Table S1: Shares [%] of total manure management NH₃ emissions related to housing in closed barns (closed_f), housing in open barns (open_f) and storage (storage_f) per country. The obtained values are derived from the EMEP (EMEP/CEIP, 2019) and MASSAGE inventories (Paulot et al., 2014)

Country	closed_f	open_f	storage_f
Afghanistan	2.7%	95.7%	1.6%
Albania	24.6%	73.0%	2.5%
Algeria	25.6%	72.4%	2.0%
Angola	9.4%	89.0%	1.5%
Argentina	5.5%	91.4%	3.1%
Armenia	18.7%	76.0%	5.3%
Australia	3.8%	95.3%	0.9%
Austria	31.6%	63.8%	4.7%
Azerbaijan	19.5%	72.4%	8.1%
Bangladesh	14.8%	60.3%	24.8%
Belarus	30.7%	64.9%	4.5%
Belgium	43.8%	52.2%	4.0%
Benin	13.3%	83.1%	3.6%
Bhutan	40.0%	59.5%	0.5%
Bolivia	16.2%	80.1%	3.7%
Bosnia and Herzegovina	44.7%	53.3%	2.0%
Botswana	4.3%	95.0%	0.7%
Brazil	10.4%	82.6%	7.0%
Bulgaria	39.5%	54.0%	6.5%
Burkina Faso	6.8%	85.6%	7.6%
Burundi	13.1%	84.9%	2.0%
Cambodia	33.1%	59.9%	7.1%
Cameroon	11.2%	86.6%	2.1%
Canada	27.9%	68.0%	4.1%
Central African Republic	6.7%	92.0%	1.3%
Chad	1.5%	95.5%	3.0%
Chile	37.5%	61.2%	1.3%
China	64.9%	27.0%	8.1%
Colombia	10.8%	83.0%	6.1%
Croatia	53.1%	42.6%	4.3%
Cuba	19.8%	75.3%	4.9%
Cyprus	63.9%	32.1%	4.1%
Czech Republic	27.4%	68.2%	4.4%
Democratic Republic of the Congo	35.6%	64.2%	0.1%
Denmark	57.6%	39.0%	3.5%
Denmark	86.3%	13.5%	0.3%
Djibouti	2.4%	96.5%	1.1%
Ecuador	34.2%	59.2%	6.7%
Egypt	17.7%	71.8%	10.5%
El Salvador	16.2%	75.4%	8.4%
Equatorial Guinea	27.7%	72.2%	0.1%
Eritrea	1.5%	96.4%	2.1%
Estonia	36.1%	58.6%	5.3%
Ethiopia	1.1%	91.7%	7.2%
Finland	28.9%	66.8%	4.3%
France	30.9%	63.6%	5.5%
French Guiana	33.9%	66.0%	0.0%
Gabon	76.3%	23.7%	0.1%
Georgia	8.4%	86.7%	4.9%
Germany	44.9%	51.1%	4.0%
Ghana	19.7%	77.6%	2.7%
Greece	47.3%	42.9%	9.7%
Guatemala	32.0%	65.6%	2.5%
Guinea	5.5%	91.1%	3.3%
Guinea Bissau	17.6%	78.7%	3.7%
Guyana	60.9%	39.0%	0.2%

Honduras	13.3%	77.9%	8.8%
Hungary	53.4%	40.6%	6.0%
Iceland	12.9%	75.1%	12.0%
India	6.8%	75.8%	17.4%
Indonesia	72.2%	26.6%	1.2%
Iran	24.3%	73.4%	2.3%
Iraq	15.4%	82.4%	2.2%
Ireland	13.8%	81.8%	4.4%
Israel	35.2%	64.3%	0.5%
Italy	29.0%	66.1%	4.8%
Ivory Coast	18.1%	79.0%	2.9%
Jamaica	39.2%	59.9%	0.9%
Japan	83.1%	16.1%	0.8%
Jordan	37.3%	62.1%	0.6%
Kazakhstan	10.5%	83.0%	6.6%
Kenya	3.2%	86.8%	10.1%
Kuwait	63.9%	35.0%	1.1%
Kyrgyzstan	6.2%	87.0%	6.8%
Laos	48.1%	49.1%	2.7%
Latvia	24.8%	70.0%	5.1%
Lesotho	7.0%	91.0%	2.0%
Liberia	29.3%	69.7%	1.0%
Libya	26.5%	73.2%	0.3%
Liechtenstein	7.1%	88.5%	4.4%
Lithuania	37.9%	57.5%	4.6%
Luxembourg	9.5%	86.7%	3.8%
Macedonia	29.7%	64.9%	5.4%
Madagascar	7.6%	91.7%	0.7%
Malawi	26.9%	72.0%	1.1%
Mali	3.3%	93.9%	2.7%
Malta	54.0%	40.0%	6.0%
Mauritania	5.2%	91.7%	3.0%
Mexico	26.5%	67.8%	5.7%
Moldova	46.4%	51.3%	2.4%
Mongolia	1.8%	98.0%	0.2%
Morocco	28.7%	67.9%	3.5%
Mozambique	24.9%	73.9%	1.2%
Myanmar	30.8%	64.1%	5.1%
Namibia	2.8%	95.6%	1.6%
Nepal	6.6%	79.5%	13.9%
Netherlands	38.5%	56.7%	4.8%
New Zealand	2.2%	94.2%	3.6%
Nicaragua	15.4%	81.2%	3.5%
Niger	4.6%	93.0%	2.4%
Nigeria	13.1%	81.1%	5.8%
North Korea	76.0%	23.3%	0.7%
Norway	37.6%	55.6%	6.8%
Oman	19.1%	80.3%	0.6%
Pakistan	6.1%	81.8%	12.1%
Palestine	42.2%	55.3%	2.4%
Panama	8.7%	88.9%	2.4%
Papua New Guinea	95.8%	4.2%	0.0%
Paraguay	11.0%	83.6%	5.3%
Peru	31.6%	66.5%	1.9%
Philippines	58.3%	40.3%	1.4%
Poland	42.4%	52.7%	4.9%
Portugal	59.4%	34.7%	5.9%
Republic of Macedonia	43.1%	54.7%	2.3%
Romania	51.6%	42.5%	5.9%
Russia	52.8%	41.1%	6.1%

