



Carbon and Cost Reduction Plan for the Portuguese National Health Service

Summary Results
2011

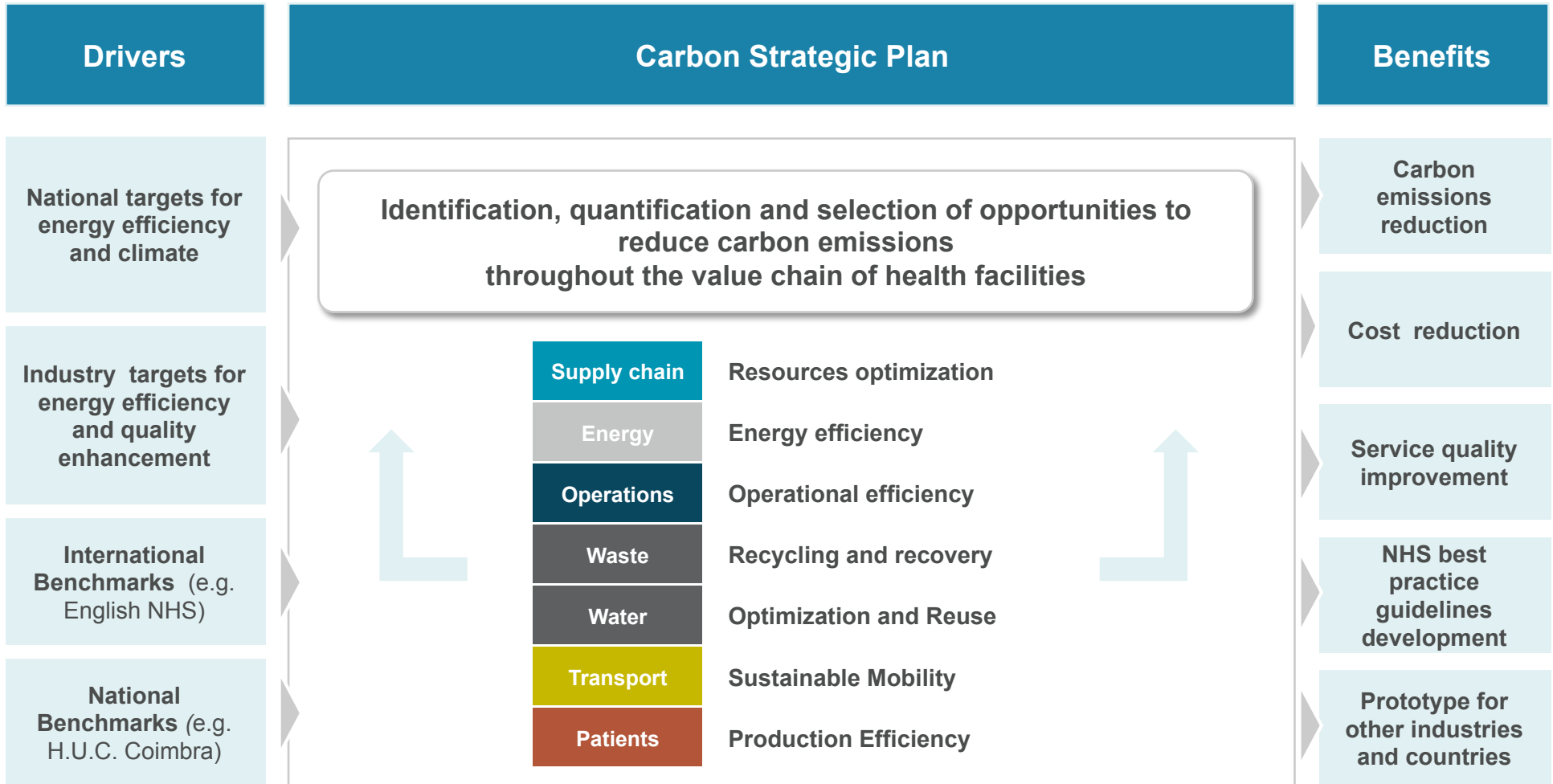


Romeu Gaspar
romeu.gaspar@thisisxy.com



Background & Objectives

This initiative aims to reduce the Portuguese NHS carbon emissions and at the same time, reduce costs, improve service quality and create best practices routines



Source: X&Y Partners



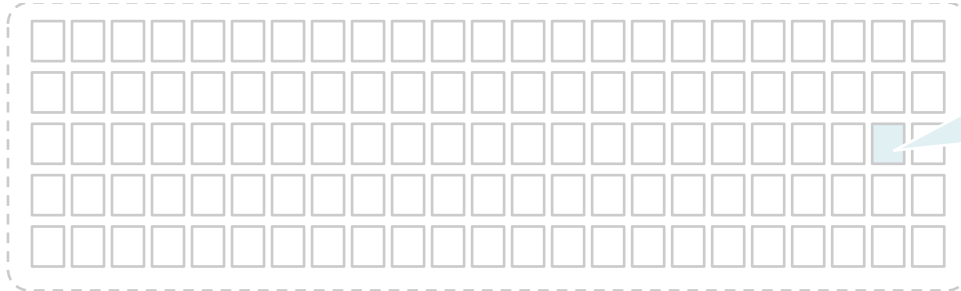
Scope of the pilot project

The pilot project was applied to three facilities in the Lisbon region: two hospitals and a primary care health center

Portuguese National Health Service (NHS)

Pilot project for Carbon Strategic Plan

Primary Health Care Units (346 Health Centers)



HC

Health Centre deployed in an 90's building

Secondary Health Care Units (73 Hospitals)



H1

Hospital with approximately 600 beds and built in the 90's

H2

Hospital with approximately 400 beds and built in the 50's



There are numerous international and national best practices that are potentially applicable to the Portuguese NHS ...

