EMT invests 10,8 M€ in a **hydrogen factory**, and adds **ten buses propelled by green hydrogen.**

From the beginning of the political term, the EMT has bought **1.291 buses**, what means a **62%** renewal of the fleet.

2022	2025	2027
8,6%	25%	35%
Of the **buses** are **electric** *(Dec 2022)*	Of the **buses** will be **electric**	Of the **buses** will be **electric**

Public transport promotion

Electrification of the bus fleet: adaptation of bus depots for electric charging

170 Inverted Pantographs – up to 450 kW

300 kW Instaled Power Capacity

Essential: Fire protection:

- Hydrants, Fire Extinguishers and Fire Alarm Activators
- Conventional detection (methane/ethylene, CO) & HeatProThermical Cam

III. Policies for urban planning and mobility

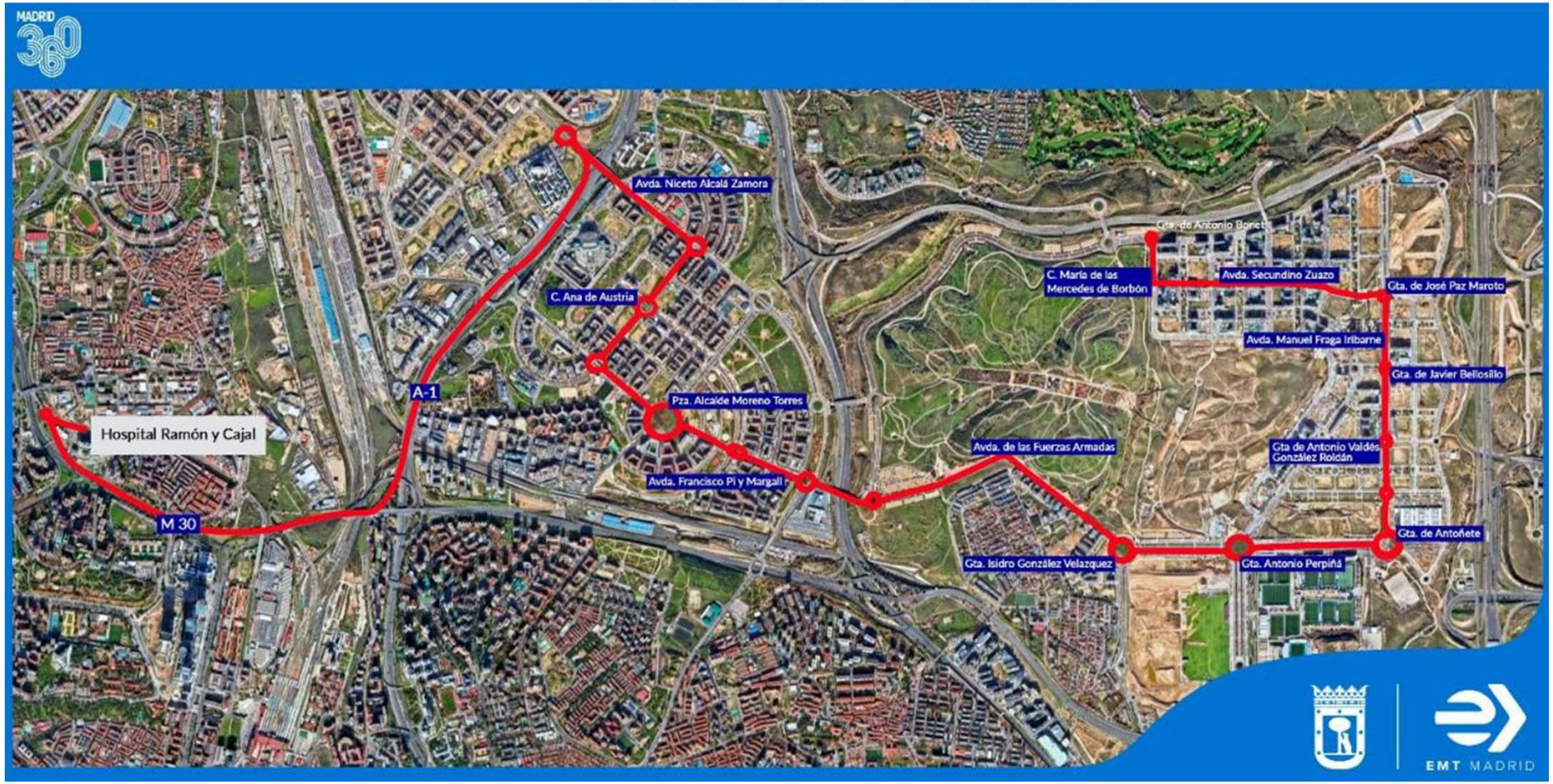
1 More and better public transport

Public transport promotion

CONSTRUCTION OF THE RAPID BUS LINE FROM VALDEBEBAS TO HOSPITAL UNIVERSITARIO RAMÓN Y CAJAL

Public transport promotion

New rapid bus line: itinerary



Public transport promotion

Passing of RAPID BUS in direction Valdebebas at Ana de Austria - Plz Alcalde Moreno Torres

III. Policies for urban planning and mobility

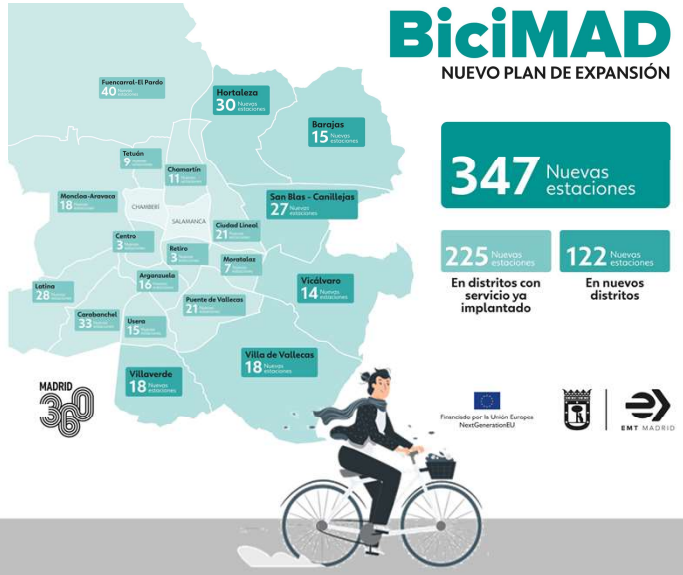
3 Promoting active mobility

The conscious promotion of the bicycle and other Personal Mobility Vehicles (PMV) by the city council has seen the biggest expansion of the **BiciMAD** service in its history, reaching all districts and the development and promotion of infrastructures such as bicycle lanes and parking spots for these vehicles.

21 districts (**+6** new: reaches all districts)

611 stations (**+347** new: more than doubling the existing ones)

7.500 bicycles (**+4.536** new: more than doubling the existing ones)



71 km

More of bicycle lanes

24,342

Municipal parking spots for bicycles + PMV + Motorbikes

6.000

Scooter authorisations

New model tidier, safer and integrated: **3 companies**

Regulations

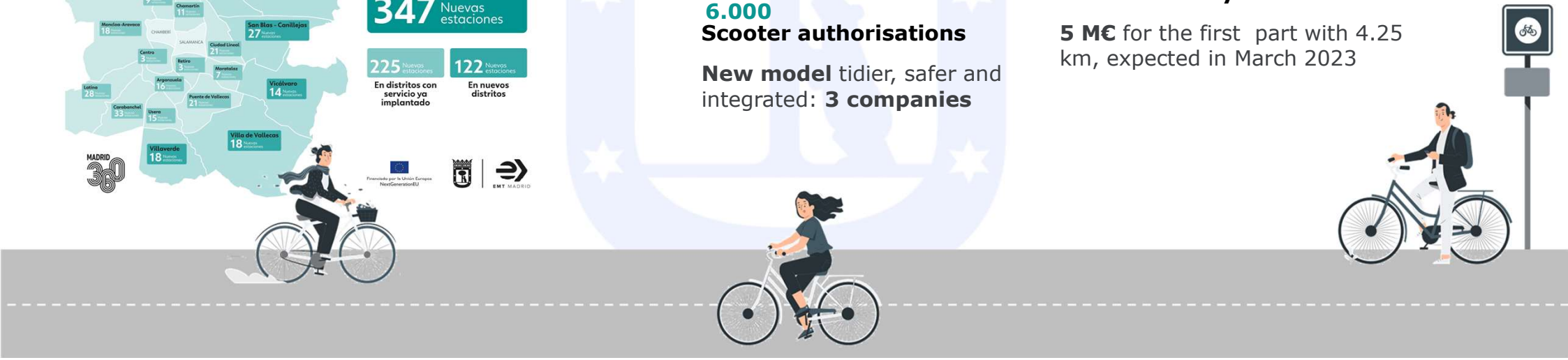
Sustainable Mobility Ordinance

The new ordinance cover the bicycle, PMV and motorcycle parking, enhancing road safety in Madrid.

13 km

Castellana bicycle lane

5 M€ for the first part with 4.25 km, expected in March 2023



III. Policies for urban planning and mobility

3 Promoting active mobility

Nuevo Carril Bici
Paseo Castellana

MADRID 360

Nuevo Carril Bici
Paseo Castellana

III. Policies for urban planning and mobility

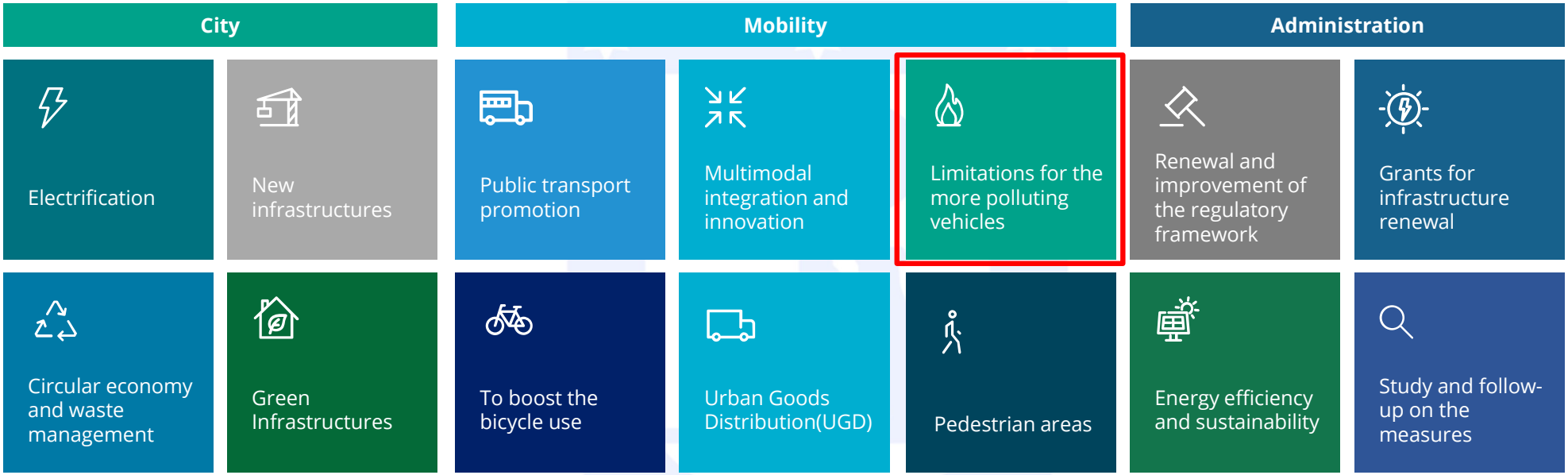
5 Facilitating modal integration through innovation and intermodality

Establish intermodal micromobility nodes and park&ride facilities to encourage intermodal travels instead of car travel

Example: Fuente la Mora

Madrid 360 Environmental Sustainability Strategy

Madrid 360 Strategy vectors and their principal components



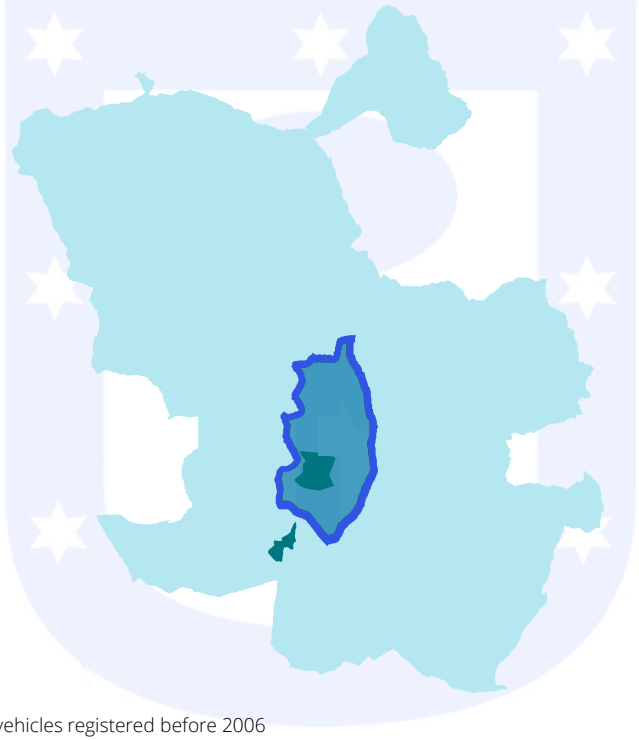
IV. Implemented actions and results

Low Emission Zones

The September 2021 Sustainability Municipal Ordinance stablished the regulatory framework so the whole city could become a Low Emissions Zone (LEZ) and created the basis for the development of two especial protection LEZ in the Central District and Plaza Elíptica

Madrid Low Emissions Zones (LEZ)

- From the **1st of January 2022: The "A" vehicles registered outside Madrid** cannot circulate **within the boundaries of the M-30**
- From the **1st of January 2023: The "A" vehicles registered outside Madrid** cannot circulate **on the M-30**
- From the **1st of January 2024: The "A" vehicles registered outside Madrid** cannot circulate **within the city boundaries.**
- From the **1st of January 2025: All "A" vehicles** cannot circulate **within the city boundaries**
- In Madrid LEZ, the unauthorised accesses have been reduced by **59,4 %** from the prewarning period.



Especial Protection Low Emissions Zones (EPLEZ)

- Central District Especial Protection Low Emissions Zones (EPLEZ): In force since September 2021

  The unauthorised accesses to the Central District EPLEZ have been reduced by **40,6 %** from the prewarning period.

- Plaze Elíptica Especial Protection Low Emissions Zones (EPLEZ): In force since December 2021

  The unauthorised accesses to the Plaza Elíptica EPLEZ have been reduced by **66,5 %** from the prewarning period.

