



# THE FIFTH FACADE PROJECT

Methodology to define a strategy of Green Roofs  
Policy for the city of Porto

Paulo Palha | [presidencia@greenroofs.com](mailto:presidencia@greenroofs.com)

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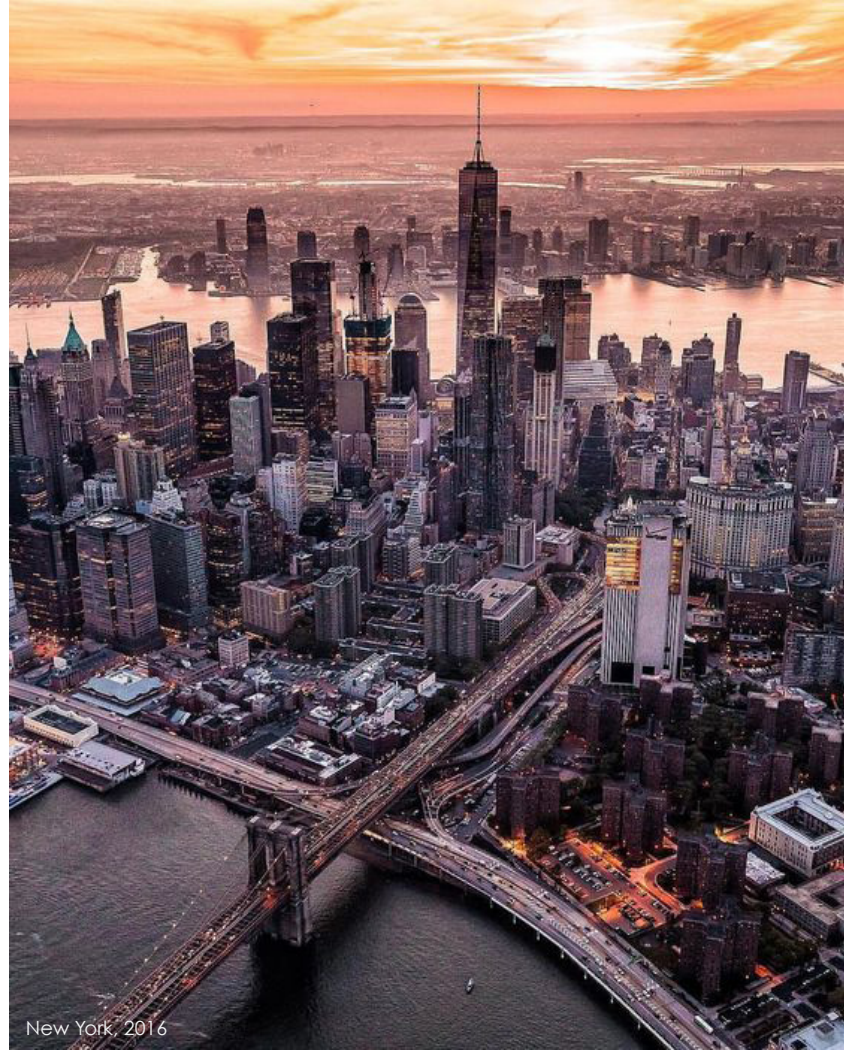


# CONTEXT

Environmental problems are one of the major problems of our times. All over the world we are feeling the consequences of our actions on planet Earth.



Shanghai, 2016



New York, 2016



Dubai, 2016



SHANGAY 1990



SHANGAY 2010



THIS IS NOT OUR REALITY YET,  
**BUT THEY NEVER THOUGHT IT  
WOULD BE THEIRS TOO.**



## IN PORTUGAL SOME CITIES ALREADY PRESENT HIGH VALUES OF AIR POLLUTION

20 ug / m<sup>3</sup> (PM10) - Maximum reference value for air pollution recommended by the UN.

372 ug / m<sup>3</sup> Ahwaz - Irão

70 ug / m<sup>3</sup> Plovdiv - Bulgária

38 ug / m<sup>3</sup> Paris

30 ug / m<sup>3</sup> Lisboa

29 ug / m<sup>3</sup> Londres

28 ug / m<sup>3</sup> Braga

27 ug / m<sup>3</sup> Funchal

26 ug / m<sup>3</sup> Berlim

26 ug / m<sup>3</sup> Maia

26 ug / m<sup>3</sup> Madrid

23 ug / m<sup>3</sup> Matosinhos



MORE FREQUENT AND SEVERE WEATHER  
DIRTIER AIR  
MORE ACIDIC OCEANS  
WILDLIFE EXTINCTION  
HIGHER SEA LEVELS  
FORCED MIGRATIONS  
WARS

