

Distributed Energy Resources as Solar Corridors & Urban Artefacts for Electric Mobility and Climate Resilience in Spanish cities

This proposal outlines a regenerative infrastructure strategy for Spanish cities, deploying Distributed Energy Resources as modular solar corridors and urban artefacts to support electric mobility, climate resilience, and inclusive urban services. Built around culturally resonant umbrellas and terrace structures, each unit delivers clean power and shade directly at the point of use — serving EV users, vendors, retail, public space users, and nearby housing clusters. These artefacts are digitally orchestrated as part of a Micro Virtual Power Plant platform, enabling dynamic energy optimization, real-time monitoring, and revenue stacking through charging, cooling, data services, and carbon monetization. Phased deployment across flagship nodes, corridor artefacts, and community mesh clusters creates economies of connection — amplifying financial performance and system intelligence as network density grows. Each artefact is an intelligent node — evolving from infrastructure to platform. As the network densifies, costs decline, and performance multiplies. With a blended finance model and alignment to SDGs 7, 9, 11, and 13, the initiative offers more than infrastructure: it activates a scalable distributed energy platform designed to deliver resilience, and measurable impact across Spanish's cities and mobility ecosystems.

A Modular
Infrastructure
Platform Delivering
Point-of-Use Solar
Power, Shade, and
Smart Urban Services
— Digitally Integrated
into Micro Virtual
Power Plants Across
Markets, Mobility
Routes, and Housing
Clusters



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Executive Summary

Distributed Energy Resources as Solar Corridors & Urban Artefacts for Electric Mobility and Climate Innovation in Spain

Abstract:

This proposal presents a modular, investable infrastructure-as-platform for Spain’s cities and urban corridors — designed to deploy **Distributed Energy Resources (DERs)** through solar artefacts that deliver clean power, cooling, and data services to commercial hubs, EV users, and housing clusters. Each artefact functions as a **localized energy node**, integrated into a **digital microgrid architecture** that supports predictive ops, dynamic pricing, carbon tracking, and fintech-enabled service monetization. The system delivers **urban electrification**, climate resilience, and proximity services — all activated through smart subscriptions and cooperative-finance models.

Backed by ROI-mapped deployment tiers and aligned with Spain's climate targets and ESG innovation objectives, the proposal unlocks investability through impact metrics, network effects, and compounding platform returns.

BBVA-Ready Highlights

- **Fintech-Enabled Infrastructure Model**
Artefacts deploy solar energy, data access, and cooling — with monetizable microservices stacked via dynamic pricing and digital wallets
- **Digital Grid Intelligence**
Micro virtual power plants (VPPs) orchestrate asset performance across urban corridors
- **Electric Mobility Activation**
Artefacts support EV charging infrastructure, last-mile logistics, and smart routing
- **Investor ROI Forecasting**
IRR ranges from 5–18% across tiers, with compounding performance via network density
- **Carbon Monetization Platform**
Offset generation linked to SDG metrics, co-financed via ESG fund structures
- **Scalable Deployment Strategy**
Flagship → corridor → mesh rollout with rapid cost compression and digital integration

Why BBVA & BBVA Spark

This isn't just infrastructure. It's a **climate mobility platform** — fundable as hard assets, scalable as digital services, and prime for integration with BBVA's ESG financing tools, smart carbon portfolios, and sustainable innovation strategies.

1: Introduction

Distributed energy resources for Spain — A Scalable Climate-Tech Platform for Urban Energy, Mobility, and Monetization

Spain's cities are facing a convergence of climate urgency, mobility disruption, and infrastructure friction. Rooftop solar deployment is often blocked by community-of-owner opposition, especially in dense urban zones like Barcelona. Meanwhile, residents in high-rise apartments lack private parking spaces for EVs, and public charging infrastructure remains fragmented and slow to scale.

This proposal introduces modular, scalable climate solutions and sustainable products: **solar artefacts** deployed in underutilized urban furniture and public spaces — including **solar umbrellas** and **solar Terrazas** — that generate clean energy, store it locally, and activate adjacent EV charging nodes. Surplus energy is exported to the building associated with the artefact, creating a **solar patio** that solves energy access, mobility, and climate resilience simultaneously.

These artefacts are organized as an ecosystem of distributed energy resources that are digitally orchestrated through a **Virtual Power Plant (VPP)** layer, enabling predictive operations, dynamic pricing, and ESG-linked performance tracking. Monetization is activated through fintech rails: digital wallets, smart contracts, and carbon credit tokenization — all compatible with BBVA's sustainability finance infrastructure.

In this document I will be referring to our climate solutions and **branded sustainable products** (like SolPort, SombraSolar, Solar Gardens, and Solar Forests), as the core components of our system of distributed (in urban space) solar energy resources across Spanish cities and their urban corridors —

especially in cities like Barcelona, Madrid, Valencia, and others where rooftop solar resistance and EV access gaps are most acute.

Introducing SolPort: Spain's Signature Climate Infrastructure for Urban Energy, Cooling, and Mobility

SolPort and sombrasolar — is a modular solar artefact designed to transform underutilized urban furniture and public space into a climate-resilient, monetizable infrastructure node. Each SolPort unit functions as a **solar patio**, generating clean energy, activating adjacent EV charging, delivering shaded cooling, and exporting surplus power to nearby buildings. It **solves energy access, mobility, and heat stress simultaneously**

This proposal presents **SolPort** — a modular solar artefact designed to transform Spain's urban corridors into climate-resilient, monetizable infrastructure zones. Each SolPort unit functions as a **solar patio**, generating, storing, circulating clean energy locally, activating adjacent EV charging, delivering shaded cooling, and exporting surplus power to nearby buildings.

SolPort and sombrasolar units are scalable into **solar gardens** and **solar forests**, forming a distributed energy mesh across Spanish cities and their urban corridors. These solar artefacts are digitally orchestrated through a **Virtual Power Plant (VPP)** layer, enabling predictive operations, dynamic pricing, and ESG-linked performance tracking. Monetization is activated through fintech rails: digital wallets, smart contracts, and carbon credit tokenization — all compatible with BBVA's sustainability finance infrastructure.

Strategic Value for BBVA Spark

- **Mobility-Tech Climate Startup Logic:** SolPort artefacts function as DER nodes with monetizable services — charging, cooling, data, and carbon
- **Fintech Integration Opportunity:** Payment flows, ESG dashboards, and smart contracts align with BBVA Spark's platform logic
- **ESG Alignment with BBVA Impact Mandates:** Each SolPort unit delivers measurable climate mitigation, energy equity, and urban resilience

Deployment Strategy

The system scales through a three-tier rollout:

- **Tier 1:** SolPort Ultra — flagship solar umbrellas for high-visibility EV hubs
- **Tier 2:** SolPort Terrace — corridor-facing mobility and energy access nodes
- **Tier 3:** SolPort Micro — artefacts for housing clusters and informal commerce zones

Each SolPort unit becomes a **monetizable infrastructure node**, generating recurring revenue and measurable ESG impact — ready to be financed, tracked, and scaled through BBVA's innovation and sustainability platforms.

Financial Model & ROI

- **CapEx per unit:** €2K–€20K depending on tier
- **Monthly revenue potential:** €30–€450 per unit
- **Payback period:** 2–5 years
- **IRR forecast:** 5–18% based on service density and corridor deployment
- **Funding structure:** Blended finance model with BBVA Spark equity, public climate grants, and community match

ESG Impact & Carbon Monetization

- SDG alignment: Goals 7, 9, 11, 13
- Carbon offset generation per artefact
- ESG reporting via BBVA-compatible dashboards
- Tokenization potential for verified climate assets

Solar artefacts such as SolPort and SombraSolar are more than infrastructure — they are branded climate-tech solutions that turn underused urban furniture and public space into a clean energy engine. It's modular, scalable, and digitally monetizable. With BBVA's support, SolPort can become Spain's signature response to urban climate resilience, mobility equity, and sustainable innovation.

2-Problem statement ad opportunity space

Integrating Renewable Energy and Electric Mobility through distributed energy resources and Solar Cultural artefacts in Spanish cities

Chapter Summary: Spain's Urban Climate Challenge Meets Fintech-Ready Infrastructure Gaps

Spain's cities face a convergence of climate stress, mobility disruption, and infrastructure friction. They face a **complex blend of urban stressors and opportunity zones**¹: intensifying heatwaves, fragmented EV corridor deployment, gaps in retail commerce electrification, and an underleveraged public space grid. In dense urban zones like Barcelona, traditional rooftop solar deployment is often blocked by **community ownership disputes** — while residents in high-rise apartments lack **private parking spaces** for EV charging. These constraints stall clean energy adoption and electric mobility, especially in neighbourhoods that need it most. Cities like Madrid, Valencia, Barcelona, and Málaga are navigating rapid mobility transitions while grappling with climate resilience demands and spatial inequality.

This proposal frames these pressures as a scalable infrastructure platform opportunity — where **solar artefacts**, deployed as **Distributed Energy Resources**, solve for multiple overlapping pain points: energy transition, decarbonizing, electric mobility, cooling, clean power access, digital connectivity, and service monetization.

Climate Pressure Zones and Urban Infrastructure Barriers

- **Rooftop Solar Resistance:** In cities like Barcelona, community-of-owner opposition prevents rooftop solar installations
- **No Private EV Charging Access:** High-rise residents lack garages or driveways for personal EV charging

¹ Elsewhere, urban populations are expanding faster than infrastructure. In many cities mobility remains **fossil-based mobility**, energy access is patchy, and local economies rely on fragile public space. **Climate stress, grid unreliability**, and rapid **urbanization** are compounding vulnerabilities. We urgently need decentralized, adaptive, and inclusive infrastructure — built for city and community resilience

- **Fragmented Public Charging Infrastructure:** Existing networks are sparse, slow, and poorly integrated with local clean energy systems
- **Heat Island Amplification:** Urban temperatures exceed 40°C, stressing public health and productivity
- **Charging Desertification:** Demand for electric vehicles is increasing, but charging infrastructure remains poor, especially in dense cities, their downtowns and mixed-use areas, and multi-family apartment buildings.
- **Proximity retail Commerce without Power:** Retailers across Spanish cities lack access to reliable power, shade, or cooling — limiting growth and urban inclusion

Our climatic Solutions and sustainable products: Solar Patios, Gardens & Forests

We introduce a modular system of solar artefacts — including solar umbrellas and solar terrazas — that generate, store, and circulate clean energy locally. Each unit becomes a solar patio (See below, **SolarPorts**):

- Solar panels embedded in public-space artefacts
- Local battery storage and energy management
- EV charging node placed adjacent to the artefact
- Surplus energy exported to the associated building
- Scalable into solar gardens and solar forests for corridor-wide coverage

This system bypasses rooftop politics, democratizes EV access, and turns public space into a clean energy engine.

