

Towards a guidance document on behavioural & structural measures (NTM)

Rob Maas, Stefan Åström, Anna de Vries

Outline of the Guidance document

1. Definitions, methodologies to assess monetary and non-monetary costs, theoretical framework and link with policy instruments

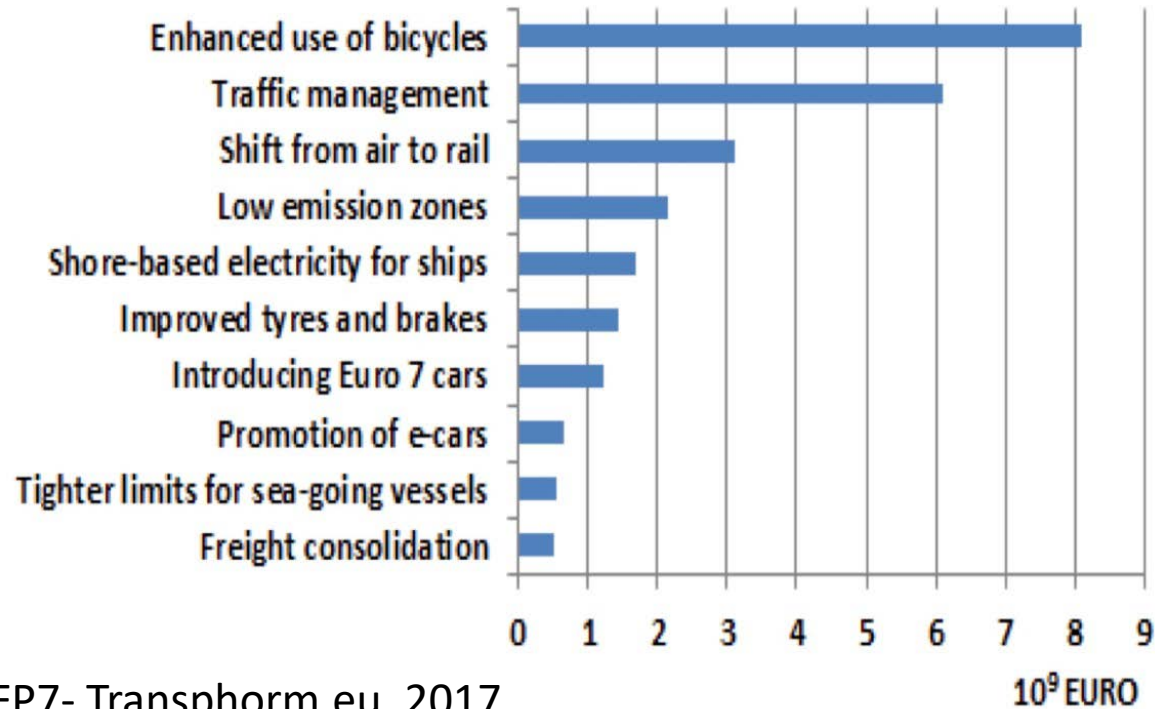
Awareness...Regulation...Pricing...Nudging (via infrastructure)

2. Data on successful NTM examples focus on transport and food
3. Estimates of potential contribution of NTM
4. Recommendations

Inventory of successful measures

- Around 50 different types of measures
- Most of them are energy and transport related
- Some measures improve air quality and have additional direct health benefits (e.g. active mobility, healthy diets)
- Costs of integrated transport-city planning is difficult to attribute
- Impacts on air quality and health are mainly based on ex ante model calculations
- Ex post evaluations are sparse and mainly available for LEZ
- Evaluation of measures to influence diets require more input
- Taxing fuels and food will have cross-border impacts

