R2CITIES: «Renovation of Residential Urban Spaces: towards NZE CITIES»

THE PROJECT IN BRIEF

Rubén García – Project Coordinator [CARTIF]

Genoa, 24th May, 2016

EeB.ENERGY.2012.8.8.3, grant agreement No.314473

Genova Smart Week
innovation for a livable city
Genova, 23-28 maggio 2016

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The Project

Develop and demonstrate replicable strategies for designing, constructing and managing large scale district renovation projects for achieving

The consortium

ABB

acciona Infraestructuras

CARTIF

D'APPOLONIA

ekodenge

İSTANBUL TEKNİK ÜNİVERSİTESİ 1773

KARTAL BELEDİYESİ

mir unique solutions

oværdi ænergy | investments UniCredit WWF

onyx

reengen

VIVA

SOLITEM group

STEINBEIS-EUROPA-ZENTRUM

UNIVERSITÀ DEGLI STUDI DI GENOVA

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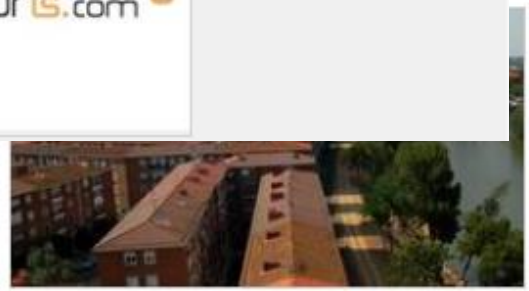

Index

Index

Positioning of R2CITIES in the EU context

- Energy
- Mobility
- ICT

- Buildings
- RES
- Integration

- Energy Efficiency

SCC – EIP Lighthouse projects

Eco-building projects → CONCERTO → PPP EeB → PPP EeB

Smart Cities

SCC – Nature Based Solutions

- Large-Scale Demonstration
- Renaturing Cities

FP5, FP6, PF7

Horizon 2020

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Index

Key facts

Our Network

Expected Impacts

57.000	m2 renovated surface area
60%	reduction energy use
860	dwelling involved

July 2013 – June 2018

14.8 M eur

9.1 M eur

17 partners

31% SMEs

Demosites

Genova almost 100%

Kartal 50%

Valladolid tender

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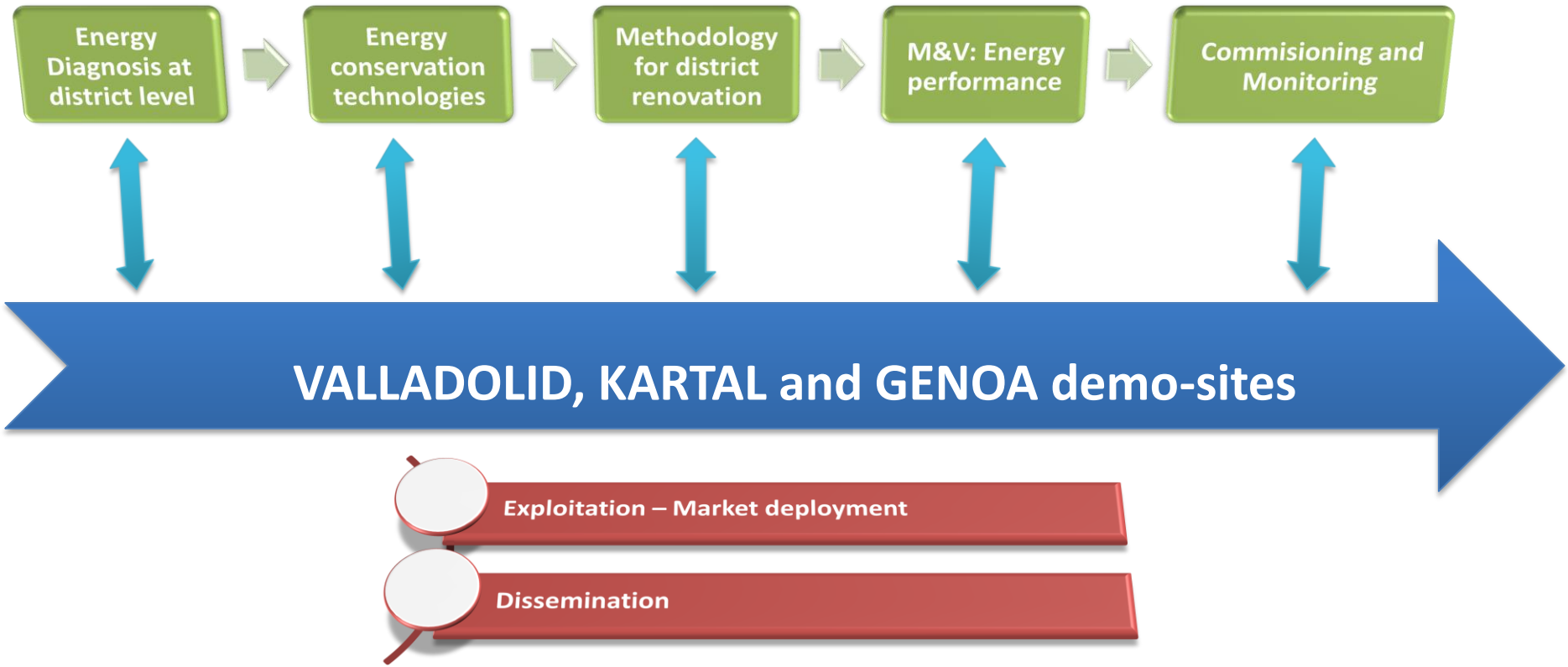
The project in a nutshell



