

# EUUREKA

Issue 7

2020

CLIMATE ISSUES

## Engineering at the heart of zero carbon strategy



ALLEN

# contents

## HOW THINGS STAND



- .....  
**p.4**  
Climate emergency... no time to lose!
- .....  
**p.7**  
Take action, yes... but how?

## INITIATIVE

- .....  
**p.8**  
What is the engineer's role in the collective "zero carbon" project?
- .....  
**p.10**  
ALTEN is committed
- .....  
**p.11**  
Key figures for Europe



## ENERGY

- .....  
**p.12**  
For low-carbon energy: action on all fronts!
- .....  
**p.14**  
3 questions for DOMINIQUE LECOCQ, Air Liquide



## TRANSPORT

- .....  
**p.15**  
How can we get around without leaving a footprint?



- .....  
**p.16-18-20**  
ALTEN is committed

- .....  
**p.17**  
Cars: how can we drive green?

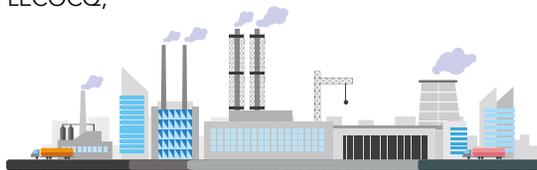
- .....  
**p.18**  
3 questions for MARK SMIDT, Heliox

- .....  
**p. 19**  
The aeronautics industry is working on a disruptive solution

- .....  
**p. 20**  
• Maritime transport: zero carbon achievable in the short term  
• The return of the airship  
• The railway: top of the class, but room for improvement

## INDUSTRY

- .....  
**p.21**  
Emissions falling sharply in the industrial sector



## CONSTRUCTION

- .....  
**p.23**  
Construction: sustained effort required throughout the life cycle

- .....  
**p.24**  
ALTEN is committed



## DATA

- .....  
**p.25**  
Digital technology: digital sobriety is required

- .....  
**p.26**  
ALTEN is committed

- .....  
**p.27**  
The green code: better designed, so less polluting

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# Engineering is committed to a zero carbon world

Although there are no dramatic results yet, one thing's for sure: the march towards a low-carbon economy is underway. This is demonstrated by the initiatives, proposals and decisions made and taken every day by companies, associations, politicians, scientists and citizens, either individually or collectively, in an effort to reduce CO<sub>2</sub> emissions and so keep global warming within a manageable limit.

The engineering sector plays a strategic role in this race against time. In fact, as we are involved right from the design phase of industrial, transport and infrastructure projects, etc., we have the ability – and from now on the duty – to choose and recommend solutions, methods and technology to help reduce the environmental impact of such projects.

Here at ALTEN, we are confirming our commitment to a low-carbon economy by signing a Climate Charter for engineers, proposed last October by Syntec-Ingénierie (with over 400 member companies and 13 regional delegations, Syntec-Ingénierie is a professional federation of consulting engineering companies in France). Through this Charter, engineering is committed to three focus areas: taking concrete action via assigned projects, permanently reducing the carbon footprint of its own activities, and finally supporting staff involvement for the benefit of the climate.

It sends a strong signal to our customers, our teams and to young engineers, too, for whom the "zero carbon" goal is an ongoing concern.

The climate has become a major issue and everyone wants their work to have a positive impact on the planet. As an engineering company, we have the opportunity to take action. Let's grab it with both hands!

**COMMUNICATIONS DEPARTMENT**  
ALTEN GROUP



# Climate emergency...



# ...no time to lose!

THE 2018 IPCC REPORT WHICH ARGUES IN FAVOUR OF LIMITING GLOBAL WARMING TO 1.5 °C IS UNEQUIVOCAL: EACH HALF-DEGREE MATTERS AND WE MUST TAKE IMMEDIATE ACTION.

**12 DECEMBER 2015:** 195 countries attended the COP 21 in Paris and signed an international agreement to keep global warming below 2 °C and reduce greenhouse gases.

**3 NOVEMBER 2019:** 20 million people in New Delhi were blanketed by a choking smog so thick that planes were diverted to neighbouring airports. That day, in the Indian capital, the concentration of PM 2.5 fine particles in the atmosphere hit 810 micrograms per cubic metre of air, a rate more than thirty-two times higher than the WHO (World Health Organization) recommendations!

## A QUESTION OF LIFE OR DEATH

Is India an example of what we can expect for the planet's future? How can we change the destiny of mankind? What are our levers for action? So many questions which become more pressing with each passing day, while the evidence piles up: a recent study published by the European Society of Cardiology<sup>(1)</sup> for 2015 revealed that in Europe, fine particles and ozone would claim many more victims than previously estimated: almost 800,000 people a year. Globally, there would be 8.8 million additional deaths. *"That means that air pollution causes more deaths per year than smoking tobacco,"* says Professor Thomas Münzel, co-author of the study. *"As most fine particles and other air pollutants in Europe come from burning fossil fuels, we must urgently switch to other energy sources,"* his colleague, Pr. Lelieveld, argues.

## TOWARDS A NEW INDUSTRIAL REVOLUTION

Yet oil, which since the 1950s has become the world's most important source of energy, still meets over 30% of energy requirements. It remains by far and away the main raw material used to make transportation fuel and is omnipresent in the petrochemical industry, even though its decline is inevitable due to the depletion of deposits. According to the American essayist and economist Jeremy Rifkin<sup>(2)</sup>: *"The civilization of fossil fuels,*

*which is at the base of the first two industrial revolutions, is collapsing in real time and it is the governments that must create the infrastructure for the industrial revolution of the twenty-first century."* He calls for nations to create environmentally friendly banks and regions to set up their own banks for issuing green bonds *"that will attract investment funds looking for stable long-term returns"*. For decarbonisation is an absolute must if we want our planet, and mankind, to have a future.





### GREATER GLOBAL AWARENESS...

Times certainly have changed since 1979 when volcanologist Haroun Tazieff was simply met with disdain and amusement when he predicted the forthcoming greenhouse effect. Since the 2015 Paris Climate Agreement, nearly every country on the planet has made a commitment to take action and limit global warming. *“Every one of us is certain that it is our activities (fossil fuels, deforestation, agriculture, industry and cement manufacturing) that are contributing to the increase in carbon dioxide and methane (two main greenhouse gases) and therefore to global warming,”* explained Jean Jouzel, a prominent French climatologist and glaciologist and former vice-chair of the IPCC Scientific Council (Intergovernmental Panel on Climate Change) when he spoke on France Culture last October.

**“2015 WAS A TURNING POINT WHEN SUDDENLY EVERYONE REALISED THAT WE HAD TO ACT FAST. THE ACTIONS TAKEN BY GRETA THUNBERG AND SOME OF THE WORLD’S YOUTH ARE HAVING A SNOWBALL EFFECT. SUDDENLY, EVERYONE, OR ALMOST EVERYONE, FEELS INVOLVED. AND THAT’S A GOOD THING.”**

#### DOMINIQUE LECOQC

VP Ecosystems & Communications at Air Liquide  
Hydrogen Energy World Business Line

### ... BUT RESULTS ARE LAGGING BEHIND

However, the Paris Agreement is proving difficult to implement. The nations made a commitment to immediately plan the reduction of their CO<sub>2</sub> emissions (with China obtaining a deferral for after 2025), but today we see that many of them are lagging behind on the path to energy transition which entails an exit from carbon-based fossil fuels, coal in particular. So as Jean Jouzel warns, *“if we want to limit global warming to around 2 °C, we must take urgent action in a very pro-active way and use all the tools at our disposal”*. In spite of the indisputable findings, many questions remain over the solutions to be implemented, experts have differing opinions, a large number of political leaders are still dragging their feet and citizens are often ill-informed. A BVA survey in June 2019 revealed that 69% of French people think that nuclear energy contributes to greenhouse gas production. And yet, as Yves Bréchet, the High Commissioner for Atomic Energy from 2012 to 2018, recalled in *Le Point*<sup>(3)</sup>, *“nuclear energy produces 200 times less carbon dioxide than coal, 100 times less than gas and the same amount as wind power. Even the IPCC pointed out in its 2018 report that we will not do without nuclear energy”*.