Rwanda	7.6%	83.4%	9.1%
Saudi Arabia	52.9%	46.8%	0.4%
Senegal	10.0%	86.5%	3.5%
Serbia	35.8%	58.9%	5.3%
Sierra Leone	10.9%	87.1%	2.0%
Singapore	89.9%	9.9%	0.2%
Slovakia	52.9%	39.7%	7.4%
Slovenia	28.7%	66.3%	4.9%
Somalia	0.5%	97.4%	2.1%
South Africa	12.4%	85.9%	1.7%
South Korea	82.9%	14.9%	2.2%
Spain	58.6%	36.0%	5.4%
Sri Lanka	5.5%	89.5%	5.0%
Sudan	1.4%	93.0%	5.6%
Suriname	43.8%	56.0%	0.1%
Sweden	21.9%	73.4%	4.7%
Switzerland	22.6%	73.2%	4.2%
Syria	8.3%	85.4%	6.4%
Tajikistan	2.1%	95.4%	2.4%
Tanzania	2.5%	88.8%	8.7%
Thailand	54.9%	42.0%	3.1%
Tunisia	31.6%	66.0%	2.4%
Turkey	30.9%	61.3%	7.8%
Turkmenistan	6.6%	91.3%	2.0%
Uganda	10.6%	81.9%	7.5%
Ukraine	59.1%	34.3%	6.6%
