

Contract ENER/C3/2018-447/05

Feasibility study EPBD article 19a

2nd stakeholder meeting

Brussels, 28 November 2019

Summary of main highlights about the feasibility on the inspection of stand-alone ventilation systems

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Awareness raising

Training

Visual inspection

Inspection with measurements

Inspection with measurements
and compliance

Indoor climate related
requirements

ENER/C3/2018-447/05



Feasibility Study EPBD Art. 19a

*Selection of policy options for inspections of
stand-alone ventilation systems and analysis of
related potential impacts*

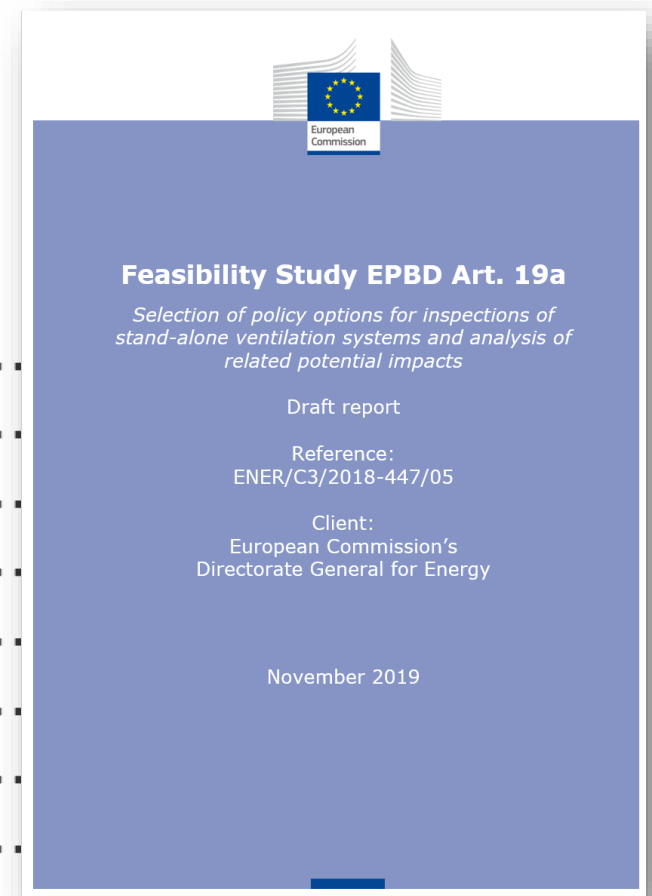
Draft report

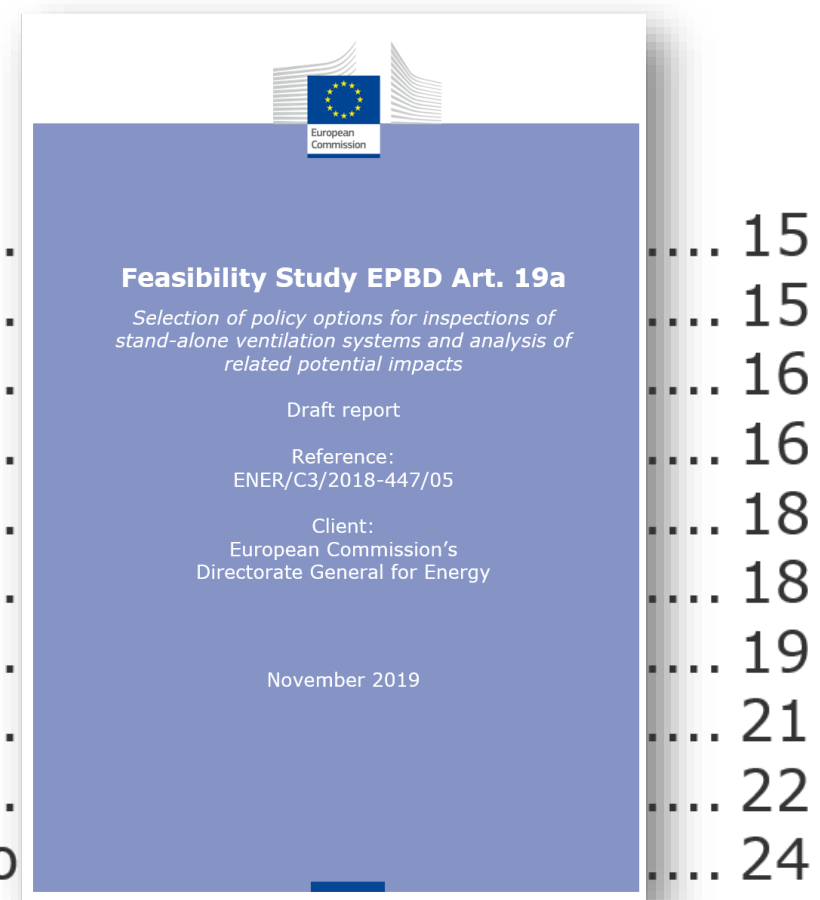
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1. Introduction	5
1.1 Context	5
1.2 Overall objectives	5
1.3 Methodology	6
2. Detailed description of the 6 options	7
2.1 Awareness raising (option 1)	7
2.2 Training (option 2)	8
2.3 Visual inspection (option 3)	10
2.4 Inspection with measurements (option 4)	12
2.5 Inspection with measurements and compliance (option 5)	13
2.6 Indoor air quality requirements (option 6)	14





