

Clean Air – Made in Germany



Federal Ministry for the
Environment, Nature Conservation,
Building and Nuclear Safety

giz Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH



Inhalte

1. Transport in Germany 德国交通现状
2. Legal Framework 法律体制
3. Measures 措施
4. European Research Group 欧洲调研团队





Transport in Germany – Facts and Figures

德国交通现状



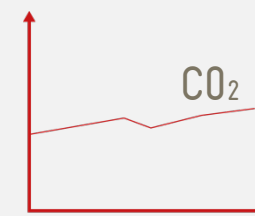
More than 42 million cars were registered in Germany in 2015

2015年德国有4千2百多万辆注册汽车



70% of freight traffic volumes are carried on roads

70%的货运流发生在道路上



Transport sector CO₂ emissions increased by 1.2% in 2015

2015年交通碳排放增加了1.2%



4.7%



5.8%



13.7%



75.9%

Modal Split in Germany in 2015 (pkm)

交通模式划分(PKM分配)



Highest PM₁₀ yearly mean values of 37 µg/m³ have been recorded in Stuttgart

斯图加特最高日均PM10值为37 µg/m³



19,000 EVs and over 107,000 hybrid

19000辆电动车和107000辆混合动力车

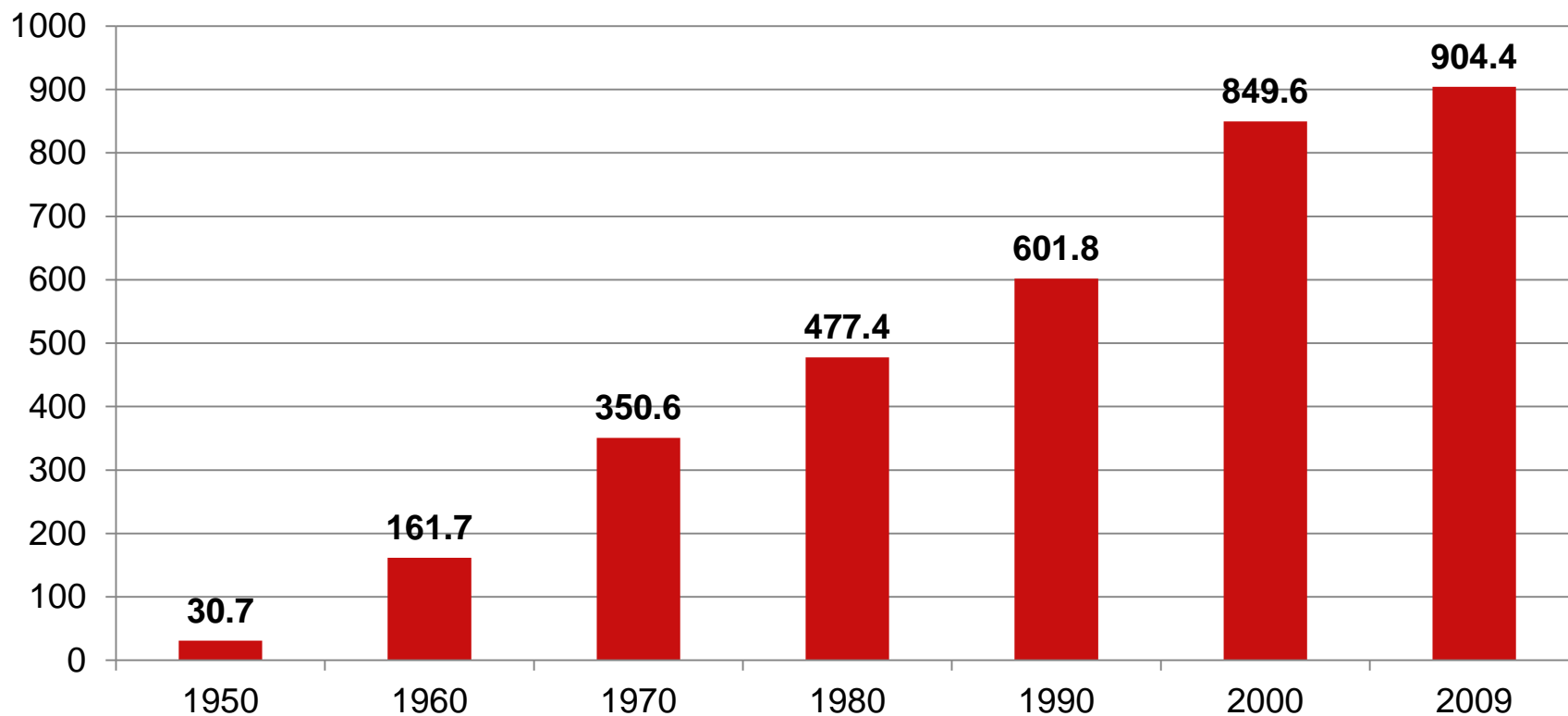


Motorized Individual Travel

个体机动车出行

1950-2009, in billion passenger km (domestic)

单位十亿PKM



1950: Without Saarland and Berlin West 1950 年数据不包括萨尔州和西柏林
From 1990: West and East Germany 自1990年开始包括东西德

