TIMEPAC Academy

Session 7

Re-Co and HVAC

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Politecnico di Torino

GOLEA

Re-Commissioning basics

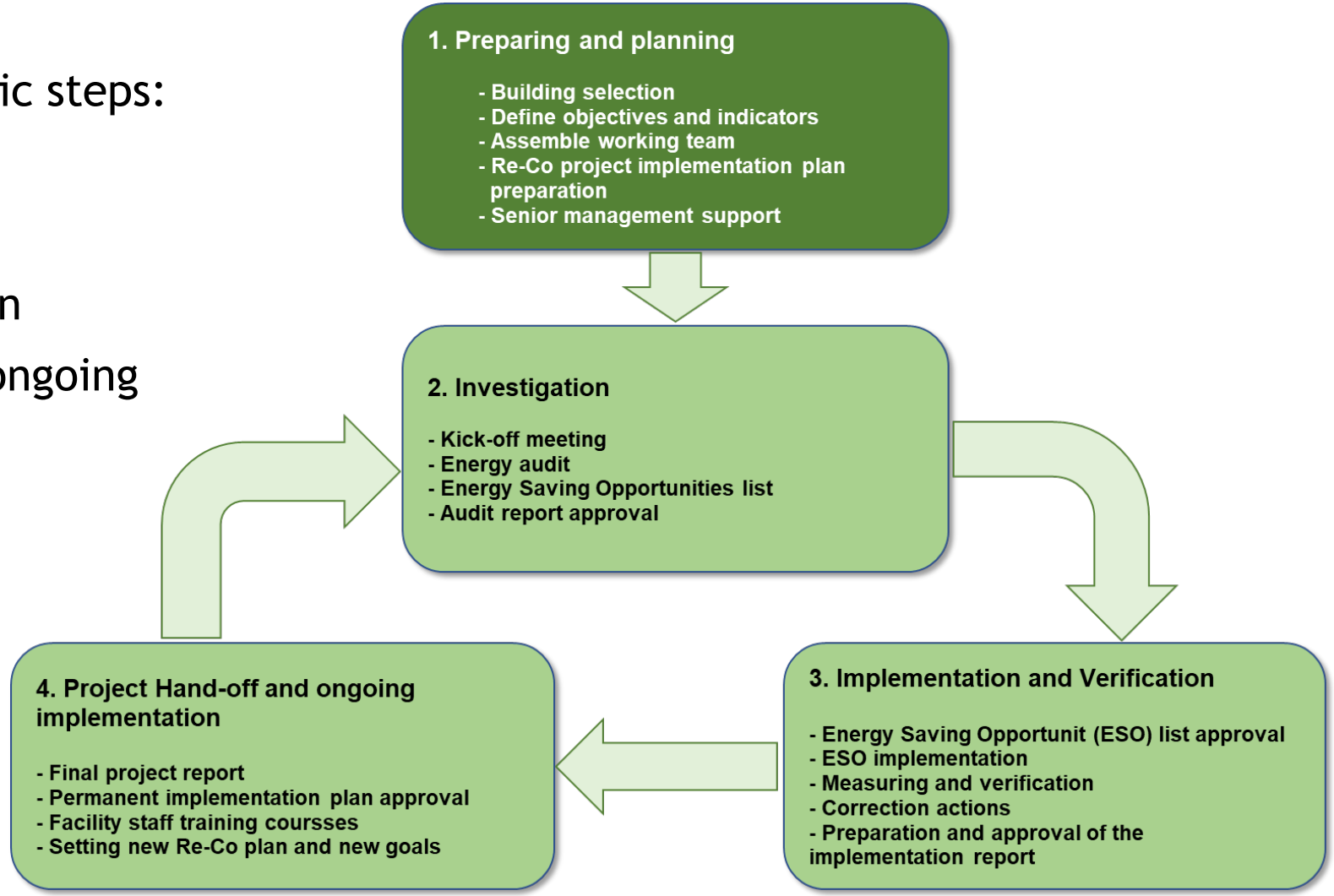
Re-Commissioning is a systematic approach to the **review and optimization** of already established **building systems**, their **operating and maintenance** procedures, and the **interaction with building users** with the aim of **reducing costs and energy use** and increasing living comfort.

