SUSTAINABILITY REPORT 2018

PARTNERSHIPS FOR IMPACT

DANISH ENERGY MANAGEMENT
DEM
FOR SUSTAINABLE IMPACT

On the Cover: Kalvebod Fælled School

DEM participated in the building of this new school designed by Lundgaard & Tranberg Architects. DEM had the overall responsibility for Sustainability, energy consultancy, indoor climate as well as the technical inspections during the construction of the building. The overall focus on sustainability helped to create the fundamental design parameters, and was a primary focus throughout the different stages of the project. From working with urban space, to the geometry and physical appearance of the building, to installations, operations and use of the buildings resources, to the overall economy, this school building is a beacon for sustainability.

Photo credit: Emilie Koefoed

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WE SUPPORT UN GLOBAL COMPACT

Issued: February 2019

PARTNERSHIPS FOR SUSTAINABLE IMPACT

Many companies, and particularly small and medium sized businesses, have found it difficult to see how the Sustainable Development Goals (SDGs) can lead to concrete market opportunities. At DEM, we recognized this opportunity early on, and have been working actively to realize this link. Over the past year we have delivered a broad range of services related to the SDGs, including business strategies, sustainability plans, marketing strategies, as well as developing cases, action plans and road maps. How does DEM achieve sustainable impact through these services? The answer lies in working with partners who are actively engaged in providing increased sustainability in their communities – whether in the US, Asia or in Denmark. These partnerships generate revenue for DEM, but more than that, projects are achieving real, measurable, sustainable impact around the world.

In addition to the sustainability services that we provide, and in order to walk-the-talk, we have also incorporated the SDGs into our own business strategy. Our motivation for incorporating these Goals into our business strategy has been supported by our firm belief that "what gets measured, gets done". For this reason, and for the third year in a row, we are measuring progress towards achieving the SDGs across all projects in Denmark and internationally, with thirty defined indicators in our online SDG reporting system. The annual results that are found in this report on page five also shows our employees the real, positive, difference their work makes in communities around the world.

While the SDGs provide a focus on the sustainable impact of our projects, the Global Compact and its ten

principles provide a clear way to evaluate our internal company sustainability, helping us to continually improve. Together, the SDGs and the Global Compact help DEM to approach sustainability in a holistic way, the benefits of which are passed directly on to each of our partners.

Yours sincerely

Jørn Lykou
CEO

DEMs COMPANY IMPACT MEASUREMENT

At DEM, we understand that the business case for sustainability is well established. Having identified the SDGs that are most closely related to our market areas, we are able to integrate these goals across our business in a holistic way. Since 2016, DEM has been using our online SDG Reporting System to measure sustainable impact and progress towards SDG 7, 11, 13 and 17 across all projects on an annual basis. Each relevant SDG, actionable SDG Target, and company specific indicator is connected to our financial system so that impact can be measured both in terms of monetary value, and in terms of hours worked. Aligning with the SDGs has enabled us to set more meaningful goals for ourselves and communicate more effectively with our partners about our commitment to sustainable development.

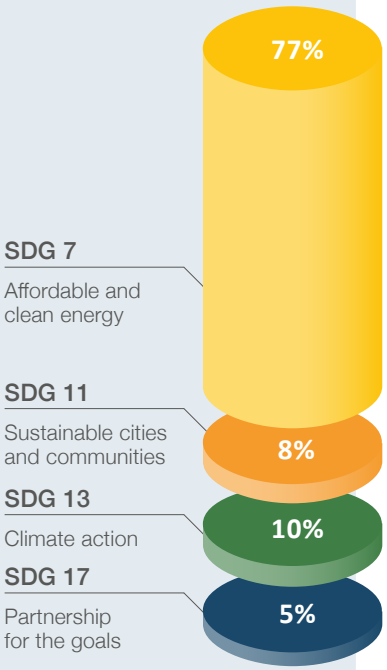
DEM MARKET AREAS CONTRIBUTING TO THE GLOBAL GOALS

- **Energy & Climate**
- **Sustainable Buildings & Cities**
- **Monitoring & Evaluation**
- **Sustainability (SDG) & Energy Management**
- **ESCO & Energy Performance Contracting (EPC)**
- **Technical Client Consultancy**

ACCUMULATED PROJECT SDG AND TARGET IMPACT

For each of the SDGs and SDG Targets that we work with directly, we measure progress towards sustainable development and also provide performance metrics that complement official data. Here is a visual representation of employee working hours, as they relate to our primary Sustainable Development Goals and SDG Targets.

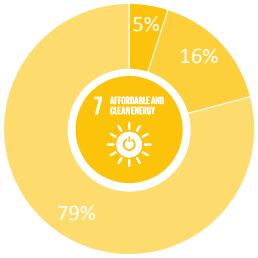
DEM DISTRIBUTION OF WORKING HOURS IN SDGs 2017-18



5 %

OF EMPLOYEE WORKING HOURS CONTRIBUTED SPECIFICALLY TO SDG 17 THROUGH EG. SUPPORTING NATIONAL PLANS AND DEVELOPING SYSTEMS IN DEVELOPING COUNTRIES

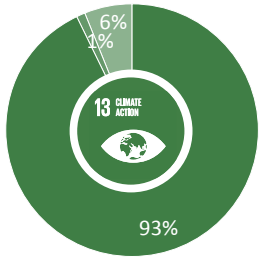
DEM DISTRIBUTION OF WORKING HOURS IN SDG TARGETS 2017-18



SDG 7.1
Ensure universal access to energy services

SDG 7.2 RE
Increase share of renewable energy globally

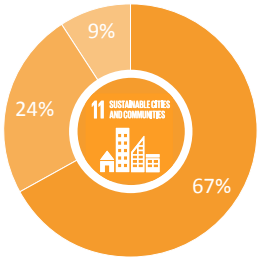
SDG 7.3 EE
Double the rate of improvement in energy efficiency



SDG 13.1
Strengthen resilience and adaptive capacity to climate-related hazards

SDG 13.2
Integrate climate change measures into national policies

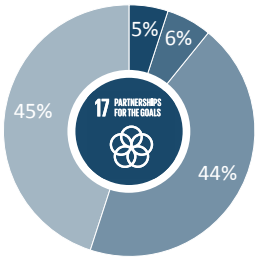
SDG 13.3
Improve education, awareness-raising and human and institutional capacity



SDG 11.1
Ensure access to housing and basic services

SDG 11.3
Enhance inclusive and sustainable urbanization

SDG 11.6
Reduce adverse impact of cities through waste management



SDG 17 FINANCE
Funds mobilized for sustainable development

SDG 17 TECHNOLOGY
Technology transfer initiatives in developing countries

SDG CAPACITY BUILDING
Support for national plans and capacity building

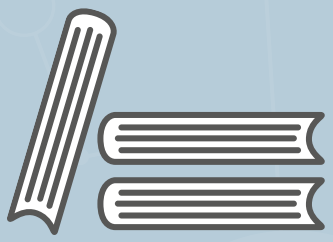
SDG SYSTEMIC ISSUES
Statistical and data handling systems or platforms

