POCITYF

Pianificare la Smart City. Una esperienza internazionale.
Il caso di Bari

Energy@work

COMUNE DI BARI

This project has received funding from the European Union's Horizon 2020 research and Innovation programme under grant agreement N° 864400.

POCITYF in breve

Consorzio
46
46 partners da 13 paesi

Città
8
2 Città faro
6 Città Osservatrici

Soluzioni Integrate
10
73 Soluzioni innovative in 4 Percorsi di Transizione

Distretti ad Energia Positiva
4
Dimostrati su 4 Bulding Block

Durata
5 anni
Entro il 2025

Budget
22.5 M€
20 M€ da UE

POCITYF

Le città che aderiscono al progetto

Light House Cities

Fellow Cities

POCITYF

Il Replication Plan: Challenge

Analisi delle azioni di Replicazione di altri progetti EU SCC

abbiamo notato che dopo il termine dei progetti non tutte raggiungevano risultati tangibili

Poche Fellow cities hanno raggiunto risultati dopo il termine del progetto

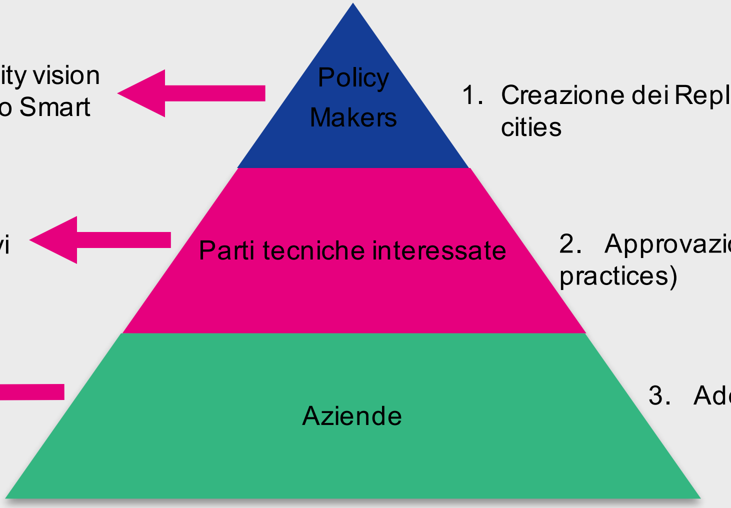
Best cases trovati
FC Valletta: in GrowSmarter, in cui hanno analizzato la loro infrastruttura di ricarica e implementato il loro primo schema di car sharing.
Leipzig: Fellow city in **Triangulum**, ora Lighthouse in **Sparcs**

Rendere i Replication plans efficaci ed utili

Dovrebbero pianificare una Smart City vision e le azioni per la replicazione in uno Smart City Plan 2050

Dovrebbero conoscere ed applicare le tecnologie adatte dal documento nei relativi progetti

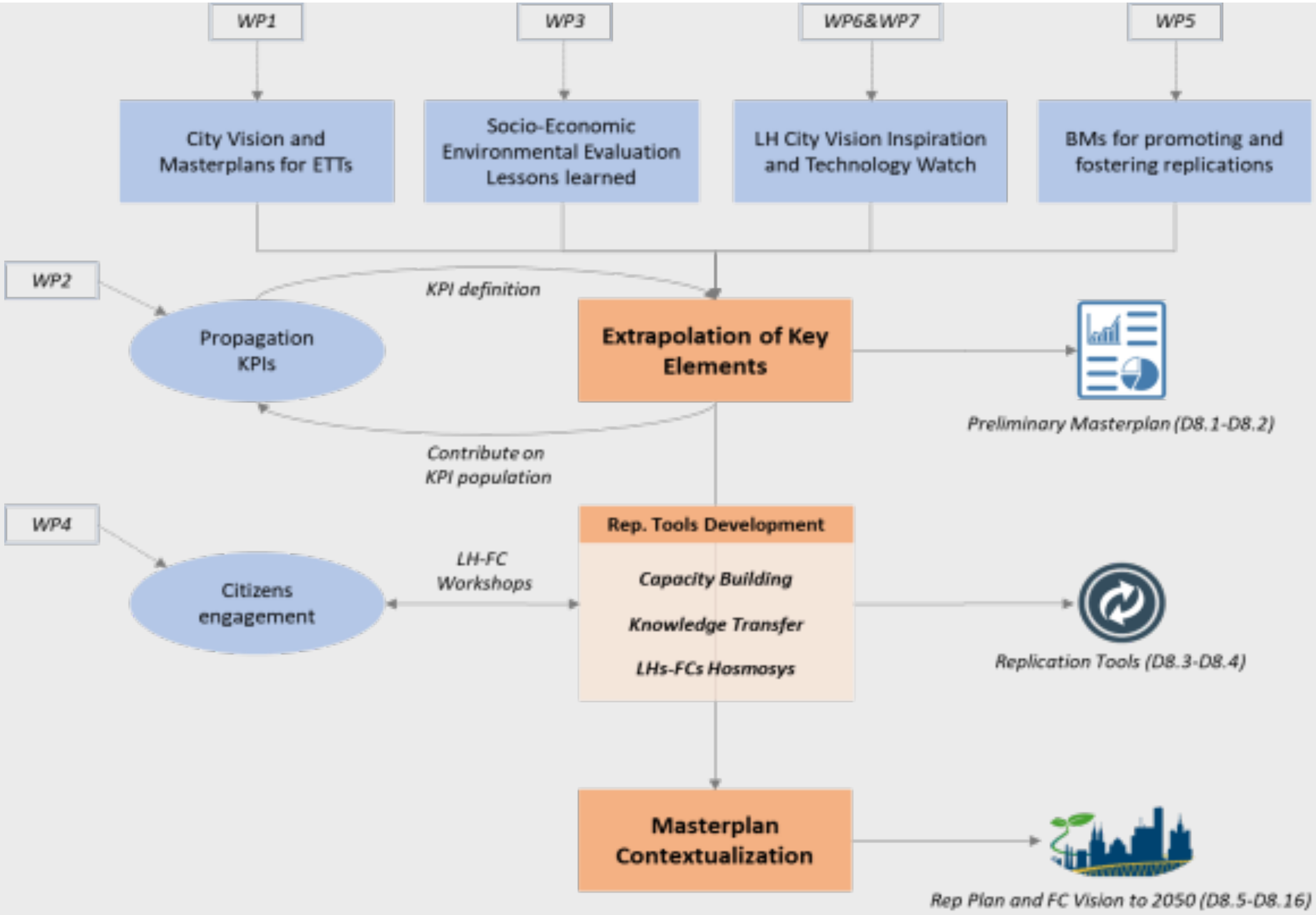
Dovrebbero essere aggiornate ed informate sulle Soluzioni Innovative