Halting net CO<sub>2</sub> emissions in less than 40 years is a major global challenge, but a number of experts agree that it is technically achievable and at an acceptable cost. Provided, as pointed out by Pierre Papon, ex-Director General of the CNRS (the French National Centre for Scientific Research) in his blog<sup>(4)</sup>, it is understood that *“energy transition has 3 dimensions – scientific, industrial and socio-economic. These must be simultaneously and consistently taken into account”*.

(1) European Heart Journal. Cardiovascular disease burden from ambient air pollution in Europe reassessed using novel hazard ratio functions <https://academic.oup.com/eurheartj/article/40/20/1590/5372326>

(2) Jeremy Rifkin, *The Hydrogen Economy*, after the end of oil, the new economic revolution, Paris, La Découverte, 2002.

(3) *Le Point*. Global warming: the French blame nuclear energy [https://www.lepoint.fr/economie/rechauffement-les-francais-accusent-lenucleaire-26-06-2019-2321239\\_28.php](https://www.lepoint.fr/economie/rechauffement-les-francais-accusent-lenucleaire-26-06-2019-2321239_28.php)

(4) Blog by Pierre Papon. Energy transition in political upheaval - <http://pierreppapon.fr/?p=980>

# Take action, yes... but how?

POLITICAL WILL, ECONOMIC INVOLVEMENT AND CIVIC PARTICIPATION: ALL LEVERS THAT MUST BE ACTIVATED AT THE SAME TIME TO ACCELERATE ENERGY TRANSITION.

## POLITICAL WILL - A VITAL TOOL

One thing is clear: nothing will be possible without the strong will of every political leader if we want to reduce the proportion of fossil fuels in the energy mix and drastically increase the role of electricity. *"In terms of transport, for example, fleet vehicles are leading the way as legislation alone is enough to replace a city's or even a country's bus fleet. Things can therefore be put in place very quickly,"* explains Mark Smidt, Managing Director of Heliox, a company which produces recharging infrastructure for electric vehicles (see also page 18). Decarbonising transport, improving the thermal efficiency of buildings, developing renewable energy, making carbon capture and storage more widespread... all of this requires a genuine industrial strategy involving both public authorities and economic players.

In her inaugural speech to the European Parliament, the new president of the European Commission, Ursula von der Leyen, also set some ambitious targets: a minimum 50% reduction in greenhouse gas emissions by 2030 and the member states adopting a "Green Pact" to firmly ground the goal of climate neutrality by 2050.

## COLLECTIVE PARTICIPATION

Nations setting the course, regional and local authorities taking action in terms of public transport and urban development, citizens recognising the lifestyle changes needed, scientists designing solutions, financial players investing in the search for innovative solutions, economic players working together to implement long-term and profitable solutions: everyone's participation is vital.

## MASSIVE INVESTMENT

Energy production and supply, the building of new factories and the efficient procurement of materials and equipment all require massive investment. *"Decentralised market mechanisms, such as carbon pricing, are essential for lending impetus to change in key industrial sectors, given the multitude of decarbonisation methods possible,"* explained Adair Turner, Director of the Institute of New Economic Thinking last September in his column for the French monthly magazine Alternatives Economiques, arguing *"that drastically accelerated action is now*

*needed"*: all developed countries must commit to achieving carbon neutrality by 2050 and developing economies by 2060 at the latest. The recent Energy Transitions Commission report entitled Mission Possible<sup>(1)</sup> considers total decarbonisation to be technically feasible with existing technologies, even though some of them still need to become commercially viable. *"This target can still be achieved at a relatively low cost,"* Adair Turner concluded, *"provided the necessary measures are adopted without delay to implement rapid change"*.

(1) Energy Transitions Commission. Reaching net-zero carbon emissions: mission possible - <http://www.energy-transitions.org/mission-possible>



# What is the engineer's role in the collective "zero carbon" project?



Introduced on 24 October 2019, the Climate Charter for engineers was immediately signed by 40 ETI\*, SME and international groups operating in all business sectors and located throughout France.

Syntec-Ingénierie proposed indicators for monitoring the progress made by companies. Annual assessments will be conducted.

\* an intermediate-sized enterprise is a company between 250 and 4999 employees

*"BECAUSE ENGINEERING IS INVOLVED RIGHT FROM THE DESIGN OF BUILDINGS, TRANSPORT, INFRASTRUCTURE, ETC., IT LIES AT THE HEART OF SOLUTIONS WHICH HELP ACHIEVE PROJECTS WITH THE LEAST CARBON IMPACT."* SO SAYS PIERRE VERZAT, CHAIRMAN OF SYNTEC-INGÉNIERIE. IT IS THEREFORE ONLY FITTING THAT THE PROFESSIONAL FEDERATION SHOULD ASK ITS MEMBERS TO SIGN THE CLIMATE CHARTER FOR ENGINEERS. **CHRISTOPHE LONGEPIERRE**, GENERAL DELEGATE, EXPLAINS HOW THE CHARTER CAME ABOUT AND THE COMMITMENTS.

→ **WHO CAME UP WITH THE IDEA OF PRODUCING A CLIMATE CHARTER FOR ENGINEERS?**

This initiative comes from the Young Engineers Council, engineers with between one and three years of experience whose mission is to take a fresh look at work habits in the engineering sector. Climate issues are one of their strongest areas of interest and that is how the idea of crystallising around this topic came about, by sharing thoughts and ideas as well as a commitment with our member companies. The result is this Charter, which aims to exploit the capabilities of engineering companies in decarbonising the economy and unite the companies in the same drive towards zero carbon.

→ **WHAT ARE THE SIGNATORIES COMMITTING THEMSELVES TO?**

They undertake to carry out ambitious, concrete actions within their own company as well as in the projects they complete for their customers. Whether it is for mobility solutions, smart buildings, clean energy or Industry 4.0, engineering provides its private and public customers with technological as well as organisational solutions for reducing the carbon footprint of their projects. The signatory companies go further with the Charter in terms of the projects they are assigned, their own activities and their staff.

→ **WHAT DOES THIS MEAN IN PRACTICAL TERMS?**

As regards the engineering profession and its responsibility in relation to projects, the Charter asserts its advisory and specifier role for decision-makers. Engineering companies must prioritise low-carbon solutions (from their eco-friendly design to their recycling), plan offsetting measures if necessary and guide decision-makers' choices in favour of low-carbon solutions, using analyses and decision support tools.

The second aspect of the Charter relates to actions within engineering companies themselves for reducing their carbon footprint. They undertake to review their company travel policy (electric vehicle fleet, limiting travel in general and by plane in particular, telework, videoconferences, etc.), to change working practices (eliminating single-use

plastic, eco-friendly use of digital tools, etc.) and to set up indicators for monitoring and controlling their carbon footprint (ISO 14001 certification, annual publication of a climate index, etc.).

Finally, the Charter signatories undertake to routinely collect their staff's suggestions, to open a dialogue and to consider solutions for improving projects. All staff can have a questioning and advisory role within their company, which is accompanied by an adaptation of the companies' decision-making processes.

→ **CAN WE SAY THAT THIS CHARTER PLACES ENGINEERING IN A STRATEGIC POSITION FOR PRESERVING THE PLANET IN GENERAL AND TACKLING GLOBAL WARMING IN PARTICULAR?**

This Charter sends a strong signal: it strengthens the engineering companies' commitment to sustainable development and underlines to young engineers starting out in the profession that their professional career is conducive to a personal commitment to climate action. The climate has become a major concern for employees who want their work to have a positive impact on the planet. There are solutions. It's up to us to promote them and implement them together.

**"FORTY COMPANIES HAVE ALREADY SIGNED AND OTHERS WILL FOLLOW. I'M VERY CONFIDENT," SAID CHRISTOPHE LONGEPIERRE THE DAY AFTER THE CHARTER WAS INTRODUCED. "SIGNING THIS CHARTER GENERATES A GREAT DEAL OF PRIDE. IT'S AN ENGAGING PROCESS, AN APPROACH GEARED TOWARDS PROGRESS."**

## ALTEN is committed

### Measuring our carbon footprint

ALTEN WAS ONE OF THE FIRST TO SIGN THE CLIMATE CHARTER FOR ENGINEERS.