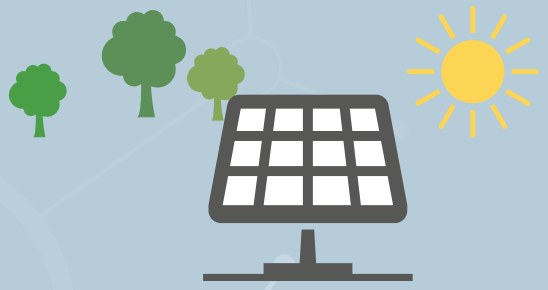
OVER 90 %

OF OUR WORK WITH CLIMATE ACTION CONTRIBUTED TO STRENGTHENING RESILIENCE AND ADAPTIVE CAPACITY

19 NATIONAL STUDIES

INCLUDING ACCESS TO RENEWABLE ENERGY OR IMPROVED ENERGY EFFICIENCY IN DEVELOPING COUNTRIES





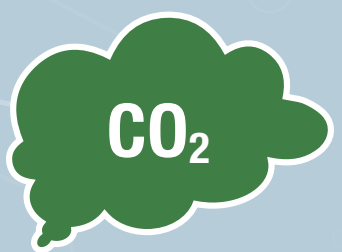
506 GWh* INCREASE

IN RENEWABLE ENERGY PRODUCTION

13 CLIMATE ACTION

7 AFFORDABLE AND CLEAN ENERGY

ACCUMULATED PROJECT IMPACT



1.77 MILLION tCO_2* SAVED

IN RENEWABLE ENERGY AND ENERGY EFFICIENCY

*Calculation of annual contribution, based on relative project lifetime

40 THOUSAND HECTARS **LAND**

INCLUDING INITIATIVES FOR BECOMING SUSTAINABLE OR CO_2 NEUTRAL

17 PARTNERSHIPS FOR THE GOALS

11 SUSTAINABLE CITIES AND COMMUNITIES

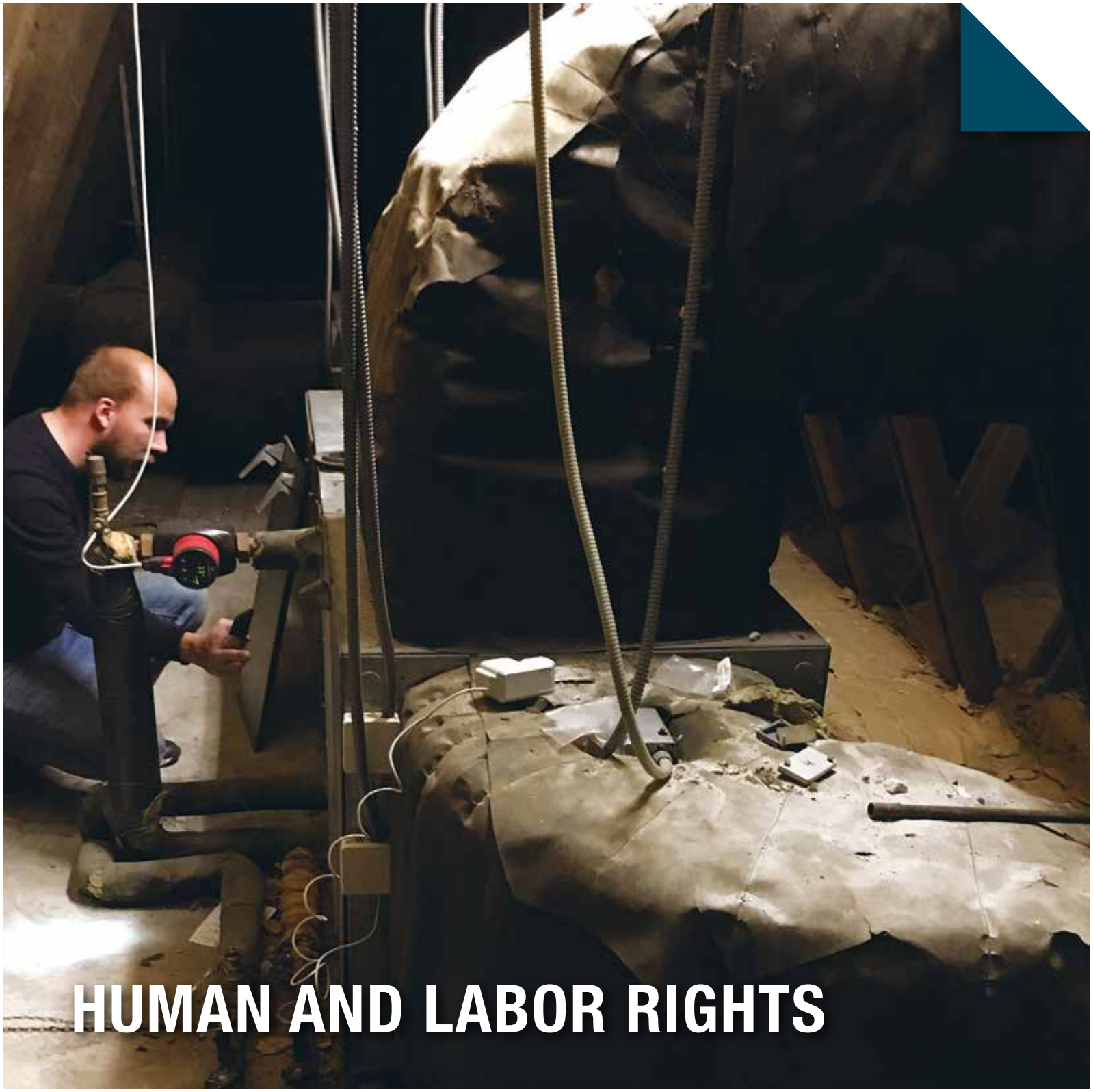
For each of the SDGs and SDG Targets that we work with directly, SMART indicators act as a report card to measure progress toward sustainable development, and also provide performance metrics that complement official data. These figures represent the collective employee contribution to specific SMART indicators across all projects calculated for the 2017-2018 reporting year.

7 PROJECTS SUPPORTING CAPACITY BUILDING

FOR SUSTAINABLE DEVELOPMENT IN DEVELOPING COUNTRIES

OUR FOOTPRINT

At DEM our vision is to build a future where energy is applied efficiently and sustainably in an affordable way. Focusing on a sustainable future means setting clear and transparent expectations – from respecting human and labor rights to minimizing environmental impact.



HUMAN AND LABOR RIGHTS

HUMAN RIGHTS

DEM is committed to ensuring equal opportunities. We respect cultural differences and see these differences as a strength allowing us to achieve our vision and tailor our consultancy services to the needs and requirements of our clients and partners. Working in partnerships, we respect and protect all internationally proclaimed human rights and strive to prevent any form of discrimination.

LABOR STANDARDS

DEM respects all international declarations adopted by the International Labor Organization.

- Fair wages reflect the qualifications of employees and the local average wage level.
- We do not accept any form of forced labor and/or child labor under any circumstances and include this as a parameter when choosing sub-suppliers and sub-contractors.
- We respect the freedom of association and the right to collective bargaining.
- We have developed and implemented structured plans for continued education for all groups of our employees and we support employee initiatives to upgrade their qualifications.
- We provide private health insurance promoting early treatment and wellbeing.
- We endeavor to secure a balance between work and family through a designated Sustainable Working Culture Group.

EMPLOYEE FOCUS ON SUSTAINABLE WORKING CULTURE

At DEM, we have been placing increased focus on stress-prevention measures in the workplace. This initiative was launched at a summer event for all employees, followed by the establishment of a Sustainable Working Culture group. The purpose of this new group is to create a sustainable working culture among all colleagues, and the group has now launched a campaign to incorporate and encourage exercises as a natural part of work routines.

The campaign is structured in two modules. In the first module, employees are introduced to new exercises that are designed to relieve mental tension and promote physical activity and wellbeing. In the second module, exercises are repeated in small groups as a competition, where employees compete for the highest score and prizes. The exercises are also combined with presentations that include topics such as sleep and mental capacity.

The first Sustainable Working Culture campaign at DEM will be rounded off at the next annual summer party, and the Sustainable Working Culture group will work continually on promoting issues related to the good health and wellbeing of employees.

A CULTURE OF WORKING SUSTAINABLY

At DEM, a sustainable working culture is in many ways something that has always existed in the company. Just as the Sustainable Working Culture group is currently introducing new exercises into work routines, many of the standing traditions in the company also promote a work culture filled with participatory actives that bring employees together.

Ski trip to Norway

For example, each new year starts with a ski trip to Norway, where employees from the offices in Denmark are together for an extended weekend. This provides colleagues with the opportunity to get to know one another on a more personal level, combined with plenty of fresh air, beautiful vistas and exercise.

In May, the We Bike To Work campaign begins, were employees compete in teams for prizes based on the distance they bike throughout the month. To aid this initiative, DEM now has a shower available for employees biking long distances in both Copenhagen and Aarhus, and there are also plans to install outdoor bike pumps to promote biking among our employees.

In summer, DEM participates in the annual DHL relay race with a great outdoor atmosphere, open tents for eating together and fireworks over the sea to end the event. The annual DEM summer party also invites employees from all offices to participate in activities, have dinner together, and enjoy the light Danish summer night.

Throughout the fall season, fieldtrips are planned to the projects that are currently being implemented. This gives all employees a flavor for what their work is contributing to out in the wider community.

By the time December rolls around Danish 'hygge' is at its best. Our annual Christmas lunch, Holiday Bingo, and winter company party all contribute to a cozy atmosphere and a culture of working in a way that is inviting and sustainable for all employees at DEM.

Summer party

DHL relay race

Fieldtrip to Kalvebod Fælled public school

This is the third year that DEM has produced a Carbon Footprint Report. Over the past year, optimizations and improvements have been made that enable us to be more precise in our emissions reporting.

Hvidebæk biomass district heating plant

ENVIRONMENTAL CARBON FOOTPRINT REPORT

ORGANIZATIONAL AND OPERATIONAL BOUNDARIES AND BASE YEAR

This carbon footprint report estimates the GHG-emissions caused by DEM activities in the reporting year 2018 (May 1, 2017-April 30, 2018). The base year for reporting on verifiable emissions data is the 2015 reporting year. The operational boundary covers scope 1, scope 2, and part of scope 3 (business travel) with relation to all DEM offices in Denmark. Figures provided follow the Green House Gas (GHG) protocol, and the GHG calculation tool provided by the World Resources Institute. In addition to international offices, DEM owns 51 percent of the company DEEP A/S (Danish Energy Efficiency Partners Sdn. Bhd.). However, the activities of offices abroad are considered to be outside the operational boundaries of this report.

The DEM offices included in the 2018 reporting year are: • Aarhus • Sønderborg • Copenhagen

To calculate results, emissions are categorized as either direct (Scope 1) or indirect (Scope 2 & Scope 3). Direct, Scope 1, emissions are those that are directly caused by a source that the company owns or controls. Indirect, Scope 2 and Scope 3, emissions are derived from the company's consumption of energy products and services, where the company does not own or control the emissions source. In the case that these activities represent a combined 10 percent change in the base year emissions, DEM will conduct a recalculation and back-cast these data points.

