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ARTICLE INFO

Fabio Iraldo and Federica Gasbarro (2013). Reward based mechanisms for the participation of local authorities in climate mitigation. *Environmental Economics*, 4(3)

RELEASED ON

Wednesday, 09 October 2013

JOURNAL

"Environmental Economics"

FOUNDER

LLC “Consulting Publishing Company “Business Perspectives”



NUMBER OF REFERENCES

0



NUMBER OF FIGURES

0



NUMBER OF TABLES

0

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Reward based mechanisms for the participation of local authorities in climate mitigation

Abstract

Several policies and measures can be defined and implemented by local authorities to tackle climate change, such as those regarding the building, transportation and energy sectors. However, financial barriers often keep municipalities from getting involved in mitigation policies. This paper analyzes economic incentives for cities to make progress towards a low-carbon future. Within the LAIKA project, four Italian cities tested a methodological approach aimed to homogenize carbon accounting and to build up measures verifiable and eligible to gain carbon credits. These carbon credits have been exchanged in a simulated voluntary market and valorized with the allocation of regional funding. The results point out a certain limitation in the participation of local authorities to voluntary markets while highlighting the feasibility and the benefits both in environmental and economic terms of the valorization of carbon credits in regional funding. The paper concludes with some policy implications.

Keywords: local climate change mitigation, urban planning, local government, carbon credits, climate change.

JEL Classification: Q58.

Introduction

Even though tackling climate change would require global and collective action, at the local level the definition of policies for the reduction of emissions of greenhouse gases (GHGs) is part of a voluntary initiative. In fact, in the EU, the EU Emissions Trading System (EU ETS) addresses the emissions of the industrial and energy sectors, which correspond to almost 40% of emissions at the European level, while the Energy and Climate Package set the objectives for Member States including non-ETS sectors, which emit almost 60% of carbon emissions. Only recently, under the Effort Sharing Decision, Member States have taken on binding annual targets for reducing their greenhouse gas emissions. Sectors affected by this development are those which are not covered by the EU ETS, including building, agriculture, waste and transport (excluding aviation). This means that the role of non-ETS actors and voluntary initiatives in these greenhouse gas-emitting sectors is crucial in order to respect these binding targets.

Cities may play an important role in reducing greenhouse gas emissions at the local level (Comodi et al., 2012; Lazarus et al., 2003). Indeed local authorities can act as regulators, planners, promoters and providers in relevant sectors such as transport, urban planning, energy efficiency in the building sector, energy distribution and production (Iraldo and Gasbarro, 2013; Salon et al., 2010). The local governments of large metropolises influence areas beyond their administrative boundaries, as they at-

tract users from surrounding territories due to their high concentration of economic activities and resources (Iraldo and Gasbarro, 2013).

However, a current, effective engagement of local authorities in addressing climate change is basically linked to a voluntary dimension of environmental governance (Lazarus et al., 2012). Therefore, cities need some incentives to overcome the barriers (e.g. financial) that keep them from defining and implementing climate change mitigation plans. These incentives could be represented by the definition of a policy setting an analytical and normative approach that needs to be homogenous in all regions and possibly in all Member States in the future. This approach should also define reward mechanisms from an economic perspective, in order to support those who voluntarily decide to act for emissions reductions (Gasbarro and Iraldo, 2013).

This paper proceeds as follows: Firstly, we provide a literature overview about the role of cities in the definition of GHG emissions reduction policies and the main mechanisms that trigger local actions in this direction. Secondly we explain the functioning of the voluntary carbon market. Subsequently, we describe the main phases of the LAIKA project together with the main objectives. The results of the projects are presented together with a short commentary regarding the problems encountered and the potential improvements. The final section contains the conclusions and the policy suggestions.