*"As part of its CSR procedure, which began a decade ago with the signing of the Global Compact, ALTEN has implemented actions for reducing its environmental footprint. So this commitment is nothing new, but it took on another dimension in 2019 when the Group's carbon footprint was measured, covering all of our activities. We therefore have a clear picture of our CO<sub>2</sub> emissions and the posts which require action,"* explains Ombeline de Villeblanche, ALTEN CSR Manager.

Not surprisingly, it is transport that has the most significant impact (85% of emissions). That's why the solutions recommended in the Climate Charter for engineers are already being applied under a highly successful action plan for direct emissions: ALTEN has introduced a travel policy which prioritises train travel and 75% of company vehicles in the catalogue are hybrid or electric. There are other local initiatives, such as grants for buying bicycles in the UK, awareness-raising in Germany, corporate travel season tickets for employees, electric vehicle charging stations on ALTEN sites in the Netherlands, etc. (see also p.18).

In second place are the buildings, which represent 15% of CO<sub>2</sub> emissions. Here too, there is a pro-active policy on all the Group's sites for reducing greenhouse gas emissions (see p.24).

*"ALTEN's continuous improvement process is observed by the customers and by the investors,"* says Ombeline de Villeblanche. *"It's a good thing because it also encourages us to move forward. Like many large corporations, we fill in the CDP questionnaire (previously Carbon Disclosure Project), which assesses our performance in terms of tackling climate change. We are very proud to say that ALTEN has been awarded A-. It confirms our leadership regarding the climate. Taking it further, one of our customers in Italy asks us to calculate the CO<sub>2</sub> emissions generated by our teams on its projects to help improve its carbon footprint."*

*"For our part, we are vigilant when it comes to choosing our partners. As well as our Responsible Purchasing Charter, we take into account the environmental performance of the suppliers we select for certain purchasing families. We encourage these suppliers to retain*



**"IT IS ESSENTIAL THAT OUR ENGINEERS TAKE THE PRODUCT'S CARBON FOOTPRINT INTO ACCOUNT IN THE DESIGN AND USE PHASES, AS WELL AS THE FOOTPRINT RELATED TO ITS DESTRUCTION AND END-OF-LIFE PROCESSING. WE MUST MAKE SURE OUR BUSINESS OPERATES IN A VIRTUOUS CIRCLE."**

**STÉPHANE OUGIER**

ALTEN Executive Director

*a continuous improvement approach via the ISO 14001 certification process, for example,"* continues the ALTEN CSR Manager.

Signing the Climate Charter for engineers fits in with the Group's philosophy. *"Our teams feel involved and our customers ask us for more and more information: we are therefore ready to increase our efforts for a zero-carbon world."*

**On the following pages are details of the various actions taken by the ALTEN Group when working on projects and in-house.**

# Key figures for Europe

## What targets need to be achieved?

The **28 member states of the European Union** have shared out the effort to **reduce CO<sub>2</sub> emissions by 2030 amongst themselves**. This effort varies between **0 and 40%**, depending on their economic situation. **France** must reduce its emissions by **37%** compared to 2005. The largest reductions are expected from **Luxembourg** and **Sweden (40%)**, **Denmark** and **Finland (39%)**, and **Germany (38%)**. **Bulgaria (0%)**, **Romania (2%)** and **Latvia (6%)** have been given the lowest targets.

### ENERGY

- Electricity production 35%
- Energy excluding electricity 6%

TRANSPORT 35%

INDUSTRY AND CONSTRUCTION 12%

RESIDENTIAL CONSTRUCTION 12%

OTHER SECTORS (including tertiary) 7%

## Where can we take effective action?

Origin of CO<sub>2</sub> emissions per economic sector in Europe in 2014  
Source: EEA Greenhouse gas

## The best solutions for the climate

According to the Drawdown project

In collaboration with almost 70 international researchers, American ecologist Paul Hawken has listed a hundred or so solutions for reversing ongoing global warming, evaluating their individual potential impact. Here are a few of them, ranked in order of effectiveness.

1. Dispense with the refrigerants used in refrigerators and air conditioners.
2. Increase the proportion of onshore wind power from 2.9 to 21.6% of world electricity consumption.
3. Halve food waste.
4. Restrict diet to 2,500 calories per day for 50% of the population and reduce global consumption of meat.
5. Restore 176 million hectares of tropical forest.
- ...
8. Produce 10% of the world's electricity from photovoltaic solar power plants.
10. Produce 7% of the world's electricity from roof solar panels.
18. Increase the proportion of the world's electricity produced from geothermal energy to 4.9%.
20. Reach 20% nuclear energy in the global energy mix.
25. Produce 4.3% of the world's electricity from thermodynamic solar power plants.
26. Reach 16% of total passenger miles in electric vehicles.

<https://www.drawdown.org/>

## For a clearer picture



SENDING AN EMAIL WITH A 1 MB ATTACHMENT



= 50 G OF CO<sub>2</sub> OR 500 M BY CAR



= ONE 60 W LIGHTBULB SWITCHED ON FOR 25 MIN



TOTAL EMAILS SENT IN ONE YEAR IN THE WORLD



= 410 MILLION TONNES OF CO<sub>2</sub>



= HALF THE GLOBAL AIR TRANSPORT PER YEAR



IT STORAGE CENTRE CONSUMPTION



= 410 BILLION WATTS PER YEAR



= 6% OF GLOBAL ENERGY CONSUMPTION PER YEAR

# For low-carbon energy: action on all fronts!



FRANCE IS VERY PLEASED TO HAVE PRODUCED 86% DECARBONISED ELECTRICITY IN 2018. ALTHOUGH WE SHOULD BE DELIGHTED WITH A RESULT LIKE THAT, WE MUST BE CAREFUL NOT TO CONFUSE ENERGY WITH ELECTRICITY. BECAUSE THIS ONLY REPRESENTS A QUARTER OF TOTAL ENERGY CONSUMPTION IN FRANCE, WHEREAS COAL, OIL AND NATURAL GAS REPRESENT 67% OF THE ENERGY MIX, THE REMAINDER BEING PROVIDED BY BIOMASS, WASTE INCINERATION AND COGENERATION. SO THERE IS STILL SOME WAY TO GO TO REACH ZERO-CARBON ENERGY.

The momentum of emerging markets, led by China and India, is pulling global energy demand upwards. It rose by 2.3% in 2018, resulting in a 1.7% increase in global energy-related CO<sub>2</sub> emissions compared to the previous year. This trend goes against the clearly defined targets of the Paris Agreement on climate change<sup>(1)</sup>, especially considering that fossil fuels accounted for almost 70% of this growth. Fatih Birol, the Executive Director of the International Energy Agency, warns: *"Urgent action is needed on all fronts, including developing all clean energy solutions, curbing emissions, improving energy efficiency, and spurring investments and innovation, including in carbon capture, utilisation and storage"*.

### **COAL, THE PRIMARY SOURCE OF ENERGY CONSUMED IN THE WORLD**

Although renewable energy is advancing rapidly, it is not enough to meet the world's demand for electricity. Coal consumption is rising sharply, mainly from a recent fleet of coal-fired power plants in Asian countries, built to satisfy the energy requirement of this area which is experiencing rapid economic development. In contrast, in developed countries, and in the United States in particular, coal mines are closing one after the other (289 since 2010): *"We're seeing a rush to the exit door from the coal industry and utilities because the economics don't work out,"* Jonathan Levenshush, from

the environmental organisation Sierra Club, told AFP. *"Since 2010, coal has become more expensive to exploit than natural gas, which is experiencing strong growth."*

The oil companies are also getting their houses in order and making their fuel cleaner by cutting methane leaks, restricting the burning of surplus gas and improving the energy efficiency of the facilities. In Texas, the oil company Occidental is working on a different concept: a direct-air capture plant which removes CO<sub>2</sub> from the atmosphere in order to inject it underground and boost oil production.

