

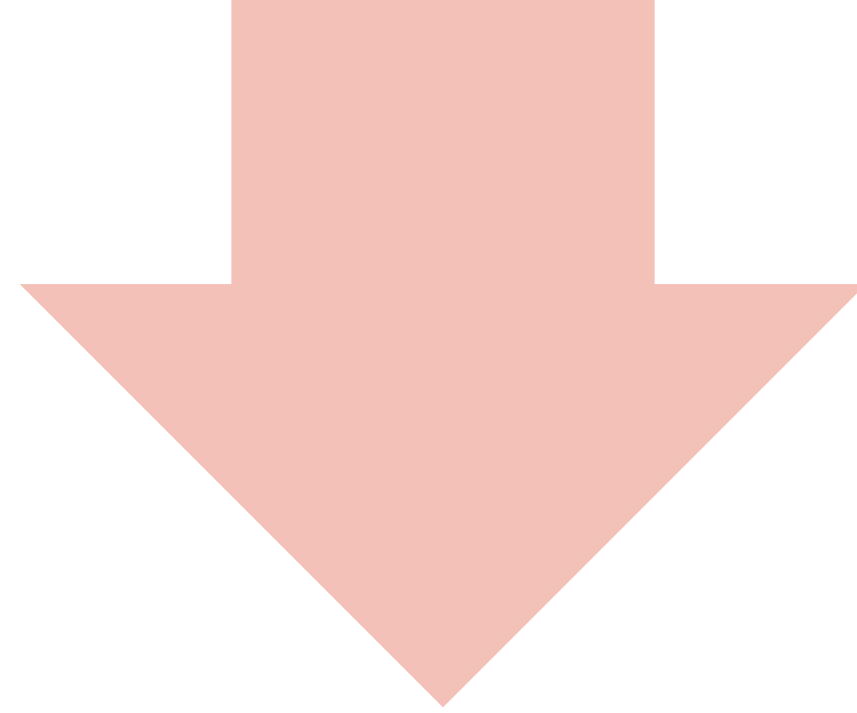
# From Technical Innovation to Market Uptake

Pop-Up Factories and Integrated ESCO–Crowdfunding Frameworks for Scalable Deep Renovation

Spain, Austria, the Netherlands, Italy, and France.

**Julia Semeniuk - Project Manager @ Ener2crowd**

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# **The urgency:** **Why building renovation matters**

# Buildings are the single largest energy consumer in Europe

40% of EU's total energy use  
75% of buildings are energy inefficient

EU target: 3% annual deep renovation rate by 2030

Current rate:  $\approx 1\%$  (far below target)

*Source: Energy Performance of Buildings Directive - European Commission*



**Deep renovations, that significantly reduce energy demand and greenhouse gas emissions, are even rarer.**



**High upfront costs and financial risk.**





**Transportation alone can account for 20–30% of total project costs and significant CO2 emissions.**

# Industrialised renovation: key principles

Applying industrial production principles to building refurbishment:

- Standardisation & modularisation
- Digital design & off-site manufacturing
- Controlled factory environments
- Façade panels, integrated services, roof systems

**LOWER EMISSIONS & WASTE**

**PREDICTABLE COSTS & PERFORMANCE**

**QUALITY CONTROL & REPRODUCIBILITY**

**REDUCED RESIDENT DISRUPTION**

# Pop-Up Factories (PuFs): Bringing Production to the Site

A Pop-Up Factory is a temporary manufacturing and/or assembly facility that can be rapidly set up and taken down to produce components for specific construction projects — located within or near the active renovation district.

## Mobile On-Site

< 15 km

Relocatable  
unit, JIT  
delivery

## Satellite

30–100 km

Semi-  
permanent  
regional  
outpost

## District

< 30 km

Multi-project  
system  
integrator

## Assembly

Near site

Final assembly,  
high  
automation

## Service

Community

Knowledge &  
training hub

# PuFs Across Five Countries: Context-Sensitive Deployment



BuildUPspeed

Spain, Italy, Austria, France & the Netherlands

## Mobile On-Site

Cross laminated timber on a listed 2,968 m<sup>2</sup> building - 200% productivity gain, 55% fewer defects, 4.79% GHG reduction



## Satellite

Hybrid precast main factory + close-to-site satellites for social housing - new build & retrofit on same lines



## Re-Use Box

Social Urban Mining: 3,300 reused building products, 124,000 kg waste prevented, 5,600 training hours



## Mobile On-Site

"Truck for reused equipment": sanitary elements recovered & reconditioned from selective deconstruction



## District

Portico-style post-war blocks in Hoensbroek - repetitive typology ideal for district-scale industrialised retrofit



# Financing Deep Renovation: The Missing Link

Technical excellence alone doesn't renovate buildings. High upfront CAPEX, fragmented delivery structures, and limited access to appropriate financing remain the dominant barriers.