Index

Positioning of R2CITIES in EU Smart Cities context

The project in a nutshell

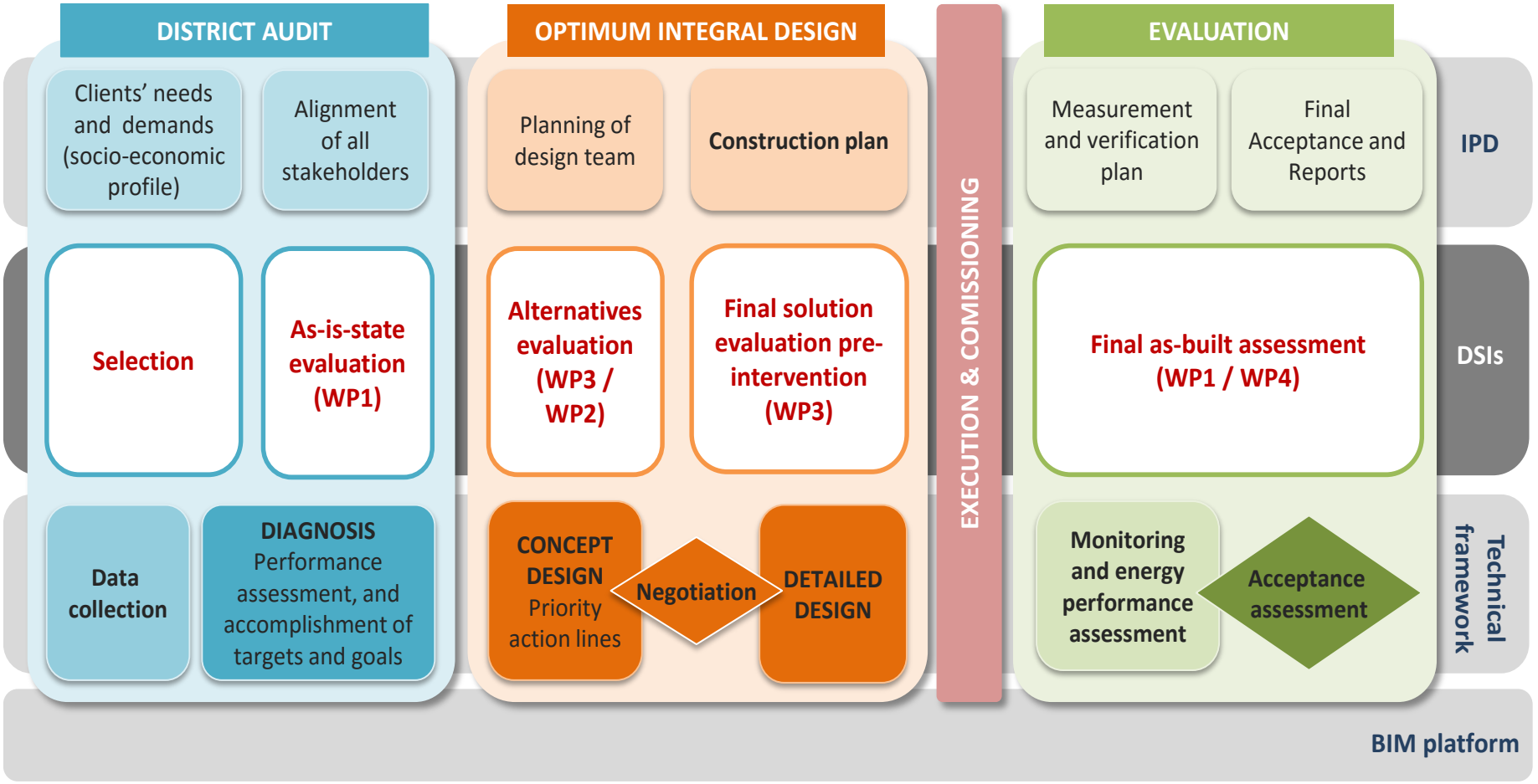
R2CITIES Methodology

R2CITIES Interventions [Genova - Iavatricci]

R2CITIES Business Models

The future

RTD - Methodology for Energy District Retrofitting



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Methodology based on a predifined set of DSI

Section			DSI	Units	Diagnosis phase	Evaluation phase	Assessment phase	Calculation method (only evaluation)
ENERGY INDEX (EN25)	EN1	DEN	Density of final energy demand or consumption	kWh/m²a	X	X	X	EP simulation
	EN2	PEE	Peak load and profile of electricity demand	kW	X	X	X	EP simulation
	EN3	PTH	Peak load and profile of thermal energy demand	kW	X	X	X	EP simulation
	EN4	DA	Degree of accordance with national laws and standards	kWh/m²a	X	X	X	EP simulation
	EN5	DC	Degree of congruence of calculated annual final energy demand and monitored consumption	%	X	X	X	EP simulation
	EN6	ESS	Degree of energetic self-supply	kWh/kWh	X	X	X	EP simulation
	EN7	NFEC	Net fossil energy consumed	kWh/m²	X	X	X	EP simulation
	EN8	MKT	Market share of the technology in order to measure the degree of innovation	%		X	X	Innovation degree
	EN9	PRE	Temporal predictability and controllability of energy supply	n.a.		X	X	Qualitative scale
	EN10	VIS	Visibility of the choices	n.a.		X	X	Qualitative scale
ECONOMIC INDEX (ECO25)	ECO1	INV	Investments	€, €/m²		X	X	n.a.
	ECO2	GRA	Grants	€/m², %		X	X	n.a.
	ECO3	TAC	Total annual costs, sum of discounted total annual costs and annuity	€/a	X	X	X	LCC
	ECO4	TAR	Total annual revenues, sum of discounted annual revenues	€/a		X	X	EP simulation / energy cost
	ECO5	EPC	Energy production costs	€/kWh	X	X	X	EP simulation / energy cost
	ECO6	NPV	Net present value	€		X	X	Economic analysis
	ECO7	IRR	Internal rate of return	n.a.		X	X	Economic analysis
	ECO8	DPP	Dynamic payback period	a		X	X	Economic analysis