### **TOWARDS GENERAL ELECTRIFICATION**

There should be an increase in electricity in overall energy consumption from around 20% to over a third by 2050. It will probably come from renewable energy and nuclear energy. But this view is the subject of debate. Partly because advocates of mainly renewable energy face a major problem with storage, crucial for being able to rely on this resource which is intrinsically irregular and random. In 2002, the American economist Jeremy Rifkin predicted the imminent end of oil and prophesied that hydrogen would replace it as an energy carrier, in spite of how dangerous it is<sup>(2)</sup>. His bold hypothesis might become a reality as hydrogen provides a way of storing electricity from wind and solar energy. The ADEME (French Environment and Energy Management Agency) confirms that the hydrogen option would provide flexible solutions for optimising the energy networks<sup>(3)</sup>.

As for nuclear energy, it is subject to ideological opposition. *"But we can't see how we can do without nuclear energy if we dispense with fossil fuels which emit CO<sub>2</sub>,"* says Stéphane Ougier, ALTEN Executive Director. *"The Germans have turned it into a political issue and have ended up with heavily polluting coal-fired power. In France, the government's awkward position over the issue is clear to see. The pro-nuclear lobby is very powerful, but it's a complex equation. For the time being, we have not demonstrated that renewable energy is a credible alternative for the amount of energy required. Offshore wind energy offers promising production prospects, but it is subject to severe corrosion which results in frequent major maintenance operations. It has a high return, but costs a lot more than nuclear energy. So what do we decide to do? Do we commit to new generation reactors? Do we continue to invest in R&D in nuclear energy? And if we limit nuclear energy, what happens to the country's energy independence?"*

And Stéphane Ougier draws a parallel with China: *"In China, decisions have been made. The country is deeply committed and is forging ahead: it is switching to electric propulsion."*



**“DECARBONISATION IS A MAMMOTH PROJECT FOR MANKIND BECAUSE WE DON'T HAVE THE CHOICE. AND WE'LL SUCCEED! IT ISN'T MISSION IMPOSSIBLE.”**

**MARK SMIDT**

Managing Director of Heliox Automotive BV



*The Chinese are skipping stages and building battery factories that are several miles long. They are pouring everything the country has into electric.”*

One of the virtuous energy initiatives is the work being done on “greening up” gas: part of the European Union’s strategy for carbon neutrality by 2050, biomethane (a renewable gas) produced from organic matter, not fossils, and purified would reduce the use of fossil gas. Its use as transport fuel would substantially reduce pollutant and CO<sub>2</sub> emissions in this sector.

#### **“GREENING UP” THE INFRASTRUCTURE TOO**

In spite of everything, we must face facts: decarbonised energy installations produce CO<sub>2</sub> as well. In the nuclear infrastructure life cycle, for example, the maintenance and decommissioning of plants consume oil-based energy, as do ore mining and processing. Likewise, the manufacture and maintenance of wind turbines or solar panels result in emissions. Dominique Lecocq, VP Ecosystems & Communications at Air Liquide Hydrogen Energy World Business Line, is well aware of the need to also “*shift hydrogen production towards low carbon*”. Because as pointed out by Mark Smidt, Managing Director of Heliox, a Dutch company which produces recharging solutions for electric vehicles: “*Decarbonisation is a mammoth project for mankind because we don't have the choice. And we'll succeed! It isn't mission impossible.*”

(1) Limit the average global temperature increase as close to 1.5 °C above pre-industrial levels.

(2) Jeremy Rifkin, *The Hydrogen Economy, after the end of oil, the new economic revolution*, Paris, La Découverte, 2002.

(3) The hydrogen carrier in energy transition, 2018, [www.ademe.fr](http://www.ademe.fr)



## **3 QUESTIONS FOR**

**DOMINIQUE LECOQC**

VP ECOSYSTEMS & COMMUNICATIONS  
AT AIR LIQUIDE HYDROGEN ENERGY  
WORLD BUSINESS LINE

#### **→ DO YOU THINK WE ARE AT A TURNING POINT AND THAT HYDROGEN FINALLY HAS A PLACE IN THE DEBATE ON ENERGY TRANSITION?**

Yes, particularly in the past three years or so. We're seeing things changing. People understand now. Our heavy industry customers see that hydrogen will be an integral part of the future: in Germany, for example, Thyssen Krupp is going to inject hydrogen to partially replace pulverised coal in the blast furnace during steel production.

#### **→ WHAT IS THE MAJOR ISSUE FOR HYDROGEN TO BECOME A SERIOUS ALTERNATIVE?**

It's developing hydrogen production to produce low carbon. Two examples: in our future Nevada plant (United States), part of the sourcing will be from biomethane, and in our Port-Jérôme facility in Normandy, we capture the CO<sub>2</sub> emitted during production and re-use it in other applications.

#### **→ HOW CAN HYDROGEN'S PLACE IN THE ENERGY MIX BE ESTABLISHED?**

Air Liquide spearheaded the creation of the Hydrogen Council at Davos in early 2017 which brings together the CEOs of global companies that believe in hydrogen. There were 13 to begin with and now there are 60. And they speak with one voice to public authorities in particular.

# How can we get around without leaving a footprint?

Transport accounts for nearly a quarter of global CO<sub>2</sub> emissions so logically it appears at the top of the list of sectors where action is urgently required. Until recently, public policies and eyes were mostly turned towards the automotive industry, with the government imposing a punitive framework to force manufacturers into investing in alternative solutions to the combustion engine. Since late 2018, there has been a movement instigated by civil society and circulated via social media which has cast aspersions this time on air travel, referred to as “flygskam” (flight-shaming). A trend which today has spread far beyond the borders of Sweden where it started and which is taken very seriously indeed by airlines and manufacturers. So things are on the move with transport and have been for several years. Manufacturers in both the automotive and aviation industries have not been sitting idly by as regards technology.



However, as Stéphane Ougier, ALTEN Executive Director, explains, *“the technological response in the transport sector, as indeed in other sectors, won't be enough to drastically reduce CO<sub>2</sub> emissions. This issue requires a complex and multiple response. Every citizen must become involved and change their behaviour to limit the number of vehicles they own and adjust the journeys they make by using clean transport (electric bus, train, tram, bicycle, etc.). Apart from passenger transport, the supply chain must also be reviewed, prioritising the relocation of production and thereby limiting the movement of cargo planes and container ships which also pollute.”*

During the Aix-en-Provence Economic Forum in June 2018, Guillaume Pépy, then CEO of SNCF, mentioned three avenues for reinventing transport. Firstly, shared mobility for people and goods: with an average vehicle occupancy rate in France of 1.1 people and considering that *“all modes of transport (train, bus, car or lorry) travel between 1/4 and 3/4 empty”*, he quite rightly felt that *“filling up”* was the first step. Secondly, the development of soft modes of transport: cycling continues to grow, even though the political will in terms of infrastructure is still not forthcoming at times. The enormous success of scooters (and their share of setbacks) shows

that the French are ready for simple, accessible solutions. Finally, communal services, developed using digital technology: carpooling apps for booking available vehicles, journey sharing, etc.

Joint effort using these various tools gives us hope that the zero CO<sub>2</sub> emissions target will be reached in transport by 2050.



## ALTEN is committed

### Implementation of a Commuting Plan

Within the Group, it is transport that has the greatest impact on our carbon footprint: 85% of CO<sub>2</sub> emissions. So a Commuting Plan has been implemented in France to cut back on employees' use of their cars for commuting between their homes and work.



#### PLANE

(passengers) 180-250 seats  
journey < 1,000 km

293 g CO<sub>2</sub>  
eq/passenger/km



#### PRIVATE CAR

Average vehicle tax rate  
Petrol engine

259 g CO<sub>2</sub>  
eq/km



#### METRO

(Paris)

5.70 g CO<sub>2</sub>  
eq/passenger/km



#### TGV

High Speed Train  
(France)

3.69 g CO<sub>2</sub>  
eq/passenger/km

# Cars: how can we drive green?

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ALTHOUGH MAINLY RESPONSIBLE FOR CO<sub>2</sub> EMISSIONS IN TRANSPORT, THE ROAD VEHICLE SECTOR IS NEVERTHELESS A CONSCIENTIOUS LEARNER WHO IS WORKING TO REDUCE ITS CARBON FOOTPRINT, MAINLY THROUGH THE GRADUAL AVAILABILITY OF SYSTEMS LIKE "STOP AND START" WHICH REDUCES FUEL CONSUMPTION BY AROUND 15% IN TOWNS AND THE INCREASE IN SALES OF ELECTRIC AND HYBRID VEHICLES (+ 64% IN 2018).

