Supporting EPC in Southern Europe

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 649772

FINANCING ENERGY EFFICIENCY

THE PROBLEM

We have money, but cannot find "good" projects!

Financial sector

"Investement"

Capacity Building
Green Rating Tool
Pipeline of EPC Projects

We have "good" projects, but we are looking for money!

EPC providers and tertiary sector / real estate agents

"Sustainable energy project"

Adapted from C. MILIN, ECEEE 2013

EPC PROJECTS

KEY BARRIERS

- **Financing**: In most cases, the credit worthiness of the customer is the key issue, but also credit worthiness of the EPC provider can play a role
- **Risk assessment**: apart from the credit risk, also performance and equipment risks need to be taken account by the investors
- **Lack of track record**: the relative absence of (numerous) successful cases may cause lack of confidence on the investor side

- **Decision making**: Complex decision making procedures may delay contract start
- **Rejection of energy saving measures**: Management and staff may reject some of the proposed measures, due to standard business operation and safety concerns.
- **Administrative hurdles**: especially if civil works are involved

Source: Trust EPC South, EEFIG

EPC PROJECTS

KEY DRIVERS

- **Standardisation**: the energy efficiency investment process, from the definition of the energy saving measures onwards, should be standardised
- **Robust baselining**: the definition of the initial energy consumption situation is key to a correct estimation of savings and financial returns
- **Insurances**: Insurance products are available to cover the equipment risk and also (recently) project performance risks
- **Reduction of transaction costs**: the reduction of all the costs involved in the preparation and assessment of an investment opportunity is key to untapping the investment potential

- **Clear business case**: the customer needs to understand all the benefits of the proposed energy saving measures (beyond the mere energy dimension) in order to facilitate decision making and mitigate rejection
- **Clear contractual arrangements**: Roles/responsibilities of each project stakeholder, validation of savings, sharing of financial benefits, performance guarantees, prices and termination cases need all be accounted for.

Source: Trust EPC South, EEFIG

TRUST EPC SOUTH

OVERVIEW OF THE PROJECT

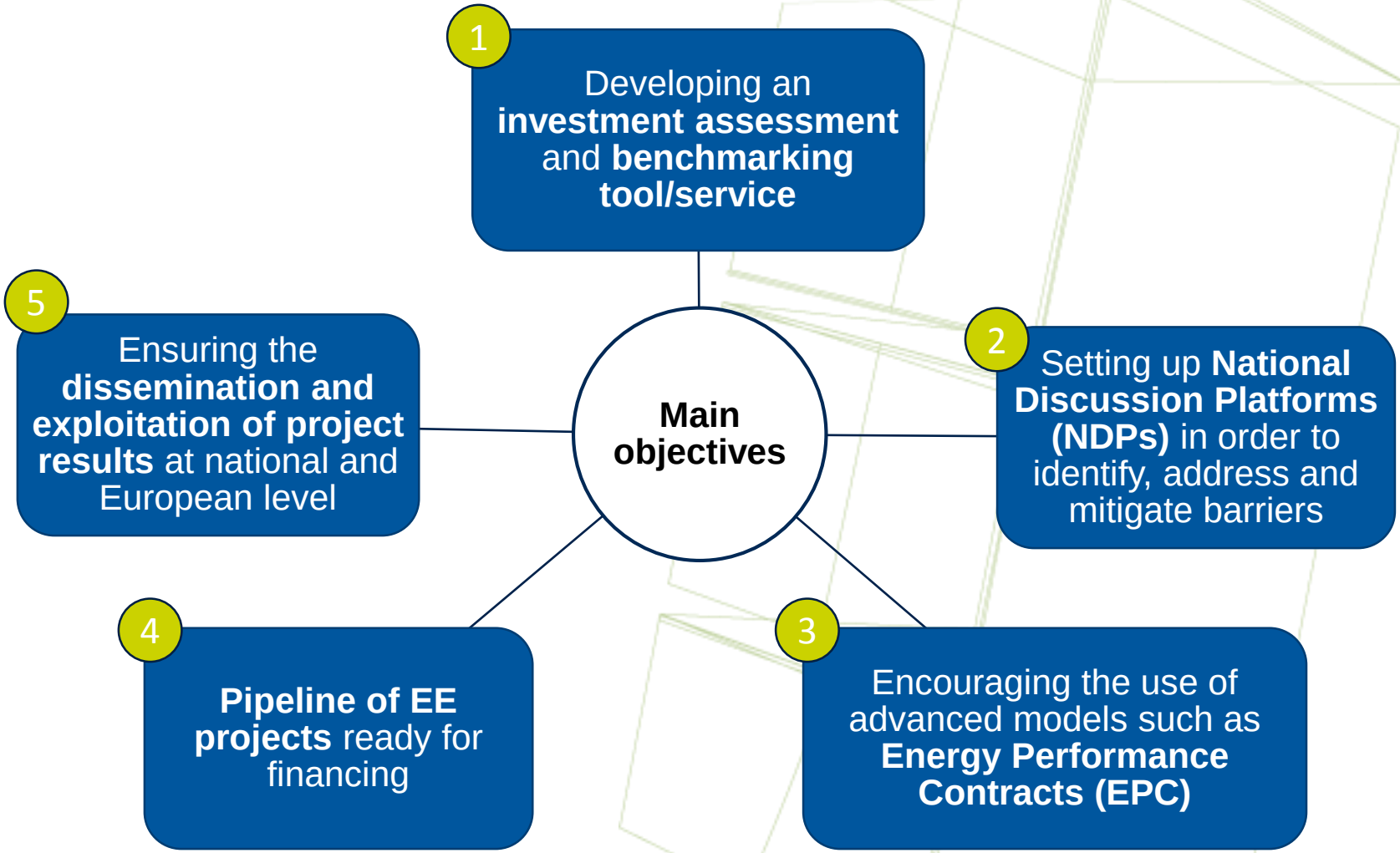
The Project started in 2015 within the European Commission's Horizon 2020 programme – *Finance for Sustainable Energy*

10 diverse European Partners from 6 southern European countries

3 years of duration, until February 2018, with a budget of nearly 2M Euros

TRUST EPC SOUTH

PROJECT OBJECTIVES



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TARGET GROUPS

To whom?