System Opportunity for BBVA

Cultural solar Artefacts as Infrastructure-Ready Distributed Energy resources:

- Activated by solar, integrated with digital wallets
- Monetizable services per site: charging, cooling, data access
- Positioned within corridors of commercial, transit, and housing activity
- Scalable into community “meshes” that self-optimize energy flows and network effects

System Opportunity for the sustainable business unit and for BBVA Spark

- **ESG Financing² Relevance:** Each artefact offers measurable environmental impact, social inclusion outcomes, and governance transparency
- **Fintech-Service Architecture:** Infrastructure monetization aligns with digital contracting, usage tracking, carbon tokenization, and pay-per-service revenue models

² ESG Financing refers to investments that consider Environmental, Social, and Governance (ESG) factors alongside financial returns when making decisions. It's a type of sustainable finance where investors aim to generate positive social and environmental impact while also achieving financial gains

- **Flagship Visibility:** Pilot deployments provide high-reputation zones for BBVA to demonstrate Spain-based climate innovation, not just global finance footprints

Our climate solutions and sustainable products are a multi-solve platform: cool the city, electrify the underserved, monetize clean services — and let BBVA fund the mesh that connects it all.

Illustration

Spain's Urban Climate Challenge Meets SolPort — A Scalable Infrastructure Solution for Energy, Cooling, and Mobility

Spain's cities face a convergence of climate stress, mobility disruption, and infrastructure friction. In dense urban zones like Barcelona, rooftop solar deployment is often blocked by **community-of-owner opposition**, while residents in high-rise apartments lack **private parking spaces** for EVs. These constraints stall clean energy adoption and electric mobility, especially in neighbourhoods that need it most.

Public charging infrastructure remains fragmented, and heat island effects are intensifying — with urban temperatures exceeding 40°C in southern and inland cities. Retail commerce zones, meanwhile, operate with high energy costs, poor shade, or cooling — limiting productivity, competitiveness, growth and inclusion.

SolPort and SombraSolar: Signature Climate-Tech Solutions

SolPort is a modular solar artefact designed to solve these energy and cooling challenges simultaneously. Each unit functions as a **solar patio**, generating clean energy, **storing it locally**, and activating adjacent EV charging. Surplus energy is exported to the building associated with the solar artefact, bypassing rooftop tensions and democratizing access to solar power.

SolPort units also deliver shaded cooling infrastructure — mitigating heat stress in public zones and enabling retail commerce, pedestrians, and transit users to operate comfortably. The system is scalable into **solar gardens** and **solar forests**, forming a distributed energy mesh across Spain's cities and their urban corridors.

SolPort System Capabilities

- Solar generation embedded in solar artefacts (umbrellas, Terrazas, awnings, etc)
- Local battery storage and energy management
- EV charging node placed adjacent to the solar artefact that generates, storage and circulate energy
- Surplus energy exported to nearby buildings (and to the grid)
- Cooling infrastructure for shaded public comfort
- Digital access layer for service monetization and ESG tracking

SolPort transforms underused public space into a climate-resilient, monetizable infrastructure node — solving energy access, mobility, and heat stress in one foldable solar artefact.

System Opportunity for BBVA

- **Infrastructure and energy-as-a-Service:** SolPort artefacts activate charging, cooling, and carbon monetization
- **Fintech Integration:** Digital wallets, smart contracts, and ESG dashboards align with BBVA Spark's platform logic
- **ESG Impact:** Each unit delivers measurable climate mitigation, energy equity, and urban resilience

SolPort is not just a solution, but a branded product BBVA can fund, and scale, and co-own.

3: Product Branding & Urban Relevance

SolPort as a Co-Brandable Climate-Tech Infrastructure for Public Space

Even though we will come back to this product on a separate document, let us notice our climate solutions include a series of sustainable products.

SolPort and SombraSolar (foldable solar umbrella), are not just hardware deployments— they are **brandable urban assets** designed for visibility, modularity, and public impact. Its physical presence in high-traffic corridors creates a tangible symbol of climate resilience and smart infrastructure — with BBVA-HQ, poised to lead its rollout visually and strategically.

Urban Relevance Highlights

- Deployed in heat-prone zones for cooling access and energy efficiency
- Positioned in multimodal corridors: transit, commerce, housing
- Suited for Barcelona, Madrid, Valencia, Seville, Málaga, and beyond

SolPort and SombraSolar meet the moment in climate-stressed, socially diverse public zones — redefining how energy, cooling, and data live in public infrastructure.

Branding & Co-Visibility Opportunities

- **Artefact surfaces** designed for BBVA logos and ESG messaging
- **QR-coded interfaces** link to BBVA Spark and ESG dashboards
- **Interactive elements** track carbon impact and public service hours
- **Press and media activation** via flagship sites

SolPort and sombrasolar becomes branded urban nodes — where BBVA's ESG leadership and fintech integration are tangible and visible.

Illustration

Branding the “solar patio” as a signature product that creates a scalable product family (solar patio → garden → forest). The brands should be:

- Evocative of solar energy, shades and public space
- Urban and modular
- Tech-forward and fundable
- ESG-aligned and scalable

Signature Product Naming Concepts

Here are a few naming directions, each with a short rationale:

1. SolPort

Solar-powered urban portal for energy, mobility, and cooling.

- Evokes a gateway or node
- Feels tech-enabled and modular
- Easy to scale: SolPort Mini, SolPort Grid, SolPort Forest

2. UmbraGrid

Shaded energy node for urban corridors.

- Combines “Umbra” (shade) + “Grid” (energy network)
- Suggests cooling + electrification
- Strong visual identity

3. TerraVolt

Ground-level solar infrastructure³ with voltage and value⁴.

- Terra = earth, Volt = energy
- Works well for Terrazas and patios
- Sounds like a product line

4. SolarNest

A neighborhood-scale solar node for energy and comfort.

- Friendly, inclusive, community-oriented
- Suggests warmth, shelter, and local power
- Easy to visualize and brand

5. Corrasol

Corridor + Sol (sun) — solar corridor infrastructure.

- Ties directly to our platform name

³ This refers to **decentralized, modular solar systems** deployed directly in public or community spaces — like:

- Foldable solar umbrellas
- Solar terrazas with EV chargers and cooling
- Shade structures with energy export capabilities

These aren't rooftop arrays or remote solar farms — they're **visible, tactile, and integrated** into the daily life of streets, plazas, and public venues. Think “solar you can sit under, plug into, and cool off with.”

⁴ “With Voltage and Value”, this part of the phrase connects **technical functionality** with **economic potential**:

- **Voltage** = These artefacts actively generate usable electricity — powering cooling, lights, WiFi, EVs
- **Value** = That energy is monetized through service fees, carbon offsets, ESG credits, and surplus exports

In short: *It's infrastructure that doesn't just sit there — it **works** and **earns**.*

- Elegant, Spanish-rooted, scalable
- Could be the name of the entire product family

Suggested Product Family Structure

Product Tier	Name	Use Case
Tier 1 – Flagship	SolPort Ultra	EV hubs, marketplaces, transit anchors
Tier 2 – Corridor	SolPort Terrace	Walkways, retail zones, housing edges
Tier 3 – Micro Node	SolPort Micro	Informal commerce, pop-up cooling zones

Optional expansion:

- SolPort Garden → cluster of Tier 2s
- SolPort Forest → full corridor mesh

4-System Architecture Overview

Chapter Summary: Tiered Distributed Energy Resources as solar Artefacts for the integration of solar energy and Smart electric Mobility Across Spanish cities and their Urban Zones

This platform deploys modular urban solar artefacts that serve as **Distributed Energy Resources** — generating solar power, delivering shade, and activating multi-layered urban services. Each artefact operates as a **point-of-use infrastructure unit** embedded in commerce hubs, housing clusters, and mobility corridors.

These assets are structured across **three deployment tiers**, each with a unique capex profile, reach, and monetization logic — digitally integrated via **Micro Virtual Power Plants (VPPs)** that enable predictive control and dynamic service optimization.

Tiered Infrastructure: Artefact Classes

Tier	Function	CapEx Range	Use Case
Tier 1	Flagship Solar Umbrellas	€20K+	High-visibility EV hubs, marketplaces
Tier 2	Corridor Terrace Artefacts	€6K–€10K	Transit routes, urban walkways
Tier 3	Community Micro Artefacts	€2K–€4K	Local housing, retail, pop-up zones

Each solar artefact includes:

- **IoT Sensors** for load, heat, occupancy, and demand profiling
- **Battery Storage & Grid Interface** for flexible energy usage
- **Digital Access Layer** enabling service subscriptions, usage tracking, and smart pricing

Microgrid Logic: Virtual Power Plant (VPP) Integration

All artefacts are digitally linked via a cloud-based VPP architecture that enables:

- **Predictive Operations** – Algorithms anticipate service demand, optimize asset output, and schedule maintenance before failure
- **Load Balancing & Energy Optimization** – DERs self-orchestrate across city zones based on time-of-day and user intensity
- **Smart Contract Integration** – Subscriptions, EV charging credits, carbon token issuance, and cooperative revenue split handled via secure digital rails

Service Stack Embedded in Each Node

Activated services vary by artefact type, but include:

- EV Charging (fast/slow depending on tier)
- Cooling Infrastructure for public comfort
- Digital Access – public WiFi, vendor data systems
- Green Logistics Integration – micro-retail and drop-off support
- Carbon Tracking – ESG performance, offset generation

Opportunity for BBVA Sustainable business unit and BBVA Spark

- **Infrastructure-as-a-Digital Channel:** the solar Artefacts become access points for energy, data, and fintech services — fundable as platform infrastructure
- **Smart Reporting & ESG Compliance:** Performance tied to measurable climate impact, social access, and transparent governance
- **Modular Scale Strategy:** Low-friction path to expansion, with visibility-driven Tier 1 anchoring and scalable Tier 3 reach — adaptable to BBVA's portfolio cities

This system architecture above turns clean energy urban infrastructure into a **live, monetizable network** — where each node increases value across the entire system and aligns with **BBVA's twin priorities of digital innovation and sustainable urban finance**.

Designing Resilience Through an Interconnected Five-Layer distributed Solar energy and Mobility Ecosystem

This system is not one technology — it's **five interlocking layers**, each orchestrated to generate clean energy, deliver urban services, enable connectivity, and unlock economic value. Together, they form an **adaptive solar infrastructure mesh** that can scale fluidly across markets, streets, and cities

Our system is built on a distributed logic that combines modular infrastructure, digital orchestration, and financial scalability. It is composed of five integrated layers, each activated through branded sustainable products (see above, chapter 3), designed for deployment in Spain's urban and peri-urban zones.