3. Objectives and methodology of impact analysis	15
3.1 Objectives	15
3.2 Methodology	16
3.3 Assumptions for an option with no action	16
4. Impact analysis findings for the 6 options	18
4.1 Awareness raising (option 1)	18
4.2 Training (option 2)	19
4.3 Visual inspection (option 3)	21
4.4 Inspection with measurements (option 4)	22
4.5 Inspection with measurements and compliance (option 5)	24
4.6 Indoor air quality requirements (option 6)	25
4.7 Conclusions for the 6 reference options	27
Annex 1 – Modules used to define options 3 to 6	36
Annex 2 – Details of the impact analysis methodology	42
Annex 3 – Details of the impact analysis results	63

Awareness raising

Training

Visual inspection

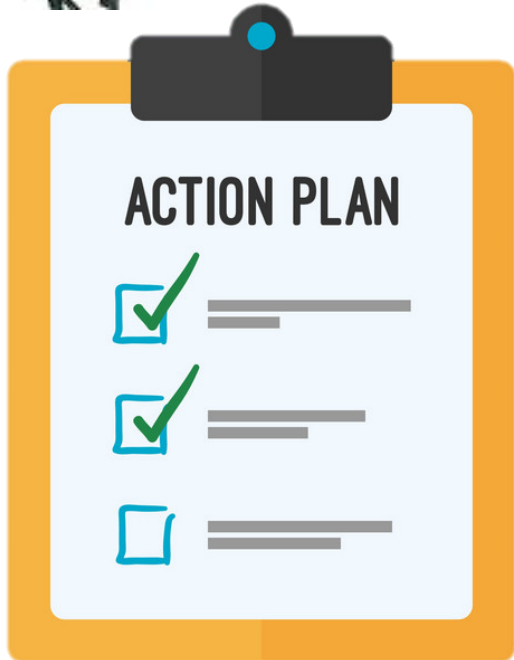
Inspection with measurements

Inspection with measurements
and compliance

Indoor climate related
requirements

It is important to recognize that the 6 options can be combined and/or used at different moments