ARE WE  
DESTROYING  
**HUMAN KIND?**

Installation by plastic artist Néle Azevedo



WHY  
**GREEN**  
**ROOFS?**





## NATURE BASED SOLUTIONS GREEN INFRASTRUCTURES ECOSYSTEM SERVICES

BENEFÍCIOS DAS  
COBERTURAS VERDES

INCREASE BIODIVERSITY AND WILDLIFE

WATER MANAGEMENT

IMPROVE RUNOFF QUALITY

IMPROVE AIR QUALITY

MITIGATION OF HEAT ISLAND EFFECT

REDUCE NOISE POLLUTION

INCREASE THE ROOF LIFE

COOLING, INSULATION AND ENERGY  
EFFICIENCY

GREEN BUILDING ASSESSMENT AND  
PUBLIC RELATIONS

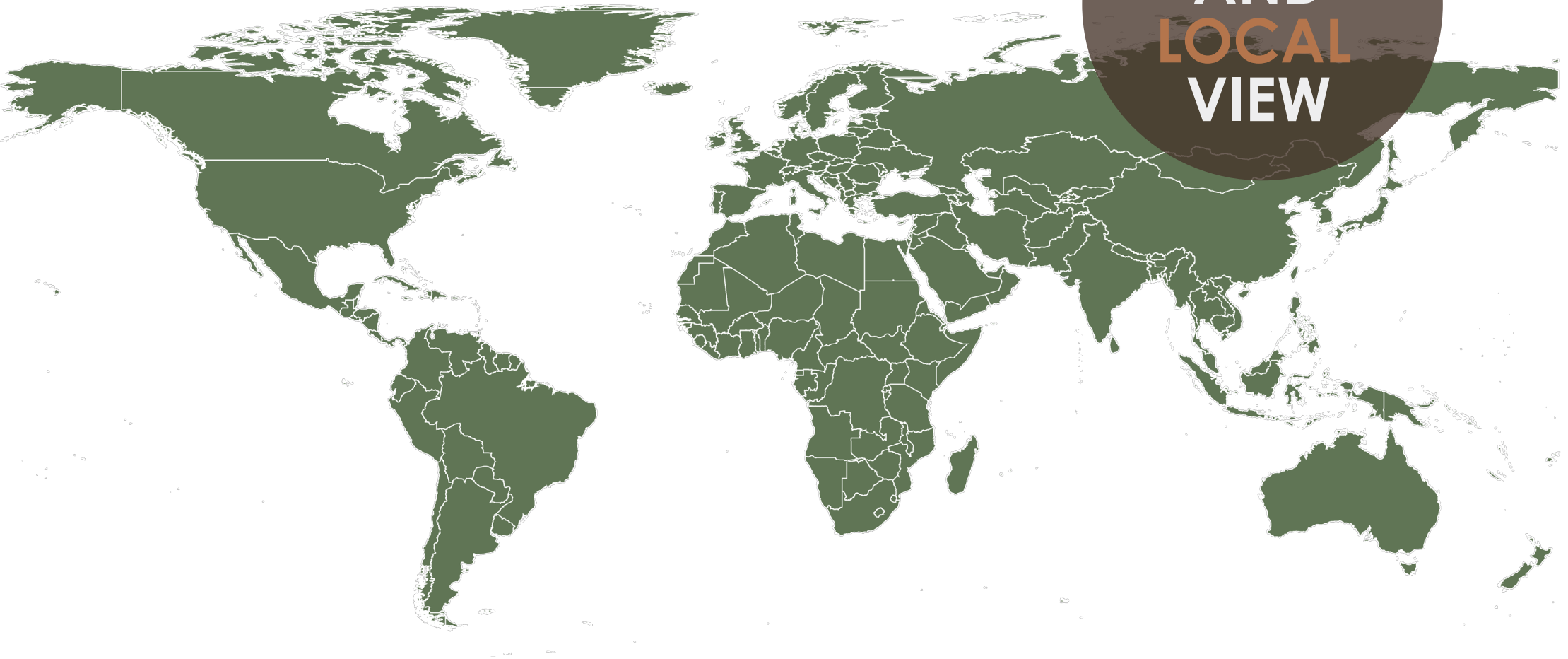
FOOD PRODUCTION



**AN OLD  
PASSION.**

CONTACT WITH DIFFERENT **GREEN ROOF**  
ASSOCIATIONS AND THE WORK THAT WAS  
BEING DEVELOPED **ALL OVER THE WORLD**

**GLOBAL  
AND  
LOCAL  
VIEW**





WORLD GREEN INFRASTRUCTURE NETWORK  
vegetation makes it possible!

GREENER CITIES  
IN EUROPE



EUROPEAN  
FEDERATION  
GREEN ROOFS  
& WALLS



THE MOVEMENT BEGAN AS PART OF **ANQUIP**



NATIONAL ASSOCIATIONS FOR QUALITY IN  
BUILDING INSTALLATIONS



# ANCVGREENROOFS.PT

ASSOCIAÇÃO NACIONAL DE COBERTURAS VERDES

In 2015 we decided it would be better to create an independent association for Green Roofs in Portugal, in order to avoid the creation of other green roof associations in the country, that could put in risk the seriousness of the cause.


The Portuguese Association for Green Roofs (ANCV), a non-profit organization, was created in July