1 Quelle: Deutsches Institut für Wirtschaftsforschung

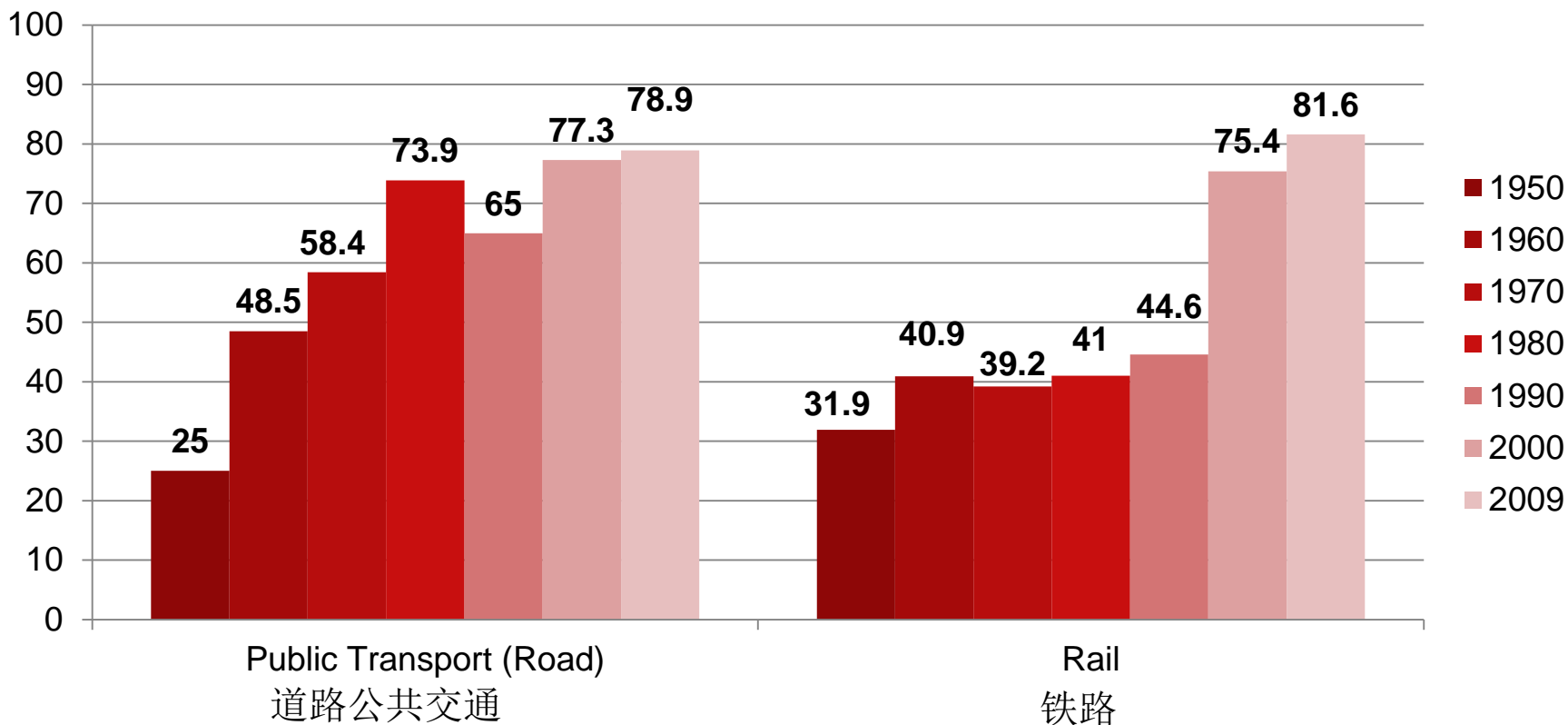


Public Transport Development

公共交通和航空业发展

1950-2009, in billion passenger km

单位十亿PKM



1 Quelle: Deutsches Institut für Wirtschaftsforschung

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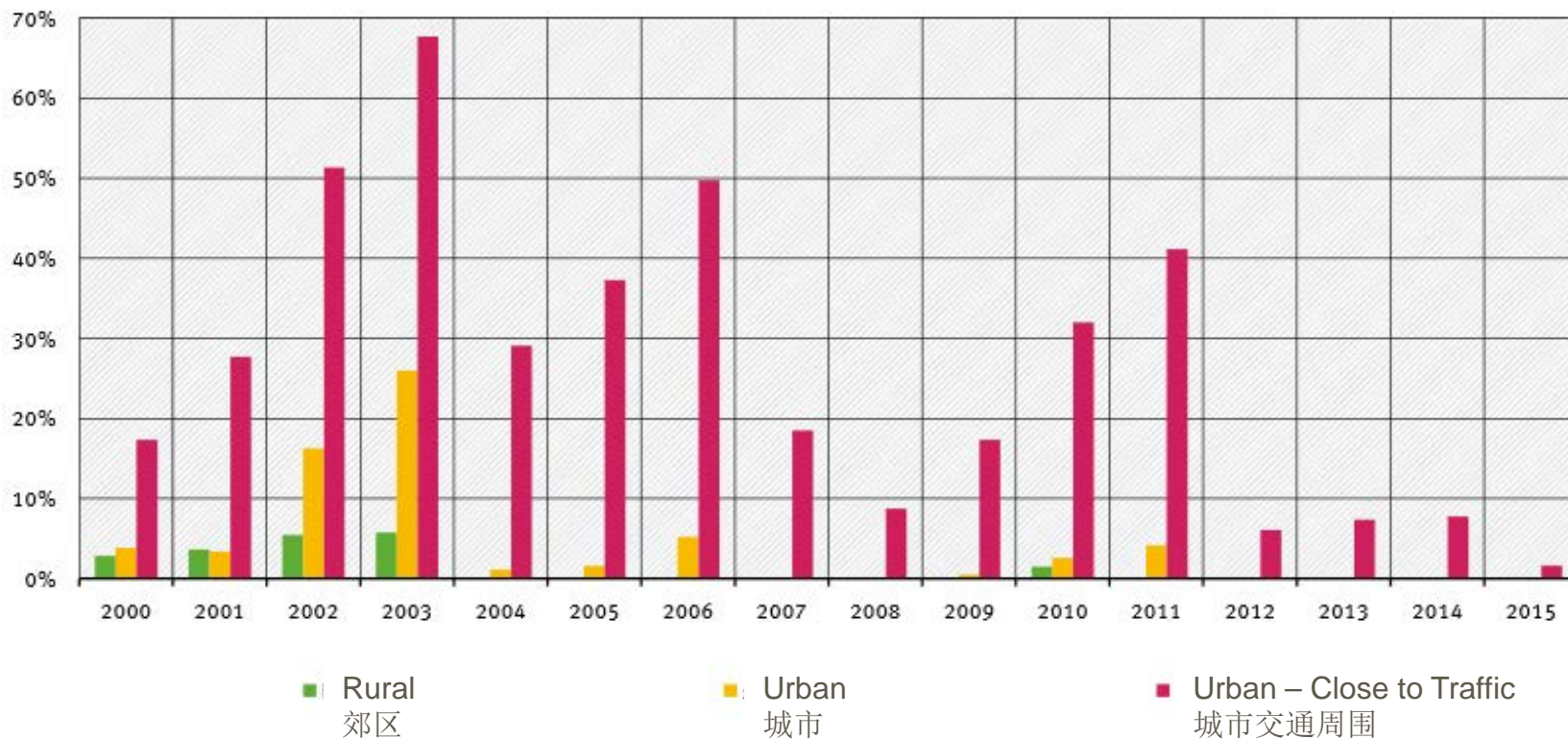