Note: The "A" vehicles are those petrol vehicles registered before 2000 and diesel vehicles registered before 2006

III. Policies for urban planning and mobility

4 Managing parking with sustainable criteria

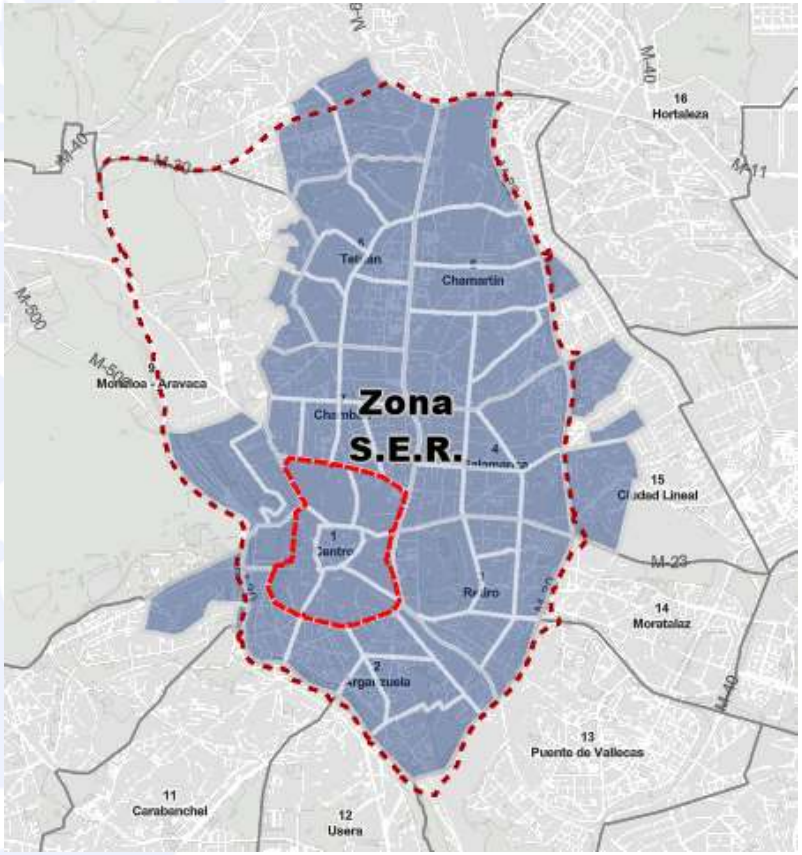
01/ EXTENSION OF SER ZONE

02/ SER DYNAMIC TARIFFICATION

03/ HIGH ROTATION SPACES

The prices for parking in the regulated areas are calculated taking into account the environmental performance of the vehicle

- Discounts for environmentally friendly vehicles can reach up to 75% in the case of ECO classification

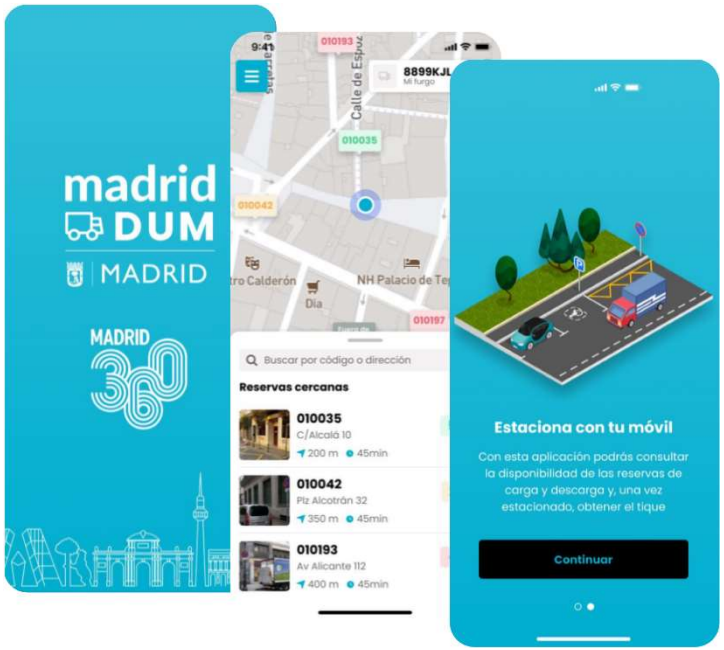


III. Policies for urban planning and mobility

7 Optimising urban freight distribution

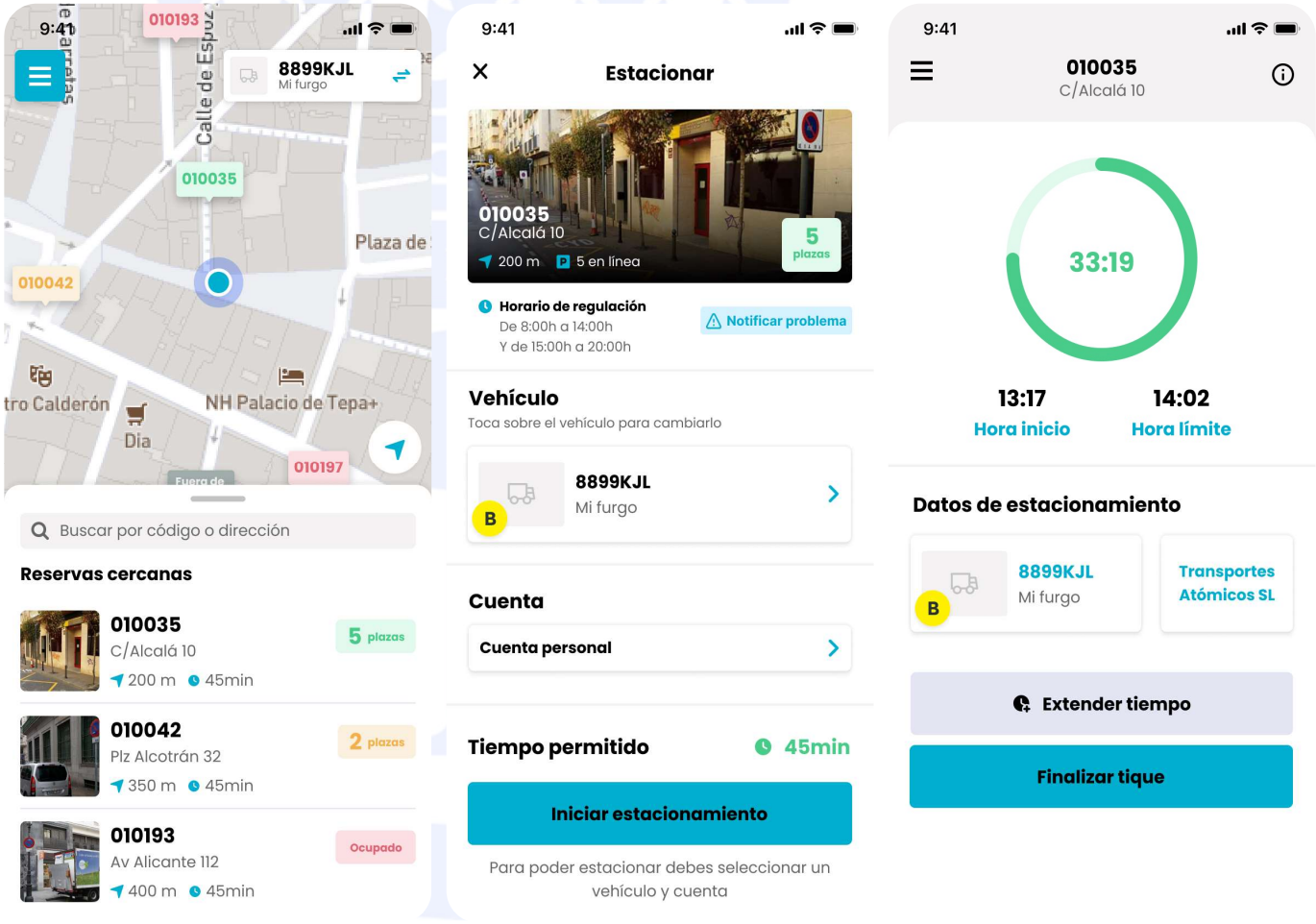
The City Council has implemented the first strategy for the **Urban Distribution of Goods (DUM 360)**. The strategy comprises ten measures to promote a more **efficient and sustainable logistics model** that allows a **greater agility** for the operators.

- The development of an **App** to know in real time the **occupancy levels** of the cargo areas.
- The installation of **reservation sensors** to obtain better usage information.
- The increase in the **number of cargo areas** for the distribution of goods.
- The **extension** of the cargo operations schedule
- The **enhancement of micro-hubs** by public and private collaboration and the promotion of nocturnal distribution of goods.
- The **installation of new lockers** for e-commerce.



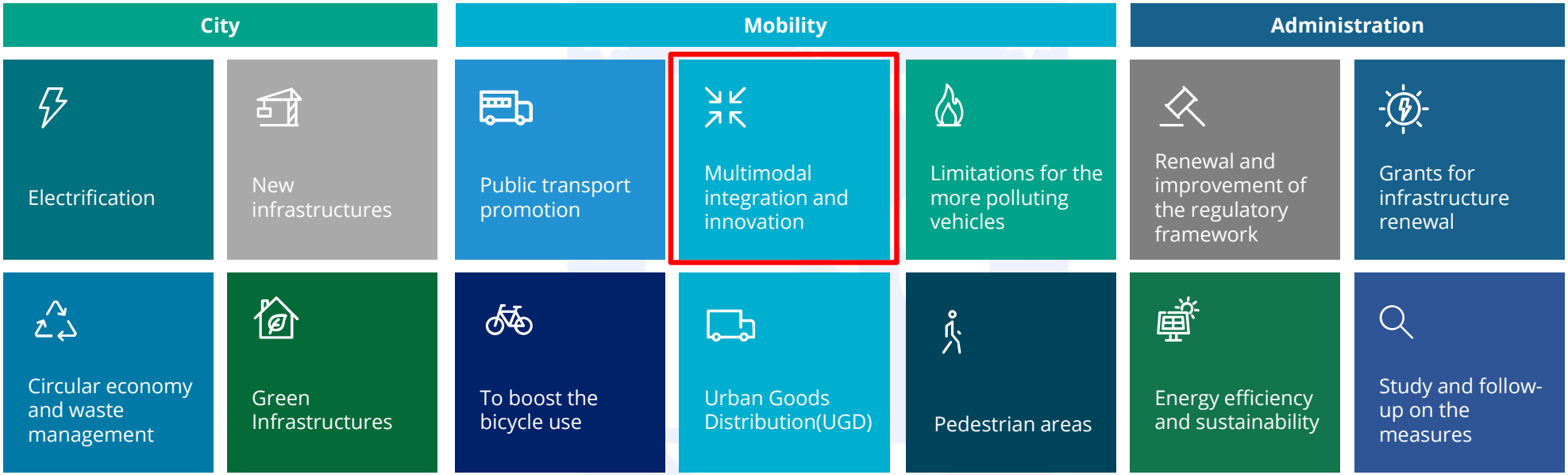
Urban Goods Distribution

Smart reserve system for loading and unloading



Madrid 360 Environmental Sustainability Strategy

Madrid 360 Strategy vectors and their principal components



Urban Goods Distribution

Micrologistics hub in Plaza Mayor

- Urban logistics operations are carried out by a 100% electric fleet
- Cargo motorcycles and vans were especially adapted for urban freight distribution
- Capacity of cargo motorcycle: 40 normal-sized packages

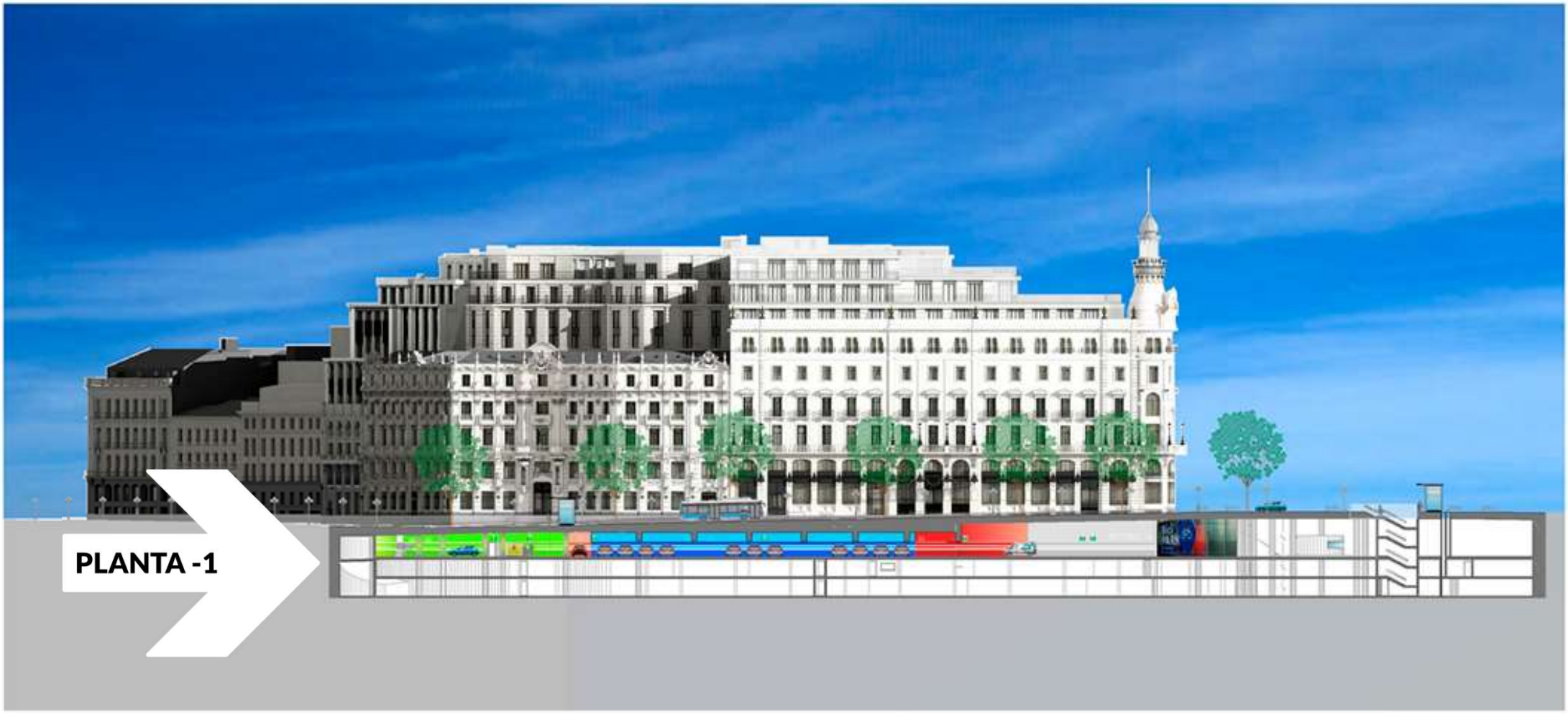
Micrologistics hub in Plaza Mayor

CANALEJAS 360
Hub de movilidad

EMT MADRID

EMPRESA MUNICIPAL DE TRANSPORTES DE MADRID


CANALEJAS
Hub de movilidad
360


PLANTA -1

III. Policies for urban planning and mobility

9 Moving towards safe mobility

- Reduce maximum traffic speed
- Resolve risky and dangerous junctions and streets
- Increase road indiscipline control
- Conduct road safety campaigns

III. Policies for urban planning and mobility

9 Moving towards safe mobility

- Resolve risky and dangerous junctions and streets

IV. Implemented actions and results

Pedestrian areas

One of the most singled out measures included in in the Madrid 360 Strategy has been development of pedestrian only areas in the 21 city districts to turn 170,000 square metres in zero emissions zones. The **Puerta del Sol and its surroundings** were the first of this pedestrian areas.