National and international best practices Benchmark

	Supply chain	Energy	Operations	Waste	Water	Transport	Patients
National	<ul style="list-style-type: none">•Inventory management through Kanban software-based	<ul style="list-style-type: none">•LED lighting in exterior facade of Sta. Maria hospital•Energy efficiency in HUC, and HB Curry Cabral•Microgeneration	<ul style="list-style-type: none">•Information and communications technology Program at Pedro Hispano Hospital, Matosinhos	<ul style="list-style-type: none">•Curry-Cabral Hospital – Eco Hospital•Entrajuda Program	<ul style="list-style-type: none">•Rainwater harvesting in several buildings	<ul style="list-style-type: none">•Carris Eco-driving program	<ul style="list-style-type: none">•Baby Care system•Mobile Communicator system
International	<ul style="list-style-type: none">•Sustainable procurement through assessment tools like Ecobuy	<ul style="list-style-type: none">•PLC systems•Painting building roofs white	<ul style="list-style-type: none">•Vodafone energy system efficiency•Cisco Information and communications technology Program	<ul style="list-style-type: none">•Waste management program at University of Washington Medical Center	<ul style="list-style-type: none">•Water management strategy at Royal Children's Hospital, Australia and St. Michael's Hospital, Canada	<ul style="list-style-type: none">•The Green Ambulance Project in Stockholm	<ul style="list-style-type: none">•Norwegian Telemedicine Center



Results of the interviews and visits to the units

... an applicability that was validated by several visits to the health care units and staff interviews, which have shown a considerable interest in this subject

Key survey answers			
Should the NHS be an example of an environmentally sustainable organization?	Maximum effort	High effort	Little/no effort
	66,0%	31,4%	2,6%
How many energy efficiency measures do you use at home?	0	1-2	+2
	5,9%	11,1%	83,0%
How important it is to create a best practice guideline for energy efficiency?	Very important	Important	Little/not important
	70,3%	29,0%	0,7%
Would you agree with waste separation and reuse of administrative material in the hospital?	Yes		No/ Didn't answer
	100%		0%
Would you be willing to replace the paper based structure by a computerized one?	Yes		No/ Didn't answer
	92,8%		7,2%

Sample quotations

“Teaching people to save and turn off the equipment is the key energy efficiency measure that should be implemented.”

“There should be some internal competition between different hospital departments, to enhance the efficiencies and reduced service costs”

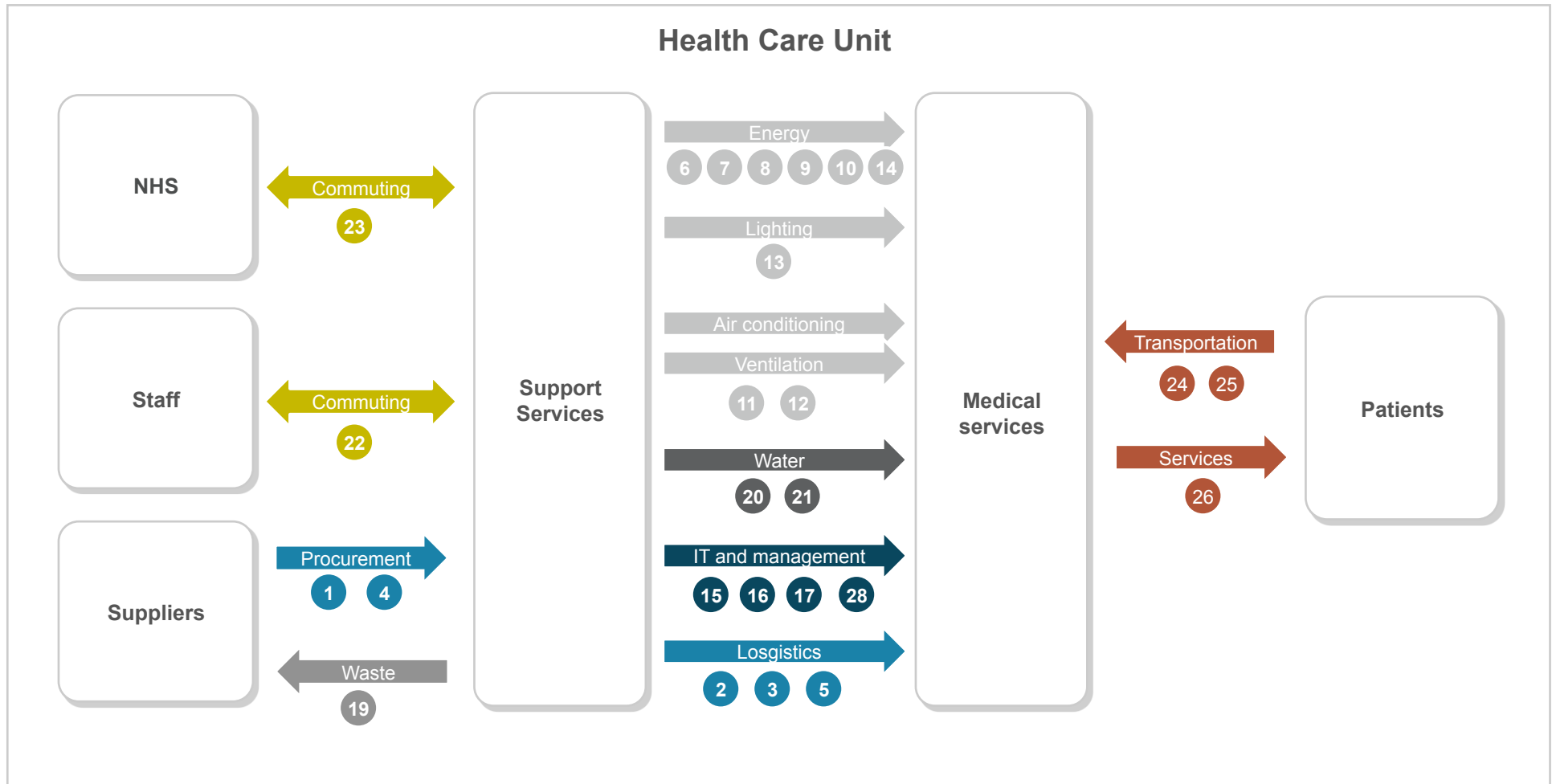
“Changing the patients medical record from paper to electronic format”