- "*Commissioning*" - planning and control during the construction of the new building ensuring the building match the expectations and requirements (including the staff training)
- "*Re-Commissioning*" - process of verifying and elimination of minor defects and resetting the systems of an existing building
- **Key challenge – Combining activities!**

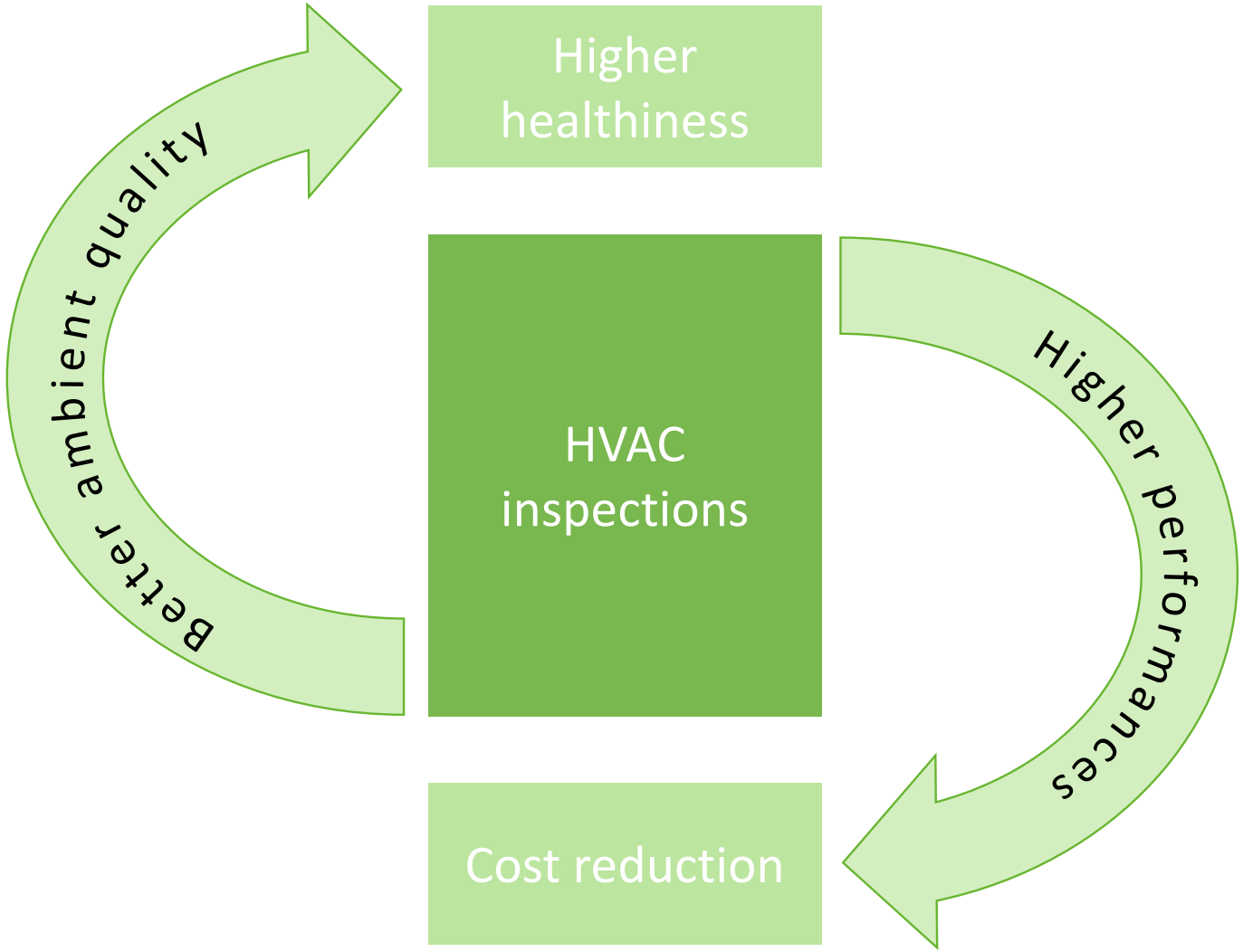
Implementation of the Re-Co project in buildings

Re-Co is implemented in four basic steps:

- Preparation and planning
- Investigation and analysis
- Implementation and verification
- Project hand-off and ensuring ongoing implementation



Scope and importance of inspection activities



The inspection of heating systems

Heating generator/system inspection aim

To verify if the heat generator/system is set, operated and maintained correctly with regard to energy efficiency