**Capital  
intensity**



**Fragmented  
Delivery**



**Risk  
Perception**

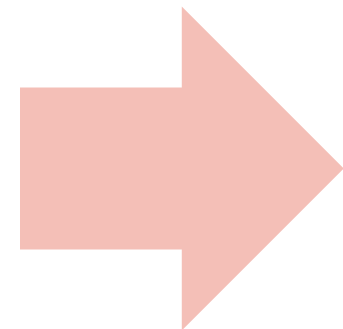


# The ESCO Model: Transferring Risk, Guaranteeing Results

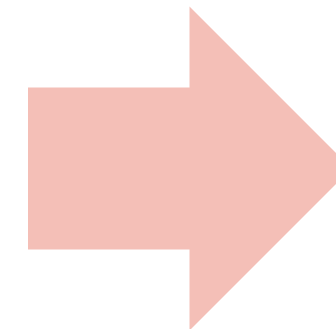
An Energy Service Company (ESCO) delivers energy services and efficiency improvements, accepting financial risk directly linked to project performance — remunerated based on verified energy savings.



**Building  
owner**



**ESCO**



**Pop-Up  
Factory**



**Verified savings**



# Crowdfunding: Mobilising Citizen Capital for Renovation

## Italian Savings



**€6 Trillion**

## Spanish Savings



**€2.7 Trillion**

Unlocks citizen liquidity

*Source: Italians a people of savers: EUR 6 trillion in piggy banks by Sole24  
HOW MUCH DO SPANIARDS REALLY SAVE? INSIGHTS INTO THE AVERAGE SAVINGS IN SPAIN by Grupo barymont*



# Two Crowdfunding Models

innovative and digital financing method through which a **promoter of a green initiative asks for funds from a large audience of potential investors (retail or institutional) in exchange for an economic return.**

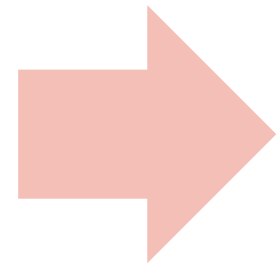
	<b>Lending crowdfunding</b>	<b>Equity crowdfunding</b>
<b>Form of financing</b>	Loan	Purchase of shares or equity stake
<b>Monetisation</b>	Principal + Interest	Dividends or liquidation event
<b>Duration</b>	1–2 months fundraising	1–4 months fundraising
<b>Best for ESCOs?</b>	✓ Flexible, predictable	Growth-stage companies

# The Integrated Framework: PuF + ESCO + Crowdfunding

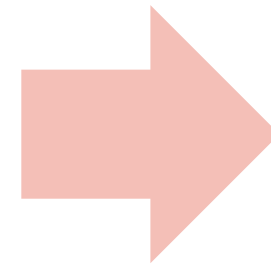
Case Study: Italian Pilot — How the Three Elements Connect



**Social Housing  
Association**



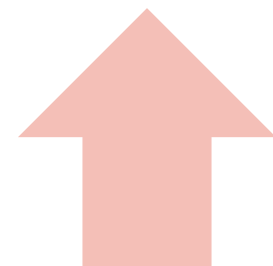
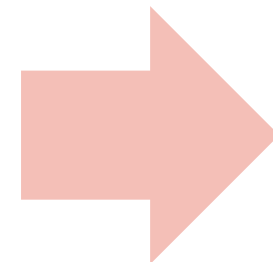
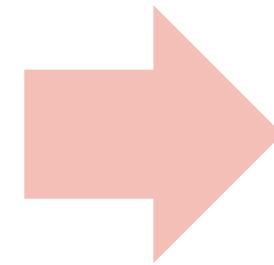
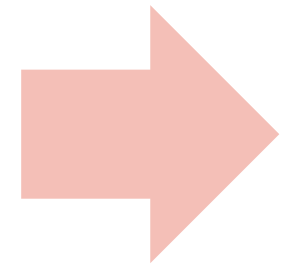
**ESCO / General  
Contractor**