Source: X&Y Partners interviews and site visits



Initiatives identified (1/2)

In total, 123 opportunities to reduce emissions and costs were identified, grouped into 26 initiatives...



Legend:

Supply chain

Energy

Operations

Waste & Water

Transport

Patients



Initiatives identified (2/2)

... covering the whole infrastructure and value chain of the health units:

1	Green purchasing implementation processes and systems	13B	Use of more efficient lighting technologies
2	Optimizing medical consumables utilization	14	Optimizing the use of electrical equipment
3	Optimizing administrative consumables utilization	15	Staff training and awareness for resource reduction and optimization
4	Optimization of Stock Management	16	Hardware and software efficiency improvement
5	Reducing meals environmental impact	17	Targets follow-up procedure creation
6	Cogeneration / trigeneration installation and operation		Targets follow-up procedure implementation
7	Use of renewable energy to produce thermal energy	18	Processes dematerialization
8	Use of renewable energy for electricity generation	19	Biomedical waste reduction and triage optimization
9	Optimization of electric bills		Urban waste reduction and triage optimization
10	Improving buildings thermal efficiency	20	Water collection and reuse
11A	Improving climate control systems	21	Water consumption reduction
11B	Improvements to existing HVAC systems	22	Staff commuting optimization
11C	Replacement of existing HVAC systems for more efficient technologies	23	Business travel and equipment transport optimization
11D	Improvements to existing ventilation systems	24	Patients transport optimization between health care units
12	Passive ventilation systems adoption	25	Patient's own vehicle use reduction
13A	Lighting control systems improvement	26	Complementary Diagnostic and Therapeutic Exams request optimization and capacity maximization

Legend:

Supply chain

Energy

Operations

Waste & Water

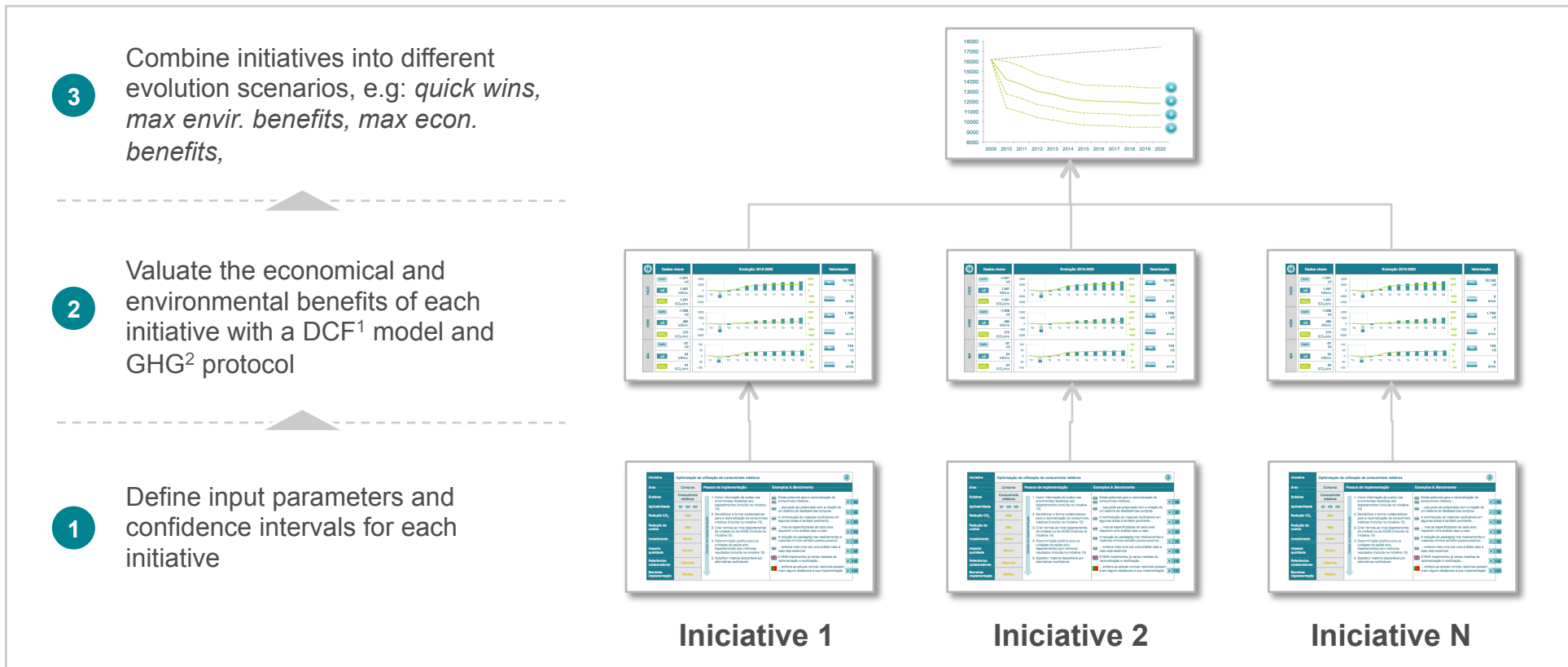
Transport

Patients



Each one of these initiatives was individually valuated, both from an economical and environmental perspective, and then combined into different evolution scenarios