1. Creazione dei Replication plans e City Visions per 2050 per tutte le Fellow cities
2. Approvazione del plan nel consiglio municipal (come document di best practices)
3. Adozione del plan come un set di specifiche tecniche di Smart City

Il Replication Plan: Attività

Elaborare piani di Smart City al 2050 basati sulle soluzioni disponibili sviluppate sulle “**città faro**”, stabilendo così una relazione sinergica con le “Fellow Cities” ed i provider di tecnologia



POCITYF

Il Replication Plan: Le Tecnologie

Energy Transition Tracks (ETT)	POCITYF Integrated Solutions	Lighthouse Cities (LH)						Fellow Cities (FC)					
		Evora			Alkmaar			Granada	Bari	Celje	Ujpest	Ioannina	Hvidovre
#1: Innovative Solutions for Positive Energy (CH) Buildings and Districts	IS-1.1: Positive Energy (stand-alone) Buildings	P	D	R	P	D	R	R	R	R	R	R	R
	IS-1.2: Positive Energy Districts Retrofitting	P	D	R	P	D	R	R	R	R	R	R	R
	IS-1.3: Feeding PEDs with Waste Streams Promoting Symbiosis and Circular Economy	P	D	R	P	D	R	R	R	R	R	R	R
#2: P2P Energy Management and Storage Solutions for Grid Flexibility	IS-2.1: Flexible and Sustainable Electricity Grid Networks with Innovative Storage Solutions	P	D	R	P	D	R	R	R	R	R	R	R
	IS-2.2: Flexible and Sustainable District Heating/Cooling with Innovative Heat Storage Solutions	P	D	-	P	D	R	R	-	R	R	-	R
#3: e-Mobility Integration into Smart Grid and City Planning	IS-3.1: Smart V2G EVs Charging	P	D	R	P	D	R	R	R	R	R	R	R
	IS-3.2: e-Mobility Services for Citizens and Auxiliary EV Technologies	-	D	-	P	D	R	R	R	-	R	R	R
#4: Citizen-Driven Innovation in Co-creating Smart City Solutions	IS-4.1: Social Innovation Mechanisms towards Citizen Engagement	P	D	R	P	D	R	R	R	R	R	R	R
	IS-4.2: Open Innovation for Policy Makers and Managers	-	D	-	P	D	R	R	-	-	-	-	R
	IS-4.3: Interoperable, Modular and Interconnected City Ecosystem	P	D	R	P	D	R	R	R	R	R	R	R

Il Replication Plan: Roadmap

1. Quadro di riferimento

Knowledge Transfer Workshops

Schede informative

- Descrizione generale della città
- Aree di Replicazione
- Sfide
- Prima lista di parti interessate
- Lista preliminare di soluzione da replicare potenzialmente
- Impedimenti

2. Ecosistema e soluzioni

Gruppi di lavoro

- Knowledge Transfer Workshops con leader tecnologici
- Capacity-building workshops con LHs
- Raccogliere informazioni sull'ecosistema locale (processi burocratici, procedure in corso e previste, city vision, ecc…)

We are here!

Meeting dei gruppi di lavoro:
- Soluzioni
- Economia
- Problemi/Barriere

I gruppi di lavoro delle FCs imparano ed analizzano i risultati forniti dalle LHs

Aggiornamenti delle dimostrazioni delle soluzioni nelle LHs

Tecnico, amministrativo, sociale, finanziario

3. Planning e finalizzazione BMs

Costruzione del smart city vision and plan

Identificare pratiche, ostacoli e problemi per un planning efficace

- BMs finalized
- Solutions selected and planned
- Barriers investigated
- Ecosystem clear and active
- KPIs for monitoring

1° iterazione M36

2° iterazione M60

Implementazione & Monitoraggio

Implementazione ⟷ Monitoraggio

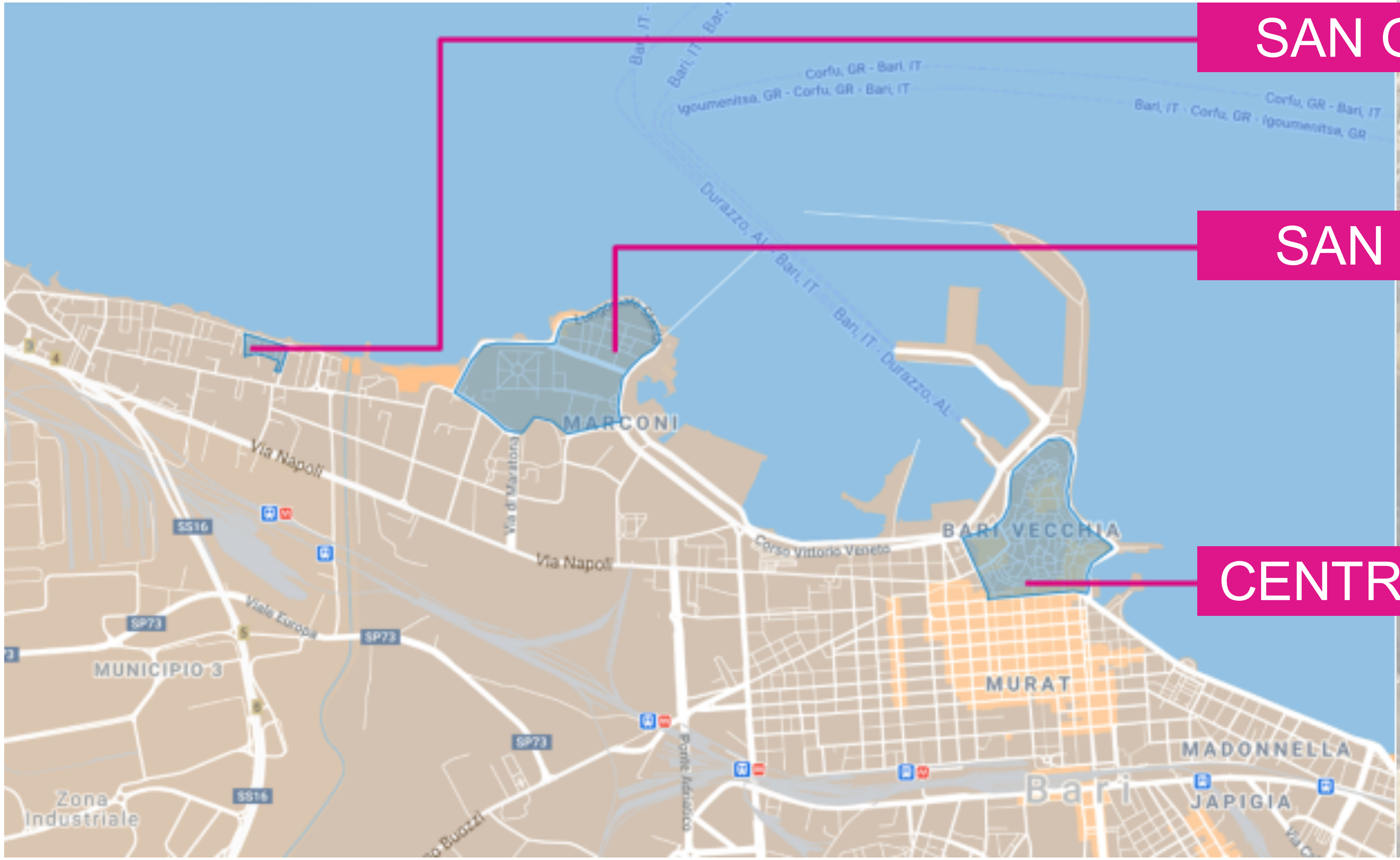
Interazioni con l'intero ecosistema locale (Policy Makers, Parti Tecniche interessate, Aziende, Cittadini, ecc…)