FOLLOWING THE GHG PROTOCOL CORPORATE STANDARD, THE DIRECT AND INDIRECT EMISSIONS ARE DIVIDED INTO THREE SCOPES:

SCOPE 1: **All direct emissions caused by the company, e.g. emissions from company owned cars, or combustion of fossil fuels such as natural gas in company-owned equipment**

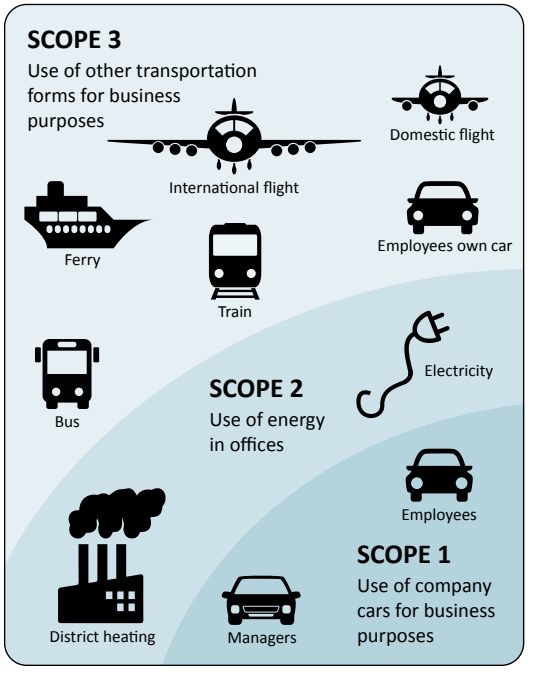
- Use of company cars for business purposes – managers
- Use of company cars for business purposes – employees

SCOPE 2: **All indirect emissions caused by the company's purchase of energy**

- Electricity use in offices
- District heating used in offices

SCOPE 3: **Other indirect emissions caused by consumption of products and services**

- Use of employee cars for business purposes (car allowance)
- Transportation by train
- Transportation by bus
- Transportation by ferry
- Domestic air transport
- International air transport

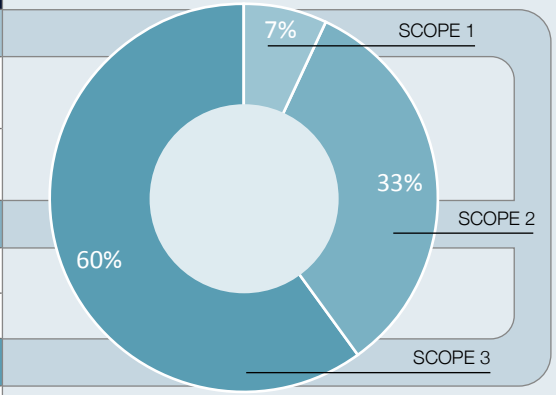


TOTAL CO_2 EMISSIONS IN THE 2017-2018 REPORTING YEAR

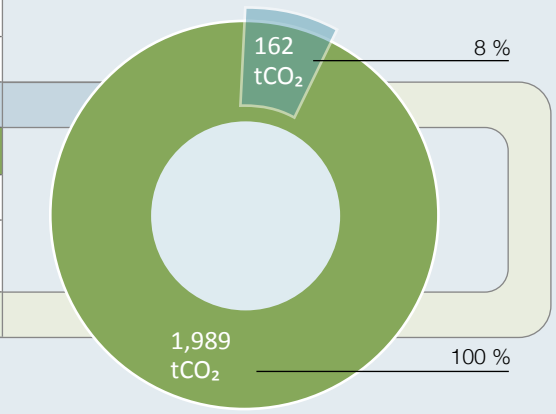
ACTIVITIES	DISTANCE (km)	ENERGY CONSUMPTION/ PRODUCTION (kWh)	CO_2 EMISSIONS (tCO_2)
SCOPE 1			
Use of company cars for business purposes – managers	11,818		3.0
Use of company cars for business purposes – employees	54,131		8.1
SCOPE 2			
Electricity use in offices		101,447	29.6
District heating use in offices		147,887	23.2
SCOPE 3			
Use of employee cars for business purposes	118,633		17.1
Transportation by train	30,373		1.5
Transportation by bus	1,408		0.1
Transportation by ferry	12,160		1.5
Transportation by taxi	1,854		0.3
Domestic air transport	*		2.4
International air transport	*		74.9
Total	**230,377**	**249,334**	**161.9**
OFFSETS			
Middelgrunden offshore wind farm		255,038	74.4
Hvidebæk biomass district heating plant/ solar thermal		12,200,000	1,914.9
Total		**12,455,038**	**1,989.0**

* Number of kilometers flown is not provided because our calculation methodology takes point of departure in take-off and landing destinations.

% CO_2 EMMISSIONS DISTRIBUTED BY SCOPE



ENERGY USED BY DEM IS EQUIVALENT TO 8% OF THE RENEWABLE ENERGY GENERATED BY OFFSETS



At DEM, there are no boilers etc. in buildings that could contribute to own oil/gas use. For this reason, our Scope 1 consists of “use of company cars for business purposes – managers” and “use of company cars for business purposes – employees.” The company cars used by managers as their personal car only registers the kilometers driven to and from work, and to and from clients for business purposes.

LIVING BY OUR VALUES

DEM follows the *OECD's Guidelines for Multinational Enterprises**, using these as a standard for business practice. These Guidelines are multilaterally agreed, providing principles and standards for responsible business conduct in a global context. DEM is also committed to working towards sustainable development with a systematic approach, and in line with the Global Compact and its ten principals. Within DEM, this approach ensures that human rights are respected, labor standards are met, environmental impact is minimized, and a zero-tolerance policy is practiced with regard to corruption, collusion and bribery.

It has now been three years since DEM incorporated the Sustainable Development Goals into our company vision and values, creating an even stronger foundation for transparency in all our work around the world. The first of our values is linked to SDG 7 – Clean Energy, highlighting our motivation to provide sustainable energy services when and where they are needed, increasing energy efficiency and the share of renewable energy in the global energy mix.

The second of our values is linked to SDG 11 – Sustainable Cities, underlining our commitment to improving people's living conditions and contributing to the creation of sustainable cities and communities. The third of our values is linked to SDG 13 – Climate Action, emphasizing our ability to be creative and adaptable, combating climate change and meeting customer needs with innovative solutions. Last but not least, our fourth value is linked to SDG 17 – Partnerships, demonstrating our willingness and desire to foster cooperation and mutual trust within all of our partnerships, maintaining a high standard of social responsibility and business ethics in a transparent manner.

In practice, these four values mean that all of our partners, employees, clients, and investors can place confidence in the company's performance, with a clear understanding of what we are doing and why we are doing it. 'Living by our values' means that each individual at DEM holds themselves to the highest ethical standards and can clearly communicate this through their work and behavior.

DEMs values demonstrate a willingness and desire to foster cooperation and mutual trust within all of our partnerships, maintaining a high standard of social responsibility and business ethics in a transparent manner.

*www.oecd.org/daf/inv/mne/48004323.pdf

TARGETS AND ACHIEVEMENTS

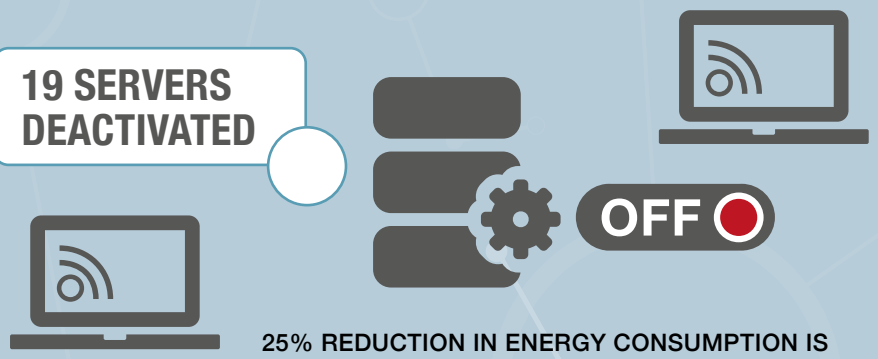
Progress: ▲ Achieved ● In progress ■ Delayed