United Arab Emirates	45.5%	53.9%	0.6%
United Kingdom	25.2%	69.9%	4.9%
United States	27.9%	66.3%	5.8%
Uruguay	2.2%	92.6%	5.2%
Uzbekistan	4.1%	91.0%	4.9%
Venezuela	20.2%	74.3%	5.6%
Vietnam	57.8%	37.4%	4.8%
Yemen	19.6%	78.8%	1.6%
Zambia	17.3%	81.8%	0.9%
Zimbabwe	10.1%	89.0%	0.9%
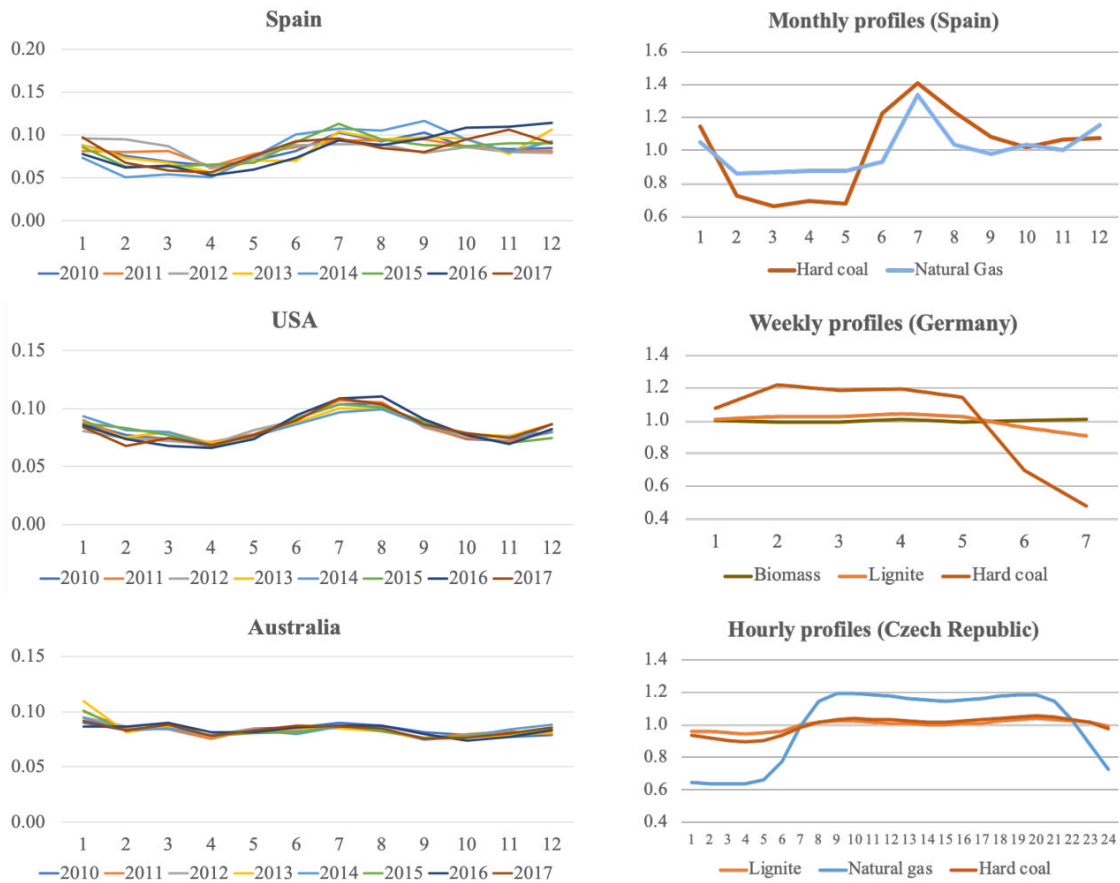
Figure S1: Left column: Electricity generation monthly profiles for the years 2010 to 2017 obtained for Spain, USA and Australia (IEA, 2018). Right column: Fuel specific temporal profiles for electricity production (average between 2015 and 2017) in Spain, Germany and Czech Republic (ENTSO-E, 2018)
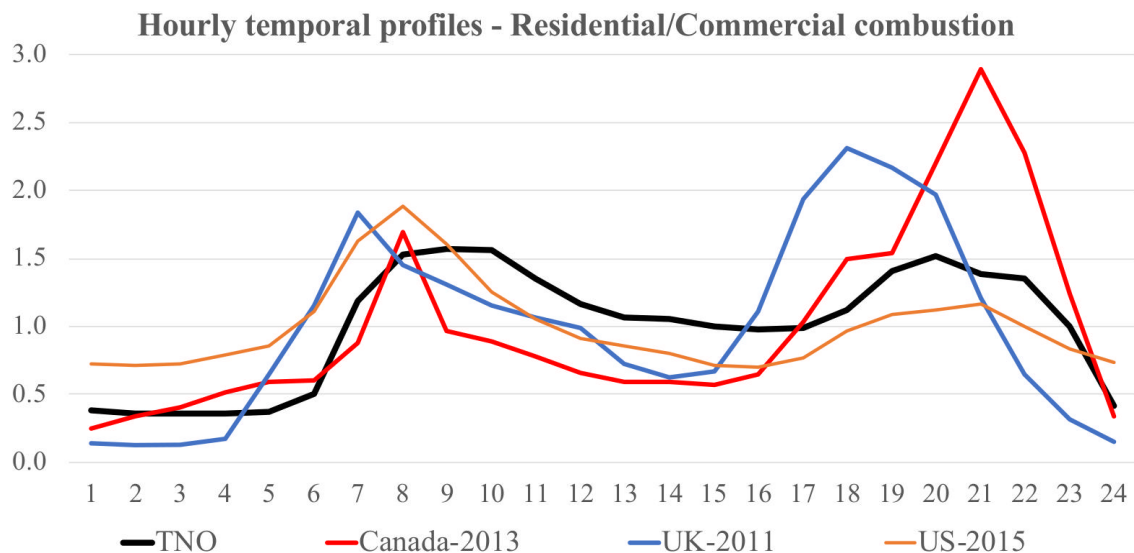