Iniziative, progetti esterni a POCITYF

POCITYF

Bari

Aree di Replication su BARI

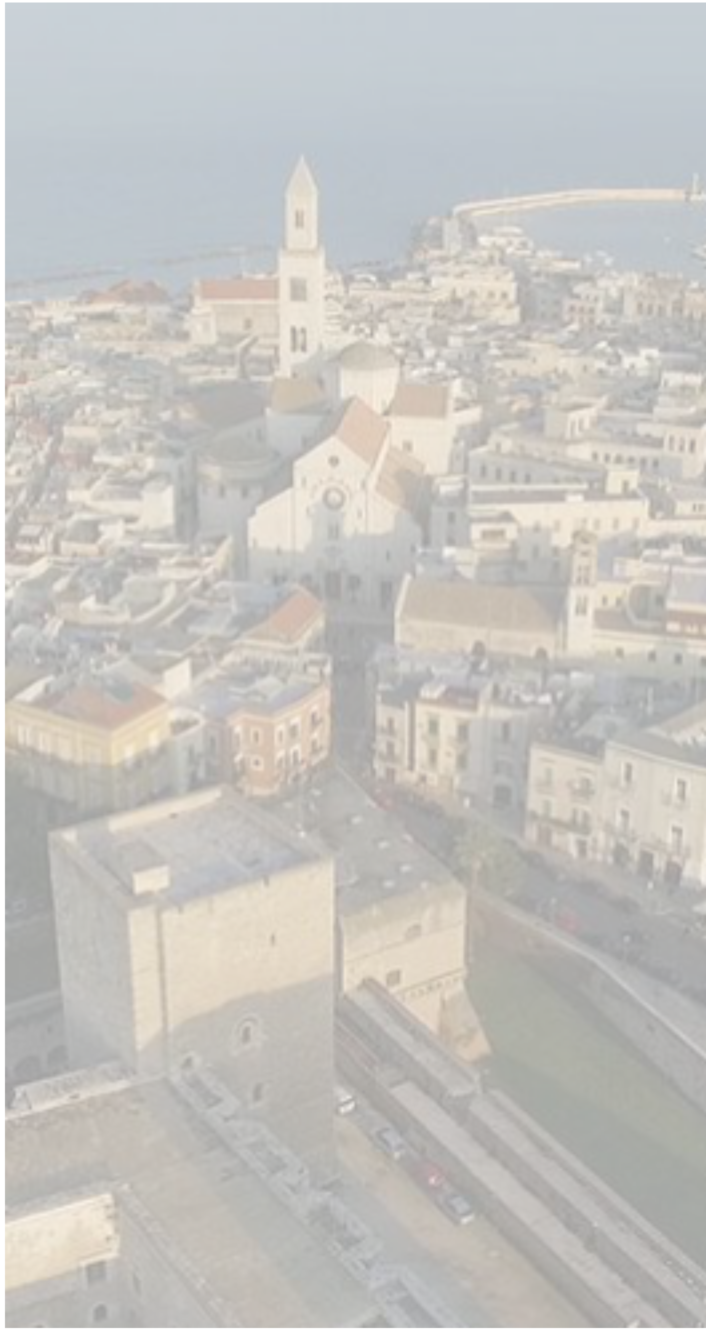


POCITYF

Definizione del Masterplan

- ANALISI DEL CONTESTO DI RIFERIMENTO URBANO E NORMATIVO
- ACQUISIZIONE INFORMAZIONI SU IS DA APPLICARE AL CONTESTO
- REPERIMENTO DI PARTNERS E STAKEHOLDERS INTERESSATI AL PROGETTO
- ROAD MAP PER REPLICATION PLAN
- STUDIO BEST PRACTIES
- DEFINIZIONE LINEE GUIDA PER UN NUOVO PAES METROPOLITANO
- STUDIO IMPATTI E VALUTAZIONE
- COINVOLGIMENTO STAKEHOLDER E CITTADINI NEL PROCESSO

