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## Milan's pollution charge: sustainable transport and the politics of evidence

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### Abstract

The city of Milan, one of the most car-dependent and polluted in Europe, is also among the few to have introduced a road pricing measure. The story of how this happened is of great interest, for it shows how EU regulations, scientific evidence and political action at the local level have concurred to bring about change in the city's transport policy. Unlike the well-known cases of London and Stockholm, it is concerns for the levels of pollution (rather than congestion) that have led to the introduction of the “Ecopass” scheme in 2008. Accordingly, in the following years the public debate has focused on the effectiveness of this *pollution charge* in reducing PM<sub>10</sub> – a pollutant with adverse health impacts. Based on the analysis of media coverage and official reports, this paper argues that EU regulations had a crucial role in determining the newsworthiness of PM<sub>10</sub> in Milan. Media and public concerns have then put increasing pressure on politicians to find a solution to the “emergency”. The dubious effectiveness of Ecopass in reducing PM<sub>10</sub> levels then has had two kinds of consequences. First, the scheme was upgraded to a *congestion charge* in 2012, following the results of a bottom-up referendum in which a large majority of voters demanded both an upgrade and an extension of the Ecopass area: this stands in stark contrast with the experience of other cities, where voters have turned down charging schemes (e.g. Edinburgh, Manchester). Second, the new city administration has recently implemented a monitoring system for Black Carbon, a new PM metric that is more suitable to prove the effectiveness of traffic restrictions. Overall, the paper shows how all actors involved in the process (politicians, media and civil society groups) made strategic use of scientific evidence on pollution, in order to bring forward their own agendas.

**Keywords:** public acceptability, road pricing, congestion charging, air pollution, sustainable transport, car use, referendum

### 1. Sustainable transport policy and road pricing

The transport sector is a major contributor to greenhouse gas (GHG) emissions: in 2005 it accounted for approximately 23% of the world's CO<sub>2</sub> (Schäfer et al., 2009), and within this sector, the motor car is the second biggest contributor behind road freight (Chapman, 2007). Moreover, the reason why it is seen as the most difficult and worrying part of the climate change agenda is that – unlike other sectors – its impact is likely to increase rather than diminish in the next few decades (Chapman, 2007; Johansson, 2009): transport is today the fastest-growing source of energy-related GHG emissions, and thus its relative importance is likely to increase at such a rate that it will be difficult to reverse for technological improvements alone (Schäfer et al., 2009).

In the context of research on sustainable transport, there is a consensus about the need for comprehensive policy packages that include action in the following directions (Banister, 2005): improving technology and

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energy efficiency; improving modal alternatives to the most polluting means of transport (such as the motor car); changing the built environment, in order to reduce travel distance and the need for car use; targeting individual attitudes and behaviour in order to achieve a modal shift away from the car; finally, the introduction of pricing measures is generally considered to be essential if sustainable transport is to be achieved. For example, the European Union White Paper on transport argues that:

“in the urban context, a mixed strategy involving land-use planning, pricing schemes, efficient public transport services and infrastructure for non-motorised modes and charging/refuelling of clean vehicles is needed to reduce congestion and emissions” (European Commission, 2011, p. 13)

In practice, however, forms of road pricing have generally been discussed and/or introduced as tools to tackle local problems such as congestion and air pollution, notably in urban areas, rather than as part of a comprehensive strategy to reduce travel-related GHG emissions

## **2. The public acceptability and political feasibility of road pricing**

The fact that road pricing has often been discussed as a tool to tackle congestion in urban areas is not surprising. Indeed, the idea of congestion charging has a long history, being first put forward by transport economists in the 1920s (Pigou, 1920). In the following decades, transport scholars have widely discussed the implications of pricing, generally agreeing that it is an effective way of internalizing the externalities of transport while reducing car use and related congestion problems. In that sense, as Eliasson puts it, when the first congestion charging proposals started to be discussed in Europe at the turn of the 21st century, “transport economists had been waiting for a hundred years” (2009, p. 205).

There are several reasons for such a delay: for a long time the main obstacle was the lack of the technology required for the automatic enforcement of the charge. While Singapore introduced its well-known Area Licensing Scheme in 1975, this was based on a combination of overhead gantries and visual checks on the part of police officers (Seik, 1997). Since a couple of decades, with the introduction of new technologies such as automatic number plate recognition (ANPR) systems, technology is no longer an issue (de Palma & Lindsey, 2011; Iseki & Demisch, 2012). As of today, researchers agree that the single most important obstacle to the introduction of transport pricing schemes is the lack of public acceptability (Schade & Schlag, 2000; Hårsman, 2001; Hårsman, Pädam, & Wijkmark, 2001). This factor explains why in many cities congestion charging is simply not on the agenda, as well as why projects have been considered, but not implemented in cities such as Edinburgh (McQuaid & Grieco, 2005; Saunders, 2005; Gaunt, Rye, & Allen, 2007; Gorman, Higgins, & Muirie, 2008), Manchester (Ahmed, 2011; Vigar, Shaw, & Swann, 2011), New York (Schaller, 2010) and Hong Kong (Ison & Rye, 2005).

Understandably, the lack of public acceptance and political feasibility of congestion charging has attracted considerable research attention in the recent past. Due to the scarcity of real-world case studies, much empirical work has relied on stated preference methods, which generally amount to asking people how they judge such a measure (Jaensirisak, Wardman, & May, 2005; Zheng & Hensher, 2012). These studies have generally concluded that public acceptance is very low virtually everywhere, even though they have shed light on the factors responsible for variations in the degree of acceptance (Link & Polak, 2004; Jaensirisak, Wardman, & May, 2005; Brundell-Freji & Jonsson, 2009; Gehlert et al., 2011; Souche, Raux, & Croissant, 2012). More recently, a few cities have held referenda on congestion charging, thus making available for the first time “revealed preference” data on this topic. Overall, these “real-world experiments” have generally confirmed the low acceptance of congestion charging – with a few very interesting exceptions.