Puerta del Sol pedestrian only area

16.751 square metres for pedestrians

Elimination of almost **7.000 daily trips** in private vehicle

II. Issues and problems of the mobility system

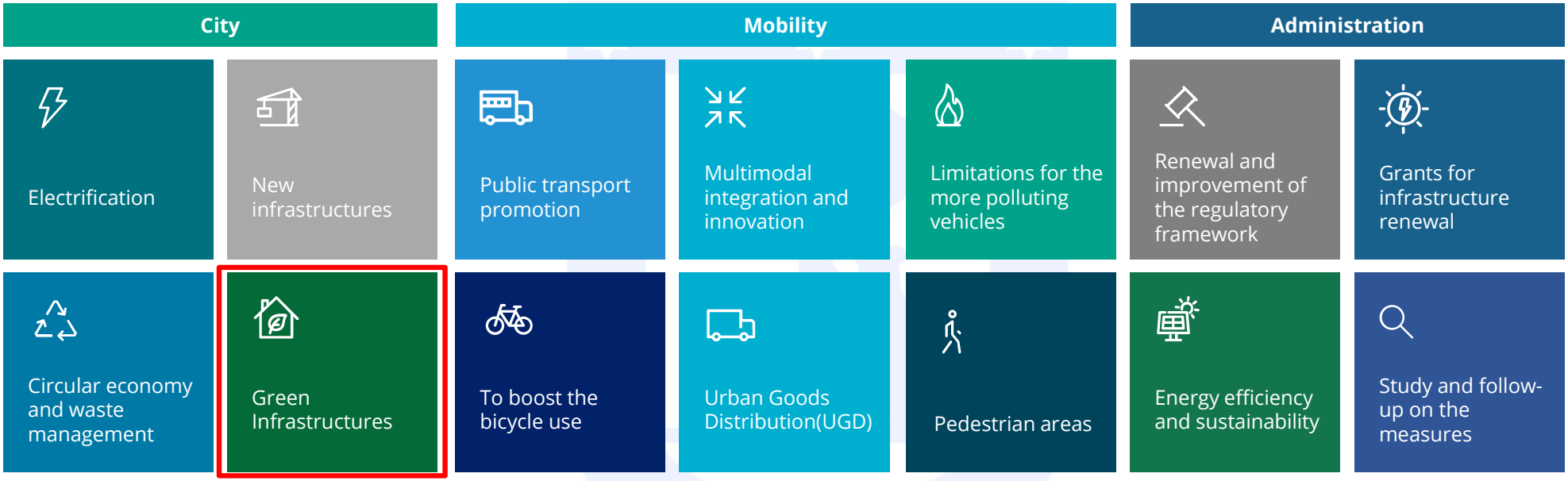
Puerta del Sol
1960s

Puerta del Sol
1990s

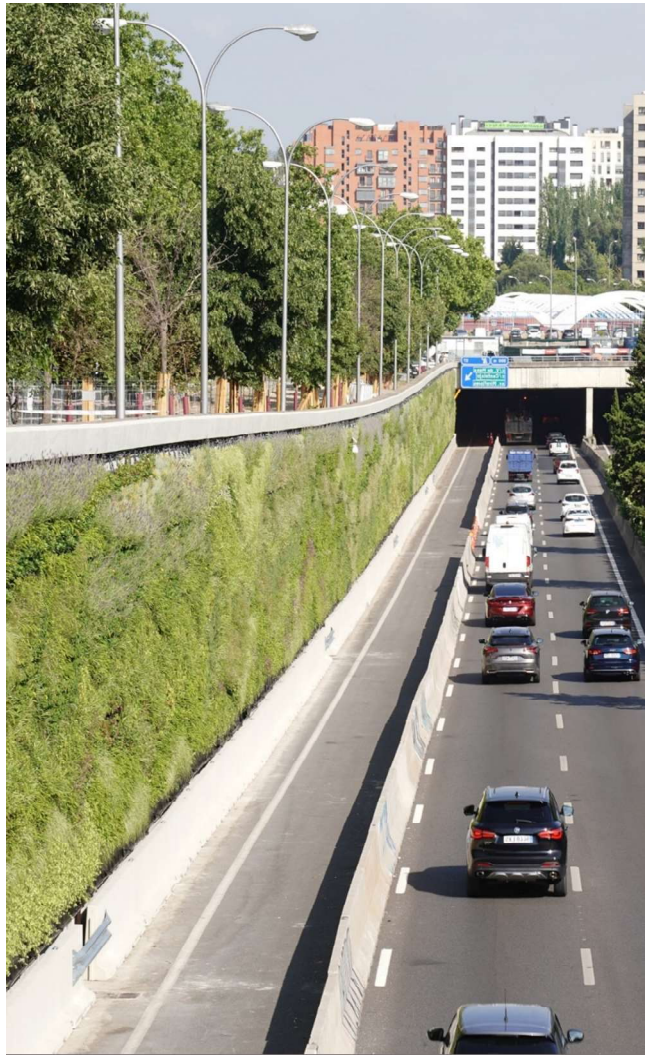
Puerta del Sol
2023

Madrid 360 Environmental Sustainability Strategy

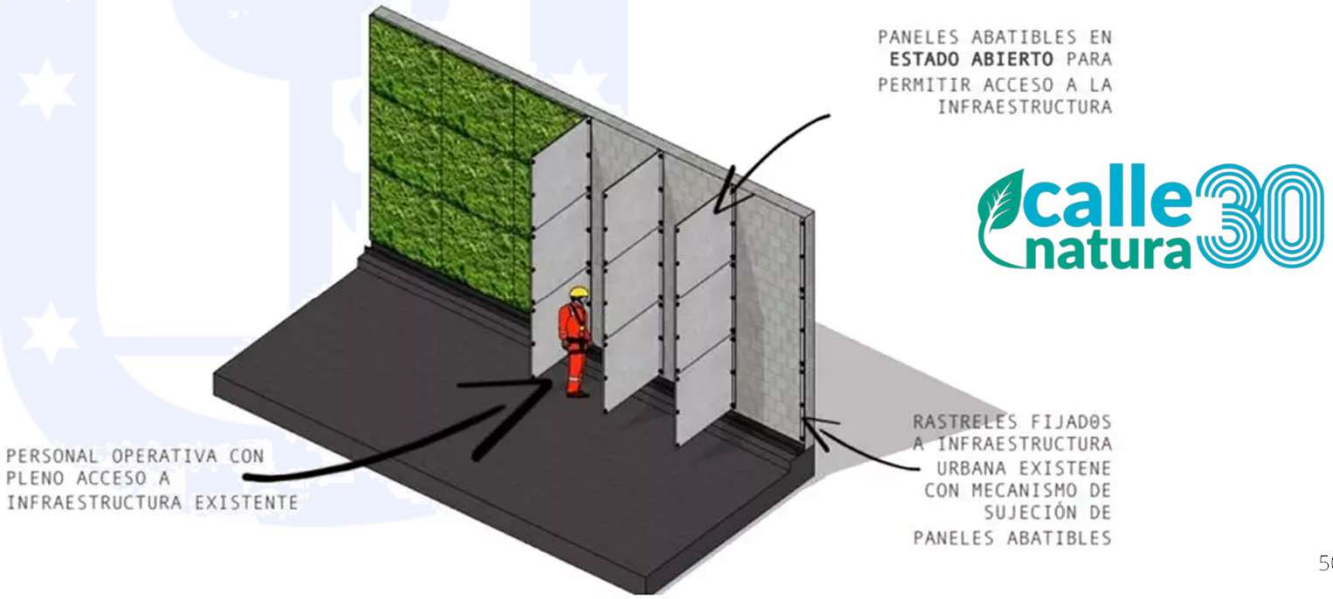
Madrid 360 Strategy vectors and their principal components



Green Infrastructures



It covers an area of 400m of the M-30 with vertical gardens made up of 30 highly durable plant species, with reduced water requirements and capacity to absorb pollutants, which include pollution sensors by means of easily accessible folding panels for their revision and maintenance, in order to know the capture of atmospheric pollutants and particulate material and will also assess the capacity to attract biodiversity in the plant walls and their evolution throughout the year.



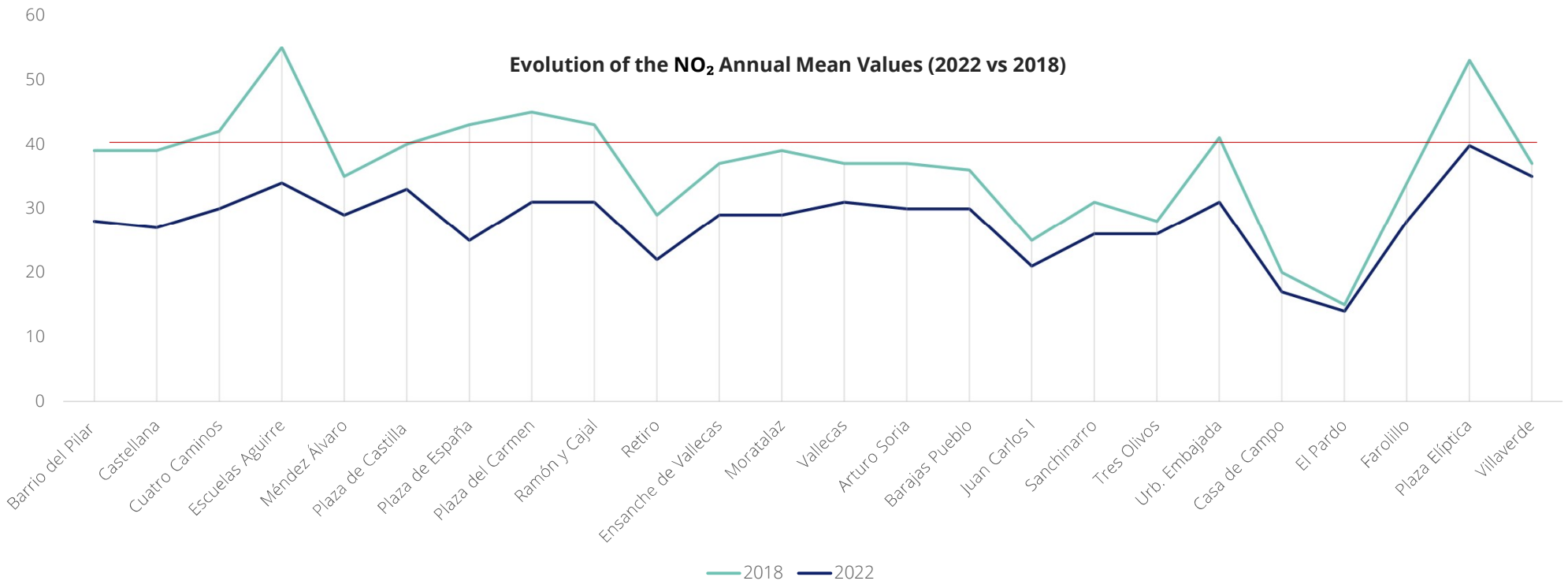
Green Infrastructures

Index

IV. Implemented actions and results

Final result: improvement in air quality

Madrid complies for the first time in 2022 with the European Directive on Air Quality.



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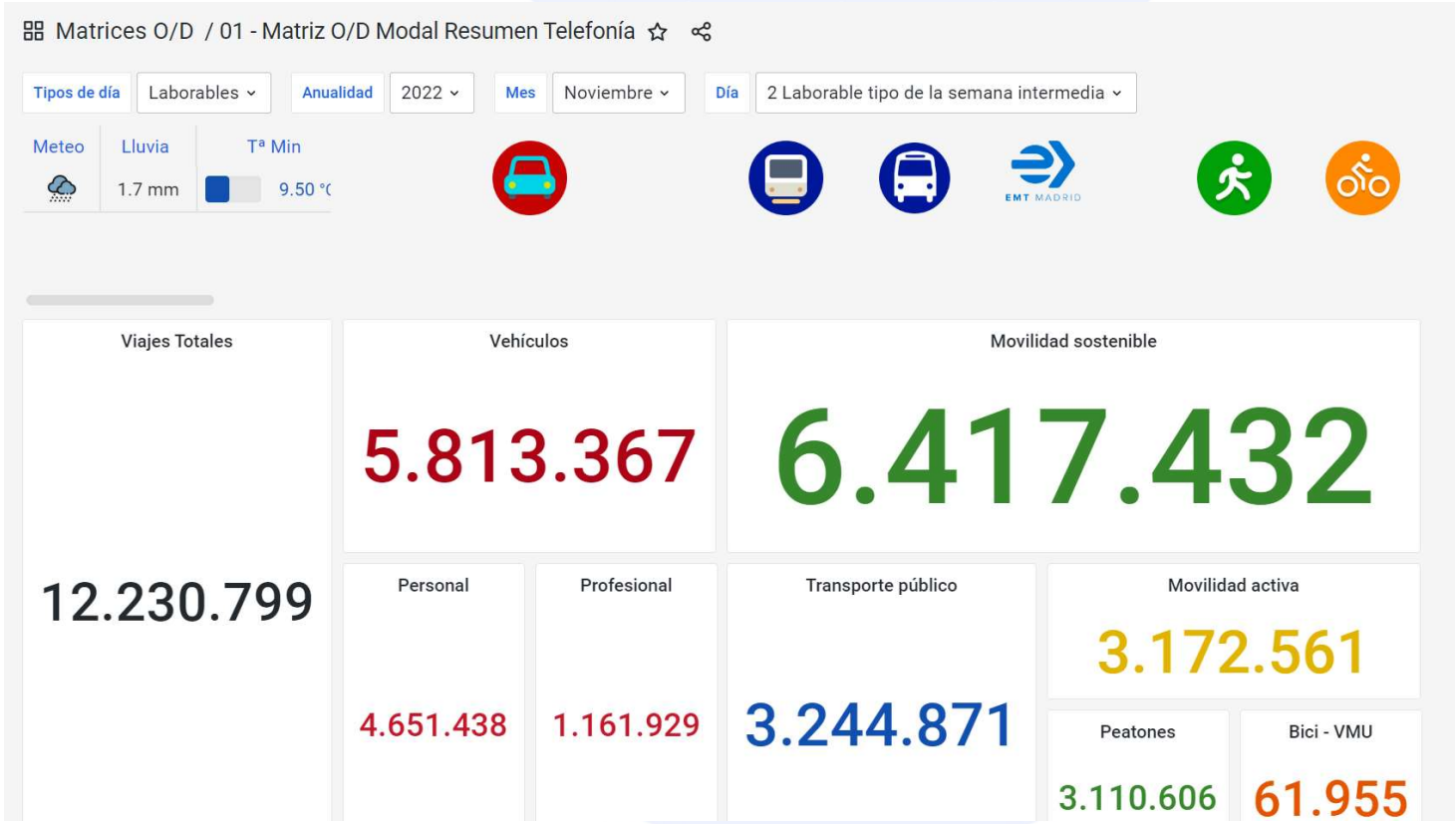
V. New technologies in decision making processes

