References	Costa, S., Ferreira, J., Silveira, C., Costa, C., Lopes, D., Relvas, H., … Teixeira, J.P. (2014). Integrating Health on Air Quality Assessment-Review Report on Health Risks of Two Major European Outdoor Air Pollutants: PM and NO2. Journal of Toxicology and Environmental Health - Part B Critical Reviews, 17(6), 307-340.
	Gardner, J.W., & Sanborn, J.S. (1990). Years of potential life lost (YPLL) – what does it measure? Epidemiology (Cambridge, Mass.), 1(4), 322–329.
	Pascal, M., Corso, M., Ung, A., Declercq, C., Medina, S. & Aphekom. (2011). APHEKON-Improving knowledge and communication for decision making on air pollution and health in Europe, Guidelines for assessing the health impacts of air pollution in European cities, Work Package 5, Deliverable D5. Saint-Maurice, France: French Institute for Public Health Surveillance.
	Silveira C., Roebeling P., Lopes M., Ferreira J., Costa S., Teixeira J.P., … Miranda A.I. (2016). Assessment of health benefits related to air quality improvement strategies in urban areas: An Impact Pathway Approach. Journal of Environmental Management, 183, 694-702.

12.11 Avoided costs for air pollution control measures

Project Name: URBAN GreenUP (Grant Agreement no. 730426)

Author/s and affiliations: Paul Nolan[1], Clare Olver[1], Raúl Sánchez[2], Jose Fermoso[2], Silvia Gómez, María González[2], Jose María Sanz[2], Esther San José[2]

[1] *The Mersey Forest Offices, Risley Moss, Ordnance Avenue, Birchwood, Warrington, WA3 6QX*

[2] *CARTIF Foundation. Parque Tecnológico de Boecillo, 205, 47151, Boecillo, Valladolid, Spain*

Recommended citation: The Mersey Forest, Natural Economy Northwest, CABE, Natural England, Yorkshire Forward, The Northern Way, Design for London, Defra, Tees Valley Unlimited, Pleasington Consulting Ltd, and Genecon LLP (2010). GI-Val: the green infrastructure valuation toolkit. Version 1.6 (updated in 2018). *https://bit.ly/givaluationtoolkit*

Avoided costs for air pollution control measures	Air Quality New Economic Opportunities and Green Jobs
Description and justification	GI-Val is The Mersey Forest's green infrastructure valuation toolkit. The current prototype is free and open source, and can be downloaded under a Creative Commons License from: https://www.merseyforest.org.uk/services/gi-val/. It

	takes the form of a spreadsheet calculator and a user manual.
	GI-Val Tool 4.6, can estimate the impact of nature-based solutions on various air pollutants, in tonnes per year, and from those quantities it can estimate the avoided costs of other measures to remove from the air sulphur dioxide (SO_2), carbon monoxide (CO) and PM_{10}. The tool uses a benefit transfer method based upon the Chicago Urban Forest Climate Study by the USDA Forest Service (Nowak et al, 1994).
	It is possible that monitoring in some cities will provide more accurate figures for the removal of air pollutants – if so, the tool can simply be used to assign a monetary value to air pollution attenuation.
	An independent assessment of GI Val by the Ecosystems Knowledge Network is available from this link, along with links to other tools: https://ecosystemsknowledge.net/green-infrastructure-valuation-toolkit-gi-val
Definition	This KPI values green infrastructure in economic units taking into account other than conventional functionalities.
Strengths and weaknesses	- Tool developed using English data.
	- The toolkit remains a prototype and this means there are some green infrastructure benefits for which it cannot calculate a direct financial value. While there is a rich body of evidence that illustrates and demonstrates the different types of benefits deriving from quality green infrastructure, robust valuation techniques do not yet exist for all benefits. Therefore some valuations come with detailed caveats as they are based on limited evidence at this stage.
	- The toolkit's calculation is designed to be useful for initial, indicative project appraisal, providing a range of figures indicating the potential impact of a green infrastructure intervention or the value of an existing green infrastructure asset. The toolkit does not assess the quality of the design or detailed management requirements of green infrastructure. It does not replace a full cost benefit analysis, but it provides a basic valuation at a much lower cost.
	- Valuations such those made with a toolkit or cost benefit analysis also need to be seen as part of a much bigger picture. The valuation should not replace community engagement and local dialogue about what is valued about a place. Calculating economic value of green assets will always be a controversial technique and financial

