

EUC Syd – A sustainable vocational school Nearly zero-energy school report

Interreg
North Sea Region
2imprez
European Regional Development Fund





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Introduction

Many schools were built in more careless times when regarding CO₂ emissions. The schools have a high energy consumption that is not in line with today's CO₂ reduction emission policies. The Interreg project "to implement energy saving methods and programme for energy-efficient and nearly-zero-energy (NZE) schools" focuses on implementing energy-saving measures in existing schools across the North Sea Region to reduce energy consumption, hence reduce CO₂ emissions. The project stimulates change by fostering both behavioural, financial and technical measures (2imprez).

Nearly zero energy school

The present report is a nearly zero energy school report based on EUC Syd – a sustainable vocational school. The school has a long portfolio of steps towards lower emissions and therefore can serve to demonstrate what results can be achieved.

The report sheds light on

- the CO₂ accounting of the school,
- Business cases of how the school pursues the green agenda in everyday building management.

Furthermore, the report displays measures that seeks to change the behavior of students. These changes will hopefully translate into the students' lives outside of school, raise awareness and further the green transition.

The project aims to serve as a tool for knowledge sharing of valuable experiences and capacity building for EUC Syd's management and stakeholders. House of Science is the authoress of this report in close co-operation and dialogue with student, staff and management of EUC Syd.

EUC Syd – the sustainable vocational school

EUC Syd is a vocational school in the South of Jutland, Denmark. It covers 80.000 m² at six different locations, one of which a boarding house, and is scattered across four municipalities plus a main office situated in Sonderborg. With 302 employees and approx. 20.000 students passing through annually, it is the largest educational institution in South Denmark. EUC Syd is a certified UNESCO Sustainable Developments Goals school, dedicated to working with the SDGs at all levels.

The school is also committed as a member company of ZERO-company within ProjectZero. By this engagement, EUC Syd commits to ambitious partial targets of 50% reduction by 2020, 75% reduction by 2025 and CO₂ neutrality by 2029. Furthermore, as a ZeroCompany the school has a target of 2% annual electricity consumption reductions. The process of carbon accounting at EUC Syd was initiated in 2015 and the progress is monitored annually by an internal energy responsible.

ProjetZero is a local public-private partnership created in 2007 with the ambition of making the region of Sonderborg carbon neutral by 2029 (Klima100).

ProjectZero has engaged both citizens and local and national stakeholders in the work to reduce energy consumption and carbon emissions in the Sonderborg area.

The decarbonization of the local energy system and improving energy efficiency is required means to achieving carbon neutrality for the partnership (ProjectZero 2029).

Important numbers for EUC Syd

690.00 kg

emission of CO₂,
baseline year 2015

36%

CO₂ emissions reduction
2015-2020

2029

The year to
be CO₂ neutral

Sonderborg area

In Sonderborg municipality, all of Europe is within reach. Sonderborg is an UNESCO Learning City with 75.000 inhabitants living in rural and urban areas, the majority of them close to the sea. The southern Danish municipality has the green transition deeply rooted in its DNA. Carbon neutrality has been on the agenda since 2007 and Sonderborg has been leading the way for years. Most recently, having been honored at the COP26 for its actions to lower emissions and involving the entire community to achieve this goal. The municipality is determined to reach its goal of carbon neutrality through education, sustainable urban development, new housing concepts and green business (Klima100). Sonderborg municipality reached the 2020 50% emission reduction goal by reaching 52% reduction since 2007.

COVID-19

Fortunately, most of society in Denmark was open during summer and autumn 2021, during which most data for the NZE-report was gathered. However, it is not possible to allocate and divide data according to lock downs and changes in uses (student and employee behavior and time spent at the school) during the COVID-19 pandemic's different phases of full lock downs, semi-opening periods and continuous full lock downs in 2020. Hence, emission changes do to the impact COVID-19 is left for future analysis and discussion.