Figure S2: Hourly temporal profiles for the residential/commercial sector derived from measurements of natural gas consumption in houses in Canada-2013 (Makonin et al., 2016), UK-2011 (https://retrofit.innovateuk.org/), US-2015 (https://dataport.cloud/) and reported from the TNO dataset (Denier van der Gon et al., 2011)
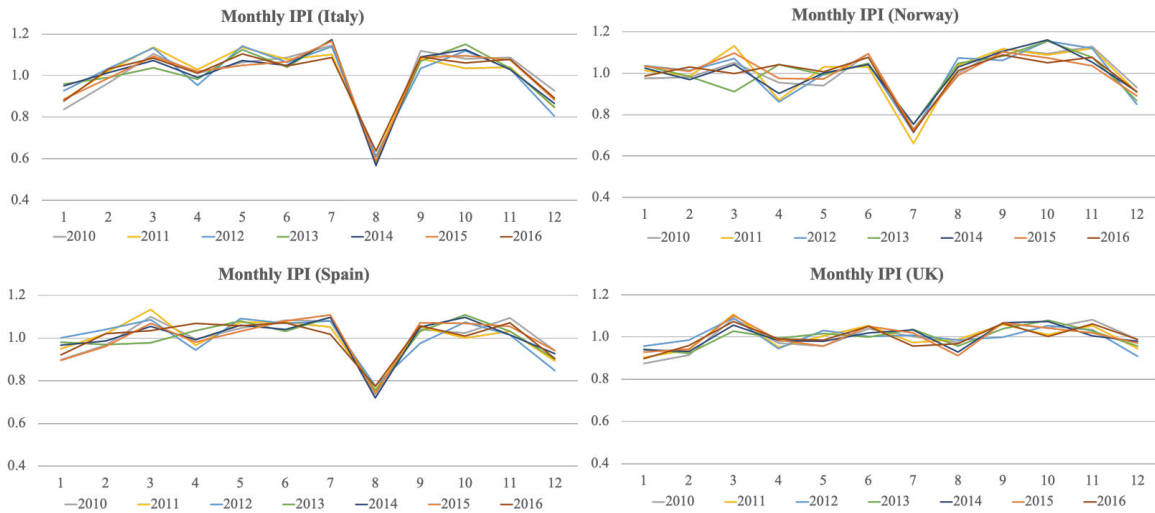
Figure S3: Seasonality of the Industrial Production Index (IPI) of manufacturing industries for selected countries and years (Italy, ISTAT, 2018; Norway, SSB, 2018; Spain INE, 2018 and the UK, ONS, 2018)
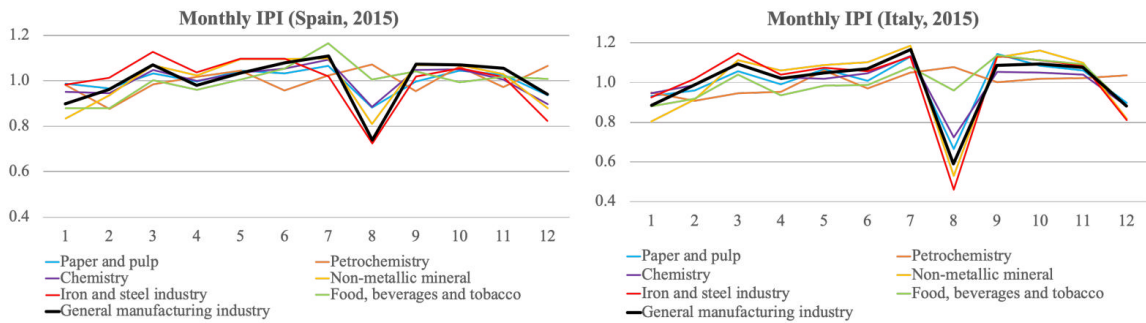
Figure S4: Seasonality of the Industrial Production Index (IPI) per manufacturing division for selected countries (Italy, ISTAT, 2018; Spain INE, 2018)
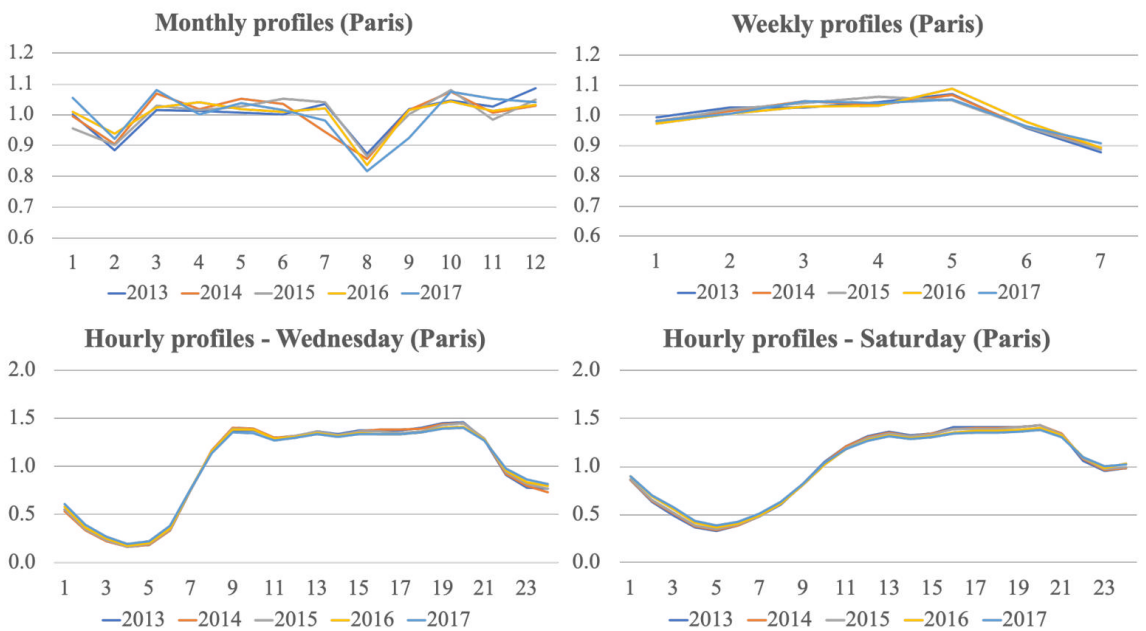