In Edinburgh, a city council plan to introduce a congestion charging scheme has been rejected with a large majority (74%) in 2005 (McQuaid & Grieco, 2005; Saunders, 2005; Gaunt, Rye, & Allen, 2007; Gorman, Higgins, & Muirie, 2008). Similarly, 79% of Manchester citizens rejected in 2008 a “Greater Manchester

Transport Innovation Fund” which included, besides considerable investment in public transport, a congestion charging scheme (Ahmed, 2011; Vigar, Shaw, & Swann, 2011). These electoral results have been widely interpreted in the UK as proof that it is impossible to introduce such schemes if citizens are allowed to vote directly – indeed, the world’s best known scheme, the London Congestion Charge, has been introduced in 2003 without referendum. By contrast, in Stockholm a narrow majority of voters (51%) has voted in favour of a similar scheme in 2006, after a full scale trial had taken place in the city for seven months (Gullberg & Isaksson, 2009b). Understandably, this “unexpected yes” (Eliasson & Jonsson, 2011) has attracted considerable research attention (Eliasson & Hultkrantz, 2009; Hårsman & Quigley, 2010): in this context, Swedish scholars have often emphasized the “lessons” that other cities around the world might draw from the scheme’s design and the process of implementation (Eliasson, 2008; Gullberg & Isaksson, 2009a; Börjesson et al., 2012).

While the research attention paid to the aforementioned case studies is well deserved, it is surprising that only a few international publications focus on the case of Milan (Lapsley & Giordano, 2010; Rotaris et al., 2010; Danielis et al., 2011). Indeed, several scholars seem unaware of this case study: for example, Gullberg & Isaksson, in their study about Stockholm, provide a list of “places that occur in the literature on road charging” that includes 31 cities from all over the world, but not Milan (2009b, p. 175). This lack of attention is problematic, since recent events arguably make Milan the most interesting case study for the acceptability of congestion charging: while a “pollution charge” aimed at reducing traffic and polluting emissions in the city centre was implemented in 2008, three years later, in a bottom-up referendum promoted by an environmental association, 79% of voters voted in favour of extending the measure to all vehicle types, increasing the charge and progressively extending the charging area. Such levels of acceptance are indeed unprecedented, and challenging for conventional wisdom on congestion charging.

In this paper, we try to make sense of this surprising electoral result, by focusing on the role of evidence about air pollution levels. The paper is structured as follows: in the next section, we focus on the city of Milan, and put forward a list of possible reasons for the high levels of acceptance. Then, we illustrate the normative context of the introduction of a pollution charge in the city. In the following two sections, we describe the pollution charge scheme introduced in 2008 (Ecopass) and the congestion charging implemented in 2012, following the results of the local referendum (Area C). In both sections, we focus in particular on the use that different actors (politicians, associations, media, etc.) have made of scientific evidence about concentrations of air pollutants. Finally, the conclusion discusses the implications of the case study, with regard to the use of evidence in environmental policy making.

### **3. Possible reasons for high acceptance of congestion charging in Milan**

Northern Italy is one of the most densely populated areas of Europe, accounting for about 28 million people living in the Po Valley and in the surrounding mountains. The metropolitan area of Milan accounts for a large portion of this *megalopolis*: in a recent study aimed to define the borders of Italian metropolitan areas, Boffi and Palvarini argue that the metropolitan area of Milan accounts for approximately 7.5 million inhabitants, covering most of the area between the city of Milan and the alpine lakes in northern Lombardy (2011). The area so defined is considerably larger than the city proper, which accounts for just 1.3 million inhabitants, while the rest of the area is fragmented in a myriad of municipalities.

Milan is commonly referred to as the “economic capital of Italy”, and it is indeed a prosperous metropolis which has successfully transitioned from an industrial to a major service city, notably in the fields of media, design and fashion. However, observers generally highlight that this economic success is hampered by deficiencies in territorial government, as well as by poor quality of life (OECD, 2006). Dell’Agnese and Anzoise, for example, have argued that Milan represents “the classic hyper-congested urban reality, where a myopic management of the urban growth and its environmental costs has severely curbed living standards”

(2011, p. 221). A major factor for this situation is that the metropolitan area of Milan is one of the most car dependent in Europe, with a car ownership rate of 0.6 cars per inhabitants and a modal share of 47% in the municipality (Comune di Milano, 2009): indeed, Milan is “among the cities with the highest car concentration in the world” (Rotaris et al. 2010, p.360). High levels of car dependence are the one the major factors behind the problems of congestion and pollution, which in turn are often mentioned as reasons for poor quality of living.

Overall, public policy in the last decades has devoted little attention to quality of life and environmental issues. For example, Lazarini and Nardi have recently concluded that climate change is a weak driver of municipal policies in Milan, especially if compared to other European cities (2012). Accordingly, it is surprising to find such a city at the forefront of sustainable transport policy and acceptance of environmental taxes. Adding to the puzzling nature of this case study, Milan is the only major European city where (to our knowledge) a charging scheme has been put forward by a right-wing city government: in fact in Edinburgh, Manchester, London and Stockholm the city council was controlled by labour, social-democratic and/or environmental parties at the time of approval.

This facts suggest that there should be something peculiar about this case study. Accordingly, in the following we put forward a list of possible reasons for the high acceptance of congestion charging shown by the referendum results. It must be stressed that these are mere hypothesis and – in the absence of more in-depth studies – should be regarded only as possible future research directions. Similarly, we have ordered the factors by increasing importance, based on our assumptions, rather than on an empirical appraisal of the relative weight of different factors.

1. The wording on the ballot papers might have increased the acceptability of the scheme: indeed, the referendum question put forward a comprehensive strategy for sustainable transport (including improvement to public transport, bike lanes and the like) to be financed with an upgraded and expanded charging scheme (see below). As previous research indicates, “if the aim of the charges is not explained, nor what will happen to the income, there is less likelihood of the tax being accepted” (Gullberg & Isaksson, 2009b, p. 140-141): accordingly, the fact that the ballot papers illustrated a detailed policy package might have increased the percentage of yeas.
2. The simultaneity with other four local environmental referenda, where more than 90% of voters have voted “yes” might have induced a response-set effect among voters.
3. In addition, the simultaneity with national referenda held on the very same day is likely to have increased voter turnout: notably, the contemporary carrying out of a nationwide popular referendum on the ban of nuclear power, a mere three months after the Fukushima nuclear disaster, has probably been the major contributing factor in this context.
4. The referendum was held in a moment of political change, with the right wing coalition in power at both the national and the local levels losing support among voters. Accordingly, the city of Milan, for almost twenty years a stronghold of Italian conservatives, elected a left-wing Mayor in May 2011, merely a couple of weeks before the referendum. Our analysis of electoral data at the census-tract level (not reported here in detail for the sake of brevity) shows that the percentage of yeas is highly correlated with the vote for the left-wing mayoral candidate two weeks before, even after controlling for other possible confounding factors. Accordingly, we put forward the hypothesis that political factors might have been crucial in determining the success of the poll: indeed, voters seem to have used local and national referenda to signal their discontent with Silvio Berlusconi’s centre-right coalition (ruling both the city and the Italian State at the time).
5. A further possible reason for the high acceptance of the pricing measure is the small area covered by the scheme: the historical city centre of Milan, corresponding to just 8 km<sup>2</sup>, considerably less than London (22 km<sup>2</sup>) and Stockholm (47 km<sup>2</sup>); also the schemes rejected by voters in Edinburgh and

Manchester were supposed to cover a much wider area. While this can be considered a reason for the higher level of acceptance observed in Milan, it is unlikely to be the main one: indeed 79% of Milanese voters actually agreed to progressively extend the area to include all the neighbourhoods inside the so-called “railway ring”. Such an extension (which as of today has not been implemented) would expand the area considerably, making it more similar to comparable schemes in other European cities.