## LEGISLATIVE BODY



Silva Afonso   
President



António Tadeu   
1<sup>st</sup>Secretary



Cristina Branquinho   
2<sup>nd</sup>Secretary

## MANAGEMENT




Paulo Palha   
President



Teresa Afonso Paço   
Vice-President




Ana Mesquita   
Treasurer

## SUPERVISORY BOARD




Luís Calafate   
President






Maria João Pedrosa   
1<sup>st</sup> Vowel



Mário Reis   
2<sup>o</sup> Vowel

Distribution of ANCV Social Entities through the country



-  Company
-  Research Institution
-  Municipality

# Social entities of ANCV





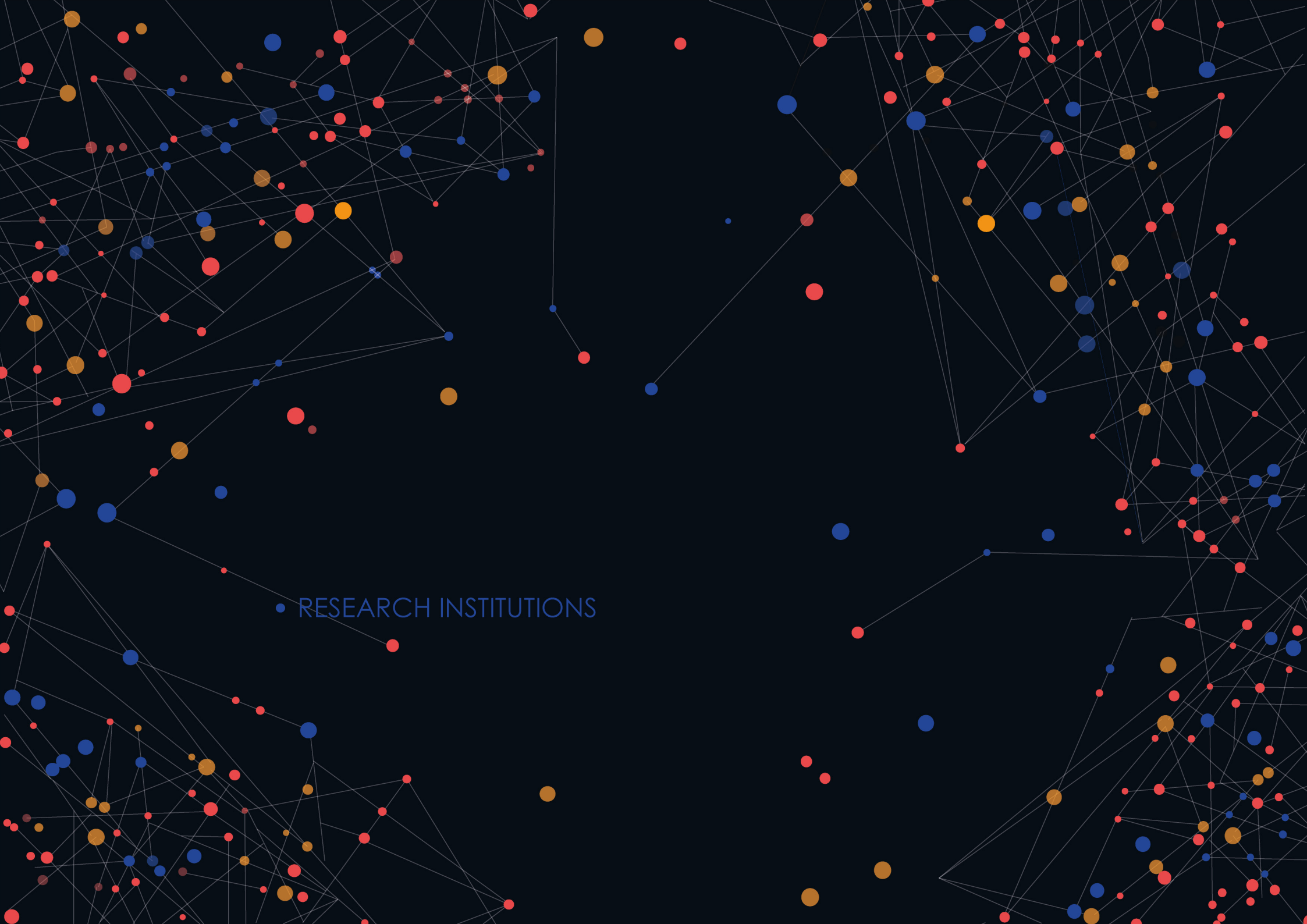
### 3. THE GOAL OF ANCV

TO PROMOTE GI'S IN CITIES, ESPECIALLY THOSE SUITABLE TO BE INSTALLED ON NEW OR EXISTING BUILDINGS, **SUCH AS GREEN ROOFS AND GREEN WALLS**. ANCV ACTIONS AIMS TO ENHANCE THE ENOURMOUS BENEFITS ASSOCIATED WITH GI'S, IN ORDER TO **CREATE HEALTHY AND SUSTAINABLE URBAN LANDSCAPES**.

How  
to  
**achieve  
this goal?**

A network diagram on a dark background. The diagram consists of numerous nodes, represented by small circles in red, blue, and yellow/gold. These nodes are interconnected by a dense web of thin, light-colored lines, representing connections or relationships. The overall structure is complex and interconnected, with some nodes appearing larger than others. The word "CONNECTING" is centered in the middle of the image in a light gray, sans-serif font.