Branded Sustainable Products Integrated into a Multi-Layered Energy, Cooling, and Monetization Platform

Layer 1: Physical Infrastructure (Solar Cultural Artefacts)

Unfolding distributed Energy sources through cultural Solar artefacts deployed and installed in urban and peri-urban spaces and across key sites

- **Fixed & foldable solar umbrellas** generating, storing and circulating energy **in situ**
- **Modular terraces** (“Terrazas” to be scaled up from solar patios to solar gardens and solar forests) generating, storing and circulating energy **in situ**
 - Supplying solar energy to
 - EV charging points & battery units
 - Local commerce
 - Open markets
 - Old gasoline stations to be transformed into new clean energy hubs
 - existing charging stations currently fed by the electricity grid to be transformed into new clean energy hubs
 - Offering
 - Public shading / urban cooling, and
 - social encounters

Solar Umbrellas, Terrazas, Smart Chargers, EVs	
Feature	Functionality
Fixed/foldable Umbrellas	Mobile-ready shade + solar generation
Terrazas	Modular terrace decks with integrated solar + cooling
Smart Charging nodes	Bidirectional charging + local energy balancing
Shared Battery Banks	Storage + energy routing capacity
EVs & Mobility Nodes	Clean mobility integration + commerce

Each solar artefact object is a solar node — part energy system, part economic enabler, part public space

Layer 2: Digital Coordination Platform-Smart energy orchestration layer enabling:

- **Real-time** energy flow and **bidirectional energy routing**
- **Tiered Subscription** access logic (for vendors and EV users)
- Peer-to-peer **energy exchange**, trading and surplus sharing

- **Data dashboard** for planners, utilities, and funders
- **Predictive** load forecasting with AI-powered diagnostics
- **maintenance alerts** & usage pattern recognition
- **Privacy-safe data** monetization via anonymized usage analytics

AI-driven Routing + Predictive Management	
Function	Use Case
Energy Forecasting	Predict demand + optimize dispatch
Load Balancing	Maximize uptime + reduce wastage
Subscription Access	Tiered services for vendors, EVs, grid sales
Maintenance Alerts	Predictive diagnostics for physical units
Data Monetization	Sell anonymized insights to planners/utilities

The **Interactivity** – Grounding the Network Logic

- **When Unit A** (umbrella/terrazza) **generates surplus energy**,
 - the smart platform routes it to nearby **Unit B** (a terraza at local retailers and commerce),
 - maintaining cold chain uptime for retailers and reducing grid draw
- **If one EV charger experiences outage**,
 - adjacent umbrella nodes reroute available storage
 - maintaining functionality for EVs with no downtime.

The digital smart platform does not just monitor — it orchestrates. Each added node improves the accuracy and intelligence of the whole. Our infrastructure isn’t just modular — it’s intelligent. The more units deployed, the smarter the system becomes. This compounding value would attract tech-savvy climate investors

Layer 3: Micro Virtual Power plant

Solar artefacts are digitally orchestrated through a **Virtual Power Plant (VPP)** layer, enabling predictive operations, dynamic pricing, and ESG-linked performance tracking (for more on this VPP, see Carlos H Betancourth Business Plan, 2025)

Layer 4: Economic logic and Model -Revenue via multi-service packaging

- EV charging fees
- Cold chain logistics (solar fridges, etc)
- Energy leasing to shops/vendors

- Subscription tiers (energy + logistics)

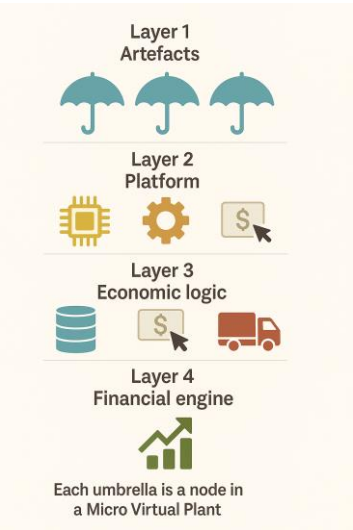
Modular Services + Local Value Creation	
Revenue Stream	Enabled By
EV Charging Fees	Umbrellas + Charging nodes
Refrigeration & Shade Leasing	Terrazas
Data-as-a-Service	Digital Platform
Peer-to-Peer Energy Sharing	Shared storage + smart contracts
Subscriptions + Logistics	Umbrella clusters (solar forests)

Each solar umbrella, solar Terraza, and solar charging node isn’t just hardware — it’s a business unit embedded in a regenerative service mesh.

Layer 5: Financial Engine-Dynamic system logic

- Each node adds **network value**
- **Shared infrastructure** reduces unit cost
- **Returns improve with system’s connectivity** density
- Aligns with SDGs, and green finance

Capital Efficiency + Catalytic ROI	
Driver	Mechanism
Tiered CapEx Model	Flagship + scalable units deployed strategically
Network Effects	Each new unit multiplies overall system value
Blended Revenue	Energy + mobility + subscriptions + data
Flexible Ownership	Co-ops, public-private partnerships, community leasing
SDG-Aligned Finance	Eligible for climate grants, donor blending, ESG funds



Our system of distributed energy resources is not a sequence of hardware units. It’s a distributed nervous system — where every artefact senses, responds, and amplifies the others. From solar shading to data exchange, the system evolves as it grows — each node adding intelligence, utility, and resilience to the network. This is **financial resilience by design**: modular, inclusive, and positioned for catalytic co-investment.

Illustration

SolPort/SombraSolar: Modular Climate Infrastructure Engineered for Spain’s Urban Corridors

SolPort is a branded family of modular solar artefacts designed to transform public space into climate-resilient infrastructure (chapter 3). Each unit functions as a **solar patio**, generating clean energy, storing it locally, activating adjacent EV charging, and exporting surplus power to nearby buildings. SolPort also delivers shaded cooling and digital access — forming the backbone of a scalable urban energy mesh. SolPort artefacts are digitally orchestrated through a **Virtual Power Plant (VPP)** layer, enabling predictive operations, dynamic pricing, and ESG-linked performance tracking. The system is structured across three deployment tiers, each with distinct CapEx profiles, service densities, and monetization logic.

SolPort Product Family: Tiered Infrastructure

SolPort Tier	Function	CapEx Range (€)	Use Case
SolPort Ultra	Flagship solar umbrellas	€20K+	EV hubs, marketplaces, transit anchors
SolPort Terrace	Corridor-facing terrace artefacts	€6K–€10K	Walkways, retail zones, housing edges
SolPort Micro	Community-scale micro artefacts	€2K–€4K	Informal commerce, pop-up cooling zones

Each SolPort unit includes:

- Solar panels embedded in public-space structures
- Battery storage and grid interface
- IoT sensors for load, heat, and usage profiling

- Digital access layer for service subscriptions and smart contracts

VPP Integration: Smart Energy Orchestration

SolPort artefacts are connected via a cloud-based **Virtual Power Plant**, enabling:

- Predictive operations and maintenance
- Load balancing and energy optimization across corridors
- Smart contract governance for usage, billing, and cooperative revenue sharing
- Carbon offset tracking and ESG reporting

Service Stack Embedded in SolPort Units

Service Channel	Description	Revenue Mode
EV Charging	Fast/slow modes activated by solar + battery storage	Per-minute / subscription
Cooling Infrastructure	Shading + fans / misting systems for public zones	Pay-per-use / public block
Connectivity Services	WiFi mesh, vendor POS data, local IoT nodes	Ad-supported / prepaid
Energy Leasing	Battery swaps, mobile charging	Lease / time-based
Carbon Monetization	Offset generation through monitored performance	Market-linked

Strategic Value for BBVA Spark

- **SolPort as Infrastructure-as-a-Platform:** Each unit is a monetizable node for energy, mobility, and climate services
- **Smart Reporting & ESG Compliance:** Performance tied to measurable impact, tracked via BBVA-compatible dashboards
- **Modular Scale Strategy:** SolPort units allow phased deployment with compounding returns and corridor-wide impact

Each new unit builds corridor density, multiplies monetization, and strengthens BBVA’s ESG footprint.

5- Economies of Connection: Financial Model & Systemic ROI

Chapter Summary: ROI Logic & Scalable Value Generation from a Modular Climate-Tech Platform

Unlike traditional infrastructure deployments, this initiative is built around **network economics** — where each deployed artefact strengthens the system, compresses costs, expands revenue, and

multiplies performance. The platform delivers **Infrastructure-as-a-Service**, combining clean energy, urban cooling, green logistics, and data services **activated directly at the point of use**.

As more artefacts are deployed, **costs drop, services layer in**, and each node becomes a contributor to systemwide returns — economically, environmentally, and digitally.

Value Dynamics for BBVA Spark & Sustainability Investors

- **Cost-per-unit drops** via localized procurement, manufacturing, and training
- **Revenue-per-unit rises** as services (charging, cooling, data access, energy resale) are activated per site
- **Service bundling** increases per-site viability: infrastructure stacks multiple revenue channels

This isn't static infrastructure — it's a regenerative infrastructure-as-platform. Each site produces clean energy, unlocks data, supports mobility, and amplifies adjacent services.

Network Effects Drive Performance

Every deployed solar artefact:

- Boosts platform intelligence (more data = smarter optimization)
- Reduces average operating cost
- Enables regional energy balancing through VPP logic
- Multiplies cooperative revenue opportunities via subscriptions and digital access tools

Systemic ROI Curve:

This unlocks a **systemic ROI curve**:

- Tier 1 flagship units drive visibility and traction (€20K+)
- Tier 2 and Tier 3 artefacts scale reach with leaner CapEx (€6K → €2K)
- Average IRR ranges from **5% to 18%** depending on tier, services activated, and corridor density

Monetization Stack: Revenue Layering at Site Level

Service Channel	Description	Revenue Mode
EV Charging	Fast/slow modes activated by solar + battery storage	Per-minute / subscription
Cooling + energy Infrastructure	Shading + fans / misting systems for public zones	Pay-per-use / public block
Connectivity Services	WiFi mesh, vendor POS data, local IoT nodes	Ad-supported / prepaid
Energy Leasing	Battery swaps, mobile charging	Lease / time-based

Carbon Monetization	Offset generation through monitored performance	Market-linked
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BBVA as Strategic Amplifier

- **Flagship Artefact Visibility:** High-footfall urban zones give BBVA reputational traction and policy proximity
- **Catalytic Capital Logic:** BBVA’s initial investment enables scale-up across Tier 2–3 artefacts with rapid maturity
- **Digital Integration Potential:** All services can be mapped to BBVA Spark fintech tools — from payment rails to ESG dashboards
- **Scalable ESG Returns:** Impact grows exponentially as nodes increase — measurable via BBVA’s environmental and financial performance metrics

We are building something that gets cheaper as it grows, earns more with every node, and builds system intelligence like a startup — but delivers real infrastructure returns. Funders will see it not just as feasible, but inevitable

Illustration

SolPort’s ROI Logic and Network Effects Across Spain’s Urban Corridors

SolPort artefacts are not static infrastructure — they are **monetizable service nodes** that grow in value as they connect, cluster, and scale. Each unit generates recurring revenue through charging, cooling, data access, and carbon monetization. But the real financial power emerges through **economies of connection**: as more SolPort units are deployed, the system becomes smarter, more efficient, and more profitable.