Awareness raising

Training



Visual inspection

Inspection with measurements

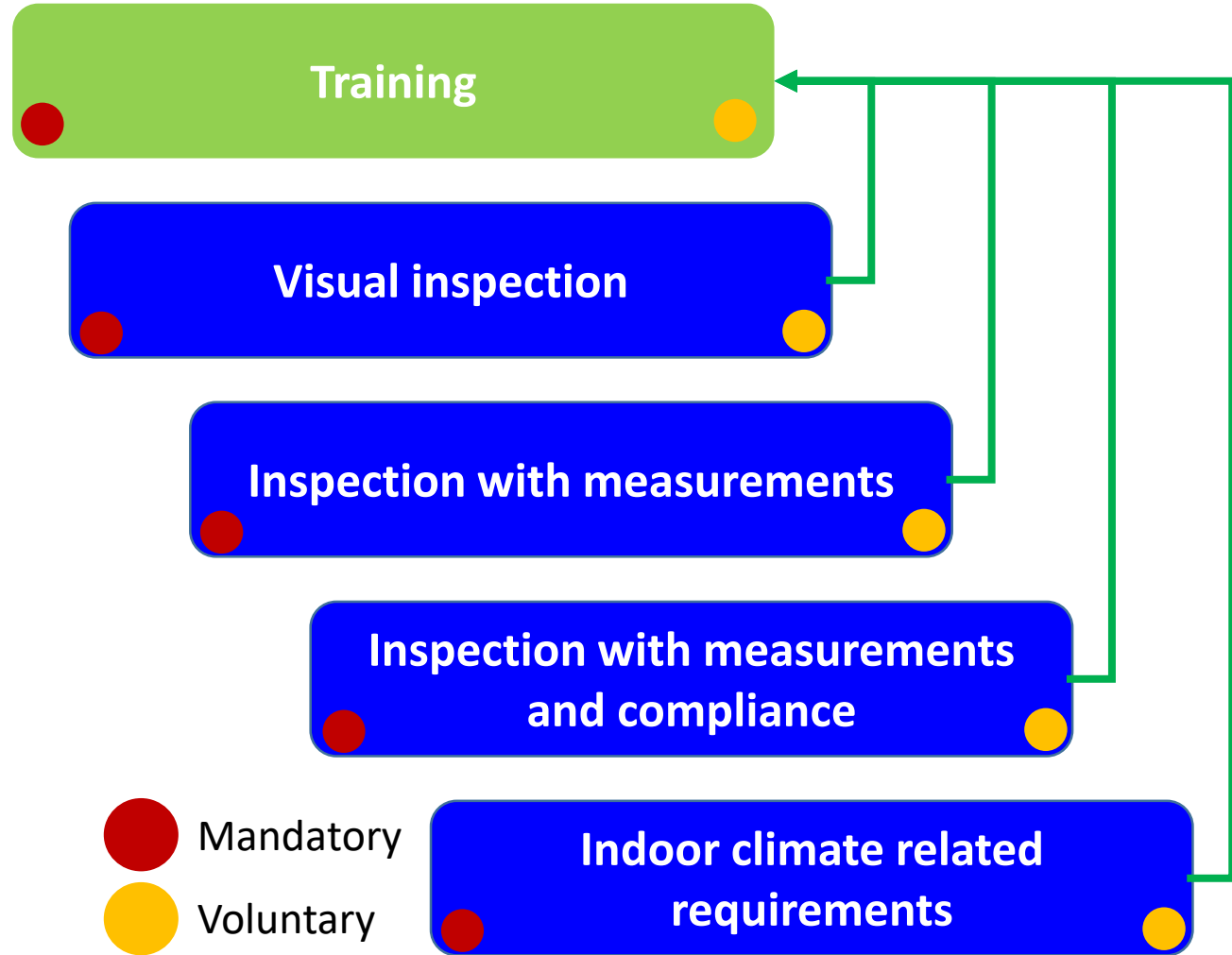
Inspection with measurements and compliance