Valuation Methodology



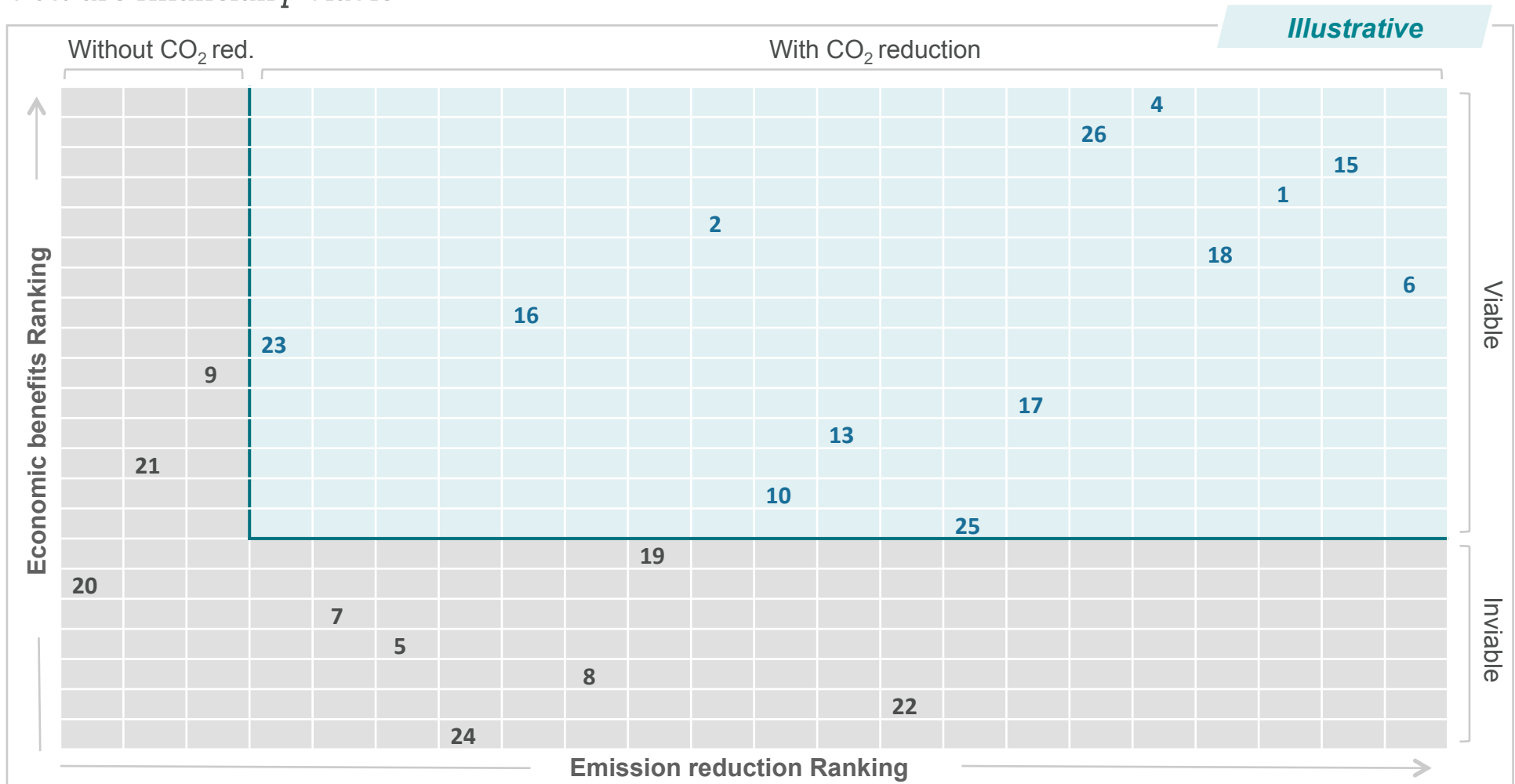
(1): Discounted Cash Flow valuation

(2): Greenhouse Gas Protocol, a standard methodology to calculate carbon emissions



Environmental and economic initiatives ranking

The results show that about 95% of these initiatives result in actual reductions of emissions, and that 70% are financially viable



Source: X&Y Partners



Initiatives selected for each health unit pilot

For each of the pilot units, the evolution scenario which better combines economical and environmental benefits was selected for implementation

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Hospital 1 H1	✓	✓	✓	✓				✓		✓	✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓
Hospital 2 H2	✓	✓	✓	✓		✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓		✓		✓	✓
Health Centre HC	✓	✓	✓	✓				✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓		✓		✓	

Legend:

Supply chain

Energy

Operations

Waste & Water

Transport

Patients



In supply chain, green purchasing and inventory management optimization are two of the most relevant initiatives

1 Green purchasing implementation processes and systems

1. Adopt environmental sustainability criteria in selecting suppliers and procurement decisions
2. Green procurement model creation that allows economic and environmental costs analysis throughout the life cycle of equipment and consumables
3. Implement a staff satisfaction tracking system on procurement, in order to understand whether the equipment meets the service demands and needs

4 Stock Management optimization

1. Optimise stock levels
2. Optimizing the layout of central and advanced warehouses
3. Reduce number of available references and suppliers for each type of materials and consumables
4. Incorporate criteria for environmental impact assessment of packaging solutions
5. Implement advanced processes and systems for receipt, storage, distribution and selection



At the energy level, the initiatives discussed include both structural projects, such as cogeneration, and simple measures such as lighting improvement

6 Cogeneration / trigeneration installation and operation

1. Installation of a trigeneration unit for simultaneous production of electricity, hot water (for heating, sanitary warm water and steam) and cold water (for cooling) from the combustion of natural gas. The system can be configured to produce more electricity than is needed for the hospital, generating scale economies and additional revenues from the sale of electricity to the national grid

13 Lighting systems improvement

1. Installing on/off switches, dimmers and timers
2. Cleaning and maintenance procedures optimization, to ensure that current systems work efficiently
3. Inefficient lighting progressive replacement by new technologies (e.g. electronic ballasts, recent CFL technology, LED)
4. Upgrading the centralized technical management system
5. Architectural review for better use of sunlight (e.g. skylights, natural light entries)



In operations, the behavioral changes and increased use of information and communication technologies will bring relevant environmental and economic benefits

15 Staff training and awareness

1. Information availability on consumed resources costs
2. Ongoing reducing opportunities identification
3. Staff training and awareness to resources optimization
4. Standards and "environmental champion" figure creation, at departmental level, unit or central government
5. Inclusion of results in the Annual Report (or a Sustainability Report creation)
6. Positive discrimination for the units or services with better performance

16 Processes dematerialization

1. Reducing duplication of records in digital and physical form
2. Standards and processes optimization in order to minimize the requirements that compel the creation of paper copies
3. Improving the interoperability between existing applications in order to reduce the need for manual data copies
4. Medical prescription and clinical record platforms roll-out



The environmental and economic benefits of water and waste initiatives are more modest, but the investment needed is also much smaller

15 Water consumption reduction

1. Operating procedures and maintenance optimization in order to promptly identify and solve water leakages
2. Limiters flow installation in toilets, faucets and showers
3. Faucets timers or sensors usage
4. Use of water efficient medical equipment

16 Waste reduction and triage optimization

1. Raising awareness among staff of the proper separation of hazardous and not hazardous medical waste
2. Raising awareness among staff to the proper waste separation between subject and not subject to incineration
3. Waste processing costs communication and/or allocation to each department
4. Municipal solid waste processing implementation and/or optimization, giving priority to paper and paperboard
5. Implementation of collection processes for obsolete equipment



Finally, hospital centralization creates opportunities for travel and transport optimization between units, and for diagnostic capacity maximization

15 Business travel and equipment transport optimization

1. Routes optimization
2. Staff training and awareness for eco-driving
3. Transport selection according to environmental and economic criteria
4. Vehicle fleet maintenance optimization
5. Use of teleconferencing (audio and/or video link), when applicable
6. Fleet gradual replacement for more efficient vehicles