	value should only be seen as one factor in decision-making. - The reported GVA values include transfers from one organisation to another, which means that although GVA increases for the beneficiaries, it may not increase for the study area as a whole.
Measurement procedure and tool	The toolkit provides a set of calculator tools, to help assess an existing green asset or proposed green investment. They are organised under eleven key benefits of green infrastructure: The toolkit looks at how the range of green infrastructure benefits derived from an asset or investment can be shown: • in monetary terms – applying economic valuation techniques where possible • quantitatively – for example with reference to jobs, hectares of land, visitors • qualitatively – referencing case studies or important research where there appears to be a link between green infrastructure and economic, social or environmental benefit but where the scientific basis for quantification and/or monetisation is not yet sufficiently robust. The toolkit uses standard valuation techniques to assess the potential benefits provided by green infrastructure within a defined project area. These benefits are assessed in terms of the functions that the green infrastructure may perform, support or encourage, depending upon the type of project. The USDA Forest Service's Chicago Urban Forest Climate Study provided monetary values per metric tonne for pollution emission prevention, based upon control strategies available at the time of study publication. The Chicago Urban Forest Climate Study calculated pollution absorption capacity and typical monetary values at individual tree level. The values determined in 1994 ranged from US$0.04 per year for small trees to more than US$2 per year for large trees. Accounting for 76.3% inflation 1994-2020 and currency conversion from USD to EUR (1 USD ≈ 0.9 EUR), the values determined in the Chicago Urban Forest Climate Study range from the 2020 equivalent of US$0.07 (0.08 €) per year for small trees to more than US$3.53 (4.26 €) per year for large trees in 2020. Tool 4.6 is based on these data.
Scale of measurement	Street to city
Data source	

Required data	General information about green infrastructure
Data input type	Numeric data
Data collection frequency	Individual assessments
Level of expertise required	Technical / Expert
Synergies with other indicators	
Connection with SDGs	SDG3 / SDG11
Opportunities for participatory data collection	Developing the toolkit's next iteration will require wide and sustained collaboration. To facilitate this process, interested parties are invited to pass the toolkit to others who might be able to incorporate it into their work and to provide feedback on their experience in using the toolkit, good and bad! Sources of improved evidence Suggestions for improving the tools Ideas for new tools The consortium who led the development of this toolkit has handed over the responsibilities for co-ordinating future work to the Green Infrastructure Value Network (GIVaN). Further information on the network can be found at: www.bit.ly/givaluationtoolkit
Additional information	
References	http://www.merseyforest.org.uk/services/gi-val/ Nowak, McPherson and Rowntree, 1994. Chicago's urban forest ecosystem: results of the Chicago urban forest climate project. United States Department of Agriculture US Forest Service. Air Pollution in the UK 2015. https://uk-air.defra.gov.uk/library/annualreport/index Bottalico, F., Chirici, G., Giannetti, F., De Marco, A., Nocentini, S., Paoletti, E., Salbitano, F., Sanesi, G., Serenelli, C., Travaglini, D., 2016. Air pollution removal by green infrastructures and urban forests in the city of Florence. Agric. Agric. Sci. Procedia 8, 243–251. doi:10.1016/j.aaspro.2016.02.099. SDG indicator 3.9.1 https://unstats.un.org/sdgs/metadata/files/Metadata-03-09-01.pdf SDG indicator 11.6.2. https://unstats.un.org/sdgs/metadata/files/Metadata-11-06-02.pdf