The total replacement of internal combustion vehicles by other types of propulsion is now on the horizon. But the development of electric mobility must also be accompanied by the decarbonisation of electricity generation. And hydrogen batteries and fuel cells still have a high environmental cost; manufacturers are therefore working on their energy density, their lifespan and their capacity to withstand a larger number of charging cycles. They also want to develop new technologies (like supercapacitors which no longer require rare metals, which it is reported will be in short supply by 2050).

## HYDROGEN OR ELECTRIC?

The "electric battery" scenario is based on the assumption of rapid advances in lithium batteries and a fall in their cost. The "hydrogen" hypothesis involves a fall in the cost of hydrogen storage tanks and fuel cells. The International Energy Agency believes that as hydrogen does not produce greenhouse gases or particles, with water its only byproduct, it must "*play a key role in a clean, secure and affordable energy future*". At the moment, public transport and captive fleet projects are being prioritised. "A massive development in private cars is a more distant prospect due to the costs of deploying charging stations and cars," says Dominique Lecocq, VP Ecosystems & Communications at Air Liquide Hydrogen Energy World Business Line. "*Hydrogen mobility will start with fleet vehicles in order to make the infrastructure profitable.*"





Yet hydrogen is mainly produced from natural gas and is not without ecological impact. *“One of the industry’s challenges today is to move production towards low-carbon hydrogen,”* Dominique Lecocq goes on to say.

### A MIXED FUTURE

The most likely scenario is that *“we will have a hybrid future in terms of propulsion. Hydrogen, electric and thermal technologies, and others yet to come, will be combined,”* says Cédric Rouxel, Head of Department at ALTEN. *“All of the international groups are joining forces to develop hybrid vehicles in a very tight market where standards are more stringent and investment much heavier,”* adds Adrien Jouhannaud, Head of Department at ALTEN. It is likely that this mixing will be found not just in vehicles but also in usage, with electric propulsion being used in urban areas and hydrogen propulsion for long distances. Different charging infrastructure for different needs.

## ALTEN is committed

### Greener journeys

- The company car catalogue for ALTEN employees is now composed of 75% hybrid or electric cars. Diesel vehicles have been removed from the catalogue completely. Likewise, for taxi journeys, ALTEN encourages its employees to choose green taxis. Finally, each newcomer must follow an e-learning eco-driving training module.
- To enable its teams to work together without having to travel, ALTEN has equipped its buildings with high-performance video conferencing equipment.



## 3 QUESTIONS FOR

### MARK SMIDT

MANAGING DIRECTOR OF HELIOX  
AUTOMOTIVE BV

HELIOX, a Dutch company founded in 2009, creates end-to-end vehicle recharging infrastructure solutions which include charging terminals, stations and maintenance. It now operates in several European cities and in 2018 installed the world’s largest electric bus depot with charging stations in Amsterdam.

#### → HOW ARE YOU FEELING IN THIS CONTEXT OF ADAPTING TO CLIMATE CHANGE?

I’m optimistic because we’re doing what’s right for the planet. Electric mobility is the first step and the contracts we’re winning show that there is a genuine change in mindset.

#### → WHAT KEY TRENDS DO YOU SEE?

A real explosion in fleets of electric buses in Europe and the United States! It’s good news because they will be driving the paradigm shift. Following in their wake will be lorry development, which I see happening by 2030 and further down the line, the development of private vehicles.

#### → DO YOU THINK WE CAN SUCCESSFULLY MAKE THIS SMOOTH TRANSITION?

It will take decades to decarbonise completely and political will and sacrifices will be required. Gandhi and Franklin D. Roosevelt are great role models to me in these times of crucial change: they accomplished great things with stubbornness and perseverance, making radical choices. Decarbonisation is the mother of all battles for our planet. And the companies working on it today are leading the way.

# The aeronautics industry is working on a disruptive solution

WITH 5% OF GLOBAL CO<sub>2</sub> EMISSIONS, THE AERONAUTICS INDUSTRY ACTUALLY HAS QUITE A LIMITED PROPORTION IN RELATION TO THE ACTIVITY – OVER 4.3 BILLION PASSENGERS IN 2019<sup>(1)</sup>.

*“But demand for air travel is growing twice as quickly as the economy,” explained Grazia Vittadini, the Airbus Director of Innovation, at the Paris Air Show in June 2019. “We may have twice as many planes in 20 years, meaning 50,000 aircraft in the skies and double the amount of CO<sub>2</sub> emissions. Our biggest joint challenge is controlling this impact. It’s necessary for society.”*

The first point to be made is that new-generation aircraft consume 15 - 20% less fuel than previous ones, something which is prompting airlines, conscious of the cost of fuel, to replace their fleets. Can we do better or even decarbonise air travel? *“As things currently stand, that seems unrealistic,”* believes Patrick Boulogne, ALTEN’s Head of Development. *“There isn’t a sufficiently effective solution for storing energy other than fossil energy. There is still work to be done on batteries and engines.”* Avenues are currently being explored: Paul Stein, Chief Technology Officer at engine manufacturer Rolls-Royce, spoke at the Paris Air Show about materials that are more lightweight and more resistant to high temperatures, new, more aerodynamic designs allowing less energy-guzzling engines to be used, engines that are more integrated into the fuselage, more electric planes and jet engines, etc. *“In order to significantly reduce CO<sub>2</sub> emissions,”* continues Patrick Boulogne, *“disruptive technology is needed, like hybrid aeroplanes. Manufacturers are considering this, Airbus in particular. Fossil energy would be used for the key or critical phases of flight and electric propulsion would be prioritised during the flight, as for cars.”*

It takes ten to fifteen years to develop a new plane and 50% of the R&D is devoted to the engine, with safety being the highest priority. For passengers to go along with it, the break-through solution must not only be environmentally friendly but also prove that it is reliable.

(1) According to the International Civil Aviation Organisation (ICAO)

## ALTEN supports

### its customers with engaging projects

#### The Airbus eTaxi system

This is where electric motors are fitted to a plane’s main landing gear wheels. Before take-off and after landing, the plane travels on the runway for twenty minutes or so. An electric motor fitted to the wheels is used at those times instead of the main engines.

#### eFanX

This is the name of the Airbus plane fitted with a Rolls-Royce hybrid electric propulsion system. A medium-term solution which emits less CO<sub>2</sub>.

#### Air route optimisation

(and optimisation of aircraft refuelling).

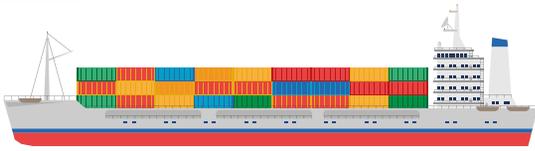
The idea developed with EuroContrôle consists of working on optimising possible routes to reduce costs and the ecological footprint of flights, with current fleets, which therefore produces an immediate result.



## ALTERNATIVES SOON AVAILABLE

### FOR SHORT JOURNEYS?

The first flight to be discontinued because of the climate was last June from Amsterdam to Brussels, cities which are 200 kilometres apart, at the initiative of a green Dutch MP, supported by the majority of her government. Although everyone agrees that trains should be used for short distances as the least polluting form of transport, what solution could be suggested for regions without a well-developed rail network? At the Paris Air Show last June, Israeli startup Eviation unveiled a 9-seater all electric aircraft with a range of 1,000 kilometres, built from carbon fibre and with three rear-facing propellers. An innovation awaiting certification which the United States is already interested in for serving second-tier cities.