An analysis of how the pandemic might affect the yearly results is a recommendation for future energy monitoring and evaluation. Energy data from 2021 are available in Medio 2022.

EUC Syd CO₂ inventory

Methodology

EUC Syd entered into the project of carbon accounting in 2015 and as such, this year serves as a baseline year for the emissions inventory. The inventory is shown as one entity, covering 6 locations, and is divided into three segments; electricity, heating and transportation, with the accompanying CO₂ emissions. The CO₂ emissions have been tracked, accounted for and reported upon every subsequent year from 2015.

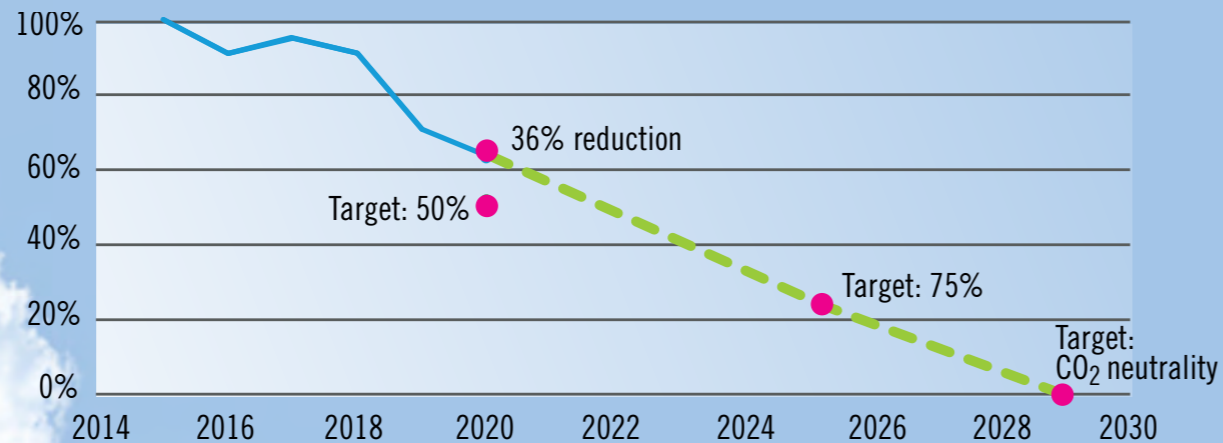
The scope of the inventory encompasses electricity consumed, the heating utilized and fuel consumption related to transportation. This division helps to showcase where the possibilities for reduction lies. The data has been comprised from yearly records of consumption. Sources of emissions factors differs between segments and are updated annually. An average grid emission factor for electricity is publicly available online (Energinet), emissions-factor for heating have been collected directly from heating suppliers with specific factors from each supplier and emissions factors for fuel consumption in transportation is also publicly available online (Energistyrelsen & Drivkraft Danmark). Emissions for transportation include fuel consumption in vehicles in the car fleet owned or leased by EUC Syd, both fossil fueled and electric, as well as fuel consumption in privately owned vehicles.

Emissions are calculated from a simple formula;
Emissions = consumption x emissions factor

The initial overview

In 2015, EUC Syd emitted 689.897kg CO₂. In 2020, they emitted 439.040kg CO₂. Over the 5 year period from 2015-2020, EUC Syd have reduced their emissions by 250.857kg CO₂, a 36% reduction relative to the baseline (Fig.2).

Progression of CO₂ emissions



In 2014, EUC Syd purchased Renewable Energy Certificate (RECs), which provided the possibility of crediting electricity related emissions. The certificate guarantees the procurement of 4,400.000kWh from renewable energy annually and the current one is valid until 2024. The RECS is included in the inventory within the electricity segment.

Figure 2. The progression of CO₂ emissions until present along the reduction targets of 50% by 2020, 75% by 2025 and carbon neutrality by 2029. This figure is based on Table 1.7

When examining the inventory by segments, the most significant reduction is found in the electricity segment. Heating is relatively stable over the accounting period whereas the transportation related emissions also have decreased (Fig. 3).

