



Policy Brief Agenda 2030

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Create an exchange to finance the creation of agroforests

by

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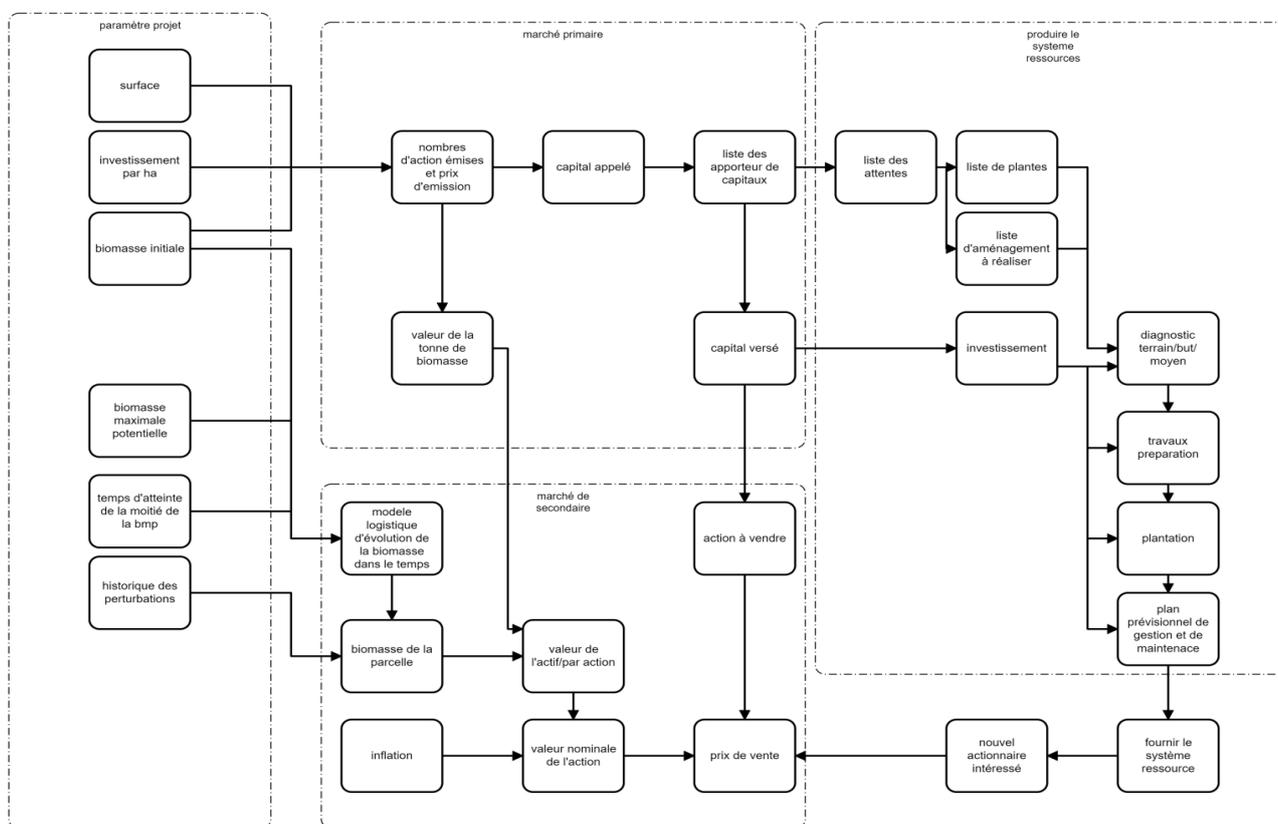
The *Agenda 2030* Policy Briefs series mobilizes economists and practitioners to identify an economic and financial reform agenda to achieve the 2030 Agenda at the territorial, national and supranational levels. Contact: thomas.lagoardesegot@kedgebs.com.

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Introduction

An agroforest is a complex agroforestry system, with a multi-stage vegetation structure, a large number of components and an ecological functioning similar to natural forests. Because of their multi-stage structure, their forest facies and their floristic composition, agroforests have a high tree diversity. Mainly present in tropical regions, experiments in temperate climates have shown how this practice could be applied in France under the terms "garden forest", "edible forest" and "food forest". The objective of this document is to propose a financing model for this approach. The idea is to use a legal status, the simplified joint stock company, to frame agroforests and to create a primary and secondary market to exchange the shares of these companies.

Figure 1: Diagram of the agroforestry financing model



Financing the creation of agroforests, the SAS forêt jardin model as a standard

Agroforests meet several objectives of sustainable development. The urgency to initiate this approach is the prospect of a return to manual agriculture based on annual plants, which is very labor intensive, whereas agriculture based on perennial plants would have required much less work and therefore freed up more time for other economic activities: in a world without tractors, producing annuals means preparing the soil, sowing, weeding, moving wheelbarrows of manure by hand many times a year, and 1 million farmers could not feed 70 million people in this way, 1 million farmers could maintain an agroforestry landscape where people would come to pick as they go to the supermarket. One could object to the use of agrofuels, but then one would have to choose to starve some people, which is contrary to MDG n°2.

