



## Kunstig intelligens og avancerede algoritmer skal give TDC NET's teknikerbiler langt færre timer på vejene

7.6.2021 11:00:00 CEST | [TDC NET](#)



**CO2-udledningen fra TDC NET's mange teknikerbiler skal reduceres kraftigt ved hjælp af automatiseret transportplanlægning. Med støtte fra Innovationsfonden søsætter QAMPO, DTU og TDC NET et nyt fireårigt projekt, hvor målet er at eliminere hver fjerde kørte kilometer inden 2025. Løsningen kan også udbredes til andre virksomheder.**



Hvert år bliver der udledt cirka 4 millioner tons CO<sub>2</sub> på de danske veje ifølge Klimapartnerskab for landtransport. Det er en stor del af den samlede CO<sub>2</sub>-udledning i Danmark.

Med dét afsæt har softwarevirksomheden QAMPO, DTU og TDC NET nu igangsat det ambitiøse fireårige projekt GREENFORCE. Gennem projektet vil partnerne udvikle løsninger, der kan reducere den samlede kørsel markant i TDC NET. Løsningerne skal samtidig udbredes til andre relevante virksomheder, der ønsker at begrænse deres kørsel.

TDC NET, der forbinder Danmark via mobilnet og fastnet, har 850 teknikerbiler, der dagligt kører 80.000 kilometer, svarende til to fulde gange omkring jorden. Målet er at reducere det med 25 procent inden 2025 bl.a. ved hjælp af langt mere avanceret automatiseret transportplanlægning.

### **Software reducerer antal kørte kilometer**

Internationale studier peger på, at de samlede transportomkostninger kan reduceres med 5 til 20 procent ved at gå fra manuel til automatisk transportplanlægning. Et potentiale, der kan oversættes til reduktioner i CO<sub>2</sub>-udledning. Det potentiale og mere til vil GREENFORCE-projektet realisere i praksis.

Konkret vil parterne udvikle ny software, der via kunstig intelligens kombineret med avancerede algoritmer, computerkraft og servicedesign analyserer data fra TDC NET og teknikerbilerne. Ved at bruge de data som afsæt, kan man optimere teknikernes daglige ruteplanlægning i realtid, gøre teknikerne i stand til at løse flere kunde problemer fra distancen, samt forudsige hvornår netværket har behov for at blive vedligeholdt.

Ali Khatam, medstifter af data- og softwarevirksomheden QAMPO fortæller:

”QAMPO er førende inden for design og udvikling af intelligente planlægningsløsninger, indenfor blandt andet sundhed, persontransport og lufthavne. Med afsæt i vores knowhow og med de stærke kompetencer, der er med i projektet, kigger vi ind i en unik mulighed for at designe og udvikle et banebrydende produkt til at udnytte de eksisterende ressourcer mere effektivt og skabe transparens i en ellers uoverskuelig logistisk problemstilling - til gavn for vores kunder, samfundet og ikke mindst klimaet. Med GREENFORCE vil QAMPO kigge ind i et støt voksende Field Service Management marked med en global omsætning på mere end 100 milliarder kroner om året.”

### **CO<sub>2</sub>-neutralitet i 2028**

Hos TDC NET har man igennem de seneste år arbejdet med data og automatisering for at optimere planlægningen af de i alt 3500 daglige opgaver og 1200 daglige kundebesøg. Det arbejde skal intensiveres yderligere gennem projektet, der spiller en vigtig rolle i TDC NET's ambition om at blive klimaneutral i 2028, målt på de CO<sub>2</sub> udledninger, der er under virksomhedens kontrol, f.eks. bilflåden.

”Som udbyder af digital infrastruktur med én af Danmarks største bilflåder har vi et medansvar for løbende at tænke nyt og udvikle løsninger, der kan forbedre vores teknikeres hverdag, den kundeoplevelse vi leverer og det aftryk, vi sætter på verden omkring os. Alle de elementer kan projektet bidrage til, og vi ser derfor frem til at komme i gang med udviklingen og ikke mindst teste de nye løsninger i vores daglige arbejde,” siger Christian Duer, Executive Vice President, ansvarlig for TDC NET's teknikere og fiberudrulning.

### **Vil udvikle nyt forskningsområde**

DTU fokuserer på at levere forskning, der ikke kun bidrager til den akademiske verden, men også kan omsættes til konkrete løsninger for virksomheder og være til gavn for samfundet. Samtidig spiller bæredygtighed en vigtig rolle på DTU. Så de to institutter i GREENFORCE-

projektet forventer sig meget af projektet, der giver mulighed for at afprøve nye ting, fortæller professor på DTU Management David Pisinger:

”DTU Compute og DTU Management er eksperter i kunstig intelligens (AI), Machine Learning og optimering. I GREENFORCE-projektet vil vi kombinere de tre fagområder på en innovativ måde, som ikke er set tidligere, og udvikle et forskningsområde med et kæmpe potentiale. Det svarer til at koble tre motorer sammen. Hvis vi kan få dem til at samarbejde, vil forskningen blive flyvende.”

