

New economic incentives for sustainable building: Density bonuses and domestic carbon project

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Abstract

Land use density bonuses and the implementation of domestic carbon projects in the building industry attest to the rise in prominence of an entire panoply of economic incentive tools, such as preferred mortgage loans, the "eco-conditionality" approach to subsidies and energy performance contracts. These instruments serve to complement the range of purely regulatory or fiscal tools for overseeing sustainable construction practices.

1. Land use density bonuses

1.1 Description of the tool

The planning instrument of granting land use density bonuses on building permits is being increasingly applied in various international contexts. A number of Swiss cantons have adopted this instrument in order to promote the construction of buildings that comply with the *Minergie* energy quality label. Other cities across the world, like Arlington County, Virginia and New York City in the United States, have introduced comparable measures revolving around broader environmental criteria.

The 2005 Energy Law in France provides municipalities with the possibility of increasing land use density ratios (building coverage ratios, i.e. the net floor area derived from use of the maximum building footprint allowable on a given parcel divided by the total parcel land area) by up to 20% for energy-efficient construction that relies on renewable energy sources. This net floor area is calculated without including attic or basement space that could not be made suitable for human habitation, nor does it include roof terraces, balconies and loggias.

The application conditions for this density bonus measure were stipulated in a May 2007 decree, which states: "New clustered construction must satisfy a very high-performance energy efficiency standard specifically dedicated to renewable energies (or "THPE Enr") or low-energy consumption buildings ("BBC", on the order of 65 kWh of primary energy / m² / year of net surface area in northern France for heating, cooling, air conditioning, domestic hot water and lighting consumption). New single-family homes must consume 20% less energy than the specified thermal regulation amounts and introduce alternative options from among wood sources, photovoltaic cells, solar hot water and a heat pump with an annual performance coefficient exceeding 3.5. For existing buildings, the planned extension must be aimed at achieving energy neutrality, with an overall insulation of upper floors under the attic space and the installation of facilities adapted to wood, photovoltaic, solar hot water or a heat pump set-up. A solar hot water system must cover at least 50% of total needs, i.e. 3 m² per housing unit. The photovoltaic modules must account for at least 25 kWh/m² of the net floor area, or a surface area equal to 10% of the net floor area.

Beyond just the energy performance conditions, other parameters in the land use plan may be enhanced by means of conditional waivers or in percentage terms (e.g. increase in building height), according to environmental criteria:

- accepting a waiver on the number of mandatory parking spaces in the event of installing a structure to accommodate bicycle parking, which could reduce the need for underground parking by 20% to 50%, depending on the specific context. This could potentially represent one less underground parking level;
- raising the ground coverage ratio (i.e. the percentage of building footprint with respect to the land area of the parcel designated for construction) for dwellings that incorporate a rainwater recovery device; and

- including a range of greened surfaces (e.g. roofs, decks, walls) to help meet the green space requirement on the designated parcel.

1.2 Application examples

This land use density bonus instrument was initially presented to planning directors of 7 municipalities within the Paris Region participated in a series of workshops organized in 2006 by the ARENE regional agency (for the environment and new energies), in partnership with ADEME (Agency for the Environment and Energy Recovery). Since May 2007, several municipalities from the region have also decided to introduce the measure, led by Paris, Bry-sur-Marne and Issy-les-Moulineaux.

Bry-sur-Marne is a very residential suburb located 12 km from Paris with a population of 15,000. The municipal council has authorized a 20% increase in land use density for all single-family type residential zones as well as mixed-use areas with a housing concentration. Four building permits have already been approved with the land use bonus: they concern subsidized multi-family units that have been targeted for additional insulation beneath the roof and double-glazed windows, as well as solar panels for domestic hot water. In practical terms, this possibility of awarding bonuses actually represents one additional building story (i.e. from a 5-story to 6-story building).

1.3 Outlook for sustainable construction

The benefits of building density bonuses are numerous:

- more stringent sustainable construction requirements: the tool serves to introduce demanding energy and environmental performance requirements in construction projects, especially from the standpoint of the "Factor 4" energy policy (i.e. a fourfold reduction in greenhouse gas emissions by 2050);
- a "win-win" strategy: the inherent incentive principle allows rewarding good environmental practices. The classic objection of "investment overruns" is no longer valid thanks to the economic benefit tied to the number of additional m² available to project owners for construction. The total cost drops, while the building use value increases and future occupants take advantage by saving on charges.
- a modular tool, in favor of urban renewal: this instrument applies to all existing urban layouts and not just development projects underway in newer districts. It meets the diversity of land use situations and enables proceeding with "customized approaches" depending on planning priorities adopted by municipalities and the level of environmental awareness shown by the local population;
- an easy-to-implement operational tool: it serves the purpose of translating into practical terms the city's environmental objectives at the construction project scale, with a simple activation process (municipal council deliberation);
- an innovation-enhancement tool: municipalities are able to develop new building projects and renovations with truly exemplary qualities. Such a tool incites cross-disciplinary approaches rallying municipality departments around a common project. This aspect provides an initiation for both decision-makers and professionals to energy and environmental performance issues;
- a contribution to both local and global environmental objectives: the resulting projects contribute to combating the greenhouse effect, conserving water and non renewable energy resources, and improving the environment from a local perspective;
- a valuable action lever during this transitional period: the tool offers the possibility of making progress with motivated actors, without having to wait for a consensus opinion and for the group of economic actors to accept mention of imposing strict energy and environmental requirements in urban planning documents.

