

# Analyzing an Energy Improvement District (EID): Framework

This framework provides a guideline on how to analyze an area as an Energy Improvement District (EID). This document joins activities of GoA 2.1, GoA 2.2, GoA 2.3, GoA 3.2. The aim is to support you in the development of a strategy for each of your EIDs and for the preparation of the local workshops. AREA 21 project partners should follow the steps for analysis as outlined in this document. This is a “living document”, meaning that adjustments along the project period can take place, as you will need the participation of your local stakeholders.

## Instructions:

The whole framework is not mandatory to complete, but instead complete only the sections which fit the needs of the purpose of your EID analysis, and which help you to reach your Vision from the beginning of the project. The different sections of the guideline are formulated as suggestions to be followed. For this reason, the layout allows each partner to select the sections that meet their purposes of individual EIDs. The sections identified in this document will assist HCU to keep a record of your process. Please select the sections that apply to your case by clicking on the checkbox: ☐ and fill in the blank spaces with a detailed summary of the results of your analysis. Just a few mandatory sections are labeled upfront as ☒, which must be completed.

Note: Diagrams, graphics and maps are welcome.

Due date: Please send the filled document **Steps 1-4** by **August 31, 2018**.

Project Partner overview	
Partner institution name	
Name and Location of the proposed EID <i>Provide a short description of the EID geographical area within the administrative district</i>	
Territorial Coverage of the proposed EID	(0,2-1,5km <sup>2</sup> aprox.)

## EID VISION

### Energy vision of your EID\*

How do you picture your EID in the future? How does it look like? What positive aspects it brings to your area?

*A vision should be established before commencing the detailed analysis of your District. It should include a selection of your top priorities. This will be a first draft that will help you select more accurately the sections of the analysis you actually need to complete. It is recommended to share this draft with your key stakeholders.*

Vision:

Top priority 1:

Top priority 2:

Top priority 3:

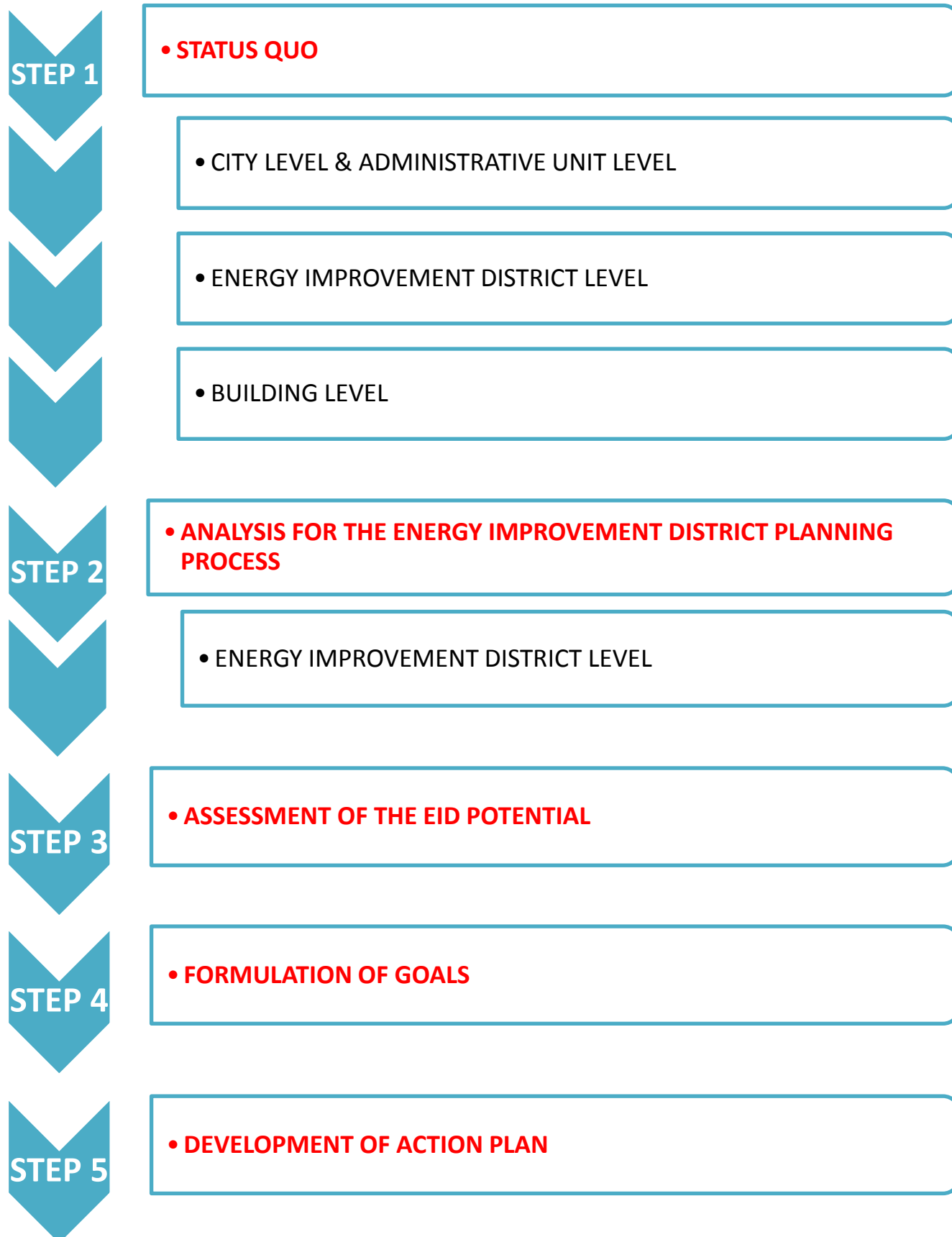
\*The following is an example of a vision and top priorities for orientation purposes. Please create your own vision and priorities for your EID according to your focus:

**Vision (*this is an idealistic view of the desired outcomes*):**

To deliver innovative solutions, participation and involvement to secure the path to an EID that is energy efficient

- Top priority 1: *to reach participation of 50% of the property owners and end users.*
- Top priority 2: *to deliver measures for a 70% reduction in CO2e.*
- Top priority 3: *to reach 100% involvement of key stakeholders*

## STEPS FOR ANALYZING AN ENERGY IMPROVEMENT DISTRICT - OVERVIEW:



STEP 1

• STATUS QUO

• CITY LEVEL & ADMINISTRATIVE UNIT LEVEL\*

\*please include the analysis of both the city level and the administrative unit level in which your EID is located.

POLICY FRAMEWORK

☒ Climate policy

Which are the most important local environmental protection policies and their goals?

☒ Energy policy

Which are the most important local energy policies and their goals? Please add the concrete targets for energy efficiency in buildings and districts.

☒ Spatial planning policy

Which are the most important local spatial planning policies and their goals?

## ENERGY GOVERNANCE

### ☒ Legal framework

What are the most relevant legal instruments, rules and regulations for energy governance?

### ☒ Financial framework

Which financial incentives and programs are available (European/ National/ Regional/ Local)? (e.g. for refurbishment, renewable energies, smart technologies, etc.)



## • STATUS QUO

## • ENERGY IMPROVEMENT DISTRICT LEVEL

### SITE ANALYSIS

#### ☒ Urban structure

Please analyze the urban morphology and describe the main aspects, such as land uses of the district with their distribution in percentages (e.g. % of commercial areas, % of office areas, % of public buildings and their specific use, in residential please include % of single housing, % of multifamily housing, etc.), building heights, street networks, age of buildings, ownership structure of the buildings and other relevant factors for your analysis.

#### ☐ Urban infrastructure

Please provide an outline of the state/condition of the district's infrastructure (e.g. of public lighting, network, renewable energies available, recent repairs known to local infrastructures, large recent infrastructure projects, etc.).

#### ☒ Demographic structure

Please describe the population in the district. (e.g. age, socioeconomic context, families/single person households, population no., behaviors/lifestyles such as high energy consumption equipment, use of car, etc.)

☒ **Existent plans**

Are there current or/and future redevelopment plans, retrofit or refurbishment projects, cooperative projects, or strategic documents existing in your area? Please identify and describe briefly their extent. If not available, consider the relevant city strategies and development plans.

☐ **Key priority areas**

According to the existing development plans, please identify the most urgent aspects to be tackled and improved in the district. These should combine local goals and matters (municipal targets, operational program targets, etc.), which are relevant for your EID. For example, energy performance of buildings, decline, insecurity, etc. Please complement these with your on-site analysis to verify its relevance in your selected area.