To estimate the actual heat generator energy performance

To estimate the sizing of the heat generator compared to building needs

To support advice on possible heat generator energy performance improvements (if required)

The inspection of heating systems

Inspection levels

Level ID	1	1	2
Level name	Basic	Basic	Detailed
Building category	Single family houses	All categories except single family houses	All categories except single family houses
Fuel	All	All	All
Power	All	All	All
Generator type	Boiler	Boiler	Boiler
Centralized/autonomous system	Autonomous	One autonomous system per building unit	Centralized

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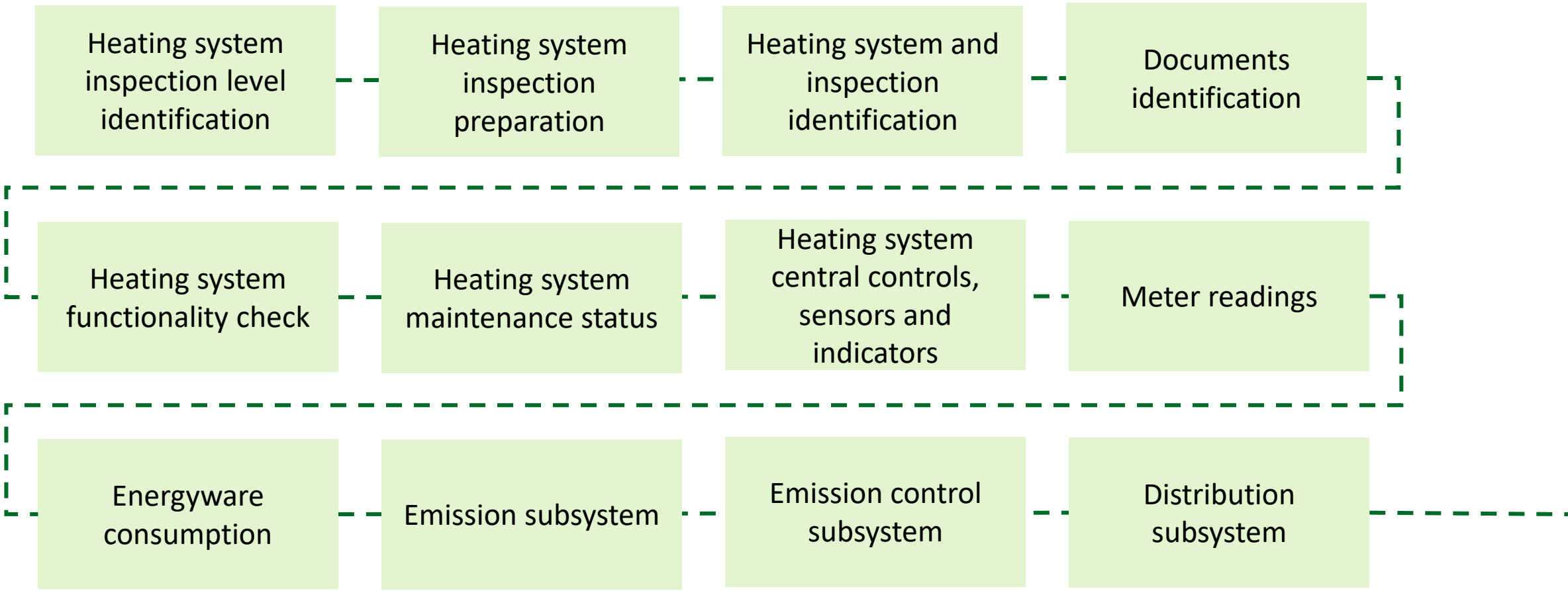
The inspection of heating systems

Inspection flowchart (1/2)