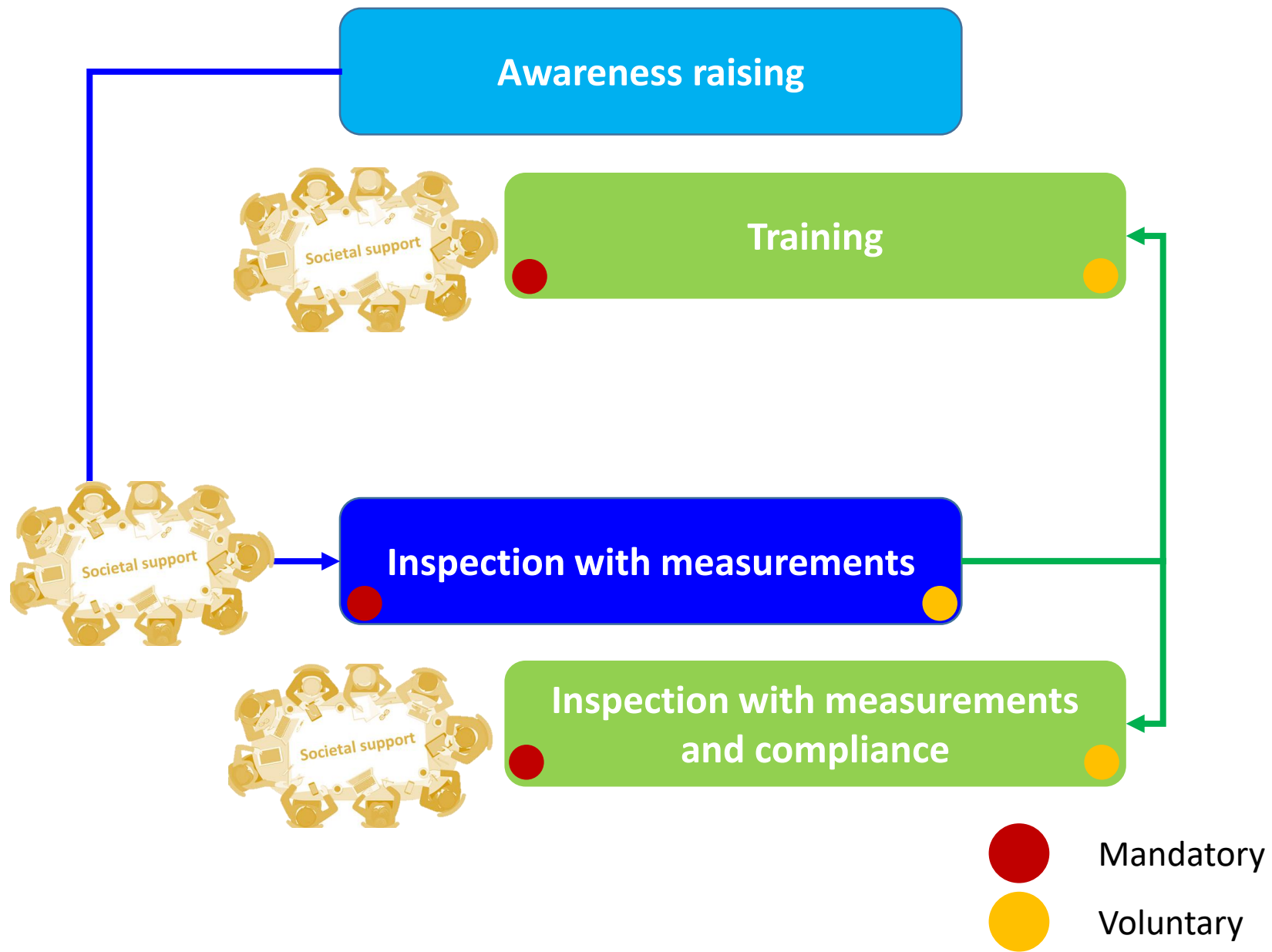
Indoor climate related requirements

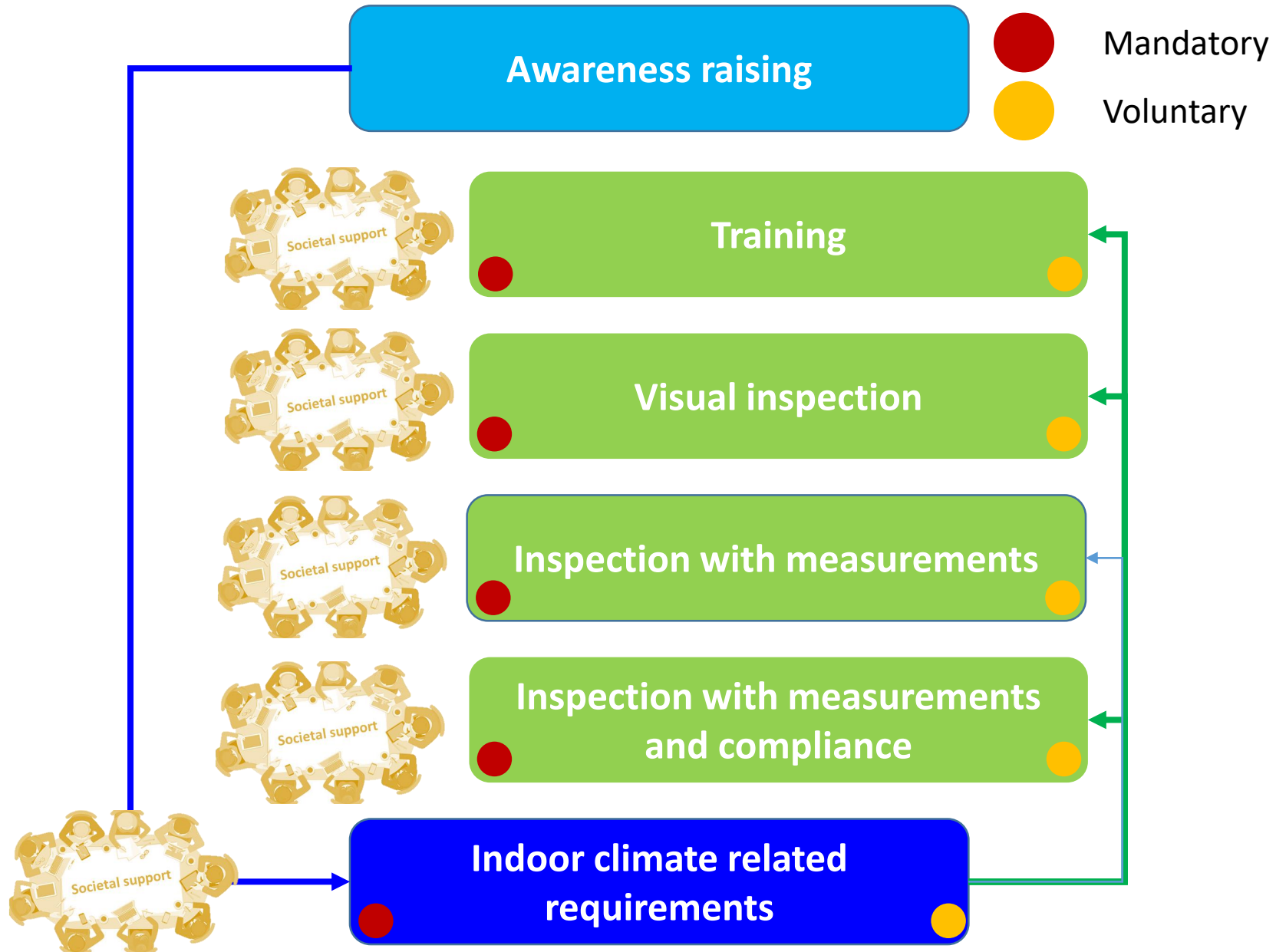


-  Mandatory
-  Voluntary

Interest in training may be the outcome of inspections...







Awareness raising

Training

Visual **inspection**

Inspection with
measurements

Inspection with
measurements and compliance

Indoor climate related
requirements

Questions to build an inspection scheme

TECHNICAL ASPECTS	
Aim of inspection	Which performance to be inspected?
Targets of inspection	Who should benefit from inspection? What types of buildings should be covered? What types of ventilation systems should be inspected? Which climatic zones should be concerned? Which period of the year should be concerned?
Rules for inspection	What are the aspects covered by inspection (technical procedure)? What are the parts of ventilation system to be inspected? Is there a sampling of ventilation systems to be inspected?
In-situ measurements	What are the measured quantities? What are the measuring instruments? What is the measuring uncertainty? What is the calibration for measuring instruments? What is the calibration for measuring instruments? What is the calibration for measuring instruments?
Reporting about inspection	What is the content of the report? What are the acceptance criteria? What is the acceptable deviation for decision? Who prepares the report? Who checks the report?

ORGANISATION	
Periodicity of inspection	Does inspection occur or is it regular? When does it occur? By whom is it operated? Is there a need for quality assurance?
Inspectors	Is there a need for training of inspectors? Is there a need for the qualification of inspectors? Is there a need for the certification of inspectors? Is there a surveillance of inspectors?
Conformity to legislation	What are the same rules if inspection is not operated according to defined rules? Is the inspection mandatory? Is there conformity with the legislation?
Economy	What are the benefits? What are the stakeholders involved in the implementation of the inspection scheme? What are the stakeholders involved in the operation of the scheme?
Other aspects	What is the role of public authorities? How is surveillance organised? Does the inspection scheme create a market differentiation? Will the inspection scheme get societal support? Does the inspection scheme create barriers to innovation? Does the inspection scheme generate any risk?

Visual inspection

Very wide range of sub-options within each inspection scheme!!

Therefore, big variation in impact of inspection schemes is possible!