## STAKEHOLDER FRAMEWORK

☒ **Stakeholder identification**

Follow the documentation given by the HCU: “Selecting Stakeholders for Energy Improvement Districts: Framework” to guide you through the selection of local stakeholders relevant for the planning of your EID. Fill in the table of the documentation and send it attached together with this document to the HCU.

☒ **Existent cooperation formats**

Are there cooperation formats such as: platforms, round tables and similar initiatives existing in your area? Please identify and describe briefly their extent.

## CLIMATE CONDITION

### ☒ Climate analysis

What are the climate conditions in your location? Seasonal analysis, e.g. wind velocity, radiation, temperature, relative humidity, illumination, cloud cover, ground temperature, etc. If not available, use city level information.

### ☐ Air pollution CO<sub>2</sub>e

What are the CO<sub>2</sub>e emissions levels found on site (if available)? If not available, use city level information.

## ENERGY BASELINE SITUATION – IDENTIFYING NEEDS

### ☒ Energy structure

Identify what kind of energy supply systems exist in the district and specify the production percentage of each sector (e.g. coal 30%, nuclear power 40%, eolic 20%, cogeneration 10%, etc.).

### ☒ District's energy flows

Analyze the power and heat supply systems and the flow per use: this means the amount of energy received by the district and where it is consumed. If possible, perform a sector based approach, diagrams can be included. Consider the fuel flow for transportation only if relevant for your targets.



☐ **Load profiles**

Identify the peak demand (on-peak and off-peak), seasonally differentiated and the temporal dependencies. Please include heating, cooling, ventilation and power.


☒ **State of the supply network**

What is the current condition of the supply network? Identify well known gaps for enhancement.


☐ **Building stock**

Which construction types can be found in the district, what is their level of energy efficiency? Please include the energy performance of the building envelope of the most common construction types, the year of construction, the typical materials, etc.


☐ **CO<sub>2</sub>e emissions**

What is the level of emissions caused by the entire supply network? Consider the emissions for transportation separately, only if relevant for your targets.

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☐ **CO<sub>2</sub>e emissions**

What emissions are caused by the energy consumption of the district? Please provide the total and the break down per major land uses (residential, commercial, recreational, etc.)


☒ **Energy cost**

What is the cost per kWh and the net cost spent for energy in the district? Please provide the total and the break down per major land uses (residential, commercial, recreational, etc.)


☐ **Feed-in Tariff (FITs)**

Which Feed-in Tariffs apply per renewable energy source and what is the process to acquire it? Use city level information if it applies to your district.


☐ **Renewable energies availability**

Check the availability of renewable energy technologies, as well as the existing renewable energy plants.




## • STATUS QUO

### • BUILDING LEVEL\*

\*Sample based approach. For the purposes of AREA 21, only a representative sample of buildings will be used. According to the main uses found in your EID please select representative buildings to perform the building level analysis. Minimum 1 building per use and per relevant construction type period.

## CURRENT BUILDING PERFORMANCE

### Building overview

Building type	
Year of construction	
Year, details and extent of last retrofit	
Type of construction and envelope materials	



#### Comfort - status quo

Current indoor thermal comfort, air quality and lighting according to the building use.



#### Passive efficiency - status quo

Level of efficiency of existing passive measures (if existing).



#### General energy performance - status quo

Describe the main aspects of the building performance, such as thermal load, energy consumption (energy

used), energy loss, etc.

## OCCUPANT/END USER BEHAVIOR

### ☐ Final energy consumption

What is the amount of energy consumed by end users, for example households?

### ☐ Energy cost - status quo

Expenses per kWh and per year.

### ☐ CO<sub>2</sub>e emissions

Environmental footprint of the occupant, per kWh and per year.

Note: If you are analyzing more than one building, copy and paste this previous section and fill in the blanks with the information corresponding to each analyzed building type.



## • ANALYSIS FOR THE ENERGY IMPROVEMENT DISTRICT PLANNING PROCESS

### • ENERGY IMPROVEMENT DISTRICT LEVEL

## STAKEHOLDERS

### ☒ Stakeholder analysis

Follow and complete the documentation provided by the HCU for the analysis of stakeholders.