CONNECTING



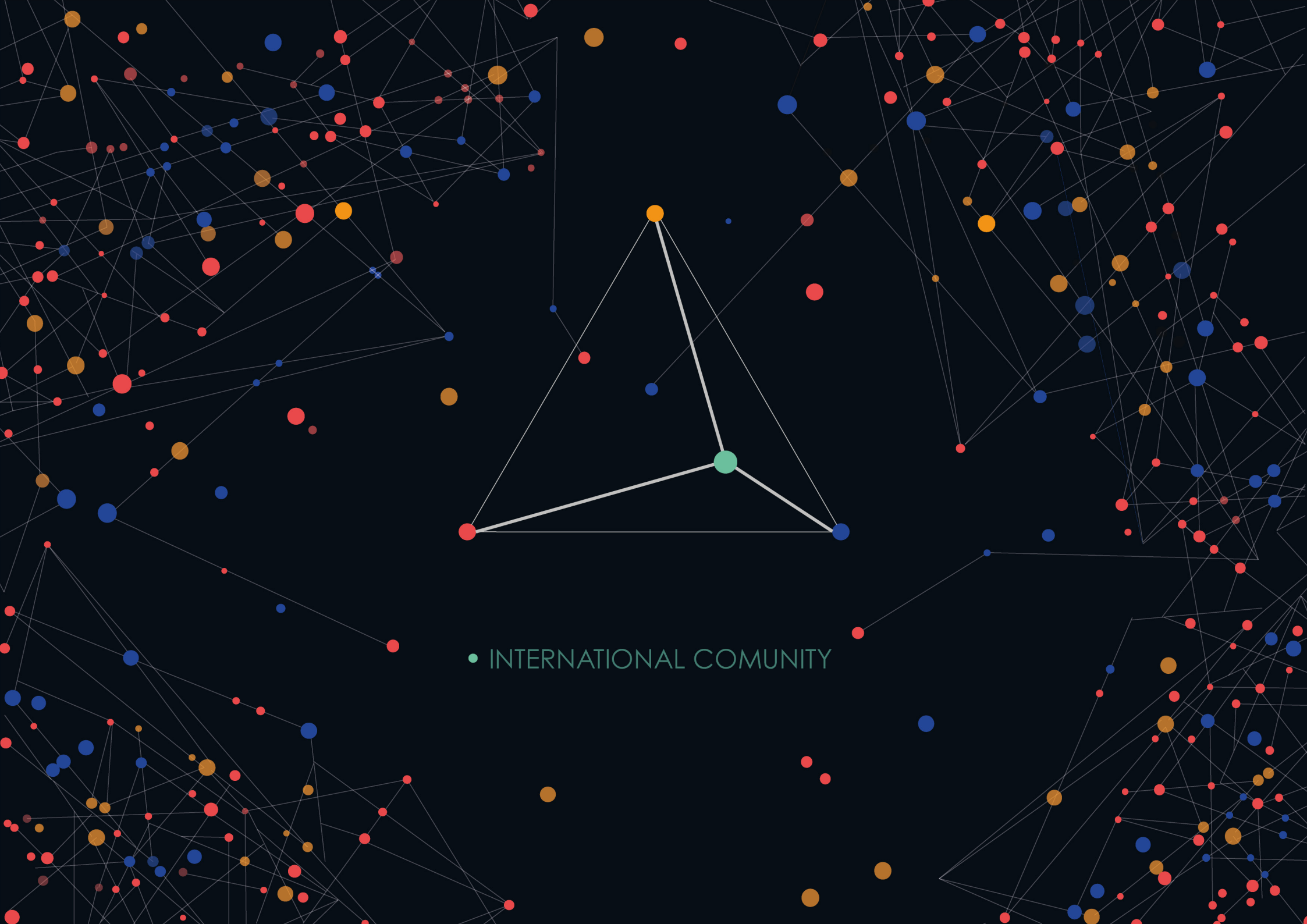
• RESEARCH INSTITUTIONS



• RESEARCH INSTITUTIONS • MUNICIPALITIES



• RESEARCH INSTITUTIONS • MUNICIPALITIES • COMPANIES



• INTERNATIONAL COMMUNITY



# THE FIFTH FACADE PROJECT





The Fifth Facade Project (PQAP) is a project between **ANCV** and the **Porto City Council**

**ANCVGREENROOFS.PT**  
ASSOCIAÇÃO NACIONAL DE COBERTURAS VERDES

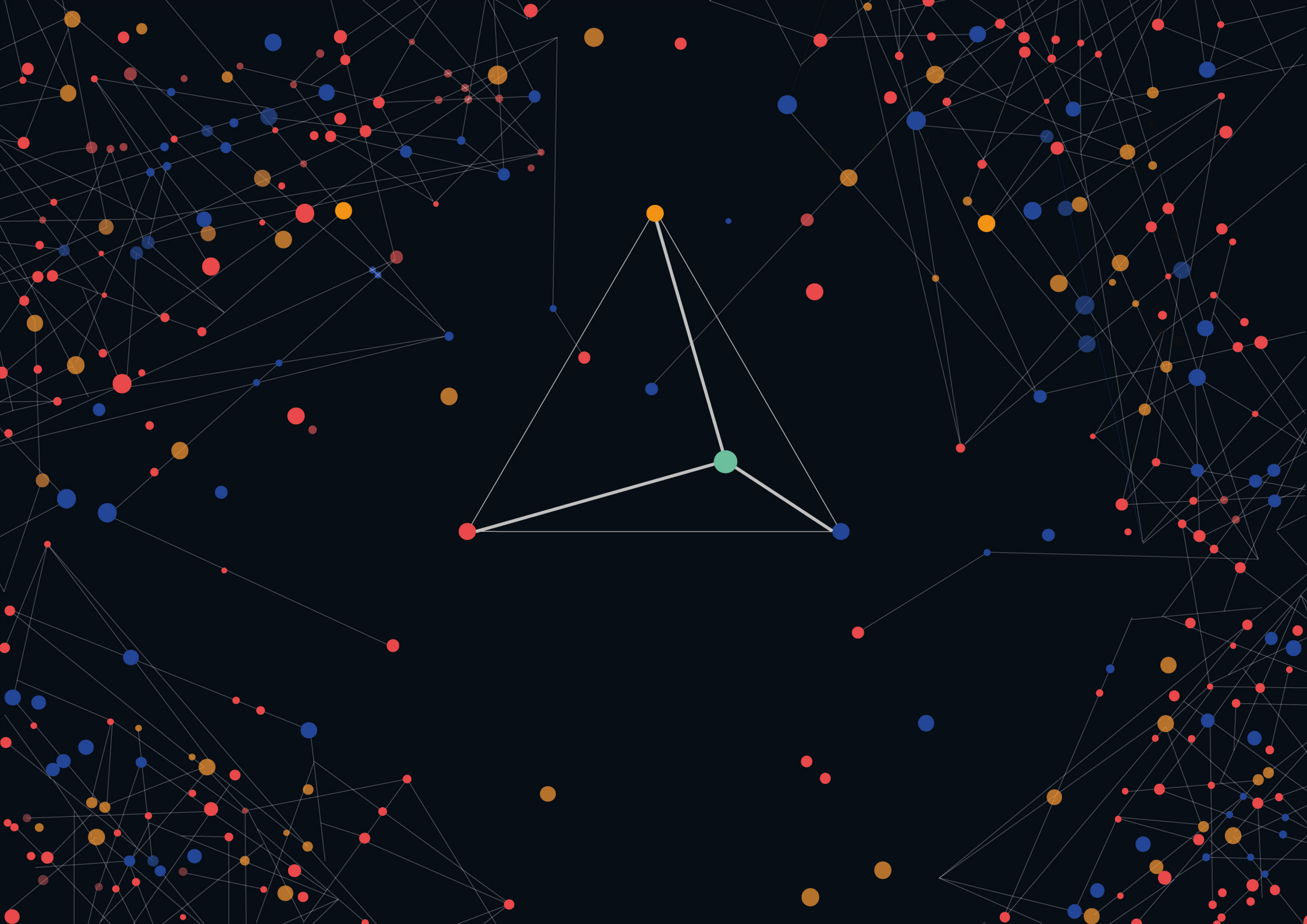
# PQAP GOAL

TO DEFINE WHICH MODELS THE PORTO CITY COUNCIL SHOULD FOLLOW IN ORDER TO INCLUDE GREEN INFRASTRUCTURE, IN PARTICULAR **GREEN ROOFS**, INTO THE URBAN PLANNING, ENVIRONMENTAL AND GREEN SPACES STRATEGY OF THE CITY