CO₂ emissions by segments

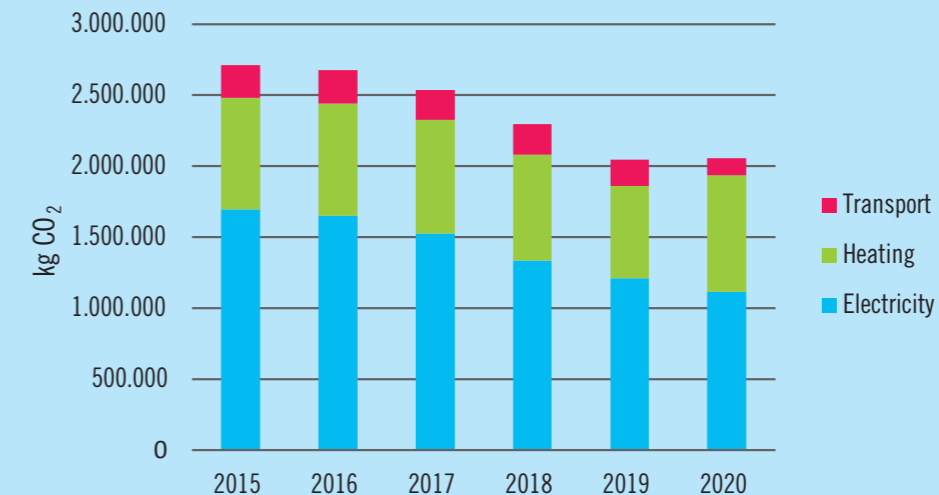


Figure 3. CO₂ emissions separated by the different segments 2015-2020. Note that the emissions are depicted without RECS. This figure is based on Table 1.

Table 1. CO₂ inventory for EUC Syd 2015-2020

	CO ₂ -emissions in kg / year					
	2015	2016	2017	2018	2019	2020
Electricity	1.697.114	1.652.295	1.526.264	1.336.932	1.208.991	1.115.070
Heating	785.964	790.131	800.152	746.106	654.457	825.819
Transportation	231.310	236.560	208.782	212.274	181.918	117.351
Total excluding RECS	2.714.388	2.678.986	2.535.198	2.295.312	2.045.366	2.058.240
Total including RECS	677.189	615.386	643.198	610.112	487.766	439.040

Electricity

The electricity consumption have been reduced by 17% in 2020 relative to the baseline, resulting in emissions reduction of 34%. Technical energy efficiency measures, i.e. an automated building system have helped to lower consumption and thereby emissions. Simple monitoring of electricity consumption can help to pinpoint specific areas to take action and potentially help cut up to 10%.

Awareness of better energy behavior from staff and students have also helped limit energy demand. The electricity consumption have been continuously reduced and as a ZeroCompany, the annual 2% reduction targets of electricity consumption have been achieved. The emissions from electricity is projected to decrease significantly towards 2030 on a national level (Klimastatus- og fremskrivning, 2021), which will in turn also reduce electricity derived emissions at EUC Syd. Since the RECs provides more kWh of green electricity than the annual consumption, EUC Syd is already carbon net zero on electricity.

**Reduced
emissions
by 34%**

Heating

In 2020, heating consumption emitted 37.000kg additional CO₂ relative to the baseline. Heating related emissions have been decreasing in 2018 and 2019, after which an increase followed in 2020. The automated building system also surveys the heating levels. Over the 5 year period, there have been fluctuations in the contribution of heating emissions between 29-40% of the total emissions. As the contribution from electricity has lessened, the heating have become more prominent as these emissions have remained relatively stable. This segment is highly impacted by the annually changing emission factors, as these are derived from the different combinations of heat sources from the various suppliers.