OBIETTIVO: Creazione gemello digitale

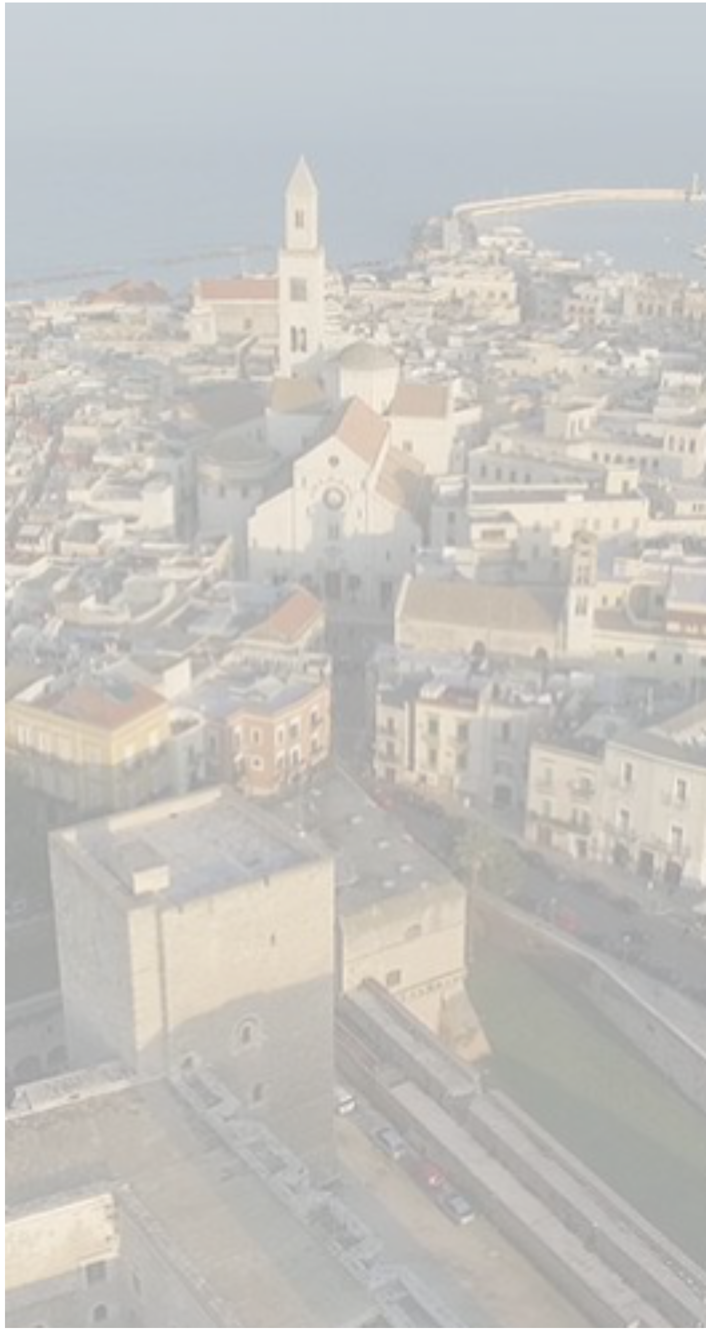


POCITYF

Definizione del Masterplan

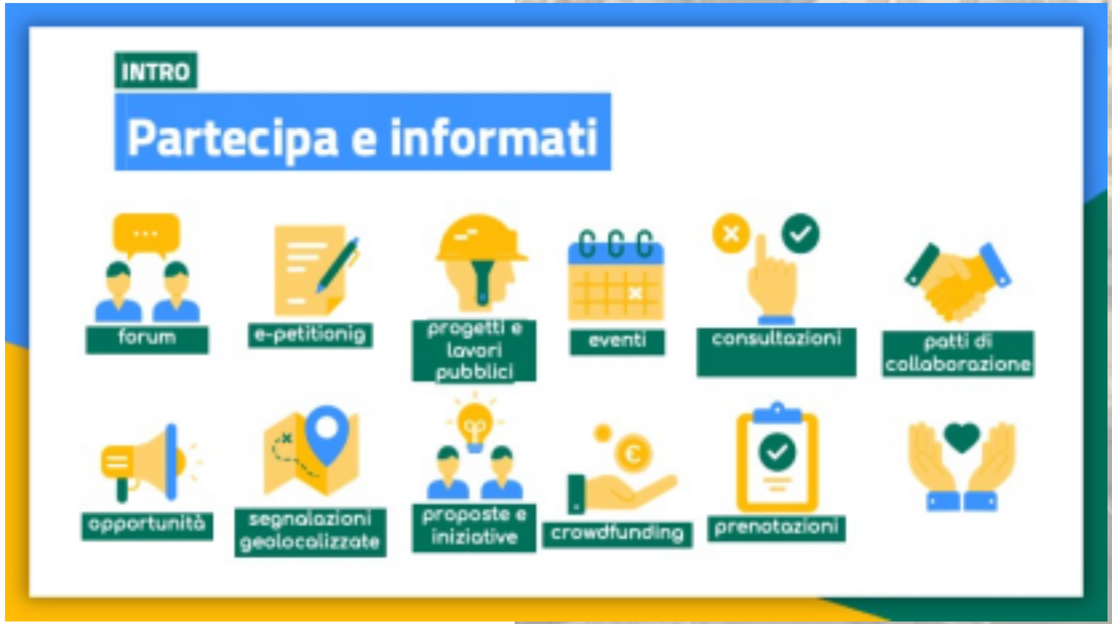
La nostra idea per la città del futuro è creare le **condizioni infrastrutturali** per produrre e gestire le informazioni per questioni cruciali come la mobilità, l'uso razionale delle risorse energetiche, la qualità dell'ambiente e la gestione delle emergenze, in un contesto in cui i cittadini non sono solo consumatori di informazioni, ma essi stessi produttori di informazioni.

Pertanto, favorire la **libera circolazione delle informazioni** e dei dati come patrimonio di conoscenza per l'intera comunità diventa elemento fondamentale di una strategia ispirata ai principi della **democrazia dei dati.**