	ECO9	AR	Achieved rents incl./excl. ancillary costs	€/m²a		X	X	Economic analysis
	ECO10	AR	Achieved rent increase (excl. ancillary costs)	€/m²a		X	X	Economic analysis
COMFORT INDEX (CO25)	CO1	PPD	Predicted percentage of dissatisfied	%	X	X	X	EP simulation
	CO2	PMV	Predicted Mean Vote	n.a.	X	X	X	EP simulation
	CO3	POR	Comfort parameter average value	%	X	X	X	EP simulation
	CO4	CPAV	Percentage outside range	%	X	X	X	EP simulation
	CO5	VC	Visual comfort	lux	X	X	X	EP simulation
	CO6	AC	Acoustic comfort	dBA	X	X	X	Acoustic simulation
SOCIAL INDEX (SO10)	SO1	AGE	Age and gender pyramid	n.a.	X			
	SO2	HSC	Household configuration (size)	m²	X			
	SO3	GDP	GDP level	%	X			
	SO4	EMP	Employment rate	%	X			
	SO5	ENT	Enterprises (number per type)	n.a.	X			
	SO6	COA	Civil organisations/associations	n.a.	X			
	SO7	DSA	Degree of satisfaction/acceptance by inhabitants/tenants/owners	%			X	
	SO8	LIP	Level of information and direct participation	%			X	
	SO9	AHB	Active/proactive householders behaviour	%			X	
	SO10	ICP	Internal comfort perception	%	X		X	
	SO11	QB	Quality of the building as a place to live and work	%	X	X	X	n.a.
	SO12	ACC	Ability of users with physical impairments to use the facility	%	X	X	X	Accesibility plan
	SO13	AGR	Access to green and open spaces	%	X	X	X	Urban plan
ENVIRONMENTAL INDEX (ENV10)	ENV1	FEN	Final energy demand and consumption	kWh/m²a	X	X	X	EP simulation
	ENV2	PEN	Primary energy demand and consumption	kWh/m²a	X	X	X	EP simulation
	ENV3	GHG	Greenhouse gas emissions	t/m²a	X	X	X	LCA
	ENV4	PME	Particulate matter emission	t/m²a	X	X	X	LCA
	ENV5	EM	NO_x and SO_x emissions	t/m²a	X	X	X	LCA
URBAN INDEX (UR5)	UR1	IUR	Impact on urban morphology	%		X	X	Urban plan
	UR2	IIN	Impact on urban infrastructures	%		X	X	Urban plan
	UR3	ILA	Impact on land use and activities	%		X	X	Urban plan
	UR4	IPU	Impact on public spaces	%		X	X	Urban plan
	UR5	ITR	Impact on transport	%		X	X	Urban plan

