



NATIONAL ACADEMY OF
TECHNOLOGIES OF FRANCE

For a reasoned, chosen, and shared progress

Food for thought on sobriety

Summary of the
2022 **S**eminar of the
National **A**cademy of
Technologies of **F**rance



Six shared findings that sum up the position of the National Academy of Technologies of France on sobriety.

1.1. Sobriety is necessary

Sobriety, a change in our consumption-related behaviour, complements efficiency, which consists of doing better with less. The challenge is to combine all the measures and everyday practices that make it possible to limit greenhouse gas emissions and the consumption of materials, space, water and other scarce resources, while guaranteeing the well-being of all within the inherent limits of the planet (definition inspired by Saheb, 2021).

Progress has been made over the last thirty years: the quantity of greenhouse gases emitted by Europe has fallen by 25% or around 1% per year. But a reduction of 5% per year by 2030 and 7% by 2050 is needed to meet European commitments to limit the risk that global warming exceeds 1.5°C. Such a reduction is out of reach if both the structure and volume of our consumption do not change.

Neither the technological innovations that already exist or are currently being developed nor the decarbonised energies, whether renewable or not, will be able to be deployed at a sufficiently rapid pace to achieve this objective. The pace of construction of wind turbines and photovoltaic installations and the deployment of CCUS (Carbon Capture, Utilisation and Storage) technologies, for example, is constrained by the possibility of extracting the necessary mineral resources, the availability of land, the adaptation of infrastructures and the acceptance by local residents. And it takes around fifteen years to approve and build a nuclear power plant.

The Académie therefore considers that sobriety is essential.

1.2. Sobriety is necessary for Progress and Progress is necessary for Sobriety

Overstepping the planet's limits and the disruption caused by climate change are leading to considerable setbacks in Hutmain's development indicators in a wide range of areas (health, food, and physical safety). Sobriety is therefore essential for genuine progress, providing all human beings with an improvement in their living conditions that is compatible with



planetary limits. This progress should not be confounded with the growth of market production.

In turn, the possibility of sober behaviour and systems often depends on the implementation of technological, organisational, and social innovations.

1.3. The experts' responsibility is to clarify, and not define, the collective choices

Individual and collective choices must consider a range of concerns: the planetary limits for humanity, climate change, erosion of biodiversity, poverty, inequalities of opportunity or access, pollution, etc. A deeper understanding and quantification of the direct and indirect impacts of various options will be key to making acceptable trade-offs (with fewer drawbacks) and defining measurable progress in terms of attaining targets.

When it comes to making technological choices, we need to analyse the benefits, costs, and risks for society and the planet. The existence of a viable market is no guarantee that an innovation is appropriate.

The role of scientists, technologists, economists, and academics is to provide reliable information on the consequences of possible choices and uncertainties, without prejudging particular priorities, so that everyone has the relevant information to make individual choices and participate in shaping collective ones.

1.4. Sobriety requires a global approach

Our behaviour is driven by the social context, education, incentives, regulations, standards, and, of course, prices (of products and services), but also by the configuration of time and space, infrastructures, work organisation, and their representations.

Low-impact individual behaviour, for example in the areas of mobility or home comfort, is only possible when there is an accessible, practical, and safe offer. This hinges on coherent policies at various levels (from local to global), using all available levers (education, incentives, regulations, public purchasing and investment), and on the availability of appropriate technologies.

To ensure that the impact of efficiency gains is not cancelled out by the rebound effect (using the resources being saved to consume more), consumption must indeed decrease, or shift towards goods and services with a smaller footprint (structural sobriety).

Consequently, supply and demand, sobriety and efficiency, and the actions of economic players and public authorities cannot be treated separately.



1.5. Sobriety requires that efforts be shared equitably

Sobriety calls for everyone to make an effort. These efforts will only be accepted, at least in democracies, if they are felt to be equitably shared. This implies a considerable reduction in the disparities between the footprints due to the consumption of the wealthiest and those of the rest.

Access to appropriate technologies should enable the poorest to meet their needs with little impact. The wealthiest will have to consume fewer of those products and services that have a high environmental footprint (CNDP, 2023).

1.6. We must act without delay

The urgency of the deadlines means that we need to combine the approaches to efficiency and sobriety. Debates between "techno-solutionists", who hope that radical innovations will make it possible to do without sobriety, and technophobes, who are disregarding accessible sources of efficiency, lead to dangerous inaction. Similarly, in the past, conflicts between advocates of "all renewable" and "all nuclear" have led to each option being denigrated, with the result that overall under-investment is now undermining our energy security.