### ☐ Integration of multiple property owners

If there are multiple property owners within the EID, analyze the possibility of bringing the owners together as network with one contact person. Networks with single contacts are recommended to simplify involvement communication and decision making processes by reducing the number of contact persons. Briefly describe the property owner situation within your EID and if applicable, possible strategy/ies to create a property owner network:

Situation:

Strategy:

## ENERGY PLANNING PROCESS – IDENTIFYING RESOURCES

### ☐ Passive efficiency potential

Which passive measures\* could be easily applied to enhance the indoor comfort of buildings in the EID?

*\*Passive measures maximize natural sources of heating, cooling and ventilation to create comfortable conditions inside buildings, without the need for mechanical or electrical based systems.*

<i>Passive Efficiency Measure</i>	<i>Application</i>	<i>Energy saving potential for the EID in kWh</i> <i>(information not mandatory, only if needed by the partner)</i>
<i>Example:</i> <i>Cross ventilation</i>	<i>Creation of opposing windows to enhance ventilation through air circulation</i>	<i>XX kWh reduction across the EID</i>

### ☐ Renewable energy production capacity

Identify the capacity to generate energy on-site through renewables. For example, by undertaking a Renewable Energy Feasibility Study. For the renewable energy potential consider the areas suitable for its application within the EID or in other available spaces close by, e.g.: areas suitable for solar installations, wind energy production and energy storage, etc. Maps or diagrams may be included under the table.

<i>Renewable energy</i>	<i>Application</i>	<i>Energy production potential for the EID in kWh</i> <i>(information not mandatory, only if needed by the partner)</i>
<i>Example:</i> <i>Photovoltaic</i>	<i>Electricity in household</i>	<i>XX kWh production across the EID</i>


### ☒ Energy efficiency potential

Analyze the potential of energy efficient measures to reduce the amount of energy consumed in the EID. Which measures have the highest energy saving potential? Please explain the measure and its application below. Consider the availability and suitability of low environmental impact and energy efficiency technology relevant for your EID. *This section of the EID Analysis will be central to the stakeholder discussions from the second EID local workshop.*

Energy Efficiency Measure	Application	Energy saving potential for the EID in kWh <i>(information not mandatory, only if needed by the partner)</i>
<i>Example:</i> Enhancement in the lighting system	Replacement of existing lighting with energy efficient light bulbs of the following type...	XX kWh reduction across the EID
<i>Example:</i> Sensitizing of occupants	Through ICT-Tools that .... and regular workshops...	XX kWh reduction across the EID
<i>Example:</i> HVAC substitution	Change HVAC for ....	XX kWh reduction across the EID

☐ **Analyze the EID's new/planned energy flows**

*Describe the new supply systems planned for the EID and the resulting level of energy expected to be produced and consumed. If relevant, detail a sector based approach. Diagrams can be included, see example below the table.*

Energy Production			Energy Consumption		
Energy source	GWh	Percent % of total	Sector	GWh	Percent % of total
<i>Example:</i>					
<i>Solar thermal</i>	<i>XX GWh</i>	<i>XX %</i>	<i>Heating and cooling - Residential</i>	<i>XX GWh</i>	<i>XX %</i>

*Diagram (in needed):*



☐ **Analyze the new/planned load profiles**

Analyze or model potential on-peak and off-peak energy demand, showing seasonal differences and temporal dependencies. Please include heating, cooling, ventilation and power. Describe and/or include diagrams below.

*Diagram (in needed):*

## END USER MODIFIED/NEW BEHAVIOR

<input checked="" type="checkbox"/> Behavioral strategies Identify seasonal and daily behavior strategies that could encourage users in your EID to reduce energy consumption. How can end users be encouraged to reduce their on-peak and off-peak energy demand? Provide separate strategies per category, for example: heating, cooling, power, etc.		
Behavioral Measure	Strategy for Application	Category – Sector – Seasonal/Daily Strategy
<i>Example:</i> Turning off monitors and lights during lunch and when leaving	Through ICT-Tools that send reminders and regular workshops to sensitize the people	Power – Office – Daily strategy
<i>Example:</i> Indoor air temperature adjustment	Decrease indoor air temperature at night during winter months	Heating – Residential – Seasonal strategy

## ICT TOOLS\* (PLEASE REFER TO ACTIVITIES IN WP4)

### ☐ ICT tools & planning

Identify and briefly describe ICT tools that could support or enhance planning and public participation in your EID. For example, interactive round table platforms and tools for collecting opinions and engaging citizens in planning processes

### ☐ ICT tools & energy fluxes

Identify and briefly describe ICT-tools that could support or enhance the regulation of energy fluxes within your EID. For example, tools for the visualization and collection of energy data.