Different types of systems heat the different locations. The majority are connected to the extensive Danish district heating system and one location is heated by natural gas onsite. The one natural gas heated location influences the heating related emissions greatly as natural gas is more CO₂ intensive than district heating (Energistyrelsen, 2021). Furthermore, the extensive district heating network supplies heat to 64% of Danish households, with 51% of the production from renewable energy (Sparenergi.dk). As a recipient of district heating, business have no control over the heat source utilized (renewable/fossil), nor is it possible to switch supplier. This fact can also influence the resulting emissions. A planned national conversion to greener district heating will help lessen the future emissions from district heating (Klimastatus- og fremskrivning, 2021).

**51% of the
production
from
renewable
energy**

Transport

Emissions from transportation have been reduced by 49% in 2020 relative to the baseline, resulting in 114.000kg CO₂ saved. This has partly been due to a replacement of fossil-fueled vehicles by low emissions cars in the carfleet, and partly due to fuel lowering driving behavior. An average electric car emits approx. 90g CO₂/km throughout its lifetime, whereas a newer fossil fueled car will averagely emit 120g CO₂/km through its lifetime (Klimarådet, 2018). This segment is expected to continue to decrease as the number of vehicles will probably be reduced, and the carfleet will become increasingly electric.

**114.000 kg
CO₂ saved**



Next step for CO₂ accounting

For future carbon accounting, EUC Syd will most likely use an official CO₂ calculator for businesses, such as the "Climatecompas" provided by the Danish Business Authority, which is freely available online. This calculator is updated annually with appropriate national emission factors, and can also encompass local emission factors when available. The calculator is based the Greenhouse Gas Protocol (GHG Protocol) methodology.

Emissions are divided into three scopes separating direct emissions from indirect. Within the GHG protocol, the natural gas for heating and fuel consumption for vehicles owned and leased by EUC Syd should be reported in Scope 1; the electricity and district heating should be reported in Scope 2 and lastly, the fuel consumption in private vehicles would fall in Scope 3 of the GHG protocol.

An important difference for future accounting would be the fact that the tool does not take RECs into account, as of yet. The change will however benefit the comparability of the accounting as well as ease the process.

[Klimakompasset](#)



Behavioral approach

Changing mindsets and behavior through education is on top of the Sustainable agenda for EUC Syd. Effects becomes remarkable when linking behavior in education and energy saving measures. By challenging students, staff and management to change behavior, it raises awareness and at EUC Syd all employees and students have the potential to become agents of change. Hereby a few of the behavioral approaches pursued at EUC Syd:

A UNESCO Sustainable Development Goals School

EUC Syd is a “UNESCO Sustainable Development Goals school” with sustainability as a cross-disciplinary theme in education, organization and institutional management. As a UNESCO SDG School EUC Syd aims at educating, young people to be able to play their part in realizing a sustainable future. Sustainability is a “whole school approach” according to the management of EUC Syd and the approach is remain in force at every level within the school. Students and staff are educated and an important part for sustainability and resource efficiency with active participation as a key ingredient.

Climatecouncil and Green Flag School

EUC Syd is also a Green Flag School, a title awarded by the Danish Outdoor Council; a non-governmental organization dedicated to protect nature and the environment with a focus on outdoor activities and sustainability (Friluftsrådet). To achieve this title, the school must establish a Climatecouncil amongst other elements. Due to the size of EUC Syd, all four locations have a separate Climatecouncil represented by students, staff and management. The Climatecouncil fosters future initiatives for pursuing the green agenda and functions as an open line of knowledge sharing between the schools. The encouragement of climate-friendly solutions to everyday issues is essential to the school as sustainability as a whole school approach.

Our culture of sustainability is not just about installations, but also about attitudes and behavior, which we can bring out to a wider audience. In a sense, we are not just educating young people directly, but we also their teachers. Staff including management level, administration, kitchen, janitors and teachers all meet yearly for status and progression of the Sustainable Development Agenda.