ENERGY [12]
Energy performance simulation tools

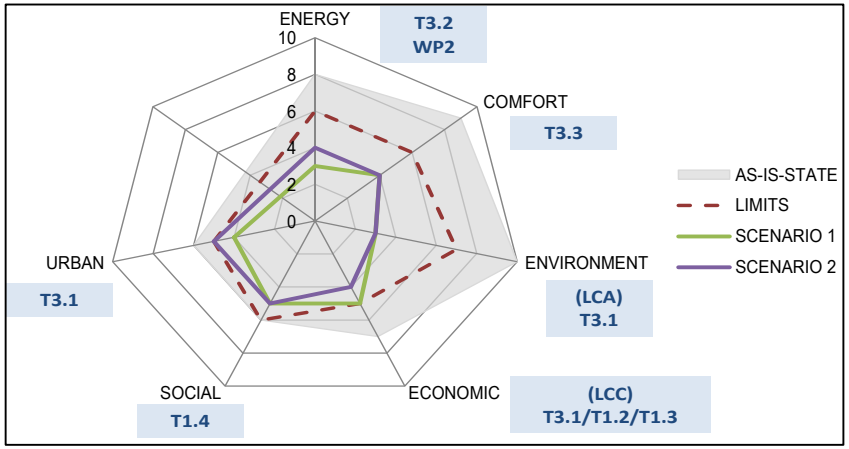
ECONOMY [11]
Life Cycle Cost analysis, investments, grants, etc

COMFORT [8]
Simulation of PMV/PPD indexes

SOCIAL [12]
Calculation of social impacts

ENVIRONMENTAL [6]
Life Cycle Analysis and GHG emissions

URBAN [4]
Calculation of impacts



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Index

Genova demosite

Requalification project	18,000 sqmt 64,000 sqmt
100% Public [retrofitted]	2 different grants