Big data: track the evolution of modal share



V. New technologies in decision making processes

Permanent demand measure points and data collection campaigns

Pedestrian flow in main axes

Flow of cyclists in main axes

Flow of vehicles in main axes

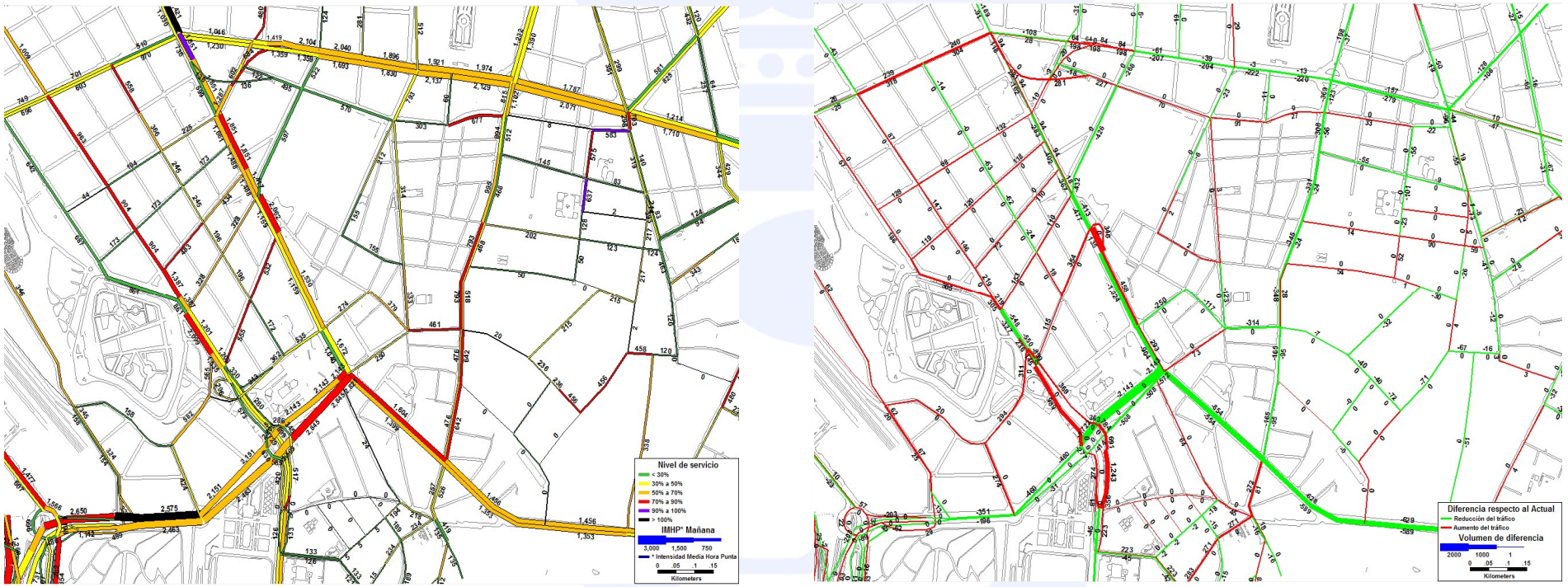
Test and measure impacts of implemented actions

Data driven analysis of possible issues

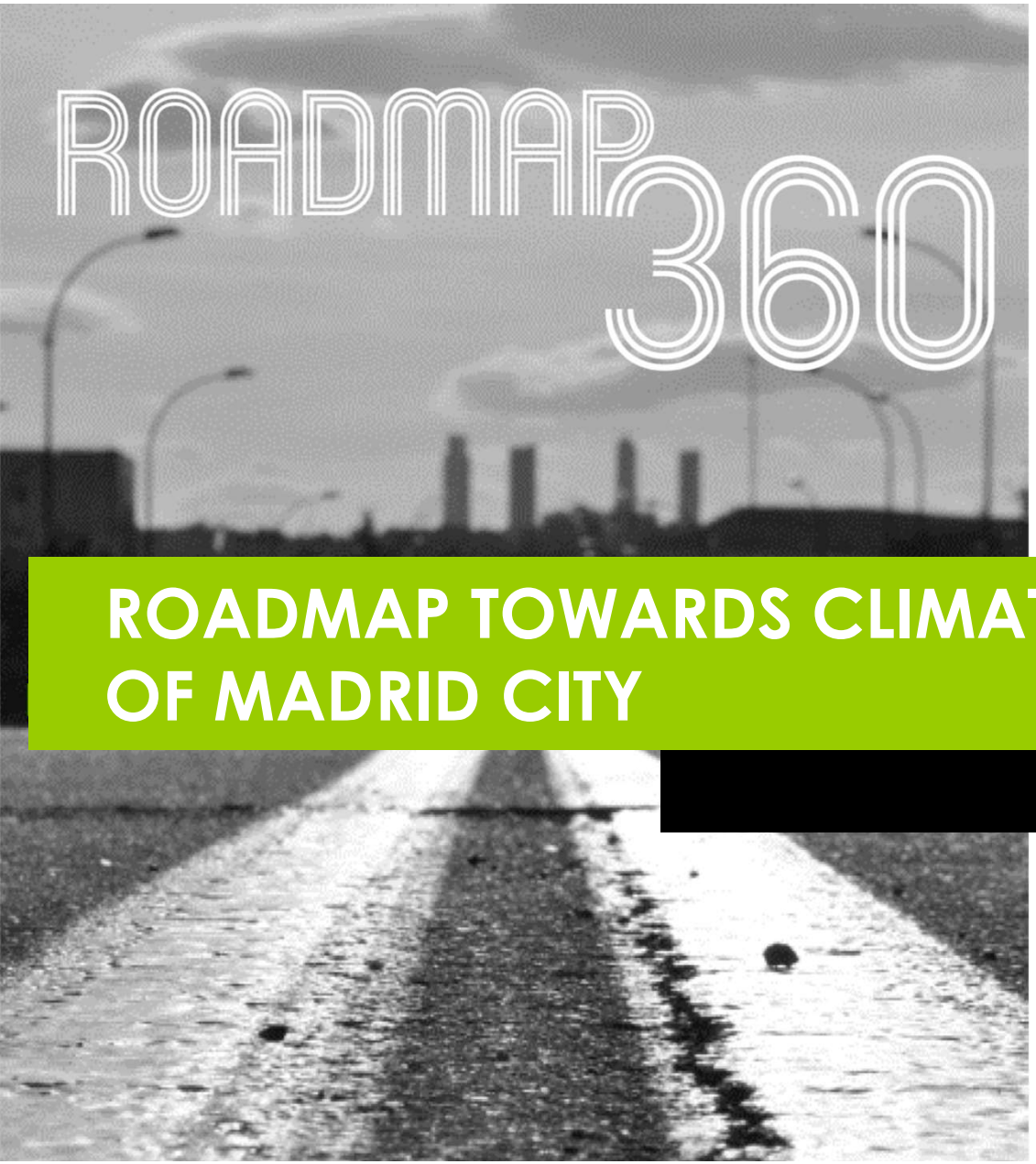
Long-term evolution of actions

V. New technologies in decision making processes

Mobility model and simulation software: evaluation of new infrastructure and road configuration



Reformation of Plaza España



ROADMAP TOWARDS CLIMATE NEUTRALITY OF MADRID CITY

Madrid Council Climate actions

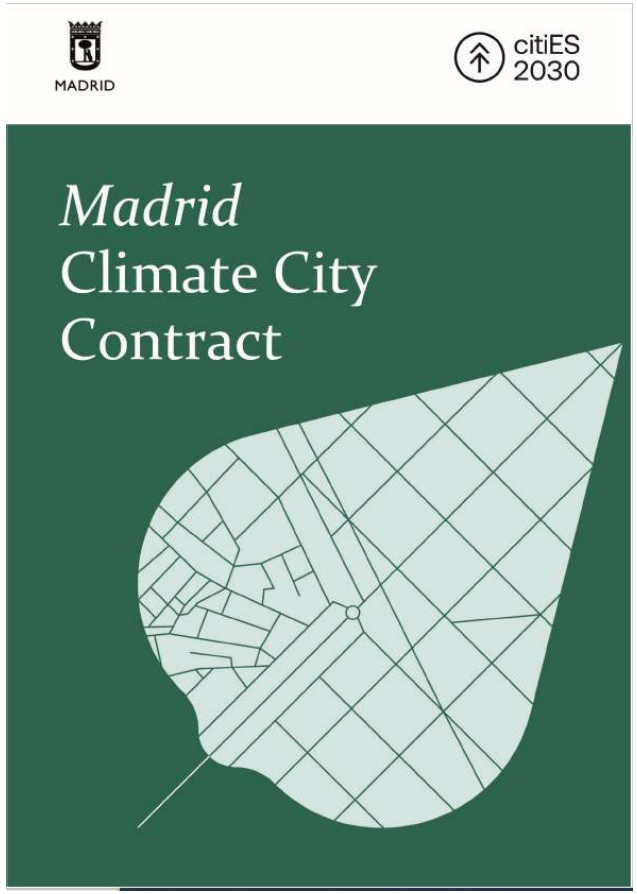
VI.Tools for delivery climate policies

Madrid was selected to be part of 'Climate-neutral and smart cities' Mission of European Commission.

28th April 2022

Madrid Council Climate actions

VI.Tools for delivery climate policies



April 2023

October 2023

Thank you for your attention

dgplaniymovi@madrid.es
sgenergiaycc@madrid.es

Advances for Sustainable Mobility in Madrid

November 15th, 2023

guppy

Sustainable & Shared Mobility as a Service platform

Pablo Campos-Ansó Fernández

Madrid · 2023

And this means…?

That just by having the guppy app on your mobile, you have at your disposal a fleet of

100%

electric vehicles

so that you can **move freely**, without emitting CO2 or noise.

You only need our app. Reserve your vehicles from your mobile and pay only for what you use.

guppy

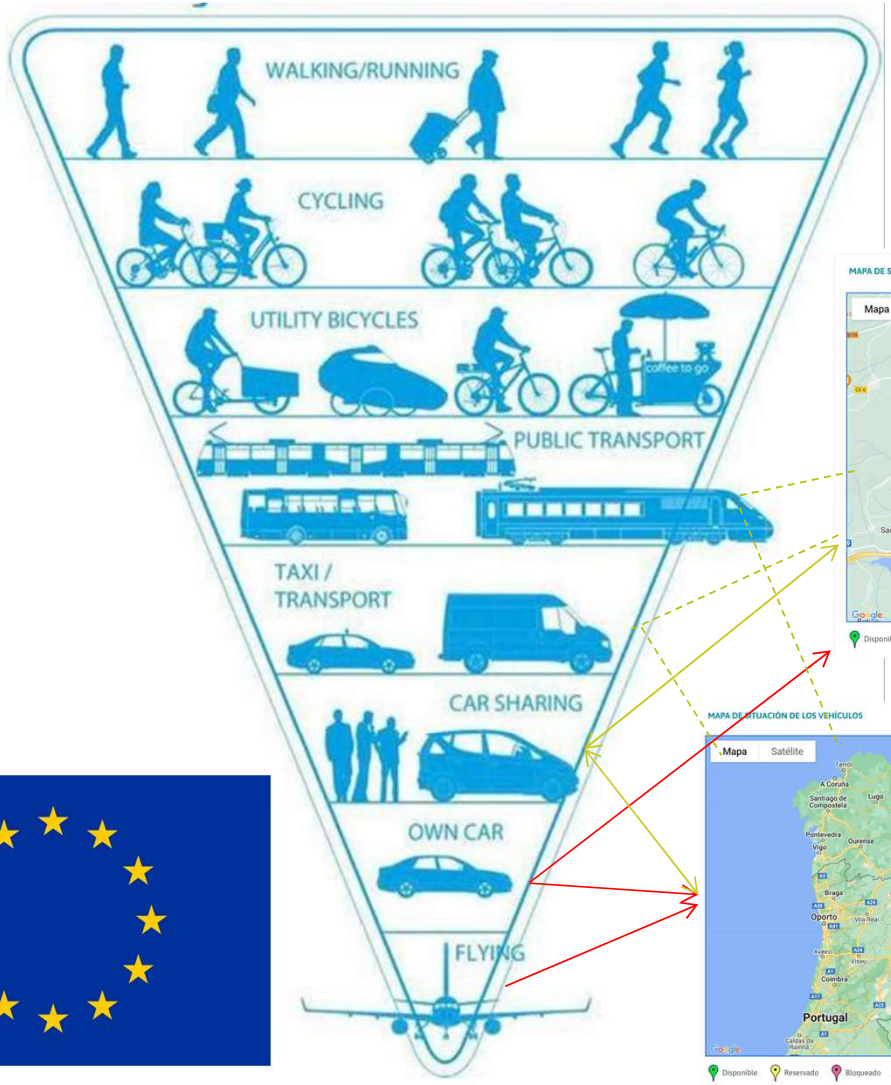
Una ola que
no deja de
crecer

Electric Vehicle sharing platform

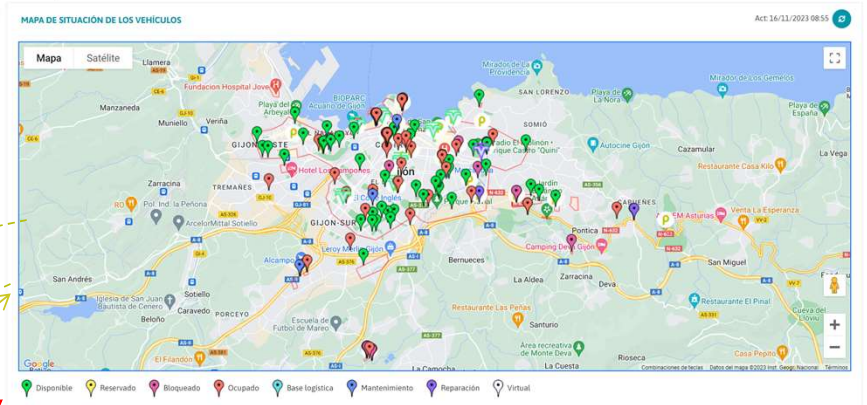
Sustainable comprehensive mobility service

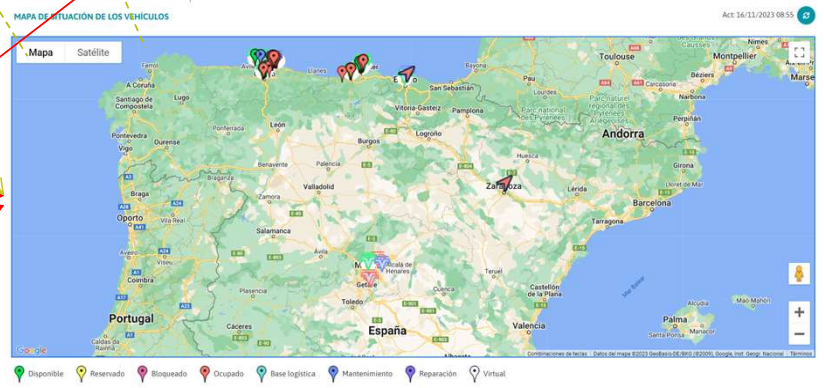
- Introduction -

Towns, cities, countries and society development need
New ways to move around – sustainability first
MaaS – tecnology is ready



Distintivo ambiental para los vehículos compartidos





This is the moment

Something is changing...