### ☐ ICT tools & behavior

Identify and briefly describe ICT-Tools that could support or enhance end user behaviors in your EID. For example, tools for encouraging physical activity instead of using elevators, Apps to encourage competitive performance between neighbors, etc.

**\*THESE ARE TOOLS THAT SUPPORT THE DEVELOPMENT OF YOUR EID.**

STEP 3

• ASSESSMENT OF EID POTENTIAL

BARRIERS AND INTERPRETATIONS

☒

Barriers from existing instruments

Identify and describe, if relevant, local instruments which are a barrier to energy planning and implementation in your EID. For example, land use controls, financial disincentives, etc.

☒

New formal instruments

Identify and describe how local instruments could be modified or created to assist EID energy planning and implementation. For example, instruments allowing flexible on-site electricity generation, financial incentives, etc.

☒ **New informal instruments and networks**

Identify local informal instruments that could be created or modified to assist EID energy planning and implementation. For example, energy round tables, etc.

☐ ***Financial considerations for EID land***

Identify relevant considerations to determine credit worthiness and financial value of the assets (eligibility to serve as collateral) for land and buildings in your EID. This will help identify future potential implementation challenges and opportunities.

## ENERGY ASSESSMENT

### ☒ Energy efficient measures

Identify all the energy efficient measures you will implement in the EID. The selected measures should reflect previous analysis from STEP2 and stakeholder discussions from the second EID local workshop. List all measures you have decided to implement.

Measure 1:

Measure 2:

Measure 3:

### ☐ Energy saving potential

Calculate and explain the total energy saving potential (in GWh) reached with the proposed EID measures.

### ☐ Energy production potential

Calculate and explain the total renewable energy potential for your EID (in GWh).

### ☐ Energy balance comparison: Status Quo vs. EID

Compare the energy balance

Sector	Status Quo	Energy Improvement District
Residential	XX GWh	XX GWh
Total:		

## INTEGRATED ENERGY PLANNING ASSESSMENT

### ☒ Local condition analysis for EID integrated energy planning

Identify strengths, challenges (possible limitations or weaknesses), opportunities and threats (possible conflicts, etc.) for EID integrated energy planning.

#### STRENGTHS

#### CHALLENGES (possible limitations or weaknesses)

#### OPPORTUNITIES

#### THREATS (possible conflicts, etc.)

### ☒ Benefits of implementation

Identify any additional benefits of the implementation of the EID.

