



FRENCH REPUBLIC



AGRICULTURE FACING THE CHALLENGE OF ENERGY PRODUCTION

Parliamentary Office for Scientific and Technological Assessment

**Information report
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Agriculture at the heart of climate and energy issues

At a moment when the fight against global warming, with the energy transition calls for greater development of renewable energy sources and agroecological approaches to agricultural production requiring the integration of ecosystem functionalities, agriculture can play a **pivotal role** that one cannot and should not ignore.

At the **heart of climate and energy issues, agriculture** must meet multiple challenges to ensure **essential crop and livestock production for our food, greenhouse gas emission reductions, soil carbon storage, biodiversity conservation or restoration, and waste recovery**, as well as **renewable energy production**. Agriculture can mobilise the land and raw materials required for the production of electricity, gas and fuels.

This is neither a secondary concern nor a cyclical issue, but a **major subject with many implications** for the **environment** and the **climate**, due to its consequences in terms of land-use planning, and the **organisation of agricultural sectors and farms**, including the economic level. However, the production of renewable energy from our sole agriculture will not be sufficient to redefine the energy mix, wether national or international.

Food crops must always prevail over crops exclusively dedicated to energy production, and whenever the same crops can have both uses, its use for food must prevail over a use as energy source. The primary role of agriculture must remain the production of our food: energy must not compete with this function. **Joint development** solutions for **both activities** must therefore be developed.

In France, the agricultural sector, with at least **50,000 farms** involved in energy production, already accounts for **20% of renewable energy** output (396 GWh, or 3.5% of national energy production).

The agricultural sector produces more of certain energy sources: 96% of national biofuel production, 83% of wind energy, 26% of biogas, 13% of solar photovoltaic and 8% of biomass for heat.

According to ADEME (French Environment and Energy Management Agency), NégaWatt and Solagro forecast scenarios, this production is set to grow rapidly with a view to reach the target of carbon neutrality in 2050. A **threefold increase**, from 4.6 Mtoe to 15.8 Mtoe, is foreseen.

Observations from the report

The main contributions

The report presents a **detailed breakdown of these potential sources of renewable energy production in the agricultural sector**, according to each kind of energy source. It reveals the multiple issues at stake: economic, financial, and technological, but also concerning social acceptability, training, uses and access to agricultural land.

For the **first time** in a synthesis document, the report **draws up a balanced review** in terms of **environmental impacts, energy efficiency, social acceptability and technological prospects**. It also presents an **international comparison of seven countries** and summarises the existing analyses by **European institutions**.

The challenge of energy storage

Energy storage is a decisive issue for the photovoltaic and wind energy segments, which rely on intermittent energy sources.

Their integration and development in the agricultural sector are associated with various storage techniques such as pumped storage plants (PSP), batteries and, above all, hydrogen.

Research and training needs

Renewable energy research is required. Recent innovations demonstrate the growing interest in combining different energy sources: solar and wind energy, biogas production and methanation, or even agricultural crops and photovoltaic energy through agrivoltaic systems. The use of new technologies such as artificial intelligence can increase the efficiency of each of these energy sources.

The agricultural sector needs **more training and advice** to ensure that farmers are fully prepared to make this agro-ecological transition. Certain types of energy production such as biogas production require knowledge, skills and expertise that must be enhanced to ensure the efficient management of energy production facilities.