OBJECTIVE	INITIATIVE	DESCRIPTION	TIME FRAME	STATUS
Sustainable energy & contributing to the achievement of 2030 objectives	Solar panels	Solar panel on the roof of HQ to cover a percentage of the energy consumption	1 year	●
Reduction of CO_2 emissions & contributing to the achievement of 2030 objectives	Hybrid or electric car	For offices in Denmark, replace company cars with electric or hybrid cars. The Copenhagen office now has a hybrid car	2-3 years	●
Environmental sustainability and contributing to achievement of 2030 objectives	Become an active member in the Global Compact	Ongoing active participation in the Global Compact. DEM presented cases for the Global Compact Nordic Network in 2018	Achieved	▲
CO_2 reduction and employee health and well-being	"We Bike To Work" initiative	Starting May 1st of each year, employees create teams and compete to see which team has biked the most kilometers during the month	Achieved	▲
CO_2 reduction and contributing to achievement of 2030 objectives	Paper recycling	Separate and recycle paper	1-2 years	■
CO_2 reduction and employee health and well-being	Electric bicycles	Electric bikes (with company logo) for meeting activity in Aarhus/Copenhagen area, to reduce the use of company cars	1 year	●
CO_2 reduction and employee health and well-being	Air pump for bicycles	Establishment of a permanent air hose for pumping bicycles in Aarhus and Copenhagen	1 year	●
CO_2 reduction and employee health and well-being	Bike mechanic visits	Visits from the bike mechanic scheduled at regular intervals	1 year	●
Environmental sustainability	Organic fruit and milk	Organic Fruit from okolageret.dk	Achieved	▲
Environmental sustainability and energy savings	Lighting	LED lighting in the offices and motion sensors. Achieved for the Copenhagen office	Aarhus 1-2 years	●
Environmental sustainability and energy savings	Optimized temperature regulation	Copenhagen office has new, intelligent thermostats for temperature control and optimization	2 years	●
Environmental sustainability and energy savings	Power savings strips	Can substantially reduce the amount of power used when combined with an awareness campaign	Ongoing	■
Environmental sustainability and employee health and safety	Ventilation	Regulation of the existing ventilation and installation where it is needed, improving energy savings and employee health	2-3 years	●

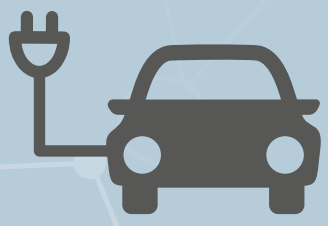
OBJECTIVE	INITIATIVE	DESCRIPTION	TIME FRAME	STATUS
Environmental sustainability and contribution to achievement of 2030 objectives	Water saving	Water saving taps, dishwashers, etc.	Achieved and ongoing	▲
Employee well-being and positive work environment	Employee association	Association that arranges activities like fishing, game nights, etc. for employees and their families at regular intervals. This is now being formalized to a greater extent through the sustainable working culture group	Achieved	▲
Employee well-being and positive work environment	Knowledge and innovation project	Three year project in connection with the Danish Innovation Fund focusing on DEM knowledge sharing and innovation processes	1 year	●
Employee health, safety and well-being	Workplace risk assessment (APV)	Screening to evaluate work environment and improvement areas	Achieved and ongoing	▲
Employee health and well-being	Employee stress-prevention initiatives	The Sustainable Working Culture group is implementing initiatives for stress prevention across the organization	1 year	●
Employee health and well-being	Private health insurance	Promoting good health by contributing to access to medicines and vaccination, and early detection of diseases	Achieved	▲
Employee health and well-being	Incorporate the 6th vacation week	Employees begin getting additional time for vacation in 2016, and the 6th vacation week will be fully rolled out by the end of the reporting year 2018-2019	1 year	●
Employee well-being	Pension	Pre-existing pension is being incrementally improved, and will be fully rolled out in 2020	2 years	●
Employee health and well-being	Access to employee shower facilities	For employees who bike to work	Achieved	▲
Employee health and well-being	Sustainable working culture group	New group established with a focus on work/ Life balance, and working with sustainable projects, teams and processes	Achieved	▲
Environmental sustainability and energy savings	Shutting down of 19 servers	Expected energy consumption reduced by 25%. Further reduction of 4 to 5 servers over the coming year	Achieved	▲
Employee well-being	Update of employee handbook	Sustainable Working Culture, 6th vacation week, knowledge sharing policy and private health insurance included in the employee handbook	1 year	●
Employee health and well-being	Flexible working hours to accommodate private appointments	“Freedom with responsibility” – a long-standing company tradition at DEM	Achieved and ongoing	▲
Knowledge sharing and positive work environment	Implementing new document handling systems	Moving employees to a cloud based, administrator driven file structure and accompanying information sharing platforms	0ngoing	●

Delayed initiatives: With relation to paper recycling power saving strips, these initiatives are planned to be achieved within the 2018-2019 reporting year. For paper recycling, the municipal regulations for paper handling has been a limitation.

19 SERVERS DEACTIVATED



25% REDUCTION IN ENERGY CONSUMPTION IS EXPECTED, CONTRIBUTING TO ENVIRONMENTAL SUSTAINABILITY AND ENERGY SAVINGS.



COMPANY CAR GOES HYBRID

THE COPENHAGEN OFFICE NOW HAS A HYBRID CAR, CONTRIBUTING TO THE REDUCTION OF CO_2 EMISSIONS AND THE ACHIEVEMENT OF 2030 OBJECTIVES.

FOR EMPLOYEES BIKING TO WORK,
NEW SHOWER FACILITIES ARE NOW AVAILABLE.

SHOWER FOR THOSE WHO BIKE TO WORK

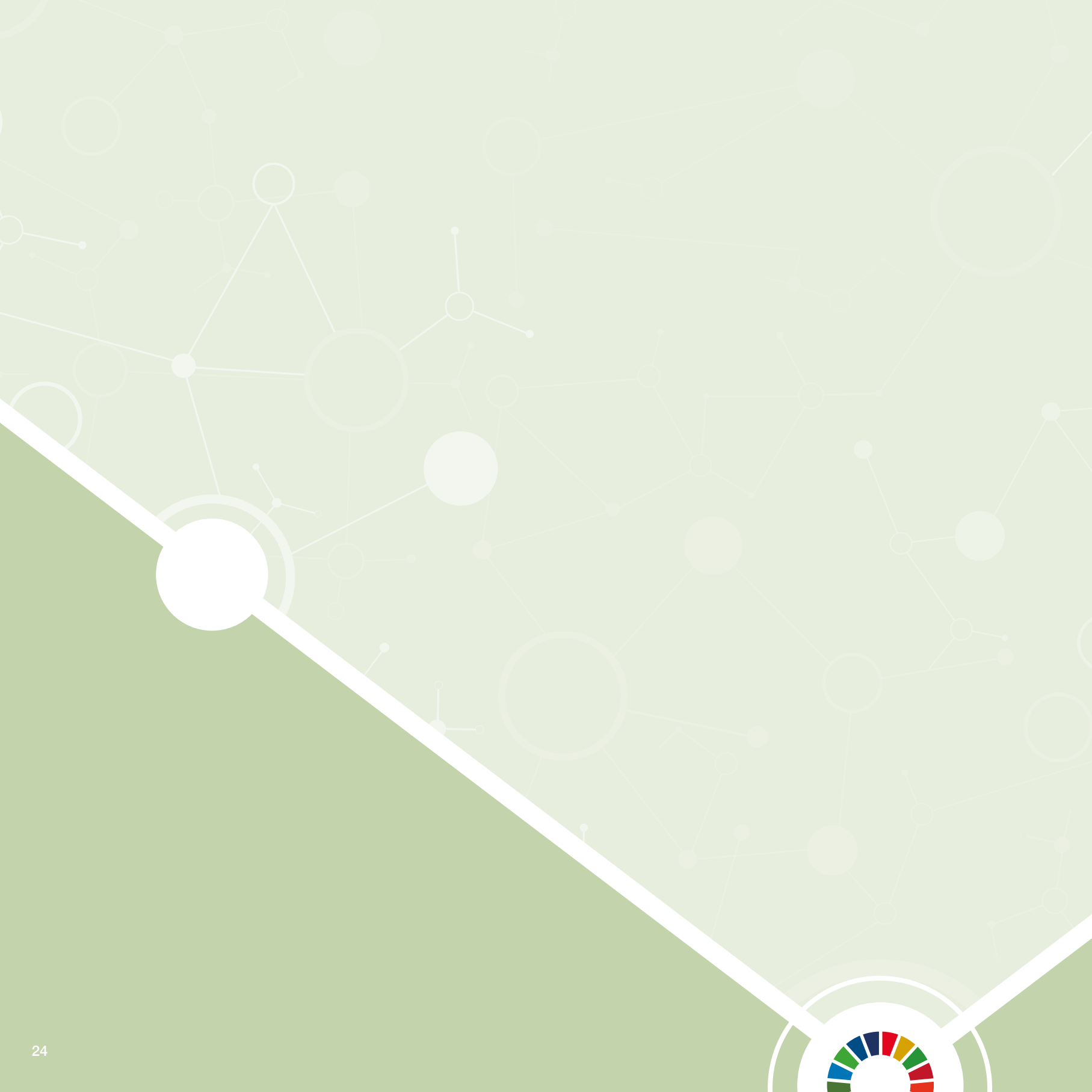
2018 SUSTAINABILITY HIGHLIGHTS

A SUSTAINABLE WORKING CULTURE EMPLOYEE GROUP IS NOW FOCUSING ON WORK/LIFE BALANCE, AND WORKING WITH SUSTAINABLE PROJECTS, TEAMS AND PROCESSES.

SUSTAINABLE WORKING CULTURE

HEALTH INSURANCE

ALL EMPLOYEES NOW HAVE PRIVATE HEALTH INSURANCE, PROMOTING GOOD HEALTH AND WELLBEING.