Consumers habits give prominence to **service**
(flexible rental vs own vehicle)

Towards a more **sustainable** world

100% electric cars

Zero emissions

Amortization of investment in renewables

Users are more aware and engaged

Brands invest in electric cars

The municipalities demand it

Governments promote it with aid

guppy

The municipalities demand it

AYUNTAMIENTO TORRELAVEGA

Ayuntamiento de Gijón

AYUNTAMIENTO DE SANTANDER

GOBIERNO DEL PRINCIPADO DE ASTURIAS

Governments promote it with aid

Fleet

Charging infraestructure

Renewables

IT integrations

guppy

We are the first car sharing service in Asturias and Cantabria.

A sustainable mobility service that makes your life easier.

Our technological development

Development is in our hands...

Complete

APP

management

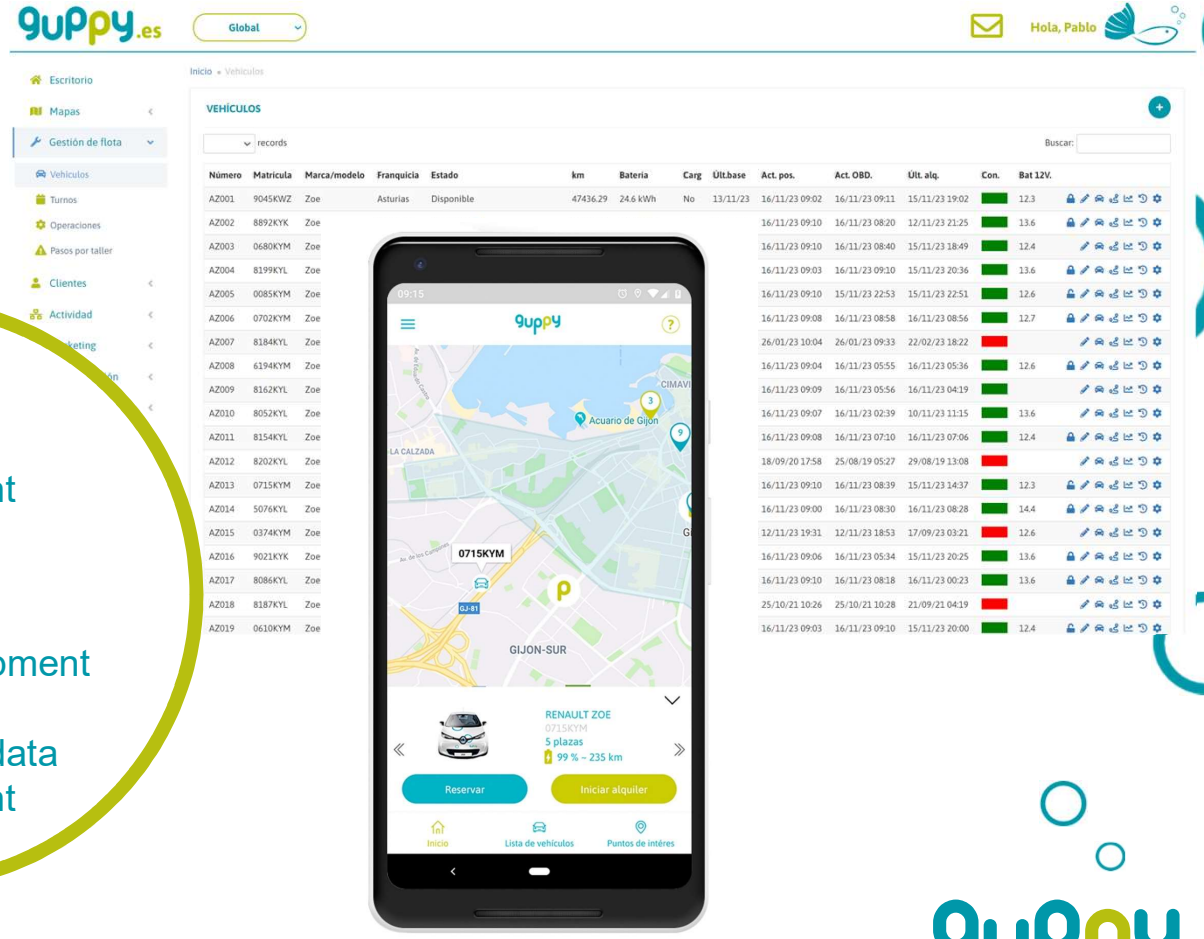
+

IoT

in-house development

+

Software and data management



Our TEAM

Development is in our hands...

Employment Development >40 people involved now

Brand book **guppy.es**

Equipo Flota

+20 personas

"Nuestra prioridad, el bienestar de nuestros clientes. Para ello, vehículos siempre limpios y cargados donde el usuario nos necesite."

Sara Fernández

Desarrollo de negocio

"Queremos seguir expandiendo la ola guppy para interconectar todas las ciudades que apuesten por la movilidad sostenible."

Fernando Palacio

Dirección y coordinación de flota

"Buscamos mejorar e innovar en los servicios para que los vehículos estén siempre listos donde y cuando los necesites."

Un gran equipo

Estos somos algunos de los miembros que formamos parte del equipo guppy. Estamos encantados de conocerte.

Daniel Remón

Tecnología

"Desarrollamos nuestra propia tecnología, incluyendo el sistema de control de flota y la conectividad de los vehículos."

Raquel Rodríguez

Marketing

"Todas nuestras acciones tienen como base los valores de guppy: movilidad, innovación y sostenibilidad."

Lucía Palacio

Comunicación

"La atención al cliente personalizada es una de las grandes diferencias de guppy. No solo nos ayuda a reforzar vínculos, sino también a conocer de primera mano las necesidades reales de nuestros usuarios

Beatriz Bobela

Administración

"Somos un piñón más, ejecutando los procesos administrativos que permiten mantener un funcionamiento óptimo del servicio."

START

Agosto 2019
Nace guppy en Gijón

Octubre 2019
Peques a bordo
Incluimos alzadores en todos los vehículos

Diciembre 2019
1ª iniciativa solidaria
Recogida banco de alimentos

Octubre 2020
Se incopora a la flota el modelo **Nissan Leaf**

Diciembre 2020
guppy llega a Cantabria

Noviembre 2021
Ayto. de Torrelavega
Primer ayuntamiento de España en usar movilidad compartida como flota

Marzo 2021
guppy en Torrelavega
Primera ciudad española de su tamaño en tener carsharing

Enero 2022
Ayto Gijón
Flota municipal guppy

Octubre 2022
Se incopora a la flota el modelo **Dacia Spring**

Julio 2023
Disponibles los puntos de recarga **en la app**

Febrero 2023
Se incopora a la flota la furgoneta **Toyota Proace**

Septiembre 2023
España a tiro de guppy
Bilbao
Madrid
Valladolid
Santiago

Octubre 2023
Prueba reflejos
Apostamos por la conducción responsable

Agosto 2023
Se incopora a la flota el **Tesla model 3**


5,000,000
km traveled
700,000
kg
CO2
saved
(140 g/km)
37,000
Users
>300
Parking spaces
N° Rentals
600,000
Individuals + Corporate
+300
companies
using guppy for business

En buena compañía

Nos gusta rodearnos de los mejores. Grandes marcas, empresas e instituciones ya saben que colaborar con guppy es una apuesta por un futuro más sostenible.

Ride the wave!

Our business expansion model

Geographic expansion

via cooperation allows the service to be developed with local knowledge

guppy


Thank you.
guppy.es

Zunder

Danish Embassy - Aarhus

16/11/2023

zunder

Agenda

- Zunder presentation
- EU and DK EV market
- Strategies for electrifying a city
- Open Discussion/Q&A

zunder

Agenda

- **Zunder presentation**
- EU and DK EV market
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zunder

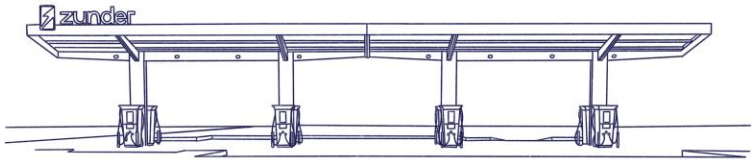
Aire du Pays de Argentan - Francia.

Zunder, a **360º business**

Solutions applied to electric mobility for all stakeholders involved (B2C-B2B)

Charging stations

Deployment of a charging network with mobility hubs and proprietary stations in interurban and urban environments. Managed by Zunder and accessible through our app or third-party apps via e-roaming.



Management platform

Software available for third parties wishing to manage their charging points. Accessible through the Zunder app, with access to its services and technology (integrations and interoperability). Open APIs available for white-label solutions.

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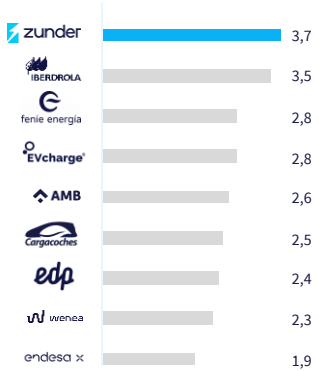
Commited to **Today** and **Tomorrow**

Today

Zunder at **present**

Independent charging network, with a presence in Spain, Portugal, and France

24/7 technical support in SP, EN & FR



+400

Operational charging points

+225

Stations at various stages of construction

Tomorrow

Strategic objectives for 2025

+50.000

EV users registered on our platform

+500

Operational ultra-fast charging hubs

+24.000

Chargers managed on our platform

+4.000

Ultra-fast charging points (HPC) by 2025

+300M

Investment to build EV charging stations

zunder

Long-term project

WHITE SUMMIT CAPITAL

19 of July of 2021

OBSERVATORIO DE LA MOVILIDAD

EasyCharger cierra una ronda de 25 millones con la que instalará 1.000 cargadores para coches eléctricos

La compañía busca impulsar la movilidad eléctrica en España.

mirova

Investing in sustainability

11 of October of 2022

EMPRESAS

Mirova entra en la española Zunder con 100 millones para hacerla crecer

L. DE LAS HERAS

11 OCT. 2022

Banco Europeo de Inversiones

15 of February of 2023

LA VANGUARDIA

Sociedad

VEHÍCULO ELÉCTRICO

Zunder recibe 40 millones del BEI y acelera su red de carga ultrarrápida

• Palencia, 15 feb (EFE).- El Banco Europeo de Inversiones (BEI) y Zunder, operador de puntos de carga ultrarrápida independiente de vehículo eléctrico (VE) en España, con sede en Palencia, han firmado un préstamo de 40 millones de euros para financiar la instalación de una red de cargadores rápida y ultrarrápida a lo largo de la Red Transeuropea de Transporte (TEN-T) en España.

AGENCIAS

Palencia, 15 feb (EFE).- El Banco Europeo de Inversiones (BEI) y Zunder, operador de puntos de carga ultrarrápida independiente de vehículo eléctrico (VE) en España, con sede en Palencia, han firmado un préstamo de 40 millones de euros para financiar la instalación de una red de cargadores rápida y ultrarrápida a lo largo de la Red Transeuropea de Transporte (TEN-T) en España.

Con el préstamo del BEI, Zunder continuará con su plan de desarrollo y acelerará la electrificación del transporte por carretera en España, evitando cerca de 1 millón de toneladas de CO2 en el período 2023-2031, según han informado el BEI y Zunder este miércoles a través de un comunicado.

De esta forma, el plan de Zunder de construir más de 4.000 puntos de carga ultrarrápida en el sur de Europa se ve impulsado gracias a este apoyo financiero del BEI en España, que permitirá acortar plazos y aumentar proyectos dentro de su plan de expansión.

Esta empresa palentina está apoyada en su despliegue por el sur de Europa por dos grandes fondos de inversión, White Summit Capital y Mirova, que recientemente ha invertido 100 millones de euros en la compañía.

Además, se espera que una gran parte de los cargadores se instalen en regiones consideradas de cohesión por la UE,

Financial strength

The support of our shareholders guarantees us a stable project for the future.

Experts and leaders

Highly capable of deploying and managing charging infrastructures

zunder

What makes us **different** from others?

