Table S3. Schematic methods for converting raw data into 0.1°×0.1° gridded fuel consumption database. For the 8 groups using different disaggregation approaches, the numbers of fuel sub-types are shown in the parenthesis.

No.	Group	Coverage	Raw data	Resolution	Conversion and prediction	0.1°×0.1° disaggregation
1	wildfire (5)	globe	CO emissions	0.5°×0.5°	converted to 0.5°×0.5° fuel consumptions using CO emission factors	biomass (grass/trees) proxy
2	aviation and shipping (9)	globe	fuel consumption	Global	none	CO emission proxy
3	power stations (13)	globe	fuel consumptions of 26,239 major stations	Locations	none	allocated directly to grids
		globe	fuel consumptions of other stations in 139 countries	National	predicted for the other 84 small countries/territories using region-specific models	national population proxy
4	natural gas flaring (1)	globe	nighttime lights for gas flaring	0.1°×0.1°	converted to 0.1°×0.1° fuel consumptions based on a regression model	allocated directly to grids
5	agricultural solid wastes (1)	China	crop productions	Provincial	converted to provincial fuel consumptions based on crop-specified production-to-residue ratios and province-specific percentages of crop residues burned in the field	sub-national population proxy
		other countries	crop productions of 206 countries/territories	national	converted to national fuel consumptions based on crop-specified production-to-residue ratios and region-specific percentages of crop residues burned in the field (those for the remained 17 small countries/territories were omitted)	national population proxy
6	non-organized waste incineration (1)	globe	municipal waste of 102 countries/territories	national	converted to national fuel consumptions using 1% and 5% incineration rates for developed and developing countries, respectively and predicted for the other 111 small countries/territories using region-specific models	national population proxy
7	dung cakes (1)	SEA13[a]	India consumption	national	predicted for other 12 countries assuming a same per-capita consumption	national population proxy
8	other fuels (33)	EC-36[b]	1) fuel consumptions except for aluminum, coke, and brick productions. National data for 132 countries and state/provincial data for U.S., China and C-6 2) coke, aluminum, bricks productions for 132, 83, and 113 countries[e]	national	converted to 0.5°×0.5° fuel consumptions using CO emission proxy	sub-national population proxy
		Mexico		national	converted to county fuel consumptions using CO emission proxy	sub-national population proxy
		U.S.		state	converted to county fuel consumptions using CO emission proxy	sub-national population proxy
		China		provincial	predicted for 2373 counties using region-specific models	sub-national population proxy
		C-6[c]		provincial/state	none	sub-national population proxy
		C-178[d]		national	predicted for other 84 small countries/territories using region-specific models (aluminum and brick productions for 140 and 110 small countries/territories not included were omitted).	national population proxy

a) 13 Southeast Asian countries including India, Bangladesh, Bhutan, Brunei, Cambodia, Laos, Maldives, Myanmar, Nepal, Pakistan, Sri Lanka, Timor-Leste, and Vietnam.

b) 36 European countries including Albania, Andorra, Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Italy, Latvia, Lithuania, Macedonia, Moldova, Netherlands, Norway, Poland, Portugal, Romania, Russia, Serbia and Montenegro, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, and United Kingdom.

c) 6 countries with state/province data collected, including India, Brazil, Canada, Australia, Turkey, and South Africa.

d) 178 countries other than EC-36, C6, U.S., China, or Mexico.

e) Consumptions of bituminous (coke and bricks productions) and anthracite (aluminum production) were converted from the production volumes (1.25, 1.06, and 3 ton coal/ton coke, bricks, and aluminum produced, respectively).