

UCI – The Urban Challenge

Martin Powell

February 18, 2021



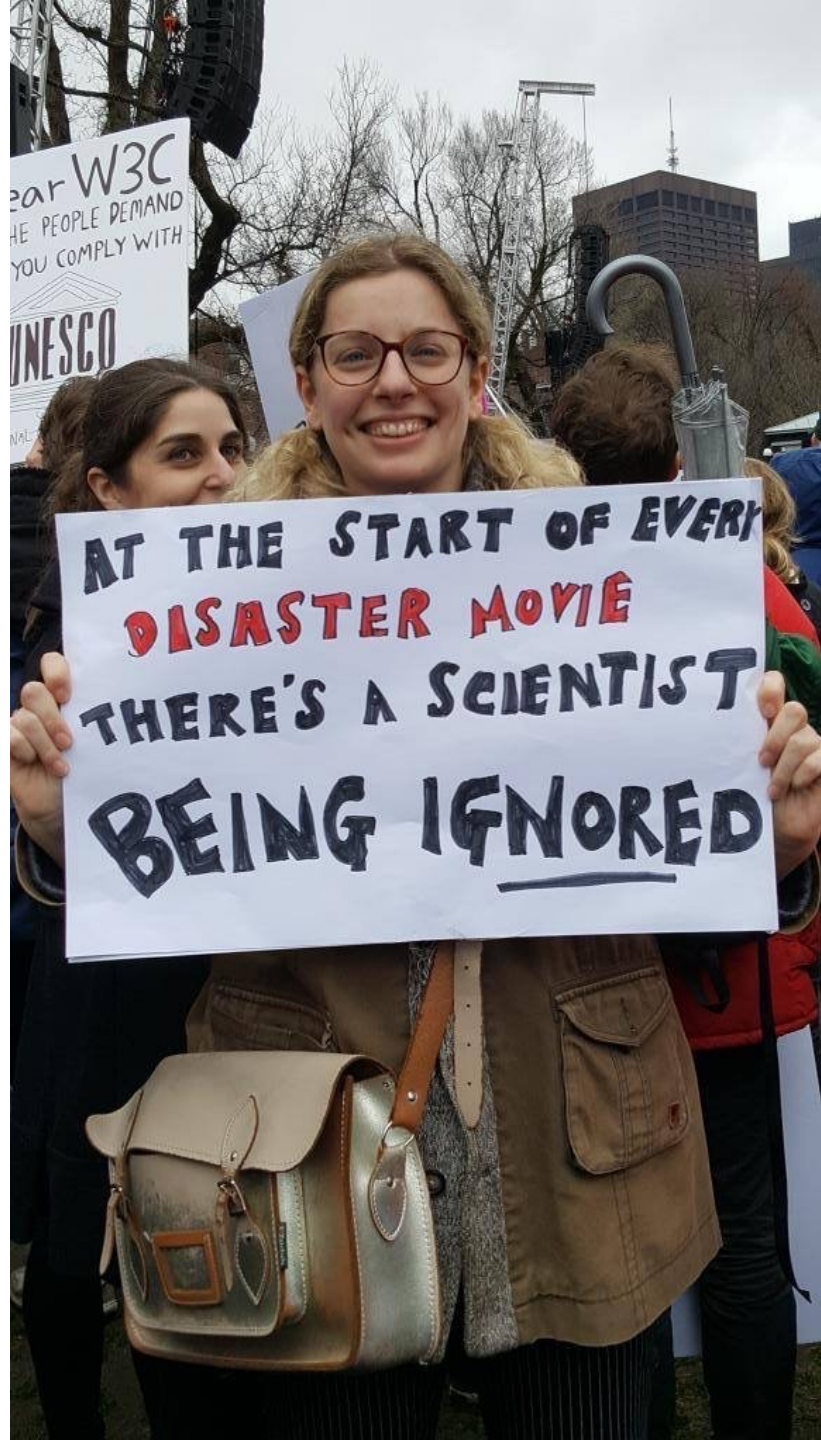


“the bank we can never bail out”

