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Evaluation of the Implementation of a Low Emission Zone in Lisbon

PDF (Size: 3344KB) PP. 1188-1205 DOI: 10.4236/jep.2012.329137

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ABSTRACT

The city of Lisbon, like many others in the EU region, introduced a Low Emission Zone (LEZ) as a tool for improving air quality in its city centre. This kind of emission reduction schemes is always controversial since it might lead to significant changes in the daily behaviours of its inhabitants. In order to evaluate the effects of the measure, an estimation of the impact of the introduction of the Lisbon LEZ was performed. Real traffic counting and fleet characterization combined with CORINAR-based emission inventory methodology allowed to estimate the impacts of three different scenarios applied to the "business as usual" condition (current vehicle fleet) ranging from "no circulation from non-compliant vehicles" to an "aggressive fleet renewal". Results highlight the high percentage of atmospheric emissions of PM₁₀ and NO_x that might result from certain fleets like taxis and buses, especially because there was an emphasis in standardized/normalized estimations (emissions per 1000 vehicles) in order to allow different strategic approaches. The total reduction of PM₁₀ emissions associated to each scenario vary between 6 ton.year⁻¹ (scenario 2) and 8 ton.year⁻¹ (scenario 1), or 25% and 34% less emissions. In terms of NO_x emission reductions vary between 6 ton.year⁻¹ (scenario 2) and 57 ton.year⁻¹ (scenario 1), or 1% and 7% less emissions. The Lisbon LEZ is therefore much more efficient in reducing PM₁₀ emissions compared to NO_x. Major reduction in PM₁₀ and NO_x emissions are to be expected with a moderate intervention in the (relatively old) taxi fleet in Lisbon while for passenger cars the impact is limited. However in absolute terms and due to its urban mileage passenger cars should also continue being included in Lisbon LEZ. Simultaneously, an effort in the increase of dedicated lanes for public transport should be made, for further reductions in PM₁₀ and NO_x emissions.

KEYWORDS

 Low Emission Zone; PM₁₀; NO_x; Euro Standards

Cite this paper

 F. Ferreira, P. Gomes, A. Carvalho, H. Tente, J. Monjardino, H. Brás and P. Pereira, "Evaluation of the Implementation of a Low Emission Zone in Lisbon," *Journal of Environmental Protection*, Vol. 3 No. 9A, 2012, pp. 1188-1205. doi: 10.4236/jep.2012.329137.

References

- [1] The World Bank, "Urban Population (% of Total)," 2012. <http://data.worldbank.org/indicator/IS.VEH.ROAD.K1/countries/1W-PT-EU?display=graph>
- [2] European Environmental Agency, "Ensuring Quality of Life in Europe's Cities and Towns. Tackling the Environmental Challenges Driven by European and Global Change," EEA Report, 2009.
- [3] European Environmental Agency, "The European Environment State and Outlook 2010—Urban Environment," 2010.
- [4] European Commission, "Communication from the Commission to the Council and the European Parliament on Thematic Strategy on the Urban Environment," 2006.
- [5] European Commission, "Thematic Strategy on Air Pollution," 2005.
- [6] European Commission, "Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee of the Regions—Action Plan on Urban

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- [7] Tender No. TREN/A4/103-2/2009, " Study on Urban Access Restrictions," 2010. http://ec.europa.eu/transport/urban/studies/doc/2010_12_ars_final_report.pdf
- [8] M. Browne, J. Allen and S. Anderson, " Low Emission Zones: The Likely Effects on the Freight Transport Sector," International Journal of Logistics Research and Applications: A Leading Journal of Supply Chain Management, Vol. 8, No. 4, 2004, pp. 269-281.
- [9] National Society for Clean Air (NSCA), " Low Emission Zones 2003 NSCA Special Report," 2003.
- [10] H. Wolff and L. Perry, " Keep Your Clunker in the Suburb: Low Emission Zone and Adoption of Green Vehicles," 2012. <http://faculty.washington.edu/hgwolff/LEZ.pdf>
- [11] F. Costabile and I. Allegrini, " A New Approach to Link Transport Emissions and Air Quality: An Intelligent Transport System Based on the Control of Traffic Air Pollution," Environmental Modelling & Software, Vol. 23, No. 3, 2008, pp. 258-267 doi:/10.1016/j.envsoft.2007.03.001
- [12] M. Li, " Estimating Congestion Toll by Using Traffic Count Data—Singapore' s Area Licensing Scheme" , Transportation Research Part E, Vol. 35, No. 1, 1999, pp. 1- 10.
- [13] Low Emission Zones in Europe, 2012. <http://www.lowemissionzones.eu>
- [14] F. Kelly, B. Armstrong, R. Atkinson, H. R. Anderson, B. Barratt, S. Beevers, D. Cook, D. Green, D. Derwent, I. Mudway and P. Wilkinson, " The London Low Emission Zone Baseline Study. Investigator' s Report, in the London Low Emission Zone Baseline Study with a Critique by the HEI Health Review Committee," Research Report 163, Health Effects Institute, Boston, 2011.
- [15] Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on Ambient Air Quality and Cleaner Air for Europe.
- [16] " Air Pollution: Commission Starts Legal Action against 10 Member States over Airborne Particles," 2009. <http://europa.eu/rapid/pressReleasesAction.do?reference=IP/09/174>
- [17] " Parliamentary Questions: Answer Given by Mr Poto?nik on Behalf of the Commission," 2012. <http://www.europarl.europa.eu/sides/getAllAnswers.do?reference=E-2011-011869&language=DA>
- [18] Portaria n. 715/2008, Diário da República, 2.a Série, N. 151, 6 de Agosto de 2008, pp. 34959-34968.
- [19] Despacho n. 20763/2009, Diário da República, 2.a Série, N. 180, 16 de Setembro de 2009, pp. 37809-37866.
- [20] " Zona de Emiss?es Reduzidas. Cidade de Lisboa," 2002. http://www.cm-lisboa.pt/archive/doc/ZER-seg_fase_MapazER_2aFase.pdf
- [21] V. Góis, H. Maciel, P. Torres, S. Mesquita, F. Ferreira, C. Almeida and L. Nogueira, " A Detailed Urban Road Traffic Emissions Inventory Model Using Aerial Photography and GPS Survey," 16th Annual International Emission Inventory Conference—Emission Inventories: Integration, Analysis, and Communications, Raleigh, 2007. <http://www.epa.gov/ttn/chief/conference/ei16/session9/gois.pdf>
- [22] " EMEP/EEA Air Pollutant Emission Inventory Guidebook—2009. Parte B: Sectorial Guidance Chapters, Energy, Combustion, Road Transport," European Environment Agency, 2010. <http://www.eea.europa.eu/publications/emep-eea-emission-inventory-guidebook-2009/part-b-sectorial-guidance-chapters/1-energy/1-a-combustion/1.a.3.b-road-transport-gb2009-update.pdf>
- [23] H. Brás, " Avalia??o dos Benefícios da Implementa??o de Zonas de Emiss?es Reduzidas em Lisboa," Master Thesis, Universidade Nova de Lisboa, Lisboa, 2012.
- [24] P. Torres, " Velocidade média de Circula??o de veículos Ligeiros na Cidade de LISBOA. 28 de