- Banks and other financing institutions
  - **Profitable projects**
  - **identify risks** and seeking **transparency**

- Tertiary and real estate actors seeking for:
  - **Reducing energy** and **water costs**
  - **Improving user comfort**
  - **Increasing the value of the buildings**

- Energy Efficiency Services EPC Providers
  - **Financing opportunities**

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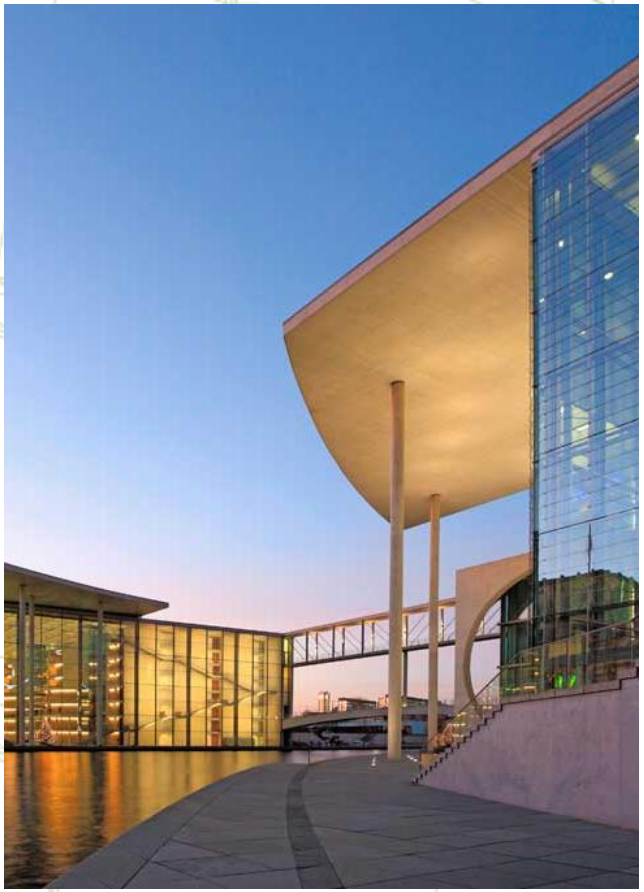
OUR OFFER

TRUST EPC SOUTH

PROJECTS PIPELINE

- **Identification of projects**
  - Hospitality, Office buildings, Health, Education & Sport centres, and Retail
  - Total energy consumption higher than 0.5 GWh/year
  - Total useful floor area larger than 2,000 sqm
  - Investment of at least 200 k€
  - Primary energy savings of at least 15-20%
  - Combination of different EE/SE measures
- **Green Rating EPC assessment tool application:**
  - Preliminary Energy Audit
  - Identification of most profitable measures
  - Estimation of Investment
- **(Identification of EPC provider if needed)**
- **Support in the financing process**



EPC ASSESSMENT TOOL

OUR APPROACH

Validation of standardised energy efficiency measures scenarios

Building and Equipment Technical Models

Consumption and Costs Data

Financial data

GreenRating™
Sustainable value for your assets

Financial Assessment

Feasibility assessment
Profitability projection
Risk assessment

Independent EPC Assessment and Verification

Certified by

BUREAU VERITAS

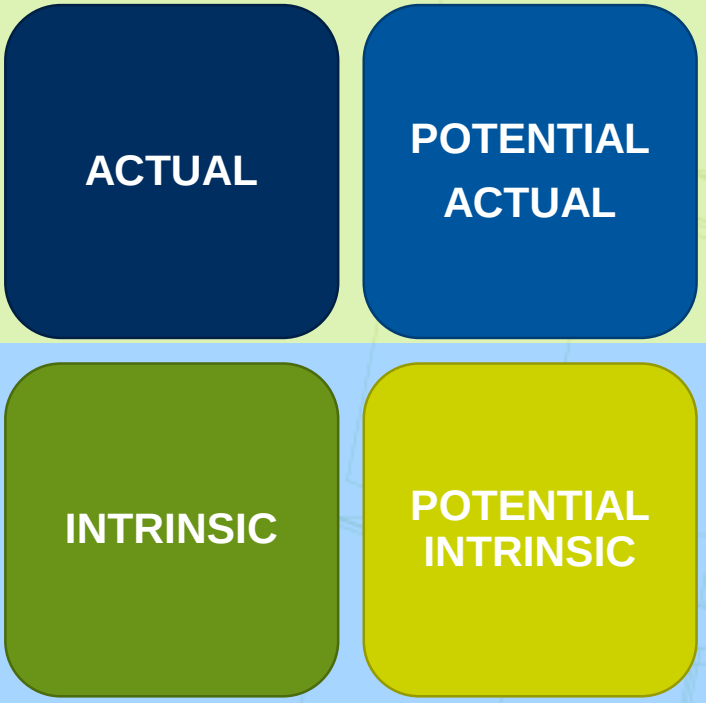
GREEN RATING™

METHODOLOGY

Four levels of performance

ACTUAL
Covers the building as it is, with its operation and tenants' behaviour

POTENTIAL ACTUAL
Achievable through implementation of operational and behavioural recommendations