Earlier inventories

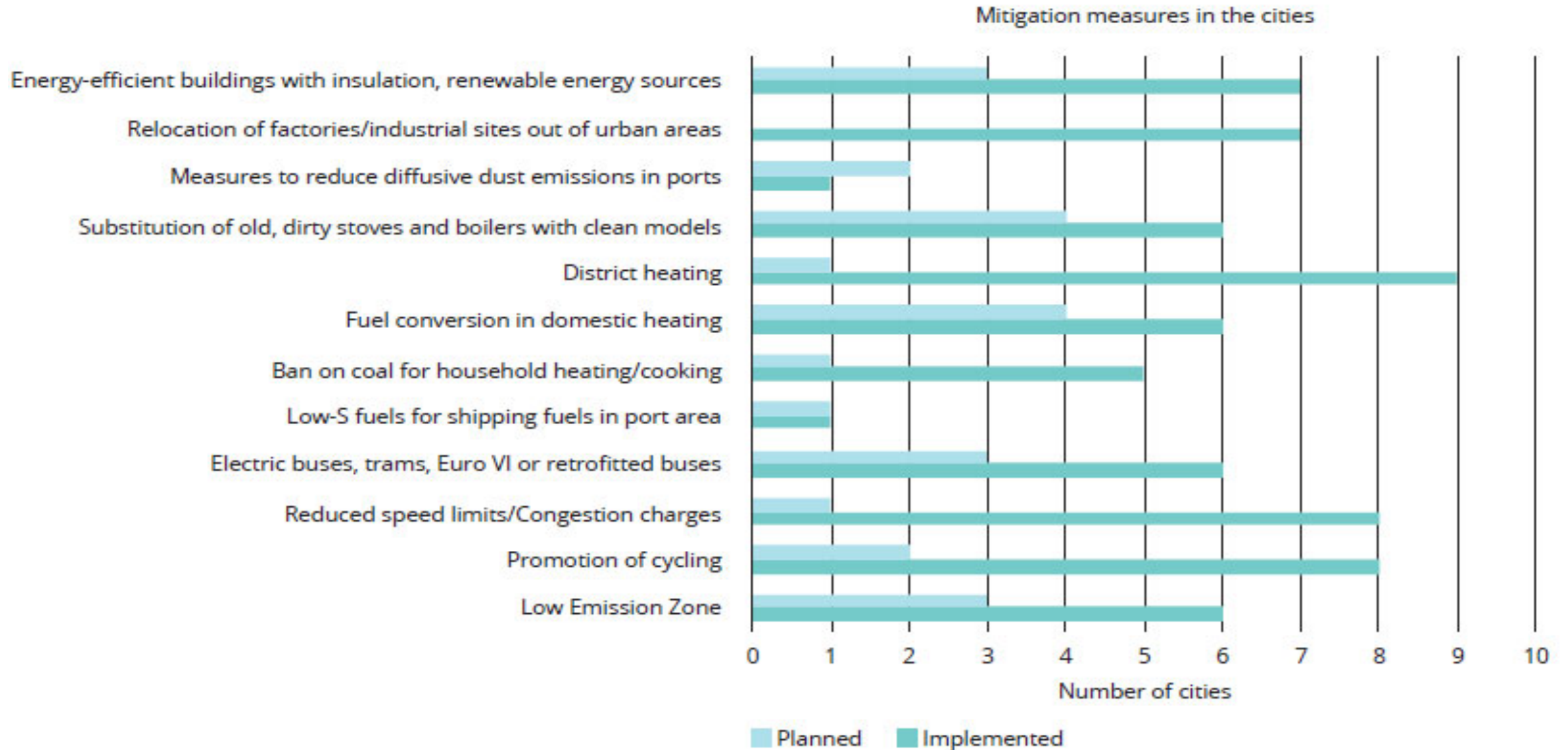


FP7- Transphorm.eu, 2017
Net societal benefits

Ranking Joaquin, 2016

NAME	JOAQUIN SCORE
<u>Low Emmission Zone (LEZ)</u>	Good
<u>Traffic Restriction</u>	Good
<u>Traffic Signal Coordination</u>	Good
<u>Public Transport</u>	Good
<u>Electric Vehicles (EV)</u>	Good
<u>Congestion Charge Scheme (CCS)</u>	Good
<u>Carpooling</u>	Good
<u>Car Sharing</u>	Good
<u>Active Transport</u>	Good
<u>Speed Limit Reduction</u>	Good
<u>Fuel Taxation</u>	Good
<u>Noise Barriers</u>	Good
<u>Fleet Renewal</u>	Moderate
<u>Parking Management</u>	Moderate
<u>Urban Planning</u>	Moderate
<u>Urban Parks</u>	Moderate
<u>Traffic Reallocation</u>	Moderate
<u>Green Barriers</u>	Moderate
<u>Engine Idling Reduction</u>	Moderate
<u>Street Cleaning</u>	Moderate
<u>Street Vegetation</u>	Low
<u>Air Purifying Building Materials</u>	Low

EEA inventory Dogan Ozturk Urban Air quality in Europe, 2019



Urban policy interventions to reduce traffic-related emissions and air pollution: A systematic evidence map (376 measures, based on over 9000 references)