1. Drivers and barriers for city action on climate change

Until now, the role of local authorities in tackling climate change has been voluntary. In fact there is no specific legislation requiring local or regional governments to produce greenhouse gas emissions reduction strategies, or to implement measures with

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This article is based on the LAIKA project, "Local Authorities Improving Kyoto Actions (LAIKA)", which is co-financed by the European Commission under the framework of the LIFE + Environment program (<http://www.life-laika.eu>). The opinions expressed in this article, however, are the author's and do not reflect, necessarily, the views of the European Commission. The full report will be published by the end of December 2013.

the same aim (Fleming and Webber, 2004; Kousky and Schneider, 2003). However, there are other legislations that give local governments the duty to prepare strategies for the improvement of energy efficiency (Comodi et al., 2012; Fleming and Webber, 2004; Bizzarri, 2011). However, many scholars recognize the important role of cities in the reduction of carbon emissions (Comodi et al., 2012; Lazarus et al. 2003; Salon et al. 2010; Zanon and Verones, 2013). In fact, local authorities can play an important role in developing the energy system (Comodi et al., 2012), urban planning (Zanon and Verones, 2013), and making improvements in energy efficiency in the sectors of building (Bizzarri, 2011), waste disposal (Lazarus et al., 2013) and transport (Salon et al., 2010; Lazarus et al., 2003), all of which are important steps toward a low carbon future. For example, local authorities could act through initiatives such as energy-saving in public buildings and lighting, information campaigns, renewable energy projects (Comodi et al., 2012; Radulovic et al., 2011), raising awareness and influencing citizens' behaviors (Fleming and Webber, 2004) and resuming an exemplary leadership role in climate change mitigation (Lazarus et al., 2013; Comodi et al., 2012). The motivations for implementing climate change mitigation policies are identified in the cost savings and co-benefits related to emissions reduction measures implemented by local governments (Kousky and Schneider, 2003). In particular, cost savings can be related to measures aimed at improving energy efficiency and public lighting (Radulovic et al., 2011; Comodi et al., 2012), while co-benefits are represented, for example, by reduced traffic, saving people time on congested roadways and reducing accidents, reductions in air pollution, and the resulting health and ecological improvements and so on (Kousky and Schneider, 2003). Together with cost savings and co-benefits, other variables drive city action on climate change, in particular the presence of a strong political leadership and the commitment of municipal officers and the community support (Cohen, 2012; Salon et al., 2010). However, there are some important barriers to the engagement of local authorities in climate mitigation policies including the following: skepticism amongst councilors and the community (Cohen, 2012); competing and conflicting objectives such as cutting carbon in the face of economic growth (Cohen, 2012); and resource pressures and reduced budgets (Cohen, 2012; Fleming and Webber, 2004; Comodi et al., 2012). Furthermore, local authorities have a limited power in raising local taxes (Cohen, 2012), which represent both a significant policy lever and significant income for

cities, which do not have compelling incentives or binding targets set by higher-level governments (Cohen, 2012; Fleming and Webber, 2004). Finally, there is a problem related to the lack of data and of a common methodology for GHG emissions management at a city level (e.g. for emissions inventory and monitoring) and a lack of a single technical solution for reducing GHG emissions (Fleming and Webber, 2004). To overcome the voluntary dimension of actions by cities to mitigate climate change, some authors suggest introducing city carbon budgets (Salon et al., 2010). In order to overcome financial barriers, some scholars propose introducing a voluntary carbon market and rewarding mechanisms with the aim of valorizing carbon emissions reductions achieved by cities (Bizzarri, 2011; Kennedy and Sgouridis, 2011).

2. A voluntary carbon market for local governments

The voluntary carbon market (e.g. Chicago Climate Exchange) includes all transactions made outside of the regulated frameworks of the Kyoto Protocol (e.g. EU ETS) and supports many projects aimed at sustainable development (Parodi et al., 2012). Those actors who are willing to demonstrate their contribution to emissions reduction according to "non-binding" criteria take part in this market (Iraldo and Gasbarro, 2013). Organizations that want to offset the emissions associated with their activities are the main buyers, together with individuals who want to offset the emissions associated with their lifestyles and organizations that have high emissions or wish to pursue sustainable paths (Parodi et al., 2012). On the other hand, the carbon credits are acknowledged when a structured process consisting of the development of voluntary programs and measures aimed at emissions reductions is completed, as well as the disclosure of carbon accounting to determine the amount of avoided emissions and successively a phase of verification. This process needs to be validated by a third party. The subjects involved in these programs are both private and public, and are driven by the need of realization of corporate strategies and the capacity to be ready for potential normative compliance in the future. Carbon credits in the voluntary market, which are referred to as Verified Emissions Reductions (VERs), can be placed and dealt with by means of apposite exchange platforms. VERs can be either exchanged through auctions or, more frequently, by bilateral exchanges, and have a price of between 3.80 and 6.8 Euros/ton CO₂eq for the projects implemented in Asia, Africa and South America and between 9 and 15 Euros/ton for those implemented in Italy (Parodi et al., 2012). According to the available data, at present the North