## Maritime transport: zero carbon achievable in the short term

Cruise ships, tankers and giant container ships use heavy fuel oil and emit a considerable amount of sulphur oxide. According to a survey published last June by the Transport and Environment NGO<sup>(1)</sup>, the cruise company Carnival Corporation alone, with 47 ships operating in Europe, emitted ten times more sulphur oxide in 2017 than all of Europe's 260 million cars. However, globally, maritime transport emits a billion tonnes of CO<sub>2</sub> a year (less than 3% of total emissions), five times more than rail transport, but a little less than planes and less than lorries and cars.

According to several organisations including the OECD, the target of net zero CO<sub>2</sub> emissions by 2050 can be achieved by reducing ship speed, making the provision of shore-based power more widespread to avoid keeping the engines running for everyday on-board needs when docked, limiting the use of this type of transport by relocating certain production lines and taxing heavy fuel oil, which is not the case at present.

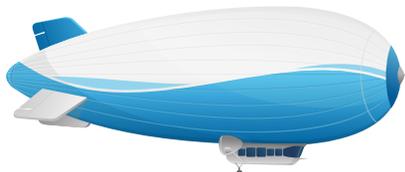
(1) Transport & Environment. One corporation to pollute them all <https://www.transportenvironment.org/publications/one-corporation-pollute-them-all>

## The return of the airship

What if airships were the solution for transporting heavy loads? The LCA60T by Flying Whales, a company supported by the French National Office for Aerospace Studies and Research (ONERA), has been designed for the cost-efficient transportation of loads over 60 tonnes, at low altitude (3,000 m), at a maximum speed of 100 km/h. A particularly interesting solution in areas that are difficult to access.

The airship floats in the air and therefore needs a lot less energy to move forward than other aircraft. And as it is sensitive to the wind, it can make use of air currents. An ideal profile for all-electric. A solution still needs to be found for generating electricity on board and, for the time being, nothing matches the turbo generators that run on kerosene. So the airship is not completely green, but likely to be improved in the future with renewable energy systems or a fuel cell.

[www.onera.fr](http://www.onera.fr)



## The railway: top of the class, but room for improvement



Although the railway is obviously the cleanest mode of transport, it needs to make further progress by replacing the trains that are still diesel-powered. To do so, there are two technologies that look promising. The first, developed by Alstom, uses hydrogen. Two trains powered by a fuel cell have already been in service since September 2018 in Germany and the French manufacturer is raking in contracts for new Coradia iLint hydrogen trains, again in Germany, a country leading the way in this field. France, Italy, the UK, Canada and Sweden are also following the same track. The second solution, introduced in particular by the Canadian manufacturer Bombardier, consists of a train fitted with batteries which means it could come off the electrified network for part of the route, the batteries recharging in about ten minutes on contact with an overhead line, when stationary or in motion, or using stations located on non-electrified sections. This technology is already being used by Deutsche Bahn in Germany and for some tramways.

Apart from the technical aspects, avenues are currently being explored regarding traffic management too, in order to reduce the time between two trains, for example, and in the carriage design itself to increase train capacity.

## ALLEN is committed

### Priority given to train travel

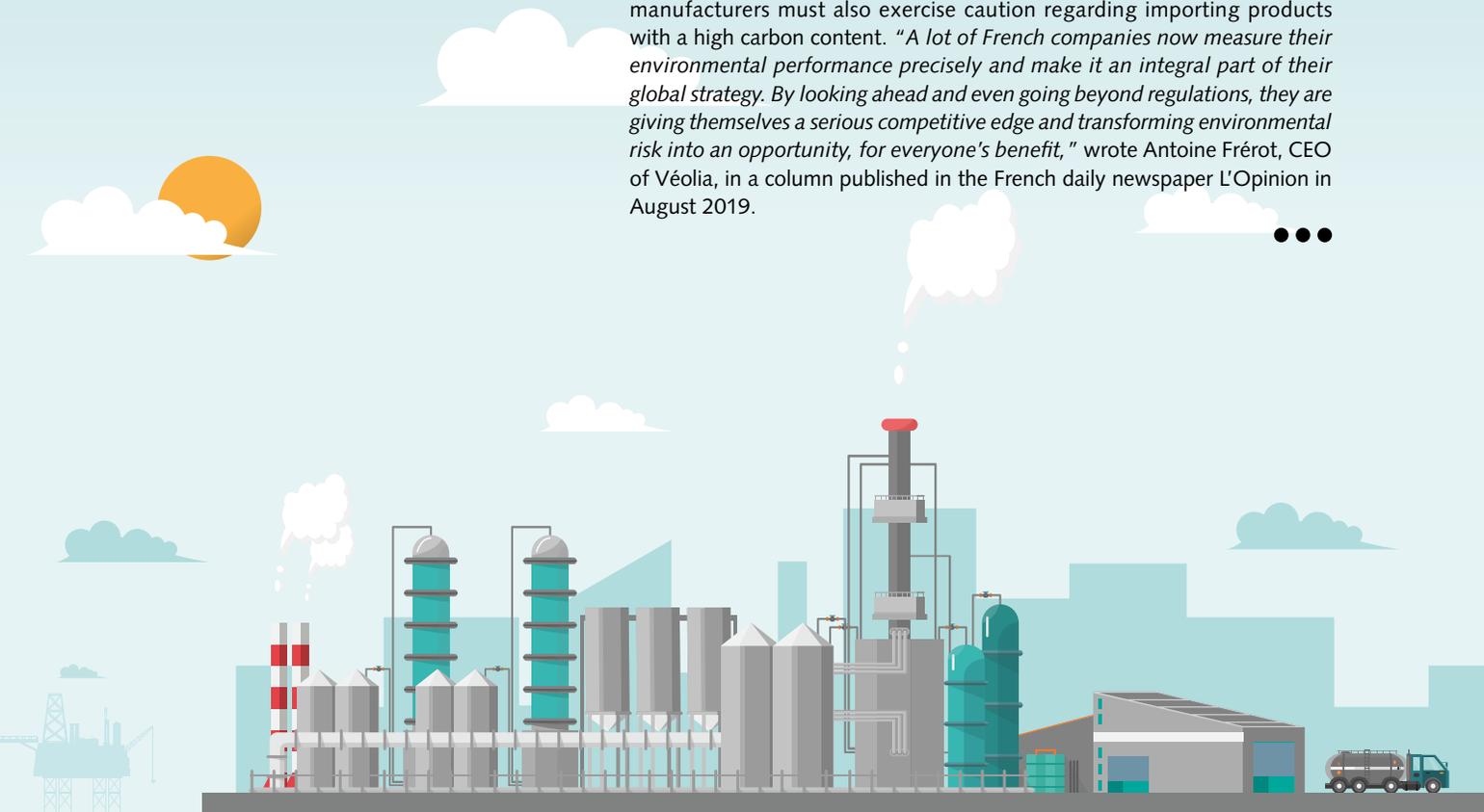
When travelling on business, employees should choose the train. Flying is only authorised for round trips of at least 5 hours.



# Emissions falling sharply in the industrial sector

SINCE 1990, INDUSTRIAL EMISSIONS (17% OF EMISSIONS IN FRANCE) HAVE FALLEN BY OVER 50%, MAKING A VITAL CONTRIBUTION TO THE DRIVE FOR REDUCING NATIONAL EMISSIONS.

The industrial sector began its march towards reducing emissions a long time ago, but even so, it must still increase its efforts to achieve carbon neutrality in 2050 in France. To accelerate low-carbon transition in the various sectors, manufacturers must also exercise caution regarding importing products with a high carbon content. *"A lot of French companies now measure their environmental performance precisely and make it an integral part of their global strategy. By looking ahead and even going beyond regulations, they are giving themselves a serious competitive edge and transforming environmental risk into an opportunity, for everyone's benefit,"* wrote Antoine Frérot, CEO of Véolia, in a column published in the French daily newspaper L'Opinion in August 2019.





*"Industry's engagement isn't a recent thing, not just for limiting greenhouse gas emissions but also for reducing its energy consumption,"* points out Stéphane Ougier, ALTEN Executive Director. *Today, those that haven't done so no longer have the choice: their customers are making ethical judgements about them.*" Now that there is global awareness, *"manufacturers that do not become involved risk losing markets with the younger generation's increasing ecological awareness."* And they will also find it hard to recruit tomorrow's talent, who will have strong ethical principles (see also pages 8 and 9).