Current Concentrations of Air Pollutants in Germany

当前德国空气污染物含量

Percentage Share of Monitoring Sites Exceeding the PM₁₀ Daily Mean Value Threshold in the Respective Pollution Regime (Years: 2000-2015)

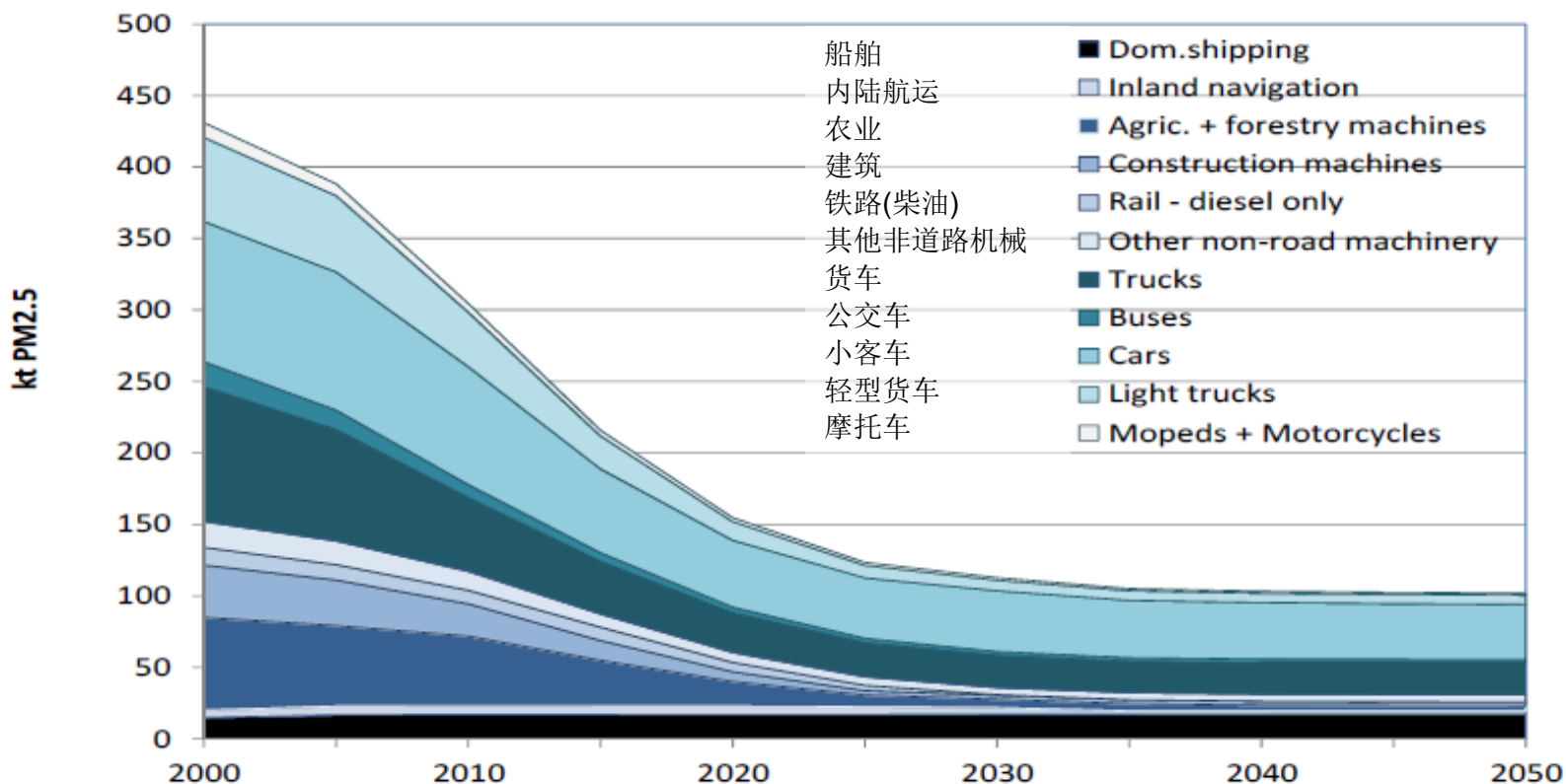
超过日均PM10监控值的天数占比





Trends in Emissions in Europe

欧洲排放趋势



IIASA 2012 (Draft): Development of PM2.5 emission from mobile sources in EU27

Note: Some NRMM categories do not follow trends and grow in importance (shipping, rail, ...)