# METHODOLOGY OF PQAP

THE PQAP ADOPTED A METHODOLOGY THAT INCLUDES THE PARTICIPATION OF RESEARCH GROUPS FROM DIFFERENT NATIONAL INSTITUTIONS OF HIGH EDUCATION, AS WELL AS INTERACTION WITH FOREIGN CITIES, COMMUNITY ASSOCIATIONS AND DIFFERENT KIND OF ORGANIZATIONS. IT ALSO INCLUDES THE PROJECT OF GREEN ROOFS FOR THREE MUNICIPAL BUILDINGS.

TO FIND THE BEST STRATEGY FOR PORTO MANY STUDIES WERE DEVELOPED IN PORTO, SUCH AS THE POTENTIAL OF THE CITY BUILDINGS TO RECEIVE GREEN ROOFS AND THE PRIORITY AREAS FOR INTERVENTION.



## 1. PHASE 1 | ORGANIZING DATABASES

### STATE OF ART

GR benefits  
GR policies around the world  
Necessities of Porto  
GR cost benefit analyses

### MODEL BUILDINGS

Analyses of different municipal buildings in Porto that could receive green roofs

### MODEL CITIES

Definition of model cities with experience in GR policies to interact with the PQAP team

### WORKSHOP WITH CMPORTO

Definition of model cities with experience in GR policies to interact with the PQAP team

## 2. PHASE 2 | CROSSING AND PRODUCING INFORMATION

### EXISTING GR IN PORTO

Materials:  
Orthophotomaps  
Google Earth Pro (GEP)  
Satellite images  
GEP 3D images

### PORTO NECESSITIES MAP

Analyzed parameters:  
Heat Island Effect  
Pollution  
Drainage system  
Green Spaces

### POTENTIAL OF EXISTING BUILDINGS IN PORTO TO RECEIVE GR

Materials:  
Orthophotomaps  
Google Earth Pro (GEP)  
Satellite images  
GEP 3D images

### INTERACTION WITH THE CITIES OF LONDON AND LINZ

### PROJECT FOR 3 MUNICIPAL BUILDINGS OF PORTO

## 3. PHASE 3 | DEFINING THE STRATEGY

LAUNCH OF THE FIRST PORTUGUESE GUIDELINES FOR GREEN ROOFS

GR STRATEGY FOR THE CITY OF PORTO

RECOMENDATIONS FOR FUTURE ACTIONS



GREEN ROOFS WORKSHOP IN THE **CITY COUNCIL**



## INTERACTION WITH THE CITIES OF LINZ, IN AUSTRIA, AND LONDON, IN THE UK

**P  
L  
A  
N  
U  
N  
G  
S**

**ARCH**  
Architekten Dipl.-Ing. Holzer und Jöchl  
4020 Linz, Robert-Str.  
Architekt Dipl.-Ing. Frank R.  
4020 Linz, Vorkwartstr.

**STATISCHE BEARBEIT**  
Dipl.-Ing. Rüdiger Mutschisch & P.  
4020 Linz, Urfaß, Kapellenstr.

**VERKEHRSPLANE**  
Dipl.-Ing. Eckard Schimel  
4040 Linz, Urfaß, Leopoldenstr. 10

**AKUSTISCHE BERECHNUNG**  
TAS Schreiner GmbH  
4020 Linz, Emil-Rathenau-Strasse 1

**SCHADSTOFF**



ANALYSES OF DIFFERENT MUNICIPAL BUILDINGS IN PORTO TO  
RECEIVE GR AND BECOME **MODEL BUILDINGS**



MAPPING



PEOPLE RECOGNIZE "PRAÇA DE LISBOA"  
AS A GREEN ROOF, BUT.....

IS THIS A **GREEN ROOF**?