Haneen Khreis et al, Env Int Feb2023

Policy Category	Policy Intervention	Frequency Studied
Pricing: 11.8 % (n = 216)	1. Air pollution charging fees	24
	2. Congestion charging	28
	3. Fuel taxes or price increase	26
	4. Mileage-based user fees	4
	5. Parking charges	55
	6. Road pricing	51
	7. Pricing incentives	27
	8. Vehicle ownership taxes	1
Land-Use: 4.2 % (n = 77)	1. Development density and mixed developments	42
	2. Parking expansion	2
	3. Superblock development	2
	4. Transit-oriented development	18
	5. Urban sprawl	8
	6. Urban transport planning	5

Infrastructure: 11.5 % (n = 210)	1. Active transportation infrastructure	26
	2. Bus rapid transit or mass rapid transit	43
	3. Greenspace or blue space	2
	4. Park and ride	9
	5. Public transportation infrastructure	33
	6. Roadway development	23
	7. Solid roadside barrier	8
	8. Speed bump development	18
	9. Street ventilation	3
	10. Unconventional intersection or intersection alteration	22
	11. Vegetative roadside barrier, surface, or roof	23

Urban policy interventions to reduce traffic-related emissions and air pollution: A systematic evidence map – ctd

Behavioral: 6.3 % (n = 116)	1. Active or non-motorized transport (i.e., bike or walk) promotion or shift	31
	2. Flexible work arrangements	26
	3. Public transit promotion or shift	47
	4. Ride sharing promotion or shift	12
Technology: 22.2 % (n = 406)	1. Alternative fuel technology	271
	2. Alternative vehicle technology	12
	3. Electronic toll technology	3
	4. Material coating	6
	5. Real-time passenger information	2
	6. Speed control technology	5
	7. Stop/Start technology	2
	8. Vehicle retrofitting	105

Management, Standards, and Services: 44.1 % (n = 807)	1. Fleet management	59
	2. Fuel regulation or restriction	35
	3. High occupancy vehicle lane	13
	4. Inspection and maintenance program	18
	5. Intelligent transport system	47
	6. Low emission zone	56
	7. Loading, unloading, and/or idling regulation	18
	8. Parking standards, reduction, or regulation	16
	9. Public transportation expansion	47
	10. Public transportation regulation	31
	11. Speed limit regulation or reduction	42
	12. Street cleaning	4
	13. Studded tire regulation	1
	14. Traffic signal optimization	29
	15. Vehicle or manufacturing alteration	4
	16. Vehicle emission regulation	134
	17. Vehicle purchase restriction	7
	18. Vehicle rerouting or route optimization	18
	19. Vehicle retirement or replacement	112
	20. Vehicle shift	2
	21. Vehicle use restriction	114

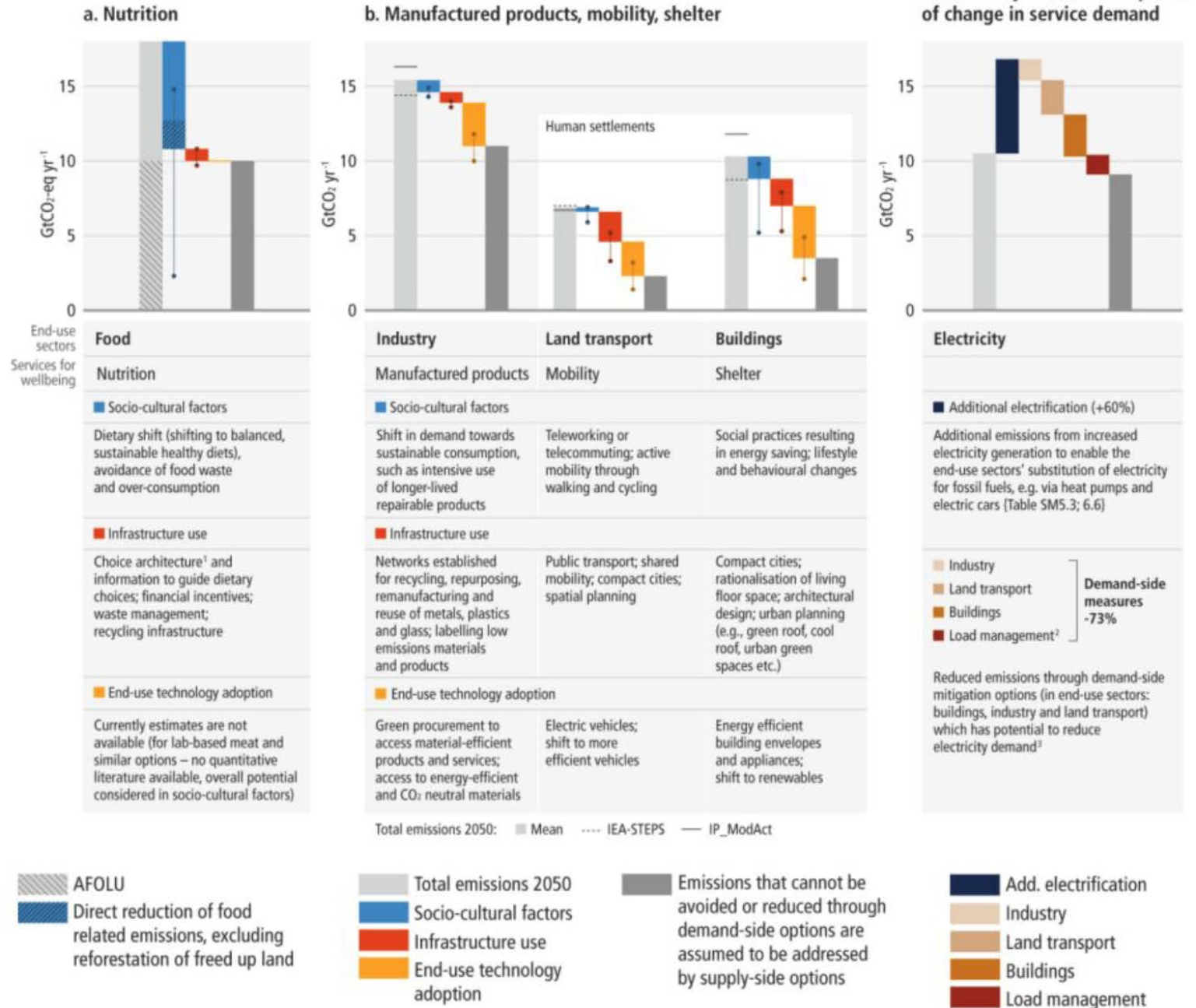
NTM overview Italy (Ilaria D' Elia & Antonio Piersanti)