Building an inspection scheme

		TECHNICAL ASPECTS								
AIM	AIM	1-WHICH PERFORMANCE TO BE INSPECTED?	Energy performance	Air flow rates, air change	Indoor air quality	Hygiene of the ventilation system	Noise	Thermal comfort (draughts, temperature gradient)	Overall well-being of occupants	Overall well-being of neighborhood
TARGETS	TAR	1-TARGET POPULATION BENEFITING FROM INSPECTION	Occupants	Owners	Workers	Children	Elderly people	Persons with low revenues		
		2-TYPE OF BUILDING SUBMITTED TO INSPECTION	All residential	Single-family house	Multi-apartment buildings	All non-residential	Offices	Retail buildings	Educational buildings	Health care facilities
		3-TYPE OF VENTILATION SYSTEM SUBMITTED TO INSPECTION	Natural	Hybrid	Mechanical decentralised unidirectional	Mechanical decentralised balanced without heat recovery	Mechanical decentralised balanced with heat recovery	Mechanical centralised unidirectional	Mechanical centralised balanced without heat recovery	Mechanical centralised balanced with heat recovery
		4-CLIMATIC ZONE FOR INSPECTION	All climatic zones	Average	Cold	Warm				
		5-PERIOD OF THE YEAR FOR INSPECTION	All year	Warm season	Cold season	Mid-season				
RULES	RUL	1-ASPECTS COVERED BY INSPECTION	Completeness	Adequacy between design and installation	Cleanliness and hygiene	General state	Good overall operation	Good operation of controls	Occupants satisfaction	Energy consumption (from energy invoices)
		2-PARTS OF VENTILATION SYSTEMS TO BE INSPECTED	Whole system	Ductwork	All system components	Ventilation unit	Air inlets	Air outlets	Air transfers	Controls
		3-SAMPLING RULES FOR INSPECTION	Each system	A sample of the systems	A sample of the buildings					
IN SITU MEASUREMENTS	MEA	1-MEASURED QUANTITIES	Air flow rates at fan level	Air flow rates at room level	Air pressures at fan level	Air pressures at room level	Ductwork airtightness	Electrical consumption	Performance of heat recovery	Indoor air quality parameters
		2-MEASURING INSTRUMENTS	Flow meter	Anemometer	Manometer	Wattmeter	Thermometer	Pollutant concentration analyser	Noise analyser	Hygrometer
		3-MEASURING UNCERTAINTY	No uncertainty	Fixed uncertainty	Uncertainty of the measurement method	Uncertainty of the measuring instrument				

5. Other considerations related to impact analysis	29
5.1. Importance to quantify multiple benefits of options 1 to 6	29
5.2. Cost aspects related to options 3 to 6	30
5.3. Options 3 to 6 as means against unfair competition	30
5.4. Importance of clear and manageable specifications (options 3-6)	30
5.5. Impact analysis for non-residential and existing buildings?	31
5.6. Considerations about good IAQ during the whole building lifetime	31
5.7. Impact of evolutions of legislation on IAQ and ventilation	31
5.8. Options 4 to 6 as drivers for innovation	32
5.9 Change in options along time	32
5.10. Differences between newly installed and older systems	32
5.11 Impact of smart monitoring and control	33

Cost and benefits...

Description	Cost
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Cost and benefits...

Description	Cost
The cost for setting up the inspection scheme	↗
The cost for implementation of the inspection scheme in practice	↗
The extra costs for delivering a compliant ventilation system	↗
The change in energy consumption due to the implementation of the inspection scheme. It is expected that in most cases the energy cost will increase due to higher air flow rates	↗↘
The cost reduction due to an improved indoor air quality and its impact on health	↘
The savings due to increased productivity	↘

Options 4 to 6 as drivers for innovation

Options 4 to 6 (with compliance checks and effective enforcement) can stimulate the development and market uptake of innovative systems.

The resulting types of innovation can cover a wide range of aspects, e.g.:

- Development/optimisation of **self-regulating air terminal devices** (air supply and exhaust)
- Development of **high efficient heat exchangers**
- Development/optimisation of **easy to install airtight air distribution systems**
- Development/optimisation resulting in **improved acoustical performances**
- Development/optimisation of ventilation systems which are **easy to maintain**
- Development/optimisation of **low pressure air distribution systems**
- Development/optimisation of **smart IAQ sensors and control**
- Development/optimisation of systems based on **monitoring and control from the cloud**
- Development/optimisation of systems with **automatic fault detection**

Options 4 to 6 as drivers for innovation

Indirectly, options 4 to 6 can also stimulate other developments, e.g.

- Development and market uptake of **smart design tools** which guarantee the installers that the required specifications will be met
- Development/optimisation of **tools in a BIM environment**

Therefore, the implementation of options 4 to 6 can be seen as a **major driver for innovation** and **reduce the need for governmental support for industrial innovations**.

Impact of smart monitoring and control...

- It is expected to see more and more intelligent ventilation systems (with control from distance, data in the cloud, fault detection, ...)
- Such systems may require other types of inspection schemes than those considered in this document and might allow a continuous check of the performances

Preliminary conclusions...

- Field studies in many countries show that the performances of most stand alone ventilation systems are poor, in particular in terms of indoor climate performances
- Various types of inspection schemes and other options have been studied
- A detailed analysis of 6 options has been made, whereby each of them has a very wide range of possible sub-options
- It is crucial to analyse in each specific context the present situation and the most suitable option for optimal market impact (country, residential/non-residential, new/existing, ...)
- There might be smart combinations of the identified options



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