Figure S5: Monthly (top-left), weekly (top-right) and Wednesday and Saturday-type diurnal (bottom-left and right) temporal profiles derived from measured traffic counts in Paris city for the years 2013 to 2017 (Paris data, 2018)
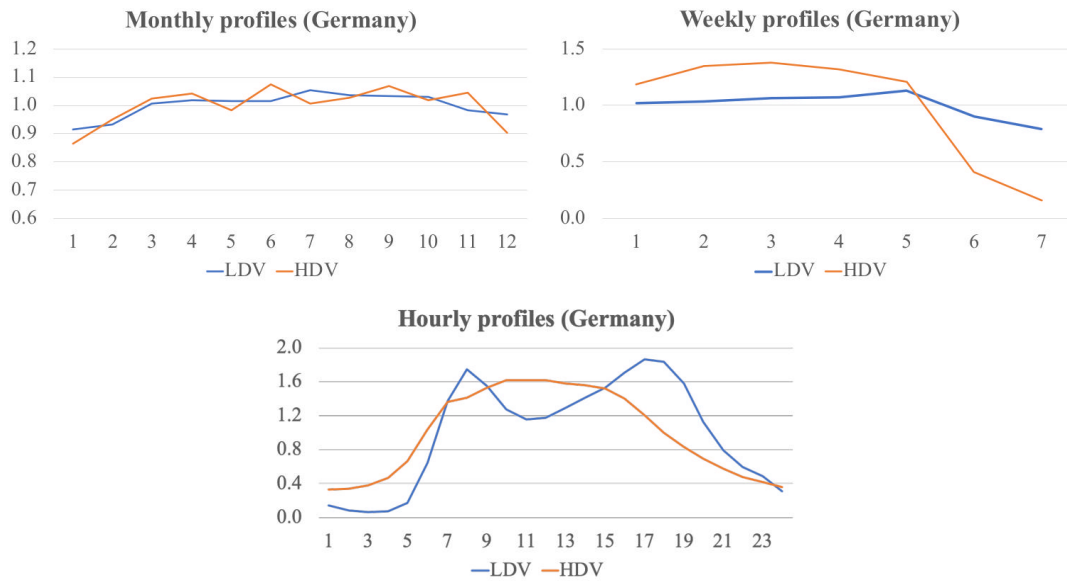
Figure S6: Monthly, weekly and diurnal temporal profiles per vehicle type (light-duty vehicles, LDV and heavy-duty vehicles, HDV) derived from measured traffic counts in Germany (BASt, 2018)
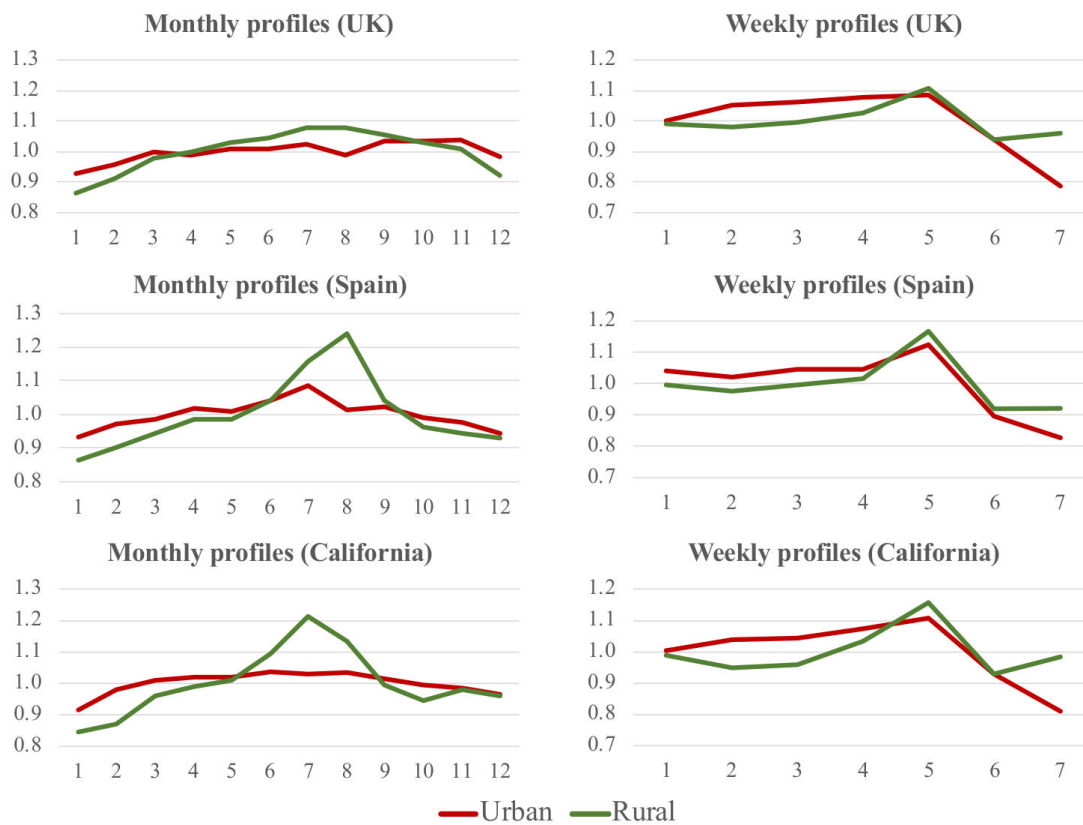