In this way, we take action together and all are responsible for taking the entire school, across locations, to the next sustainable level.

Hans Lehmann, Vice Principal, EUC Syd



“In this way, we take action together”



I really appreciate going to a school with so much focus on the green transition. Our next step within the Climatecouncil is seeking inspiration from other schools on their green experiences” Aslaug Blom Thomas, winner of EUC Syd Sustainability Award 2021

“I really appreciate going to a school with so much focus on the green transition”

EUC Syd Sustainability Award – and the winner is...

Student engagement plays a great part within EUC Syd and every year a student receives the EUC Syd Sustainability Award. Aslaug Blom Thomas is an eighteen-year-old senior at the Technical upper secondary school and a student representative of the Climatecouncil at EUC Sønderborg. She is winner of the EUC Syd Sustainability Award 2021 due to her work on furthering the green agenda amongst her fellow students.

Behavioral barriers can complicate student and staff involvement, wherefore different activities and events help to make the sustainability agenda more tangible in students’ lives and everyday life at the school. Example is the participation in World Cleanup Day, initiated within EUC Syd by the Climatecouncil. Groups of students gathered trash in the local vicinity during school hours to draw attention to value- and utilization of resources. Next project for the Climatecouncil is production of informational posters on relevant SDGs and relevant indicators to hang on campus.

Sorting waste







Denmark produces one of Europe's highest amount of waste per capita at 800 kg per capita in 2020 (Miljøministeriet, 2021). Reducing and sorting waste is a focal point of sustainable management and highly implemented at EUC Syd.

The total amount of waste reduction from 2019-2020 accounted for 154.000 kg and nearly 72% of EUC Syd generated waste was recycled (Table 2). The production of materials such as paper, plastic and aluminum are CO₂ intensive. The recycling of materials to be included in the value chain once again, lessens the energy requirement for new production and the accompanying emissions. In 2019, recycling of 31.230 kg waste saved 24.364 kg CO₂.

In 2020, recycling of 30.060 kg waste saved 31.611 kg CO₂. The fraction of recycled iron and metal increased drastically, while the food waste fraction decreased. This resulted in the total amount of waste for recycling remaining practically unchanged, but the corresponding emissions savings increased as the gain from recycling metal is higher than the gain from recycling food waste (Miljøministeriet, 2021). More than that, the recycling of paper and cardboard led to CO₂ savings of 18.384 kg in 2020, constituting 58% of the total savings. Some waste fractions sorted for recycling are categorized as waste recovery operations other than recycling, i.e. concrete found in construction waste which is broken down and used in road construction, has a negligible emissions savings. Hence, this concrete is disregarded in accountings of CO₂ savings from waste recycling (Miljøministeriet, 2021).

EUC Syd has a large amount of construction waste due to its capacity as a vocational school. Reuse of resources also benefits other aspects of the natural environment, i.e. the production of paper requires large amounts of water and releases excess chemicals. The focus on waste management is also present in the education at EUC Syd through teaching materials on the reasons and results of reducing and sorting waste.

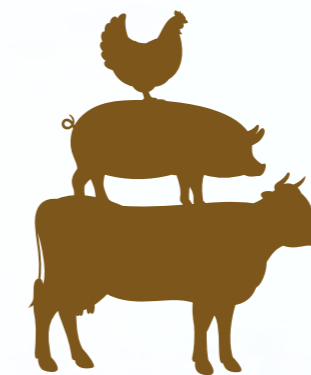
Table 2. Distribution for combustion and recycling of waste collected at EUC Syd in 2019- 2020.