USER

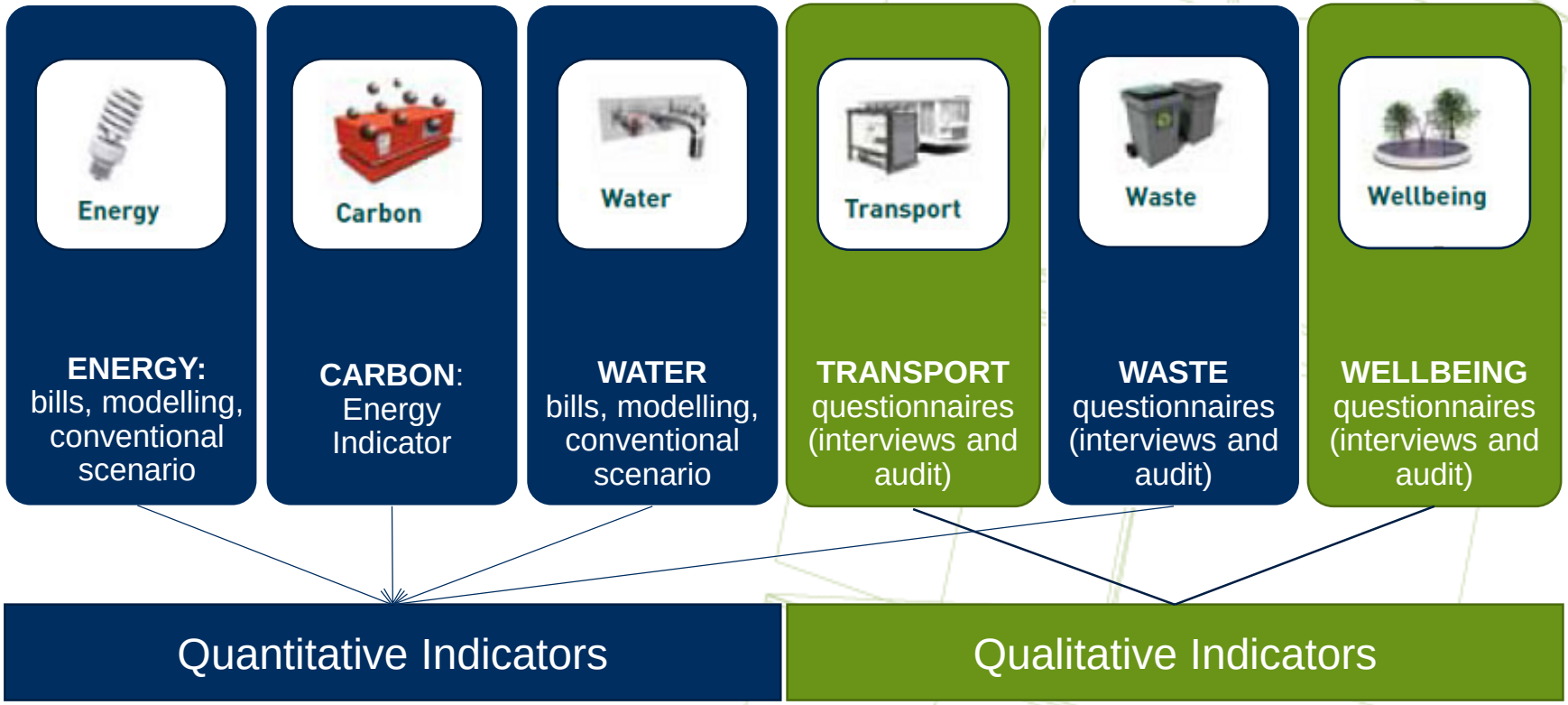
BUILDING

INTRINSIC
Related to building design, equipment and physical provisions

POTENTIAL INTRINSIC
Achievable through implementation of tech. recommendations covering the building design & equipment