Elements that underpin these six shared findings.

The emergence of the previous six findings was a gradual process. This section summarises the key points used to arrive at the findings.

2.1 We must face up to our planetary limits

More than fifty years ago, the Meadows Report on "The Limits to Growth" sounded the alarm about the impossibility of infinite growth in a world of finite resources.

The nature of some of the identified limits has changed. In the 1970s, people feared that fossil fuels would run out. Today we know that it is rather the quantity of greenhouse gases that we can emit into the atmosphere without risking a climate catastrophe that represents in itself a much more restricting limit. This should prohibit us from using all available fossil energy resources; similarly, the spectacular progress in agricultural techniques has made it



possible to ward off fears of widespread malnutrition, but these techniques are not without their own negative effects on the climate and biodiversity.

In addition, it is sometimes possible to find substitutes for materials considered strategic, or to limit the extraction of natural resources through a high recycling rate, or to find alternative processes that emit less greenhouse gas, thereby reducing the footprint of certain activities.

How can we guarantee the well-being of all by ensuring that people can live on our planet in good conditions while limiting greenhouse gas emissions and the use of materials, space and water=¹, and preserving biodiversity?

2.2 Combining efficiency and sobriety

There are two complementary ways: reducing our consumption (sobriety) and reducing its environmental impact (efficiency).

The first path is that of temperance and frugality. Before it was advocated as a way of making our lifestyles sustainable, it was proposed by Greek philosophers and, closer to nowadays, by thinkers such as Ivan Illich, Jacques Ellul, and André Gorz. Some, like Serge Latouche, argue in favour of degrowth.

The second is to aim for a decoupling between our consumption and its impact on resources. If this decoupling could be sufficiently far-reaching, it would make it possible to continue to satisfy the growing demand for consumption linked in particular to population growth and access for all to better living conditions, while respecting "planetary limits"² and thus ultimately enabling sustainable or "green" growth.

It is highly unlikely that efficiency alone will be enough by 2030. Europe's 55% emissions reduction target³ is unattainable without a major effort at sobriety, especially if we also want to regain some of our sovereignty by redeveloping our industry. In the longer term, beyond 2050, technologies may make it possible to somewhat reduce this effort.

¹ The Academy does not advocate reducing energy consumption as an end in itself, since the earth receives 8,000 times more energy from the sun than mankind needs today. The only challenge is to have energy that is carbon-free (without greenhouse gas emissions), safe (with controlled risks), reliable, and whose production does not deplete other resources (metals, biomass, land use).

² More specifically, the possibility for humanity to live in satisfactory environmental conditions.

³ The same applies at the global level with respect to the objectives of the Paris Agreements.



The vast majority of the Academy's members believe that the two approaches should be combined pragmatically. Relying on sobriety alone would lead to sacrifices and frustrations that would be too unpopular and difficult to accept in a democracy. On the other hand, the current prospects for decoupling still seem very inadequate given the urgency of the issues.

2.3 Sobriety, growth and progress

The debate is often poisoned by equating sobriety with degrowth and degrowth with less satisfaction of human needs and general impoverishment.

Reality is more complex

The primary effect of efficiency and behavioural sobriety is a reduction in GDP: we produce the same satisfaction with fewer scarce resources. However, there can be rebound effects. These are undesirable if they relate to consumption with a large footprint. Notwithstanding, consumers can also switch to activities with a lower environmental impact (healthcare, education, sport). Consumption that uses scarce resources sparingly can mobilise human labour (care economy, agroecology, sustainable construction, investment in the ecological transition) and therefore contribute to job growth and the reduction of inequalities. Similarly, the development of a circular economy creates jobs that cannot be relocated, in repair, recycling and so on. The overall effects on the economy are therefore not easily foreseeable. Moreover, GDP growth, which is easy to measure, is not a reliable indicator of progress. Although there is as yet no consensual aggregate indicator, there is emerging agreement on the need to take into account other factors of progress, such as the satisfaction of basic needs for all, access to healthcare and education, and social and territorial cohesion. In any event, investment in the ecological transition, inclusion policies, and the fight against poverty require substantial resources to generate significant productive activity.

It is therefore important to approach these complex debates without equating progress with growth in GDP (or GDP per capita), or contrasting sobriety with human development. Sobriety, along with the search for maximum efficiency and decoupling, is a means of achieving sustainable progress for human societies, not an end in itself.

2.4 Sobriety and inequalities

Is sobriety possible when several billion people cannot afford a decent life and are frugal out of necessity? Today, the poorest 50% of the world's population produces just 12% of greenhouse gas emissions, while the richest 10% produce almost half.