This illutration outlines how ROI compounds through corridor density, digital orchestration, and service layering — creating a scalable financial model aligned with BBVA’s fintech and ESG mandates.

Artefact-Level ROI: Tiered Performance Logic

SolPort Tier	CapEx (€)	Monthly Revenue (€)	Payback Period	IRR Range
SolPort Ultra	€20K+	€150–€450	4–5 years	12–18%
SolPort Terrace	€6K–€10K	€80–€200	3–4 years	8–12%
SolPort Micro	€2K–€4K	€30–€80	2–3 years	5–8%

Revenue sources include:

- EV charging subscriptions
- **Cooling time credits**
- Data access and vendor services
- Carbon offset monetization

Cooling time credits

They represent units of time where public cooling infrastructure — like SolPort umbrellas or terrazas — provides thermal relief in heat-exposed zones. Think of it like carbon credits, but instead of offsetting emissions, you're offsetting heat stress.

They can be:

- Measured in minutes or hours per person served
- Digitally recorded through IoT sensors or user logins
- Monetized or tracked for ESG reporting, health impact, or equity indexes

How Do They Work?

Every time a citizen uses a SolPort unit for shade, misting, or ventilation, the system records a "cooling time event." These credits can then be:

- Tracked as a public health metric (e.g. cooling hours per neighborhood)
- Bundled into impact reports for BBVA's ESG dashboards
- Tokenized or awarded in community apps to incentivize usage
- Sold to municipalities or insurers as a climate resilience service

Why It Matters

In heat-vulnerable regions, access to cooling isn't just comfort — it's survival. Cooling time credits:

- Quantify thermal equity
- Reward infrastructure that reduces heat stress
- Create new ESG-linked value streams for BBVA and partners
- Serve as indicators in climate adaptation finance

They turn public cooling into a measurable, monetizable, and socially impactful utility.

Corridor-Level ROI: Network Effects in Action

As SolPort units are deployed across urban corridors, they begin to self-optimize:

- **Load Balancing:** Artefacts share energy and usage data via VPP
- **Service Bundling:** Users access multiple services from one node
- **Utilization Growth:** More nodes = more users = more revenue
- **Carbon Yield Compounding:** Offset generation increases with density

A corridor with 50+ SolPort units performs like a distributed utility — generating clean energy, cooling, mobility access, and ESG returns.

Systemic ROI for BBVA

SolPort’s financial model aligns with BBVA’s strategic goals:

Value Driver	BBVA Benefit
Recurring Revenue	Fintech integration via wallets and contracts
ESG Impact	Carbon tracking, SDG alignment, offset packaging ⁵

⁵ Offset packaging means:

- Aggregating carbon offsets from one or multiple sources (e.g. SolPort artefacts across a corridor)
- Certifying them through recognized standards (like Gold Standard or Verra)
- Structuring them as a **package** — by geography, vintage, service type, or impact category
- Registering, selling, or tokenizing the package for buyers seeking ESG compliance or climate neutrality

It transforms isolated impact data into a fundable ESG asset. SolPort units generate carbon offsets through:

- Renewable energy production (solar replacing grid electricity)
- Avoided emissions (cooling tech reducing HVAC demand)

Public Visibility	Flagship zones (e.g. BBVA HQ) for brand leadership
Scalable Investment	Tiered CapEx enables phased funding and risk control

SolPort Deployment Strategy Across Spain’s Urban Zones

Urban Zone Type	SolPort Tier	Services Activated
Transit Hubs & Marketplaces	SolPort Ultra	EV charging, cooling, carbon tracking, high visibility
Urban Corridors & Retail Zones	SolPort Terrace	Walkway cooling, vendor access, building energy export
Residential Clusters & Informal Commerce	SolPort Micro	Shade, misting, data access, community energy nodes

Deployment Matrix Integration

The ROI logic is mapped across Spain’s cities:

- **Barcelona:** Dense corridor deployment → high cooling + carbon yield
- **Madrid:** BBVA HQ anchor → flagship visibility + fintech pilot
- **Valencia, Seville, Málaga:** Tiered rollout → corridor monetization + community impact

Each city welcomes a **SolPort mesh**, growing financial and climate returns with every new artefact.

Deployment Matrix by City

Strategic Placement of SolPort Tiers Across Spain’s Urban Zones

City	SolPort Ultra Zones	SolPort Terrace Zones	SolPort Micro Zones
Barcelona	Sants Station, La Boqueria Market	Eixample corridors, Poblenou rooftops	Raval, informal vendor zones, housing blocks
Madrid	Atocha Station, El Rastro Market, BBVA HQ	Lavapiés, Chamberí, Gran Vía walkways	Usera, Vallecas, community plazas

- EV charging replacing fossil-based mobility

These offsets can be:

- Quantified via smart sensors and BBVA’s ESG dashboard
- Aggregated corridor by corridor
- Bundled by BBVA into offset portfolios for sale to corporates, cities, or green investment vehicles

Offset packaging allows BBVA to:

- Monetize ESG data captured from SolPort
- Participate in verified carbon markets
- Offer offset-backed finance products or sustainability-linked instruments
- Strengthen its positioning in climate-tech and green capital deployment

Valencia	Estació del Nord, Central Market	Ruzafa, Cabanyal corridors	Benimaclet, informal commerce zones
Seville	Santa Justa Station, Triana Market	Alameda de Hércules, Nervión	Polígono Sur, shaded vendor areas
Málaga	María Zambrano Station, Atarazanas Market	Soho, El Palo, shaded retail corridors	La Trinidad, informal housing clusters

Deployment Logic

- **Ultra:** High-visibility zones for EV charging + ESG branding
- **Terrace:** Mid-tier corridors for energy export + cooling
- **Micro:** Community-scale artefacts for inclusion + resilience

Special Highlight: BBVA Headquarters – Madrid

SolPort Ultra Deployment at BBVA HQ (Ciudad BBVA)

- Flagship solar patio with EV charging, cooling, and carbon tracking
- High-visibility ESG demonstration zone
- Integrated with BBVA’s sustainability dashboard and fintech rails
- Opportunity for co-branded pilot and media visibility

BBVA HQ becomes the anchor node of Spain’s solar corridor mesh — showcasing climate infrastructure, fintech integration, and ESG leadership.

Digital Monetization & Smart Contracts

SolPort units are digitally monetized through:

- Mobile payments and subscriptions
- Smart contracts for cooperative ownership
- ESG dashboards for BBVA-linked reporting
- Predictive pricing based on usage and weather

Infrastructure becomes software — and BBVA becomes the platform.

Artefact-Level ROI: Tiered Performance Logic

To understand the financial viability of SolPort, we begin with a comparison of unit-level economics across the three tiers. This table illustrates the capital expenditure, revenue potential, payback period, and IRR range for each artefact type.

SolPort Artefact ROI Comparison

SolPort Tier	CapEx (€)	Monthly Revenue (€)	Payback Period	IRR Range
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SolPort Ultra	€20K+	€150–€450	4–5 years	12–18%
SolPort Terrace	€6K–€10K	€80–€200	3–4 years	8–12%
SolPort Micro	€2K–€4K	€30–€80	2–3 years	5–8%

Revenue sources include:

- EV charging subscriptions
- Cooling time credits
- Data access and vendor services
- Carbon offset monetization

This table shows that each SolPort unit is financially viable on its own — but the real value emerges when they operate as a connected system.

Corridor-Level ROI: Network Effects in Action

As SolPort units are deployed across cities and urban corridors, they begin to self-optimize:

- **Load Balancing:** Artefacts share energy and usage data via VPP
- **Service Bundling:** Users access multiple services from one node
- **Utilization Growth:** More nodes = more users = more revenue
- **Carbon Yield Compounding:** Offset generation increases with density

A corridor with 50+ SolPort units performs like a distributed utility — generating clean energy, cooling, mobility access, and ESG returns.

The following table illustrates how corridor density amplifies financial returns, carbon yield, and cooling impact.

Corridor Density vs. IRR Growth

Units per Corridor	Average IRR (%)	Carbon Yield (tCO ₂ /year)	Cooling Hours Delivered
10	6%	12	1,000
50	10%	65	5,500
250	16%	320	28,000

This table demonstrates the principle of “economies of connection”: as more SolPort units are deployed in proximity, the system becomes more efficient, more impactful, and more profitable.

Systemic ROI for BBVA

SolPort’s financial model aligns with BBVA’s strategic goals:

Value Driver	BBVA Benefit
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Recurring Revenue	Fintech integration via wallets and contracts
ESG Impact	Carbon tracking, SDG alignment, offset packaging
Public Visibility	Flagship zones (e.g. BBVA HQ) for brand leadership
Scalable Investment	Tiered CapEx enables phased funding and risk control

Deployment Matrix Integration

The ROI logic is mapped across Spain’s cities:

- **Barcelona:** Dense corridor deployment → high cooling + carbon yield
- **Madrid:** BBVA HQ anchor → flagship visibility + fintech pilot
- **Valencia, Seville, Málaga:** Tiered rollout → corridor monetization + community impact

Each city becomes a SolPort mesh, growing financial and climate returns with every new artefact.

Digital Monetization & Smart Contracts

SolPort units are digitally monetized through:

- Mobile payments and subscriptions
- Smart contracts for cooperative ownership
- ESG dashboards for BBVA-linked reporting
- Predictive pricing based on usage and weather

Infrastructure becomes software — and BBVA becomes the platform.

Strategic Takeaway

SolPort’s ROI logic is not linear — it’s exponential. BBVA’s investment in corridor density unlocks compounding returns through shared energy flows, bundled services, and ESG-linked monetization. The more connected the mesh, the greater the financial and climate impact.

6-Investment Briefing – Monetizing Modular soloar Infrastructure Through Connectivity

Chapter Summary: Monetizing Modular Infrastructure Through Digital Service Connectivity

This initiative transforms solar-powered urban artefacts into intelligent service nodes — monetizing clean energy, cooling, data, and mobility access through digital subscriptions, usage pricing, and

carbon-based finance. Each site and node⁶ become a gateway for **energy-as-a-Service**⁷: a recurring revenue model embedded within Spain’s city fabric, tied directly to BBVA's ESG goals and fintech delivery rails.

Monetization Stack by Artefact Tier

Tier	Service Channels Activated	Revenue Logic
Tier 1	EV charging, cooling pods, WiFi access, carbon tracking	Monthly subscription, usage-based billing
Tier 2	Logistics hub charging, shaded retail zones	Cooperative billing + BBVA-linked wallet
Tier 3	Data node + solar spot for vendors/housing	Pay-per-service or prepaid infrastructure

Each service is integrated with a **BBVA-compatible digital platform**: payment APIs, ESG tracking tools, and mobile-access contracts⁸.