### **Fakta om projektet:**

- I et fireårigt Grand Solution-projekt vil QAMPO, DTU og TDC NET udvikle nye løsninger og software, der kan forbedre den intelligente styring af bilflåder
  - Totalbudgettet er på 30 millioner kroner, hvoraf Innovationsfonden bidrager med 15 millioner
  - Allerede i dag indsamler og bruger TDC NET en række data omkring f.eks. varighed af forskellige typer af serviceopgaver, GPS-data fra biler, historiske data etc. De data skal nu bruges endnu mere og endnu smartere ved at udvikle nye løsninger gennem projektet
  - Ved hjælp af kunstig intelligens og decision science-teknologi skal data bearbejdes og analyseres, hvorefter softwareløsningen hjælper med at tilrettelægge planlægningen af teknikernes opgaver, så de kan gennemføres mest effektivt og med den bedst mulige kundeoplevelse
  - Ved at effektivisere den automatiske transportplanlægning og ved at gøre teknikerne i stand til at løse flere kundeproblemer fra distancen forventer projektet at kunne begrænse antal kørte kilometer hos TDC NET med 25%. Det svarer til, at TDC NET's CO2 udledning i 2025 vil være reduceret med 3000 tons sammenlignet med 2020
  - Som en del af projektet forventes den udviklede software også at blive udbredt til andre relevante virksomheder og institutioner med store bilflåder
  - GREENFORCE giver DTU mulighed for at ansætte to ph.d.'ere samt 3 postdocs
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## Climate action

### Deep dive into 2021 initiatives

In 2021, our journey towards becoming a net-zero emissions company (scopes 1, 2 & 3) by 2030 gained pace through more initiatives.

### Investing in renewable energy

Our digital infrastructure is powered by electricity and, as data volumes continue to increase, so does the need for energy. With regard to energy consumption, we also included additionality as a mandatory requirement, when procuring renewable energy. As we want to take responsibility for adding renewable energy to the Danish grid, we established Power Purchase Agreements (PPA) instead of purchasing Renewable Energy Certificates (Guarantees of Origin).

In 2021, we signed a PPA for four new solar parks in Denmark, reflecting the geographical coverage of our network and infrastructure. The solar parks will start to become operational in 2022 and will be able to supply 140

“ We are pleased that TDC NET has chosen us as partners. TDC NET is building the infrastructure of the future, and it is clear that it must be operated with sustainable, fossil-free, Danish-produced electricity.

Rasmus Lildholdt Kjær,  
CEO of Better Energy

GWh of green electricity in 2023, covering approximately 60% of TDC NET's total energy consumption.

### The best energy is the energy saved

We continued to push for energy efficiency in 2021, and saw the first results of decommissioning legacy technology, although some energy savings will materialise later than anticipated as the programme was delayed.

During the first year of operating nationwide 5G coverage, electricity consumption from our mobile network was in line with expectations. This was driven by activation of features such as cell-sleep and micro-sleep functions.

### A greener vehicle fleet

TDC NET has one of Denmark's largest vehicle fleets, used by its field technicians. In 2021, we launched 'Project Greenforce', which aims to reduce the total number of kilometres driven by up to 25% by 2025. This will be achieved by utilising advanced automated route planning. The project has already identified initiatives with a potential saving of 25-30% of the target. We aim to publish the project findings as inspiration for other fleet operators, thereby contributing to further future reductions of emissions from transport on Danish roads.

### Engaging with suppliers

In 2021, we launched our supplier engagement programme to address emissions in our supply chain. We built a solid foundation that was acknowledged by the CDP with a ranking of

“ As a digital infrastructure provider with one of the largest vehicle fleets in Denmark, we have a responsibility to develop solutions to reduce our environmental footprint. We look forward to working on Project Greenforce and implementing the solutions in our work.

Christian Duer, Executive Vice President,  
Chief of Delivery and Field Service

'A-' for supplier engagement, placing us in the leading band. At TDC NET, we have more than 3,500 suppliers worldwide. This includes international suppliers supporting us with the build-out of the 5G network and local civil works suppliers supporting our fibre roll-out. We joined the Joint Audit Coalition (JAC) to coordinate our onsite audits with peers in our industry, while also using the EcoVadis platform to track supplier progress. Furthermore, we initiated dialogues with some of our closest vendors on how they can support our ambition to become net-zero across our value chain by 2030. Finally, we strengthened our internal collaboration between sustainability and procurement departments, and included procurement in our Climate Forum.

As a signatory to the UN Global Compact, we take our commitment to act responsibly seriously. We use the Partner Code of Conduct to outline our requirements for TDC NET

employees as well as our suppliers in relation to human rights, labour conditions, the environment, anti-corruption, Health & Safety, data protection and security.