American context represents 56% of the demand in the voluntary market (24.2 MtCO₂eq in 2009), while Latin America composes as much as 16% (6,8 MtCO₂eq) and Asia 12% (Parodi et al., 2012). Nowadays, the market is paying for the absence of a clear set of rules (it is also working out operative problems such as the overlapping of credit generating subjects) and of official standards and validation instruments, functional in order to make the credits put on the market trustworthy (Parodi et al., 2012; Iraldo and Gasbarro, 2013).

The voluntary market can be considered a valuable opportunity for local authorities to emphasize climate mitigation policies and funding (Iraldo and Gasbarro, 2013; Bizzarri, 2011; Kennedy and Sgouridis, 2011). In fact, VER projects could derive from both measures aimed to increase the local capacity to offset or stock up the emissions that are locally produced (i.e. tree planting, forestation or reforestation), and interventions to reduce the pressures generated on the territory by the different industrial compounds (industrial, civil, tertiary, agriculture, transport), put into practice through the increase in energy efficiency, adopting cleaner technologies, mobility management, etc. (Iraldo and Gasbarro, 2013). Thereafter, the opportunities provided appear to be highly relevant.

3. The LAIKA project

Within the LAIKA project (Local Authorities Improving Kyoto Actions), four Italian municipalities, Milano, Torino, Bologna and Lucca, implemented, between 2010 and 2013, a methodological approach previously developed by the Cartesio Network (Regions of Emilia Romagna, Lazio, Liguria, Lombardia, Sardegna and Toscana). The project aimed to:

- ◆ support the European and Italian institutions in the activation of a scheme able to give value to cities' contributions to the Kyoto Protocol targets, and to the European integrated energy and climate change policy for 2020, by enabling the verification and attribution of credits for GHG reduction measures through the implementation of a national Register;
- ◆ elaborate and test the methodology of the accounting, the validation and the assignment of forms of economic incentives for voluntary GHG emissions reductions, such as privileged funding policies or market instruments;
- ◆ implement and simulating a voluntary market for GHG emissions credits, in order to set up a valid experience that may enrich existing expertise on markets for voluntary reduction credits.

Three main actions were implemented to fulfill these objectives. The first step of the LAIKA project was the application of a methodology previously

elaborated jointly and shared by the partners, in the stages of emissions accounting and eligibility evaluation of GHG reduction measures, within a planning process carried out at the city level. The first action was a fundamental step to prepare and give a strong foundation to the following experimental and more innovative phases of the project. In fact, it was crucial in order to homogenize the experiences carried out by the cities in the field of carbon accounting and in the process of verification and assignment of credits, which up to date is differentiated and often not comparable among territorial entities (Kennedy and Sgouridis, 2011). The methodological strongholds was represented not only by a common method for the calculation of the GHG emissions inventory, but also by a common method for the calculation of a "baseline" of the GHG emissions and by the approach in defining objectives, targets and planning tools, in order to pursue them. The method was tested and implemented by the cities involved in the project. Specific eligibility requirements to gain carbon credits were fulfilled by some actions and measures defined in each Climate Commitment Plan. These eligibility criteria were previously defined by the Cartesio Network (Cancila et al., 2010).

The second step of the LAIKA project consisted in the application of the methodology in the stages of implementation and monitoring of planned measures for GHG reduction (included in the Climate Commitment Plan) at the municipal level, also through verification of emissions and potential release of emissions reduction credits. The partners focused on those actions feasible according to the timeline of the Climate Commitment Plan and encompassed an implementation phase that falls into the time limits of the LAIKA project. Moreover, the monitoring activity provided the cities with useful information on the effectiveness of these measures and potential improvements and corrective actions.