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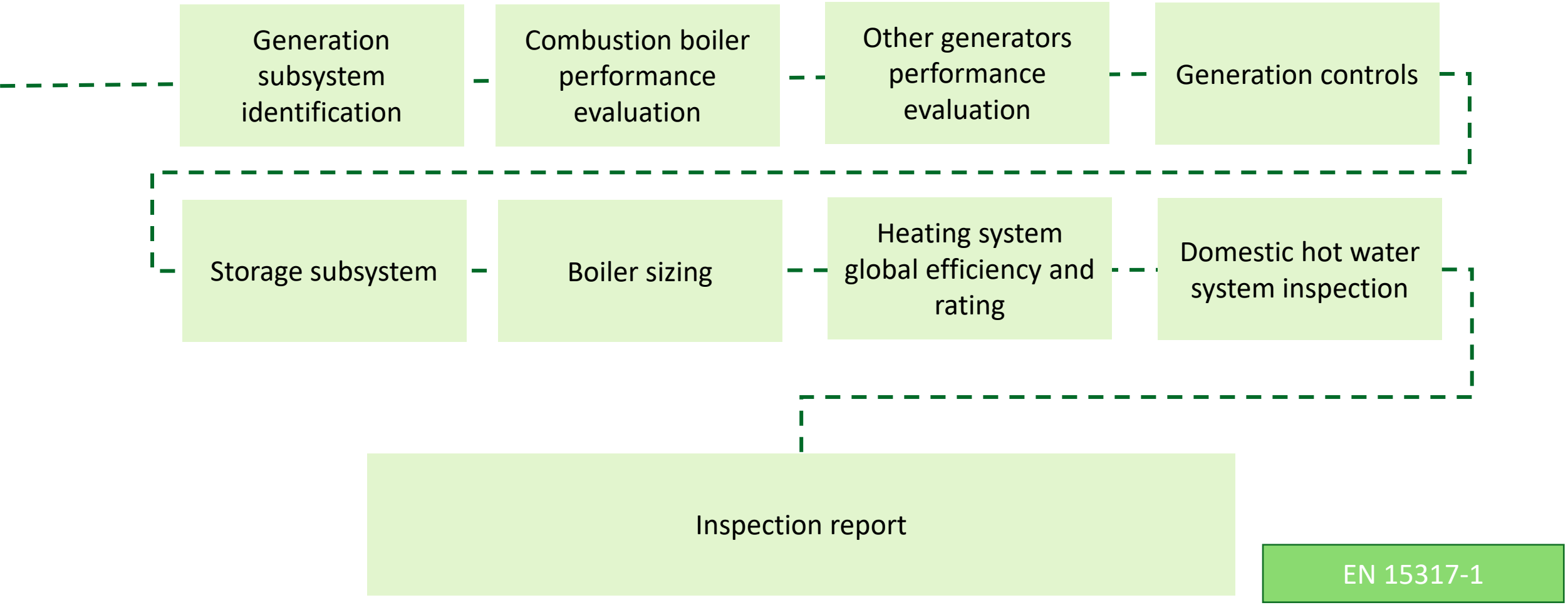
The inspection of heating systems

Inspection flowchart (2/2)



The inspection of ventilation and air conditioning systems - Inspection aim

To provide recommendations for improvements with an indication of their probable cost-effectiveness and any other benefits

To provide an assessment of the system efficiency including maintenance and controls

To provide an assessment of the sizing compared to the cooling and ventilation requirements of the building

To provide characteristics of the air conditioning and/or ventilation system that can be compared to design specifications or inputs of energy calculations

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The inspection of ventilation and air conditioning systems - Inspection levels

Inspection level	Type of inspection	Description
1	Pre-inspection and functional checks	This basic level of inspection has two purposes: a) to gather all relevant documentation on the system type and size, and to identify any priority inspection areas where the design, installation or operation of the system departs from good practice in a manner likely to affect its energy consumption; b) to non-intrusively identify on site (normally visually) features of system operation that are wasteful of energy. It does not include measurements.
2	Functional measurements	This level requires, in addition to level 1, measurements to check that the system is operating as intended and to identify sources of energy wastage. These can include, for example specified design conditions and set points.
3	Special measurements	This level requires, in addition to level 1 and 2, additional measurements to provide more detailed assessments of system performance. Such measurements can, for example, cover extended periods of time, or technical aspects such as *in situ* component performance.