An equitably shared effort towards sobriety means asking for more sobriety from those who can afford it (including the richest of the less advanced countries) and giving others the means to be more efficient, for example in the areas of heating, cooking, or mobility, thanks to a massive transfer of technology.

2.5 Individual, systemic, and structural sobriety⁴

By changing their individual behaviour (towards frugality), Europeans can only reduce their ecological footprint by around 25%⁵. This is far from enough. Our behaviour is "conditioned" by the social context, incentives, regulations, standards and, of course, prices, as well as by the way time and space are configured, infrastructure, urban planning and the way work is organised. For example, it is futile to explain to people living in rural areas that they should cycle to work. In the context of highly dispersed housing, they often have no choice but to take their car. Sobriety is therefore a systemic problem that requires a rethink of the country's infrastructure: consumers need to have accessible and reassuring alternatives to change their behaviour and, for example, abandon their private car⁶ or control their energy consumption. Finally, the structure of our consumption can change: if we place more importance on health, education and leisure⁷, we will be more frugal than we are today, because these activities consume fewer resources and emit fewer greenhouse gases than others.

The practical distinction between sobriety in consumption and efficiency in production needs to be qualified. Companies' "intermediate consumption" can be reduced by choosing more efficient processes. Reducing food waste can be achieved both by better optimisation of supply chains and by vigilance on the part of households. We can save water by turning off the tap when we brush our teeth and by repairing leaks in the network.

2.6 Technologies and innovation for sobriety and efficiency

The discourse on sobriety has long been carried by communities critical of liberal capitalism, growth and technology, and advocating the use of low-techs.

⁴ This section is taken from the presentations by Pierre Veltz and Michèle Pappalardo at the seminar on 25/5/2022.

⁵ Daniel Moran, University of Trondheim (presentation by Pierre Veltz).

⁶ See Christophe Midler's contribution to the seminar on 22/6/2022 and the mobility file.

⁷ By avoiding certain high-emission activities (aviation, car racing, jet-skiing, certain immersive games, etc.).



While some technologies have a significant environmental footprint concerning the services they provide, technologies are often needed to enable more frugal behaviour (the economy of functionality, sharing, and circularity functions largely thanks to networking platforms) and the efficiency of the production and distribution system (particularly for large energy networks), including to enable more local solutions (distributed electricity or heat production, short food circuits, etc.)⁸. Technologies are also essential for promoting production methods that are more economical in terms of critical resources, to achieve maximum decoupling between satisfying needs and environmental impact⁹.

In light of this, technology and innovation play an essential role both in enabling and encouraging frugal behaviour and, by reducing the ecological footprint of our consumption (decoupling), in preventing the necessary sobriety from requiring unacceptable efforts or from hampering the access of part of humanity to better living conditions.

2.7 Technological discernment

The National Academy of Technologies of France can contribute to an analysis of the benefits and costs, impacts and risks of various technological options and promote better technological discernment¹⁰, to inform collective choices without seeking to prescribe them. In many areas, including those that contribute globally to sobriety, we need to move from a society of abundance to an approach of "just enough". Technologies such as blockchain, metaverse, or artificial intelligence based on deep learning will not escape this need for discernment if they are to be implemented wisely, according to the expected usefulness of their use or in a way that reduces their footprint¹¹. Technology is neither desirable in itself, nor a threat if its use is controlled. We need to promote the reasoned choice of "right techs" adapted to the need, neither unnecessarily sophisticated nor minimalist (Campillo & al., 2019).

2.8 Embracing sobriety is based on a narrative that motivates people and on greater fairness¹²

Moving towards greater sobriety can be encouraged by new infrastructures and by incentives (product prices that reflect their impact) and regulations (bans on certain processes or certain products and services). But acceptance will only happen widely and on a massive

⁸ See in particular the contributions from the Digital, Mobility and Energy clusters.

⁹ See the contributions of the Environment Division and Victoire de Margerie to the seminar on 22/6.

¹⁰ See Stéphane Andrieux's contribution.

¹¹ See the file of the Digital Division.

¹² This section is based on presentations by Valérie Guillard at the seminar on 22/6



scale if sobriety is part of a shared "grand narrative". The young people who took part in the three round tables stressed the need for a rallying narrative and an equitable approach. Ademe, for its part, refers to "a positive vision of moderation in the production and consumption of goods and services". Individual frugality must be a voluntary process (frugality for poor people would be more akin to deprivation). This can be achieved by promoting the sharing of equipment and the use of second-hand objects, and by making social and symbolic status less closely linked to certain types of consumption, to make sobriety desirable.