6. Our study of the Milan case, however, lead us to think that the single most important reason for high levels of public acceptance and support is the fact that here, unlike in other cities, it is concerns for the levels of pollution (rather than congestion) that have led to the introduction of Ecopass in 2008. Accordingly, in the following years the public debate has focused on the effectiveness of this pollution charge in reducing PM<sub>10</sub> – a pollutant with adverse health impacts. This is likely to have boosted acceptance, as previous research based on stated preference data shows that the attitudes are more positive when the charging scheme is aimed at compensating for the pollution caused by drivers (Jaensirisak, Wardman, & May, 2005; Souche, Raux, & Croissant, 2012): for instance Eliasson and Jonsson, in a study focused on Stockholm find “a strong connection between environmental concerns and positive attitudes to congestion charge” and argue that “the politicians’ decision to “re-label” the congestion charges to “environmental charges” and emphasizing their positive effects on air quality may very well have had a positive impact on acceptability” (2011, p. 363).

Discussing the relevance of all factors listed above is clearly beyond the scope of this paper. Accordingly, in the following we will focus on the latter point: notably, we will illustrate the crucial role of evidence about levels of air pollutants and their impact on health in the public debate that has accompanied the introduction of charging in Milan, as well as the strategic use of evidence made by all actors involved. The paper is based on desk research, notably focused on official reports and press articles for the period 2008-2012. Therefore, it is best conceived as a preliminary study, which will hopefully pave the way for further more in-depth research.

#### **4. The normative context: air pollution in the Milan area**

A crucial element to understand how Milan’s congestion charging came about is the normative context at the EU level. In the context of the EU policy on air quality, the directive 1999/30/EC (later integrated in the directive 2008/50/EC) has set limit values for PM<sub>10</sub>, which member states had to comply by 2005. PM<sub>10</sub> refers to atmospheric particulate matter with a diameter of 10 micrometers or less, which is proven to have serious health effects in terms of cardiopulmonary mortality (including lung cancer) (Kappos, et al., 2004). Accordingly, the directive sets two concentration levels: a daily value of 50 µg/m<sup>3</sup>, that should be exceeded for not more than 35 days per calendar year; and a calendar year average of 40 µg/m<sup>3</sup>. The directive has been transposed in Italian law three years later, with a Ministerial Decree (D.M. 60/2002). As it is always the case with EU directives, failure to comply may lead to a non-compliance procedure, and to the Commission taking member states to the European Court of Justice, and this in turn can result in financial penalties for the member state. Indeed, the high concentrations of PM<sub>10</sub> in several Italian areas has led the European Commission to take Italy (as well as several other European States) to the European Court of Justice in 2010.

In this context, Northern Italy is one of the areas of Europe where daily limit values have been exceeded more often and average annual concentrations are higher. There are three main reasons for this: firstly, as illustrated, this is one of the most densely populated and industrialized area of the country, as well as of Europe. Secondly, levels of car use are very high, partly as a result of insufficient public transport supply. Finally, and most importantly, the role of adverse geo-climatic conditions has to be taken into account: indeed, the Po valley is almost enclosed by the Alps and the Appenine Mountains; accordingly, wind speed is usually low and temperature inversion is common during the winter. These geo-climatic conditions

contribute greatly to the high concentration of air pollution that is observed in this region: indeed, experts argue that “if in Milan there was a wind speed of 2,5 m/sec (average in European cities), instead of 0,9m/sec (..), that would result in only 3 days per year beyond limit values – all emissions being equal” (Commissione Ecopass, 2010, p. 16). Given these conditions, PM<sub>10</sub> levels in the Po Valley regularly exceed the limit values set by the European Commission. The same goes for Milan, where in the last decade a decrease was observed: this trend is related to vehicle fleet change, with the progressive introduction of new, cleaner vehicles, as well as to more structural determinants such as the reduction of industrial activity and, since 2008, the economic crisis, which has kept travel demand down in the last few years (Commissione Ecopass, 2010). Despite these reductions, the Milan area is still exceeding EU limit values: in 2010 the number of days exceeding the threshold was 86, more than double those allowed (*ibidem*).

### 5. A “pollution charge”: Ecopass (2008-2011)

Having set the context, in this section we describe the story of congestion charging in Milan more in detail, focusing on the pollution charge in force between January 2008 and January 2012. Tab.1 presents a sketchy chronology of the events, from the first discussions about charging to the introduction of a fully-fledged congestion charge in 2012.

Period	Mayor	Events
2001-2006	Albertini (right)	Discussions about road pricing “ticket” for access to the city centre
2006-2008	Moratti (right)	<i>Ecopass</i> in the making
1/2008		<i>Ecopass</i> implemented
2009-2011		<i>Ecopass</i> in question
5-6/2011	Pisapia (left)	Mayoral elections and referendum
1/2012 – present		<i>Area C</i> implemented

**Tab. 1– Chronology of events**

The idea of levying a “ticket” for the access of vehicles to the city centre was discussed intensively during the second mandate of Mayor Gabriele Albertini (centre-right) in 2001-2006 (Lapsley & Giordano, 2010). In this phase, the reason for the interest in road pricing are to be found in the then-recent EU Directive on air quality, as well as the example of the London congestion charge (implemented in 2003). Still, Albertini preferred to defer the matter to the successor, Letizia Moratti (centre-right), who was elected in 2006. After two further years of discussion, a charge for the access to the city centre was finally implemented in January 2008, under the name of Ecopass. In the two following years, the public debate focused on the alleged lack of effectiveness of Ecopass in cutting PM<sub>10</sub> concentrations: in this period, the scheme increasingly came under the fire of critics, notably from the ranks of the municipal majority. While the mayoral elections of May 2011 saw the unexpected victory of left-wing candidate Giuliano Pisapia, a bottom-up referendum on traffic policy held a few weeks later resulted in a clear majority of yeas (79%). Accordingly, in January 2012 the new city government upgraded Ecopass into a fully-fledged congestion charge named “Area C” (where the “C” stands for “city centre” as well as for “congestion”), in accordance with the results of the referendum.