Hence, in the third phase, the partners set up a system for attributing economic value and creating monetary incentives to the GHG reduction targets achieved. In particular, the partners tested the implementation of an emission credit attribution and trading scheme for the GHG reduction measures carried out by the cities. These monetary incentives were hypothesized both in relation to the recognition of carbon credits in the allocation of regional funding and to the sale of carbon credits in a simulated voluntary market.

These actions aimed to provide funding to local authorities. Indeed, the incentives and economic advantages could help cities to overcome the financial barriers to acting against climate change.

The cities took part in the simulation of a voluntary carbon market as sellers and public and private subjects as participated as buyers (e.g. regions, provinces, traders, private companies). The simulation was executed twice between June and July of 2013. The trade was finalized through bilateral agreements. The carbon credits were first inserted on the Register¹ and after the sale removed from the Register as in a real voluntary market.

To understand the potential financial opportunities related to the carbon credits to be recognized in the funding criteria of the higher level institutions, a list of funding scheme types was submitted to the assessment of higher-level institutions (some partners of the Cartesio Network). This assessment regarded the economic sustainability, the environmental effectiveness, the technical-administrative-juridical feasibility, in addition to the coherence with the strategic objectives of the higher-level institutions.

4. Results

During the project, the cities did not have particular difficulties in the definition of the emissions inventories and the Climate Commitment Plans. In fact, Milano, Torino and Bologna had previously adhered to the Covenant of Mayors and therefore already had Sustainable Energy Action Plans (SEAP) in place. Therefore, these cities needed only to update their inventories according to the emissions factors defined by the LAIKA partners. In addition, the city of Lucca calculated its carbon emissions and defined a Climate Commitment Plan for the first time. However some difficulties were encountered in the following steps of the project:

- ◆ defining the Business as Usual (BAU) scenario. As an example, for measures regarding the improvement of energy efficiency such as those implying the substitution of a heating system, in the BAU some substitutions due to the end of life of the systems needs to be considered as well as the substitution of automotive vehicles in the transport sector;
- ◆ the eligibility criteria, as well as in the case of VER standard, often are considered too restrictive to be applied in a local dimension such as that of the cities. In fact, many measures remain ineligible, such as those regarding transportation. For example, the development of public transport is considered an ineligible measure since it is related to autonomous local development;
- ◆ the definition of monitoring indicators for some specific measures; the ability to associate the carbon credits directly and univocally with the

emissions reduction projects as opposed to other local policies or, for example, the external circumstances (e.g. traffic reduction due to the economic crisis rather than to the local emissions mitigation policy); and a difficulty in the ability to obtain data were some important limitations found. For example, in the case of a policy that encourages citizens to use alternative transportation instead of private cars, it is difficult to demonstrate what kind of transportation was used before the implementation of the measures and the real substitution of private cars with an alternative transportation after the implementation of the measures (e.g. bicycle, public transport, etc.);

- ◆ it is difficult to define the ownership of carbon credits since many measures are defined and co-funded by multiple subjects (e.g. regional authorities, private partners), not only by the municipal authority;
- ◆ a risk of double counting was predicted, in particular for those measures involving the use of renewable energy and aiming at improving energy efficiency. In fact, these kinds of measures are often also eligible for green and white certificates respectively.

Some limitation also emerged from the simulations. On the one hand, the price of the carbon credits, reflecting only the additional costs of the certification process without considering the costs of the implementation of the measures, was considered too high by the buyers, in particular the traders, and some credits remained unsold. Indeed, as recalled previously, the price of VERs varies between 3.80 and 6.8 Euros/ton CO₂eq for the projects implemented in Asia, Africa and South America, which is much lower than the price of carbon credits certified by the cities. Therefore, the carbon credits developed at the city level, in particular those regarding energy efficiency, renewable energy and the transport sector, are not competitive with some other kinds of VERs. This discrepancy has been highlighted in particular by the traders, who have access to VERs and in general are looking for lower prices. However, city carbon credits were considered very interesting by companies operating at a local level and/or with local customers. In fact, local carbon credits can be spent more effectively in terms of communication and image and in terms of corporate social responsibility. On the other hand, the certification process requires financial and human resource allocation. For example, there are some institutional costs the costs of running the program (Salon et al., 2010). These costs can be divided into start-up program costs and ongoing costs of emissions monitoring and verification. These institution-

¹ <http://www.eco2care.org/>.

al costs need to be added to the implementation costs, which are the financial outlays necessary for local emissions reduction measures. Therefore, this could represent a further barrier if the price of carbon credits needs to be kept as low as is necessary in order to be competitive with VERs derived from projects implemented in Asia, Africa and South America.