Figure S7: Monthly (left) and weekly (right) temporal profiles derived from traffic counts in urban and rural areas for UK (GovUK, 2018), Spain (courtesy from Spanish Ministry Transport) and California (McDonald et al., 2014).
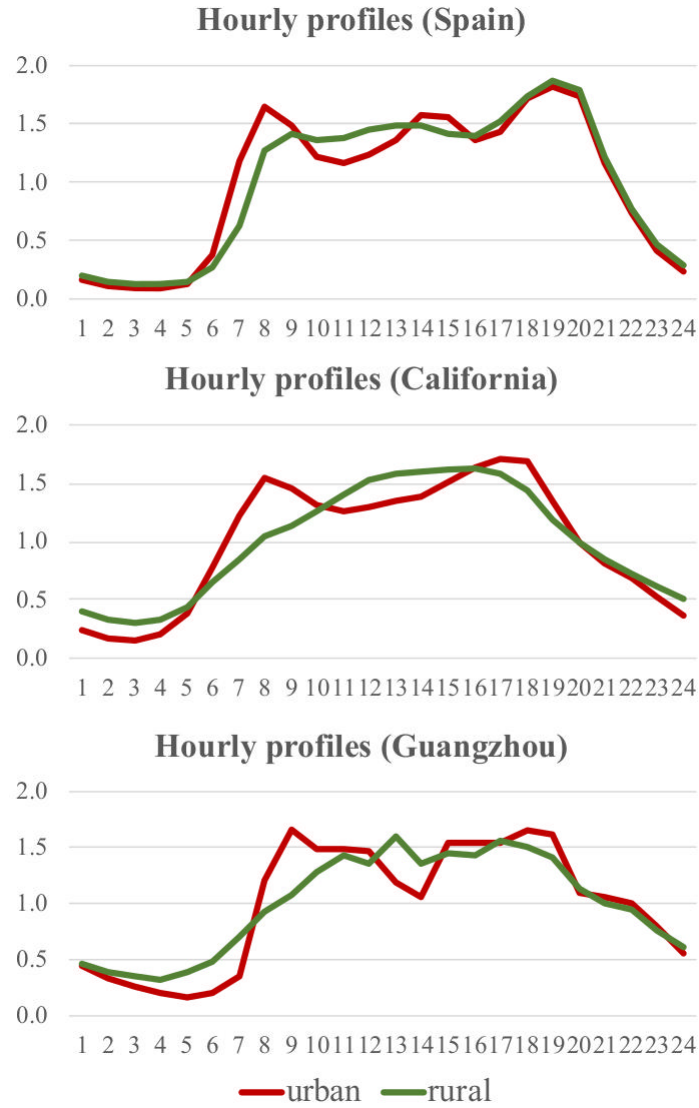
Figure S8: Hourly temporal profiles derived from traffic counts in urban and rural areas for Spain (courtesy from Spanish Ministry Transport), California (McDonald et al., 2014) and Guangzhou (Zheng et al., 2009).