Ultra-fast charge
Higher revenue per unit, higher fidelity

Photovoltaic panels
Customer coverage and lower energy costs

Easy and intuitive APP
The best rated by EV users

For all vehicles
Regardless brand or model

We do it all
Project, installation, management from our platform and customer service

zunder

Zunder: **the highest-rated** independent **charging network**

Clients' comments showcasing the **premium quality** of our services

Cristian A. Aldama @crisaldama • Aug 23
Opinión personal para ver qué opináis los que cargáis coche eléctrico fuera de casa. Para mí la mejor experiencia es la de **@zunder_es** sin ninguna duda. Llegas, enchufas y te cobran. Y la app me da datos en tiempo real de cómo va la carga.
6 4 13

Jesús Fernandez García @pimpollova • Feb 3
@zunder_es da gusto viajar sabiendo que funcionan. @HotelesTudanca 20 minutos, almuerzo y seguir ruta
2 1 5

CarlesCM @Cercamins • Apr 23
Primera vegada carregant amb **@zunder_es** i sorprenent lo ràpid q va, és arribar i moldre comparat a d'altres tipus de carregadors.
#ChargingHero
1 3 8

Flaviobriga @makey_castro • Jul 10
Parada en el Área de Servicio de Puerta de la Montaña para recargar mi vehículo eléctrico en el cargador de **@zunder_es**, el primer cargador no iba, una llamada a soporte y en menos de un minuto funcionando (algún graciosillo debió apretar el botón de emergencia). Eficacia, da gusto
1 2 6

Angel Olbés @AngelOlbes • May 6
Parada técnica rápida en el área Tudanca, probando los nuevos cargadores rápidos de **@zunder_es**. Muy cómodo, como siempre, sobretodo con el Plug&Charge!
1 2 8

Francisco Valencia @fjmvalencia_m • Mar 30
Fabulosa la primera experiencia cargando en **@zunder_es** en Unquera. Muy buena la atención telefónica para liberarme la manguera que había bloqueado por inexperiencia.
4 1 8

Martin Lewis @EVXMartin • Jul 2
Impressed with the **@zunder_es** network during our vacation trip in northern Spain. Up to 180kW, chargers working, no queues, and no trouble authenticating with the @KiaUK Charge card.
#TapiadeCasariego
1 6 33

Craig Nutyall @life_is_hell • Jul 6
Great charge spot at Torrent AP-7 on our way to Torrevieja from Bolton UK **@zunder_es**
2 3 13

Rafael Martí @MartRrafael • Jun 15
Saber que tienes una estación de **@zunder_es** cerca o en tu camino, da mucha tranquilidad, pues sabes que va a funcionar.
3 3 21

GreenKees @GreenKees • Apr 23
@zunder_es @NIOGlobal thanks for making a roadtrip with my son a breeze!
1 3 12

Mariano Yébenes @Marianoyr • Dec 25, 2022
@zunder_es la mejor carga pública que he usado este año ha sido sin duda #Zunder. Espero ver en 2023 más puntos de Madrid hacia el sur, sería una buena noticia.
2 2 13

Pablo Leo @pleocalzada • Jan 2
Primera carga en **@zunder_es** y no podría ser más fácil! Configurar el Plu&Charge sencillísimo, no más de 30 segundos. Y además carga más rápido que en los V2 de @Tesla
#ChargingHero
3 4 24

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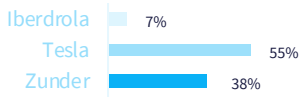
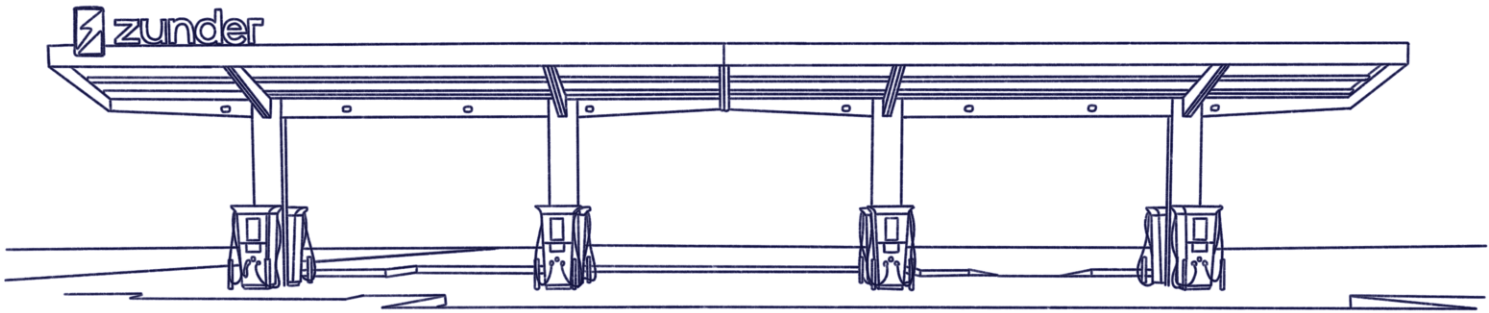


AUVE 2022 Awards

Rated by users as:

”The preferred charging network chosen by EV users for its quality of services and pricing”

“When life **flows**,
everything **works**”



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Easier & **always** operational

Dynamic power balancing
On our stations

24/7 customer service
Best rated operator by EV users

Plug & Charge
One-click charge

5 different payment methods
App, POS, RFID key fob, interoperability, autocharge

Different rates and promotions
Possibility to apply different rates and exclusives discounts

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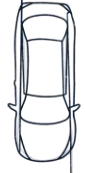
Advantages of DC charging

Attract more customers to your facility by providing them with the necessary freight options

All current electric cars support DC (fast) charging. AC (slow) charging is limited in cars to 7.4 or 11kW and is primarily intended for overnight home charging.

Foster customer loyalty so that they always recharge at your facility by offering them a **payload solution**, adapted to the time they spend in your facilities.

Objective: provide a **charging solution to attract** users with **varying needs** (from slow to fast charging).



Advantages of DC vs. AC charging

Type of charger	11kW AC	25kW DC	50kW DC	150kW DC	300kW DC
Charging time (70% capacity) [3]	294 min	129 min	65 min	22 min	11 min

1. Estimated time, assuming a recharge from 10% to 80% of the battery of a 77kWh vehicle.

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What do we **offer?**

3 ways to work with Zunder / 3 ways to become a #ChargingHero

	Zunder **invests**	**Integrate** your chargers in Zunder	Invest at **your own pace** (leasing)
Business model			
Type of charger	**Urban** Fast charge 25 – 200kW **18 – 147 min** **Interurban** Ultra-fast charge 150 – 4000kW **9 – 32 min**	**Any type of charger**	**According to customer needs**
Who invest	**CAPEX & OPEX** **100% Zunder**	**The client invests on the chargers** **Zunder offers the "Platform"**	**The client invests** **Zunder finances (Leasing)**
Description	Offer your customers a premium charging service without the need to invest. Zunder rents the space where the charging station will be located.	Integrate your chargers into the Zunder App to attract more users. 24/7 remote customer support and maintenance.	Invest in your own charging station, with all the advantages of Zunder. Zunder offers you all the technical support and market knowledge.

Fleets

zunder

Zunder **invests**

Where

Urban stations

Interurban stations

Commercial surfaces

Independent power supply

Zunder will have a separate electrical connection.

Fix &/or variable remuneration

Receive a fixed income from renting space for the charging station and receive an additional variable % of the profit generated by the installation.

Long-term lease agreement

Guaranteed rental period during which Zunder will operate the charging station.

100% of costs **assumed** by Zunder

Initial investment, maintenance and power supply included.

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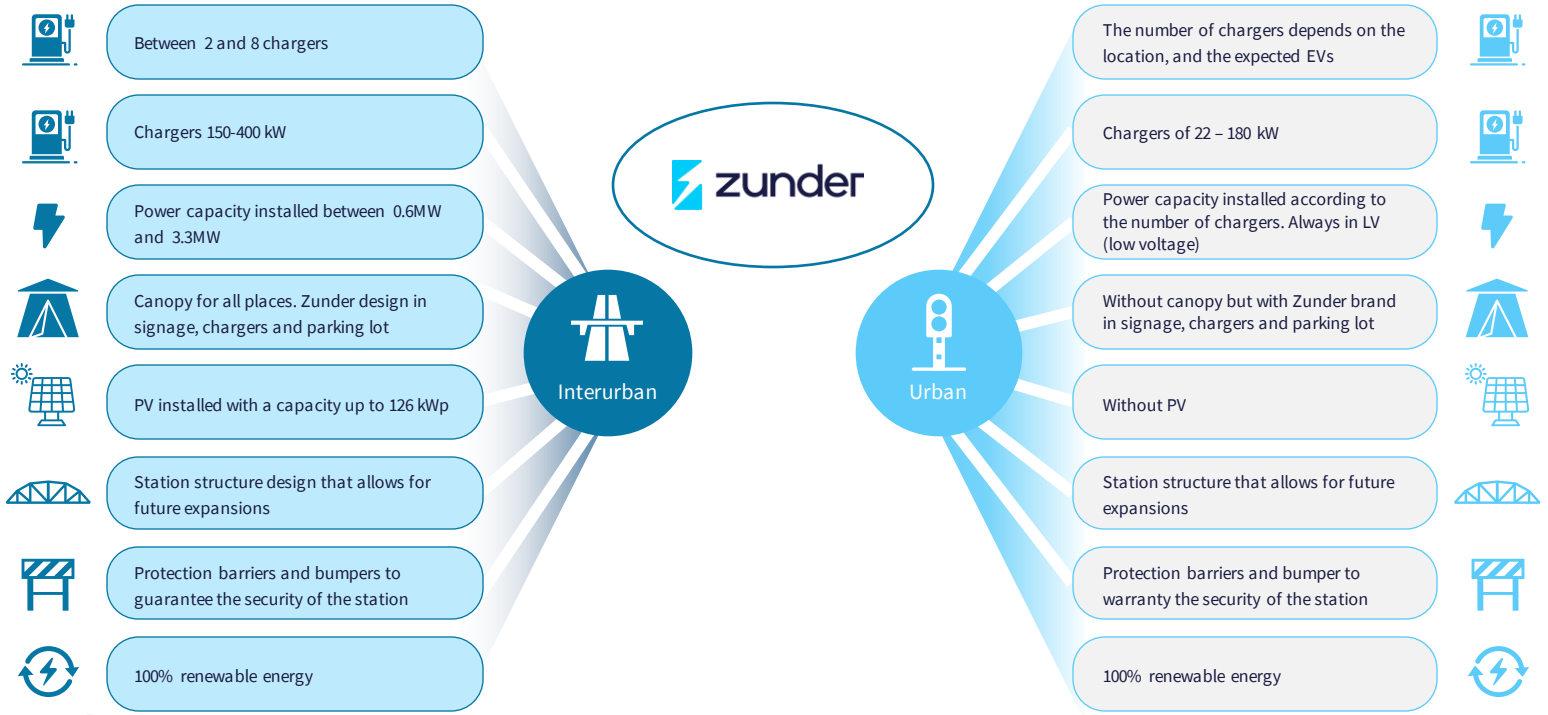
Premium Site based on specific location

Interurban Stations
Urban Stations

Both types of stations count with a set of functionalities **designed to optimize the site and satisfy customer needs**



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Source: Company information

Designs conceived **by and for** users

Unique and **unmistakable** design

Able to attract electric vehicle users to your facility

A design **adapted** to your customer's **needs**

Power and charging speed tailored to the average facility usage time






zunder

How we do it

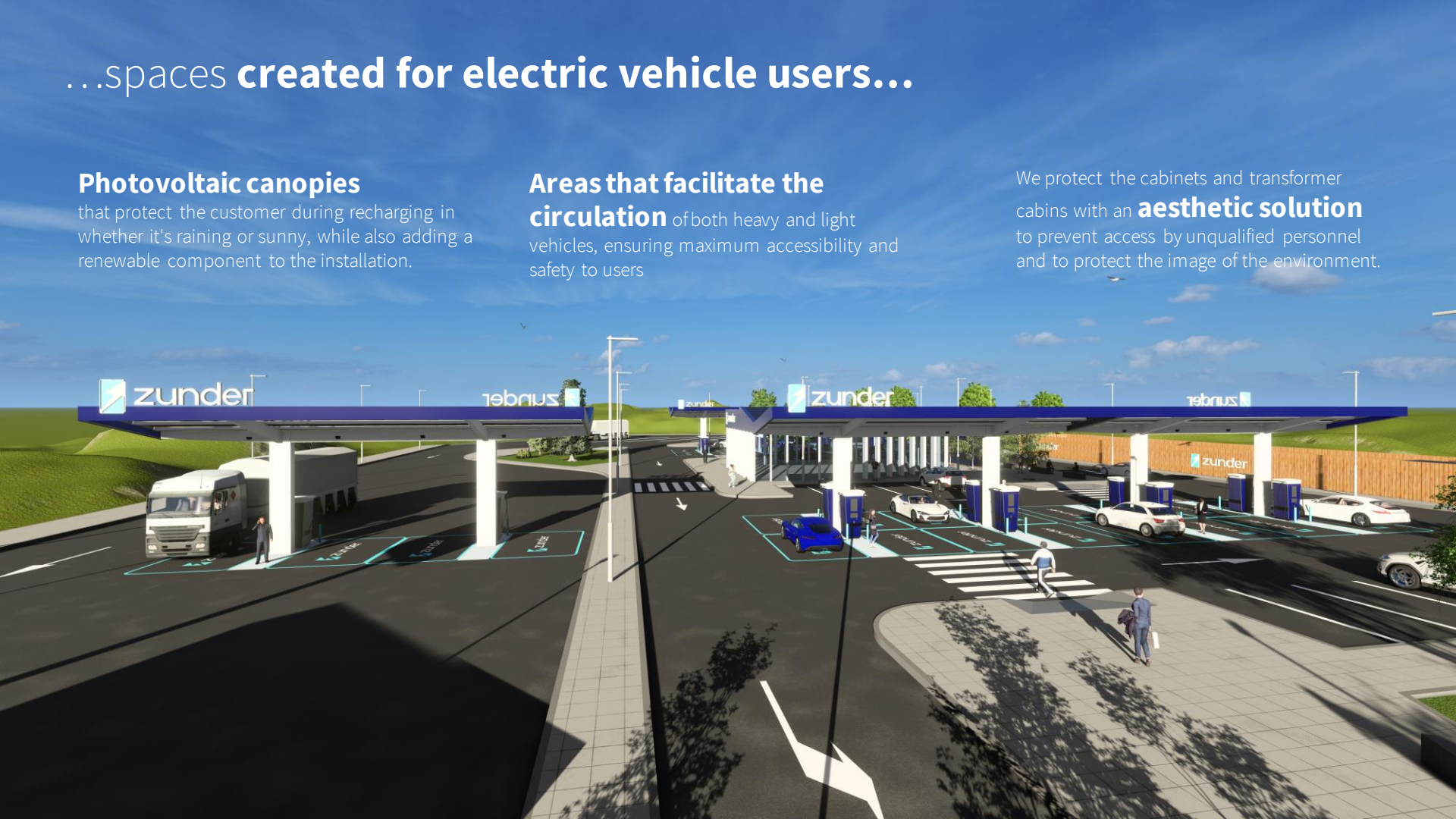
We design spaces created for electric vehicle users

…spaces **created for electric vehicle users…**

Photovoltaic canopies
that protect the customer during recharging in whether it's raining or sunny, while also adding a renewable component to the installation.