	Successful examples	summary	Effective zone (country/area)	Air pollution reduction	Health effects	Costs	reference
Transport	Speed limit highway	reduction of speed limit from 130 km/h to 100 km/h	Italy	Year 2030: reduction of 11.5% of Nox emissions respect to the 2030 baseline. Smaller reduction for PM10 (<2%)	available but not per single measure	not estimated	D'Elia et al., 2018, https://www.sciencedirect.com/science/article/abs/pii/S1309104217306529
	Low emission zones		several Italian regions	5% of NOx emission reductions	available but not per single measure	not estimated	D'Elia et al., 2009, https://www.sciencedirect.com/science/article/pii/S1352231009007675
	road traffic restriction	Limitation to vehicle circulation of older Euro vehicles	several Italian regions	10% of NOx emission reductions and 5% of PM10 emissions	available but not per single measure	not estimated	D'Elia et al., 2009, https://www.sciencedirect.com/science/article/pii/S1352231009007675
	New heavy duty vehicles	Incentives for the substitutions of heavy duty vehicles	several Italian regions	31.4% of NOx emissions	available but not per single measure	not estimated	D'Elia et al., 2009, https://www.sciencedirect.com/science/article/pii/S1352231009007675
	Renew fleet for freight vehicles	Promote the use of methane/liquefied natural gas (LNG)-powered heavy duty trucks. Promote the use of LNG in maritime transport	Italy	NOx emission reduction of 49% at the year 2030 respect to the baseline	available but not per single measure	available but not per single measure as benefits obtained applying a set of measures	Piersanti et al., 2021, https://www.mdpi.com/2073-4433/12/2/196
	Public transport renewal	Incentives for bus substitution, frequency increase, etc	several Italian regions	10% of NOx emission reductions and 2% of PM10 emissions	available but not per single measure	not estimated	D'Elia et al., 2009, https://www.sciencedirect.com/science/article/pii/S1352231009007675
Energy	Promotion of photovoltaic integrated in domestic buildings	incentives to install photovoltaic systems in houses	Italy	negligible emission reductions	not estimated	not estimated	D'Elia et al., 2009, https://www.sciencedirect.com/science/article/pii/S1352231009007675
	Regulation of residential biomass, oil and coal use	ban of these type of fuel	Italy	Reduction of SO2 emissions (36.4%), of 15% of PM10 emissions and 5% of Nox emissions	available but not per single measure	not estimated	D'Elia et al., 2009, https://www.sciencedirect.com/science/article/pii/S1352231009007675
	Efficiency improvements in fireplaces and stoves	Renewal of old biomass heating systems with efficient and low-emission technologies	Italy	PM10 and NMVOC emission reduction of 12% and 20% at the year 2030 respect to the baseline	available but not per single measure	available but not per single measure as benefits obtained applying a set of measures	Piersanti et al., 2021, https://www.mdpi.com/2073-4433/12/2/196 ; D'Elia et al., 2009, https://www.sciencedirect.com/science/article/pii/S1352231009007675
Agriculture	Lower nitrogen feeding diet for bovines	10% of lower nitroge feeding diet for bovins (not regulated by EU Directive)	Italy	the two measures were applied together with an overall NH3 emission reductions of 7%	available but not per single measure	not estimated	D'Elia et al., 2018, https://www.sciencedirect.com/science/article/abs/pii/S1309104217306529
	More efficient use of nitrogen fertilizers	Reduction of 50% of nitrogen application in fertilization with an efficiency of 50%	Italy		available but not per single measure	not estimated	D'Elia et al., 2018, https://www.sciencedirect.com/science/article/abs/pii/S1309104217306529
	Incorporatate fertilizers	Incorporate urea-based fertilizers	Italy	NH3 emission reduction of 27% at the year 2030 respect to the baseline scenario	available but not per single measure	available but not per single measure as benefits obtained applying a set of measures	Piersanti et al., 2021, https://www.mdpi.com/2073-4433/12/2/196