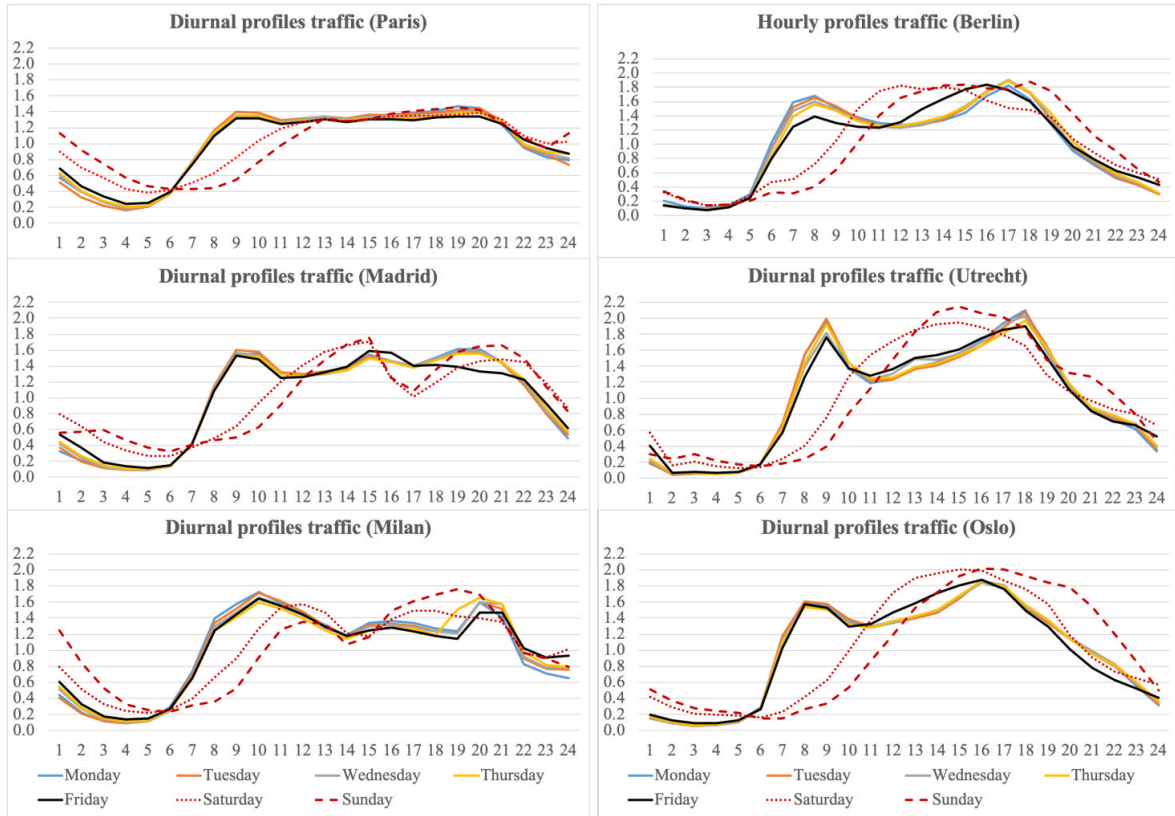
Figure S9: Diurnal road transport temporal profiles per day type (Monday to Sunday) derived from traffic counts for selected cities (Paris, Paris data, 2018; Berlin, VLB, 2018; Madrid, Madrid data, 2018; Utrecht, Utrecht data, 2018; Milan, Milano data, 2018; Oslo, Courtesy from Norwegian Road Administration).
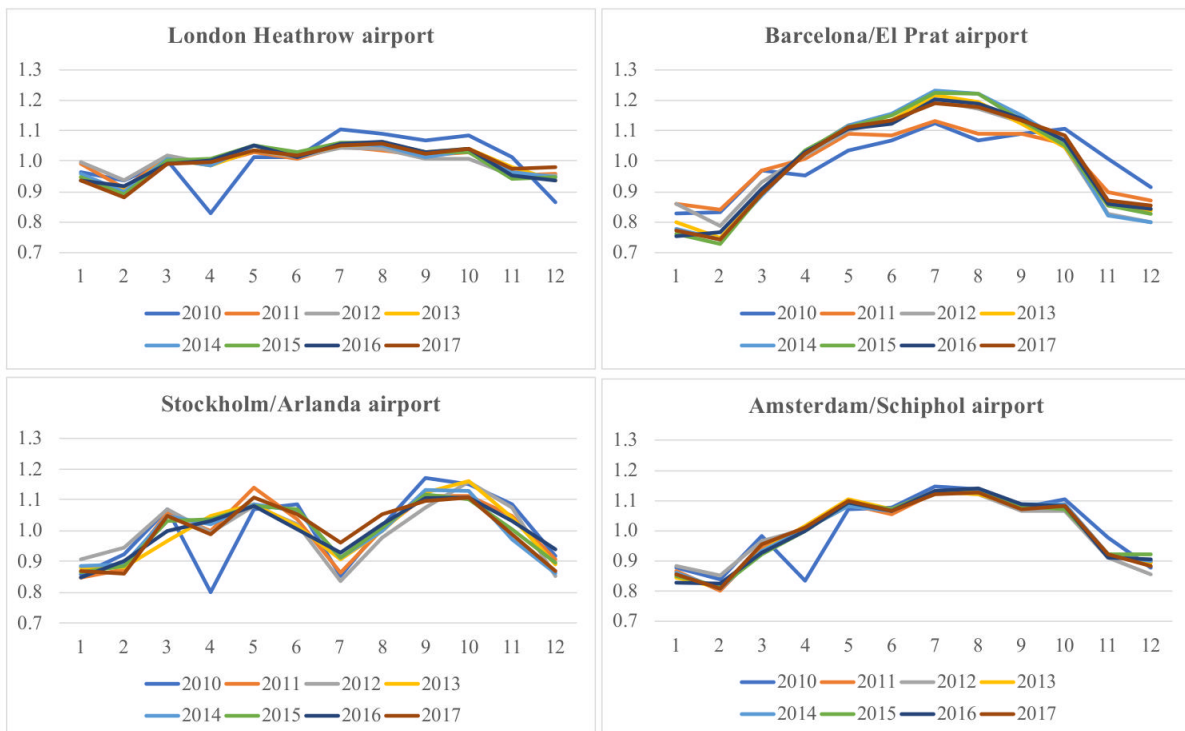