Transparent elements [4/16Argon/4 low-e] U=1,18 W/m2K	Thikness 70 mm Insulation polistirene [blind panel]
Heating plant Condensing group 400 kW each (2)	Circulation pumps General pipes Electrical equipment
Satellites + ICT [in every dwelling] Valve, electrovalve, counter	Communication system Insulation of pipes

Genova demosite

PV Plant

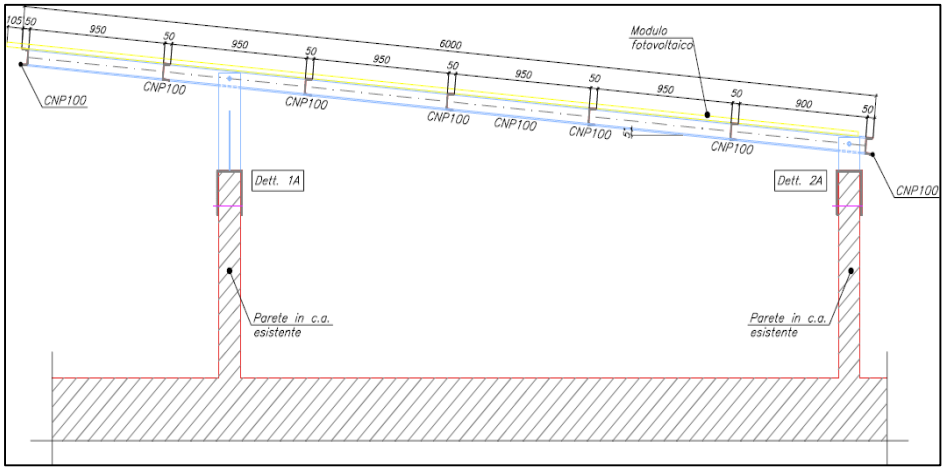
Electrical supply for boilers

13 kWp

Thin-film tech. A-silicon

inclination of about 5 degrees above to horizontilt

Lightweight solution



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Valladolid demosite

190 buildings 180,000 sqmt	24 buildings 21,000 sqmt
100% Private	3rd call for grants

Façade insulation (more restrictions) [U = 0.266 W/m2K]	Roof insulation [U = 0.40 W/m2K]
New Windows: [U = 2.70 W/m2K East/West/South]	New Windows: [U = 2.60 W/m2K North]
New Boilers [Condensation, min COP: 1.0]	Solar thermal: [60% DHW]

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Kartal demosite

3 buildings
[Public – private ownership]