IIASA 2012年在EU27引入PM2.5移动源排放

你写NRMM类别不遵循排放规律



Governance – From EU Policy to Local Implementation

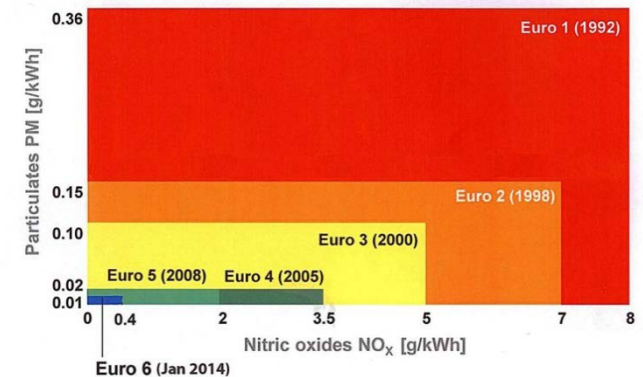
管理-欧盟政策到地方实施

1 European Union Legislation 欧盟立法

- Contains air quality standards for various pollutants with limit values, averaging period and permitted exceedences per year per pollutant
包括各种污染物的空气标准时段限值和每年每种污染物可超标次数
- Introduction of additional PM_{2.5} objectives based on the average exposure indicator (AEI)
根据AEI规定PM_{2.5}目标值
- Vehicle emission standards for air pollution and carbon dioxide emissions
空气污染物和二氧化碳机动车排放标准
- Type approval standards and test cycle development
型式认证标准和测试工况研发

EU Emissions Standards

Exhaust emissions Euro 1–6





Governance – From EU Policy to Local Implementation

管理-欧盟政策到地方实施

2 National Level and Regional Level Laws and Ordinances

国家和地方水平的法规

- Member states lay down rules on penalties applicable to infringements of the directive provisions and ensure implementation
成员国指定惩罚措施确保法规试试
- Vehicle testing and type approval
车辆测试和型式认证





Governance – From EU Policy to Local Implementation

管理-欧盟政策到地方实施

3 Municipalities 城市治理

- Air quality plans developed for zones and agglomerations within which concentrations of pollutants in ambient air exceed the relevant air quality target values or limit values
针对超过排放/含量限值的区域或人口密集区制定了空气质量规划
- Based on emission and exposure models of the two main pollutants (PM and NO₂), air quality measures are established
基于PM和NO₂的排放和暴露模型建立空气质量管理措施
- If municipalities or cities do not comply to the timely delivery of the action plan or enforcement is lax, financial penalties can be imposed
如果城市或不能及时采取措施，将受到经济惩罚





Pollutant Limit and Target Values

排放限值和目标值

<i>Pollutant</i> 污染物	<i>Concentration</i> 浓度	<i>Averaging period</i> 平均周期	<i>Legal nature</i> 法律性质	<i>Permitted exceedences each year</i> 每年允许超标
Fine particles (PM2.5) 细颗粒物	25 µg/m ³ ***	1 year 1年	Target value entered into force 1.1.2010 2010年1月1日为目标价值生效日 Limit value enters into force 1.1.2015 2015年1月1日为最迟价值生效日	n/a
Nitrogen dioxide (NO ₂) 二氧化氮	200 µg/m ³	1 hour 1个小时	Limit value entered into force 1.1.2010 2010年1月1日为最迟价值生效日	18
	40 µg/m ³	1 year 1年	Limit value entered into force 1.1.2010* 2010年1月1日为最迟价值生效日	n/a
PM10 可吸入颗粒物	50 µg/m ³	24 hours 24小时	Limit value entered into force 1.1.2005** 2005年1月1日为最迟价值生效日	35
	40 µg/m ³	1 year 1年	Limit value entered into force 1.1.2005** 2005年1月1日为最迟价值生效日	n/a



Legal Framework – From EU Policy to Local Implementation

法律体制

- Financial penalties for non-compliance with air quality plan development or implementation

违背空气质量计划实施或发展的行为将受到经济处罚

- European Court of Justice can apply “daily penalty” and/or “lump sum”

欧洲议会法庭可以按天罚款或一次性罚款

- Daily penalty most commonly used, basic formula:

按日罚款很常见

$$\text{Daily penalty} = (\text{Flat Rate} * \text{Seriousness} * \text{Duration}) * \text{Country Factor } N$$

$$\text{每日罚款} = (\text{基本数额} * \text{严重度} * \text{持续时间}) * \text{国家因素 } N$$

- Example: Penalty of 700,000 Euro per day (1,000,500 USD per day) imposed on Leipzig for repeatedly violating the 35-day limit rule

案例：Leipzig城反复违反35天限制规定每天罚款70万欧元(100.05万美元)

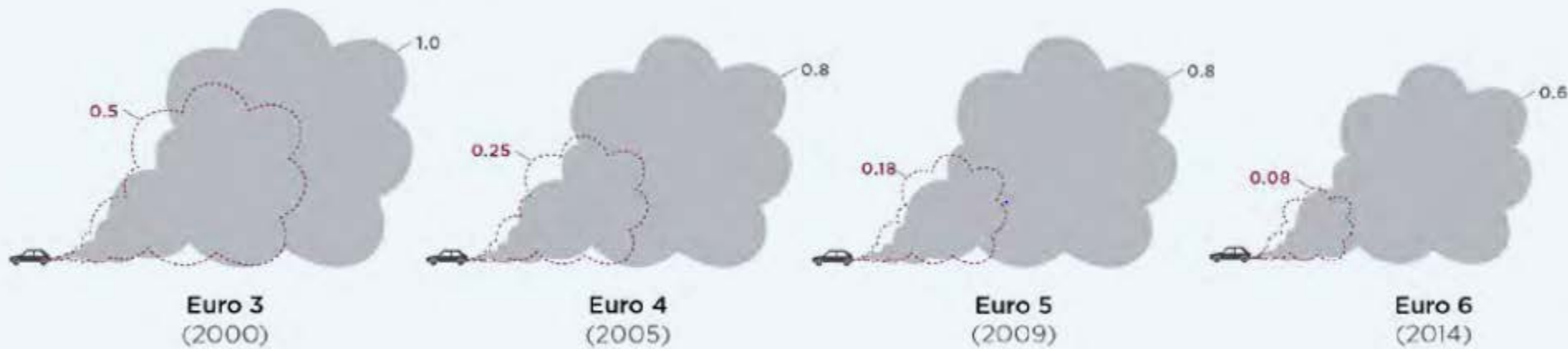


Measure: Vehicle emission Standards in the EU

措施，欧盟机动车排放标准

- Carbon dioxide emissions 二氧化碳排放
 - Passenger vehicles 小型客车 130 g CO₂ /km by 2015, 95 g CO₂ /km by 2020.
 - Light duty vehicles 轻型车 175 (g CO₂ /km) by 2017, 147 g CO₂ /km by 2020
- Air pollutant emissions 空气污染物
 - Euro emission norm sets emission limits for carbon monoxide (CO), hydrocarbons (HC), nitrogen oxides (NO_x), and particulates for light and heavy duty vehicles 欧洲排放标准设定了轻型和重型车CO, HC, NO_x, 和颗粒物限制

