TIMEPAC Academy

Session 4

Quality assessment of the EPC database contents

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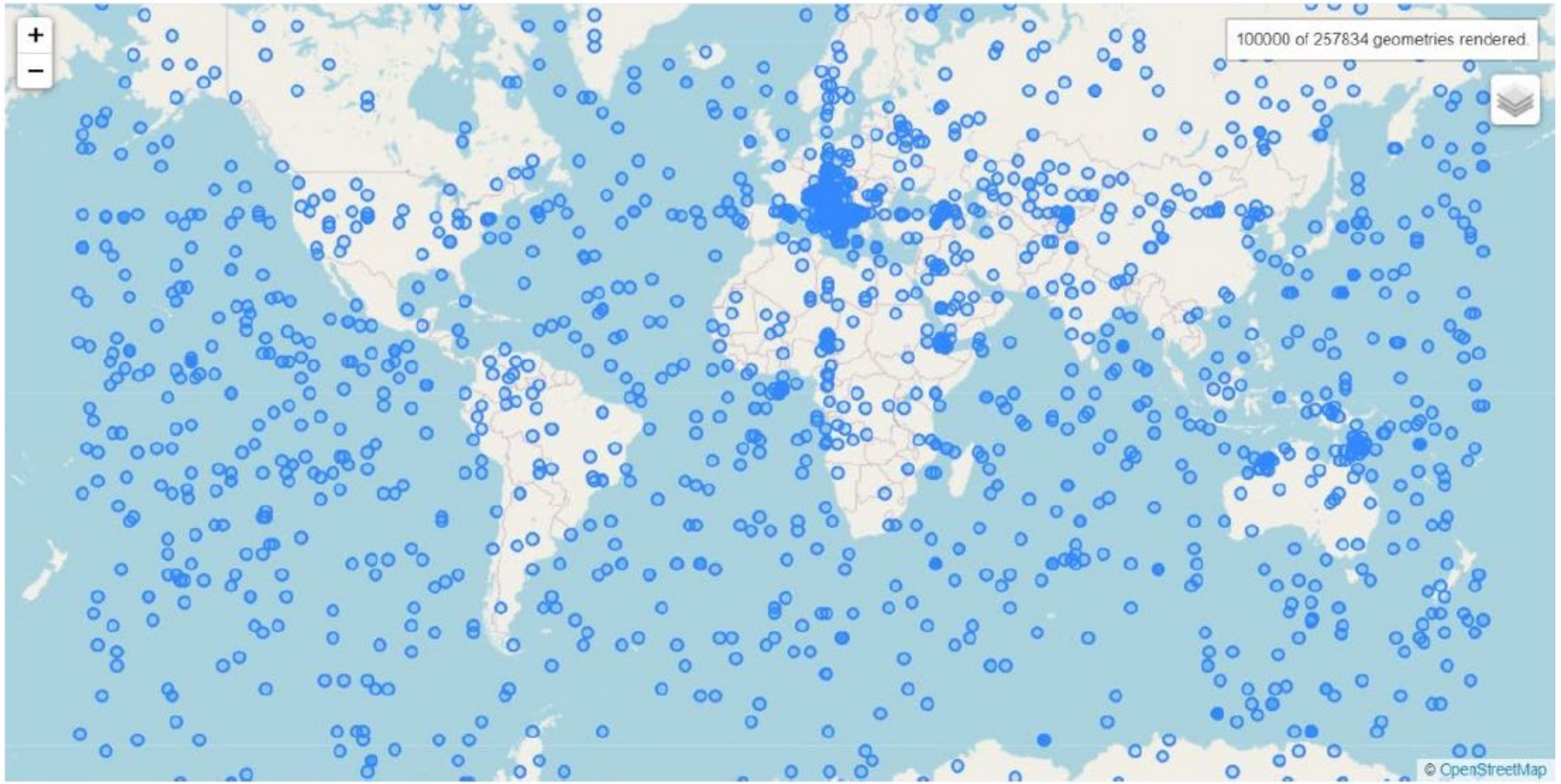
Why is data quality important?



Source: ENEA & CTI. (2023). Annual report on the energy certification of buildings - 2023. p. 69. ISBN 978-88-8286-448-4.