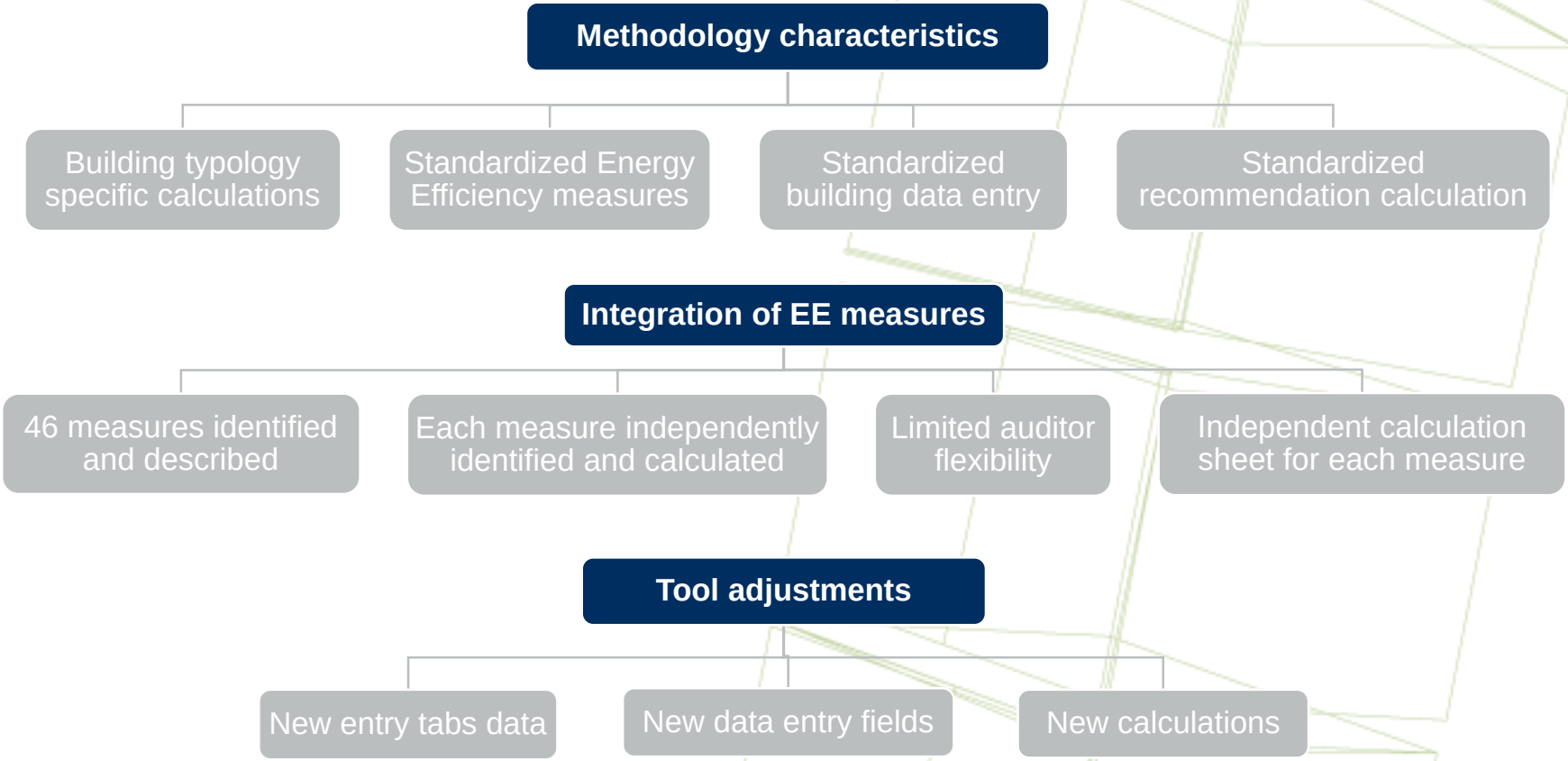
GREEN RATING™

KEY INDICATORS



GREEN RATING FOR EPC

UPDATED GR METHODOLOGY



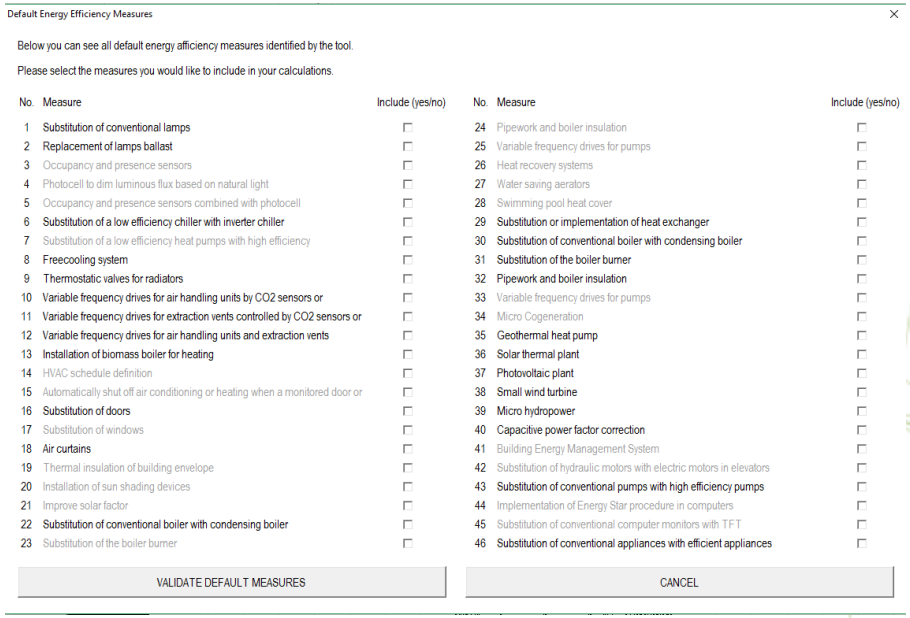
GREEN RATING FOR EPC

UPDATED GR METHODOLOGY

Identification of Energy Efficiency Measures:

By the Tool, based on building data provided

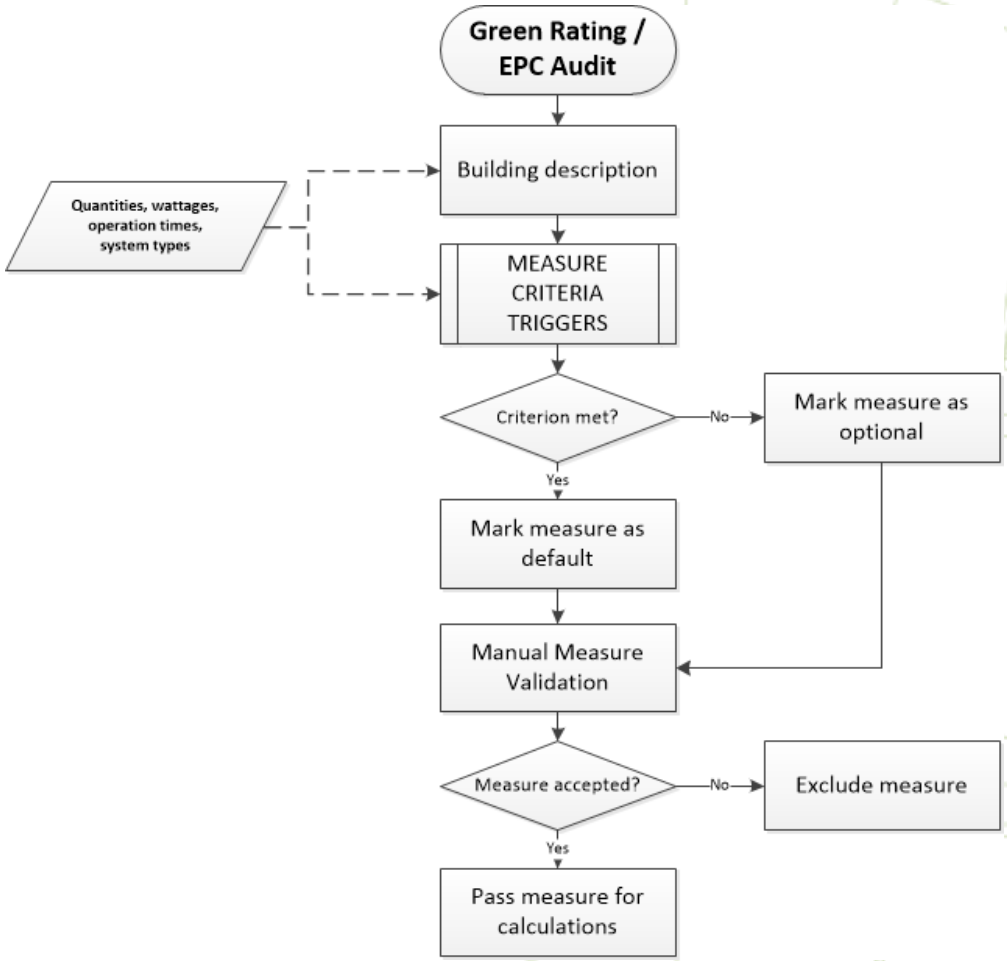
By the Auditor, from the default list



Energy use	Measure n.°	Title			
Lighting	1	Substitution of conventional lamps	50	0	0
	2	Replacement of lamps ballast	3000		
	3	Occupancy and presence sensors	0	0	0
	4	Photocell to dim luminous flux based on natural light	0	0	0
	5	Occupancy and presence sensors combined with photocell	0	0	0
Heating, Ventilation and Air Conditioning	6	Substitution of a low efficiency chiller with inverter chiller	2	0	
	7	Substitution of a low efficiency heat pumps with high efficiency	0	0	
	8	Freecooling system	1		
	9	Thermostatic valves for radiators	1		
	10	Variable frequency drives for air handling units by CO2 sensors or occupancy sensors	1		
	11	Variable frequency drives for extraction vents controlled by CO2 sensors or occupancy sensors	1		
	12	Variable frequency drives for air handling units and extraction vents controlled by CO2 sensors or occupancy sensors	1		
	13	Installation of biomass boiler for heating	3	5	0
	14	HVAC schedule definition	0		
	15	Automatically shut off air conditioning or heating when a monitored door or window remains open for a period of time	0		
	16	Substitution of doors	1		
	17	Substitution of windows	0		
	18	Air curtains	1		
	19	Thermal insulation of building envelope	0		
	20	Installation of sun shading devices	0	0	
	21	Improve solar factor	0		
	22	Substitution of conventional boiler with condensing boiler	3	5	
	23	Substitution of the boiler burner	0	0	0
	24	Pipework and boiler insulation	0	0	
	25	Variable frequency drives for pumps	0		
Hot Water	26	Heat recovery systems	0		
	27	Water saving aerators	0	0	
	28	Swimming pool heat cover	0		
	29	Substitution or implementation of heat exchanger	0	0	1
	30	Substitution of conventional boiler with condensing boiler	1		
	31	Substitution of the boiler burner	0	1	
	32	Pipework and boiler insulation	1	0	0
	33	Variable frequency drives for pumps	0		
Renewable Energy Sources	34	Micro Cogeneration	0		
	35	Geothermal heat pump	1		
	36	Solar thermal plant	1		
	37	Photovoltaic plant	1		
	38	Small wind turbine	1		
	39	Micro hydropower	1		
	40	Capacitive power factor correction	1		
	41	Building Energy Management System	0	0	0

GREEN RATING FOR EPC

UPDATED GR METHODOLOGY



GREEN RATING FOR EPC

UPDATED GR METHODOLOGY

Measure Generation

GR Tool Calculates the EE Measures

Measure Transfer

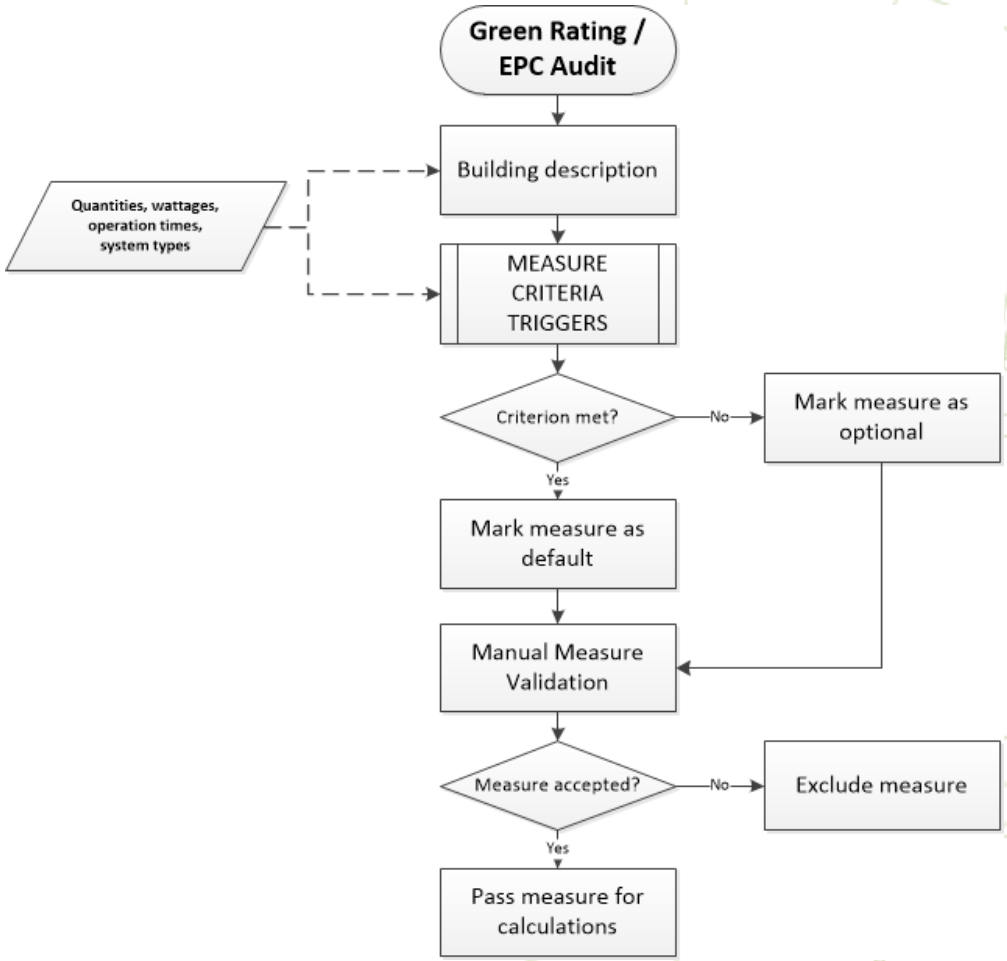
GR Tool generates one Financial Tool per Measure or Group of Measures	GR Tool transfers Measure Data to the Financial Tool