Diesel cars: Nitrogen oxide (NO_x) emissions (in g/km)



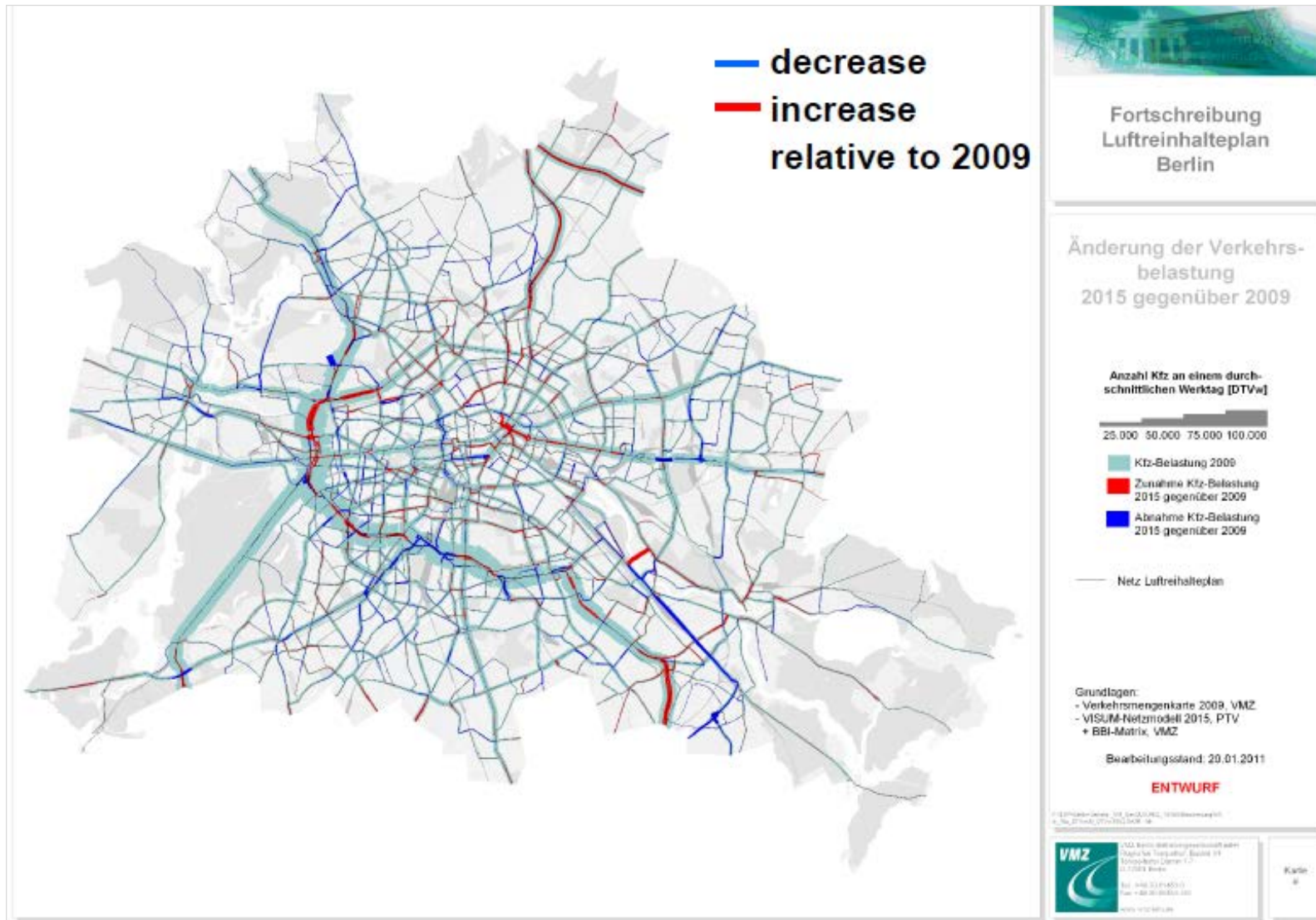


Clean Air Management – Air Quality Plans

请假空气管理-空气质量规划

- Compulsory urban air quality monitoring and air quality plans if target values not met
城市若未能达标应义务进行空气质量检测和履行规划
- Exemplary measures from Berlin
柏林管理措施
 - Repeal of rules for exceptions in LEZ
废除了LEZ的免责条款
 - Municipal fleet renewal and retrofitting (EURO 6)
城市车队更新
 - Mobility and traffic management
移动源和交通管理