OUR IMPACT

SUSTAINABILITY (SDG) MANAGEMENT SERVICES

The United Nations Sustainable Development Goals (SDGs or Global Goals) have created a new platform and framework for working with sustainability. These Global Goals prioritize and place focus on environmental, social and economic sustainability. They are a driving force opening-up new business opportunities by enabling organizations to work in partnerships to meet the growing sustainability demand of consumers and our planet.

As a leading consultancy working with the UN Sustainable Development Goals, DEM assists private companies and public institutions in Denmark and abroad in converting the Global Goals into new business opportunities. As first-movers in the area, we regularly arrange workshops and present at conferences in New York where the SDGs were launched, as well as in Denmark and around the world. These engagements give us the opportunity to share our knowledge and experience and provide recommendations regarding how to work with and measure sustainability.

CLIENT SERVICES PROVIDED TO THE FOLLOWING SECTORS

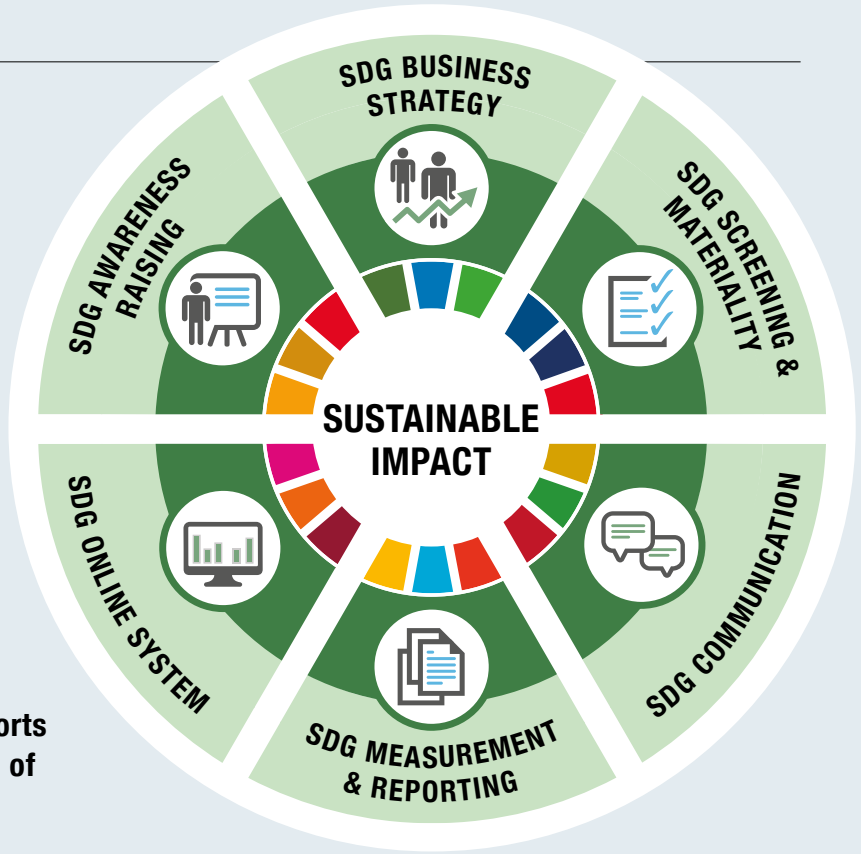
- **Information Technology**
- **Food Services**
- **Higher Education**
- **Government Agencies**
- **Real Estate Development**
- **Engineering Consultancy**

SDG Client services provided within:

Our services provide tools for unlocking a vast number of innovation and market opportunities, helping organizations to: identify current and future business risks & opportunities; make contributions toward global sustainability tangible for employees and stakeholders; measure sustainable impact easily over time; maintain visibility for sustainability internally and in the wider community, and; generate key performance metrics that can complement official data and statistics.

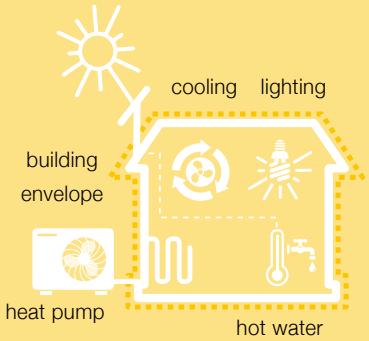
DEMs SUSTAINABILITY MANAGEMENT SERVICES INCLUDE:

- **SDG Business Strategy – providing the means to steer in a more sustainable direction**
- **SDG Materiality Screening/ Assessment – mapping key Sustainable Development Goals (SDGs) and targets**
- **SDG SMART Indicator (KPI) Identification – for simple, consistent measurement and reporting**
- **SDG Impact Tracking Cases/ Reports – providing visual representation of sustainable impact**
- **SDG Measurement System – a web-based system for tracking and reporting sustainable impact**
- **SDG Workshops – training, education and hands-on case development**



7.2 7.3

RENEWABLE ENERGY & ENERGY EFFICIENCY



Improved energy efficiency

20%

kWh saved*

*Calculated over component lifetime

Services provided

- Energy audits conducted.
- Delivery of energy Performance Contract (EPC).
- Energy management consultancy and training.
- Project financing for renewable energy and energy efficiency.

7 AFFORDABLE AND CLEAN ENERGY

11 SUSTAINABLE CITIES AND COMMUNITIES

SUSTAINABLE URBANIZATION

11.3

9 **State owned buildings providing access to a public service**

Services provided

- Contributing to sustainable urbanization through the renovation of public service buildings including a hospital, office building and public transportation building.

13 CLIMATE ACTION

17 PARTNERSHIPS FOR THE GOALS

13.1

CLIMATE ACTION

430

tons CO_2 savings, Renewable Energy*

63,000

tons CO_2 reduction, Energy Efficiency*

*Calculated over lifetime

Services provided

- Adhering to Malaysia's COP 21 Pledge for greenhouse gas reduction 45% by 2030 relative to the emissions intensity of GDP in 2005.

CAPACITY BUILDING PARTNERSHIPS

17.CapB

Zero net cost

repayment of the investment through the energy cost savings achieved

Project contributers:

- ✓ Danish Climate Investment Fund
- ✓ Private pension funds
- ✓ Government
- ✓ The private sector

9 Projects

Services provided

- Supporting capacity building for sustainable development.
- Promoting energy efficient equipment in the country and giving quantitative results to show feasibility of implementation.
- Training & introduction to the energy efficiency standards.

MELAKA, MALAYSIA

Energy Performance Contracting (EPC) with Government-Owned Buildings

The State of Melaka entered into an Energy Performance Contract (EPC) with Danish Energy Efficiency Partners (DEEP) in June 2015, with the objective to save energy in nine state-owned buildings by installing and financing energy efficient technologies and services.

This pilot project will showcase a large-scale energy efficiency implementation and financing for the public sector in emerging markets.

DEEP has completed the detailed energy audits which reveal significant energy saving potential. Based on the screenings done for nine buildings, a savings of 20% can be expected from the retrofitting of lighting, cooling and hot water systems and building envelope, with a total investment of approx. 8 million USD. In January 2017, the Energy Efficiency (EE) retrofitting of the first of three state buildings was fully completed, and repayment to DEEP began. These buildings include Putra Specialist Hospital, Wisma Negeri (a state administration building) and Melaka Sentral Bus Terminal, covering a total area of 80,000 m^2. The expected energy saving is around 4.7 million KWh per year. The next phase under implementation now will cover six additional buildings, including Seri Negeri (Chief Minister's Office), Graha Makmur (City Council), Graha Maju, MPAG (Town Council), Wisma Air (State Water Works) and Melaka International Trade Centre, with a total area of 100,000 m^2.

To finance the EPC, a public/private partnership was created with the Danish Climate Investment Fund. Other partners include private pension funds, state and the private sector. This secures a holistic approach covering investment, finance and implementation for the project under an EPC. The building owners repay the investment through the energy cost savings achieved, meaning that there is no net cost, but instead savings for the state and the building occupants.

Client: The state of Melaka

Properties: Nine state owned buildings with access to a public service

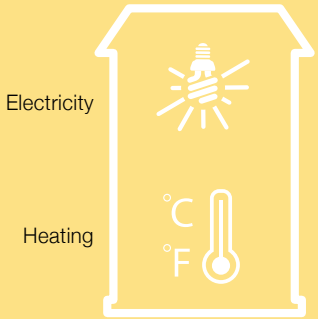
SF: 180,000 m^2

Timeframe: 2015-ongoing

7.3

ENERGY EFFICIENCY

Reduce calculation uncertainty by **75%**
= Higher quality



Reduce the cost of energy efficiency pre-analysis with up to

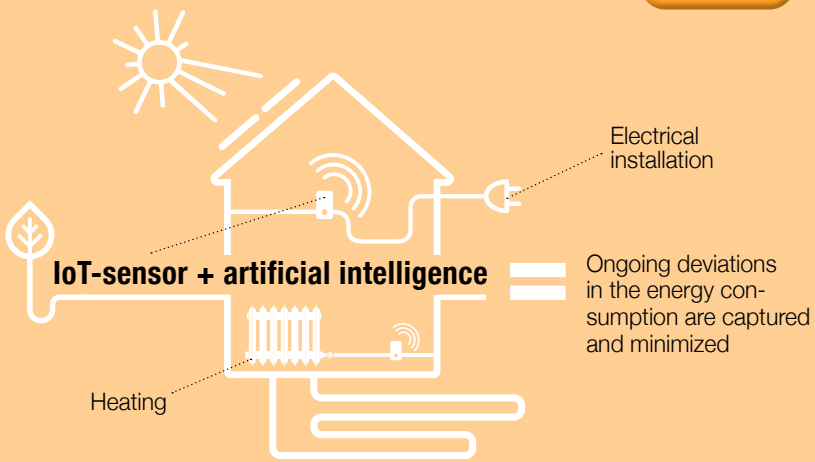
= 50%

Services provided

- Active use of IoT-sensors for energy auditing.
- Reduce the cost of energy audit by half.
- Improve quality of energy efficient solutions.