Iterative Financial Calculation

Each copy of the Financial Tool calculates its own set of measures	GR Tool extracts results from all copies of the Financial Tool and presents six top results

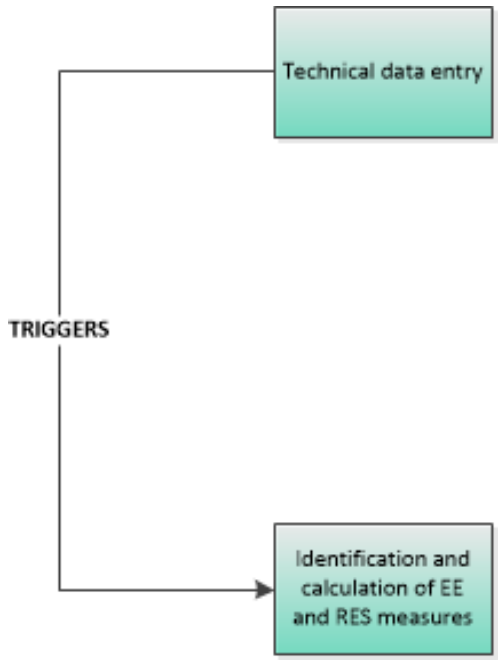
GREEN RATING FOR EPC

UPDATED GR METHODOLOGY



GREEN RATING FOR EPC

THE PROCESS



It's the technical data that triggers potential default measures

For example:

- Lighting with standard ballast will trigger ballast retrofitting measure
- Low efficiency boiler burner will trigger boiler burner replacement measure

Correct and complete technical data entry is crucial to ensure relevant measures are identified and correctly calculated

GREEN RATING FOR EPC

THE PROCESS

Identification and calculation of EE and RES measures

Each measure is identified and calculated independently:

Energy use	Measure n.º	Title	Criteria				
Lighting	1	Substitution of conventional lamps	Halogen lamps	Incandescent lamps	Fluocompact lamps	T12 Fluorescent tubes	T8 Fluorescent tubes
	2	Replacement of lamps ballast	Standard ballasts				
	3	Occupancy and presence sensors	Central switching	Local manual switching	Motion sensors to zones other than office	Daylight sensors	No controls (operation 24/7)
	4	Photocell to dim luminous flux based on natural light	Central switching	Local manual switching	Motion sensors to zones other than office	Motion sensors including office	No controls (operation 24/7)
	5	Occupancy and presence sensors combined with photocell	Central switching	Local manual switching	Motion sensors to zones other than office	Motion sensors including office	Daylight sensors
Heating, Ventilation and Air Conditioning	6	Substitution of a low efficiency chiller with inverter chiller	2.5	2.5			
	7	Substitution of a low efficiency heat pumps with high efficiency	2.5	2.5			
	8	Freecooling system	No				
	9	Thermostatic valves for radiators	No				
	10	Variable frequency drives for air handling units by CO2 sensors or occupancy sensors	No				
	11	Variable frequency drives for extraction vents controlled by CO2 sensors or occupancy sensors	No				
	12	Variable frequency drives for air handling units and extraction vents controlled by CO2 sensors or occupancy sensors	No				
	13	Installation of biomass boiler for heating	Normal boiler	Low temperature boiler	Condensation boiler	District heating network	Electricity
	14	HVAC schedule definition	No				
	15	Automatically shut off air conditioning or heating when a monitored door or window remains open for a period of time	No				
	16	Substitution of doors	NO CRITERION				
	17	Substitution of windows	2				
	18	Air curtains	NO CRITERION				
	19	Thermal insulation of building envelope	0.35				
	20	Installation of sun shading devices	None	Tinted glazing			
	21	Improve solar factor	0.6				
	22	Substitution of conventional boiler with condensing boiler	Normal boiler	Low temperature boiler			

GREEN RATING FOR EPC

THE PROCESS

Identification and calculation of EE and RES measures

Via a dedicated Recommendation sheet (one per measure):

EPC RECOMMENDATION SHEET

Energy Efficiency Measure 2

Replacement of lamps ballast	
Measure automatically identified?	YES
Building system link:	Lighting
Recommendation criterion type:	Lamp ballast type
Number of possible criteria:	1
Number of criteria met:	1