### Enabling the green transition

Our industry, products and services enable the green transition in other sectors. In 2021, we were among the founders of the European Green Digital Coalition, a consortium of ICT companies that seeks to recognise and support green and digital transformation. We have committed to investing in developing green digital solutions that achieve a net positive impact, to developing methods and tools to measure the impact of green technologies, and to co-creating guidelines for the green digital transformation of other sectors. In 2021, we set the ambition for our coalition and initiated a 2-year programme to deliver on our commitments.

“ I am thrilled to see the European Green Digital Coalition project, which I have initiated together with the European Commission, move forward as it will help policymakers, the industry and civil society make the green and digital transitions a reality.

Valerie Hayer, Member of European Parliament, co-President of the French delegation

## Climate action (continued)

### Outlook

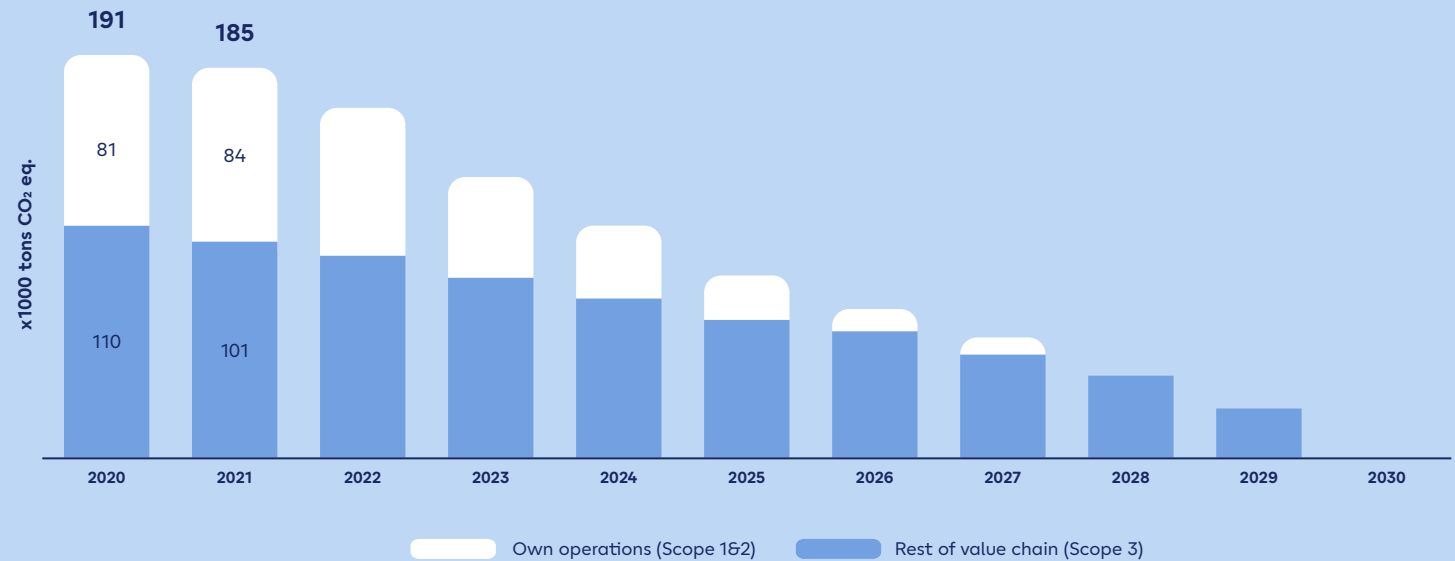
In the coming years, we will continue our trajectory towards becoming a net-zero emission company and look for opportunities to support the green digital transition in Denmark. The recent soaring energy prices add a financial imperative to the equation, making the transition to renewable energy a necessity.

During 2022, we expect to have our net-zero target validated by the Science Based Targets initiative. Reducing our scope 1 & 2 emissions to reverse the trend from 2021 will have high priority in 2022. The first solar parks will be put into operation in 2022, and we will begin assessing opportunities for the remaining energy consumption not covered by renewable energy. We also plan to launch a pilot project on transitioning our fleet to green energy by exploring alternative fuel options.

In our value chain (scope 3), we will continue to formalise our sustainable procurement process and improve data quality.

Finally, as an enabler of the green transformation, we plan to invest and promote digitalisation. We will continue to be closely involved in the work of the European Green Digital Coalition and identify opportunities with partners to reduce the climate impact of other sectors.

Illustration of the transition pathway to net-zero



### Examples of initiatives

**Energy efficiency initiatives**

Invest in the most energy efficient technology and reduce network energy consumption

**Green fleet transition**

Optimise technician routes to reduce km travelled by up to 25% and convert fleet to electrical cars and vans

**Supplier engagement**

Engage with top suppliers to set climate targets and provide data transparency

**Renewable energy**

Cover 100% of energy consumption from high impact renewable energy sources

**Excessive heat utilisation**

Utilise excessive heat from data centres and equipment with e.g. heat pumps

**Avoid and offset**

Promote solutions to avoid emissions and follow the development of carbon removal projects