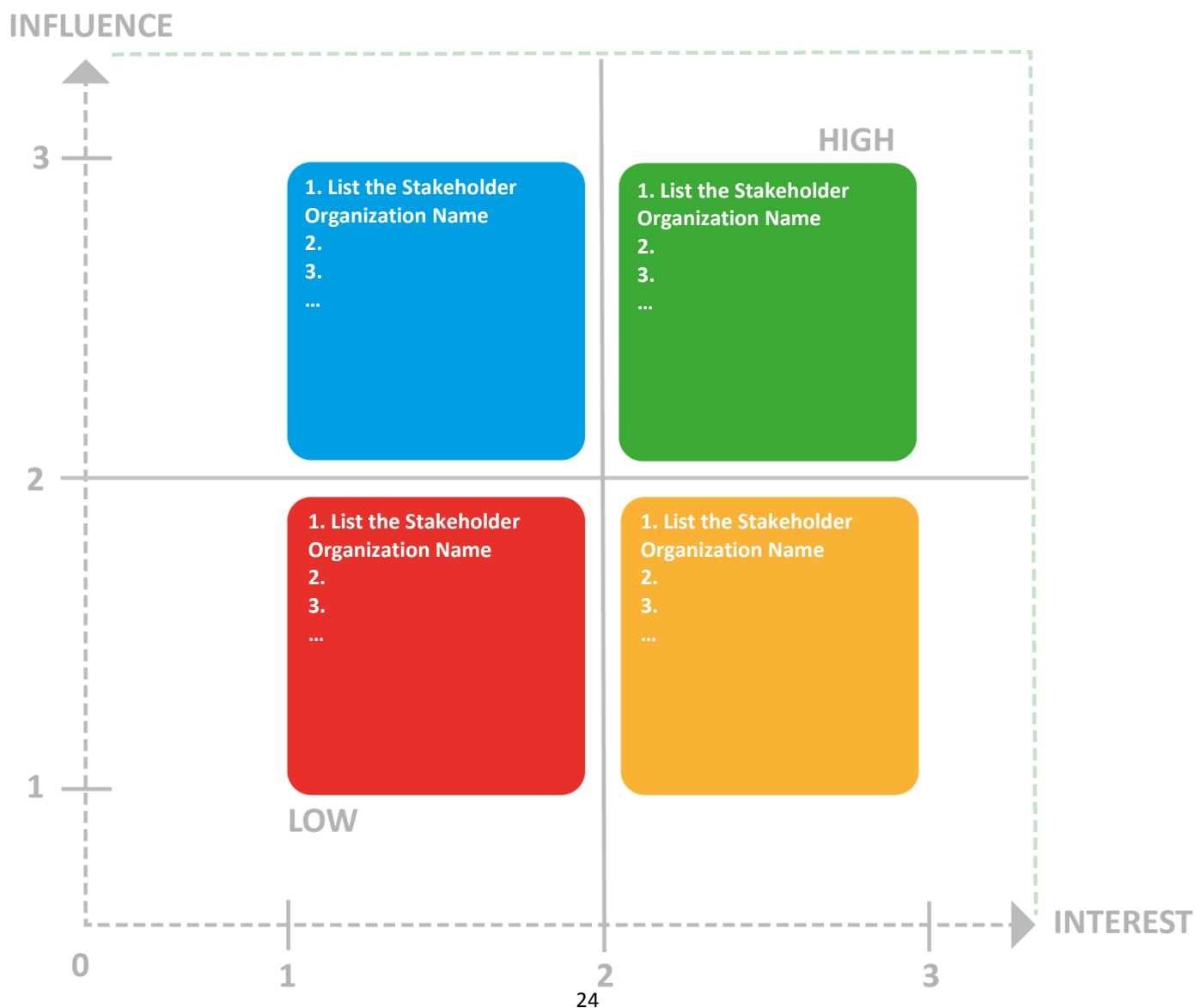
☒ **Assessment: policy framework vs. anticipated results**

Evaluate the achieved results vs. the existing goals within the policy framework and programs previously identified in step 1 of this document. Make a comparison between the results obtained in the earlier assessment.

Existing Policy Framework	Anticipated results with Energy Improvement District
<i>Example:</i> <i>Local climate plan sets a 30% reduction in energy consumption</i>	<i>EID achieves a 50% reduction in overall energy consumption</i>

☒ **Stakeholder Involvement**

Follow the documentation provided by the HCU for the analysis and involvement of stakeholders and insert below your Stakeholder Impact Map (located at Excel-Tool).





## STEP 4

### • GOAL FORMULATION

#### GOALS CHECK



#### Goal formulation

Formulation of achievable goals. These should be agreed with the key stakeholders.

*For example, 20% reduction of CO2 emissions with the EID measures, 50% energy saving with building renovation and integration of renewable energy sources by 2025, 50% energy costs reduction by 2030, improve reliability for consumers by the application of the EID, etc. In defining the goals, include units and timeframe. List all goals for the EID.*

#### Goal 1: GOAL TITEL

Description:

Timeframe: estimation duration for application

#### Goal 2: GOAL TITEL

Description:

Timeframe: estimated duration for application.

#### Goal 3: GOAL TITEL

Description:

Timeframe: Estimated duration for application.

#### Goal 4: GOAL TITEL

Description:

Timeframe: Estimated duration for application.

#### Goal 5: GOAL TITEL Description:

Timeframe: estimated duration for application.

Follow the documentation provided by the HCU for the analysis of stakeholders. Stakeholders with high impact to the EID should be regularly involved. Provide a brief summary of key stakeholder responsibilities towards achieving the goals.

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## • ACTION PLAN DEVELOPMENT

### ACTION PLAN



#### Action plan

Develop an action plan including only priority measures which are feasible to achieve your EID goals.

*Note: This is a placeholder for the relevant PP responsible for the development of WP3: Action Plan strategy development.*