Measure criteria

		Criterion met?
Criterion 1:	Standard ballasts	Yes

Total system consumption:	**724,048**	kWh/year
Total sub-system(s) consumption:	**718,848**	kWh/year

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THE PROCESS

Funding Feasibility calculations

Financial tool explanation:

PROJECT GENERAL DATA		
Project indexes		
(1)	Energy inflation rate	2%
(2)	General inflation rate	1%
(3)	Euribor (select)	2%
(4)	Spread	2%
	Interest rate	4%
(5)	EBT tax rate	25%
Project financial data		
(6)	Project direct investment	100
(7)	% of adittional expenses	10%
	Total investment amount	110
(8)	% debt	60%
(9)	% equity	40%
	Debt	66
	Equity	44
(10)	K asset (required return)	9%
(11)	K equity (required return)	11%

Euribor (select)
IRS (select)

PROJECT SPECIFIC DATA		
RESULTS (k€)		
	Income (Sales)	96.0
(12)	Energy savings	20.0
(13)	Energy production	70.0
(14)	Water savings	4.0
(15)	Carbon credits trading	2.0
	Expenses	65.0
(16)	Energy supply	50.0
(17)	O&M	15.0
(18)	Overhead	15.0%
(19)	% Of the investment subject to depreciation	100%
	Investment subject to depreciation	110.0
BALANCE (k€)		
(20)	Working capital requirements (% of income)	16.7%
(21)	Project duration (years)	10

GREEN RATING FOR EPC

THE PROCESS

Funding Feasibility calculations

Financial tool explanation:

RISK MATRIX

Risks		Impact: Insignificant	Impact: Restrained	Impact: High	percentile
Higher investment amount		<2%	2%<I<5%	5%<I<10%	
Probability of occurrence	Rare	0.050%	0.175%	0.375%	10%
	Unlikely	0.150%	0.525%	1.125%	20%
	Likely	0.350%	1.225%	2.625%	50%
	Very likely	0.750%	2.625%	5.625%	100%
Weight (% of total investment)		**100%**			
Smaller energy savings					
Probability of occurrence	Rare	0.001	0.002	0.004	10%
	Unlikely	0.002	0.005	0.011	20%
	Likely	0.004	0.012	0.026	50%
	Very likely	0.008	0.026	0.056	100%
Weight (% of total energy savings)		**100%**			
Lower energy production					
Probability of occurrence	Rare	0.050%	0.175%	0.375%	10%
	Unlikely	0.150%	0.525%	1.125%	20%
	Likely	0.350%	1.225%	2.625%	50%
	Very likely	0.750%	2.625%	5.625%	100%
Weight (% of total energy production)		**100%**			
Higher O&M costs					
Probability of occurrence	Rare	0.050%	0.175%	0.375%	10%
	Unlikely	0.150%	0.525%	1.125%	20%
	Likely	0.350%	1.225%	2.625%	50%
	Very likely	0.750%	2.625%	5.625%	100%
Weight (% of total O&M costs)		**100%**			

measure n.º	Title
14	Thermostatic valves for radiators

RISK MATRIX

Risks		Impact	RISK (% RANGE)
Higher investment amount			
Probability of occurrence	Rare	Restrained	0.300%
	Unlikely		0.000%
	Likely		0.000%
	Very likely		0.000%
Smaller energy savings (or water savings)			
Probability of occurrence	Rare		0.000%
	Unlikely		0.000%
	Likely	Restrained	2.100%
	Very likely		0.000%
Lower energy production			
Probability of occurrence	Rare		0.000%
	Unlikely		0.000%
	Likely		0.000%
	Very likely		0.000%
Higher O&M costs			
Probability of occurrence	Rare	Insignificant	0.050%
	Unlikely		0.000%
	Likely		0.000%
	Very likely		0.000%

GREEN RATING FOR EPC

THE PROCESS

Identification and calculation of EE and RES measures

Each EE and RES Measure calculation is based on the data provided by the auditor

Measure n.º	Title	Criterion 1
9	Thermostatic valves for radiators	No

Gas	**Heating 1**	**1,500,000**	***kWh/year***	**34%**
Electricity	**Heating 2**	**456,000**	***kWh/year***	**10%**
Electricity	**Cooling**	**500,000**	***kWh/year***	**11%**

Heating system	Number of radiators	Current consumption (kWh/year)	Introduce TRV's?	Number of TRV's to be installed	TRV unitary cost (€)
Heating system 1	75	1,500,000.00	Yes	75	128
		1,500,000			

Total cost (€)	New consumption (installed) (kWh)	New consumption (total) (kWh)	Savings (kWh/year)	Savings (€)	Simple payback time (years)
9,600	1,425,000	1,425,000	75,000	1,875	5.1
9,600	1,425,000	1,425,000	75,000	1,875	5.1