EPC data contents assessment

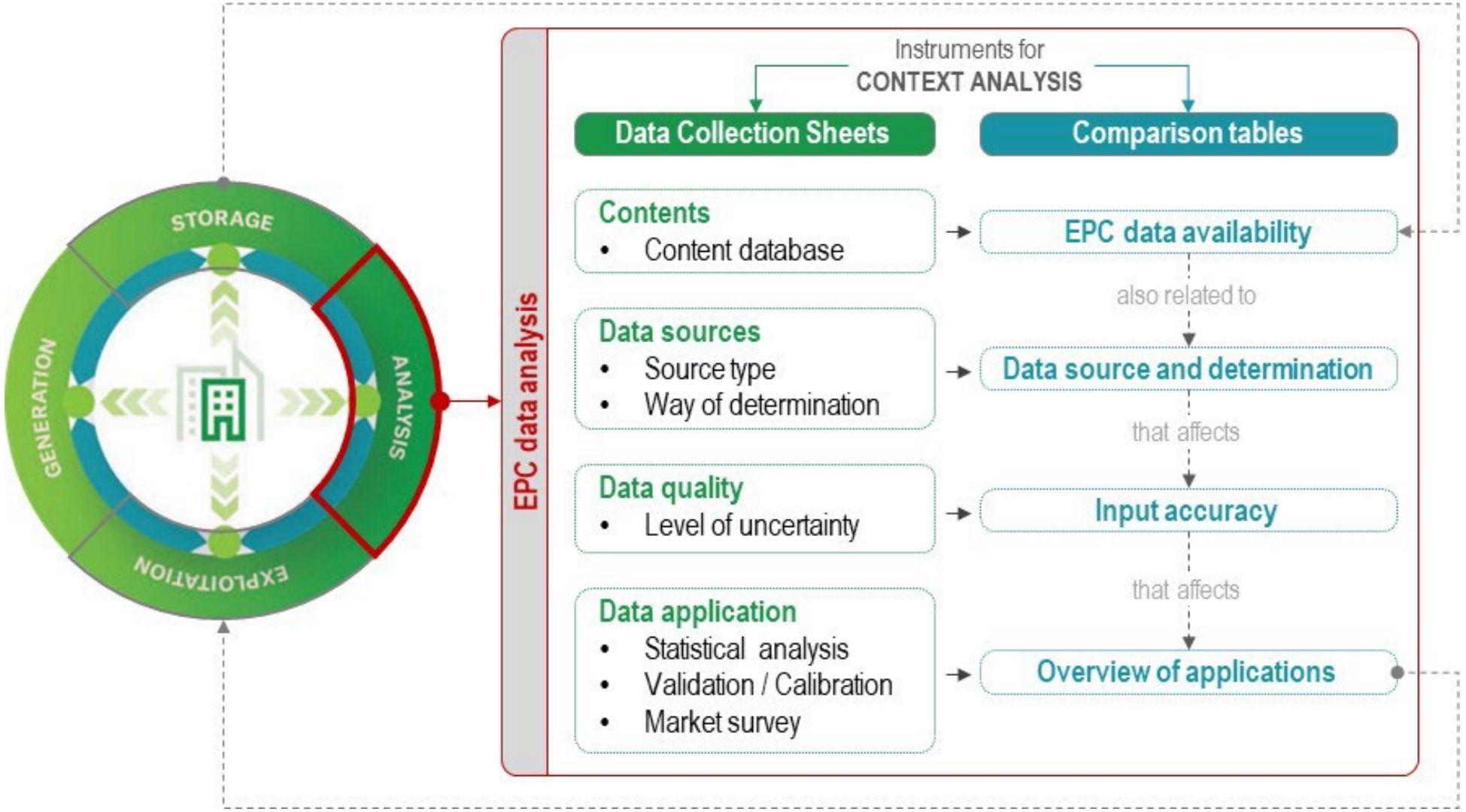
PURPOSES:

- Identification of deficiencies in current energy certificates
- To establish the validity of the EPC data in order to exploit them for carrying out benchmarking and large-scale analyses
- Identifying potential improvements in current EPC data quality