16 Procedure request optimization and capacity maximization

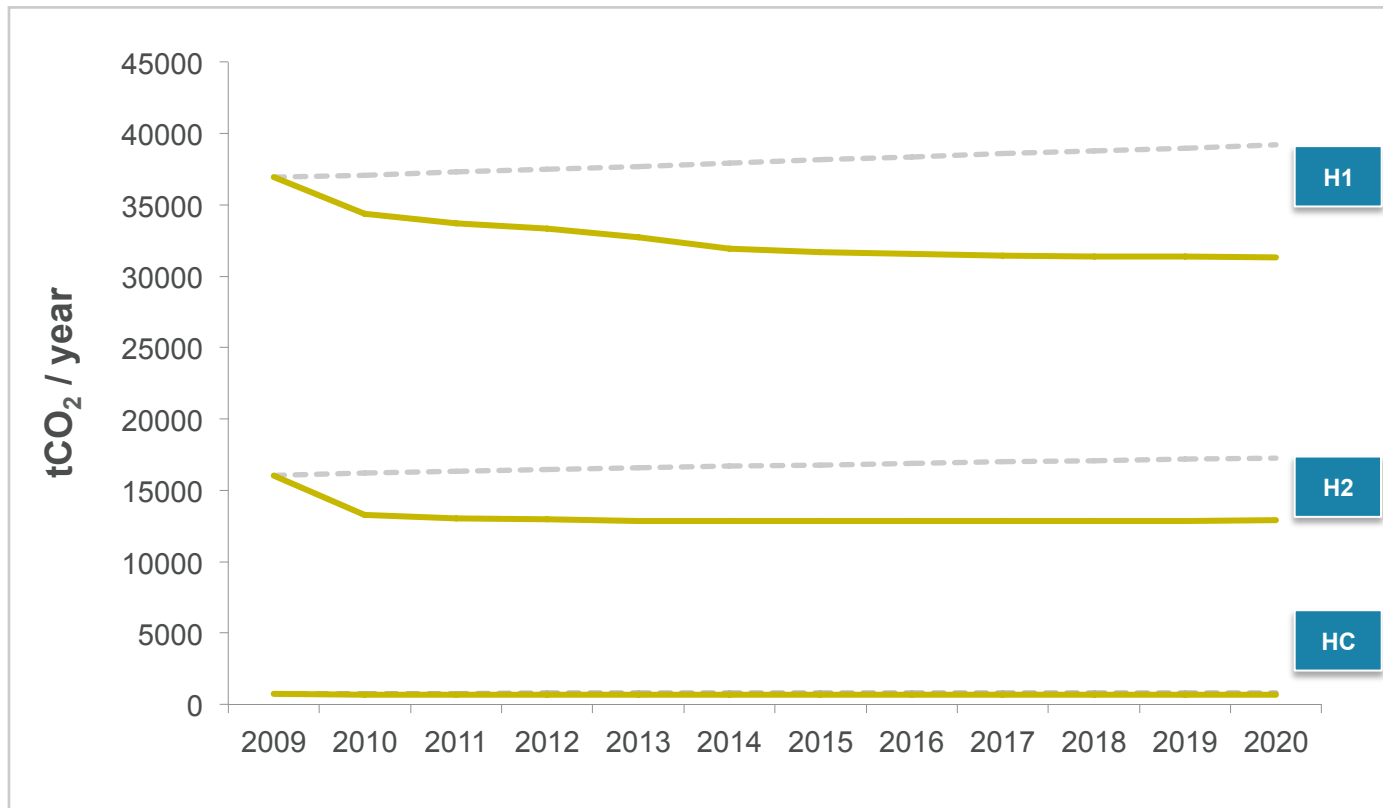
1. Staff awareness to each diagnostic exam costs
2. More stringent approval procedures for medical exams with the highest cost
3. Capacity maximization through agreements with other NHS and private units



Expected results for carbon emissions

In total, the financially viable initiatives will allow, by 2020, a reduction in carbon emissions between 13 and 20%

Emissions expected trend compared to baseline¹



Key Data

H1	Baseline +6% (2009-2020)
	Recommended Scenario -15% (2009-2020)
H2	Baseline +8% (2009-2020)
	Recommended Scenario -20% (2009-2020)
HC	Baseline +10% (2009-2020)
	Recommended Scenario -13% (2009-2020)