### IMPROVING ENERGY EFFICIENCY

One of the effective ways of reducing the environmental footprint is looking at the heating in industrial premises. There is significant potential for improving energy efficiency: *"Energy bills can fall by 10 to 15%, perhaps by 20 to 25% in the case of cogeneration, and even more if the process itself is optimised,"* Antoine Frérot believes. Fossil fuel heating can be replaced by very high-temperature heat pumps to cut emissions. A measure both eco-friendly and economically cost-effective.

### CAPTURING CO<sub>2</sub>

Another potential approach is capturing and storing the carbon (CSS) in industrial fumes to stop it escaping into the atmosphere, technology which it is vital to implement in order to significantly reduce greenhouse gas emissions and limit the risks from climate change.

Although CO<sub>2</sub> emissions from transport and housing are too dispersed to be captured and stored, it is, however, feasible for major industrial sources. For the International Energy Agency (IEA), none of the envisaged scenarios for tackling climate change can be achieved without applying CCS to power generation and other industrial sectors. However, the large-scale capturing and storing of carbon dioxide involves substantial initial investment and manufacturers are currently working on reducing these costs and simplifying the implementation of solutions.

### RELOCATING MANUFACTURING

*"The logic of low-cost production has had its day,"* Stéphane Ougier believes. *"A car manufacturer has done the sums, comparing the cost of a vehicle manufactured in Slovakia for the French market and the same vehicle manufactured in a French*

*factory. The car made in France costs 500 Euros more. However, the carbon footprint related to its manufacture and delivery is 10 times lower!"*

The question of the long-term viability of such production conditions has therefore now become acute, what with the immense logistical complexity and the pollution generated by offshoring when you have to move your products across a continent or even halfway around the world. Manufacturing different parts in several countries, then assembling them in another country before the finished product is delivered somewhere else no longer makes any sense when faced with the climate emergency.

The carbon footprint is even greater when manufacturing takes place in countries with scant regard for environmental standards. So manufacturers are gradually committing to a local, customised approach, promoted by Industry 4.0. Delivery takes place as close as possible to customers and according to their needs. *"Industry 4.0 is reshuffling the deck: on-site production is becoming profitable again and the idea of re-industrialising western countries is gradually gaining momentum,"* notes Stéphane Ougier. *"Now when a manufacturer moves its production abroad, it's mainly because it's for a local market."*

### RECYCLING PLASTIC,

#### FANTASTIC!

A tonne of recycled plastic saves 830 litres of oil compared to virgin materials.  
Producing a plastic bottle using recycled plastic emits 70% less CO<sub>2</sub>.  
Globally, only 8% of plastic is recycled.  
Europe, star pupil, recycles 25%.  
Prospective figures predict that raising this rate to 60% in 2025 would create thousands of direct and indirect jobs.



# Construction: sustained effort required throughout the life cycle

WHEN WE TALK ABOUT CO<sub>2</sub> EMISSIONS IN THE CONSTRUCTION SECTOR, HEATING AND AIR-CONDITIONING IMMEDIATELY SPRING TO MIND, THE MAIN CONSUMERS OF FOSSIL ENERGY. YET THE CONSTRUCTION INDUSTRY'S CARBON IMPACT IS FAR MORE MASSIVE AS IT ACCUMULATES AT EACH STAGE OF THE LIFECYCLE: DURING THE MANUFACTURE OF MATERIALS, DURING CONSTRUCTION, PARTICULARLY WITH ENERGY USE, IN THE OPERATING STAGE, THEN THE RENOVATION STAGE AND FINALLY THE DEMOLITION STAGE. AWARE OF THE ISSUES, PROFESSIONALS HAVE IDENTIFIED EFFECTIVE MEASURES FOR BUILDING ZERO CARBON BUILDINGS AS OF 2020<sup>(1)</sup>.



(1) In particular the Sustainable Building Plan RBR 2020-2050 working group, attached to the French Ministry for Ecological and Inclusive Transition - <http://www.planbatimentdurable.fr/note-thematique-vers-des-batiments-bas-carbone-r239.html>

### **BUILDING IN RESPONSE TO EXACT NEEDS**

Why build a 5-storey building when only 4 are needed? The idea here is to optimise areas in order to build precisely to requirements: the effects for every square metre not built on are felt at each stage of the lifecycle (nearly one tonne of CO<sub>2</sub> emissions avoided per square metre). This approach has already been adopted by a large number of non-residential building operators keen to make their spaces profitable, with employees being encouraged to use shared areas like the foyer or company restaurant, a work from home policy, a reduced number of parking spaces offset by corporate travel season tickets, etc.

### **REVIEWING THE CRITERIA FOR SELECTING A BUILDING'S LOCATION**

Considerations which were once secondary become strategic when you want to build an eco-friendly building, for example, taking into account the average distance between the building and where the employees live, and between the building and the amenities (shops, restaurants, health care buildings, schools, etc.), to limit transport-related emissions.

Another criterion which is expected to become important is the availability of clean energy in the area for supplying the building (heating networks, renewable electricity), perhaps the possibility of producing wind or solar energy itself and connecting to a microgrid, a micro energy distribution network which relies on local means of electricity and heat production.

### **RENOVATE OR BUILD? TO BE EXAMINED ON A CASE-BY-CASE BASIS**

We hear a lot about "energy sieves", old, poorly insulated buildings which are abundant in the public property portfolio and in social housing. At the forefront in thermal renovation projects, they will not be able to achieve results as good as those of new buildings in terms of CO<sub>2</sub> emissions. However, considering the whole life cycle, particularly the use of an existing building or structural work, their carbon impact may be much less than that of new buildings, for decades in fact.

### **RETHINKING ENERGY CONSUMPTION**

Consuming less energy through more fuel-efficient systems (like hybrid heat pumps), building energy management solutions (for better use of heating, air-conditioning and lighting) and through changes in occupants' behaviour, as well as moving towards carbon-free (or less-carbonised) energy are major levers for limiting the environmental footprint of new buildings. The creation of microgrids (or smartgrids) also offers promising prospects with the opportunity for energy consumers, producers and aggregators to exchange information at district or city level and so consume less carbonised energy when it is available or store it in batteries.

## **ALTEN is committed**

### **Green energy and certified buildings**

ALTEN chooses certified buildings when opening any new site. This was the case with 5 buildings opened in 2018 which were awarded the BREEAM label (method of assessing the environmental performance of buildings), the BBC label (Low-Energy Building) and the local BDM label (Mediterranean sustainable buildings). In Sweden, the Group occupies a LEED-certified Gold level building (Leadership in Energy and Environmental Design).

The Group has signed a green energy contract which covers 70% of the energy consumption of buildings in France. Other Group subsidiaries in India, Italy and Spain have adopted the same policy.





# Digital technology: digital sobriety is required

CONSIDERED TO BE A LEVER FOR ECONOMIC AND SOCIAL DEVELOPMENT, DIGITAL TRANSITION IS GENERALLY PERCEIVED AS A WAY OF REDUCING ENERGY CONSUMPTION; ITS DIRECT AND INDIRECT ENVIRONMENTAL IMPACT IS SYSTEMATICALLY UNDERESTIMATED.

## GEOGRAPHICALLY DIVERSE DIGITAL CONSUMPTION

### In 2018:

- one American person owned on average almost 10 connected digital devices and consumed 140 GB of data per month.
- one Indian person owned on average just one single device and consumed 2 GB per month.

The direct energy footprint, including the energy used to manufacture and use equipment (servers, networks and terminals), is rapidly rising by 9% per year. The Shift Project, a think tank working for a carbon-free economy, states in a report<sup>(1)</sup> published in 2018 with CIGREF that the energy intensity of the digital industry is increasing by 4% per year whereas the energy intensity of global GDP is currently decreasing by 1.8% each year. The author of the report, Hugues Ferreboeuf, believes that *"digital transition as currently implemented is contributing to climate change more than it is helping to prevent it."*

The major contributors to this energy inflation in digital technology have been clearly identified:

- An explosion in video usage, which is capturing an increasingly significant proportion of available electricity.
- Proliferation and replacement of digital devices, the production of which requires rare metals, also vital for low-carbon energy technologies, whereas their availability is already under threat.