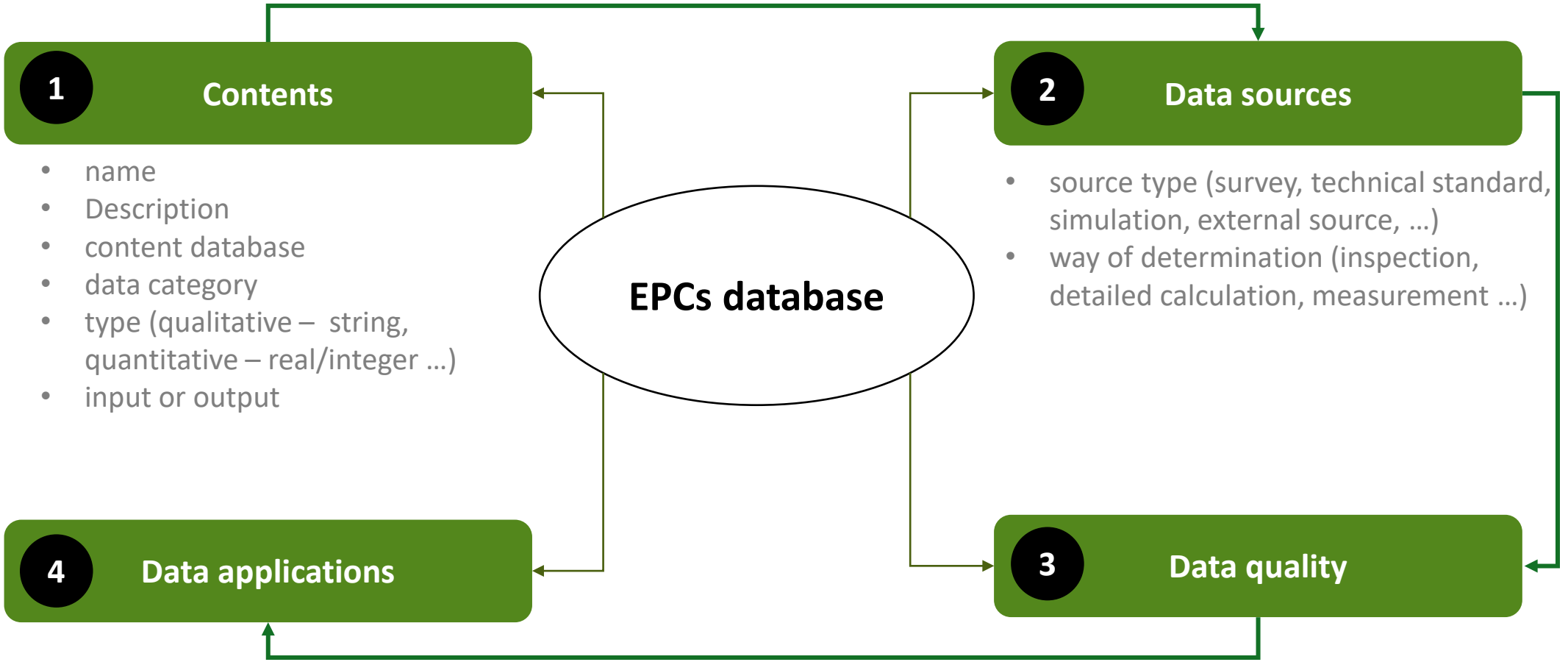
METHODS:

- *Qualitative assessment through the* **comparative analysis of EPC data**
- *Quantitative assessment through rules and score attribution applied to EPC data*