The Ecopass scheme of 2008-2011 had several peculiar characteristics: as noted above, the covered area was small, corresponding to the perimeter of the 16<sup>th</sup> century city walls; one of the reasons for choosing it was

that an ANPR system was already in place, and thus the implementation of the charge did not require a huge investment in technology. The charge was levied between 7:30 and 19:30 on working days, and it varied between 2 and 10 Euros. There was a high level of differentiation of the charge according to the Euro Emission Standard of the vehicle: indeed, several categories of vehicles considered as less polluting (including, among others, petrol fuelled vehicles with Euro 3 or higher standard) were totally exempted from the charge; for other vehicles, the level of the charge varied from 2 to 5 Euro, depending again on the Euro Emission Standard. Moreover, the scheme included discounts for frequent users and residents, and was conceived as part of a wider transport policy package including also public transport improvements.

The striking feature of Ecopass, if compared to other congestion charging schemes in Europe, is that it was focused mostly on pollution reduction. As acknowledged by the Municipal Agency for Mobility, Environment and Territory (AMAT) “(the) specific goal (of Ecopass was) to answer the environmental emergency due to the recurrent exceeding of the limit values for PM<sub>10</sub> set by the EU” (AMAT, 2011). Accordingly, as Rotaris et al. have observed, that the charge was “mainly conceived and communicated as a pollution charge (with), congestion mentioned only as a side-goal” (2010, p.361). Also the periodic monitoring reports produced during the period 2008-2011 (see for example AMAT, 2010) mainly focused on air pollution reductions, and paid only little attention to other positive side-effects of the charging (reduced number of accidents, increased speed of public transport in the charging area, etc.). Similarly, the information and advertising campaign that accompanied the launch of Ecopass was very much focused on pollution: one of the posters depicted a kid on a toy car, with the caption “With Ecopass, green light to non-polluting cars. Less traffic, more clean air”. Incidentally, it is interesting to observe that this advertising implicitly conveyed the message that more recent vehicles (Euro 3 to 5), that were exempted from the charge, were to be considered as non-polluting, despite the fact that they can have very high emission factors (for example, when engine size is big). Broadly speaking, the way in which Ecopass was advertised is consistent with the findings of Gullberg and Isaksson who, reviewing the literature on the implementation of congestion charging projects note that “in order to mobilise external support, there is a tendency (..) to exaggerate what can be achieved, how fast things will proceed and how cheap it will be” (2009b, p. 44).

With regard to the impacts of Ecopass, the following has been observed (Commissione Ecopass, 2010): in terms of vehicle access to the charging zone, a drastic drop in 2008 (-21%) was almost immediately followed by a slow but steady increase which, however, was not enough to bring it back to pre-charging levels. This was accompanied by a rapid increase in the share of exempted vehicles: while in 2007 50% of vehicles entering the area would have been exempted from Ecopass, in the first year of the scheme this percentage went up to 75%. In 2010, the share of exempted vehicles was as high as 90%. Clearly, vehicle fleet change (possibly accelerated by the incentive to buy a new car given by the charge) gradually reduced the dissuasive power of Ecopass. This stands in stark contrast with the charging schemes of London and Stockholm, where the share of exempted vehicles has remained quite low throughout the years. In terms of PM<sub>10</sub> concentrations at the city level, some improvement was observed, notably in the first years, even though it was not aligned with the policy target nor with European value limits. In detail, there was a big drop in the number of days over limit in 2008, which is likely to be the result of an abnormally high level of rainfalls (reducing concentrations of pollutants) during that year, even though media and politicians often interpreted it as a sign of the effectiveness of Ecopass (see below). However, in 2009 Milan reached the threshold of 35 days on the 22th February (AMAT, 2010); the following year, this happened on the 38th day of the year, marking the worst result since 2006. Overall, the expert panel in charge of the evaluation of Ecopass concluded in 2010 that the scheme had an impact on the reduction of polluting emissions in the charging area; however, given the reduced size of the area, this effect was barely discernible at the city level, let alone to the regional level (Commissione Ecopass, 2010).



## 5.1 The media coverage

Across the period 2008-2011, then, the initial apparent drop in traffic and pollution of the first year was followed by increasing doubts about the ability of Ecopass to reach its stated objectives. As this happened, the public debate became more and more heated. In this context, it is interesting to focus on how the media covered the issue of air pollution in Milan. First of all, an analysis of local media coverage shows that EU limit values (both at the daily and the annual level) were used as threshold for newsworthiness. This had a double and contradictory effect: on one hand, a day with concentrations exceeding the limit was generally considered as a “polluting” and thus newsworthy day. On the other hand, the effect of the 35-day clause was that, paradoxically, each year media attention was greater in the first two-three months of the year, before the 35th day was reached; then, with the “countdown” over, media attention tended to drop. This is also related to the marked seasonal variation in PM<sub>10</sub> levels in the area (Commissione Ecopass, 2010): indeed, for climatic reasons as well as for the additional contribution of home heating, PM<sub>10</sub> levels are markedly higher during the winter. Media attention generally followed suit, with the issue of air pollution generally disappearing from the headlines during the summer months. Broadly speaking, it appears that local media often presented the issue as a matter of “pollution emergency” (following, for example, a week where PM<sub>10</sub> concentrations had been especially high) rather than as a chronic problem with an oscillating trend. Moreover, the local media generally emphasized (and possibly exaggerated) the health impacts of air pollution, as well as the effectiveness of charging in reducing them: for example the daily *Il Giorno*, a mere three months after the introduction of Ecopass, argued that the slightly lower number of hospital admissions for pulmonary conditions in 2008 (as compared to the same period in 2007) was proof of the effectiveness of the scheme<sup>2</sup>.

Finally, it is worth noting that the attitude towards Ecopass was very positive in the major local newspapers. For example the local edition of the Milan-based daily *Corriere della Sera* often published comments by Prof. Edoardo Croci, arguably one of the main driving forces behind the introduction of charging (see below): this happened both during<sup>3</sup> and after his term as local councillor for Transport (2006-2009). Indeed, in the period between his resignation from the post (November 2009) and the referendum (June 2011), at least ten leading articles and letters written by Croci in favour of the upgrading of Ecopass were published in the local edition of the daily<sup>4</sup>. The support of *Corriere della Sera* to the cause of charging is confirmed by other leading articles during the period, where the reluctance of Mayor Moratti to upgrade the charging scheme was criticized and readers were encouraged to vote yes in the upcoming referendum<sup>5</sup>. Also the local edition of the left-wing daily *La Repubblica* held a similar stance, emphasizing the criticism towards the

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<sup>2</sup> Mingoia, M. (2008, June 10). Ecopass promosso, ora si punta all’allargamento. *Il Giorno*, p.4.

