HAUT CONSEIL
pour le CLIMAT

CONTROLLING
THE CARBON IMPACT OF 5G

A REPORT FROM
THE HIGH COUNCIL ON CLIMATE

DECEMBER 2020

EXECUTIVE **SUMMARY**

The deployment of 5G in France means the adoption of a new mobile telephone standard by French operators. As the frequency bands already used for 4G (around 700 MHz) cannot deliver the technical advantages of 5G (higher speeds, reduced latency, and increased density of connectable devices), the State auctioned new frequencies (around 3.5 GHz) in October 2020, which are to be supplemented at a later date by a third frequency range (around 26 GHz).

The availability of these new frequencies has not been subject to a prior environmental assessment; only the economic value of these frequencies for the State, the potential competitiveness of French companies, and the equality and cohesion of France as a whole, plus any health impact, were considered. The request from the President of the French Senate to the High Council on Climate to assess the carbon impact of the deployment of 5G fills part of this gap, but cannot replace a full assessment of all the environmental (including the material footprint), health, economic, financial and social impacts, which should have been carried out beforehand. In the absence of a moratorium on 5G, the first such prior assessment should be undertaken as part of the allocation of the next 5G (26 GHz) frequency bands.

There is great uncertainty about the potential effects of 5G deployment. The arrangements for actual deployment by operators are not known. The extent of subsequent provision of devices and digital services or their adoption by businesses and consumers are also unknown. Certain uses can be anticipated at this point, including some which could even reduce greenhouse gas (GHG) emissions. Past experience in deployment of digital technologies shows that the uses ultimately made of them are rarely those that were anticipated, but that the technical possibilities offered have always been used in some way. Against this backdrop of high uncertainty, the carbon impact of 5G deployment could reach between 2.7 $MtCO_2e$ and 6.7 $MtCO_2eq$ in 2030. This is a significant increase compared to the carbon footprint of digital tech (around 15 $MtCO_2eq$ in 2020).

These additional GHG emissions would mainly result from the manufacture of devices, the replacement or adoption of which is likely to accelerate (not only smartphones but also virtual reality headsets, connected objects, etc.) and emissions from network and data centre equipment. These emissions, which are mostly actually located abroad, could increase France's imported emissions from 1.8 $MtCO_2e$ to 4.6 $MtCO_2e$ by 2030, compared to the 239 $MtCO_2e$ of imported emissions that would be consistent with a global carbon neutrality trajectory. The first step in controlling these emissions is therefore the publication of a quantified strategy for reducing imported emissions from digital, which is part of the "digital and environment" roadmap currently being prepared. In order to control these emissions in practice, the provisions of France's "AGEC" law (in particular concerning clarity over the reparability and durability of electronic equipment), and the work in progress on the roadmap, are moving in the right direction, but do not for the moment provide any guarantee that the sum of these measures will result in lower emissions, or emissions lowered sufficiently to reduce imported emissions. One way of providing this guarantee could be to use regulation to limit the carbon footprint, through the life-cycle assessment of electrical and electronic equipment placed on the market in the European Union, along the lines of what already exists for the specific absorption rate (SAR).

The deployment of 5G is also likely to increase emissions from electricity generation in France from 0.8 $MtCO_2e$ to 2.1 $MtCO_2e$ by 2030, out of a carbon budget for energy production of 30 $MtCO_2e$ in the same year. These emissions are already covered by the European Emissions Trading Scheme (ETS). This market mechanism guarantees in theory that the deployment of 5G will fit into the negotiated quotas, but does not guarantee that France's objectives will be achieved, and even less the carbon budgets for specific sectors. Support will be needed for any upward effects on the price of electricity. Finally, 5G deployment is likely to have a significant impact on electricity consumption in France, between 16 TWh and 40 TWh by 2030, i.e. between 5% and 13% of final electricity consumption in the residential and tertiary sectors in 2019. The consistency of the Multi-year Energy Programme with such orders of magnitude needs to be checked.

These additional emissions and the extra demand for electricity from the rise of digital will consequently entail additional reductions in emissions and demand for electricity from other sectors of the economy. In the digital environment, it is necessary to make users, both companies and consumers, aware of the impact of their use. One starting point has to be making visible what is being done to limit climate

impacts in terms of the technologies and services provided to them. Secondly, best practice should be publicised to avoid wasting energy or using it disproportionately. Ultimately, prioritising or banning certain uses by businesses or domestic consumers is an option often mentioned. Giving priority to certain uses, which cannot be based on content if the principle of net neutrality is followed, should then be the subject of public debate on the theory and the practice.