Carbon credits could also be recognized at a higher institutional level (i.e. Regional, National, and European) in the evaluation criteria of funding programs. The types of funding schemes where carbon credits could be valorized have been identified as follows:

1. Regional funding, where the cities participating in projects with certified carbon credits can have additional points in the project assessment by recognizing carbon credits in the funding criteria.
2. Tax reduction in presence of certified carbon credits.
3. Additional funding in the presence of certified carbon credits.
4. Regional agreement among local institutions and additional points/faster procedures to access European funding (e.g. in the case of the European Investment Bank).
5. Carbon credits to be considered as necessary to access a certain funding scheme, such as those with a minimum target to be achieved (e.g. minimum energy efficiency to be achieved).
6. Easier procedures with relation to the administrative requirements.
7. Integration with white and green certificates.
8. Other non-economic incentives in the presence of certified carbon credits (e.g. image, administrative and legal simplification).
9. Regional funding for local adaptation to climate change, where the cities participating in projects with certified carbon credits can have additional responsibilities in the project assessment by recognizing carbon credits in the funding criteria (i.e. the cities are asked to implement carbon reduction measures while implementing adaptation projects).

Cartesio's partners, who are often the funders of local measures, were asked to assess the opportunities for the development of carbon credits at the city level to be recognized in the funding criteria. They gave interesting feedback, in particular with relation to the role of carbon credits in achieving environmental targets and economic benefits. In addition, some forms of funding were identified as the most suitable to recognize carbon credits in the evaluation criteria of funding programs. These were, in particular, those which set a minimum target to be achieved

in order to receive funding (i.e. 5). Actions related to the allocation of funding aimed at implementing adaptation measures to climate change coupled with carbon emissions reduction criteria (i.e. 9) were noted as suitable, in addition to those related to European funding schemes (i.e. 4). Furthermore, this recognition system seems to be particularly well-matched with higher level policies (e.g. climate mitigation, sustainable development, energy policies).

The ambitiousness of the project relies on the recognition of the methodology developed at a higher level (i.e. national and international). This could allow the launch of a voluntary market with shared rules where cities could sell their carbon credits and, by doing so, overcome financial barriers, which keep them from the definition of climate mitigation policies and measures.

Conclusion

In this study we analyzed some form of economic incentives to encourage cities to take action toward the definition and the implementation of climate mitigation policies. In fact financial barriers often keep municipalities from implementing emissions reduction measures (Cohen, 2012; Fleming and Webber, 2004; Comodi et al., 2012). This study was based on the LAIKA project, implemented between 2010 and 2013. Four Italian cities tested a methodological approach aimed to homogenize carbon accounting and to build up measures that are verifiable and eligible to gain certified carbon credits. These carbon credits have been exchanged in a simulated voluntary market and valorized in the allocation of regional funding. The main goal of the LAIKA project was to act as a demonstration. The results highlight a certain limitation in the participation of local authorities in voluntary carbon markets in the present context. The results also emphasize the feasibility and the benefits of the valorization of carbon credits in regional funding, both in environmental and in economic terms. The project shows that a harmonization of accounting and planning methods adopted by the cities for projects and plans in the field of GHG emissions reductions is possible and necessary. This harmonization would make these methods effective tools to stimulate initiatives at the local level and to promote reporting on target achievements for institutional contexts (at the national level, and at the level of the European Commission). However, to overcome the limitations found in the simulation of a voluntary carbon market, a city carbon budget (Salon et al., 2010), a country-based registry (Comodi et al., 2012) and a national market would be necessary. In fact a volun-

tary city carbon market means that local governments would be assigned an emissions “budget” by a higher-level of government (e.g. regional, national), and would be required to keep annual local transportation and buildings emissions within this budget (Salon et al., 2010).

A country-based system for the registration and the assignment of emissions reduction credits would be an effective solution to: (1) prevent an uncontrolled development of local registration systems working with incompatible rules; (2) ensure that emission reduction initiatives have the highest visibility; and (3) provide cities with credibility at the national and potentially communitarian scale (Iraldo and Gasbar-

ro, 2013). This carbon registry could also be used for trade at the European level.