<sup>3</sup> Croci, E. (2006, July 26). La tassa per chi inquina. Un passo contro lo smog. *Corriere della Sera – Cronaca Milano*, p.1.

<sup>4</sup> Croci, E. (2010, January 27). “Cara Letizia, quando ero in giunta abbiamo fatto tanto. Ora si deve continuare”, *Corriere della Sera – Cronaca Milano*, p.3; Croci, E. (2010, February 16). “Con le nuove regole del carico merci traffico e inquinamento in aumento”. *Corriere della Sera – Cronaca Milano*; Croci, E. (2010, May 29). Pensiamo al futuro. *Corriere della Sera – Cronaca Milano*, p.1; Croci, E. (2010, September 28). Il modello inglese. *Corriere della Sera – Cronaca Milano*, p.1; Bossi Fedrigotti, I. (2010, October 14). L’Expo e i referendum “verdi”. Ritrovare la voglia di partecipare. *Corriere della Sera – Cronaca Milano*, p.8; Croci, E. (2010 November 24). Se lo smog aumenta. *Corriere della Sera – Cronaca Milano*, p.1; Croci, E. (2010, December 22). Buone notizie sull’aria. *Corriere della Sera – Cronaca Milano*, p.1; Croci, E. (2011, January 25). Due mosse. *Corriere della Sera – Cronaca Milano*, p.1; Croci, E. (2011, February 7). Gli esempi dall’estero. *Corriere della Sera – Cronaca Milano*, p.1; Croci, E. (2011, February 11). Smog e coincidenze. *Corriere della Sera – Cronaca Milano*, p.1.

<sup>5</sup> Schiavi, G. (2010, January 25). La scomparsa dello smog. *Corriere della Sera – Cronaca Milano*, p.1; Schiavi, G. (2010, March 23). Un passo indietro. *Corriere della Sera – Cronaca Milano*, p.1; Giavazzi, F. (2010, September 18). Un’occasione da sfruttare. *Corriere della Sera – Cronaca Milano*; Harari, S. (2010, October 9). Un’accelerata sullo smog. *Corriere della Sera – Cronaca Milano*; Morganti, F. (2010, November 7). Qualcosa di concreto. *Corriere della Sera – Cronaca Milano*, p.1.

right-wing mayor<sup>6</sup>. Even the national edition of *La Gazzetta dello Sport*, a major Italian newspaper mostly dedicated to the coverage of sports, following a period of alleged “pollution emergency” in January 2010, published an article praising Ecopass but criticizing the excessive number of exemptions granted by the scheme<sup>7</sup>. In all these articles, the reference to evidence about harmful levels of air pollution and the related concerns for public health was dominant.

In a nutshell, then, local media in Milan were quite supportive of the principle behind Ecopass, even to the point of calling for an upgrading of the charging scheme. This fact stands in stark contrast with the cases of other European cities where attempts at introducing charging schemes have been made: indeed, both in Edinburgh (McQuaid & Grieco, 2005; Saunders, 2005; Gaunt, Rye, & Allen, 2007; Gorman, Higgins, & Muirie, 2008) and Manchester (Vigar, Shaw, & Swann, 2011) the hostility of the media is considered to have been a major factor in the rejection of congestion charging proposals. Even in the case of Stockholm the media attitude was very critical towards the congestion charging, at least before the trial (Gullberg & Isaksson, 2009b). Therefore, we put forward the hypothesis that this difference might be explained by the different framing of the charging scheme in Milan, where the issue was perceived as one of air pollution and public health, rather than merely as a transport and congestion issue. Arguably, the positive media attitude towards the principle of Ecopass has increased the acceptance of the scheme, as well as putting considerable pressure on public authorities to tackle the air pollution problem.

## 5.2 The use of evidence on PM by Ecopass proponents

Local media were not alone in using evidence about air quality to support an upgrading of Ecopass: proponents and supporters of the scheme also drew extensively on PM figures to put forward their arguments. To exemplify this, in this section we focus on the case of Edoardo Croci, often referred to in the media as “the father of Ecopass”. Professor of Institutions of Economics at a local private University, Croci was named Transport, Mobility and Environment Local Councillor (the first time these sectors were brought together) by Mayor Moratti in 2006. In this position, Croci was responsible for initiating Ecopass. Due to conflicts in the municipal majority (which included, but were not limited to, the issue of Ecopass) Croci was forced to resign in November 2009. Merely a couple of months later, Croci was among the founders of *Milano si Muove*, the association which promoted the bottom-up referendum for the upgrading of the scheme.

To begin with, an analysis of Croci’s statements to the local media over the years 2008-2011 shows that, also in this case, the health impacts of the measure were often emphasized and possibly exaggerated. For example, in February 2011 Croci defended Ecopass’ record by arguing that:

“with the exception of the most critical periods, between 2006 and 2006 there has been a significant improvement to air quality. The annual average concentration of PM has decreased by  $10\mu\text{g}/\text{m}^3$ . *This means, in terms of public health an increase in life expectancy of six months*”<sup>8</sup> (emphasis added)

Secondly, and more importantly, almost from the start Croci tended to present Ecopass as a work in progress, for example referring to it as a “dynamic tool which needs to be upgraded” if it has to survive<sup>9</sup>, or as “an

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<sup>6</sup> Berni, I. (2010, May 12). L’Ecopass, da ‘flagship’ a bandiera Bianca. *La Repubblica ed. Milano*, p. 1; Rho, R. (2010, August 22). Abuso di silenzio. *La Repubblica ed. Milano*, p.1; Berni, I. (2010, November 15). I referendum sono una doppia sconfitta del sindaco. *La Repubblica ed. Milano*, p.1.

<sup>7</sup> Dell’Arti, G. (2010, January 26). Come mai non si fa più nulla contro lo smog? *La Gazzetta dello Sport*, p.38.

<sup>8</sup> Berbenni, M. (2011, February 11). Croci: “Il piano del Comune? Una sconfitta annunciata”. *Cronaca Qui*, p.6.