IPCC – WGIII, 2022

High expectations of dietary change

Demand-side mitigation can be achieved through changes in socio-cultural factors, infrastructure design and use, and end-use technology adoption by 2050.



Follow up

- Additional ex post evaluations are welcome
 - ideally including costs and measured impacts
 - A microsoft sharepoint is available for co-authors
- Info on successful changes in diets is badly needed
 - with TFRN – EPNF
- First draft Guidance document in September 2023
- GAINS estimates on potential contribution of NTMs
- Final version to be approved by EB in December 2024

More Examples (available on Sharepoint)

NTM example	Summary	Effective Zone	Air pollution reduction	Health effects	Costs	Reference
Fat tax	Tax on saturated fat from milk products and meat as part of the Danish "spring package"(=lower taxes on work and increase taxes on goods with detrimental effect on environment, climate and health) Okt 2011-Jan 2013.	Denmark	<i>Not mentioned. Should be visible when looking at PM and NO2 concentrations over the years.</i>	4% less saturated fatt intake. Modelled health effect: 123 averted deaths per year.	estimated 6 milion for bussines sector and 14 milion extra for cross-border trade. (reason for abolition.)	The effects of the Danish saturated fat tax on food and nutrient intake and modelled health outcomes: an econometric and comparative risk assessment evaluation European Journal of Clinical Nutrition (nature.com) 2021-5063 Final.
speed limit polluted roads trail->went to permanent	"the speed limit on five polluted roads, along a total length of 8.5km, was lowered from 50km per hour to 30km per hour."	Berlin, Germany	"reduction of 2-4µg/m ³ in annual average concentrations of both NO2 and coarse particulate matter (PM10)" (and noise reduction by 2 decibel)		pilot cost 850000 euro.+ 620000 for the more busses needed to maintain service level.	Traffic management in Berlin, Germany — European Environment Agency (europa.eu)
London congestion tax	tax of 5 pound (july 2005 8 pound) introduced from Feb 2003. These are results after 4 years But more reason findings say 15 pounds	London city introduction in 2003	NOx redcuton of 13%, PM10 15% for 2005. But in 2019 CO 60%, NO2 24%, SO2 61% reductions.		net revenues of 112M pound	Has the London Congestion Charge Zone Improved Air Quality? (selectcarleasing.co.uk) London congestion tax FourthAnnualReportFinal.pdf
Superblock model	modelling of superblock in the city of Barcelona (and potential upscaling)	Barcelona	<i>"The greatest number of preventable deaths could be attributed to reductions in NO2 (291, 95% PI: 0–838), followed by noise (163, 95% CI: 83–246), heat (117, 95% CI: 101–137), and green space development (60, 95% CI: 0–119). Increased PA for an estimated 65,000 persons shifting car/motorcycle trips to public and active transport resulted in 36 preventable deaths (95% CI: 26–50). "</i>	<i>We estimated that 667 premature deaths (95% CI: 235–1,098) could be prevented annually through implementing the 503 Superblocks. The Superblocks were estimated to result in an average increase in life expectancy for the Barcelona adult population of almost 200 days (95% CI: 99–297), and result in an annual economic impact of 1.7 billion EUR (95% CI: 0.6–2.8).</i>		Changing the urban design of cities for health: The superblock model - ScienceDirect