Digital transition has a heavy carbon footprint: its share in greenhouse gas emissions has increased by half since 2013, rising from 2.5% to 3.7% of total global emissions. Hugues Ferreboeuf also goes on to say that *"the current development of digital technology's environmental impact goes against the objectives of decoupling energy and climate from GDP growth set by the 2015 Paris Climate Agreement."*

CIGREF, which brings together nearly 150 major French corporations and organisations which use digital solutions and services, therefore believes that digital technology's global energy consumption will rise from around 3% in 2018 (the same level as air transport) to around 7% in 2025 (level of automobile emissions).

## PROMOTING CITIZENS' AWARENESS

It's hard for citizens and companies to escape the debate on global warming and the future of the planet. The outlook for the future will inevitably increase citizens' concerns and the demands they make on economic players. Changes in regulations and environmental standards will become tougher. So what we really need to do is make all stakeholders behave responsibly. In April 2018, The Shift Project presented the "Lean ICT: towards Digital Sobriety" report formulating several recommendations for major organisations:

- improve awareness of the environmental impact of digital technology
- adopt the concept of digital sobriety as a policy principle for digital transformation, especially in terms of video usage, control of digital copies and replacement of infrastructure equipment and terminals, as well as the inclusion of the carbon footprint of digital projects among the decision-making criteria
- include energy and environmental criteria in major client tender procedures.

For Hugues Ferreboeuf, digital sobriety is "A lean approach which is also a source of efficiency for organisations: energy efficiency, human efficiency and financial efficiency. Its principle extends the inclusion at a societal level of the objectives pursued by technical approaches such as "Green IT" primarily targeted at Information Technology Departments and Directors." The implementation of these digital sobriety principles would contain the current explosion of the digital environmental footprint without undermining the very principle of digital transformation, and would bring the increase in digital technology energy consumption back to 1.5% – namely a similar level to the global trend across all sectors. In the 2018-2025 "Sobriety" scenario, presented by The Shift Project, the volume of data exchanged continues to grow and the number of smartphones and televisions produced each year stabilises around its 2017 level – whereas today their markets in developed countries are already close to saturation.

(1) The shift project. "Towards digital sobriety": the new Shift report on the environmental impact of digital technology - <https://theshiftproject.org/article/pour-une-sobriete-numerique-rapport-shift/>

(2) GAFAM (Google, Apple, Facebook, Amazon, Microsoft), BATX (Baidu, Alibaba, Tencent Xiaomi)

## QUESTIONING OUR BEHAVIOUR

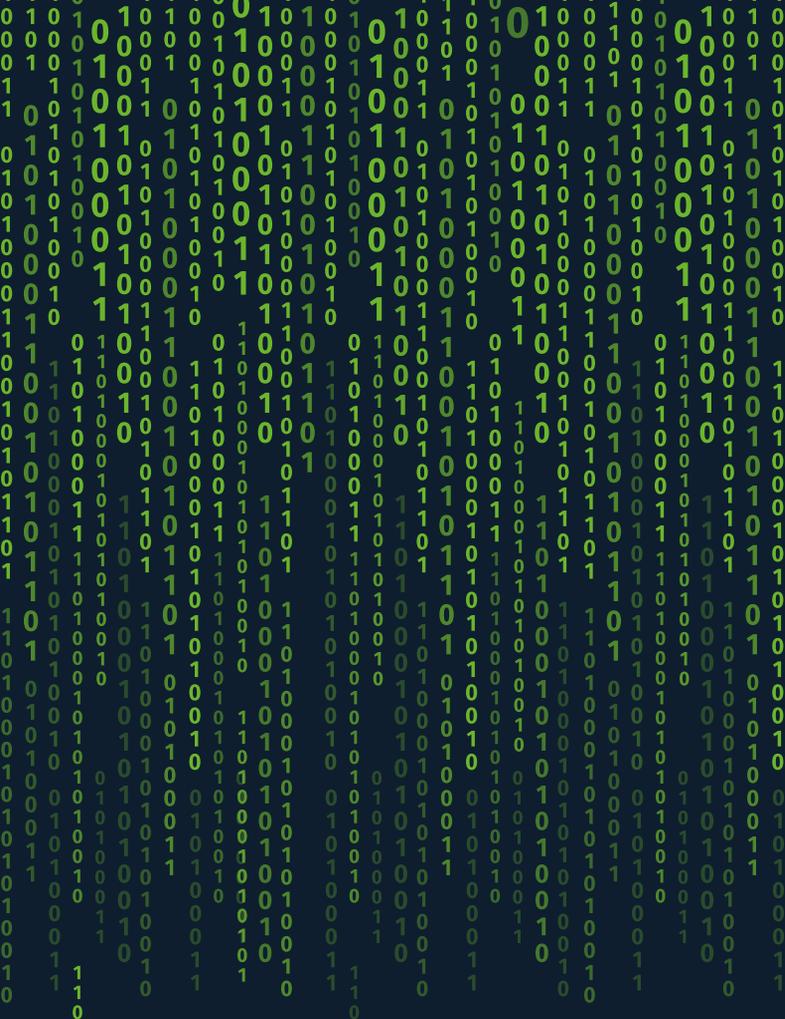
Today, public and private organisations play a key role in ensuring that digital transition is as eco-friendly as possible, for example by measuring the environmental impact of their IT choices or predicting the carbon footprint of their major digital projects. "We must recover our individual and collective abilities to question the social and economic benefits of both our purchasing and consumption behaviour with regard to digital objects and services," Hugues Ferreboeuf goes on to say. *Digital sobriety must be adopted as a policy principle. The supply-side pressure (GAFAM, BATX<sup>(2)</sup>) and the expectations of GDP growth related to digitalisation cannot serve as sole judges in the selection of digital projects. Companies have a key role to play and much to gain – including the long-term continuation of their digital transition, and cost containment."*

## ALTEN is committed

### More energy-efficient digital infrastructure and equipment

- In France, ALTEN secures its infrastructure via two physically separate data centres managed by an ISO 14001-certified supplier.
- The ALTEN Netherlands servers are hosted in eco-friendly data centres which use liquid and natural convection technology for their cooling systems. This system reduces the energy footprint by 50%.
- To limit the amount of data stored on the networks, ALTEN provides its employees with digital tools such as Skype for Business and SharePoint. At the same time, the energy consumption of non-productive systems has been examined and optimised.
- Finally, ALTEN chooses energy-efficient IT equipment: in France, every single computer and screen for support function staff and the sales teams has the Energy Star label.





# The green code: better designed, so less polluting

## **HOW CAN LINES OF COMPUTER CODE POLLUTE THE ATMOSPHERE?**

Code is the writing used by developers to develop software. As is the case for authors, developers' writing can be concise, stylish, pompous, even bombastic. This is referred to as "bloatware". This type of software takes up too much space on the computer hard drive or makes excessive demands on its resources to operate. Why? Because this software contains a large number of useless functions and lines. Consequently, the processor must perform more calculations than with simpler software to achieve the desired outcome and therefore consumes more energy which results in more CO<sub>2</sub> emissions.

## **WHAT ARE THE SOLUTIONS FOR MORE ECO-FRIENDLY CODING?**

One solution is to develop a simpler and better designed code: the green code. Alongside code optimisation, the "digital fat" can also be trimmed away, in other words all the functions that serve no purpose – therefore the corresponding lines of code – can be removed in order to focus on what matters.

## **IS THIS APPROACH ALREADY BEING TAKEN INTO ACCOUNT BY THE DIGITAL INDUSTRY?**

It's an idea that is only just emerging. And we must recognise that today it is economic issues that are driving code optimisation more than the environmental footprint. If a customer is on an e-commerce website which is slow because it is using all of his computer's or tablet's resources, he may well quickly abandon his search and move on to competitors' websites. That is why well-designed and well-written code is important. Everyone wins, including the environment!



**You are part  
of those who  
advance, of those  
who enhance.**



**ALLEN**

**YOU ARE AN ENGINEER,  
HERE IS WHERE YOU BELONG.**

**WELCOME HOME**

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