<sup>9</sup> Giannattasio F. (2009, December 27). “Non ammazzate l’Ecopass”. Ticket sospeso dall’1 al 6 gennaio. *Corriere della Sera – Cronaca Milano*, p. 3.

experiment that has never been concluded”<sup>10</sup>. This argument was notably used by Croci to counter claims that the effectiveness of Ecopass was decreasing, by arguing that the solution to this problem was simply to have “more of the same”. The fact that Croci resorted to this line of argument very soon after the introduction of Ecopass<sup>11</sup> may suggest that he considered Ecopass as “a foot in the door”, i.e. a trial with a small scope, useful to gain acceptance for a larger scheme to come. This hypothesis is reinforced by his later claims that “the upgrading to a fully-fledged congestion charge was inherent in Ecopass”<sup>12</sup>.

In this context, it is interesting to note how Croci used both “good” and “bad” values for PM<sub>10</sub> to support the charging scheme: notably, while low values of PM<sub>10</sub> were usually commented by arguing for example that “the positive results that have been achieved encourage us to go forward and to set more ambitious goals for an urban transformation towards sustainability”<sup>13</sup>, high or increasing levels of particulate matter were commented in the following way: “current high levels of pollution confirm the need to strengthen action”<sup>14</sup>.

### 5.3 The use of evidence on PM by Ecopass opponents

If we turn to the use of evidence on PM made by Ecopass opponents, there are other interesting observations to be made. To exemplify this, we focus in this section on Matteo Salvini, city council member for *Lega Nord* (centre-right). Even though the party was part of the council majority supporting Mayor Moratti all throughout the period 2006-2011, it was often critical of Ecopass.

In his statements, Salvini often described the charging scheme as a “failed experiment”, founding his claims on data showing high and increasing concentrations of PM<sub>10</sub>. For example, in February 2011 (a few months before the municipal elections), he affirmed that “levying a charge for the access to 4% of the municipal territory does not make sense. Three years of Ecopass show that and we should have the courage to admit that this trial has been a failure”<sup>15</sup>. It is interesting to note, however, that Salvini did not propose to drop traffic restrictions altogether – far from it. In fact, he went on record arguing that the best alternative was to close entirely to traffic the city centre (or at least parts of it). To deal with so-called periods of “environmental emergency”, he suggested to impose traffic restrictions based on odd-even plate numbers of vehicles<sup>16</sup>. It must be noted that both solutions were experimented in the city of Milan in the 1980s and 1990s: accordingly, his stance can be seen as equivalent to preaching a “return to the past”.

However, it is interesting to note that even opponents of Ecopass did not question the principle of restricting car use in the city centre. Arguably, this can be seen as another effect of the dominant framing in terms of “public health emergency”: in this context, it is probably difficult for politicians not to propose any solution, as this might threaten their support among voters.

## 6. Area C: the referendum and the implementation of a new congestion charge

As illustrated, scepticism about the effectiveness of Ecopass brought about conflicts in the municipal majority: partly as a result of this, local councillor Croci was forced to resign in November 2009. In February 2010, however, he was among the founders of the Association *Milano si Muove* (“Milan gets moving”) which included, besides other politicians, members of the civil society and academics<sup>17</sup>. Starting from June 2010, *Milano si Muove* gathered signatures for five local referenda demanding environmental improvements

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<sup>10</sup> Diamanti, O. (2010, July 2). Milano: Intervista a Edoardo Croci. *Eco dalle Città*. <http://www.ecodallecitta.it/notizie.php?id=103111>

<sup>11</sup> Cecconi, J. (2008, April 3). “Ecopass funziona, lo amplieremo”. *DNews Milano*, p. 5.

<sup>12</sup> Cravotta, S. (2011, November 3). “Sì al ticket unico, ma con più servizi”. *DNews Milano*.

<sup>13</sup> Croci, E. (2010, December 22). Buone notizie sull’aria. *Corriere della Sera – Cronaca Milano*, p.1.

<sup>14</sup> Croci, E. (2011, January 25). Due mosse. *Corriere della Sera – Cronaca Milano*, p.1; Croci, E. (2011, February 7).

<sup>15</sup> Legnani, M. (2011, February 1). La Lega molla il PdL “Ecopas è roba loro”. *Libero Milano*, p.43.

<sup>16</sup> *Ibidem*.

<sup>17</sup> Giannattasio F. (2010, June 4). “Cinque referendum su Ecopass e verde”. *Corriere della Sera – Cronaca Milano*, p.3.

in Milan including (but not limited to) the upgrading of Ecopass to a fully-fledged congestion charge. 25,000 signatures (considerably more than the 15,000 required by law) were gathered by November 2010. This implied that the referendum would have to be held in the same period as the mayoral elections, in spring-summer 2011.

The wording on the ballot papers put forward a comprehensive strategy to deal with traffic and mobility with several goals, including: to double pedestrian areas by 2012; to double 30km/h areas by 2012; to realise a bike lanes network of 300km by 2015; the protection of all bus lanes by 2015; the introduction of a neighbourhood bus service; the extension of bike and car sharing services; the implementation of a subway service during the night; the improvement of taxi services. This comprehensive strategy for the improvement of modal alternatives had to be financed with the levying of a new congestion charge for all vehicles (5-10 Euros). Moreover, the ballot papers stated that the charging would have to be progressively extended to include all the neighbourhoods inside the so-called “railway ring” – a move which would substantially increase its size. The stated goals of this package (mentioned on the ballot papers) were a 50% reduction of traffic and polluting emissions in the city. The referenda were held on the 12th June 2011, two weeks after the second round of the mayoral election. The voter turnout was approximately 49%, considerably more than the 30% threshold required for the referenda to be valid. The percentage of yeas was approximately 95% for all questions, except for that on congestion charging and transport policy, where the yeas were “only” 79%.

Following the results of the referendum, in November 2011 the new left-wing majority in the city council approved the implementation of a new “congestion charge”<sup>18</sup>. The scheme, which goes under the name of “Area C”, entered into force on the 16th January 2012. The main difference with respect to Ecopass is the drastic reduction in the number of exemptions, which are limited to vehicles running on alternative fuels, while Euro 0 petrol vehicles and diesel fuelled vehicles Euro 1, 2 and 3 are no longer allowed to enter the city centre; all other vehicles are charged a 5 Euro ticket. These changes increased the number of charged vehicles considerably, from 12% (in the last months of Ecopass) to 92%. By contrast, the charging area was not extend, even though the city administration argues that this might happen in the future<sup>19</sup>.

### **6.1 The attempt to decouple charging from the pollution issue**

In the months preceding the introduction of Area C, the city government repeatedly stressed that it acknowledged that it is impossible to impact on levels of PM<sub>10</sub> with a congestion charging scheme in such a small area, and put forward new, different objectives for the charge: a reduction of traffic in the area, instrumental to an improvement of liveability in the city centre and to the financing of sustainable transport policies all over the city (AMAT, 2011). In the first few months since its implementation, Area C appears to have achieved its stated goals, at least with regard to traffic reductions, as a further reduction of 34% in vehicles accessing to the area (as compared to 2011) has been observed (AMAT, 2012b).