Comparative analysis of EPC data



Data collection sheet overview

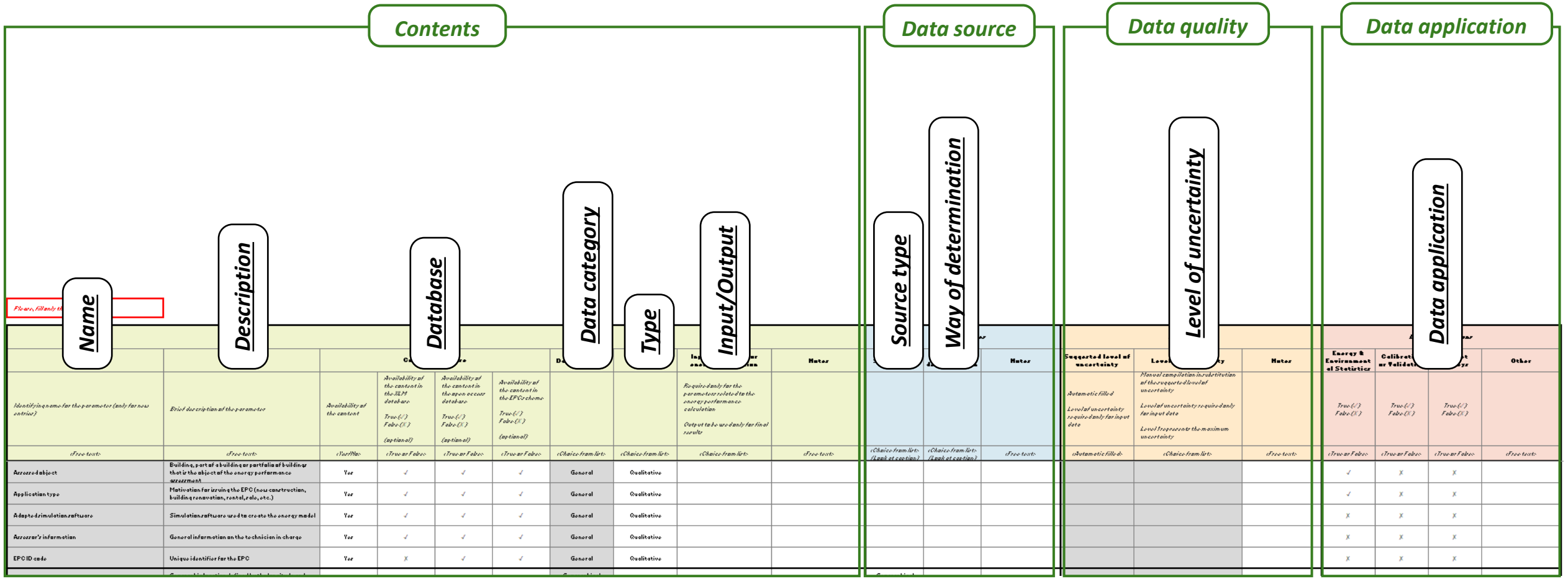


Data quality attribution

- Suggested levels of uncertainty were identified based on the **Source type** and **the Way of determination.**

		WAY OF DETERMINATION						
		Inspection	Detailed calculation	Simplified calculation	Measurement / Monitoring	Technician assumption	External reference	NA
SOURCE TYPE	Cadastre database	Inconsistency between source type and way of determination, please check	Inconsistency between source type and way of determination, please check	Inconsistency between source type and way of determination, please check	Inconsistency between source type and way of determination, please check	Inconsistency between source type and way of determination, please check	Level 3	Inconsistency between source type and way of determination, please check
	Geographical database	Inconsistency between source type and way of determination, please check	Inconsistency between source type and way of determination, please check	Inconsistency between source type and way of determination, please check	Inconsistency between source type and way of determination, please check	Inconsistency between source type and way of determination, please check	Level 3	Inconsistency between source type and way of determination, please check
	Regional or national database	Inconsistency between source type and way of determination, please check	Inconsistency between source type and way of determination, please check	Inconsistency between source type and way of determination, please check	Inconsistency between source type and way of determination, please check	Inconsistency between source type and way of determination, please check	Level 3	Inconsistency between source type and way of determination, please check
	Statistical database	Inconsistency between source type and way of determination, please check	Inconsistency between source type and way of determination, please check	Inconsistency between source type and way of determination, please check	Inconsistency between source type and way of determination, please check	Inconsistency between source type and way of determination, please check	Level 3	Inconsistency between source type and way of determination, please check
	Survey on-site	Level 2	Inconsistency between source type and way of determination, please check	Inconsistency between source type and way of determination, please check	Level 3	Level 2	Inconsistency between source type and way of determination, please check	No suggested level of uncertainty is available
	Technician defined	Level 2	Inconsistency between source type and way of determination, please check	Inconsistency between source type and way of determination, please check	Level 2	Level 1	Level 2	No suggested level of uncertainty is available
	Legislative or technical standard	Inconsistency between source type and way of determination, please check	Level 3	Level 2	Inconsistency between source type and way of determination, please check	Level 2	Level 3	No suggested level of uncertainty is available
	Based on occupant interview	Level 2	Inconsistency between source type and way of determination, please check	Inconsistency between source type and way of determination, please check	Inconsistency between source type and way of determination, please check	Level 2	Inconsistency between source type and way of determination, please check	No suggested level of uncertainty is available
	Existing energy report	Inconsistency between source type and way of determination, please check	Inconsistency between source type and way of determination, please check	Inconsistency between source type and way of determination, please check	Inconsistency between source type and way of determination, please check	Inconsistency between source type and way of determination, please check	Level 2	No suggested level of uncertainty is available
	Numerical assessment	Inconsistency between source type and way of determination, please check	Level 3	Level 1	Inconsistency between source type and way of determination, please check	Inconsistency between source type and way of determination, please check	Inconsistency between source type and way of determination, please check	No suggested level of uncertainty is available
	Energy bills	Level 2	Inconsistency between source type and way of determination, please check	Inconsistency between source type and way of determination, please check	Level 3	Inconsistency between source type and way of determination, please check	Inconsistency between source type and way of determination, please check	No suggested level of uncertainty is available
	NA	No suggested level of uncertainty is available	No suggested level of uncertainty is available	No suggested level of uncertainty is available	No suggested level of uncertainty is available	No suggested level of uncertainty is available	No suggested level of uncertainty is available	No suggested level of uncertainty is available