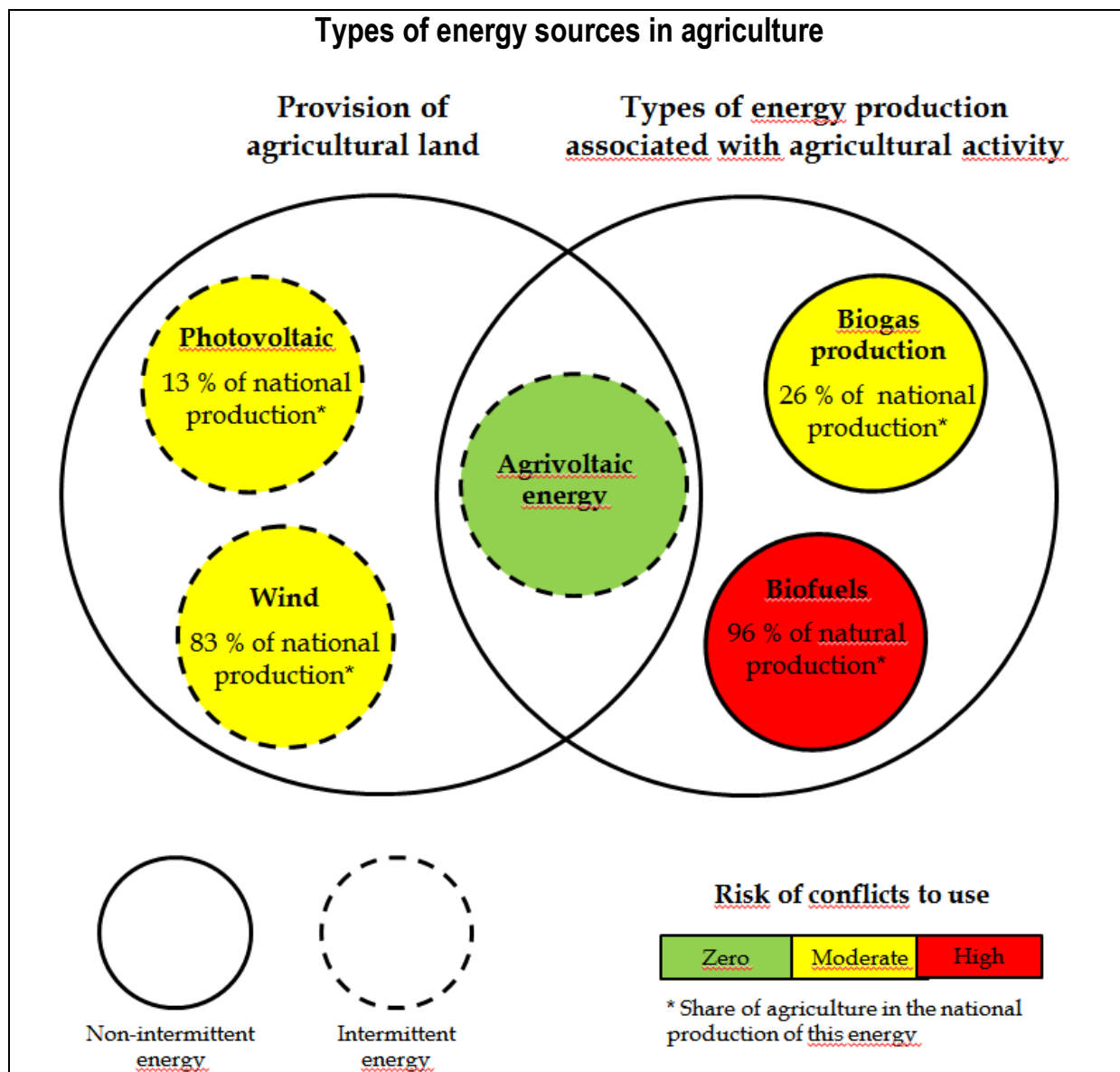
For a cross-cutting vision

Given our experience with the COVID-19 pandemic, it will be increasingly necessary to **rethink the interdependence** of our intestinal flora, immune systems, food, agriculture and our health policy in light of pollution, deforestation, land artificialization, biodiversity damages, global warming, globalisation and the development of pandemics.

This is why the report calls for a **cross-cutting and systemic vision of the interdependent issues of health, environment and agriculture**.

The current context, with the need to accelerate the energy transition and define a recovery plan following the pandemic, presents a **significant opportunity**. A **future bill on agricultural land** could be a **way to reform the agricultural sector** by incorporating some of the proposals presented in this report.

Our agriculture will increasingly have to be turned towards **agroecology** and **agroforestry** – the only form of land use combining trees and crops, which may present many benefits, not only for soil protection but also for biodiversity conservation and the productivity of land.



The rapporteurs' proposals

General proposals

- 1.** Conciliate French energy policy and its implications for the agricultural sector with our objectives for producing food, fighting land artificialization, storing carbon in the soil, and protecting biodiversity and public health, while ensuring the primacy of food production over other objectives, in order to prevent conflicts of use.
- 2.** Clarify our national energy strategy regarding the agricultural sector and, more generally, improve the internal coherence of French energy policy towards the development of renewable energy by strengthening the role of Parliament.
- 3.** Support research on energy production in the agricultural sector and encourage the financing of innovative approaches by adding an agricultural component to the energy research strategy.
- 4.** Ensure regular and rigorous monitoring of energy production in the agricultural sector by optimising the integration of life cycle assessment (LCA) schemes.
- 5.** Promote energy production and consumption in the agricultural sector by providing incentives to boost the attractiveness of business models for farmers, and by adapting regulated tariffs, calls for tender and direct guaranteed contracts (*guichets ouverts*), using

agricultural taxation as a lever, and by removing certain regulatory obstacles.

6. Roll out regional energy production projects in the agricultural sector within the framework of land-use planning policy.

7. Adopt certification schemes for the projects carried out, e.g. in the form of an “Agroenergy” quality label.

8. Improve the provision of training on energy production in the agricultural sector, at both initial (secondary and higher) and continuing in-service training levels, with certain programmes leading to the acquisition of high-level competencies such as those required for the installation and management of energy facilities.

9. Protect agricultural land through a new legislative framework.

Sectoral proposals

10. Prioritise the development of biogas production and, whenever possible, combine it with methanation; use biomass to bolster the bioeconomy and step up the overly modest ambitions of the Multiannual Energy Programme (*Programmation pluriannuelle de l'énergie* - PPL) for biogas.

11. Defend the right to feed biogas into gas supplies and encourage the connection of existing plants to the national gas network.

12. Ensure the traceability of inputs supplied to biogas plants in order to guarantee their methanogenic power and produce high-quality digestates suitable for spreading on farmland.

13. Establish a vigilance procedure for the quality of installations involving regular monitoring and spot safety inspections.

14. Reduce unwanted gas leaks (especially methane, CO₂ and ammonia) during biogas production.

15. Raise the thresholds for the reinforcement works defined by the earmarked account entitled “Financing of local-authority support for rural electrification” (*Financement des aides aux collectivités pour l'électrification rurale* - Facé).

16. For photovoltaic projects, use the leverage provided by the thresholds set in calls for tenders and direct guaranteed contracts while supporting agrivoltaic projects in order to prevent land artificialization, and make maximum use of innovative technologies such as artificial intelligence.

17. Reflect on support schemes for onshore wind turbines and ensure compliance with the requirement to rehabilitate sites after decommissioning operations.

18. Learn the lessons from the phasing out of support for first-generation biofuels and develop innovative technologies, e.g. in the aviation biofuel.

19. Meet the challenges of energy storage, currently the only way to solve the problems associated with intermittent photovoltaic and wind energy sources.

20. Develop energy storage technologies and infrastructures through “power-to-gas” solutions enabling the production of synthetic hydrogen and/or methane, which can be used for applications including fuel cells.

President,	First Vice-President	Rapporteurs	
			
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