(1): Emissions expected trend without reduction initiatives implementation

--- Baseline
— Recommended scenario

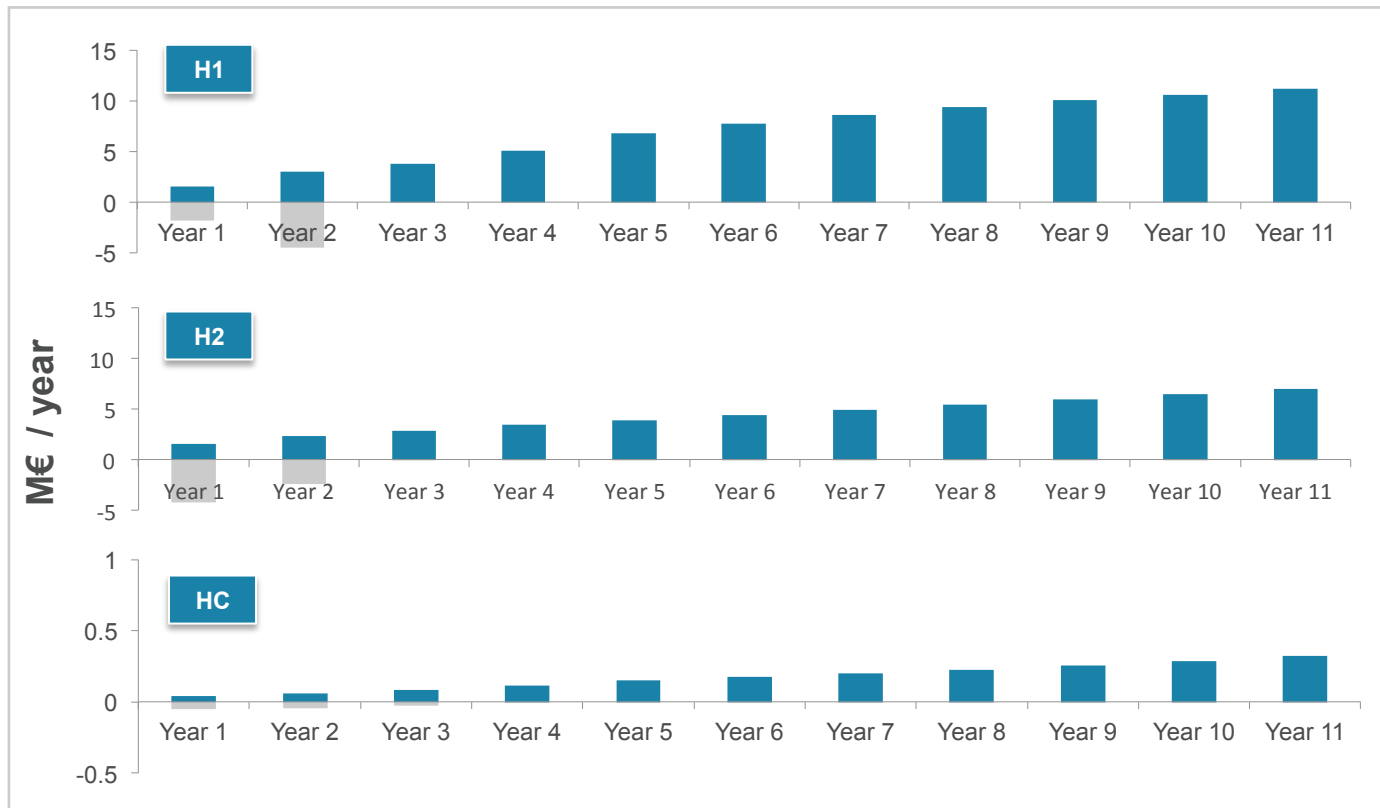


Expected cost reductions and required investment

The direct costs reductions associated with these environmental benefits are substantial; 7.1 M€/year and 4.4 M€/year in the hospitals and 174 k€/year in the health center

Cost reductions achieved and the required investments

Key Data



Legend CapEx (investment costs) Direct cost reductions (for Health Care Units)