18,800 sqmt
3 buildings

Insulation of envelope
Interventions on roof

Glazing
Replacement of all windows

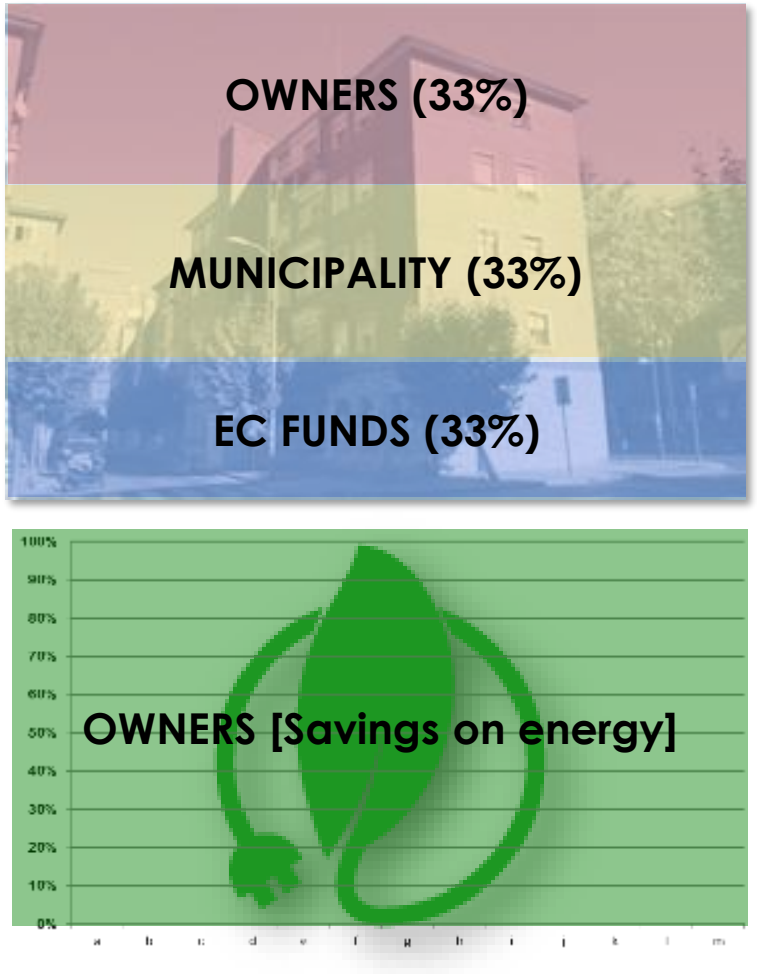
Solar collectors and roof insulation

Heat pumps with geotermal and heat recovery

Variable flow pumps

Lighting, HVAC, others [interior]

Index

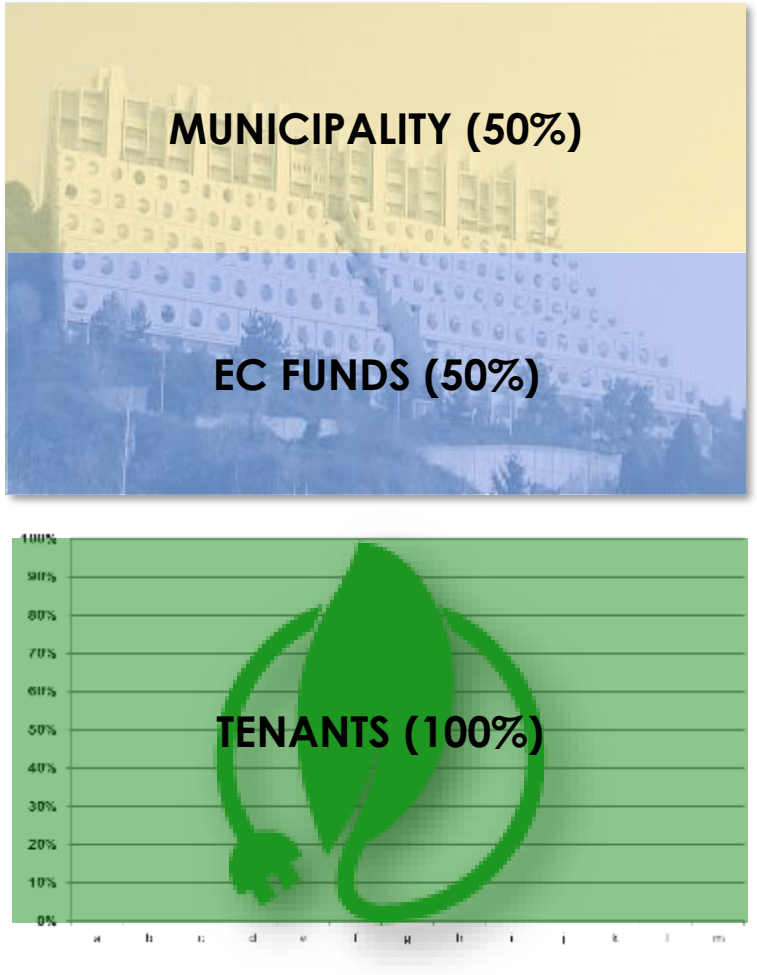


Valladolid (SP): Cuatro de Marzo District

Area of Intervention: 180,000 m2
R2CITIES renovation: 21,000 m2

-Public promotion of Private Intervention
-Owners are private: condominiums to decide

Investment:
-**Public + Private investments from apartment owners**
-SoU (EC funds) covers building related interventions
-Total EU funding: 1M€
-Total co-funding: 2M€ (1M€ from owners)