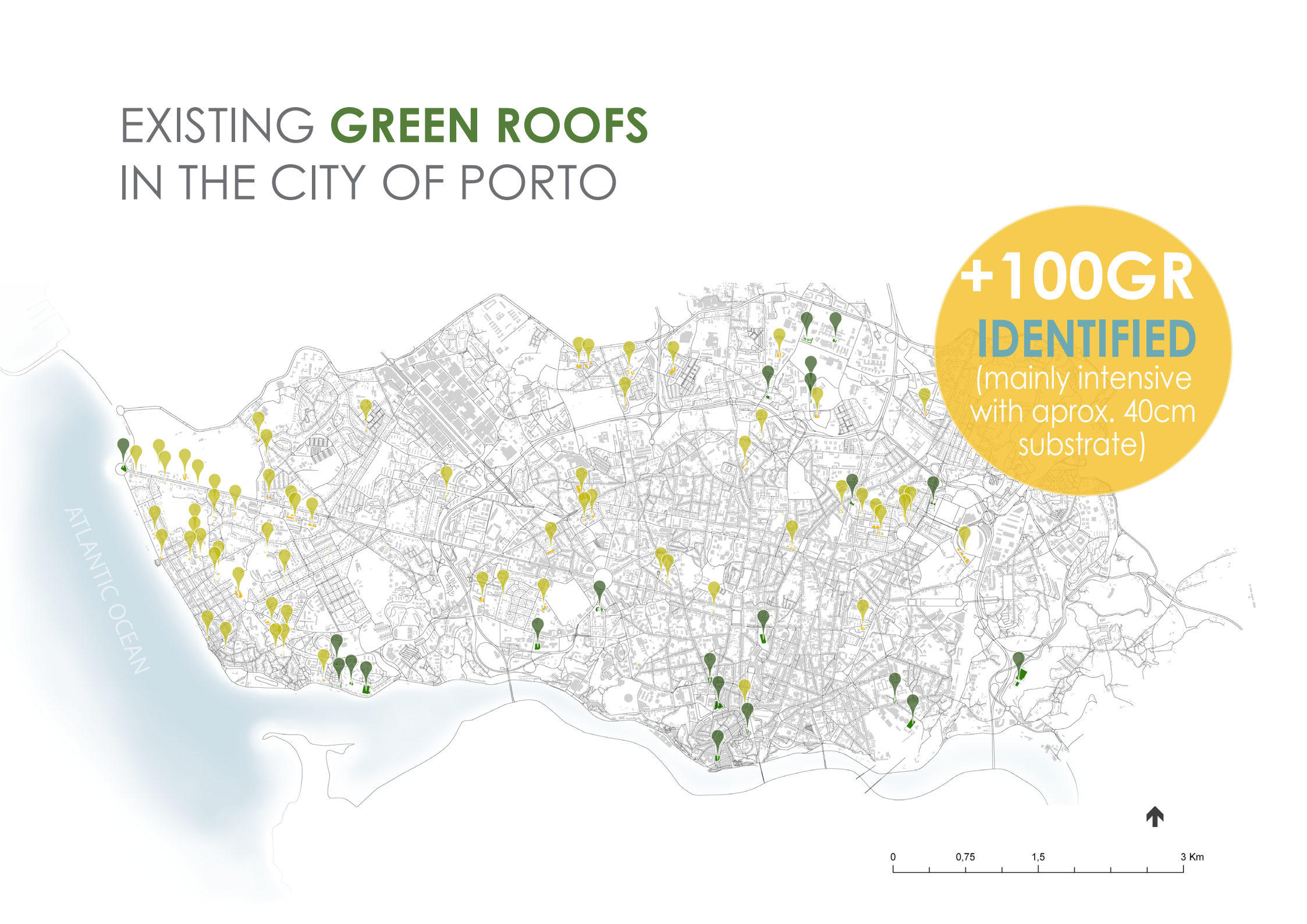
# EXISTING **GREEN ROOFS** IN THE CITY OF PORTO

**+100GR**  
**IDENTIFIED**  
(mainly intensive  
with aprox. 40cm  
substrate)

ATLANTIC OCEAN



0 0,75 1,5 3 Km



# MAPPING **EXISTING BUILDINGS WITH POTENTIAL** TO RECEIVE GREEN ROOFS IN PORTO

Chromatic differentiation diagram



# EXISTING BUILDINGS WITH **POTENTIAL** TO RECEIVE **GR** IN THE CITY OF PORTO

**25%**  
potential  
buildings



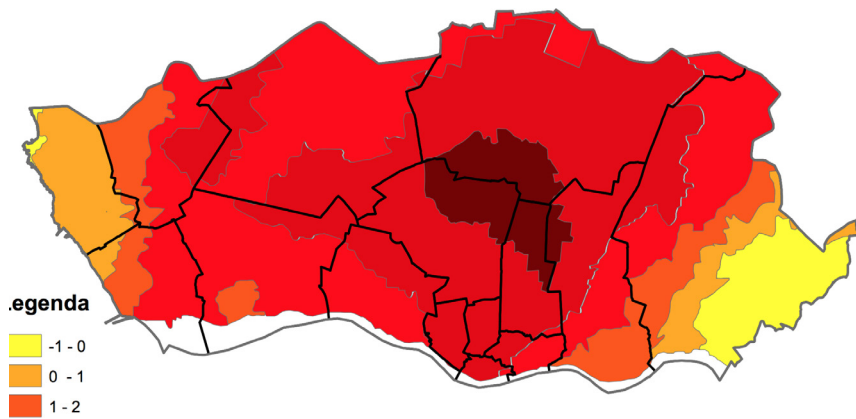
WHAT  
MOTIVATES  
A GR  
POLICY  
IN PORTO?

- ▶ REDUCTION OF HEAT ISLAND EFFECT
- ▶ INCREASE GREEN SPACES
- ▶ NOISE REDUCTION
- ▶ POLLUTION REDUCTION
- ▶ OVERLOADED URBAN DRAINAGE