This stance of the new city government can be interpreted as an attempt to decouple the new congestion charge from the issue of PM<sub>10</sub> and European Directives. However, it must be noted that among the general public as well as in the media, the question is still very much framed in terms of air pollution: this is understandable, given that for more than ten years this has been the main framework for the discussion of charging. Moreover, as illustrated, EU directives and the resulting threat of financial penalties had been the reason why the idea was brought up in the first place, at the turn of the century.

The fixation of the public debate on air pollution explains in turn why the stance of the new city government on air pollution has in fact elements of ambiguity: while city officials have repeatedly stated that a reduction

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<sup>18</sup> Santucci, G., Stella, A. (2011 November 5). Milano tassa chi entra in centro. *Corriere della Sera*.

<sup>19</sup> Gandolfi, S. (2012, February 23). Il Comune è (quasi) soddisfatto: “Ora dobbiamo pensare alle periferie”. *Corriere della Sera - Sette*, p.26-33.

in pollution levels is not one of the main objectives of charging, the city government still seizes every piece of evidence, when available, to prove that Area C is effective in reducing air pollution and the related risks for health. For example the municipal agency responsible for monitoring the new scheme, in the report preceding its introduction, argues that “despite the new priorities, modelling shows that it is likely to achieve a considerable reduction in PM<sub>10</sub> emissions” (AMAT, 2011, p.34).

## 6.2 Black Carbon: a new suitable PM metric

In this context, a recent development in atmospheric science is likely to make it easier for the city government to demonstrate the health impacts of its transport policy. Indeed, a growing number of recent studies have focused on Black Carbon (BC) as an alternative (or complementary) statistic for air pollution (Wang, et al., 2009; Westerdahl et al., 2009; Bruckmann, 2011; Reche, et al., 2011; Invernizzi, et al., 2011), and there many reasons to assume that this new PM metric might be more suitable to prove the effectiveness of traffic restrictions.

A recent review report by the World Health Organisation (Janssen, et al., 2012) argues that BC is a “better indicator of harmful particulate substances from combustion sources (especially traffic) than undifferentiated PM mass” (p. vii); while this is clear for short-term health effects, there is still considerable uncertainty with regard to the long term effect. The same review argues that BC “may not be a major directly toxic component”, but is rather a carrier of toxic combustion-derived chemical constituents (p.vii). Moreover, an important finding of recent studies is that within-city variability is greater for BC than for PM mass, particularly in relation to traffic (p.19). As a result, the report suggests that the health effects of traffic limitation policies “may be seriously underestimated when based on effects estimates for PM<sub>2.5</sub> or PM<sub>10</sub>” (p. 32). Accordingly, it recommends that it be used as an additional indicator “in evaluating local action aimed at reducing the population’s exposure to combustion PM (for example, from motorized traffic)” (p. vii).

Recent studies in Milan have compared concentrations of PM and BC across the city: in 2008, Ruprecht and Invernizzi have found no significant difference in PM levels between the Ecopass area and outside (Ruprecht & Invernizzi, 2008). In a subsequent study by the same group, however (Invernizzi, et al., 2011), it was found that BC levels are considerably lower in the charging area, as compared to the rest of the city; for the purpose of this paper, it is interesting to quote at length the abstract of the academic article published in *Atmospheric Environment*:

“Traffic restrictions are an *unpopular* tool to mitigate urban air pollution, and a *measurable improvement in air quality is needed* to demonstrate the effectiveness of this measure. *Previous attempts failed* to detect measurable reductions of PM mass pollution within the areas subject to traffic restriction. However, black carbon, which is emitted primarily by traffic sources, *could be a PM metric more suitable to demonstrate pollutant reductions* (..)” (Invernizzi, et al., 2011, p. 3522, emphasis added)

In this citation it is apparent that the focus is not so much on whether BC constitutes a better indicator of the health impacts of air pollution on health; rather, it is the usefulness of this metric for increasing the public acceptability of traffic restrictions that is emphasized. The results of this and subsequent studies on BC levels in Milan caught the attention of the local media, and were widely reported as proof of the fact that air quality is better in the city centre, as a result of the charging schemes<sup>20</sup>.

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<sup>20</sup> Santucci, G. (2011, May 3). Ma in centro le polveri sono meno “tossiche”. *Corriere della Sera – Cronaca Milano*, p.6; Bravi, M. (2010, May 5). L’Ecopass di Milano promosso dall’Europa. “Ha ridotto lo smog”. *Il Giornale Milano*, p.44; Gandolfi, S. (2012, February 23). Smog, state in centro (se potete). *Corriere della Sera – Sette*, p.26-33.

### 6.3 The use of evidence on BC and PM by proponents of Area C

Following the introduction of Area C and the “discovering” of Black Carbon, the debate about the effectiveness of the charging scheme continued. There is a great degree of continuity with the debate about Ecopass in the period 2008-2011, in that it is still predominantly based on the discussion of scientific evidence on air pollutants.

On the side of supporters of congestion charging, the city government has launched in February 2012 a monitoring project for BC, which involves AMAT and the research team responsible for the aforementioned study on BC in Milan (Invernizzi, et al., 2011). In this context, the municipality emphasises the implications for public health, by arguing, for example, that “by monitoring BC, it will be possible to relate more directly the efficiency of traffic limitations to the health of citizens”<sup>21</sup>. The results of the monitoring (which is still limited in scope), confirm that BC levels are lower in the charging area: a first report in March 2012 has found BC concentrations to be 28% lower in the city centre as compared to outside (AMAT, 2012a), while a subsequent report in July has reported a difference as high as 40% (AMAT, 2012c).

It is important to note that, while the results of this monitoring tell something about difference in air quality between the charging area (where there is less traffic) and the rest of the city, this is not enough to demonstrate that the charging scheme has brought about a reduction in BC levels: in order to prove that, time-series data (currently not available) would have to be provided. Despite these limitations, the city government has emphasised the significance of these research findings for public health, suggesting a positive effect of the charging scheme. For example the new Transport, Mobility & Environment Local Councillor Pierfrancesco Maran has stated in February 2012 that “as of today, we are not able to have an impact on the levels of PM<sub>10</sub> and PM<sub>2.5</sub> (...). However, we can impact on toxicity and the monitoring on BC confirms that in less congested areas we breathe a better air”<sup>22</sup>. Similarly, media have often attributed the lower levels of BC in the city centre to Area C, overlooking the complexities involved in the monitoring.