Figure S10: Monthly temporal profiles at different European airports for years 2010 to 2017 derived from air traffic operations reported by Eurostat (2019). Results show the air travel disruption in North and Central Europe during April 2010 caused by the Eyjafjallajökull eruption.

References

BASt: Federal Highway Research Institute. Automatic counting stations on highways and federal highways. Available at: https://www.bast.de/BASt_2017/DE/Verkehrstechnik/Fachthemen/v2-verkehrszaehlung/zaehl_node.html (last accessed April 2018), 2018.

Denier van der Gon, H. A. C., Hendriks, C., Kuenen, J., Segers, A., and Visschedijk, A. J. H.: Description of current temporal emission patterns and sensitivity of predicted AQ for temporal emission patterns, EU FP7 MACC deliverable report D_D-EMIS_1.3, 2011.

EMEP/CEIP: Present state of emission data. Available at: http://www.ceip.at/webdab_emepdatabase/reported_emissiondata/ (last accessed, March 2020), 2019.

ENTSO-E: Transparency Platform. Available at: https://transparency.entsoe.eu/ (last accessed, May 2018), 2018.

Eurostat: Airport traffic data by reporting airport and airlines. Available at: https://ec.europa.eu/eurostat/web/products-datasets/product?code=avia_tf_apal (last accessed, March 2020), 2019.

GovUK: Road traffic statistics information. Available at: https://www.gov.uk/government/collections/road-traffic-statistics (last accessed March 2018), 2018.

IEA: Electricity Statistics. Available at: http://www.iea.org/statistics/monthlystatistics/monthlyelectricitystatistics/ (last accessed, May 2018), 2018.

INE. Spanish Statistical Office. Industrial production. Available at: https://www.ine.es/en/prensa/ipi_prensa_en.htm (last accessed, May 2018), 2018.

ISTAT. Italian National Institute of Statistics. Industrial production. Available at: https://www.istat.it/en/archive/industrial+production (last accessed, June 2018), 2018.

Madrid data: Madrid city open data portal. Traffic. Historic traffic data since 2013. Available at: https://datos.madrid.es/sites/v/index.jsp?vgnextoid=33cb30c367e78410VgnVCM1000000b205a0aRCRD&vgnextchannel=374512b9ace9f310VgnVCM100000171f5a0aRCRD (last accessed April 2018), 2018.

Makonin, S., Ellert, B., Bajic, I.V., and Popowich, F.: AMPds2-Almanac of Minutely Power dataset: Electricity, water, and natural gas consumption of a residential house in Canada from 2012 to 2014. Sci. Data, 3, doi:10.1038/sdata.2016.37, 2016.

McDonald, B. C., McBride, Z. C., Martin, E. W., and Harley, R.A.: High resolution mapping of motor vehicle carbon dioxide emissions, J. Geophys. Res. Atmos., 119, 5283–5298, doi:10.1002/ 2013JD021219, 2014.

Milano data: Milano city open data portal. Area C traffic reporting. Available at: https://areac.amat-mi.it/it/areac/ (last accessed March 2018), 2018.

ONS. Office for National Statistics. Index of production. Available at: https://www.ons.gov.uk/economy/economicoutputandproductivity/output/bulletins/indexofproduction/previous Releases (last accessed May 2018), 2018.

Paris data: Paris city open data portal. Traffic data from permanent sensors. Available at: https://opendata.paris.fr/explore/dataset/comptages-routiers-permanents/information/ (last accessed March 2018), 2018.

Paulot, F., Jacob, D. J., Pinder, R. W., Bash, J. O., Travis, K., and Henze, D. K.: Ammonia emissions in the United States, European Union, and China derived by high resolution inversion of ammonium wet deposition data: interpretation with a new agricultural emissions inventory (MASAGE_NH3), J. Geophys. Res.-Atmos., 119, 4343–4364, https://doi.org/10.1002/2013JD021130, 2014.

SSB. StatBank Norway. Index of industrial production. Available at: https://www.ssb.no/en/pii/ (last accessed July 2018), 2018.

Utrecht data: The Netherlands data platform. Utrecht traffic counts 2014. Available at: https://ckan.dataplatform.nl/en/dataset/verkeer-tellingen-verkeerslichten-2014 (last accessed March 2018), 2018.

VLB: Berlin Traffic Control. Average daily traffic volume 2014. Available at: https://www.stadtentwicklung.berlin.de/umwelt/umweltatlas/edd701_03.htm (last accessed October 2018), 2018.

Zheng, J., Zhang, L., Che, W., Zheng, Z., and Yin, S.: A highly resolved temporal and spatial air pollutant emission inventory for the Pearl River Delta region, China and its uncertainty assessment. Atmos. Env., 43, 5112–5122, https://doi.org/10.1016/j.atmosenv.2009.04.060, 2009.