POCITYF

BARI Smart City Vision

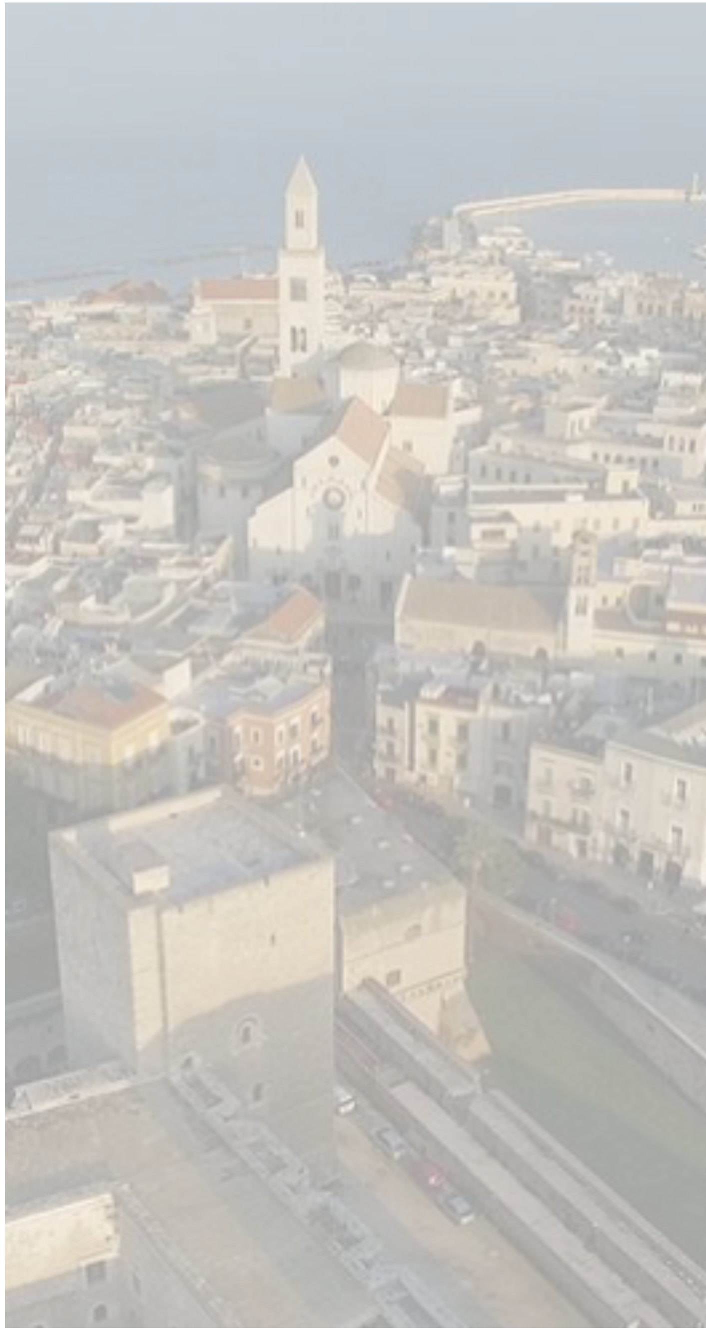


https://www.facebook.com/comunedibari/videos/bari-partecipa-video-1/377730512844327/

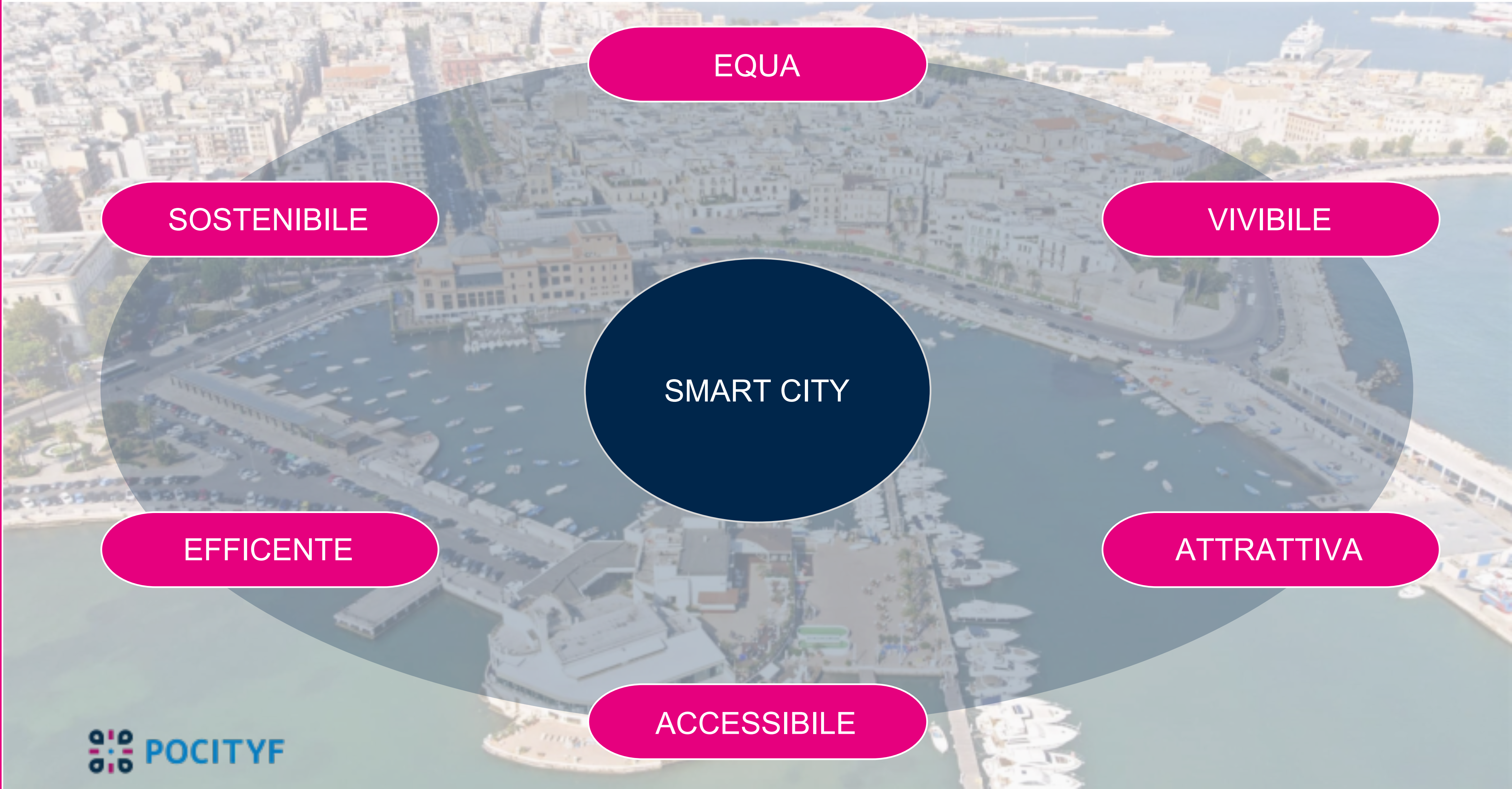
BARI Smart City Vision

L'obiettivo è informare, coinvolgere e mobilitare la comunità, i cittadini residenti, le associazioni, le organizzazioni pubbliche e private, al fine di sviluppare un efficace piano d'azione in collaborazione con la Commissione Europea.

L'obiettivo di ridurre le emissioni del 50% non è stato raggiunto al momento, la cifra si attesta al 25%. Obiettivo che il Comune persegue attraverso diverse aree tematiche quali Istruzione, Pianificazione Energetica, Infrastrutture di Rete, Mobilità Sostenibile, Edifici a Basso Consumo, Fonti Rinnovabili, Rifiuti e Acqua, Pubblica Amministrazione Sostenibile.