Moreover, this measure favoring higher building coverage ratios lies within a general framework for raising density and fighting against urban sprawl, by targeting a greater urban dynamic in optimizing urban networks and services through the guarantee of ecological buildings intended not to compromise lifestyle quality.

As part of recent work conducted at the time of France's multi-party environmental debates, it was decided to generalize, based on experience gained from the land use bonus, these incentive measures on the planning code in order to support sustainable construction, and to raise the possible land use density until 30%.

A reasonable hypothesis calling for adoption by 50% of France's municipalities over the time frame through 2012, then reliance upon the bonus in 50% of building permit applications, would lead to a direct savings of 500,000 tons of CO₂ out to 2012 in all of France (based yearly on one ton of CO₂ saved per new or refurbished dwelling or office).

2. Domestic carbon project

2.1 Description of the tool

In France, just a quarter of the greenhouse gas emissions, accounting for 132.8 million tons of CO₂, are actually covered by the European quota exchange system, within the scope of the national quota allocation plan. Sectors of diffuse emissions, such as the construction, are exempt. A domestic "building" project, pertaining to new construction or energy-oriented building renovations, provides the potential for reducing greenhouse gases throughout the entire nation and, as such, is eligible to generate revenue stemming from the sale of carbon credits. These projects are categorized as joint implementation (JI) from the standpoint of the Kyoto Protocol, i.e. they make it possible for economic actors from one country to contact partners in other industrialized countries in order to yield emission reduction units (ERU) that may be sold on the international market.

Several conditions need to be fulfilled for any given domestic project:

- Reductions in greenhouse gas emissions must be realized during the period 2008-2012;
- The project cannot focus on installations with a power rating of more than 20 MW in order to avoid "double counting" with the national allocation plan;
- Cumulative project components, which means that the project could not be conducted under satisfactory economic conditions without the contribution of carbon credits;
- The project sponsor must make use of an efficient tool for regularly tracking emissions, in the aim of accurately evaluating the quantity of CO₂ actually avoided;
- Validation of emission calculation methods by the joint ministerial mission to combat the greenhouse effect.

In France, the *Caisse des Dépôts et Consignations* (a public-sector financial institution) launched a call for projects at the end of 2007 as a means of inciting use of this new economic instrument for an investment envelope of 5 million tons of CO₂ equivalent over the period 2008-2012, with an average redemption price on the order of € 10 per ton of carbon. Around 20 projects in all sectors have been already selected, representing more than 2 million tons of CO₂.

For the building industry, the potential target in terms of actual projects would be in the range of 20 million tons of CO₂ for the 2008-2012 period, on the basis of a theoretical total deposit of 90 million tons of CO₂, i.e. 4 to 5 million tons for the Paris Region alone, which represents some 15% of all emissions from the residential and tertiary sectors. Among these high-potential target projects would be the reduction in HFC emissions by means of fluid substitution or refrigeration installation change, improvement in tertiary building management or the introduction of biomass boilers.

2.2 Application examples

Two major categories of projects can be distinguished in the Paris Region: those centered on making energy supply modifications to buildings, and "CO₂ dedicated" programs:

- shifting in favor of renewable energies for building heating. Given a boiler with a 1 MW power rating, the transition from gas supply to biomass will allow saving approximately 1,500 tons of CO₂ equivalent in emissions each year. To supply a residential building containing 20 units, the transition to a wood-fired boiler compared with a fuel oil- or gas-fired boiler will generate 25 tons in savings per unit, or for the whole building 500 tons of CO₂ equivalent. The resultant carbon credit would be situated around € 5,000 (i.e. € 10 x 500), or 20% for an investment of € 25,000;
- extending the decarbonized heat networks by means of a geothermal connection for buildings conventionally heated with fuel oil or gas;

- developing, for tertiary office buildings, interest in geothermal heat pumps mounted on piles since residential buildings in the Paris Region sit on a sedimentary basin that often necessitates the installation of piles;
- anticipating, for the set of dedicated CO₂ programs likely to be supported by the Paris Regional Council, a subsidy for either the construction of 500 BBC-certified housing units or the renovation of single-family dwellings resulting in a 50% drop in CO₂ level.

2.3 Outlook for sustainable construction

The advantage of domestic carbon projects is to gain access to both the most sensitive sectors, due to the rise in their emission levels, and the most diffuse in terms of emissions by sending a price signal relative to carbon. The French system, backed by the *Caisse des Dépôts et Consignations*, offers an innovative economic mechanism: it actually represents Europe's first domestic carbon system. Moreover, it incites the "decarbonation" step within economic sectors like construction and urban development, while lowering the total cost associated with emissions reduction. Participation in such projects serves to familiarize economic actors with mechanisms relevant to the carbon markets, which will be expanding over the coming years.

3. Conclusion

Land use density bonuses and domestic carbon projects for the building industry provide two complementary, yet distinct, tools. They open the door to incentive measures that make it possible to reward good practices aimed at generating greater energy efficiency and an improved ecological assessment of the buildings in our environment. Beyond their power of legal, fiscal and public subsidy incentives, these innovative tools serve to revamp the range of economic and financial instruments capable of introducing greater durability into the construction sector from the perspective of "carbon neutrality".

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