Data collection sheet (Excel file)



Name	Description	Availability of the content	Database			Data category	Type	Input/Output	Meter	Source type	Way of determination	Meter	Suggested level of uncertainty	Level of uncertainty	Meter	Energy & Environmental Statistics	Calibration or Validation		Other
Identifying name for the parameter (only for new entries)	Brief description of the parameter	Availability of the content	Availability of the content in the XLM database True (✓) False (✗) (optional)	Availability of the content in the open access database True (✓) False (✗) (optional)	Availability of the content in the EPC schema True (✓) False (✗) (optional)			Required only for the parameters related to the energy performance calculation Output to be used only for final results					Automatic filled Level of uncertainty required only for input data	Manual compilation in substitution of the requested level of uncertainty Level of uncertainty required only for input data Level free to enter the maximum uncertainty		True (✓) False (✗)	True (✓) False (✗)	True (✓) False (✗)	
<Free text>	<Free text>	<Yes/No>	<True or False>	<True or False>	<True or False>	<Choice from list>	<Choice from list>	<Choice from list>	<Free text>	<Choice from list> (Least et cetera)	<Choice from list> (Least et cetera)	<Free text>	<Automatic filled>	<Choice from list>	<Free text>	<True or False>	<True or False>	<True or False>	<Free text>
Assessed object	Building, part of a building or portfolio of buildings that is the object of the energy performance assessment	Yes	✓	✓	✓	General	Qualitative									✓	✗	✗	
Application type	Motivation for issuing the EPC (new construction, building renovation, rental, sale, etc.)	Yes	✓	✓	✓	General	Qualitative									✓	✗	✗	
Adopted simulation software	Simulation software used to create the energy model	Yes	✓	✓	✓	General	Qualitative									✗	✗	✗	
Assessor's information	General information on the technician in charge	Yes	✓	✓	✓	General	Qualitative									✗	✗	✗	
EPC ID code	Unique identifier for the EPC	Yes	✗	✓	✓	General	Qualitative									✗	✗	✗	

Comparison tables

- Comparison tables are used to conduct **context analysis** on EPC data, which involves comparing all the information collected through the data collection sheet.

- Four comparison tables were produced, each one focusing on a specific research topic:
    - EPC data availability
    - Data source and determination
    - Input accuracy
    - Overview of applications

Comparison table: EPC data availability

- The EPC data availability table concerns the information gathered about EPC contents with respect to the availability of the data in a specific database.

	Name	Description	ITALY			CROATIA			CYPRUS		
			POLITO / EDIC / RP			EIHP			CEA / CUT		
EPC information on the assessed object, tool and assessor	Assessed object	Building, part of a building or portfolio of buildings that is the object of the energy performance assessment	XML	OAD	EPC	XML	OAD	EPC	XML	OAD	EPC
	Application type	Motivation for issuing the EPC (new construction, building renovation, rental, sale, etc.)	XML	OAD	EPC	XML	OAD	EPC	XML	OAD	EPC
	Adopted simulation software	Simulation software used to create the energy model	XML	OAD	EPC				XML	OAD	EPC
	Assessor's information	General information on the technician in charge	XML	OAD	EPC	XML	OAD	EPC	XML	OAD	EPC
	EPC ID code	Unique identifier for the EPC	XML	OAD	EPC	XML	OAD	EPC	XML	OAD	EPC