BARI Smart City Vision



BARI Smart City Vision

L'Amministrazione comunale intende dare nuovo slancio ai suoi progetti di Agenda Metropolitana Digitale e Smart City attraverso un corposo programma di interventi che punta a un'idea di città come **grande infrastruttura funzionale e altamente interoperabile.**

Le sfide per la città del futuro

OBIETTIVO TRASVERSALE

comunicare ai cittadini la possibilità di poter risparmiare attraverso l'uso sostenibile delle risorse e l'efficienza energetica degli edifici attraverso la creazione di pacchetti per rendere più efficienti edifici corrispondenti a diverse fasce di prezzo sperimentazione di nuove tecnologie

RISPARMIO ENERGETICO E RIDUZIONE DEGLI SPRECHI

CONTROLLO E RIDUZIONE DEI CONSUMI NEGLI SPAZI PUBBLICI

CONTROLLO E GESTIONE DELLE DISPERSIONI ENERGETICHE

CONTROLLO DEI DATI E LORO DIFFUSIONE

BARI Smart City Vision

Riqualificazione energetica degli apparecchi di illuminazione e del sistema di telecontrollo, e ampliamento della rete di videosorveglianza, dotata anche di moderni sistemi di videoanalisi degli scenari, nei punti più sensibili della città.

Smart Lighting

Smart CCTV Security

BARI Smart City Vision

POCITYF

BARI Smart City Vision

POCITYF

BARI Smart City Vision

Smart Mobility

Inserimento di colonnine elettriche nei

nuovi parcheggi, nuove pensiline e paline

BARI Smart City Vision

Una città in cui l'innovazione porti ad un miglioramento tangibile della vita dei cittadini

SAN GIROLAMO

SANTO SPIRITO

SAN PAOLO

POCITYF

Tecnologie di Smart City: Schede informative

Include informazioni generali, dettagli

sulle dimostrazioni e specifiche

tecniche delle tecnologie in

sperimentazione sulle Città Faro.

ETT2 - FLEXIBLE AND SUSTAINABLE ELECTRICITY GRID NETWORKS WITH INNOVATIVE STORAGE SOLUTIONS

NiMH (NICKEL METAL HYBRIDE) BATTERY

DESCRIPTION

InVesta, with the help of Indutecc, will demonstrate a Nilar battery at her Centre of Expertise. This stationary nickel metal hydride (NiMH) battery will store the overproduced electricity from the various solar panels (regular photovoltaic-, photovoltaic thermal- and building integrated photovoltaic panels) during times of peak production (or low electricity demand) and discharges this energy during peak electricity demand (or low production). With the demonstration of this IE InVesta's maximizes its own usage of produced electricity and minimizes the need of (grey) electricity from the electricity grid. The battery will (likely) not solely be used by InVesta, the total storage capacity also offers the possibility for other enterprises at the Boekelermeer industrial area to store locally produced energy in the battery. Finally, the battery might also provide grid services to the electricity grid, such as stabilizing the frequency of the grid (50 Hz), balancing supply and demand, and avoid or remedy grid congestion.

INDICATORS

POTENTIAL DEGREE OF USEFULNESS: 80%

Already demonstrated in Lighthouse cities: Yes

Cultural heritage compliance: No

PERFORMANCE

Theoretical storage capacity: 5 x 34.5 = 172.5 kWh

Practical storage capacity is 80% (= 138 kWh)

Ferroamp capacity: 84 kW

COST

(estimated) investment cost: € 151,500.00

Cost per metric: € 878.00/kWh

(estimated) installation cost: € 10,000.00

DIMENSION

Size: 701 x 2320 x 485 mm (w x h x d) per cabinet

Weight: 950 kg per cabinet

TIME

Installation time: 1 month

Startup time: 1 hour

SAFETY

No dendrite formation

No risk of spontaneous fire and explosion

Water based electrolyte

SUSTAINABILITY

No toxic heavy metals

Electrodes can be fully recycled

Recycled materials have an end-of-life value

POCITYF | NiMH (NICKEL METAL HYBRIDE) BATTERY | ETT #2

ENVISAGED DEMONSTRATION IN POCITYF

If applicable, here you can describe one or more real world use cases of your solution.

LOCATION

InVesta's Centre of Expertise will be located at the Diamantweg in the Boekelermeer industrial area of Alkmaar. The battery will be installed inside the building.

TIMELINE

The construction of InVesta's Centre of Expertise, including NiMH battery, is expected to be finalized in June 2022.

DETAILS

As depicted in the schematic overview, the battery system is directly coupled to the solar panels and to the EV chargers. Another innovative aspect is that the entire system operates on direct current (DC) which avoids energy conversion losses (DC/AC and AC/DC).

TARGETED OUTPUT

The application of a battery reduces the usage of (grey) electricity from the electricity grid (<10% of the total electricity consumption). This share would be significantly higher without a battery due to the intermittent nature of solar energy production.

IMPACT ON COMMUNITY

More than the energy storage of InVesta's Centre of Expertise, the total storage capacity also offers the potential for other enterprises at the Boekelermeer industrial area to store and discharge energy. By doing so, the demonstration of this innovative element creates a more sustainable and self-sufficient energy system at the Boekelermeer community.

OTHER RELEVANT INFORMATION

1) Left: Indutecc supplied the 60 kWh battery at the ABN AMRO building in Amsterdam that was the first building worldwide with a direct current (DC) infrastructure.
2) Right: Indutecc supplied an energy container, with a capacity of 140 kWh, to Qurios holiday resort to balance the local electricity grid.

POCITYF | NiMH (NICKEL METAL HYBRIDE) BATTERY | ETT #2

Tecnologie di Smart City: Schede informative

INDICATORS

POTENTIAL DEGREE OF USEFULNESS

80%

PERFORMANCE

Theoretical storage capacity: 5 x 34.5 = 172.5 kWh

Practical storage capacity is 80% (= 138 kWh)

Ferroamp capacity: 84 kW

DIMENSION

Size: 701 x 2320 x 655 mm (w x h x d) per cabinet

Weight: 950 kg per cabinet

SAFETY

No dendrite formation
No risk of spontaneous fire and explosion
Water based electrolyte

Particolare enfasi ricade sul rispetto dei Beni Culturali e sull'impatto sulla cittadinanza.