2019		2020
COMBUSTION		COMBUSTION
156.350 Kg 23%		27% 143.570 Kg
RECYCLING		RECYCLING
11.490 Kg		11.780 Kg
240 kg		230 Kg
60 Kg		2.120 Kg
1.970 Kg		1.980 Kg
17.200 Kg		13.740 Kg
TOTAL 695.679 Kg		TOTAL 541.666 Kg

Reducing meat in the schools diet

The meals served at the school offers another opportunity to incorporate sustainability. The menu has grown increasingly greener and with the large number of people that enjoy meals every day, this will affect the climate accounting of the school. Climate friendly food items are being deliberately preferred to lower the food-related CO₂ emissions. Less carbon intensive meals substitutes the amount of red meat meals. This is very effective in reducing food-related emissions as 1kg of beef emits an average of 52 kg CO₂, whereas a 1kg of pork emits an average of 4 kg CO₂ and 1 kg of chicken an average of 2 kg CO₂ (CONCITO, 2021).

The meat that remains on the menu is predominantly chicken and a green alternative dish available is always available. Beyond the menu itself, the cantina uses small "nudging steps" to reduce food waste i.e. introducing smaller plates that unconsciously encourage people to smaller portions or selling remaining sandwiches at a lower price at the end of the day to avoid waste.



UNESCO SDG School is a part of the UNESCO Associated Schools Project (ASP) in Denmark. ASP is a part of the international UNESCO strategy, focusing on UN's Sustainable Development Goals. The purpose of the SDG schools is to expand and integrate the SDGs through education. More about EUC Syd as a UNESCO SDG School: [202108_baeredygtighed_dannelse_verdensmaal.pdf](https://www.eucsyd.dk/202108_baeredygtighed_dannelse_verdensmaal.pdf) (eucsyd.dk)

1kg of chicken emits an average of **2 kg CO₂**

1kg of pork emits an average of **4 kg CO₂**

1kg of beef emits an average of **52 kg CO₂**



Energy saving business cases

Energy consumption in buildings are responsible for nearly 40% of the total Danish energy consumption (Energistyrelsen, n.d.). The large consumers are heating, ventilation and lighting. As such, synergies exist between optimizing within this sector and reducing CO₂ emissions. As EUC Syd aims at reducing energy consumption, maintenance is very often the starting point, especially for the larger actions related to building upkeep. Investments projects differ in sizes and difficulty of implementation and gives a wide array of possibilities to lower emissions. Considerations and calculations that lay behind a decision for investing in the green alternative are important together with the shortest possible payback time.

There are several opportunities in Denmark for obtaining outside investments in implementing emissions reducing technologies. EUC Syd is a self-owned state institution, where funding for green investments is managed within their own budget. Therefore it is crucial to ensure best financial value and investment in energy saving technologies one place can create financial benefits, i.e. to be used for furtherbuilding energy optimization.

Replacement of printers

144 printers across the six locations were replaced for a lesser number of a more environmentally friendly printer version. This resulted in an annual financial savings of 136.000 DKK and reducing emissions by

15.000 kg
CO₂ (EUC Syd)

Case: Installing LED lighting

The case of replacing LED lighting is exemplified by the considerations performed in one location. Replacing the current light sources with LED lighting at the location has proven to be a valuable case for both financial and emissions savings. LED lighting consumes approx. 25-50% less energy than conventional light sources (Miljøstyrelsen, n.d.).

The case assesses the aspects of installing LED lighting and require an initial investment of 210.469 DKK. With the projected savings in kWh and financially, the investment has a payback time of approx. 2,5years. Furthermore, the measure leads to an emission savings of 7.333kg CO₂. Additionally, in several new LED lamps, the lightbulb itself cannot be replaced after end use and must therefore be disposed of.

This project bases upon refitting the armature on the already existing lamps to accommodate LED fluorescent tubes, which EUC Syd have considered a learning opportunity for the relevant students. Transfer the case into a student-project, where students carry out the refitting, and the cost-efficiency of the case improves and the case substantiates the whole school approach to sustainability at EUC Syd.