H1

Cost reduction
7,1M€/year (average)
Investment
6,3M€

H2

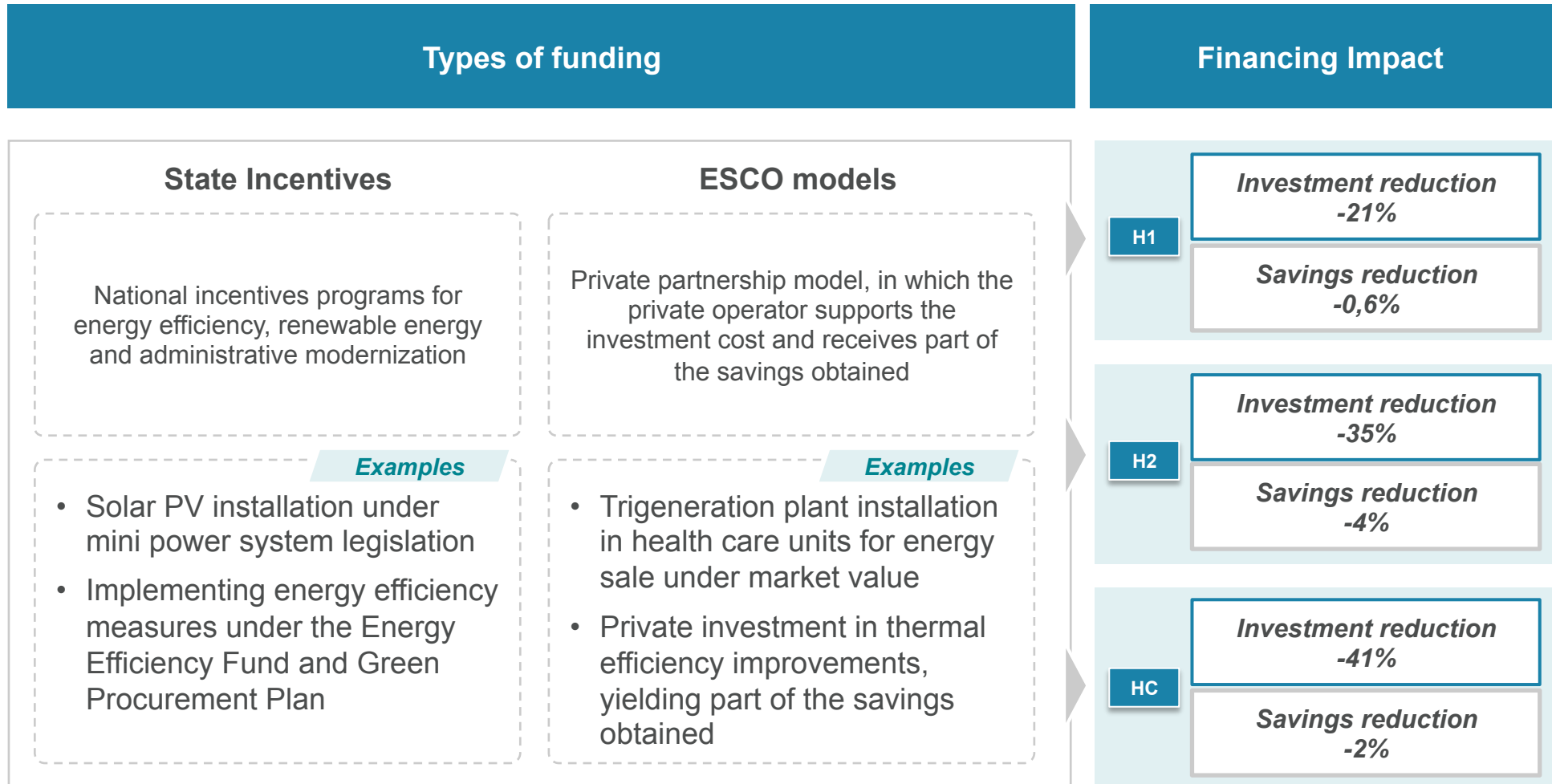
Cost reduction
4,4M€/year (average)
Investment
6,6M€

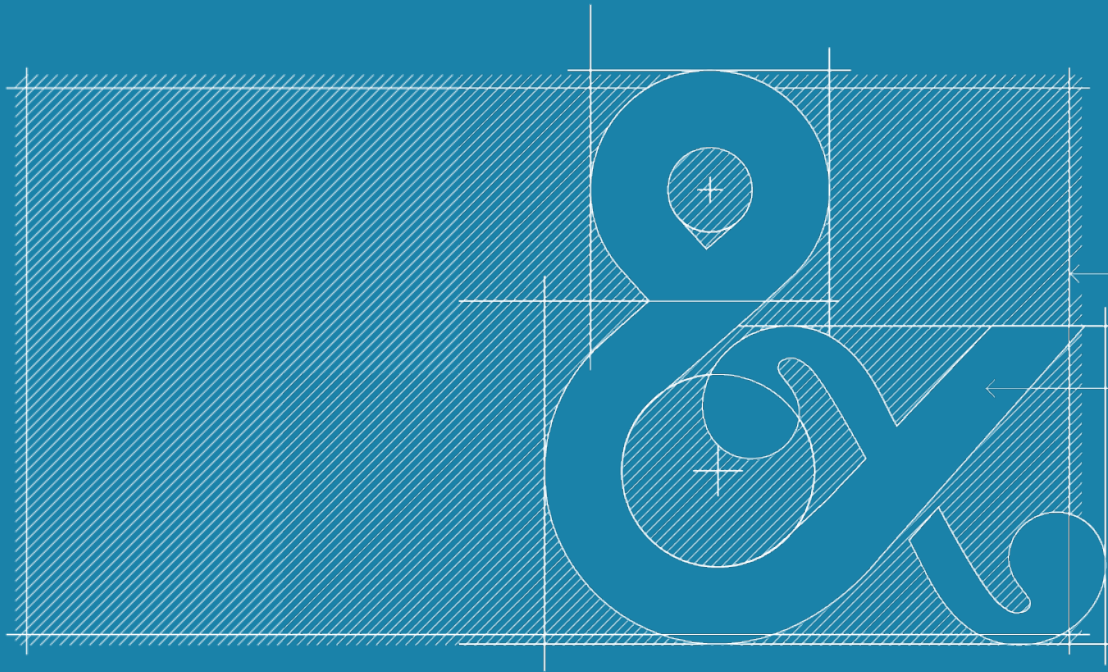
HC

Cost reduction
174k€/year (average)
Investment
137k€



The required equity capital investment can be lowered by using various types of funding, with small impact on savings





straight answers

for emerging issues

X&Y PARTNERS

X&Y is an expert advisory firm, providing multi-disciplinary, structured and quantified answers in emerging areas such as energy, climate change and advanced technologies. We work with both the private and public sectors, either individually or together with other professional service companies, such as investment, legal and engineering firms. Our assignments can range from a single expert call to multi-year projects.

To get to know us better, please contact us or browse the content we publish regularly on a wide range of topics.

www.thisisxy.com