**Pop-Up  
Factory**

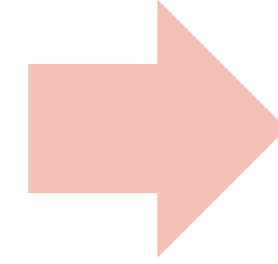
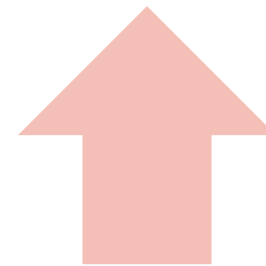
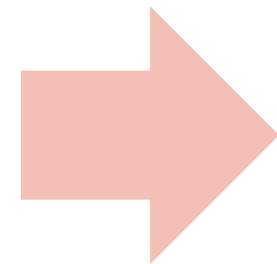
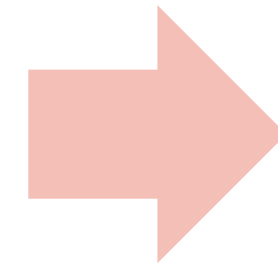
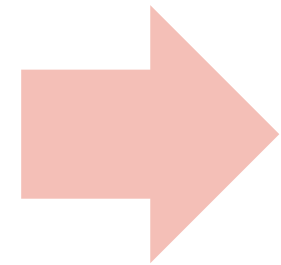
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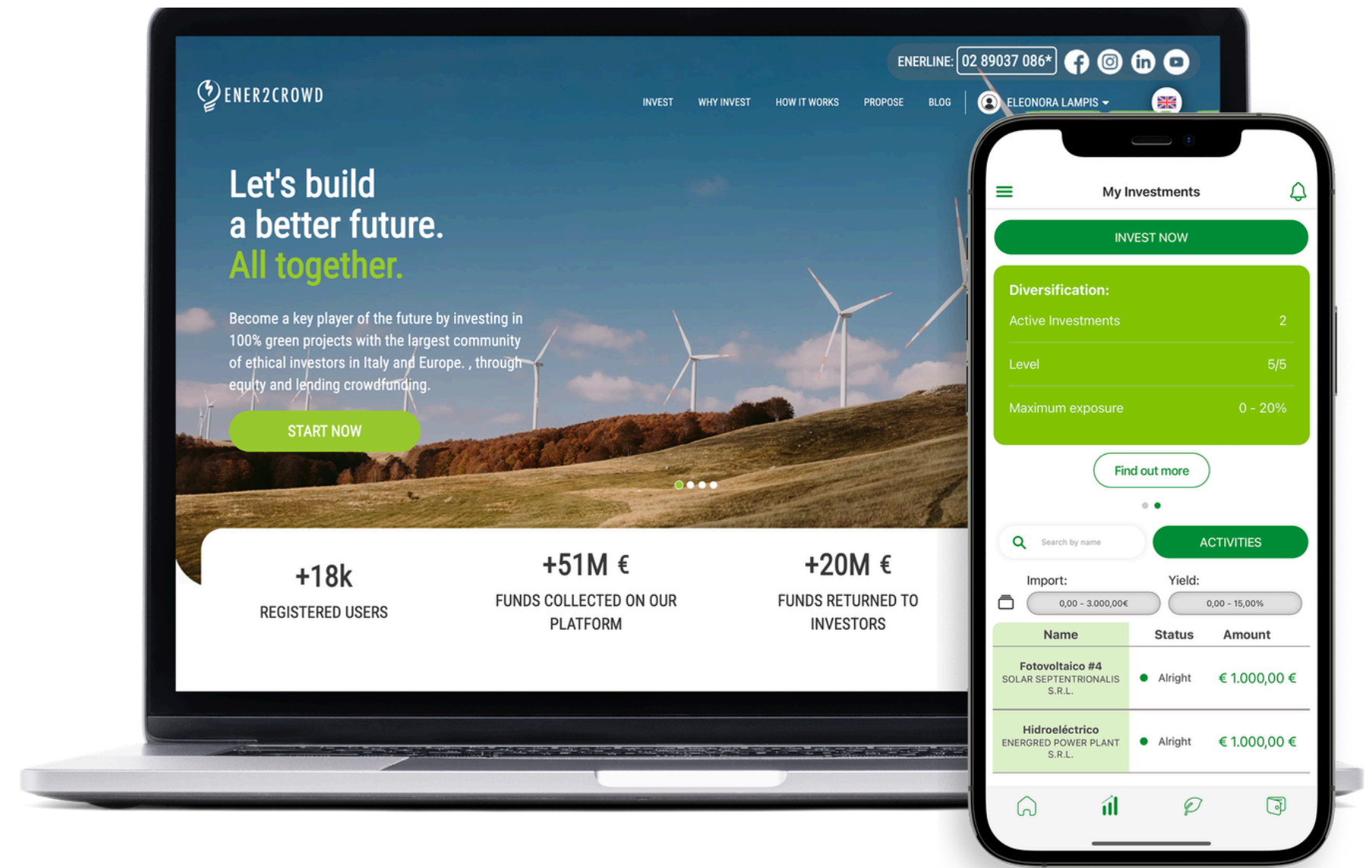


**Reduces bank debt dependency**

**Builds ESCO track record**

**Engages local communities**

**Finances PuF CAPEX**



# Conclusions & The Path Forward

## Pop-Up Factories work

Across five pilots: ↑ productivity, ↓ emissions, ↓ defects. Adaptable to heritage, social housing, and circular economy models.

## ESCOs transfer the right risks

Energy Performance Contracts shift performance risk from owners to specialists — unlocking investment and enabling whole-building upgrades.

## Crowdfunding bridges the gap

Citizen capital can co-finance CAPEX including PuF investment. Tiered rates convert communities from bystanders into stakeholders.

## Integration is the key

PuFs + ESCOs + crowdfunding = a modular, replicable, bankable framework for deep renovation at scale across diverse European contexts.



# JOIN THE ENERGY REVOLUTION

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