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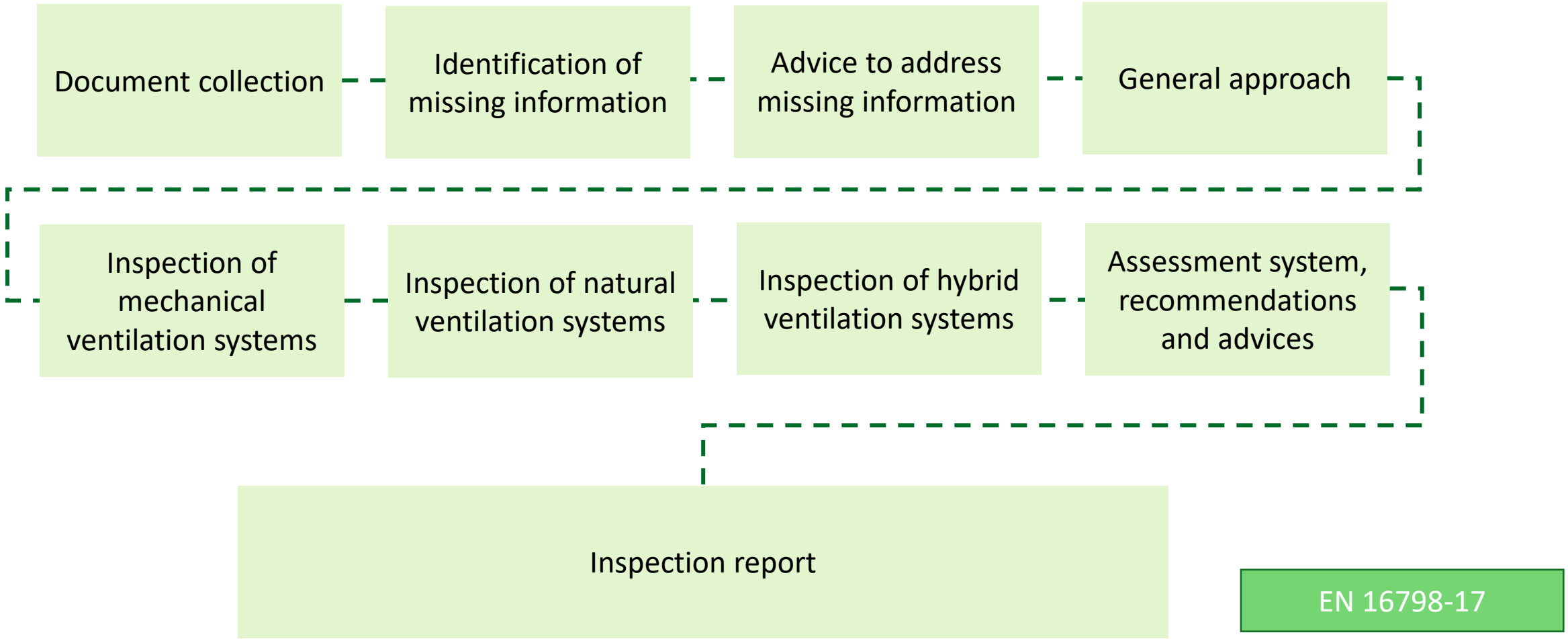
The inspection of ventilation systems

Inspection flowchart (1/2)