The case presents an emission reduction of
7.333 kg CO₂

Investment	kWh savings	DKK savings	Payback time
210.469 DKK	57.295	85.942	2,55

Table 3. The replacement of LED lighting at one location. Cost estimate of initial investment, yearly savings (financial and consumption) and payback time of the investment.



The case presents an emission reduction of

3.420 kg CO₂

Case: Upgrading ventilation

Improving ventilation equipment represents a opportunity for reducing emissions and expenses. In the current case, upgrading an aging ventilation system at welting workshop area reduces both heating and electricity consumption.

The case presents an emission reduction of 3.240kg CO₂ over a time of 3,4 years by an initial investment of 120.000DKK. The annual savings amount is approx 49.000kWh and 35.000DKK.

The case is considered for one out of several possible areas and can therefore be scaled up. A ventilationsystem improves airquality, reduces moisture and ensures an healthy indoor climate. This is important in an educational setting, especially at a vocational school which operates heavy machinery. Better ventilation is also beneficial for the amount of heating required in the area. Another step for the upgrading of the ventilationsystem involves optimization within operating hours i.e. by installing sensors which monitor and regulate airflow.

Investment	kWh savings	DKK savings	Payback time
120.000 DKK	49.498	35.658	3,4

Table 4. Upgrade of ventilation system. Cost estimate of initial investment, yearly savings (financial and consumption) and payback time of the investment.

Case: District heating at one EUC Syd location

The EUC Syd location in Haderslev provides a case for optimizing space heating by replacing natural gas with district heating. The change to district heating results in a decrease of emissions, as district heating serves as a strong source of green heating and emissions from the district heating sector is projected to decrease drastically towards 2030 (Klimastatus-og fremskrivning, 2021). The fossil natural gas accounts for approx. 20-25% of the emissions in the heating segment at EUC Syd and as such, contains a large inherent reduction potential.

The following indicates how the case is considered from multiple angles by the financially determining factors and how the inherent uncertainties of these factors influence the case. The case assess three scenarios for the continued use of natural gas, and compare them to the similar consumption of district heating. The basic outline of the three scenarios are identical and assumes that;

1 The conversion to district heating cuts CO₂ emissions drastically by 169.114 kg CO₂, an emissions reduction from heating in Haderslev by 99,7% and the total heating emissions by 20%.

2 Gas consumption is assumed to remain unaltered from the 2020 level

3 The expenses of installing the district heating and disposing of the gas boiler comes to 732.500 DKK.

The large reduction in emissions is the outcome of the specific district heating supplier (Haderslev Fjernvarme). The production at this specific facility mainly originates from biomass and hence has a low emission factor.



The three scenarios projects the expected operating costs of the continued use of natural gas and differ due to uncertainties of the short termed parameter gas price, and the long termed parameter of changes in CO₂ toll charges.

Table 5. Calculations of three costs scenarios for natural gas. The conversion calculations are equal for all three scenarios.

	m ³ 2020	kWh 2020	Price DKK/ m ³	Consumption
Scenario 1 - historical cost				
Consumed natural gas in 2020	75.567	831.233	6,82	515.365 DKK
CO ₂				169.572 kg
Scenario 2 - estimated cost at current price				
Consumed natural gas in 2022	75.567	831.233	8,44	637.783 DKK
CO ₂				169.572 kg
Expected increased CO2 toll Charge of 105 DKK / ton				17.805 DKK
Scenario 3 - forecast				
Consumed natural gas in 2022	75.567	831.233	12,31	9630.226 DKK
CO ₂				169.572 kg
Expected increased CO2 toll Charge of 300 DKK / ton				50.871 DKK
Conversion to district heating				
2020 consumption converted to district heating		MWh	Price DKK / MWh	Consumption
		748	365	266.327 DKK
Annual maintenance fee				81.890 DKK
CO ₂				458 kg
Conversion factors	1000 kWh = 1MWh = 3,6 GJ			
Emission for supplier	0,00017 kg/GJ			
The required heat is less from district heating than natural gas due to an inherent heatloss from the gasboiler.				