### 6.4 The use of evidence on BC and PM by opponents of Area C

Also opponents of congestion charging draw extensively on evidence on concentrations of air pollutants: interestingly, however, they tend to focus on other indicators, namely PM<sub>10</sub>. Indeed, as far as PM levels are concerned, 2012 seems to be one of the worst years in the last decade for Northern Italy<sup>23</sup>. In this situation, critics of Area C tend to stress the ineffectiveness of the scheme in curbing particulate matter concentrations and complying with EU directives. To mention but one example, Riccardo De Corato, ex Transport Local Councillor and current member of the city council for *Popolo della libertà* (centre-right) commented on a report on air pollution in the following way: “the quality of air is getting worse: punishing car drivers is not enough, air pollution keeps increasing anyway. The Mayor should rather focus on home heating (...)”<sup>24</sup>.

However, opponents of congestion charging do not limit themselves at reminding of high concentrations of PM. Interestingly, they seem to question the legitimacy of BC as an indicator for air quality improvements and related health impacts. For example, the association of city centre residents *Residenti No Charge* has criticized the use of Black Carbon statistics made by the city government by arguing that “as the data on

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<sup>21</sup> Comune di Milano (2011). Con Area C si monitorerà il Black Carbon [Press release]. Retrieved from [http://www.comune.milano.it/portale/wps/portal/CDM?WCM\\_GLOBAL\\_CONTEXT=/wps/wcm/connect/ContentLibrary/giornale/giornale/tutte+le+notizie+new/mobilita%2C+ambiente%2C+arredo+urbano%2C+verde/black\\_carbon\\_area\\_c](http://www.comune.milano.it/portale/wps/portal/CDM?WCM_GLOBAL_CONTEXT=/wps/wcm/connect/ContentLibrary/giornale/giornale/tutte+le+notizie+new/mobilita%2C+ambiente%2C+arredo+urbano%2C+verde/black_carbon_area_c)

<sup>22</sup> Gandolfi, S. (2012, February 23). Il Comune è (quasi) soddisfatto: “Ora dobbiamo pensare alle periferie”. *Corriere della Sera - Sette*, p.26-33.

<sup>23</sup> (2012, July 30). Smog, città sempre più oltre i limiti. Nel nord da 4 anni mai così male. *La Repubblica*. Retrieved from [http://www.repubblica.it/ambiente/2012/07/30/news/istat\\_aumentano\\_sforamenti\\_pm10-40004942/](http://www.repubblica.it/ambiente/2012/07/30/news/istat_aumentano_sforamenti_pm10-40004942/).

<sup>24</sup> Carra I. (2012, April 1). Smog e rumore fuori controllo. Legambiente: “Va fatto di più”. *La Repubblica Milano*.

PM<sub>10</sub> do not stand up to scrutiny, the city government talks about elusive Black Carbon<sup>25</sup>. Notably, the association argues that at no point the monitoring demonstrates that current Black Carbon levels are to be considered as dangerous for health<sup>26</sup>. In a nutshell, opponents of congestion charging accuse the city government of making instrumental use of evidence, using it, in the context of widespread concerns for the health related impacts of air pollution, to push forward a “hidden agenda” aimed at the reduction of car use in the city.

## 7. Conclusion

The case of Milan is arguably one of the most interesting for research on the acceptability of road pricing: in this city, widespread concern about high levels of air pollution led to the implementation of a pollution charge for the access to the city centre in 2008, then upgraded to a fully-fledged congestion charging scheme in 2012. This stands in stark contrast with the experience of other European cities (London, Stockholm, Edinburgh, Manchester), where the focus has been on reductions in congestion levels, rather than on pollution. This difference in focus is arguably the main reason for the high levels of acceptance of congestion charging in Milan, as demonstrated by the surprising results of the 2011 bottom-up referendum. In that sense, there are indeed “lessons to be learnt” from the story of Milan’s congestion charging.

Moreover, the implications of this case study for research on the use of evidence in environmental policy making are also substantial, as shown by the analysis of the local public debate in the years 2008-2012. In this respect we argue that, firstly, EU air quality directives have opened a “window of opportunity” for political entrepreneurs (such as Prof. Croci and the association *Milano si Muove*) who intended to push through congestion charging in order to limit car use in Milan. Secondly, the actions of the centre-left administration in charge since 2011 can be interpreted as an attempt to “decouple” congestion charging from the issue of air pollution. However, this (half-hearted) effort has encountered only limited success: as of today, both opponents and supporters of congestion charging still make extensive use of evidence on air pollution to support their arguments. Moreover, our study shows that there is an interesting tendency to use the air quality statistics that conforms to the actor’s agenda, taking advantage of the plurality of competing indicators in atmospheric research. In this context, the increasing use of Black Carbon as a PM metric seems advantageous for congestion charging supporters, as it provides them with a suitable indicator to demonstrate air quality improvements. On the other hand, congestion charging opponents increasingly question what they see as an opportunistic and instrumental use of evidence on the part of the city government, and prefer to rely on well-established PM<sub>10</sub> indicators that allows them to argue that congestion charging is ineffective and thus avoidable. Accordingly, we argue that the case of Milan congestion charging provides an illustration of how actors can make strategic use of evidence in environmental policy making.

In prospective terms, the findings of this paper imply that future developments in EU directives and/or in atmospheric research are likely to have a big impact on Milan congestion charging. Notably, it seems likely that European Court of Justice will eventually fine Italy for exceeding PM<sub>10</sub> levels in several areas of the country (including, but not limited to, Milan and the Po Valley). Also, the EU will probably set limit values for Black Carbon in the next few years, which will possibly complement (rather than substitute) existing limit values for other pollutants<sup>27</sup>. *How* these developments might impact on the evolution of congestion charging in Milan is an interesting subject for speculation.

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<sup>25</sup> Residenti No Charge (2012, March 30). E siccome il PM10 non regge... [Web log message]. Retrieved from <http://residenti-nocharge.blogspot.de/2012/03/e-siccome-il-pm10-non-regge.html>

<sup>26</sup> Costa, M. (2012, March 30). Nessuna soglia UE l’allarme Black Carbon esiste solo per il PD. *Liberio Milano*, p. 40.

<sup>27</sup> See the answer given by Mr Potočnik on behalf of the European Commission to a written question on this issue (<http://www.europarl.europa.eu/sides/getAllAnswers.do?reference=E-2011-005530&language=LV>)

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