Fintech Layer Activation

- **Digital Wallets** – User access to cooling, charging, and data via BBVA-linked mobile apps
- **Smart Contracts** – Govern usage tiers, billing logic, cooperative profit-sharing
- **Carbon Accounting Modules** – Integrated with BBVA ESG reporting infrastructure for offsets and SDG mapping
- **IoT Telemetry & Data Monetization** – Commercial insights on heat exposure, usage density, and EV traffic

Each artefact becomes a monetizable access node for clean energy, electric mobility and urban connectivity — turning modular hardware into platform infrastructure.

Revenue Pathways Enabled per Node

Channel	Description	BBVA Opportunity
EV Charging Access	Fast/slow via solar-battery systems	BBVA wallet micro-payments
Cooling Time Credits	Subscription or ad-sponsored user blocks	ESG-tagged commercial usage reports

⁶ Solar Umbrella-solar terrace/battery-street parking-solar charging station/battery-electric vehicle/battery-adjacent building/battery

⁷ See, Carlos H Betancourth. Business Plan. 2025

⁸ Mobile access contracts, in the context of physical security and access control, refer to agreements where a user's smartphone or other mobile device is used as a credential to access a building, facility, or system, replacing or supplementing traditional methods like key cards. These contracts often involve a software or service provider that enables the mobile access functionality and a user agreement outlining the terms of use

Connectivity Bandwidth	Public WiFi or vendor POS (point of sale) activation	Data service bundling + fintech pilots
Carbon Offset Tracking	Artefact-level carbon savings mapped to BBVA ledger	Green finance dashboard integration
Grid Resilience Support	Artefacts provide load balancing + local storage	Infrastructure resilience co-financing

Platform-Wide Financial Logic

- **Solar Artefact ROI Timeline:** 3–5 years depending on tier, service density, and corridor traction
- **IRR Forecast:** Tiered range of 5–18%, with increased performance as nodes densify and services bundle
- **ESG Return Multiplier:** Climate mitigation, digital inclusion, retail commerce electrification — measurable and bankable

Investment Modalities for BBVA

Model	Benefit to BBVA
Impact-Linked Credit Facility	Lower rates tied to carbon, usage, or SDG KPIs ⁹
Venture Co-Investment (Spark)	Scalable infrastructure startup logic
ESG Project Finance Structure	Measurable returns via ESG reporting dashboard
Carbon Offset Integration	Tradable carbon assets tied to BBVA portfolios

Each artefact is more than infrastructure — it's a **monetizable node in a scalable urban climate platform**, ready to align with BBVA's capital models and ESG mandates.

Illustration:

Monetizing Modular Infrastructure Through SolPort: A Scalable Climate-Tech Platform for Spain

This investment briefing presents **SolPort** as a branded infrastructure product line designed to deliver clean energy, cooling, and mobility services across Spain's urban corridors. Each SolPort unit is a modular, monetizable artefact — generating recurring revenue and measurable ESG impact.

⁹ SDG KPIs, or Sustainable Development Goal Key Performance Indicators, are specific, measurable, achievable, relevant, and time-bound (SMART) metrics used to track progress toward achieving the United Nations' Sustainable Development Goals (SDGs). They provide a way to quantify and assess the effectiveness of policies and initiatives aimed at addressing global challenges like poverty, inequality, and environmental degradation

SolPort transforms public underused urban furniture and public space into a **climate-resilient service platform**, activated through digital payments, smart contracts, and carbon tracking.

BBVA is invited to co-anchor this rollout — not just as a funder, but as a strategic partner in Spain’s climate-tech transformation.

Investment Proposition

- **Modular energy Infrastructure-as-a-Service:** SolPort units deliver EV charging, cooling, data access, and carbon monetization
- **Tiered CapEx Strategy:** Enables phased deployment, risk control, and corridor scaling
- **Recurring Revenue Model:** Monthly income per unit from subscriptions, usage fees, and offset sales
- **Digital Monetization:** Fintech rails enable smart contracts, mobile payments, and ESG reporting
- **ESG-Linked Returns:** Each unit generates measurable SDG impact and tradable carbon assets

Financial Performance Snapshot

SolPort Tier	CapEx (€)	Monthly Revenue (€)	Payback Period	IRR Range
SolPort Ultra	€20K+	€150–€450	4–5 years	12–18%
SolPort Terrace	€6K–€10K	€80–€200	3–4 years	8–12%
SolPort Micro	€2K–€4K	€30–€80	2–3 years	5–8%

Blended Finance Structure

To ensure scalability and risk control, SolPort uses a **blended finance model**. This structure allows BBVA to anchor the investment while leveraging public climate grants and community co-investment. The following table outlines the recommended funding mix for each SolPort tier.

Investment Structure

- **Blended Finance Model:**
 - 40–50% BBVA Spark equity or ESG-linked credit
 - 30–40% public climate grants
 - 10–20% community co-investment or prepaid access
- **Optional Instruments:**
 - ESG project finance
 - Impact-linked credit facilities
 - Carbon asset packaging and tokenization
 - Venture co-investment for platform buildout

Blended Finance Structure by Tier

SolPort Tier	BBVA Share (%)	Public Grant (%)	Community (%)
SolPort Ultra	50%	30%	20%
SolPort Terrace	40%	40%	20%
SolPort Micro	30%	50%	20%

This table illustrates how BBVA can strategically deploy capital across tiers — maximizing visibility and impact while minimizing exposure.

Strategic Deployment Zones

- **BBVA HQ (Madrid):** Flagship SolPort Ultra site for visibility and ESG leadership
- **Barcelona, Valencia, Seville, Málaga:** Corridor rollout with tiered artefact deployment
- **Community Zones:** SolPort Micro clusters for inclusion, cooling, and carbon yield

Each city welcomes a monetizable mesh — and BBVA becomes the platform catalyst.

Fintech Integration & ESG Alignment

SolPort is designed to plug directly into BBVA’s digital infrastructure:

- Mobile wallet payments
- Smart contract governance
- ESG dashboards for carbon and SDG tracking
- API-ready reporting for BBVA’s sustainability-linked instruments

Impact & Visibility

- **SDG Alignment:** Goals 7, 9, 11, 13
- **Carbon Offsets:** Verified per artefact, pooled by corridor
- **Public Branding:** Co-branded artefacts in high-visibility zones
- **Investor Confidence:** Data-linked returns, dashboard transparency

Strategic Takeaway

The blended model allows BBVA to:

- Anchor high-visibility deployments (e.g. BBVA HQ)
- Leverage public funding for ESG-linked infrastructure
- Engage communities through prepaid access and cooperative ownership

This structure is modular, scalable, and **aligned with BBVA Spark’s venture logic and the Sustainable Business Unit’s ESG mandates**. This illustration positions SolPort as a **fundable, scalable, and branded climate-tech product line** — with BBVA at the center of its rollout.

7: Stakeholder Ecosystem in Spain

Chapter Summary: Mapping Urban Partnerships for Climate Infrastructure, Fintech Integration, and ESG Acceleration

This chapter anchors our proposal in a collaborative network where BBVA becomes a system catalyst — not just backing nodes but helping activate the mesh and the system of distributed energy resources.

To scale this modular system of distributed energy resources disseminated across Spanish cities, we propose a **multi-sector stakeholder constellation** — combining municipal authorities, sustainable mobility platforms, digital service enablers, and impact-driven investors. Spain’s landscape is uniquely primed for collaborative infrastructure innovation, with BBVA at the intersection of fintech scalability and ESG-aligned investment.

Public Sector Partners – Deployment Access & Visibility

Stakeholder	Role & Synergy
Municipal Governments (e.g. Madrid, Málaga, Valencia)	Land access, permitting, pilot visibility zones
Climate & Urban Ministries	Alignment with decarbonization policy, resilience funding
Regional Innovation Agencies	Public co-financing, smart infrastructure testing zones
Public Housing Entities	Artefact deployment near housing clusters, inclusive energy access

BBVA Opportunity: Public-private deployment accelerates ESG reporting, SDG alignment, and brand visibility.

Mobility & Urban Tech Startups – Channel Distribution

Stakeholder	Role & Synergy
EV Platforms (e.g. Wallbox, Zunder)	Artefact co-location, charging infrastructure distribution
Last-Mile Logistics (e.g. Paack, Koiki)	Shaded pickup nodes, microcharging stations
Energy-Mobility-as-a-Service (MaaS) Operators	Transit integration, user onboarding via subscription bundles

BBVA Spark Opportunity: Co-deploying services with artefacts provides channel acceleration and shared data layers.

Digital & Fintech Infrastructure Enablers

Stakeholder	Role & Synergy
BBVA Fintech Teams	Wallet integration, smart contracts, carbon credit marketplaces
ESG Analytics Providers (e.g. Clarity AI)	Embedded reporting and impact quantification
IoT & Connectivity Firms (e.g. Libelium, Cellnex)	Sensor infrastructure and data layer orchestration

BBVA Opportunity: Artefact nodes become live infrastructure for fintech activation, data monetization, and impact finance.

Circular Economy & Impact Investors

Stakeholder	Role & Synergy
ESG-Focused VC Funds ¹⁰ (e.g. Ship2B, Creas)	Early-stage co-investment, Tier 2–3 asset scaling
Cooperative & Social Economy Groups	Local ownership models and decentralized infrastructure governance
Carbon Finance Platforms	Tokenization, verification, and tradability of carbon savings

BBVA Opportunity: Partnering across impact capital and circular models positions BBVA as a mobilizer of inclusive climate investment.

BBVA’s Strategic Role

Across this ecosystem, BBVA can play multiple roles:

- **Investor:** Anchor funder in modular urban infrastructure rollout
- **Fintech Enabler:** Payments, digital contracts, ESG ledger integration
- **ESG Platform Partner:** Performance tracking, carbon monetization, SDG metrics alignment
- **Public-Private Advocate:** Leader in sustainable innovation ecosystems within Spanish cities’ urban corridors

¹⁰ A venture capital (VC) fund is a type of investment fund that pools capital from various investors to invest in early-stage, high-growth potential companies, typically startups, in exchange for equity. These funds are managed by VC firms who evaluate, select, and nurture these companies, with the goal of generating significant returns for their investors through exits like acquisitions or initial public offerings (IPOs).

8- Deployment Economics: Budget Architecture & Phased Rollout Strategy

Chapter summary: Budget Architecture & Phased Rollout Strategy for Scalable Distributed energy resources Infrastructure in Spain

This proposal scales through a three-phase deployment architecture anchored in **modular capex**, **digital integration**, and **ROI-linked service activation**. **Flagship nodes** provide reputational traction and early monetization, while Tier 2–3 artefacts build corridor density and performance compounding.

Each phase is designed to compress cost, grow coverage, and diversify revenue — reinforcing BBVA’s sustainable finance goals and Spark’s startup logic.