The primary market must finance the creation of agroforestry, which is an outlet for the landscape and nursery sectors, for example.

In order to produce economies of scale and a better readability for the financing the idea is to propose a standardized model.

The standard of the primary market must pose an equivalence share / area / initial biomass, let us admit that at the creation 1 share is equivalent to the investment on 1m² and that on 1m² there is 10kg of biomass.

To measure biomass, one can try to evaluate the volume of wood and roots and assume an average density, sample volumes of soil and measure the mass of the soil fauna, etc. This work is not easy. On average, an agrosystem has 10T/ha of biomass, so we can consider that there is 10kg/m² of biomass in a field or in a clear cut. The figure, although false, can be taken as an acceptable approximation.

To create an industrial orchard today, it is necessary to count about 50,000€ (4000 low stem trees at 10€ and additional investments such as fertilization, preparatory work, irrigation, anti-hail nets, stakes), if one completes such an orchard with a stratum of perennials and a stratum of shrubs, the amount can still increase. The challenge is then to produce a consultation with the sector and to agree on a standard budget for all projects.

For some projects, the standard budget will suffice for others, especially if the budget for soil improvement is very large, it will be necessary to rely on learning from the sector (better knowledge of the different biotopes and cost of diagnosis, better knowledge of adaptive designs and cost of design, better knowledge of management methods and cost of management advice...) and productivity gains. The more agroforestry projects there are, the more economies of scale can be made (mechanization of plant propagation) and the more existing agroforests there are, the more accessible certain plant material resources will be (seeds, cuttings, grafts, bulbs).

Living in the agroforest as a common shareholder

The investment reflects the desire of companies to integrate the upstream by reducing the uncertainty of a biosourced supply, the desire of households to equip themselves with fruit trees that can be "liquidated" as they move, the desire of livestock farmers to have access to fodder, or the desire of environmental associations to translate their goal in situ. The investment must allow for the establishment of a resource system for these actors, and the composition of the resource system is all the more complex given the variety of expectations.

The titles will give rights over the agroforest and the agroforest produces a bundle of rights, for its users it is a common property whose governance rules must be established to ensure its sustainability. The manager of the agroforest must allow the provision of the resource system.

Households can by this means tend towards the control of their ecological footprint by linking their consumption to an area and on the long term shun a whole part of the value chain and avoid pollution due to transport or packaging. The SAS agroforest can be considered as a social and solidarity enterprise for poor households that can support themselves through self-picking or access to foodstuffs that they are excluded from because of the cost of picking, such as cherries or raspberries that can be exchanged at more than 5€ per kg.

For processing companies, SAS agroforestry shares could be considered as part of their business, as their supply implies a land footprint and an allocation of land in competition with other allocations, so that the integration of the upstream in a world that knows itself to be finite becomes less uncertain and more responsible than resorting to the market. The challenge is to link the size of the processing tool and the supply capacity allowed by agroforests rather than to build a model on a given tool in the hope that the supply market will follow, even if it means developing new land.

The farmers must consult each other before placing the animals in the agroforest and agree on how to share the resource, and the SAS manager must exercise control to ensure that the contract between the farmers is respected, as well as the other objectives of the agroforest; this can be done by establishing a provisional forage plan defining the resource to be shared, the load, and the rest periods. With the animals they produce not only raw materials but also a maintenance service for the agroforest, allowing the substitution of animal activity for human labor. The beekeeper who wants to take advantage of the agroforest must work to think about the production of nectar and pollen during the year.

Nature protection associations can be shareholders in order to promote the habitat of certain species.

The right way to manage the commons and make it last remains an enigma, it is a game of trial and error to discover good governance practices and then to limit these practices. The proposal here is to use the SAS as a legal form and to write the statutes according to a first idea of governance. As the issue of climate and biodiversity are paramount, I propose that the governance focus on biomass as an indicator of the carbon stored in the commons and as an indicator of life forms seen as mass.