# EXPLORATORY ANALYSIS

a Susceptibility to extreme heat episode



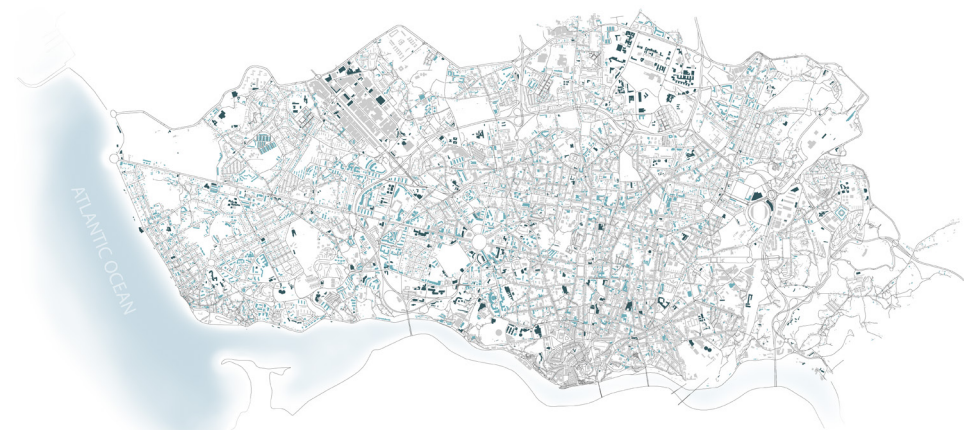
b Main green spaces



c Proximity map



e Potential GR in Porto

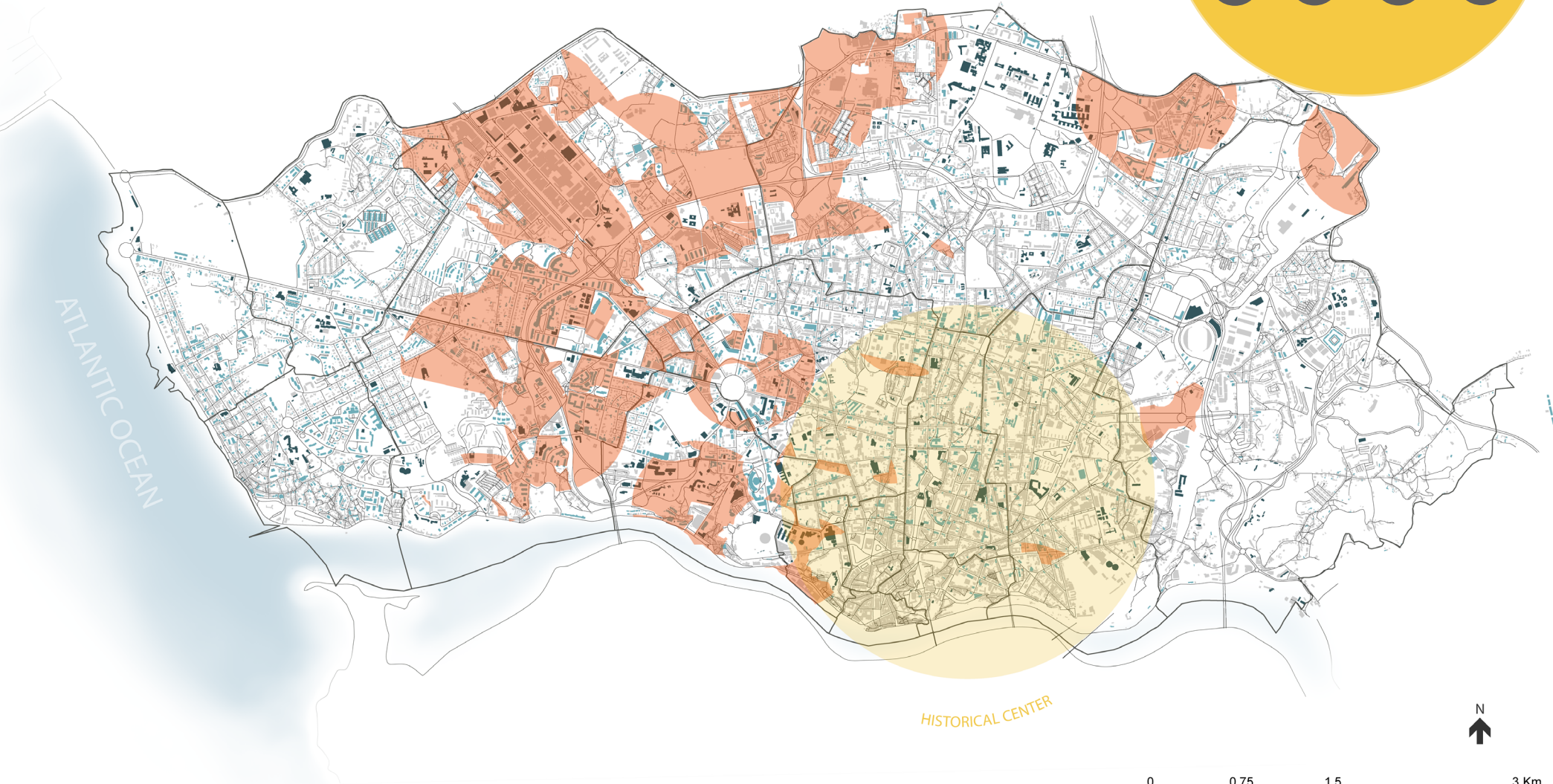


# EXPLORATORY ANALYSES

Priority areas for intervention

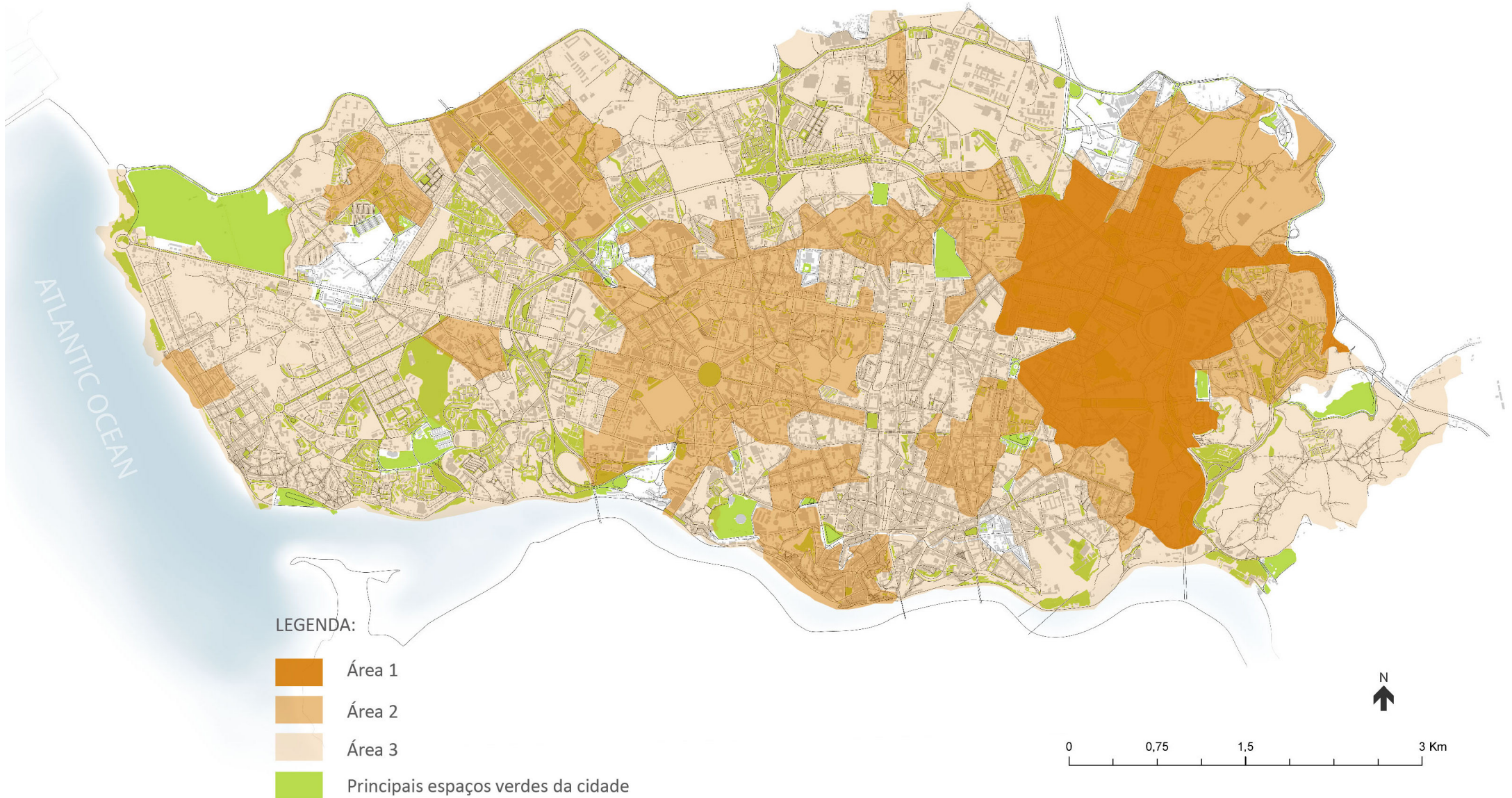
SYNTHESIS  
MAP

a + b + c + d



# PRIORITY AREAS FOR INTERVENTION

Source: Adapted from "The influence of socioeconomic, biogeophysical and built environment on old-age survival in a Southern European City"



OUR ANALYSIS AND  
INTERACTION WITH EXPERTS  
SHOWED THAT PORTO HAS  
A GOOD ENVIRONMENTAL  
QUALITY, WHICH LEADS US  
TO A POLICY OF  
**PREVENTION** RATHER THAN  
REACTION.

WHAT IS THE BEST  
STRATEGY TO  
INCLUDE GREEN  
ROOFS IN **PORTO?**

# COMBINATION OF 4 TYPE OF POLICIES



Persuasion

Incentives

Fees reduction

Mandatory

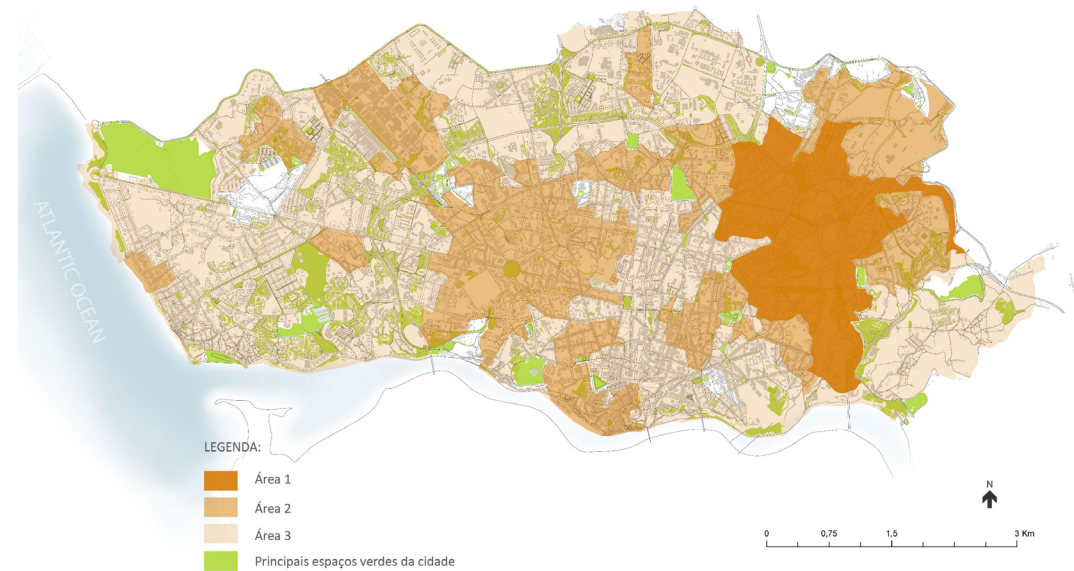
# PQAP STRATEGY (DRAFT)

## General measures

## Specific measures by area

### 6 measures valid for the entire city

- 1 Use of the portuguese guideline for GR
- 2 New comercial and municipal buildings
- 3 New underground constructions
- 4 Environmental education and promotion
- 5 Maintenance control
- 6 Historic buildings



#### Area 1

- mandatory and incentive for new buildnings
- incentive for existing buildnings

#### Area 2

- mandatory and incentive for new buildnings
- incentive for existing buildnings

#### Area 3

- No mandatory policies
- Incentive for new and existing buildings

LAUNCH OF THE FIRST  
**PORTUGUESE GUIDELINES  
FOR GREEN ROOFS**  
PROJECT, MANAGEMENT  
AND INSTALLATION.





THE PROJECT FOR THE FUTURE **CAMPANHÃ BUS TERMINAL** OF PORTO IS A SIGN THAT OUR ACTIONS ARE GIVING **POSITIVE RETURN TO CITIES**. IT REPRESENTS AN IMPORTANT STEP FOR ALL THOSE INVOLVED IN THIS CAUSE.



Source of image: Público newspaper

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THANK YOU FOR YOUR ATTENTION

Paulo Palha | [presidencia@greenroofs.pt](mailto:presidencia@greenroofs.pt)