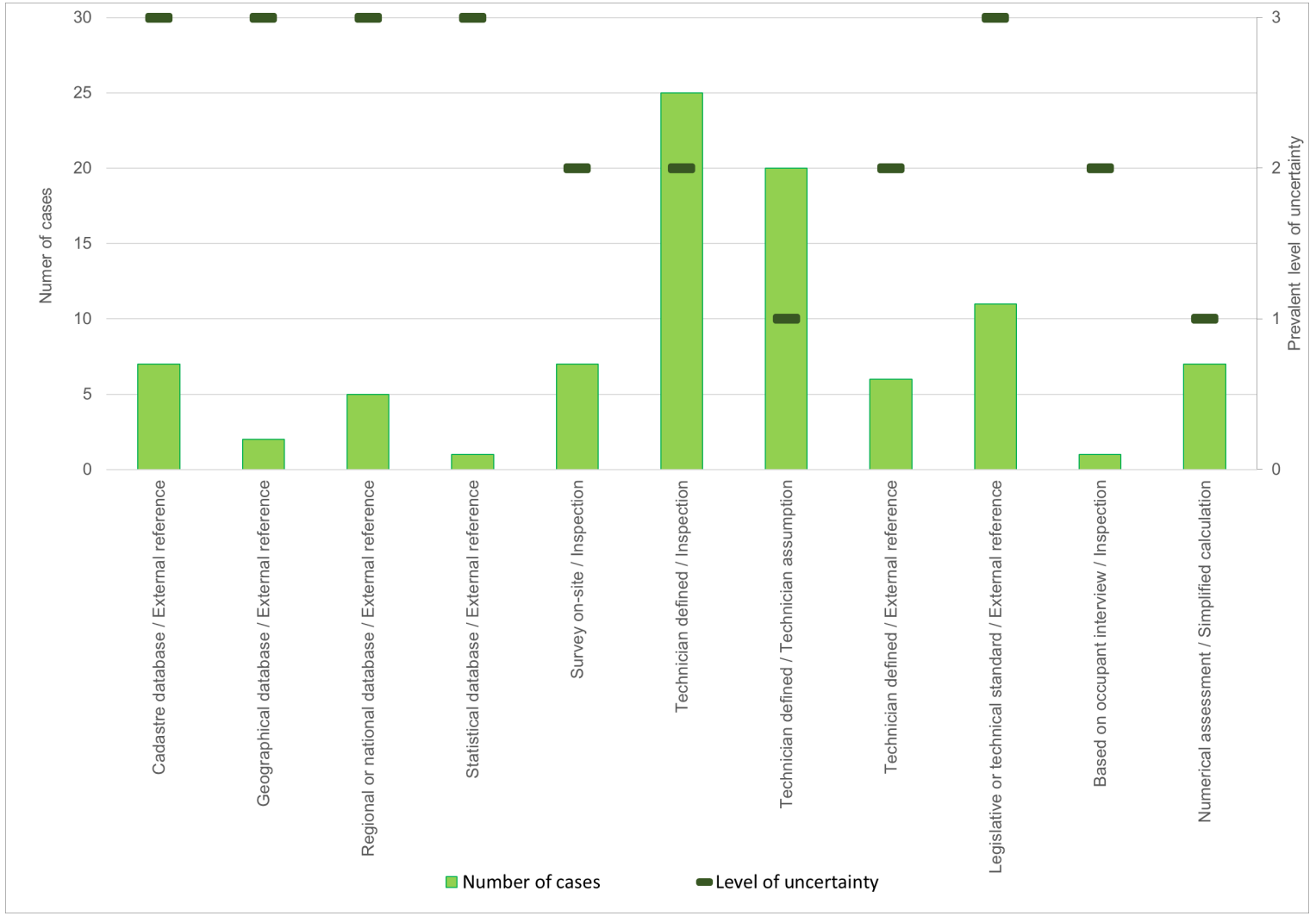
Comparison table: Data source and determination

- The data source and determination table summarizes all the possible couples of source type and way of determination that were assigned to the data in the collection sheets.

Cadastre database	Geographical database	Regional or national database	Statistical database	Survey on-site
External reference	**External reference**	**External reference**	**External reference**	**Inspection**
Geographical location - SLOVENIA	Geographical location - ITALY - SPAIN - AUSTRIA	Building typology - ITALY	Climatic region - CROATIA - SLOVENIA	Building address - CROATIA
Building address - SLOVENIA - AUSTRIA	Building address - ITALY	Year of construction - ITALY		Building constructive typology - ITALY
Cadastre information - ITALY - CROATIA - SLOVENIA - AUSTRIA		Year of last renovation - ITALY		Technical building system (TBS) type of generator per energy service - ITALY - CROATIA - CYPRUS - SLOVENIA
Number of building units - ITALY - SLOVENIA		Climatic region - ITALY - CYPRUS - SPAIN		TBS energy carrier per energy service - ITALY - CROATIA - CYPRUS - SPAIN - SLOVENIA
Building use - ITALY		TBS mean global seasonal efficiency per energy service - AUSTRIA		TBS nominal power per energy service - ITALY - CROATIA - CYPRUS - SLOVENIA
Information of building property - ITALY - CROATIA - SLOVENIA - AUSTRIA				TBS subsystems efficiency per energy service - ITALY - CYPRUS - SLOVENIA
Year of construction - CROATIA - SLOVENIA				TBS year of installation per energy service - SLOVENIA