“

We are obligated to showcase the rationale behind all investments. I strive to do that by elucidating all parameters into monetary terms for it to be used in a model, which allow all involved stakeholders to evaluate the weight given to the different parameters.”

- Simon Sneevang, Head of HSE, Facility Management and Procurement

Scenario 1 bases on historical gas prices for 2020 (Danmarks Statistik) and as such, most likely underestimates the financial case since the current gas price is historically high. The current average gas price in 2021 is approx. 65% higher than the average gas price of 2020. In this scenario, the price of gas is cheap enough to worsen the financial case of a conversion to a payback period of 4,4years.

Scenario 2 bases on the current market price for gas and a predicted increased toll charge on CO₂, supposedly to take effect in 2023 (Skatteministeriet, n.d.). These two parameters causes the operating costs of natural gas in this scenario to rise and therefore strengthen the case for conversion as the payback period drops to 2,4 years.

Scenario 3 is based on a forecast of expected increase in gas prices along with a further increase in CO₂ toll charges. Natural gas is not desirable as a heat source henceforth and the price for gas is predicted to continue increasing, resulting in a historically uncertain market. Furthermore, an economic pressure will expectedly increase the toll charges on CO₂ further than that of Scenario 2. Scenario 3 projects the operating costs of continued heating by natural gas will become disproportionately large and the payback period of conversion to district heating will drop further to 1,2 years.

The more expensive gas will become and the higher the toll charge on CO₂, the better financial sense it makes to convert to district heating since the operating costs are less. More than that, district heating is a preferred source of energy, deemed essential for reaching the societal goals of climate neutrality and hence a low risk investment.

Table 6. Comparison of operating costs for the three scenarios and conversion to district heating. Annual heating expense and payback time.

Scenario	Heating expense DKK	Payback time
Calculated annual cost of district heating	348.217	
Scenario 1	Historical annual coast	515.365
Scenario 2	Estimated cost at current price	655.588
Scenario 3	Forecast	981.097
		4,4
		2,4
		1,2

Concluding remarks

EUC Syd, the sustainable vocational school has a whole school approach to sustainability and hence curbing the schools' emissions and involves both students, staff and management. As a nearly-zero energy school many considerations, initiatives and investments are necessary and many of these already exists across the locations of the school.

- CO₂ inventory A reduction in electricity consumption, through energy efficient behavior and technical energy saving measures, are responsible for the majority of the emissions reduction. This reduction is a cut down of 36% since 2015. Emissions due to changes in transportation is a 50% cut down, whereas emission from heating remained relatively stable.

- Energy saving business cases Examples of energy saving business cases presented are all offering different energy-lowering opportunities. The cases represents small and large-scale investments covering both printers, LED lighting, ventilation system and conversion to district heating. The report serves as a capacity building aid within financial aspects of investments, which influences on energy savings and CO₂ emissions.

House of Science

The public-private partnership House of Science, started in 2009 by Danfoss UNIVERSE, Project-Zero and Sonderborg Municipality operates within Climate, Innovation and Sustainability. Through the motto "from ABC to PhD", House of Science secures educational courses, materials, visits and knowhow within Science, Technology, Engineering and Math for children, pupils, students and teachers. House of Science co-operates with students, schools and managements to achieve 100% CO₂ neutrality by 2029 (Klima100).

The 2imprezs partnership

The 2imprezs partnership consists of IOK – Intermunicipality of the Campine Region (Belgium), Energy Challenges (The Netherlands), Atene KOM (Germany), Provence of Antwerp (Belgium), The University of Southern Denmark (Denmark), Southend-on-Sea Borough Council (Great Britain), IGEMO (Belgium) Djapo (Belgium), Thomas More (Belgium) & House of Science (Denmark).

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