Tiered CapEx Infrastructure: Per Unit Economics

Artefact Tier	CapEx Range (€)	Function	Capital Source
Tier 1	€20K+	High-visibility solar umbrellas	Impact-linked finance (BBVA ESG, public grants)
Tier 2	€6K–€10K	Corridor-facing terrace artefacts	BBVA Spark equity + co-op debt
Tier 3	€2K–€4K	Solar artefacts in retail corridors and multifamily apartments	Subscription pre-sales, community match

Artefacts become monetizable in 3–12 months depending on node services and deployment intensity.

Phased Rollout Strategy: Growth in Visibility, Reach, and Return

Phase	Timeline	Units Deployed	Focus & Objective
Phase 1: Pilot Launch	0–9 Months	10–15 Tier 1 & 2	Urban visibility, beta service activation, fintech sandbox
Phase 2: Corridor Expansion	4–18 Months	50–100 Tier 2–3	Mobility corridor buildout, service monetization stack
Phase 3: Mesh Clustering	18–36 Months	250–500 Tier 3	Regional replication, ESG scaling, carbon credit flow

Corridor logic designed for Spain’s urban layouts — major cities, regional towns, peri-urban growth zones.

Capital Activation Matrix: Blended Finance Structure

Funding Source	% Share	Deployment Role
Public / ESG Grants	30–40%	Climate alignment, permitting, digital tools, SDG visibility
BBVA-Spark Equity	40–50%	Hardware purchase, rollout coordination, digital rail setup
Community Match	10–20%	Prepaid subscriptions, local access, cooperative ownership

Each phase blends capital types to reduce risk and align ROI with BBVA’s sustainability investment objectives.

ROI & Payback Timeline

Artefact Tier	Expected Payback	Return Drivers
Tier 1	4–5 years	Charging access, carbon credits, visibility contracts
Tier 2	3–4 years	Mobility services, digital bundling, asset licensing
Tier 3	2–3 years	Microservices, prepaid cooling/data, local retail power

IRR ranges from **5% to 18%**, growing with network density and service layering — modeled across corridor simulations in Málaga, Seville, and mid-sized transit nodes.

BBVA Strategic Leverage

- Visibility from Phase 1 → ESG Reputation
- Recurring Revenue from Phase 2 → Fintech Integration
- Carbon Monetization from Phase 3 → Climate Portfolio Growth

Illustration

Phased Rollout of SolPort with Financial Maturity Milestones

SolPort’s deployment strategy follows a **three-phase rollout**, designed to balance visibility, financial traction, and ESG impact. Each phase activates a growing mesh of solar artefacts — starting with flagship zones and scaling into full urban corridors. The financial model is modular, allowing BBVA to co-invest at each stage with clear ROI logic and ESG-linked returns.

Phased Rollout Summary

The following table outlines the key parameters of each deployment phase — including unit count, CapEx range, and milestone targets. It shows how SolPort scales from pilot activation to corridor monetization and full mesh maturity.

Phased Rollout Summary

Phase	Timeframe	Units Deployed	CapEx Range (€)	Key Milestone
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Phase 1: Pilot	Months 0–3	10–15	€200K–€400K	BBVA HQ launch
Phase 2: Buildout	Months 4–18	50–100	€500K–€1.2M	Corridor monetization
Phase 3: Mesh	Months 18–36	250–500	€2M–€4M	IRR realization + offset packaging

This table illustrates how SolPort’s deployment grows in scale, complexity, and financial maturity — with BBVA positioned to lead each phase.

Strategic Takeaway

- **Phase 1** delivers visibility and ESG branding
- **Phase 2** activates monetization and corridor logic
- **Phase 3** unlocks IRR realization and carbon asset packaging

Each phase is modular, fundable, and aligned with BBVA’s appetite for scalable, impact-driven infrastructure.

Phase 1: Pilot Activation (Months 0–9)

Deployment Focus	BBVA HQ (Madrid), select sites in Barcelona & Valencia
Units Deployed	10–15 SolPort Ultra & Terrace
CapEx Range	€200K–€400K
Key Activities	Site validation, fintech integration, ESG dashboard
Financial Milestone	Visibility funding, beta service launch

BBVA anchors the pilot with branded artefacts and ESG dashboard integration.

Phase 2: Corridor Buildout (Months 4–18)

Deployment Focus	Urban corridors in 3–5 cities
Units Deployed	50–100 SolPort Terrace & Micro
CapEx Range	€500K–€1.2M
Key Activities	Monetization stack, offset registration, usage analytics
Financial Milestone	Break-even zones, carbon asset packaging

Corridor density activates economies of connection and recurring revenue.

Phase 3: Mesh Clustering (Months 18–36)

Deployment Focus	Full corridor mesh in 5–7 cities
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Units Deployed	250–500 SolPort Micro + Terrace clusters
CapEx Range	€2M–€4M
Key Activities	Cooperative ownership, data scaling, ESG reporting
Financial Milestone	IRR realization, offset trading, platform maturity

SolPort becomes a distributed climate-tech utility — monetized, measurable, and scalable.

Financial Maturity Milestones

Milestone	Trigger Point	Investor Signal
Pilot ROI Visibility	10+ units deployed	Usage data, ESG dashboard
Corridor Break-Even	50+ units per city	Monthly revenue > O&M costs
Mesh IRR Realization	250+ units networked	5–18% IRR, offset monetization
ESG Asset Packaging	Verified carbon data	Tradable credits, SDG alignment

BBVA’s Strategic Role

- **Phase 1:** Visibility funder + ESG dashboard host
- **Phase 2:** Co-investor in corridor monetization
- **Phase 3:** Platform partner for carbon finance and smart contracts

BBVA doesn’t just fund infrastructure — it activates a climate-tech platform.

This illustration gives BBVA a **clear financial roadmap**, with modular entry points and measurable returns

9 – Business Model & Revenue Strategy

Chapter summary: Infrastructure-as-a-Service for Clean Energy, Cooling, Urban Logistics, and Climate Finance

At its core, this project delivers a business model where solar artefacts become **modular service channels**, monetized through subscriptions, microtransactions, and data-linked fintech rails. Our solar Artefacts are not fixed costs — they’re **digital service nodes** that generate recurring income, social impact, and carbon-linked financial assets

Revenue Model: the solar Artefact-as-a-Platform

Each artefact functions as a **multi-service terminal**, offering:

Service Layer	Revenue Mechanism	BBVA Integration Pathway
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EV Charging Access	Subscription / per-minute pricing	Mobile wallet, smart contract ledger
Urban Cooling Credits	Time-based service blocks, ad-sponsored	ESG-tagged usage logs for reporting
Public Connectivity	Paid data access / sponsored WiFi	Telecom billing APIs
Energy Leasing	Battery swaps and microcharging hubs	Lease-to-pay fintech options
Carbon Offsets	Verified carbon savings per node	Integration with BBVA sustainability tracking tools

Monetization Logic Across Deployment Tiers

Tier	Monthly Revenue Potential (€)	Service Density	Payback Window
Tier 1	€150–€450	High (charging, cooling, data, carbon)	4–5 years
Tier 2	€80–€200	Moderate (charging + cooling)	3–4 years
Tier 3	€30–€80	Light (cooling, data)	2–3 years

Revenue grows non-linearly with service bundling, usage intensity, and corridor density — confirmed through pilot modelling in urban Spanish zones.

Platform Economics & Growth Multipliers

- **Cost Compression:** Tiered rollout strategy allows local fabrication, reducing CapEx over time
- **Network Effects:** Every new artefact increases systemic energy balancing, data value, and monetization scope
- **Digital Recurrence:** Smart contracts + mobile payment loops enable automated income and flexible pricing

Our system of distributed energy resources is not a fixed infrastructure investment. It’s a dynamic urban platform, activated through BBVA-compatible fintech rails and scaled through urban corridor intelligence.

Strategic Value for BBVA

- **Recurring Revenue Streams:** the solar Artefacts become microeconomic drivers at the neighborhood level
- **Digital Monetization Alignment:** Payment APIs, offset dashboards, and ESG performance tracking built for BBVA logic
- **Asset-Backed Climate Finance Potential:** Carbon savings and SDG-compliant services can be tokenized, bundled, and financed via BBVA’s sustainability-linked structures
- **Scalable SME & Cooperatives Onboarding:** our solar Artefacts allow BBVA to extend digital banking and service platforms to local users across cities

We are delivering clean infrastructure that creates economic value, multiplies performance, and aligns perfectly with BBVA’s dual mandate — fintech expansion and ESG leadership.

Illustration

SolPort: Distributed Energy Resources -as-a-Service Meets Urban Cooling-as-a-Platform

SolPort is more than infrastructure — it’s a **platform business** that monetizes clean energy, cooling, data, and carbon through modular artefacts deployed across Spain’s urban corridors. Each SolPort unit functions as a **service node**, generating recurring income through digital payments, smart contracts, and ESG-linked assets.

Monthly Revenue Breakdown by Service

To understand how SolPort units generate income, the following table breaks down the average monthly revenue per service channel across the three tiers. It shows how each artefact type contributes to the overall business model — with higher-tier units activating more services and greater monetization potential.

Monthly Revenue Breakdown by Service

Service Channel	SolPort Ultra (€)	SolPort Terrace (€)	SolPort Micro (€)
EV Charging	€100–€250	€40–€100	—
Cooling Infrastructure	€30–€100	€30–€60	€20–€40
Connectivity Services	€10–€30	€10–€20	€10–€20
Carbon Monetization	€10–€70	€10–€20	€5–€20
Total Monthly Revenue	€150–€450	€80–€200	€30–€80

This table illustrates how SolPort artefacts function as multi-service revenue nodes — with monetization scaling by tier and corridor density.

Strategic Takeaway

- SolPort Ultra delivers high-margin services in flagship zones
- SolPort Terrace balances affordability with multi-channel monetization
- SolPort Micro enables inclusive access and community-scale revenue

The business model is modular, scalable, and digitally enabled — perfectly aligned with BBVA’s fintech infrastructure and ESG finance logic.

Energy generation meets cooling

This illustration outlines how SolPort’s business model blends the **system of distributed energy resources-as-a-Service** with **Urban Cooling-as-a-Platform**, creating a scalable revenue engine aligned with BBVA’s fintech and sustainability priorities

Core Revenue Channels

Service	Description	Revenue Mode
EV Charging	Solar-powered fast/slow charging	Per-minute / subscription
Urban Cooling	Shaded zones, misting, fans	Pay-per-use / public block
Connectivity Services	WiFi mesh, vendor POS, IoT data	Ad-supported / prepaid
Energy Leasing	Battery swaps, mobile charging	Lease / time-based

Carbon Monetization	Offset generation, verification, packaging	Market-linked / tokenized
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Each SolPort unit becomes a multi-service revenue node — monetized through digital rails.