Comparison table: Data source and determination

- Most of the EPC data come from **technicians' assessments** and **assumptions.**



Comparison table: Input accuracy

- The input accuracy table provides the level of uncertainty information only on the **input data.**
- This analysis gives the opportunity to better define the specific input data that need to be **improved for accuracy** concerns.
- There is a need for a more efficient control system on input data by defining **plausible intervals**.

	Name	ITALY	CROATIA	CYPRUS
		POLITO / EDIC / RP	EIHP	CEA / CUT
EPC information on building at the current state	Thermally conditioned floor area	Input	Input	Input
	Thermally conditioned gross volume	Input	Input	
	Compactness ratio	Intermediate result	Input	
	Thermal envelope area	Input		Input
	Opaque thermal envelope area	Input		Input
	Transparent thermal envelope area	Input	Input	Input
	Thermal envelope area per exposure	Intermediate result		Input
	Mean thermal transmittance of the total building envelope	Intermediate result	Intermediate result	Intermediate result
	Mean thermal transmittance of opaque building envelope	Intermediate result		Intermediate result
	Mean thermal transmittance of transparent building envelope	Intermediate result		Intermediate result
	Thermal transmittance per building envelope component	Intermediate result	Intermediate result	Input
	Thermo-physical properties of the materials composing the envelope components	Input		Input
	Building envelope thermal transmittance limit		Input	Input

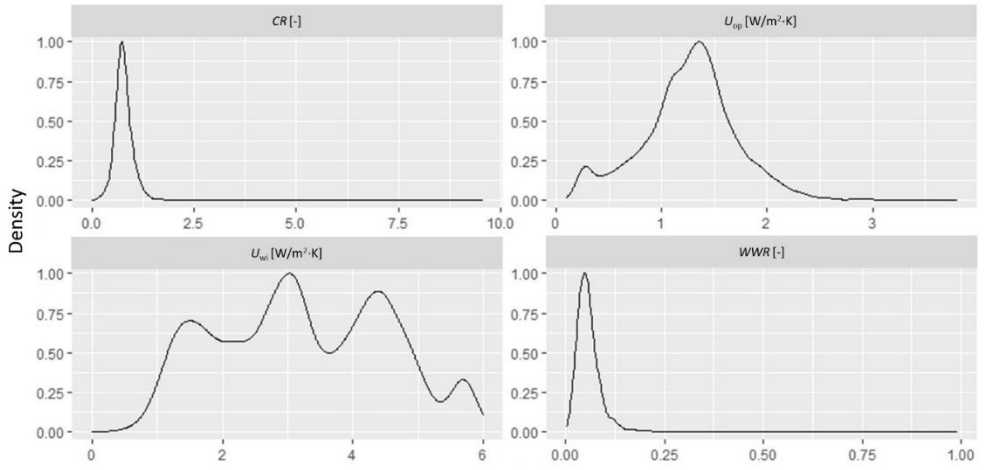
Confidence intervals

- **Plausible values** for the main input data from the regional EPC databases that **affect the energy performance of buildings**.

- Set of controls on EPC input data to increase **reliability** and **representativeness**.

The procedure has been applied to the **Piedmont Region EPC database** (**SIPEE**).