Areas that facilitate the circulation of both heavy and light vehicles, ensuring maximum accessibility and safety to users

We protect the cabinets and transformer cabins with an **aesthetic solution** to prevent access by unqualified personnel and to protect the image of the environment.



Integrate your chargers in Zunder

Interoperability

Your chargers in the market leading App

Up to 5 payment methods

Management of your chargers

With the **Zunder App** you will be able to allow users from other Apps to **charge in your chargers as well** both domestic and international customers.

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Technology made in Zunder

Interoperability

28

Countries in Europe

Some partners

IBERDROLA

acciona energía

edp

Naturgy

Integrate your chargers in Zunder

- Interoperability
- **Your chargers in the market leading App**
- Up to 5 payment methods
- Management of your chargers

Your customers will be able to **search, find, charge and pay** at the chargers through the App.

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Integrate your chargers in Zunder

- Interoperability
- Your chargers in the market leading App
- **Up to 5 payment methods**
- Management of your chargers

Charging and payment methods

Options for every type of user, from the most analog to the most digital.

- Plug & Charge
- Virtual card- Mobile app
- Physical card- TPV
- Apple Watch
- RFID keychain

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Integrate your chargers in Zunder

- Interoperability
- Your chargers in the market leading App
- Up to 5 payment methods
- **Management of your chargers**

Manage your chargers from the Zunder control panel. **Monitor, control** income, alarms, etc.

*In addition, our Customer Service Department will be available 24/7 to attend to your customers' incidents.

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Invest **at your own pace** (renting)

Have **your own charging station**

And Zunder takes care of everything. Design, legalization, market study, design proposal, power and number of seats, etc.

zunder

Invest **at your own pace** (renting)

Customer's **power** supply

Power is supplied from the customer's connection point.

zunder

Invest **at your own pace** (renting)

Management and maintenance

Zunder takes care of the management and maintenance of your charging facilities, so you don't have to worry about anything.

Invest **at your own pace** (renting)

Renting

It has all the advantages and income of having a Zunder station, without assuming the initial investment required for it with a simple fixed monthly payment.

Fleets

Easy Payment

Up to **5 payment methods** to choose from (App, Card, RFID, QR and Plug&Charge).

Furthermore, with Zunder **Roaming**, you can charge at stations that are not owned by us, gaining access to the largest **charging network in Europe.**

Capillarity

Access the **largest ultra-fast charging network in** the market, to minimize your vehicle waiting times during charging.

Your chargers

We assist you in **deploying the necessary chargers** for your fleet and **provide financing** through Zunder Leasing.

Company and employee account

Access **to all chargers** through the Zunder App.

Possibility of having a **company account** and a private account for **employees**.

Balance limits for employees..

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Trucks charging in Zunder stations

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Agenda

- Zunder presentation
- **EU and DK EV market**
- Strategies for electrifying a city
- Open Discussion/Q&A

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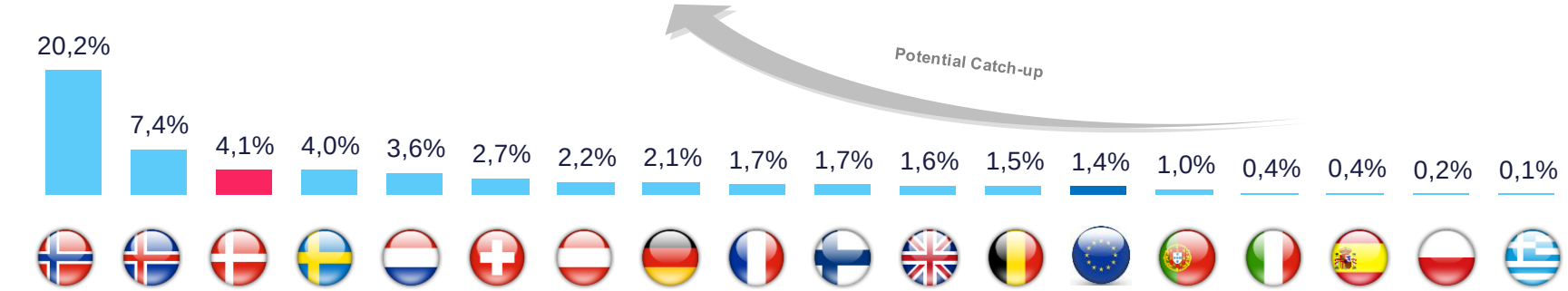
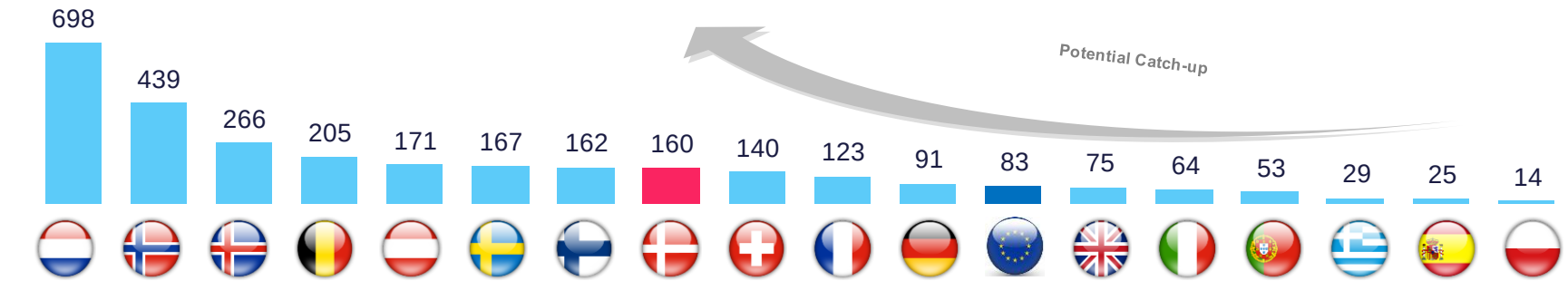
Huge BEV Adoption Catch-up Potential in natural expansion geographies…

The **current insufficient penetration** of BEV in Southern Europe represents a **significant growth opportunity** in the coming years

BEV Adoption catch-up in Southern Europe - % Passenger BEV over total Passenger Cars – 2022



Expected significant chargers deployment in Southern Europe – Public Charging Points per 100k inhabitants - 2022



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Source: IEA, European Union. Europe refers to European Union Countries, Iceland, Israel, Norway, Switzerland, Türkiye and the United Kingdom

… and very attractive EV penetrations in northern EU countries

	Denmark	Spain	France	Portugal	Italy	Germany	Belgium	Austria	Switzerland
Market share of BEVs in 2022	20,8%	3,8%	13,3%	11,4%	3,7%	17,8%	10,3%	15,9%	17,8%
Market share of BEVs in 2023	31,0%	4,8%	15,2%	15,12%	3,8%	16,4%	16,8%	18,5%	18,5%
Market size of car market	2.782k	25.345k	38.739k	5.410k	39.823k	48.541k	5.852k	5.1342k	4.779k
BEV in 2023	106k	120k	752k	70k	205k	1.428k	139k	132k	146k
Fast chargers in 2023	744	1.731	6.088	1.212	3.642	8.515	750	1600	1.275
Evs per Fast charger	142	69	123	57	56	168	185	83	114

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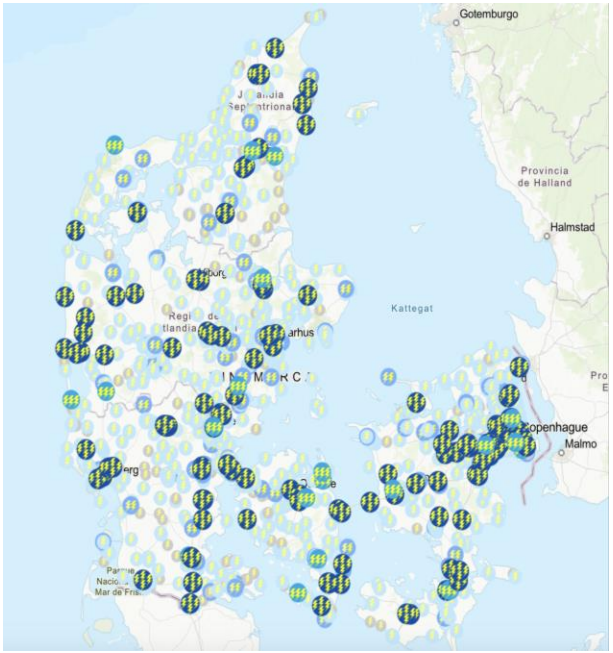
Denmark: an interesting **market for ultra-fast charging deployment**

Important traffic axis with higher-than-average EV penetration

Need to complement existing infrastructure with new ultra-fast charging deployments



Understanding of electrical network is crucial to plan for ultra-fast charging hubs

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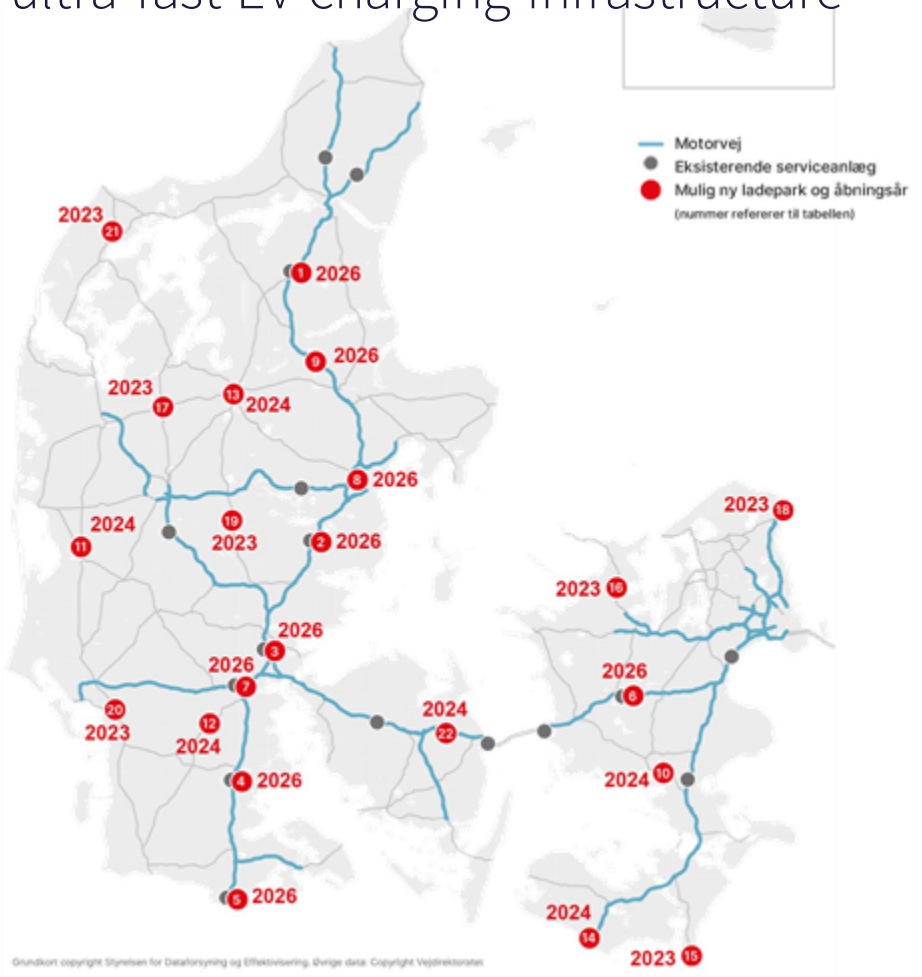
Zunder aims to help to deploy the ultra-fast EV charging infrastructure network in Denmark

Vejdirektoratet plans …

- 8 EV charging stations already awarded by July 2023
- 14 EV charging stations to be tendered in Q3 2024
- Expected commissioning 2024-2026

… and complementary locations:

- Locations close to high traffic axis
- Urban hubs
- EV truck hubs



Agenda

- Zunder presentation
- EU and DK EV market
- **Strategies for electrifying a city**
- Open Discussion/Q&A

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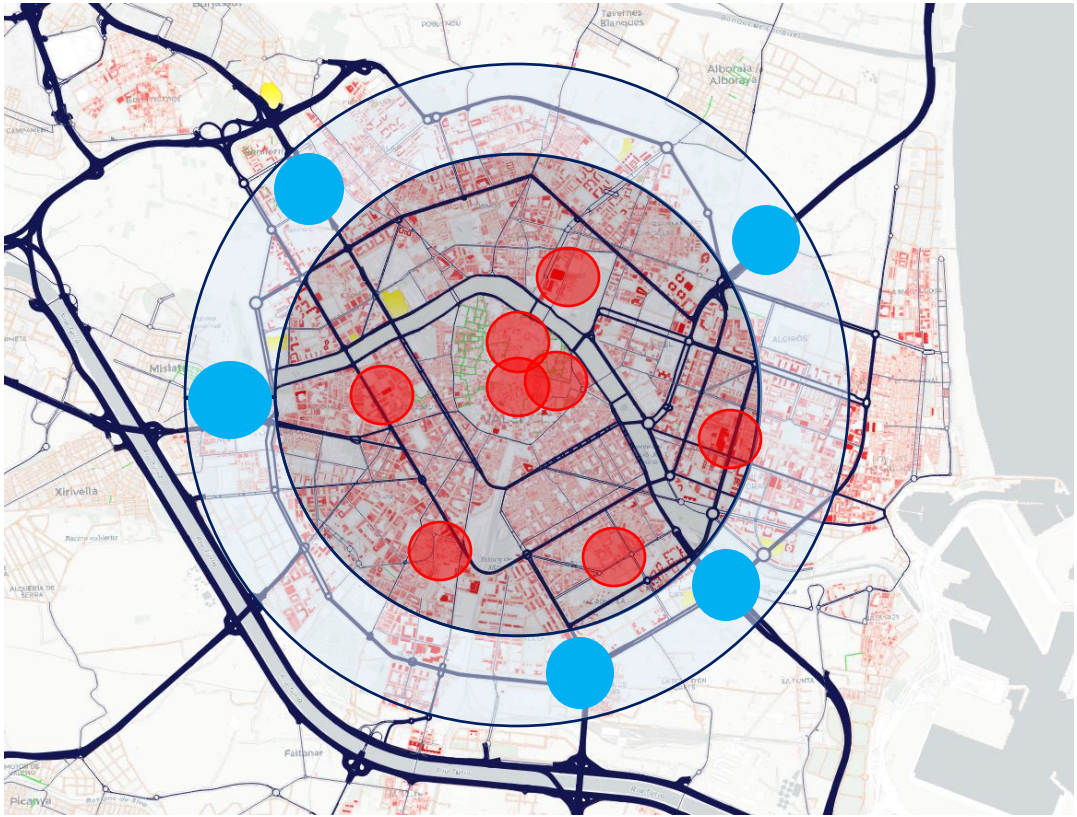
Strategies for **electrifying** a city

As we envision the future of urban living, Zunder unveils a comprehensive strategy for electrifying cities, embracing **three distinct charging typologies** strategically embedded in our cityscape

- Recurrent Charging - Peripheral Location: Typically occurs at the vehicle owner's home, which could be situated in a residential area on the outskirts of the city.
- Opportunistic Charging - Central Location: It may be more common in central areas, where people tend to make brief stops, such as offices, shops, or restaurants.
- Need-Based Charging- Strategic Location: Fast-charging stations or superchargers would be strategically placed in peripheral and central areas for easy access during longer journeys or emergencies.