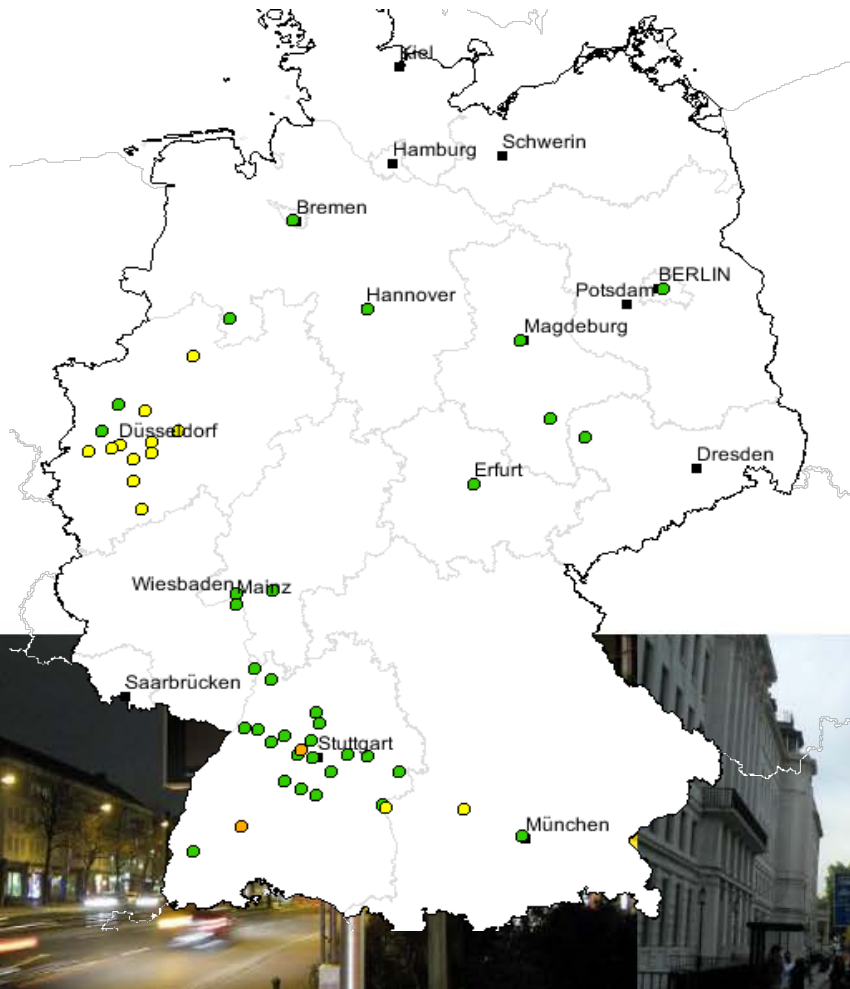






Measure: Low Emission Zones

措施：低排放区



LEZ scheduled
将要实行低排放区的城市



LEZ stage 1
ban on vehicles emission class 1
低排放区第一阶段
禁止车辆的排放标准为1级



LEZ stage 2
ban on vehicles emission class 1+2
低排放区第二阶段
禁止车辆的排放标准为1级和2级



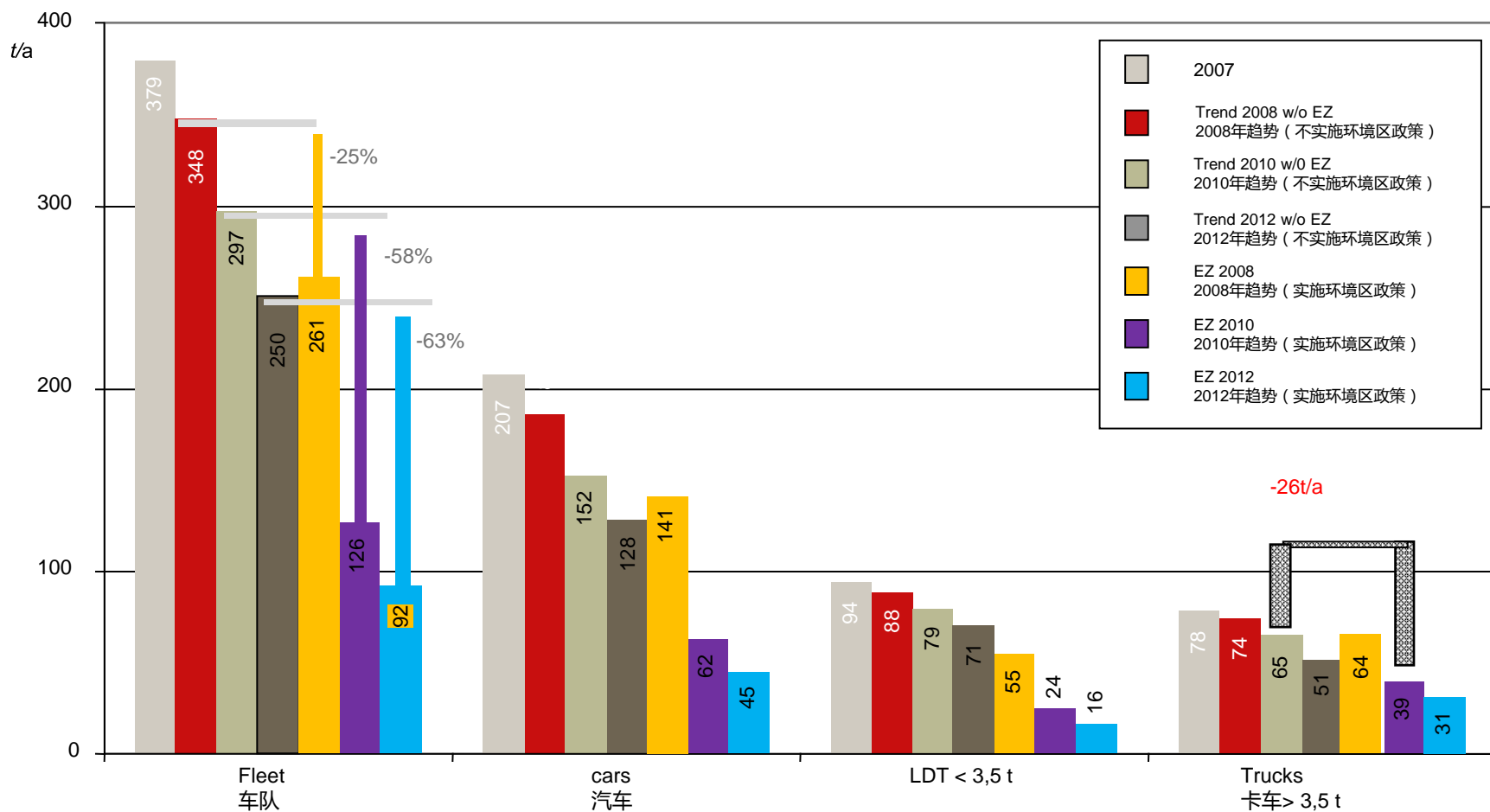
LEZ stage 3
ban on vehicles emission class 1+2+3
低排放区第三阶段
禁止车辆的排放标准为1级、2级、3级