Artefact-Level Revenue Logic

SolPort Tier	Monthly Revenue (€)	Primary Services
SolPort Ultra	€150–€450	Charging, cooling, carbon
SolPort Terrace	€80–€200	Cooling, energy export, connectivity
SolPort Micro	€30–€80	Shade, misting, data access

- Revenue scales with:
- Corridor density
 - User engagement
 - Service bundling
 - Carbon yield

Fintech Integration with BBVA

SolPort’s monetization stack is designed for BBVA’s digital infrastructure:

- Mobile wallet payments for charging and cooling
- Smart contracts for cooperative ownership and usage rights
- ESG dashboards for carbon tracking and SDG reporting
- API-ready integration with BBVA Spark and sustainability-linked instruments

BBVA becomes the financial engine behind Spain’s solar corridor mesh.

ESG-Linked Revenue Streams

- **Carbon Offsets:** Verified per artefact, pooled by corridor
- **SDG Impact Credits:** Linked to Goals 7, 9, 11, 13
- **ESG Reporting Services:** Sold to municipalities and funders
- **Climate Branding:** Co-branded artefacts in high-visibility zones

Platform Expansion Opportunities

- Cooling-as-a-Service for Municipalities
- Carbon-as-a-Service for ESG investors
- Data-as-a-Service for urban planners and mobility operators
- Subscription models for vendors, cooperatives, and residents

SolPort evolves from infrastructure into a climate-tech platform — monetized, measurable, and scalable.

This illustration positions SolPort as a multi-service business model, not just a deployment plan — and BBVA as the platform enabler.

10: Governance & Ownership Models

Inclusive Digital Governance for Community-Scale Infrastructure

Let me briefly illustrate this with the case of the SolPort and SombraSolar brand sustainable products (I will come bac to this in a separate document). SolPort’s modularity supports distributed ownership and digital governance. BBVA can host this architecture via fintech rails and smart contracts — enabling transparent management, cooperative models, and ESG accountability across tiers.

Ownership Models by Tier

SolPort Tier	Ownership Model	Governance Logic
Ultra	Municipal or BBVA-hosted	ESG dashboard, public-private contract
Terrace	Cooperative or retail commerce-led	Smart contract for shared usage rights
Micro	Community-owned or prepaid access	Tokenized access, local maintenance

Smart Governance Stack

- **Smart contracts** define service rights and revenue splits
- **Digital wallets** enable prepaid access and cooperative usage
- **Maintenance triggers** built into sensor stack
- **ESG compliance** integrated with BBVA sustainability dashboards

Strategic Value for BBVA

- Hosts fintech infrastructure for artefact governance
- Enables community onboarding and service monetization
- Provides ESG-compliant reporting to regulators and funders
- Positions BBVA as the governance orchestrator of these systems of distributed energy resources

SolPort isn’t just deployed — it’s governed smartly and inclusively, with BBVA at the core.

11 – capital Activation Strategy: Scaling Climate-Ready Mobility Infrastructure.

Summary chapter: Scaling Climate-Ready Mobility Infrastructure Through Blended Finance and ESG-Linked Investment Vehicles

This initiative presents BBVA with an opportunity to co-anchor a scalable urban infrastructure platform — one that combines hardware deployment with fintech-enabled service monetization, climate impact, and measurable ESG performance. The solar Artefacts are deployable through a multi-phase rollout with predictable return profiles, performance-linked service contracts, and a direct path to carbon asset generation.

Capital Structure: Modular Funding Logic per Deployment Tier

Tier	CapEx Range (€)	Funding Approach	Return Timeline
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Tier 1	€20K+	Impact-linked credit / SDG-aligned green bonds	4–5 years
Tier 2	€6K–€10K	BBVA Spark equity + grant co-finance	3–4 years
Tier 3	€2K–€4K	Subscription-backed microfinance / prepaid model	2–3 years

Capital deployment scales with asset modularity — reducing exposure while accelerating validation cycles¹¹.

Blended Finance Architecture

Source	% Contribution	Role in Rollout
Public Climate Grants	30–40%	De-risk permitting, training, and early infrastructure activations
BBVA Spark Equity	40–50%	Platform buildout, fintech stack integration, service enablement
Community Capital Match	10–20%	Local ownership via prepaid access or cooperative subscriptions

Co-investment logic aligns financial return with social license and regional resilience goals.

Value Dynamics for Funders

- **Unit Costs Decline** with localized fabrication, vendor training, and policy alignment
- **Revenue Rises** through charging, cooling, data, and carbon service stacking
- **Network Effects Multiply Returns** — each deployed solar artefact improves system intelligence, utilization, and monetization scope

The solar Artefacts aren’t sunk assets¹² — they’re adaptive income nodes in a digital, climate-linked network.

Climate Finance Channels & Offset Eligibility

The infrastructure qualifies for:

- SDG 7, 9, 11, 13 alignments

¹¹ **Capital deployment scales with asset modularity** refers to how BBVA (or any investor) can commit funding incrementally, rather than all at once. Since SolPort units (Micro, Terrace, Ultra) are modular and tiered:

- BBVA can start with a few low-CapEx units (e.g. Micro)
- Scale to mid-tier Terrace units as performance is verified
- Eventually deploy Ultra units with full-stack services when ROI and impact are validated

¹² Sunk assets, also known as sunk costs, refer to money or resources that have already been spent and cannot be recovered. These are expenditures that have been made in the past and are irrelevant to future decision-making. Essentially, they are costs that are "sunk" or "lost" and cannot be retrieved, regardless of future actions.

- Scope 3 offset generation at artefact and corridor level
- Digital impact tracking via BBVA’s ESG platforms
- Carbon credit packaging and sale (direct or pooled)

Optional integration with carbon finance marketplaces or BBVA’s green portfolio dashboard.

Investment Instruments Available to BBVA

Instrument Type	Use Case	Advantage
ESG Project Finance	Corridor deployments	Aligns capital with impact KPIs
Venture Co-Investment (Spark)	Early solar artefact tiers	Scalable platform ownership
Impact-Linked Credit Facility	Flagship site expansion	Performance-tied interest rates / returns
Carbon Offsets or Tokenized Assets	Verified artefact performance	Tradable impact value

System Economics vs. Unit Sales Logic

Each solar artefact grows the ecosystem, enhances performance, multiplies returns, and strengthens resilience. As the digital platform grows, each unit becomes an intelligent node — unlocking predictive maintenance, energy optimization, dynamic pricing, and regional balancing.

This isn’t hardware deployment. It’s **infrastructure-as-a-network**, and BBVA is positioned to scale it across Spain’s climate-ready corridors.

Illustration

Financing SolPort: Blended Capital for Scalable Climate Infrastructure in Spain

SolPort is designed to attract and deploy capital across multiple layers — from flagship artefact funding to corridor-wide ESG monetization. Its modular architecture enables **phased investment**, while its digital infrastructure supports **transparent reporting**, **carbon asset packaging**, and **smart contract governance**

Capital Flow Timeline

To guide BBVA’s investment strategy, the following table outlines key capital activation milestones. It shows when visibility funding, blended finance, ESG instruments, and venture co-investment are triggered — aligned with SolPort’s rollout phases.

Capital Flow Timeline

Month	Activity	Capital Trigger
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1	Pilot launch at BBVA HQ	Visibility funding
6	Corridor monetization begins	Blended finance activation
12	Carbon asset packaging	ESG-linked credit instruments
24	IRR realization across mesh	Venture co-investment potential
36	Platform maturity	Tokenization and offset trading

This table illustrates how BBVA can deploy capital in sync with SolPort’s growth — minimizing risk while maximizing visibility, impact, and return.

Strategic Takeaway

- **Early-stage funding** builds brand leadership and ESG credibility
- **Mid-stage investment** activates corridor monetization and carbon finance
- **Late-stage capital** supports platform expansion and asset packaging

SolPort’s capital strategy is modular, transparent, and aligned with BBVA’s appetite for scalable, impact-driven infrastructure.

Blended Capital for Scalable Climate Infrastructure in Spain

This illustration also outlines a capital strategy that blends BBVA Spark equity, public climate grants, and community co-investment — turning SolPort into a scalable, fundable, and measurable climate-tech platform.

Blended Finance Structure

Capital Source	Role in SolPort Financing
BBVA Spark Equity / Credit	Anchor funding for pilot and corridor rollout
Public Climate Grants	Co-financing for SDG impact and carbon offset generation
Community Co-Investment	Prepaid access, cooperative ownership, local traction
Impact Investors / ESG Funds	Platform expansion, carbon monetization, data services

Each SolPort tier is matched with a capital mix that balances risk, return, and impact.

Tiered CapEx Strategy

SolPort Tier	CapEx (€)	Funding Mix
SolPort Ultra	€20K+	50% BBVA + 30% grant + 20% community
SolPort Terrace	€6K–€10K	40% BBVA + 40% grant + 20% cooperative
SolPort Micro	€2K–€4K	30% BBVA + 50% grant + 20% prepaid access

Capital Activation Milestones

Milestone	Trigger	Capital Signal
Pilot Launch	10+ units deployed	Visibility funding, ESG dashboard
Corridor Monetization	50+ units per city	Break-even, offset registration
Mesh IRR Realization	250+ units networked	IRR maturity, carbon asset packaging
Platform Expansion	ESG data + fintech traction	Venture co-investment, tokenization

BBVA’s Strategic Role

- **Phase 1:** Anchor investor and ESG dashboard host
- **Phase 2:** Corridor co-investor and carbon asset validator
- **Phase 3:** Platform orchestrator for smart contracts and ESG-linked finance

BBVA becomes the capital engine behind Spain’s solar corridor mesh — blending finance, climate tech, and urban innovation.

ESG Finance Integration

SolPort artefacts generate:

- **Carbon Offsets:** Verified, pooled, and monetized
- **SDG Impact Credits:** Linked to Goals 7, 9, 11, 13
- **ESG Reporting Services:** Sold to municipalities and funders
- **Climate Branding Assets:** Co-branded artefacts in flagship zones

These outputs can be packaged into:

- Sustainability-linked bonds
- Carbon-backed tokens
- ESG investment dashboards

This illustration positions SolPort as a capital-ready platform, with BBVA at the centre of its financial architecture.

12: Risk & Resilience Strategy

Infrastructure Built for Durability, Decentralization, and Climate Adaptation

Let us take the case of SolPort above. These solar artefacts are designed to withstand urban challenges — physical, financial, and environmental. This brief chapter illustrates how the system defends against deployment risks, operational breakdown, and climate stress, with BBVA positioned as the resilience champion.