L'obiettivo è creare un catalogo di tecnologie innovative potenzialmente replicabili, che possano fungere come riferimento per Bari.

IMPACT ON COMMUNITY

More than the energy storage of InVesta's Centre of Expertise, the total storage capacity also offers the potential for other enterprises at the Boekelermeer industrial area to store and discharge energy. By doing so, the demonstration of this innovative element creates a more sustainable and self-sufficient energy system at the Boekelermeer community.

OTHER RELEVANT INFORMATION

1) Left: Indutecc supplied the 60 kWh battery at the ABN AMRO building in Amsterdam that was the first building worldwide with a direct current (DC) infrastructure.
2) Right: Indutecc supplied an energy container, with a capacity of 140 kWh, to Qurios holiday resort to balance the local electricity grid.

POCITYF

Esempio: PV glass

INDICATORS

POTENTIAL DEGREE OF USEFULNESS

100%

Already demonstrated in Lighthouse cities Yes

Cultural heritage compliance Yes

PERFORMANCE

Visual Light Transmission Dark, 10%, 20%, 30% and no obstructed views.

Efficiency 2.8% - 5.76%

Greater energy production (kWh) at the same installed power (kWp).

Better behaviour under the presence of shadows/overcast

Low temperature coefficient (better performance under high temperature)

COST

From 200 to 225 €/m² (only considered the PV glass)

DIMENSION

Double laminated PV glass: maximum dimension 1245x635 mm

Triple laminated PV glass: from 1245x635 mm to 4000x2000mm

SAFETY

Manufactured according to the architectural glass standard requirements

Manufactured according to the PV standard requirements

POCITYF | PV glass | ETT #1

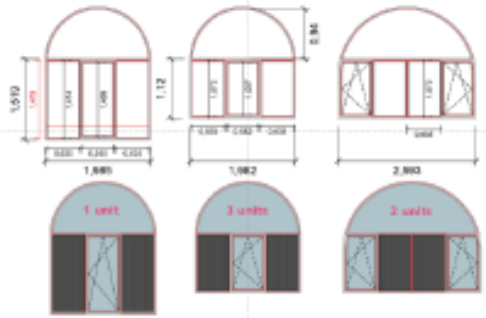
ENVISAGED DEMONSTRATION IN POCITYF

LOCATION

Escola Basica 1° Ciclo de São Mamede. H3FV+P2 Évora, Portugal (38°34'27.4"N 7°54'26.7"W)

TIMELINE

Permanent; at least until 2024 analysing the impact of solutions implemented



DETAILS

The conventional glass of the six windows showed on the previous point, located on the court yard elevation, will be replaced partially with a-SI PV glass with a 20% of transparency. Due to the dimensions of the current glass panes, the PV solution will be based on a triple laminated glass, with the same dimensions of the existing ones. A total of 12 units will be implemented with the following dimensions and power:

- 10 units of 1072x635 mm with 23Wp/unit
- 2 units of 1474x635 mm with 32 Wp/unit

The total power installed reach 294 Wp.

TARGETED OUTPUT

It is estimated that the installation will generate 261 kW per year. This means in 35 years of life spam: 9,135 kWh of electricity generated and 3 Tn avoided emissions of CO_2.

POCITYF

Esempio: Bidirectional Smart Inverters

DESCRIPTION

Bidirectional smart inverter is a prototype solution developed by INESCTEC during several years. It uses the best available technologies and methods to meet the requirements of residential market. The main features to highlight is a appealing and lightweight design, compact dimensions, quiet and efficient operation and low maintenance. The previous versions were already demonstrated in field within the scope of project such as Sustainable, Sensible and InteGrid (EU-funded).

The main distinctive feature is the possibility to combine three interfaces (PV, battery, and grid) in a single device, aiming to be a complete solution for self-consumption. The conversion core is built with SiC carbide technology providing high efficiency and power quality in a compact size. It includes a comprehensive range of features such as complete tool-free connections, BMS interface for batteries, and rich communications interfaces such as Wi-Fi and Bluetooth. It can be easily integrated with smart home and energy management systems throu…

INDICATORS

POTENTIAL DEGREE OF USEFULNESS

75%

Already demonstrated in Lighthouse cities **Yes**

Cultural heritage compliance **Yes**

PERFORMANCE

High conversion efficiency

Compact dimensions and easy installation

Complete solution for PV and storage

COST

(estimated) <800€/equipment in mass production

DIMENSION

Size: 450x350x80mm

Weight: approx. 10 kg

TIME

Installation <1h (inverter only)

(estimated) Lifespan >10 years

SAFETY

IP20 protection for indoor installations

Rugged steel enclosure

Password protected

SUSTAINABILITY

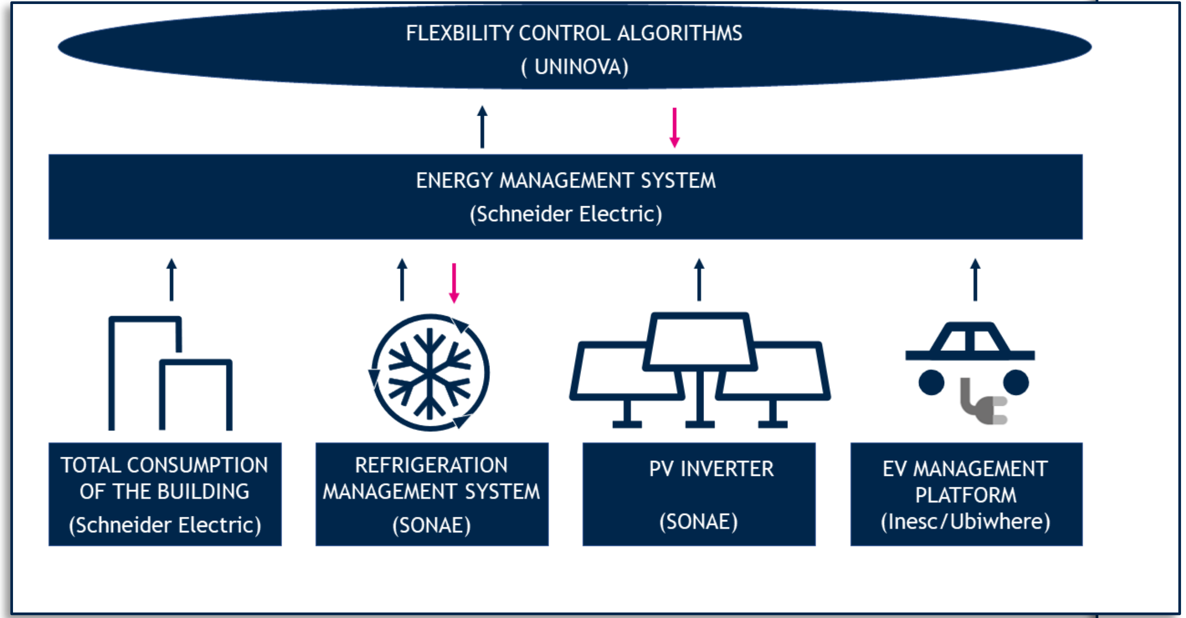
Leverages self-consumption for residential consumers