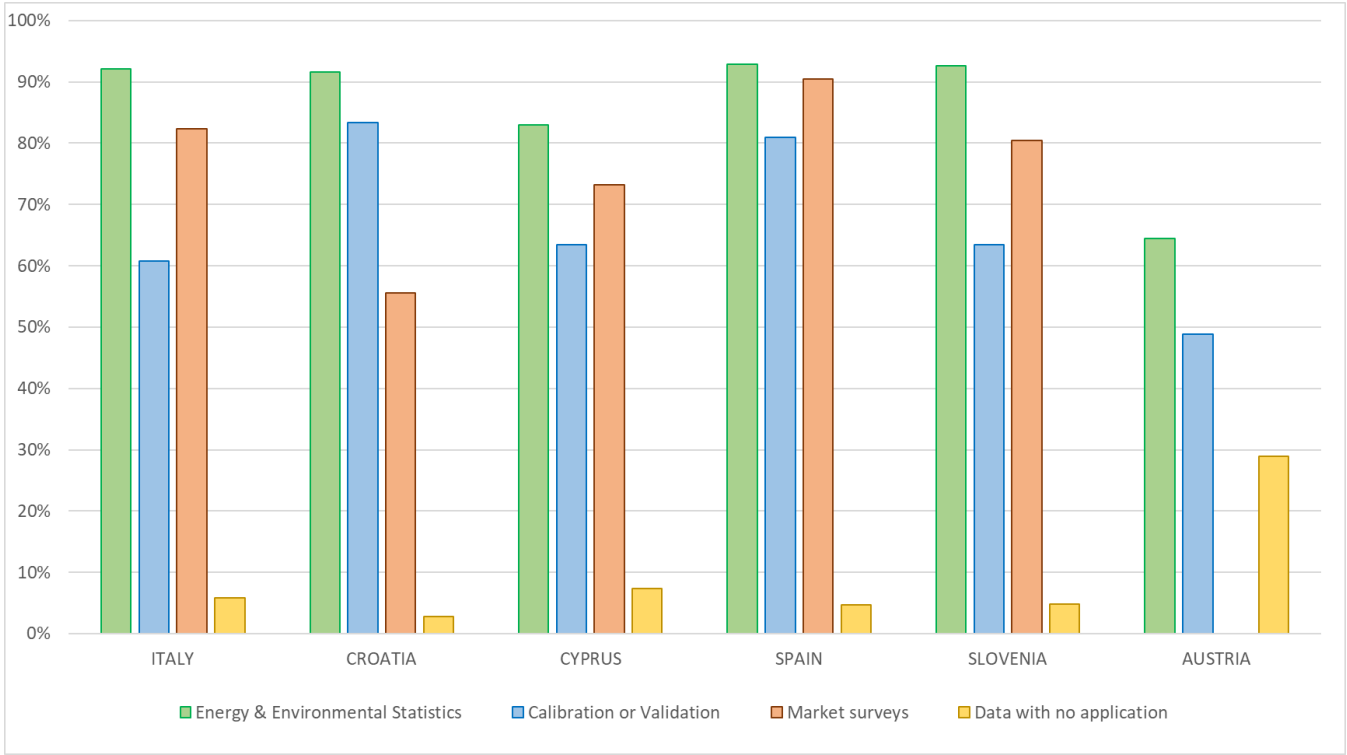
SFH	U_{op} [W/(m²·K)]			U_{wi} [W/(m²·K)]		
	Mean ± SD	95% CI		Mean ± SD	95% CI	
		LL	UL		LL	UL
CP1	1,259 ± 0,45	1,250	1,268	3,234 ± 1,30	3,209	3,260
CP2	1,243 ± 0,45	1,225	1,261	3,209 ± 1,25	3,159	3,258
CP3	1,216 ± 0,44	1,205	1,227	3,170 ± 1,30	3,138	3,203
CP4	1,114 ± 0,45	1,104	1,125	2,960 ± 1,29	2,929	2,991
CP5	1,019 ± 0,42	1,009	1,030	2,872 ± 1,32	2,840	2,905
CP6	0,970 ± 0,38	0,959	0,981	2,678 ± 1,14	2,645	2,712
CP7	0,830 ± 0,33	0,820	0,840	2,390 ± 0,81	2,366	2,415
CP8	0,447 ± 0,30	0,439	0,456	1,749 ± 0,68	1,730	1,769



Comparison table: Overview of applications

- The overview of the applications table is derived from the information provided by the country partners in the “Data Applications” section of the data collection sheet.

	Name	ITALY			CROATIA		
		POLITO / EDIC / RP			EIHP		
		Energy & Environmental Statistics	Calibration or Validation	Market surveys	Energy & Environmental Statistics	Calibration or Validation	Market surveys
EPC information on the assessed object, tool and assessor	Assessed object	✓	✗	✗	✓	✗	✗
	Application type	✓	✗	✗	✓	✓	✗
	Adopted simulation software	✗	✗	✗			
	Assessor's information	✗	✗	✗	✗	✓	✗
	EPC ID code	✗	✗	✗	✗	✓	✗



TIMEPAC The new EPC for Europe

If you would like more information, please visit www.timepac.eu or contact us at

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