ACCESS TO BASIC SERVICES

11.1



Services provided

- Providing artificial intelligence to improve indoor climate.
- Continuous surveillance preventing breakdown in technical equipment.

7 AFFORDABLE AND CLEAN ENERGY

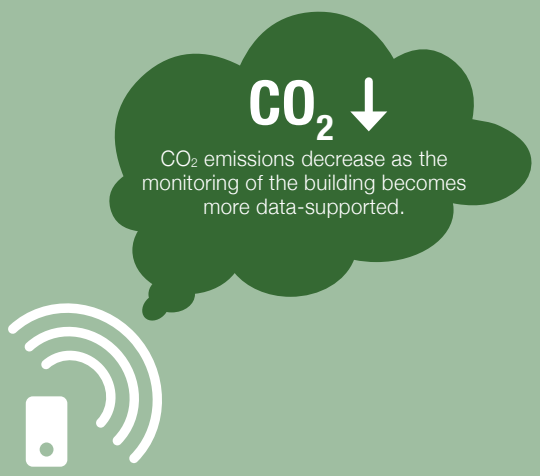
11 SUSTAINABLE CITIES AND COMMUNITIES

13 CLIMATE ACTION

17 PARTNERSHIPS FOR THE GOALS

13.1

CLIMATE ACTION



Services provided

- Increasing the number of energy effective projects that will reduce the CO_2 emissions.

CAPACITY BUILDING PARTNERSHIPS

17.CapB

Project funding:

335,000 EUR

(supported by the Danish government through the Danish Energy Agency)

Project contributers:

- ✓ One public developer
- ✓ Two knowledge institutions (DTU and Aarhus University)
- ✓ Two private companies (ReMoni and DEM) DEM has contributed with 73,700 EUR

Services provided

- Partnership providing sustainable and innovative solutions to increase energy efficiency in buildings globally.

eSNAP

Innovation promoting energy efficiency through technology start-ups

The Danish Energy Agency administrates a pool that will advance the development and establishment of energy efficient and intelligent buildings. The pool is a part of a political agreement from 2015.

One of the projects that has been granted support is eSnap, which represents an innovative partnership between universities, tech start-ups and DEM. The project is developing an innovative data driven solution to improve the quality of energy audits. This includes energy consumption and optimization potentials as well as the energy efficient operation of buildings.

Results are achieved by combining new technological options, such as IoT-sensors with artificial intelligence. The artificial intelligence is based on simulations of the energy consumption in buildings in combination with knowledge of building dynamics as well as specific installation modeling.

This data-based energy audit improves the building owner's basis for carrying out- and following up on possible energy saving initiatives that eSnap has identified through detailed data collection from the individual building components and installations.

This project holds great possibilities for advancing the leading position of Denmark in energy efficient investments. In Asia, where e.g. buildings consume up to 10 times more energy than Danish buildings, there is a great potential for energy efficiency. Yet these buildings are often without secondary measurements and therefore only have one main measurement of, perhaps 20-40,000 square meters, which makes the optimization of energy efficient investments difficult. Consequently, it is expected that this solution can be exported and help create green solutions in developing countries.

Client: Danish Energy Agency

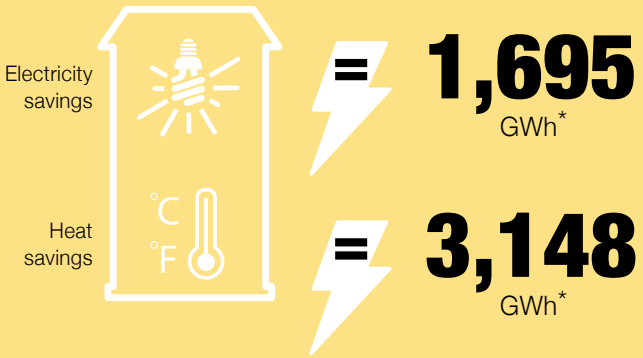
Product delivered: Method for data-driven energy audit

Knowledge sharing: Minimum 30 workshops and presentations

Timeframe: 2018-2019

7.3

ENERGY EFFICIENCY



= **1,695** GWh*

= **3,148** GWh*

*In the project lifetime

Services provided

- Design of new buildings to a building code classification higher than the requirement.

7 AFFORDABLE AND CLEAN ENERGY

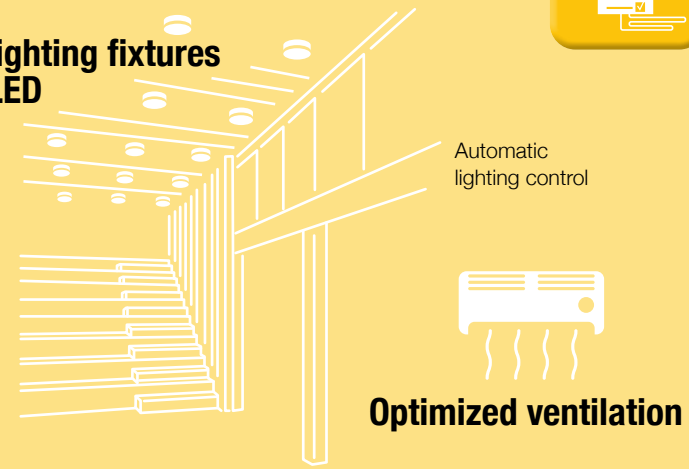
7 AFFORDABLE AND CLEAN ENERGY

11 SUSTAINABLE CITIES AND COMMUNITIES

13 CLIMATE ACTION

ENERGY EFFICIENCY

7.3



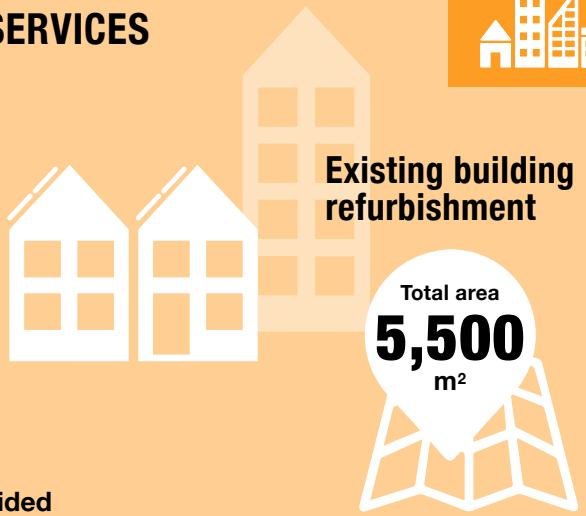
Services provided

- Replacing lighting solutions for more energy efficiency and introducing motion detector regulated lighting control.
- Refurbishing of the heating system.
- Introducing a Building Management System (BMS) and providing mechanical ventilation with heat-recovery.

11.3

ACCESS TO BASIC SERVICES

2 new school buildings

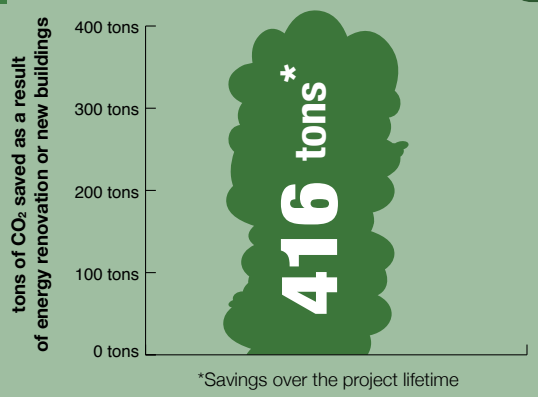


Services provided

- Refurbishing a 4 story, 90-year old school building.
- Incorporating two new buildings making it possible to include an additional class of pupils every year.
- Refurbishing school yard facilities and opening them up for public use, giving the neighborhood access to a football field and a playground.

CLIMATE ACTION

13.3



*Savings over the project lifetime

Services provided

- Providing a Building Management System that can deliver 25% energy savings, by reducing temperatures and air flow in areas not in use during weekends, days off, holidays etc.
- Introducing a solar PV array that produces enough electricity to power 4 ventilation units running 100% – thus reducing the use of fossil fuels.

GRØNDALSVÆNGETS SCHOOL

Circular Economy in refurbished & new school buildings

This project includes a beautifully refurbished four-story, 90-year-old school building of 6,500 m^2, the construction of two new school buildings of 5,500 m^2, and a total area of approximately 10,000 m^2. Taken as a whole, many aspects of sustainability and circular economy are included. The first element of sustainability lies in the optimization of resources by keeping all students and personnel on-site through the duration of the project. To do this, temporary teaching facilities were built, and moved to accommodate two stages of the project.