Reduction of Diesel Soot-Emissions by the EZ in Berlin

通过环境区实现的柴油机炭黑颗粒排放量的减少

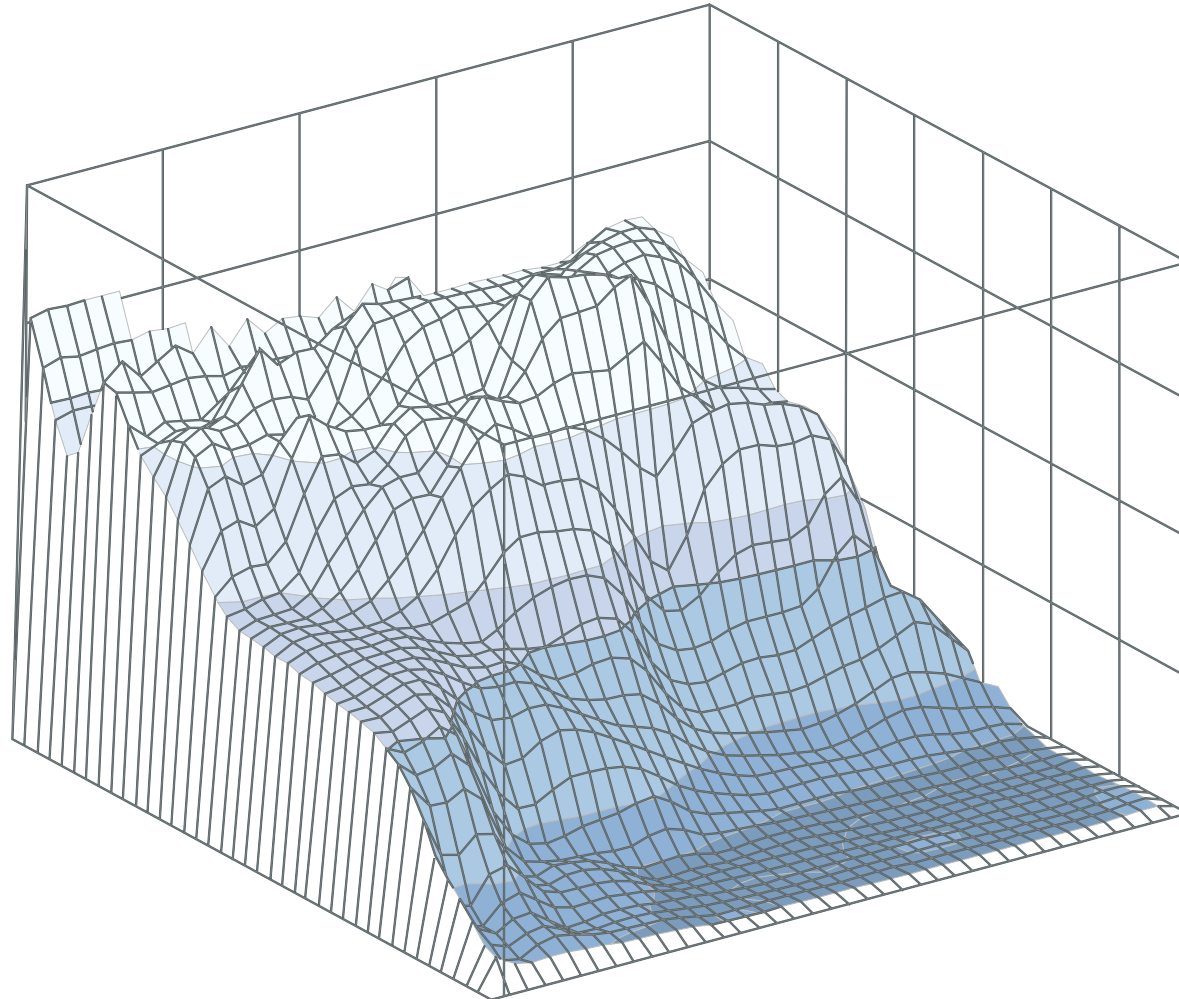


Frankfurter Allee Berlin



Modelling Support for Policy Development

用于决策的模型开发

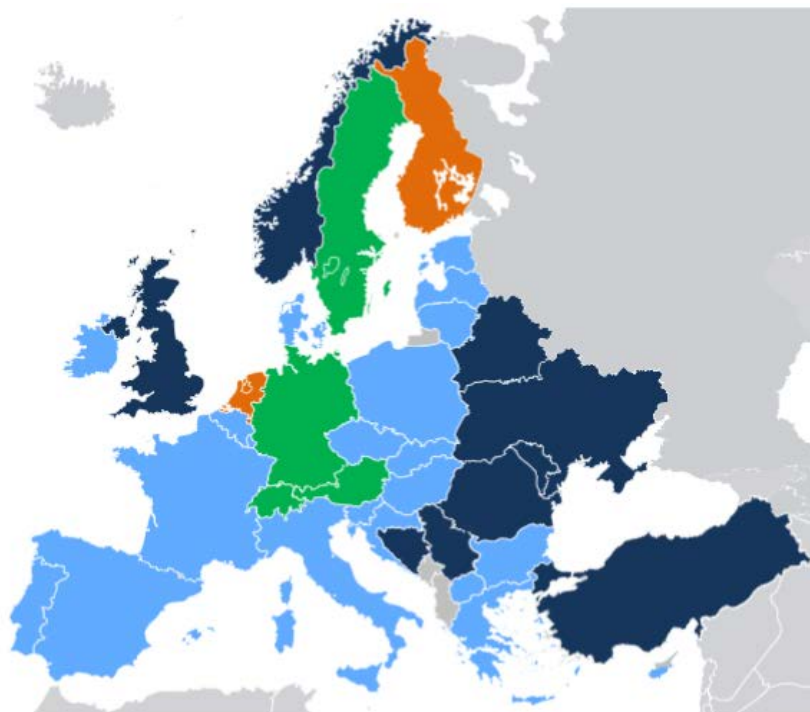




Modelling Support

European Research Group on Mobile Emission Sources

欧洲移动排放源调研组



- Research coordination
协同研究
- Harmonization and data sharing
数据共享
- Model development supervision
模型开发监管
- Test cycle development
测试工况开发
- Emission factor development
排放因子研究