Furthermore, a voluntary market for emissions reduction credits may work effectively and efficiently if it relies on a national basis and if it actively engages higher-level actors (e.g. regional, national) as promoters of credit registration in a unique platform (Iraldo and Gasbarro, 2013). In this way, private companies will have a further incentive in buying carbon credits coming from local projects rather than from foreign ones, despite their higher price. In addition, linking EU financing policies to emissions offsetting requirements is an effective way to develop and encourage voluntary GHG reduction initiatives.

References

1. Bizzarri, G. (2011). Local energy policies for Kyoto goals: Ecoabita protocol a key action to reduce, *Energy and Buildings*, 43, pp. 2394-2403.
2. Cancila E., Bosso A., Tollari F., Franceschetti A., Iraldo F., Melandri S., Molteni T., Fontanella A., De Stefani A., Gallo M., Del Borghi A., Alfieri F., Pasinetti R., Lazzari C. (2010). Linee guida per la definizione e attuazione di una strategia di riduzione delle emissioni di gas serra da parte delle pubbliche amministrazioni, 145 p. Available at <http://www.retecarterio.it>.
3. Cohen, T. (2012). Can participatory emissions budgeting help local authorities to tackle climate change? *Environmental Development*, 2, pp. 18-35.
4. Comodi, G., Cioccolanti, L., Polonara, F., Brandoni, C. (2012). Local authorities in the context of energy and climate policy, *Energy Policy*, 51, pp. 737-748.
5. D'Avignon, A., Azevedo Carloni, F., Lebre La Rovere, E., Burle Schmidt Dubeux, C. (2010). Emission inventory: An urban public policy instrument and benchmark, *Energy Policy*, 38, pp. 4838-4847.
6. Fleming, P.D., Webber, P.H. (2004). Local and regional greenhouse gas management, *Energy Policy*, 32, pp. 761-771.
7. Gorecki, P.K., Lyons, S., Tol, R.S.J. (2010). EU climate change policy 2013-2020: Using the Clean Development Mechanism more effectively in the non-EU-ETS Sector. *Energy Policy*, 38, pp. 7466-7475.
8. Iraldo F., Cancila E. (2010). Pubbliche amministrazioni e riduzione delle emissioni di gas serra. *Inquinamento 125 – Gestione ambientale*, June-July, pp. 40-44.
9. Iraldo F., Gasbarro F. (2013). How can Local Authorities Participate in Kyoto Actions? *Joint Implementation Quarterly*, Vol. 19, No. 1, pp. 7-8.
10. Kennedy, S., Sgouridis, S. (2011). Rigorous classification and carbon accounting principles for low and Zero Carbon Cities, *Energy Policy*, 39, pp. 5259-5268.
11. Kousky, C., Schneider, S. H. (2003). Global climate policy: will cities lead the way? *Climate Policy*, 3, pp. 359-372.
12. Lazarus, M., Chandler, C., Erickson, P. (2013). A core framework and scenario for deep GHG reductions at the city scale, *Energy Policy*.
13. Parodi, L., Gallo, M., Del Borghi, A. (2012). Il mercato volontario dei Crediti. *Ingegneria Ambientale*, Vol. 41, No. 2, pp. 99-111.
14. Radulovic, D., Skok, S., Kirincic, V. (2011). Energy efficiency public lighting management in the cities, *Energy*, 36, pp. 1908-1915.
15. Ren, H., Zhou, W., Gao, W., Wu, Q. (2011). Promotion of energy conservation in developing countries through the combination of ESCO and CDM: A case study of introducing distributed energy resources in to Chinese urban areas, *Energy Policy*, 39, pp. 8125-8136.
16. Salon, D., Sperling, D., Meier, A., Murphy, S., Gorham, R., Barrett, J. (2010). City carbon budgets: A proposal to align incentives for climate-friendly communities, *Energy Policy*, 38, pp. 2032-2041.
17. Zanon, B., Veronesi, S. (2013). Climate change, urban energy and planning practices: Italian experiences of innovation in land management tools, *Land Use Policy*, 32, pp. 343-355.