Finally, the increase in the demand for electricity that causes these emissions on French territory can also be controlled through two mechanisms. Firstly, as with the carbon footprint of devices, in-use energy consumption standards for devices and network infrastructure equipment can be implemented for the overall European market. Secondly, in France itself, the telecoms regulator ARCEP can be mandated by the government to set contractual objectives for operators. These objectives would be based on metrics covering all aspects of the 5G carbon footprint (infrastructure and the means by which devices are provided to their customers). These conditions should be set out in advance in the specifications for the frequencies still to be allocated, but they could also be included in fresh negotiations of the terms and conditions of use for frequencies already allocated, along the lines of France's "Mobile New Deal" for 4G.

. RECOMMENDATIONS

1. CLARIFY THE CLIMATE ISSUES PRIOR TO THE DEPLOYMENT OF TECHNOLOGIES SUCH AS 5G

- Assess new technologies from a climate perspective before deciding on measures accompanying their deployment, in the same way as the economic, financial, social, health and environmental impacts (including the material footprint) of new technologies are evaluated before deciding on any measures accompanying deployment. Such an assessment should have been conducted for 5G before deciding to allocate the necessary frequencies.

- In the absence of a moratorium on 5G to allow the decisions on frequencies already allocated to be reviewed, the first such assessment will have to be undertaken as part of the allocation of the next 5G frequency bands.

- Promote adaptations to the European Telecommunications Code within the EU, to make explicit provision for the option to limit deployment for environmental reasons.

- Maintain an ambitious and firm position within the European Union and the International Telecommunication Union to ensure that the technical conditions for the deployment of 5G in the 26 GHz band do not interfere with Earth exploration satellites and meteorological analyses.

- If necessary, set up a system to monitor 5G deployment in the 26 GHz band to ensure the effectiveness of interference prevention measures.

2. REQUIRE CARBON FOOTPRINT MANAGEMENT FROM OPERATORS WITH 5G FREQUENCIES

- Define a set of metrics covering the various aspects of the 5G carbon footprint on which operators can act.

- Mandate ARCEP to propose voluntary commitments in the specifications for the use of 5G frequencies. These commitments will be produced before the next 5G frequency bands are allocated. For frequency bands already allocated, the terms and conditions of use of the frequencies could be renegotiated to introduce carbon footprint management commitments.

- Monitor changes in the environmental assessment of 5G and digital technology by centralising data via the digital observatory. In the event operators fail to comply with voluntary commitments or they prove inadequate, make them mandatory.

- Across the EU as a whole, promote the explicit inclusion of energy efficiency as a condition attached to authorisations for the deployment of radio equipment.

3. TAKE INTO ACCOUNT THE EFFECTS ON DEMAND FOR ELECTRICITY AND THE IMPLICATIONS FOR THE EU EMISSIONS TRADING SCHEME

- Verify that 5G deployment does not substantially change the Multi-year Energy Programme because of a significant increase in demand for electricity. If this occurs, all energy transition scenarios would have to be modified accordingly.

- Monitor the inequalities that could arise from changing electricity prices on the European carbon market.

4. ACT ON SUPPLY-SIDE IMPORTED DIGITAL-RELATED EMISSIONS FROM EQUIPMENT

- Implement all the aspects developed by France's National Digital Council in the roadmap on the environmental impact of digital technology.

- Include a strategy in the roadmap currently being prepared by the government to reduce imported digitally-related emissions through quantified targets.

- Adopt standards in the European Union to reduce imported emissions from electrical and electronic equipment, for life-cycle assessment emissions, and for reparability and durability, along the lines of what already exists for the specific absorption rate (SAR).

- Reinforce consumer information stipulated by the AGEC law (durability and reparability) through environmental labelling on electronic products on sale.

5. INFORM CONSUMERS AND BUSINESSES USERS AND RAISE THEIR AWARENESS AND RESPONSIBILITY ABOUT BEST PRACTICE TO AVOID ENERGY WASTE OR DISPROPORTIONATE USE OF ENERGY IN RELATION TO DIGITAL SERVICES

- Show users (businesses and consumers) that they are not alone in taking action, by increasing the visibility of efforts to incorporate climate impacts in the supply of digital technologies and services.

- Inform and educate users and raise their awareness about the impacts of their 5G uses (environmental labelling on devices, and best practice guides adapted to different audiences and uses).

- If necessary, bring the question of prioritising technological developments and their uses into the public debate.

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ABOUT THE HAUT CONSEIL POUR LE CLIMAT (THE HIGH COUNCIL ON CLIMATE)

Thee High Council on Climate (HCC) is an independent body tasked with issuing advice and recommendations to the French government on the delivery of public measures and policies aimed at reducing France's greenhouse gas emissions. Its purpose is to provide independent insight on government climate policy. The HCC was established on 27 November 2018 by the President of the Republic and then by Decree in May 2019. Its members are chosen for their expertise in the fields of climate science, economics, agronomy and energy transition.