POCITYF

Esempio: Flexibility Control Algorithms

DESCRIPTION

Flexibility Control Algorithms use the energy flexibility provided by new or existing controllable devices through APIs made available by the devices operators or other entities which enable the required monitoring and control activities. Flexibility Control Algorithms allow the characterisation and use of the available energy flexibility, at building achieve different objectives as defined by a specific DSM measure. This is achieved by modifying the energy consumption profiles while respecting the comfort needs and preferences of the involved consu Flexibility Control Algorithms will be used in all PEBs to explore the available energy flexibility. F Commercial Building, this solution will explore energy flexibility provided by the refrigeration sys electricity costs and improve the self-consumption of the future PV installation and therefore support t Freezing Storage in Store. The figure above presents the conceptual architecture of the solution to Commercial Building.



ENVISAGED DEMONSTRATION IN POCITYF

Despite being demonstrated in all PEBs, this section presents information related to the demonstration at SONAE Commercial Building as an example.

LOCATION

SONAE store - Continente de Évora, Quinta do Moniz, 7000-172 Évora, Portugal

TIMELINE

Flexibility Control Algorithms will operate for, at least, two years in Évora PEBs. Implementation expected during first quarter of 2022.

DETAILS

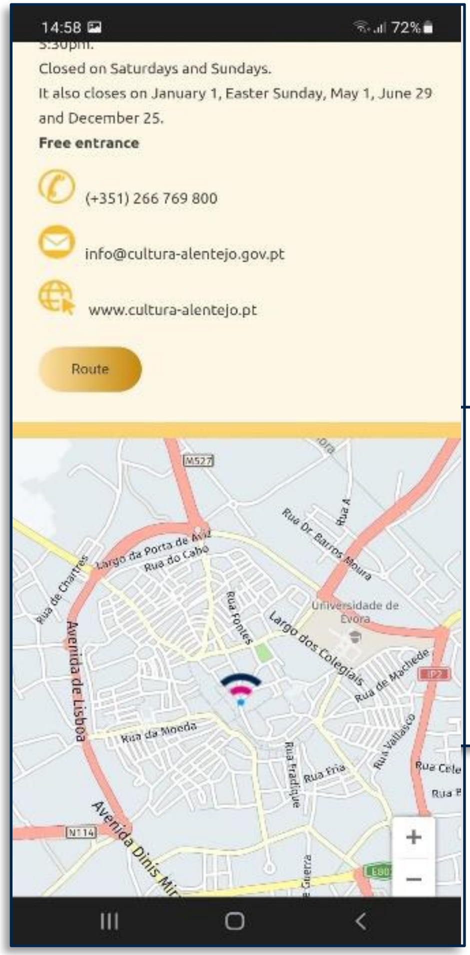
Refrigeration systems are critical in food retail. The solution will rely on data collected at the building to control different operation modes of the refrigeration system (each mode with different temperature set points). Given the criticality of the system, additional safety layer was imposed by the means of an additional Loytec controller, that will interact with Schneider hardware, which gets the control signals through an API. This Loytec controller will ensure that any miscarried command will not be passed to the refrigeration system. Additionally, apart from exposing all necessary variables and receive the control signals, Loytec controller will also group different types of cabinets and displays allowing dedicated management strategies for different clusters of goods, increasing the impact of the solution while ensuring each specific limit is met.

TARGETED OUTPUT

This store will be equipped with an oversized PV plant. Recurring to the Flexibility Control Algorithms Sonae aims to maximize self-consumption, storing cold as much as possible during "free solar energy" hours, therefore reducing dependency of the grid, maximizing use of renewable energy. As energy price varies along the day, potential for additional savings can be also explored. Last but not least, peak shaving strategies can be applied inducing savings on the contracted power.

POCITYF

Esempio: Tourist App



DESCRIPTION

The Tourist APP will be implemented through a responsive website that works on, both, computers and mobile phones, addressing, therefore, the requirement established by CME and other entities of not requiring users to install new software on their machines. The Tourist APP will provide three main types of outputs to its users, namely: a) pre-established touristic circuits; b) list of monuments that can be included in each circuit; and c) creation of optimized circuits.

The monuments list can have static information (e.g., visiting hours, average visiting time, information about the monuments) or dynamic information (e.g., waiting time, occupancy rates). Regarding the pre-established circuits, this output presents a list with different circuits and shows the duration and difficulty of each one as well as the monuments included in each circuit. The creation of optimized circuits offers the visitors the possibility to create their own circuits, choosing the monuments that they want to visit, the start and end location and if the circuit is simple or optimized. If it is simple, the visiting sequence will consider the order that the tourist as selected the monuments to visit and the duration will not be optimized. On the other hand, in the case of the optimized circuit, an optimization algorithm will be applied to present the tourist a circuit considering the waiting time and the average visiting time on each monument and distance between monuments or the occupancy of each monument in order to maximize the tourist experience.

KEY REQUIREMENTS

In order to implement the Tourist APP the following data should be available:

- Real time number of visitors at each monument;
- Maximum capacity of each monument;
- Number of visitors waiting to enter at each monument;
- Average visiting time at each monument.

IMPACT ON COMMUNITY

The Tourist APP, that will be used directly by citizens and tourists, will increase the awareness of cultural buildings and important places of Evora city. With the use of the Tourist APP by citizens and tourists the cultural agents will be able to promote and publicise its monuments as well as promote hidden places in the city. Additionally, Tourist APP will improve the touristic experience and increase the number of visited monuments per tourist considering the respective preferences.

CULTURAL HERITAGE BUILDINGS COMPLIANT

The Tourist APP refers to a software solution with no negative impact on cultural heritage.

OTHER COMMENTS - OPEN CONSIDERATIONS

The Tourist APP aims to improve tourists' experience by reducing waiting times at monuments while reducing the number of visitors per monument.