The two new buildings contain an important component of circular economy, as the outside surfaces are laid with recycled bricks. Using cleaned and recycled bricks instead of producing new bricks does not only save resources, but also saves a large amount of CO_2 that would have been used in the production of new bricks. A positive side effect of incorporating circular economy is that the two new buildings look a lot more like the surrounding residential buildings, which were built around 1910. Today, red bricks are hard to come by and/or very expensive, as all of this clay has been excavated in Denmark.

In the existing building, all areas were refurbished to include automatic, demand-controlled optimized ventilation, automatic lighting control, new lighting fixtures with LED, and a Building Management System (BMS) that controls all of it, including the renovated heating system. This is a very large component of sustainability for this refurbished building, as all of these elements contribute to energy savings and efficiency within the building. In addition, a new internal elevator now gives access to all floors, meaning disability access and fulfilling requirements of the newest Danish building regulations. The refurbished project has also created a better connection though the buildings.

The school yard areas have also been completely renewed, with a football field which is open to the public neighborhood, providing green space and contributing to sustainable urbanization. Below the field is a large storm tank/rainwater system fit to hold back more than 150.000 liters of water, thus delaying rainfall from the public sewer system. The new buildings have a photovoltaic array consisting of 21,5 kWp (which is equivalent to approx. 21,500 KWh per year), and all the buildings have been equipped with a weather-based, outside solar screening system and new, energy efficient windows.

Client: Copenhagen Municipality

Properties: 3 municipality-owned buildings

SF: Internal 12.000 m^2 external 10.000 m^2

Timeframe: 2016-2019

7.1 7.3

ENERGY EFFICIENCY

National Study

- ✓ Current building design
- ✓ National climate and weather condition
- ✓ Cost of building materials

Improved energy efficiency

= **40%**

saving potentials

Services provided

- Review and analysis of common building design practices.
- Providing up to 40% savings from compliance with newly developed efficiency standards.

7 AFFORDABLE AND CLEAN ENERGY

11 SUSTAINABLE CITIES AND COMMUNITIES

SUSTAINABLE URBAN DEVELOPMENT

11.1 11.3

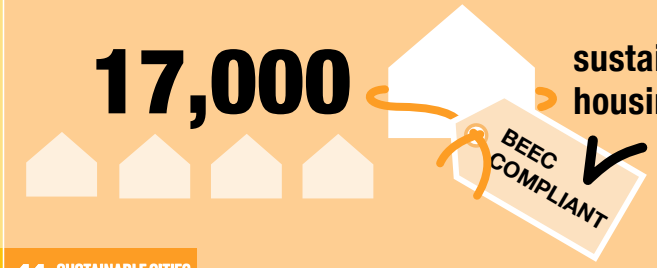
Total potential sustainable land development

730,000

hectare of land

Area of the Federal Capital Territory

17,000



sustainable housing units / annually

Services provided

- Development of national labeling system for building energy efficiency code compliance.

13 CLIMATE ACTION

17 PARTNERSHIPS FOR THE GOALS

13.2 13.3

EMISSION REDUCTIONS

Policy measure = energy savings in residential and public buildings

Energy Efficiency Standards = Emission reductions

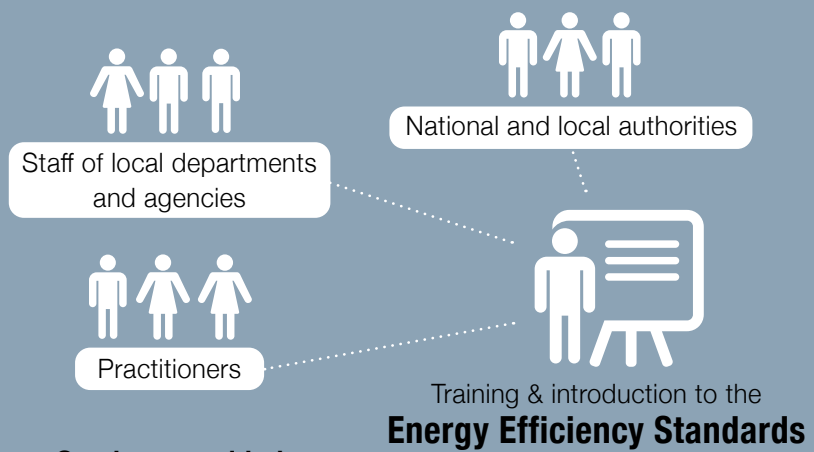
Public validation and training

Services provided

- National policy measure developed: Building Energy Efficiency Code.
- Public hearings and consultations, training seminars on energy efficient building design.

ENGAGEMENT OF STAKEHOLDERS

17.CapB 17.Tech



Services provided

- Training targeting representatives from related ministries, local staff involved in code compliance screening and issuance of building permits and practitioners, such as architects and engineers.
- Documentation uploaded to knowledge platform and the webpage for the National Energy Support Program funded by the GIZ.

NIGERIAN ENERGY SUPPORT PROGRAM

Unit 2 – Energy Efficiency in Buildings

The project "Development of the Nigerian Building Energy Efficiency Code (BEEC)" was supported through funds provided by the German Gesellschaft für Internationale Zusammenarbeit (GIZ) and implemented in collaboration with DEM's partner Solid Green, a consulting company which is based in South Africa. The overall aim of the project was to develop suitable minimum energy efficiency standards in the form of Building Code requirements. Nigeria is claimed to have a housing deficit of 18 million units. To address this, the Nigerian Government has pledged to build more than 17,000 housing units annually. At the same time there is a lack of secure power supply to the residential sector. Most of the power supply is generated by fossil fuels resulting in a high level of CO_2 emissions. To tackle such development challenges, energy efficiency in buildings can play a major role and will both enable higher quality level of power supply as well as reduce greenhouse gas emissions. The project consisted of 4 working packages:

- Development of minimum efficiency requirements
- Building energy labels and efficiency incentives
- Recommendations to Building Code Control and enforcement and
- Development of calculation methods and tools.

The first version of the BEEC defines minimum efficiency requirements for roof insulation, window-to-wall ratio, lighting power density in residential and offices and finally minimum performances for air conditioning units. The new minimum requirements were compared with the common design and construction practice in Nigeria and it was estimated that up 40% energy savings could be achieved.

The achievement of the project led to the Nigerian Ministry's announcement of the first Building Energy Efficiency Code, in August 2017. Initially, the new Building Energy Efficiency Code will be implemented voluntary and therefore they need to be promoted in the relevant sectors through various awareness creation activities.

Client: GIZ GmbH – Nigerian Energy Support Program (NESP) II

Number of minimum energy efficiency requirements: 5

Target group: Residential & offices

Timeframe: September 2016-August 2017

ACCESS TO RENEWABLE ENERGY

358,580

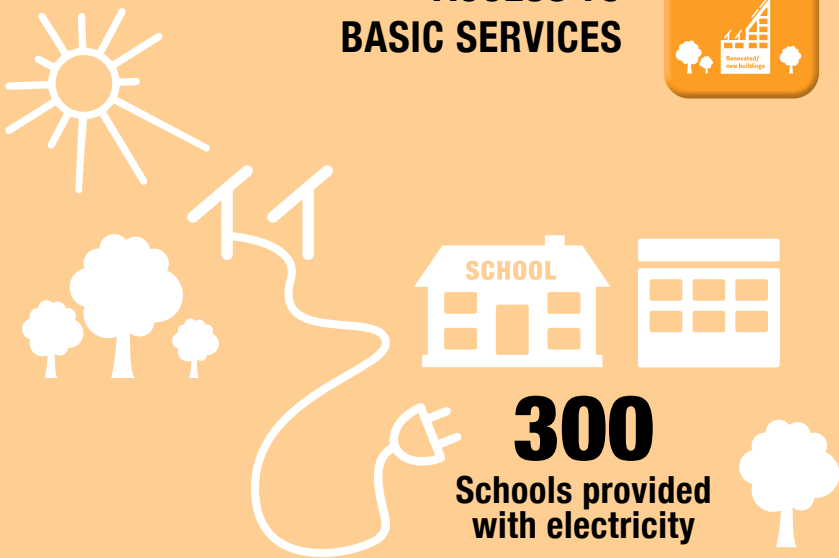
Population gaining access to energy

=17,280 kWh

Services provided

- Evaluation of the performance of the solar PV systems leased to customers.
- Recommendation of new models in the range of solar PV-products offered.
- Evaluation of the performance of solar PV systems and hydropower mini-grids.

ACCESS TO BASIC SERVICES



300

Schools provided with electricity

Services provided

- Evaluation of the management plan for solar PV systems in rural schools.
- Recommendations made for systems improvements.

CLIMATE ACTION

305,000

tons CO_2 reduction

*calculated over a 30 year lifetime

Services provided

- Estimation of carbon emission reduction for the two projects combined. One of the projects is ongoing. Only the current number of installations are used to calculate the estimate.