GREEN RATING FOR EPC

THE RESULT

PROJECT RATING 1

Building X

Energy Performance Contract Potential

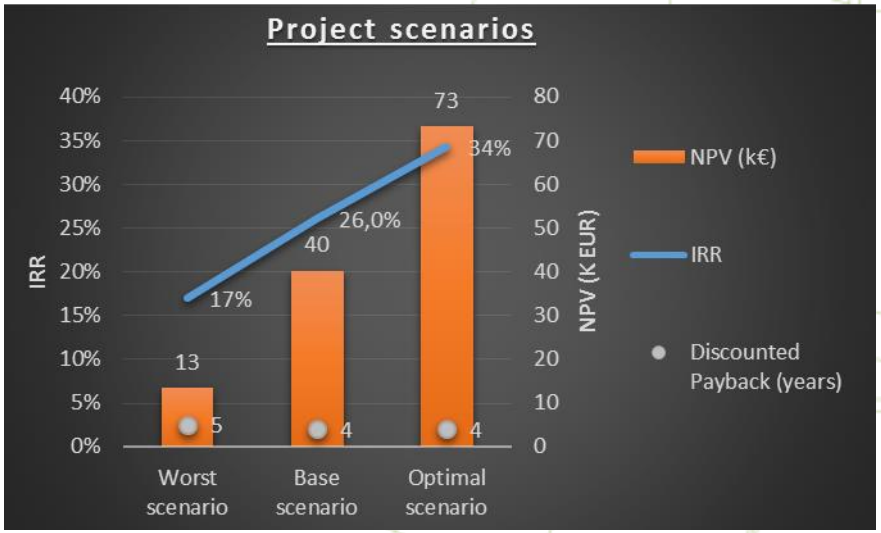
Financial savings:	**€**
Energy savings:	**kWh/year**
Carbon savings:	**kgCO_2/year**
Investment:	**€**
IRR:	**%**
NPV:	**€**

GREEN RATING FOR EPC

THE RESULT

FINAL RESULTS: EQUITY INTERNAL RATE OF RETURN & NET PRESENT VALUE

	IRR	NPV (k€)	Discounted Payback (years)
Worst scenario	**17%**	**13**	**5**
Base scenario	**26,0%**	**40**	**4**
Optimal scenario	**34%**	**73**	**4**



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MAIN RESULTS ACHIEVED

- **National Discussion Groups**
  - Addressing national market barriers and solutions
- **National EPC market reports**
  - Portugal, Spain, France, Italy, Croatia and Greece
- **Modelisation of Energy Saving Measures**
  - 46 technical models
- **Upgraded Green Rating methodology**
- **Investment Assessment and benchmarking tool**
  - Testing phase
- **Identification and assessment of a pipeline of projects**
  - 25 EPC projects identified so far
  - Assessment ongoing

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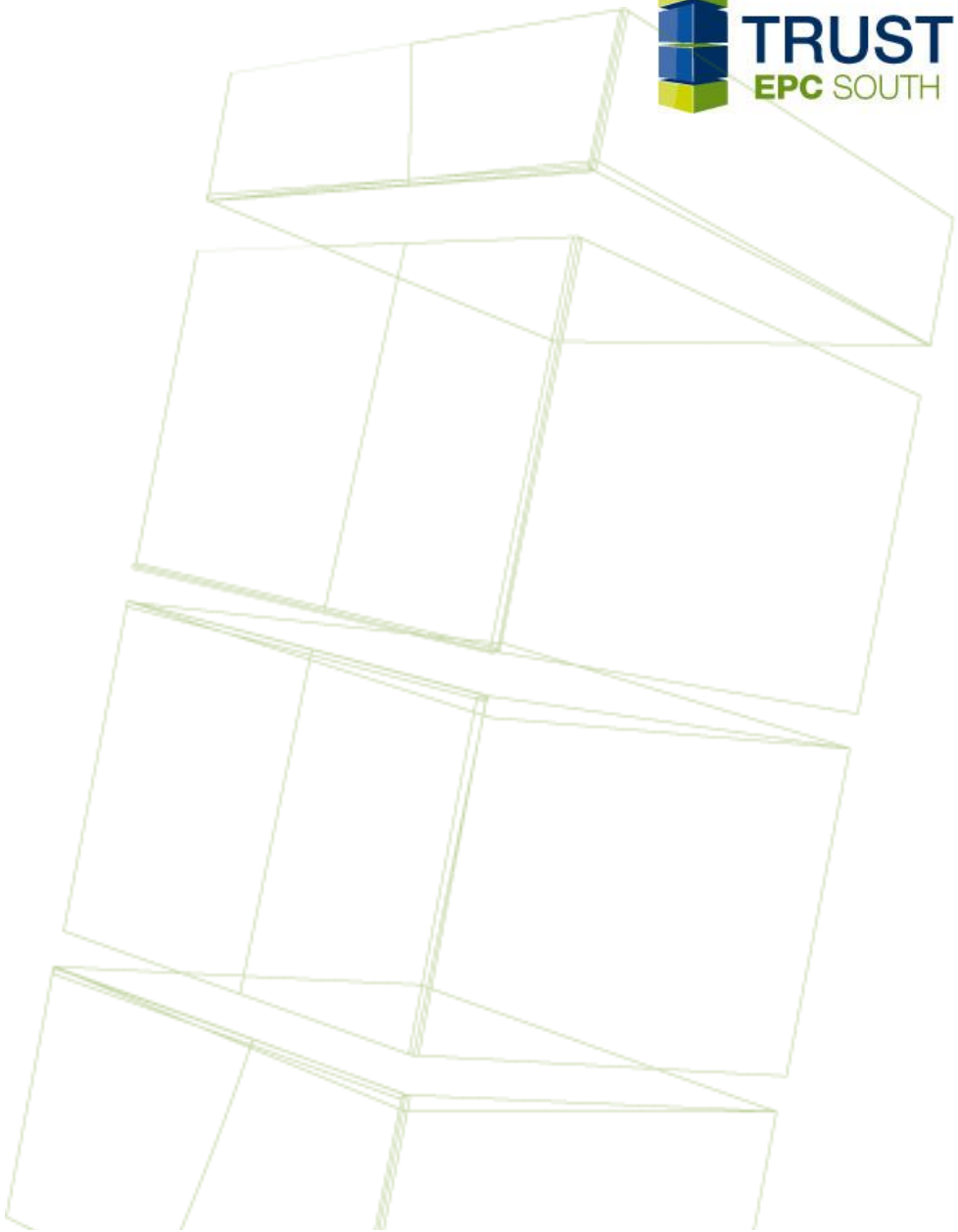
THANK YOU FOR YOUR ATTENTION



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