Model Characteristics

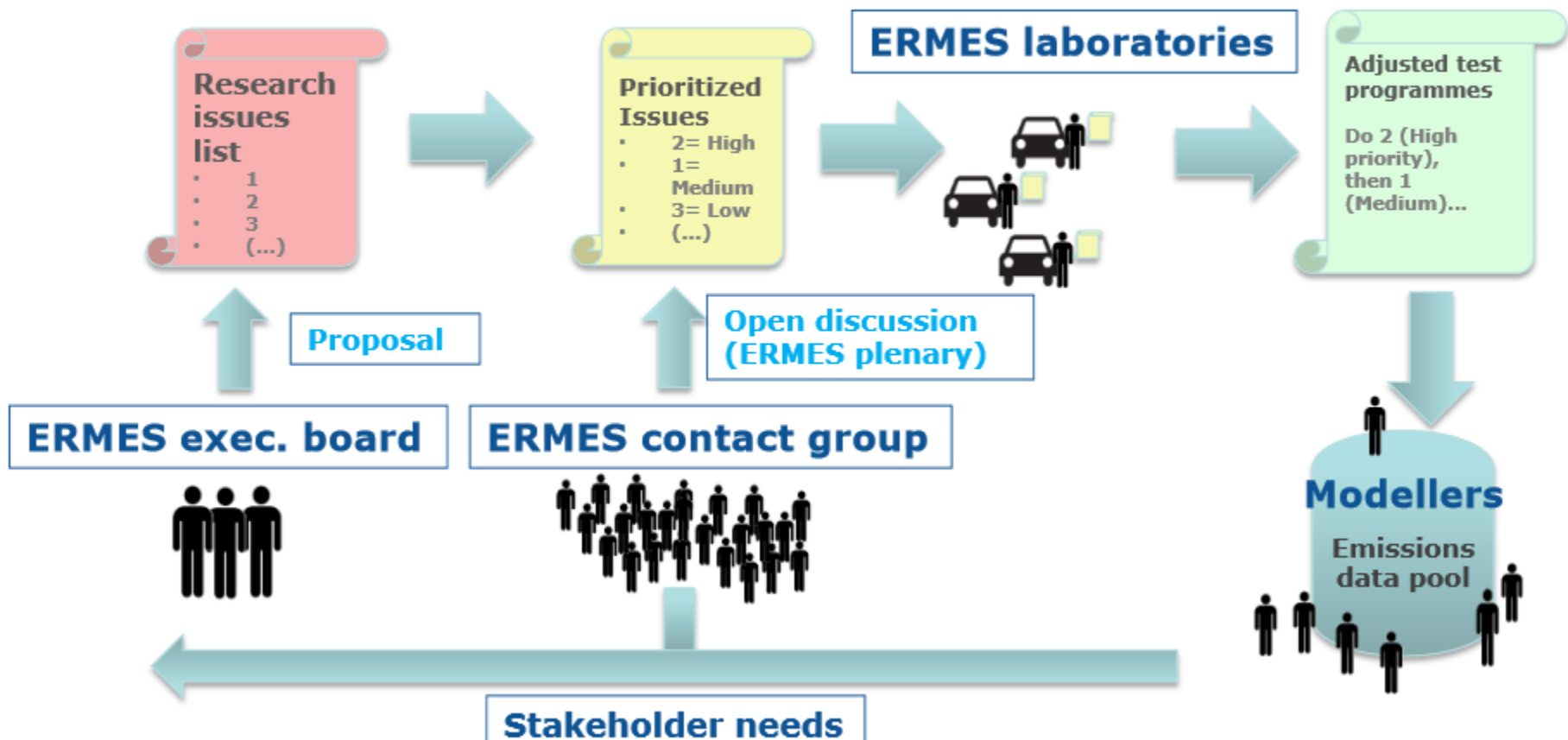
模型特征

	COPERT 4	HBEFA 3.1	VERSIT +	NEMO	PHEM
Geographical scale	Broad	From street level up	From street level up	From street level up	Single vehicle to street level
Emission factors	Based on average speed	Based on traffic situations	Based on traffic situations (road types, speed limits, degrees of congestion)	Based on calculation of driving resistance for avg. traffic situations	Based on instantaneous vehicle speed trajectories and engine emission maps
Pollutants	Regulated + CO ₂ , FC, CH ₄ , N ₂ O, NH ₃ , SO ₂ , heavy metals, PAHs, POPs, NMVOC speciation	Regulated + CO ₂ , FC, NO ₂ , CH ₄ , N ₂ O, NH ₃ , SO ₂ and PN	Regulated, CO ₂ , NO ₂ , PM _{2.5} , EC, PAH, PM wear (tyre, brake, road surface)	Regulated + CO ₂ , FC, NO ₂ , CO ₂ and PN	Regulated + CO ₂ , FC, NO ₂ , CO ₂ and PN
Typical applications	Large scale inventories and assessment of measures	Inventories, assessment of measures (large and medium scale)	Inventories, assessment of measures (large and medium scale)	Inventories, assessment of measures (based on road networks)	Calculation of emission factors for various traffic situations, driving styles, and vehicle technologies



Modelling Air Pollution – Research Coordination

协同研究





Thank you for your attention !

感谢

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可持续交通在中国
SUSTAINABLE TRANSPORT IN CHINA