Entering and exiting an agroforest: the secondary market for agroforestry securities and the question of the valuation of the living biomass asset

The proposal here is to make the value of the share evolve according to the biomass of the plot, so that the shareholder is caught in a contradiction between the rights that he can assert over the agroforest by withdrawing at a given moment and the risk of withdrawing too much, which would decrease the share price. The renunciation of harvesting is a source of gain because biomass increases, biodiversity increases, the organic matter contained in the soil increases, and the agroforest improves, allowing for greater harvesting later.

a) a bookkeeping game to justify an exchange rate based on the biomass of the agroforest

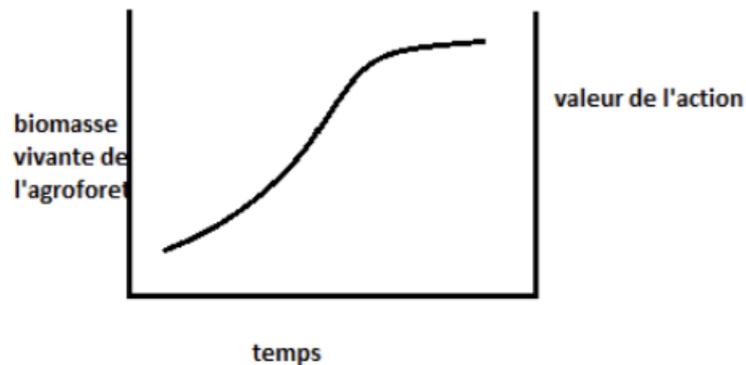
Let us assume that the investment corresponds to a tangible asset under construction.

Initially, the valuation of this asset is the set of purchases that the contributions have allowed, let's consider this set of young plants that constitutes the agroforest, they will grow and reseed and in the absence of disturbances too important the plantation will have more use value than at this initial stage in the future, so depreciate this asset would produce a non faithful accounting picture.

Let's assume that we value the plantation by its biomass and that it will grow according to a

logistic model. Then the price per ton of biomass is given by Investment/Initial Biomass. If we assume that the initial biomass is 10T/ha and that the investment is 100,000€/ha, we have a price of the living biomass of 10,000€/T or 10€/kg. If we assume that the biomass can reach 400T/ha, potentially the asset can be valued at 4 000 000€/ha.

Figure 2: Theoretical evolution of the share price of an agroforestry SAS



No work was necessary to achieve the accumulation of biomass, let us imagine a writing game such that each year a quantity of atmospheric carbon is purchased and a debt towards the atmosphere is contracted in order to record the increase in biomass. The secondary market manager in charge of the exchange of the securities can also be in charge of the revaluation of the asset from which the exchange value of the securities would be derived, and therefore of the production of the invoices allowing the writing game on behalf of the "atmosphere" agency selling the carbon and holding the associated debts.

Figure 3. Simplified balance sheet and income statement

BILAN 9			
ACTIF		PASSIF	
IMMOBILISATION		CAPITAUX PROPRES	
Immo. Corp. en cours	1800	capital social	1000
		résultat	0
		dette atmosphère	800
total actif	1800	total passif	1800

COMPTE DE RESULTAT			
CHARGES		PRODUITS	
achat de carbone	100	production immobilisée	100
RESULTAT			0

At 400T/ha one could imagine valuing the asset as the sum of the market value of the logs that constitute the agroforest, but then the valuation is excessive. Let's assume that when wood is sold, the asset is degraded according to the biomass exported, which is transferred to the buyer, the shareholders share the proceeds of the sale as a dividend and the atmospheric debt corresponding to the decrease in the asset is transferred to the buyer of the log.

Figure 4. Sales Journal

journal vente de bois			
512		trésorerie	10
	7	vente de bois	10
1		transfert de dette atmosphère	1000
	2	transfert de biomasse	1000

An investor could judge his investment by the discounted dividends from the sale of timber but then the valuation is too high, to get past this problem let's look at the stock from a charting perspective and how the change in the stock would discount the tax liability.

b) tax to legitimize the exchange value of the securities

Let us imagine that the State authorizes the payment of taxes in shares of SAS agroforestry, it validates the asset valuation model and the device as an element of its climate policy and in this perspective the State will then be able to redistribute shares and therefore the rights associated with these shares.

The investor buys X shares in year n to pay them back in the form of taxes in year p. Let L be the logistic function that represents the share price over time. Then the return on investment is $X * [L(p) - L(n)] / (p - n) > 0$ by construction. In other words, by investing $X * L(n)$ in year n, he will be able to pay $X * L(p)$ of tax in year m and as $L(n) < L(p)$ his savings as a reserve in anticipation of the future tax will find an interesting investment.

From this point of view, the role of the banker is to determine a decreasing sequence (X1, X2,...) of the number of shares to be purchased in order to pay the tax, based on a constant tax schedule specific to his client.

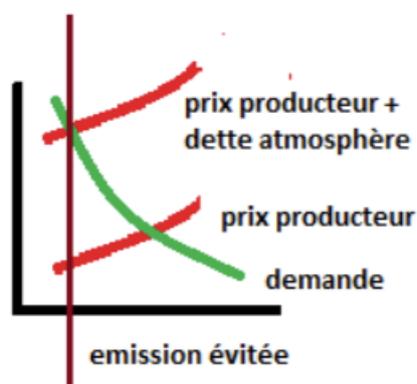
This chartalist vision being limited, let's try to go beyond it with a marginalist approach by asking how the SAS agroforestry model and its high valorization of living biomass will induce a higher price of biomass energy in the long term.

c) AVOID: towards a balance between the marginal utility of wood fuel and the marginal utility of living biomass or biomass transformed into goods

The value of the living biomass of the agroforest is currently much higher than its exchange value if it were sold for energy: a stère of about 500kg would be worth 5000€ when it is worth less than 100€ today!