FINANCING PARTNERSHIPS

Funds mobilized for sustainable development

15,000,000 EUR

Contributors to the projects:

- ✓ The Government of Rwanda
- ✓ The Belgian Government
- ✓ EDCL (Energy Development Corporation Ltd)
- ✓ Solar systems provider Mobisol Rwanda

Services provided

- Launch of a lessons-learned seminar in Rwanda's capital-city, Kigali, with the participation of relevant ministries and other development partners who are active in Rwanda's energy sector.
- Knowledge sharing gained through the evaluation of the two EU funded projects.

OFFGRID SOLAR PROJECTS IN RWANDA

ACP-EU Energy Facility Monitoring

DEM has completed an evaluation of two off-grid solar energy projects in Rwanda, both supported by the EU. One of the projects, IREA-RPPP, was finished two years ago and was mainly focused on providing electricity to schools in rural areas. DEM found that the systems installed were for the most part still working well, of high quality and well maintained by the local schools. Concerning long term maintenance, however, there were several areas that could be improved. DEM made recommendations to address the issues and the relevant stakeholders are currently discussing changes in the management of the school systems.

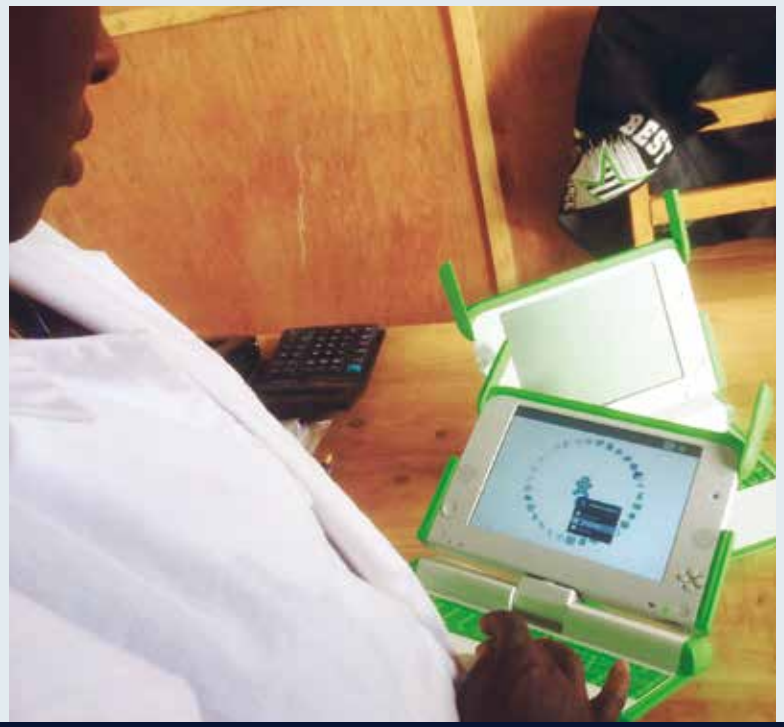
The other project, Prepaid Energy, was ongoing and focused on providing smaller solar home systems to domestic users and small scale businesses. The project is a public-private partnership between the public utility, EDCL, and the German company, Mobisol.

Mobisol's systems are of high quality but compared to the competition they are also expensive and as a result, the project found it difficult to reach its quantitative targets. After DEM's evaluation, the EU granted an extension to the project and allowed for a diversification of the products offered which was also a recommendation made by DEM. This is projected to help the project to reach its targets.

The Prepaid Energy project follows a trend in Official Development Assistance today where international donors increasingly seek to involve the private sector. Lessons learned from our evaluation will assist future Public-Private-Partnerships to perform in a more timely manner.

To find more information about these (and other) projects, please visit the ACP-EU Energy Facility Monitoring website: http://energyfacilitymonitoring.eu/

In one of the projects, the electricity provided by solar energy was primarily used to recharge laptops that the schools use in classes.



Client:
The European Commission

Product delivered: 1 evaluation report of the two projects
1 lessons-learned seminar

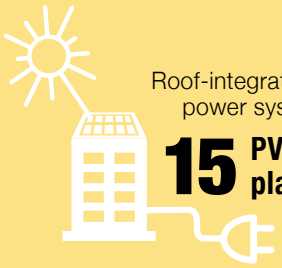
Timeframe projects:
IREA-RPPP: 2008-2016
Prepaid Energy: 2014-2019

7.3

ENERGY EFFICIENCY

Feasibility studies
for integration of renewable energy systems

150 buildings



Roof-integrated solar power systems

15 PV plants = **52** GWh saved electricity*

4 Heat pump plants = **240** GWh saved heating*

*calculated over a 25 year lifetime

Services provided

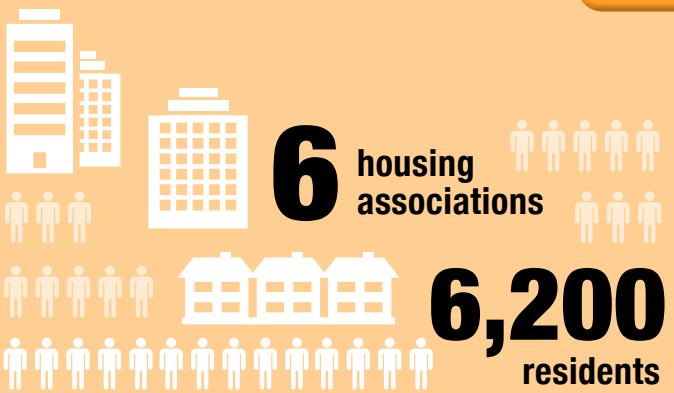
- Energy audits and classification of energy efficiency measures.
- Identification of innovative energy products and technologies.

7 AFFORDABLE AND CLEAN ENERGY

11 SUSTAINABLE CITIES AND COMMUNITIES

ACCESS TO BASIC SERVICES

11.1



6 housing associations

6,200 residents

Services provided

- Energy baseline, monitoring procedures and KPIs.
- Implementation of energy monitoring systems.
- Energy behavior survey – 600 respondents.

13 CLIMATE ACTION

17 PARTNERSHIPS FOR THE GOALS

13.1

CLIMATE ACTION

35,654
tons CO_2 reduction*

*calculated over a 25 year lifetime

Services provided

- Development of energy saving initiatives for both technical installations and building envelopes and the establishment of solar power systems.

CAPACITY BUILDING PARTNERSHIPS

17.CapB

Project contributors:

- ✓ Six housing associations
- ✓ The educational institution EUC Syd
- ✓ Project Zero
- ✓ Danish Energy Management

Training workshops
to support the adoption of new technical and financial methodologies

Services provided

- Partnerships on procurement and implementation of energy efficiency projects.
- Innovative business models for Housing Associations' energy retrofit projects.

HAPPI

Innovation Partnerships Facilitate Energy Renovation

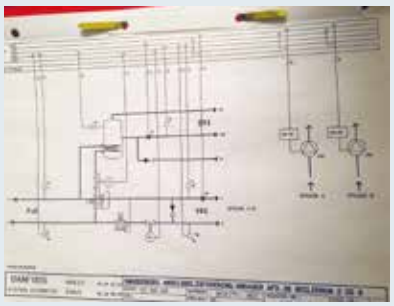
By 2029, the Sonderborg area should be 100% carbon neutral. An important step in this major transformation is the energy renovation of social housing association buildings. Housing associations in Sonderborg account for approx. 20% of the total housing stock in the municipality. The EU-funded HAPPI project "Social Housing Association's Energy Efficiency Process Planning and Investments" increases the energy renovation rate within the social housing sector via an exemplary action bringing together six social housing associations in the Danish municipality of Sonderborg to tackle the complex interplay of non-technological barriers (organizational, legal, financial) through process organization and capacity building leading ultimately to an aggregated 16.1 million Euro investment program for sustainable energy measures in their existing building stock.

DEM (Danish Energy Management) has been awarded the role of energy efficiency and energy management expert. DEM has carried out energy audits in 57 different departments of the six social housing organizations' building stock, and proposed prioritized energy saving measures, investment needs and savings in terms of energy and costs for the project. A set of tools and standardized procedures has been developed to ensure a smooth project implementation including tools for planning and executing energy optimization, sources of financial support for the execution of energy optimization and training and workshops.

To ensure the sustainability and visibility of energy performance in the Housing Association buildings, procedures for determining baselines, monitoring procedures and performance indicators for the buildings' energy consumption are developed and automatic data monitoring is established. The project handles use and dissemination of results, and communication and capacity building among building operators and users.

DEM is assessing current Energy Management practices in each of the Housing Associations and developing an Energy Strategy in order to state the management team's commitment to continuously improve energy efficiency within the organization, comply with requirements, communicate with the public, raise energy awareness and facilitate trainings.

The HAPPI consortium consists of 9 innovative partners – six housing associations (SAB, NAB, DANBO, B42, SØBO and Gråsten), the educational institution EUC Syd, Project Zero and DEM.



Visualization of roof-mounted solar cells, Søstjernevej 10-12 in Sønderborg. Sketch project is carried out as part of the EU project HAPPI.

Client: HAPPI

Properties: 6 housing associations, 3,440 tenancies, 6,200 residents

Timeframe: 2018-2021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