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We help cities make their transition to electric mobility

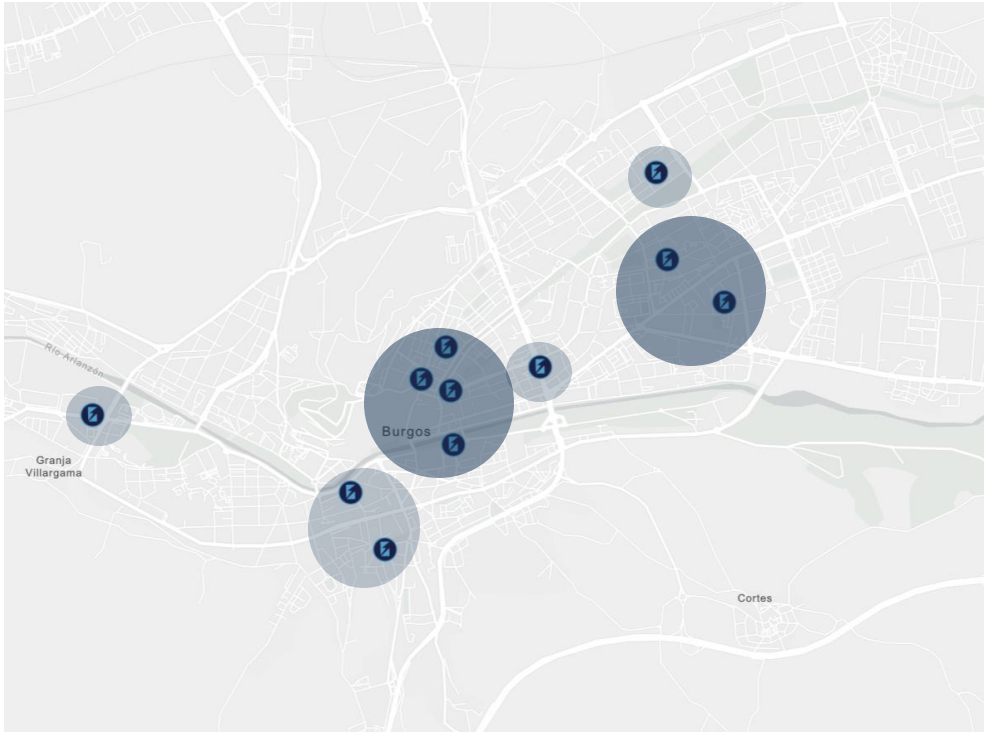
Opportunistic Zunder charging stations in **Burgos**

- Our solutions for cities like Burgos epitomize cutting-edge advancements in electric vehicle infrastructure. With a focus on **DC charging**, each site features **two 180 kW** charging stations.

- The growth in Burgos has been remarkable, experiencing a staggering **+147% increase in electric vehicles since Zunder** initiated its deployment a year and a half ago, according to the DGT.

- The **rapid turnover of vehicles** at these high-capacity charging points efficiently caters to a broad spectrum of users in public spaces. Emphasizing the collaborative spirit, the success in Burgos is a testament to the impactful public-private partnership driving this transformation.

- The city center now boasts **11 Zunder ultra-fast charging stations**, solidifying Burgos as a trailblazer in embracing accessible electric mobility for all.



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We help cities make their transition to electric mobility

Opportunistic Zunder charging stations in **Vitoria**

Vitoria has become the capital of Spain with **the largest** and most important **ultra-fast urban cha**rging electrification project to date thanks to Zunder

- In Vitoria, Zunder takes the lead in managing and operating **21 stations & 84 charging points**, marking a significant stride towards a sustainable future.
- **Each operational** site in Vitoria boasts a standardized structure with **4 charging points**, each featuring 4 CCS connectors, delivering a powerful 25kW per connector.
- This harmonious blend of **public-private collaboration** showcases Vitoria as a city at the forefront of innovative urban mobility solutions.
- The uniformity in design and high-capacity charging points not only reflects efficiency but also exemplifies a commitment to providing a seamless and accessible charging experience for **residents and visitors alike**.

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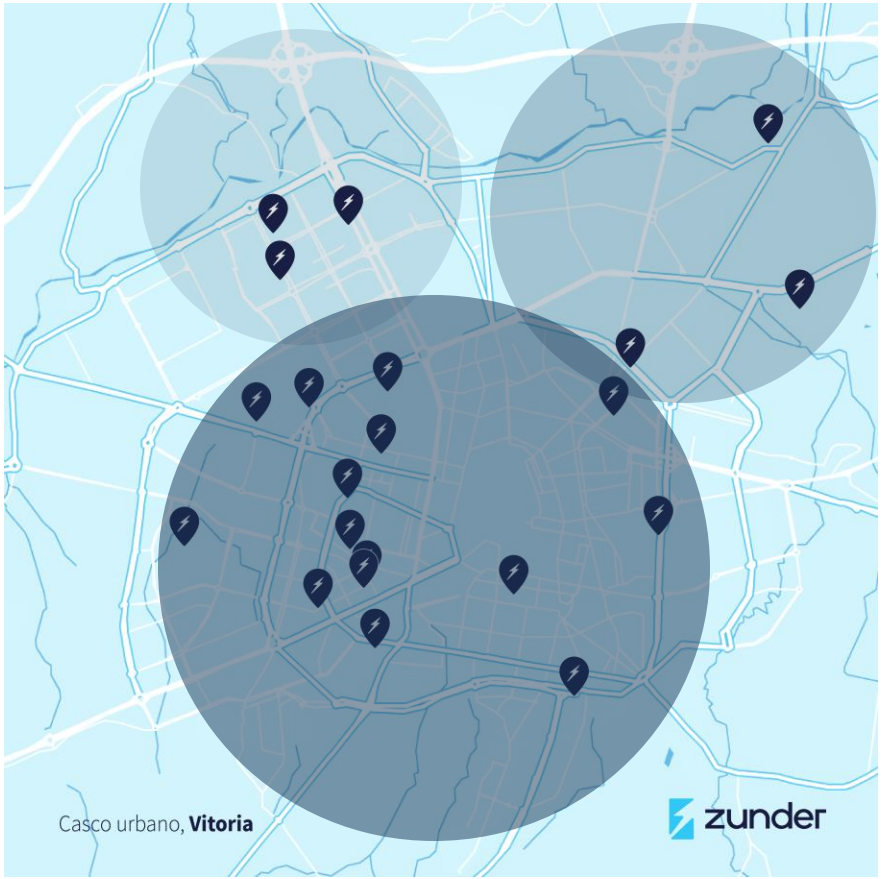
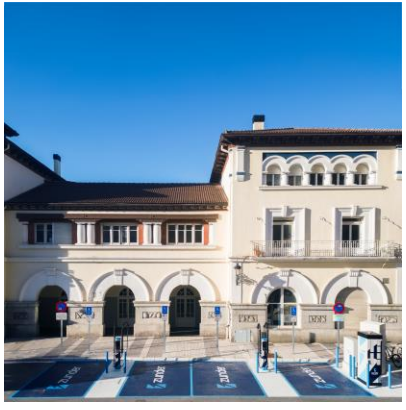
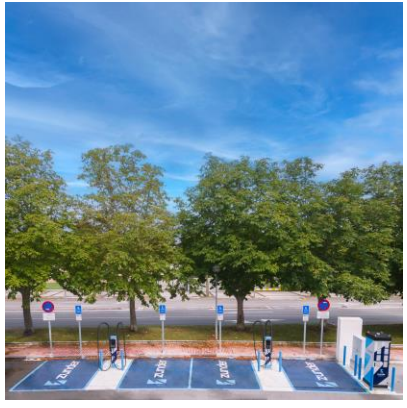


We help cities make their transition to electric mobility

Zunder charging stations in Vitoria and Zaragoza





Vitoria

84 charging points

Burgos

11 ultra-fast charging stations

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Ultra-fast Charging Stations in **Aarhus**

Current locations with chargers of > 150 kW power in the City of Aarhus

1. LN - Aura Energi DC (Skanderborgvej 180) **2x299.92 kW**
2. Shell Viby J (Skanderborgvej 123) **2x299.92 kW**
3. Thit Jensens Gade - AURA – DC (Thit Jensens Gade 2) **4x299.92 kW**
4. ViggoEnergy Katrinebjergvej (Katrinebjergvej 58) **4x299.92 kW**
5. Q8 Randersvej 162, (8200 Århus N) **6x150 kW**
6. Aarhus, Denmark Bredskiftevej (20, Aarhus, 8210) **5x120 kW / 1x125 kw**
7. DK, Blomstervej Tiilst Århus (Blomstervej 2R) **2x300 kW**

7

locations

With chargers of >150 kW

26

chargers

With power exceeding 150 kW

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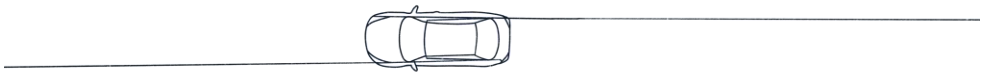
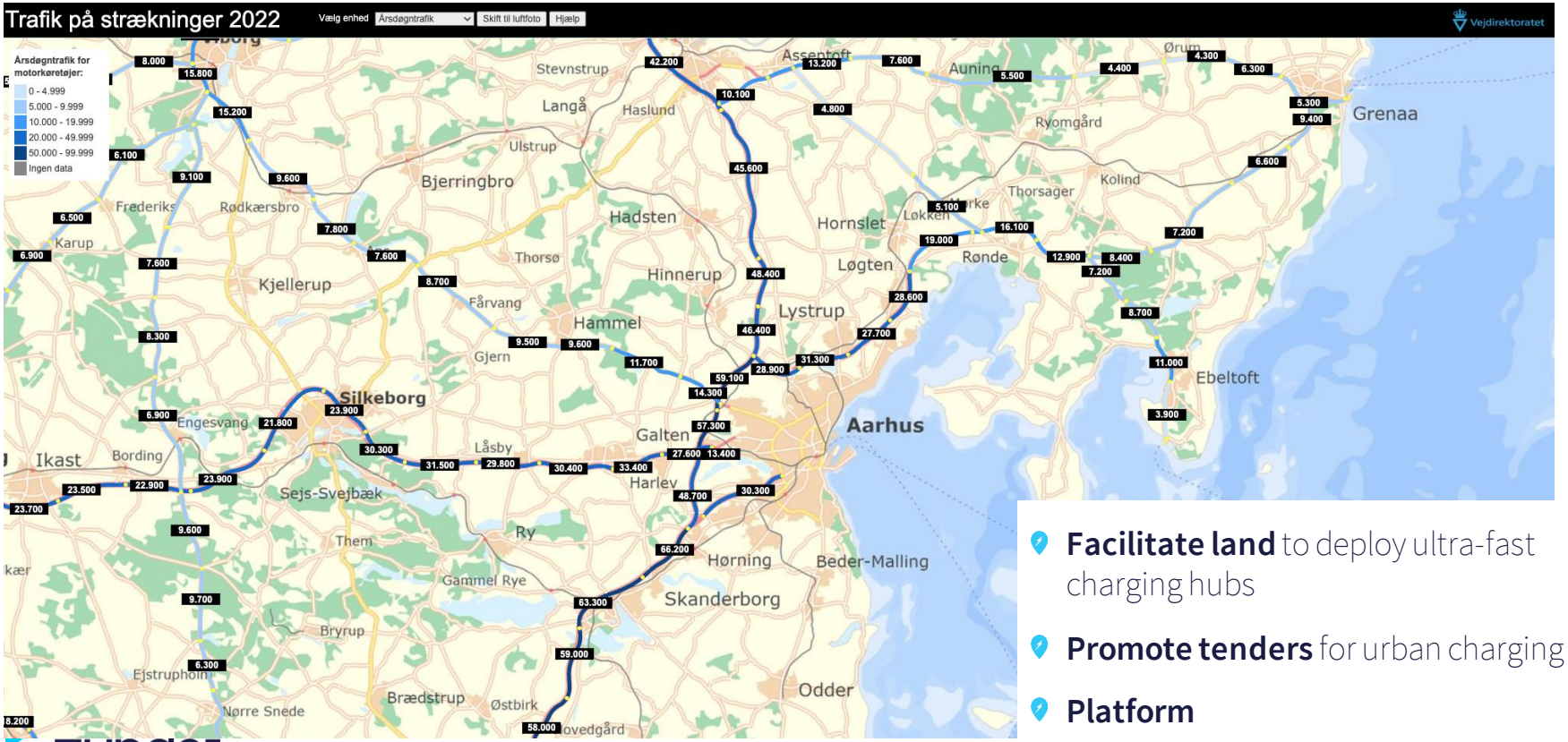


Potential levers to collaborate with Zunder



- **Facilitate land** to deploy ultra-fast charging hubs
- **Promote tenders** for urban charging
- **Platform**
- **Interoperability**

Index

- Zunder presentation
- EU and DK EV market
- Strategies for electrifying a city
- **Open Discussion/Q&A**

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Open Discussion/Q&A

- Challenges and opportunities for public/private collaboration.
- What can municipalities do to help companies grow in their area?
- What is your vision for electric mobility, both urban and peri-urban?
- Procedure: Model envisaged to develop ultra-fast charging infrastructure in urban-peri-urban areas (urban hubs).
- How can an operator like Zunder develop land or a site? What support options are available? Is renting, selling, or tendering an option? Can we initiate tenders, and if so, what is the procedure?
- How do you see that a company like Zunder can collaborate with you?

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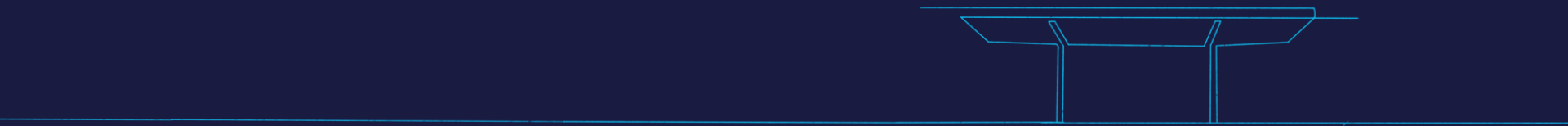
Thank you



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