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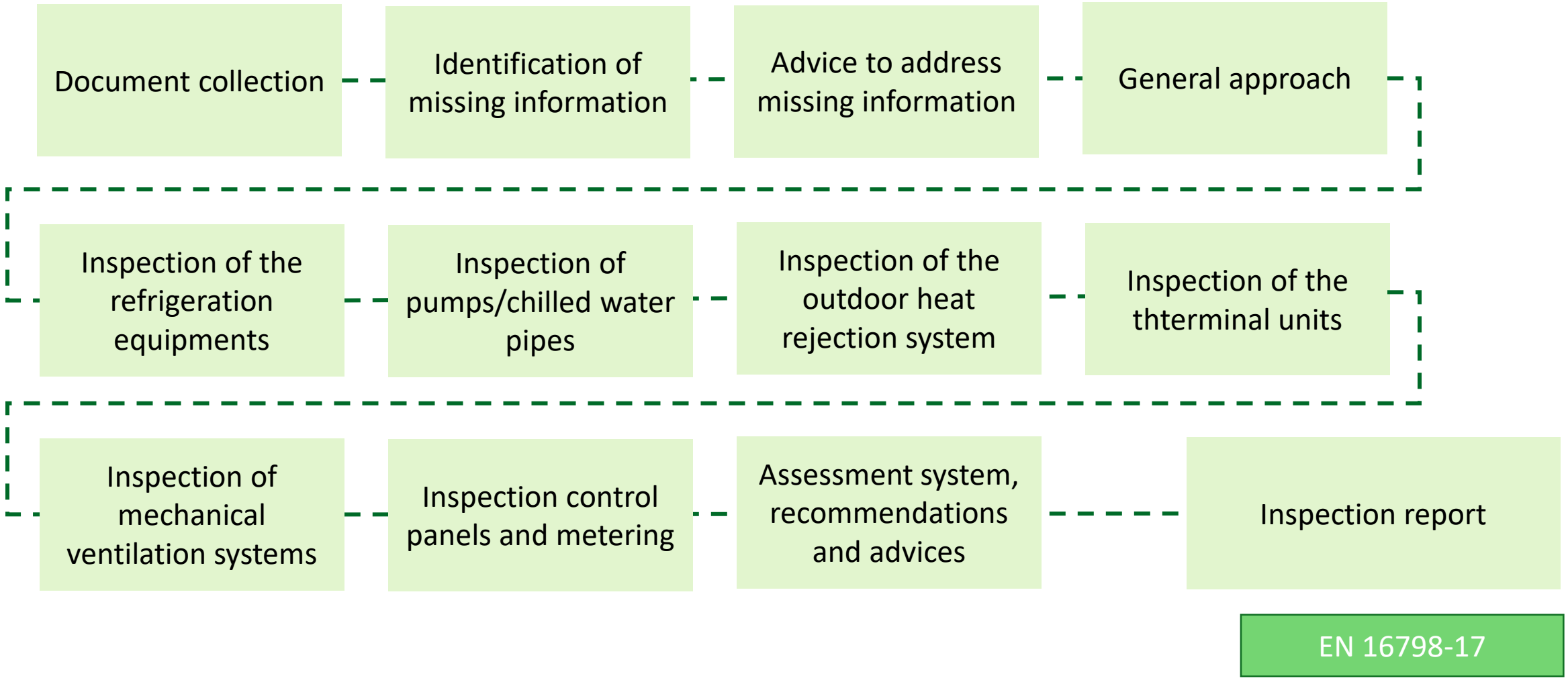
The inspection of ventilation systems

Inspection flowchart (2/2)



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Example of RCx for an Office Tower in Canada

Built in 1965, the Royal Bank office building in downtown Winnipeg is one of the first modern high-rises built in Manitoba. The 17-storey building of 20,000 m^2 accommodates about 1,000 employees and its annual energy bill before the RCx was about $294,000. Completed in 2009, the RCx reduced the bill by 20% and focused mainly on the following electromechanical systems:

- Two natural gas boilers, each with a capacity of 2,930 kW
- Ten air handling units with a total capacity of 69,500 L/s
- Two chillers with a total capacity of 430 tonnes

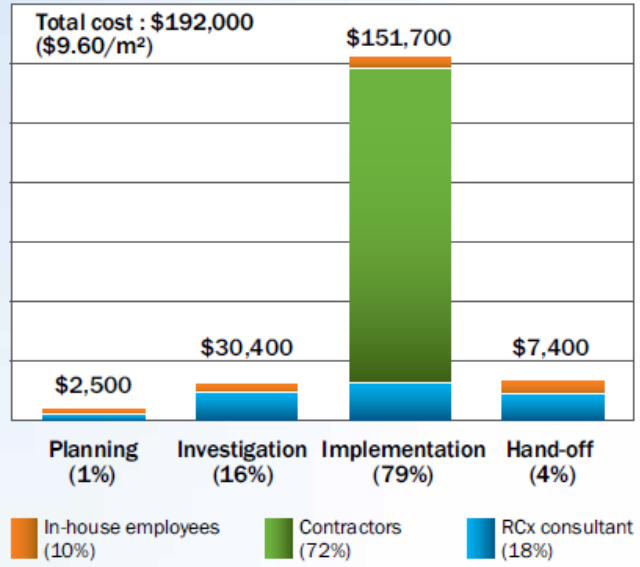
RCx main measures

1. Optimization of ventilation systems
2. Installation of CO_2 sensors
3. Setpoints modification of day and night setback

Results

Energy savings[1] (75% natural gas, 25% electricty)	6,652 GJ/year (25%)
Monetary savings[2]	$59,000/year
GHG reduction (equivalent to 66 cars)	363 t CO_2 e/year
Simple payback period[3]	3.3 years

Cost breakdown



Source: National Resources Canada, CammetENERGY, Catalogue no.: M154-48/2011E

Example of RCx for an Elementary School in Canada

The Our Lady of Peace Elementary School, built in 1968, comprises 1,950 m² of floor area on one single floor. The building accommodates children in kindergarten up to Grade 6. Before the RCx, the annual energy bill was about $44,500. After completion in 2010, the RCx reduced the bill by 17% and focused mainly on the following electromechanical systems:

- Natural gas boiler with 225 kW capacity (23 hp)
- Electric boiler with 150 kW capacity
- Ventilation system with a capacity of 5,700 L/s
- Cooling system with a capacity of 12 tonnes

RCx main measures

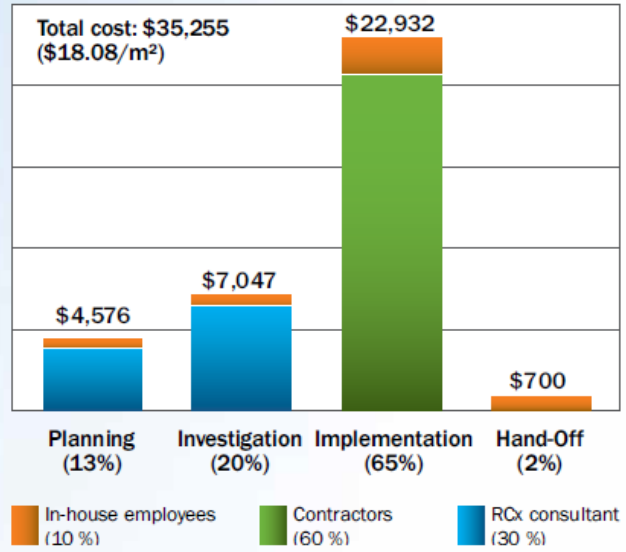
1. Optimization of stop/start commands for the ventilation unit and the main evacuators
2. Restart electric boiler
3. Decrease the temperature during unoccupied periods

Source: National Resources Canada, CammetENERGY, Catalogue no.: M154-48/2011E

Results

- Energy savings[1]: 745 GJ/year (37%)
- Monetary savings[2]: $7,515/year
- GHG reduction: (equivalent to 7 cars) 41 t CO_2 e/year
- Simple payback period[3]: 4.7 years

Cost breakdown



Example of RCx for an Office Building in Canada

About 345 occupants work daily at the CRA Building, a five-storey building of 8,175 m² built in 1995 and located on the Selkirk Waterfront in Victoria. The building houses a number of provincial government department tenants, including BC's forest fire command centre, which operates 24/7 during the peak fire season. Annual energy consumption was about $150,000 before the RCx was done. When completed in 2008, the RCx, focusing mainly on the following electromechanical systems, had reduced the bill by 26%:

- Two natural gas boilers, each with a 325 kW capacity
- Two air handling units with a total capacity of 39,200 L/s
- Two chillers with a total capacity of 80 tonnes

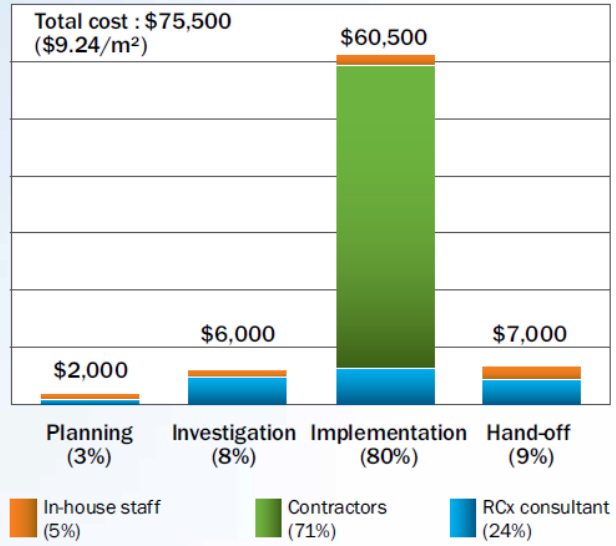
RCx main measures

1. Simultaneous heating and cooling
2. Optimization of variable air volume (VAV) systems
3. Reset of air temperature supply

Results

- Energy savings[1]: 3,042 GJ/year (30%)
  (60% natural gas and 40% electricity)
- Monetary savings[2]: $39,000/year
- GHG reduction: 164 t CO_2 e/year
  (equivalent to 30 cars)
- Simple payback period[3]: 1.9 year

Cost breakdown



Source: National Resources Canada, CammetENERGY, Catalogue no.: M154-48/2011E

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

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