By a game of writing, exporting a stère from the agroforest means capturing the exchange value and exporting the biomass asset and the atmospheric debt associated with the stère, The person who buys a stère from the agroforest would therefore be in debt to the institution that manages the atmospheric debt, and burning this stère exposes him to having to pay this debt since the carbon captured in the atmosphere contained in the biosphere (here the stère) will be exported into the atmosphere, and it is therefore preferable for him to obtain his supplies elsewhere

Figure 5: Theoretical model



As the model spreads, the opportunities to source elsewhere diminish, so the cheap supply diminishes. The slow diffusion of agroforestry gives time for adaptation, unlike an immediate carbon tax.

For the cost to be acceptable, the utility that the user derives from it must be equal to the expense, so this approach tends to avoid all uses with low utility and to reduce the demand to the strict necessary so that the expense of using wood as fuel is worth the high value of exporting carbon from the biosphere to the atmosphere, ultimately the risk of dying of cold. In this respect we can imagine a distribution by the State of the right to burn wood, to emit carbon, in the form of an atmosphere credit such that when a household comes to buy a stère, it pays the producer price and gives the corresponding atmosphere credit to the seller of the stère, accounting for the atmosphere debt associated with the steres it has in stock.

The utility of comfort or running a machine is then no longer satisfied by wood energy, which encourages better insulated buildings or water or wind mills, that is to say practices where the wood can be used as material and the carbon kept in its woody form, the atmospheric debt being then kept by the owner of the good containing the wood and the acquisition price is the producer price. At the end of the life cycle of the material wood, it can be burned, and its user can thanks to this wood in material form make a long-term provision in order to pay the carbon debt or at the end of the cycle the wood can be restored to an agroforest and serve as an amendment for the soil.

Figure 6. Simplified Balance Sheet and Income Statement

bilan entreprise location meuble			
2 biomasse morte	1000	1 capitaux propres	100
2 stock de meuble	100	1 dette atmosphère	1000
2 stock meuble cassé	0	1 résultat	0
5 trésorerie	10	1 provision pour brûler	10

compte de résultat			
6 provision	10	7 location de meuble	10

At the end of the logic, once the high price of wood energy and the parsimony in its use have become social facts, one can consider the disconnection of the value of the living biomass from

the value of the initial investment necessary to the creation of the agroforest such that the marginal utility of the living biomass was constant via a financial liberalization in order to reconnect it with the value of the biomass energy. It should be noted that accumulating living biomass means accumulating oxygen producers and tending towards problematic atmospheric concentrations of combustive, hence the challenge of evaluating the marginal utility of living biomass and if for the moment it is worth a lot of money in order to capture carbon and support biodiversity, the more biomass there is, the more we can afford to take without seriously damaging the climate or biodiversity.

d) COMPENSATION: increase biomass and roll over the debt, agroforest as collateral

Since by construction the value of the share increases as long as there is no serious disturbance of the agroforest, an individual can borrow to buy shares and commit to repaying and paying interest by returning the shares increased in value or by making a new loan by committing to ensuring that the biomass of the agroforest is increased for an additional period. As with *subprime* mortgages in real estate, it is possible to provide access to credit for all to shares in SAS agroforests, with these shares constituting collateral for the loan.

This openness to the greatest number of people is essential since the mutual control of the users of the agroforestry commons, and thus the achievement of the planned increase in biomass, depends on the existence of users who are likely to observe the other users and to point out misuses that thwart the mission of offsetting the carbon emissions allocated to the agroforest.

e) CONSERVE: destruction of the agroforest and sharing of the added value of artificialization

As a last resort, the agroforest can be considered as the manager of the abusos of the agroforest parcel and in case of destruction of the agrarian vocation for an artificialization we can imagine a rule such as the bare owner of the parcel receives the agricultural value of the land and the shareholders share the surplus value produced by the artificialization.

Where a hectare of agricultural land is worth about 0.5€/m², a building plot is worth at least 10€/m² and several hundred € depending on the situation, so that owners of agricultural land can expect huge gains from artificialization. Let's imagine a future where the agroforest is mature and is valued at 400€/m² if the opportunity to artificialize arises for this price, one of the stakes is then the existence of a blocking minority among the shareholders likely to prevent the artificialization and to perpetuate the agrarian vocation and to preserve the capacity to capture carbon of the plot, the capacity to welcome life and in this respect the associations of nature protection holding shares play a role.