Technical Resilience

- Modular construction enables easy swap and repair
- Localized fabrication prevents supply chain disruption
- Sensor stack ensures early fault detection

Energy Redundancy

- Onboard battery storage enables night-time and cloudy-day usage
- Grid fallback logic in Ultra/Terrace units prevents service gaps
- Peer-to-peer load balancing via corridor-wide VPP

Financial Risk Management

- Tiered CapEx allows gradual investment and corridor densification
- Corridor mesh provides failover and usage flexibility
- Multi-service monetization diversifies revenue streams

Climate Adaptation Metrics

Metric	Impact Range
Cooling hours delivered	800–2,000 per unit annually
Heat stress reduction zone	5–15 meters radius per artefact
Carbon offsets generated	0.3–2.0 tCO ₂ /year per unit
Public zone temperature drop	1–3°C through shading + misting

Strategic Role for BBVA

- Positions BBVA as a provider of climate-resilient infrastructure
- Activates ESG impact tracking per unit and corridor
- Builds investor confidence via performance transparency
- Enables proactive risk mitigation through smart contract logic

SolPort is built for Spain’s climate stress and urban complexity — with BBVA enabling resilience from day one.

13-Implementation Roadmap & Metrics for Success




Chapter Summary: Phased Activation of a Climate-Linked system of distributed energy resources, with Trackable ESG Returns

This roadmap outlines a systematic deployment of solar corridors and urban artefacts — designed to deliver climate resilience, fintech-enabled mobility services, and scalable economic value. The strategy follows a pilot-to-scale trajectory, activating visibility, monetization, and network effects at each phase.

BBVA gains clear entry points for capital, data, and ESG alignment — with milestone-based performance logic and measurable impact KPIs

Three-Phase Rollout Strategy

Phase	Timeline	Artefacts Deployed	Key Activities	BBVA Engagement Mode
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 Phase 1: Pilot & Platform Activation	0–9 Months	10–15 Tier 1–2	Site validation, fintech integration, branding	Visibility funding, beta service launch
 Phase 2: Corridor Buildout	4–18 Months	50–100 Tier 2–3	Monetization stack, offset registration, usage dashboard	Venture co-investment, ESG ledger setup
 Phase 3: Mesh Clustering	18–36 Months	250–500 Tier 3	Regional expansion, cooperative ownership, data scaling	Carbon finance linkage, digital contract networks

Performance Metrics & Success Indicators

1. Financial Metrics

- Revenue Per Artefact / Corridor
- IRR Forecast by Tier and Node Density
- Subscription Growth Across Cooling, Charging, and Data Services

2. ESG & Climate Metrics

- Verified Carbon Offset Generation per Node
- Beneficiary Inclusion (retail, low-income housing clusters)
- SDG Alignment: Goals 7, 9, 11, 13

3. Digital Platform Metrics

- Service Usage Analytics (charging time, cooling minutes, bandwidth)
- Predictive Ops Accuracy (forecast vs. real-time load usage)
- Smart Contract Volume (digital agreements, cooperative payouts)

Governance & Reporting Infrastructure

- BBVA-linked dashboard for tracking solar artefact deployment, monetization performance, ESG outcomes, and offset packages
- Open API for integration with BBVA’s sustainable finance monitoring tools
- Digital twin simulations for predictive maintenance and energy yield forecasting

Strategic Value to BBVA

- Investor Confidence via Data-Linked Returns
- ESG Leadership with Traceable Climate Impact
- Fintech Innovation through Infrastructure Monetization
- Public Sector Traction via Flagship Visibility Zones

This roadmap transforms BBVA’s role from lender to system activator — scaling impact, data, and revenue across urban Spain.

Illustration

SolPort in Action: Phased Deployment, Measurable Impact, and Scalable Climate-Tech Infrastructure

This illustration suggests the implementation roadmap — from pilot activation to full corridor mesh — and defines the metrics that will track success across financial performance, ESG impact, and stakeholder engagement.

BBVA is positioned to lead the rollout, starting with its Madrid HQ and expanding into Spain’s urban corridors. Each phase builds visibility, traction, and monetization — turning SolPort into a living platform for climate resilience and urban innovation.

Phased Implementation Timeline

To visualize the rollout, the following table summarizes the timeline, unit count, and strategic milestones for each phase. It shows how BBVA’s role evolves from pilot host to platform orchestrator.

Phased Rollout Summary

Phase	Timeframe	Units Deployed	CapEx Range (€)	Key Milestone
Phase 1: Pilot	Months 0–9	10–15	€200K–€400K	BBVA HQ launch
Phase 2: Buildout	Months 4–18	50–100	€500K–€1.2M	Corridor monetization
Phase 3: Mesh	Months 18–36	250–500	€2M–€4M	IRR realization + offset packaging

This table illustrates how SolPort scales in phases — with BBVA anchoring each stage through capital, visibility, and ESG leadership.

Metrics for Success

To ensure accountability and impact, the following table defines the key performance indicators across financial, environmental, and stakeholder dimensions. These metrics will be tracked via BBVA’s ESG dashboard and smart contract infrastructure.

Success Metrics Framework

Metric Category	Key Indicators
Financial Performance	Monthly revenue per unit, IRR realization, payback speed
ESG Impact	Carbon offsets generated, SDG alignment, cooling hours
User Engagement	Charging sessions, cooling usage, vendor subscriptions
Stakeholder Activation	Municipal partnerships, community co-investment, NGO support
Platform Maturity	Smart contract volume, dashboard analytics, offset packaging

This table shows how BBVA can measure SolPort’s success — not just in infrastructure deployed, but in services activated, impact delivered, and capital returned.

Strategic Takeaway

SolPort’s implementation is not just about rollout — it’s about performance. BBVA’s leadership will be visible, measurable, and fundable at every stage.

14: Replicability & Global Expansion

SolPort Beyond Spain: A Climate-Tech Blueprint for Urban Resilience

SolPort is built with global ambition. While its initial deployment focuses on Spanish urban corridors, its modular design, service stack, and financing architecture make it replicable across climate-vulnerable regions, especially where BBVA has existing visibility.

Geographic Replication Logic

Region	Strategic Fit
Latin America	Urban heat, retail commerce, energy access gaps
Mediterranean Cities	Heat stress, public space retrofit, ESG financing
Sahel & West Africa	Off-grid cooling, mobile charging, vendor support
Burkina Faso	the country is making strides through the launch of its first locally manufactured electric vehicle (EV) , ITAOUA. However, this breakthrough risks stagnation without a resilient, off-grid charging and energy infrastructure

SolPort adapts naturally to equatorial, subtropical, and dry urban environments — delivering cooling, clean energy, and fintech-powered services.

Solar Artefact Adaptability

- **Climate Tuning:** Mist, shade, cooling infrastructure vary by region
- **Local Materials:** Artefacts fabricated with locally sourced components
- **Energy Stack:** Configured for solar-only, hybrid, or grid-export logic
- **Digital Layering:** Compatible with BBVA’s APIs across markets

Global ESG Finance Channels

SolPort generates:

- Verified **carbon offsets** per unit

- SDG-linked **impact credits** (Goals 7, 9, 11, 13)
- ESG dashboards for public funders and private investors

These can be packaged into:

- Sustainability-linked bonds
- Carbon-backed tokens
- ESG investment dashboards

SolPort becomes a globally deployable climate-tech solution — with BBVA’s network as the launchpad.

Strategic Expansion Playbook

1. **Phase 1:** Activate Spain as proof of concept (corridors + BBVA HQ)
2. **Phase 2:** Replicate in Latin American cities via BBVA local branches
3. **Phase 3:** Scale to Mediterranean and African climate adaptation zones
4. **Phase 4:** Deploy carbon and cooling-as-a-service platforms globally

BBVA positions itself as the **financial engine of replicable climate infrastructure**, turning SolPort into a transnational ESG portfolio.

Financial Annex: Consolidated Calculations

Consolidated Calculations for SolPort Deployment in Spain

This annex supports BBVA’s decision-making with unified financial models across SolPort tiers and rollout phases. This annex provides a unified view of SolPort’s financial architecture — consolidating key calculations from across the proposal. It supports BBVA’s investment review by presenting clear, comparable metrics for artefact performance, corridor ROI, and capital deployment.

Artefact Economics Summary

This table illustrates the **unit-level economics** of each SolPort tier — including CapEx, revenue, operating costs, net margin, payback period, and IRR. It helps BBVA assess the financial viability of each artefact type and understand how returns scale with deployment.

Tier	CapEx (€)	Monthly Revenue (€)	Annual Revenue (€)	O&M Costs/Year (€)	Net Margin/Year (€)	Payback Period (Years)	IRR Range (%)
Ultra	€20,000	€300 (avg)	€3,600	€800	€2,800	7.1	12–18%
Terrace	€8,000	€140 (avg)	€1,680	€400	€1,280	6.3	8–12%
Micro	€3,000	€55 (avg)	€660	€200	€460	6.5	5–8%

This table shows that each SolPort artefact is financially self-sustaining — with predictable margins and attractive IRRs. It also highlights how BBVA can tailor its investment strategy by tier, balancing visibility, affordability, and return.

Strategic Takeaway

- **SolPort Ultra** delivers flagship visibility and high-margin services
- **SolPort Terrace** offers corridor-scale monetization with mid-tier CapEx
- **SolPort Micro** enables inclusive access and community-scale returns

Together, these tiers form a scalable infrastructure portfolio — modular, fundable, and aligned with BBVA’s ESG and fintech priorities

Corridor ROI Simulation (Barcelona Deployment)

Units Deployed	Total CapEx (€)	Annual Revenue (€)	Carbon Yield (tCO ₂)	Estimated IRR
50	€500,000	€75,000	65	10%
250	€2,500,000	€375,000	320	16%

Capital Flow Timeline

Month	Activity	Capital Trigger
1	Pilot launch at BBVA HQ	Visibility funding
6	Corridor monetization begins	Blended finance activation
12	Carbon asset packaging	ESG-linked credit instruments
24	IRR realization across mesh	Venture co-investment potential
36	Platform maturity	Tokenization and offset trading

Appendix: Artefact Design Portfolio

Visual Identity of SolPort’s Modular Infrastructure

This appendix presents the visual and functional design of SolPort artefacts — helping funders, municipalities, and communities understand what they’re investing in (For more on this, see Carlos H Betancourth. **design concepts** for solar cultural artefacts, 2025)

Artefact Renderings

- **SolPort Ultra:** Flagship solar umbrella with EV charging, cooling, and carbon tracking
- **SolPort Terrace:** Mid-tier artefact for corridor deployment and building energy export
- **SolPort Micro:** Lightweight cooling and data node for informal commerce and housing clusters

Modular Components

- Solar panels
- Battery storage
- Cooling infrastructure (shade, misting, fans)
- IoT sensors and connectivity stack

Branding & Co-Visibility

- BBVA co-branding zones
- ESG dashboard integration
- QR codes for public engagement and usage tracking

SolPort artefacts are not just functional — they're iconic, visible, and community-centered.

A handwritten signature in black ink, appearing to be 'C. H. Betancourt'.