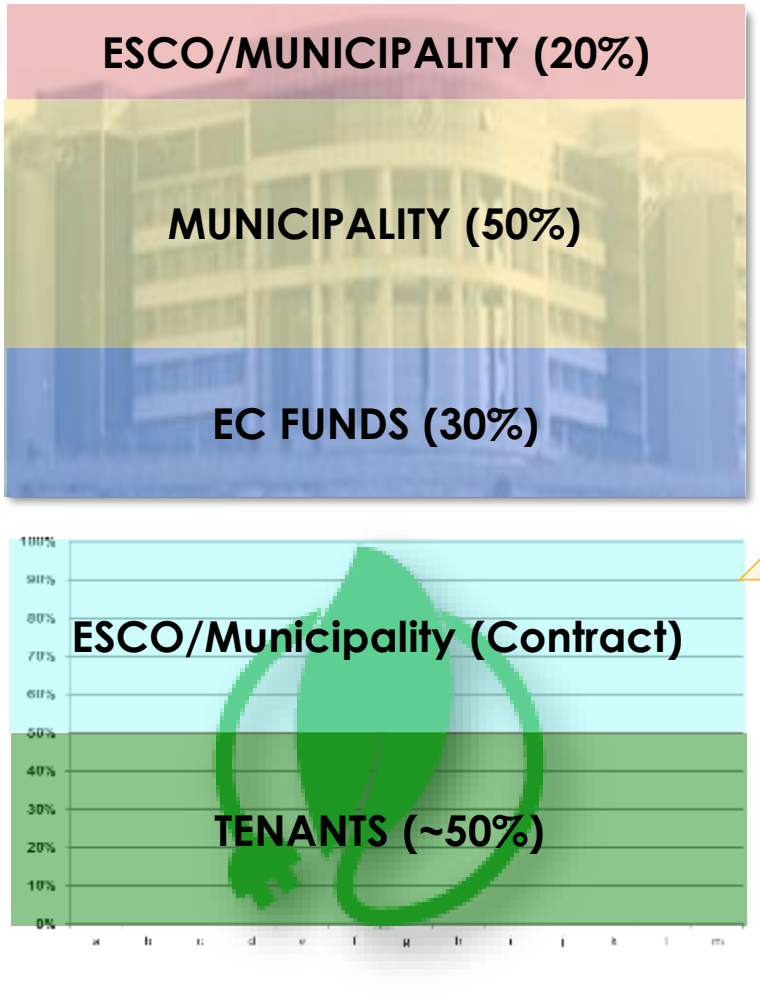
Genoa (IT): Lavatrici District

Area of Intervention: 64,000 m^2
R2CITIES renovation: 18,000 m^2

-Social Housing
-Buildings in poor insulation conditions
-More ambitious interventions than "business as usual" renovations

Full Public investment model:
- -Avoid increase of rents
- -Benefits from EE measures → directly affects Tenants

-Total SoU funding: 900K €



Kartal-Istanbul (TK): Yakacık District

Area of Intervention: 81,000 m^2
R2CITIES renovation: 18,800 m^2

- Huge Building + 2 additional residential blocks.
- Perfect idea of heterogeneous district
- Elderly building currently not used → to be reconverted for Social Housing (independent living).

Public investment

- Municipality: New incomes obtained from new rents.
- LT investment
- Tenants: Appropriate rents, comfort, etc.
- **Open to ESCO model/Facility Managers**
- Open to share benefits from EE measures
- Total SoU funding: 900K €

Index

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R2CITIES Methodology

R2CITIES Interventions [Genova - lavatricci]

R2CITIES Business Models

The future [Conclusions]

Conclusions

[RTD]
Almost Completed

[DEMO]
Executions are our focus now

[Valladolid]
Start this summer

[KARTAL]
2 small Buildings to finish

[GENOVA]
To be finished in September

[REFERENCE]
Examples of District Retrofitting

[CIZITENS]
Excellence acceptance of the results

[PARTICIPATION]
3 municipalities committed

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