Editorial New Scientist 18 Oktober 2008

Dear W3C
THE PEOPLE DEMAND
YOU COMPLY WITH
UNESCO

AT THE START OF EVERY
DISASTER MOVIE
THERE'S A SCIENTIST
BEING IGNORED





BE SURE
TO WASH YOUR
HANDS AND ALL
WILL BE WELL

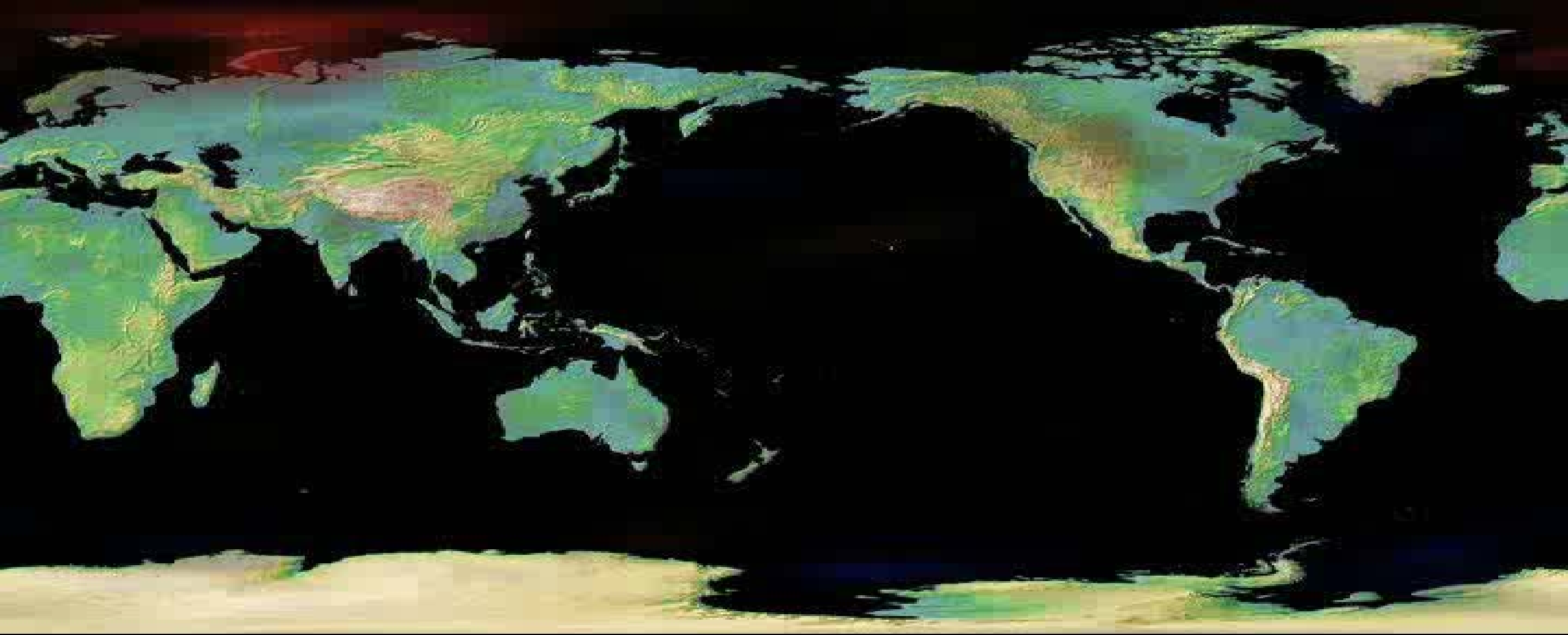
COVID
19

RECESSION

CLIMATE
CHANGE

“What is driving this change?”

megatrends



1950

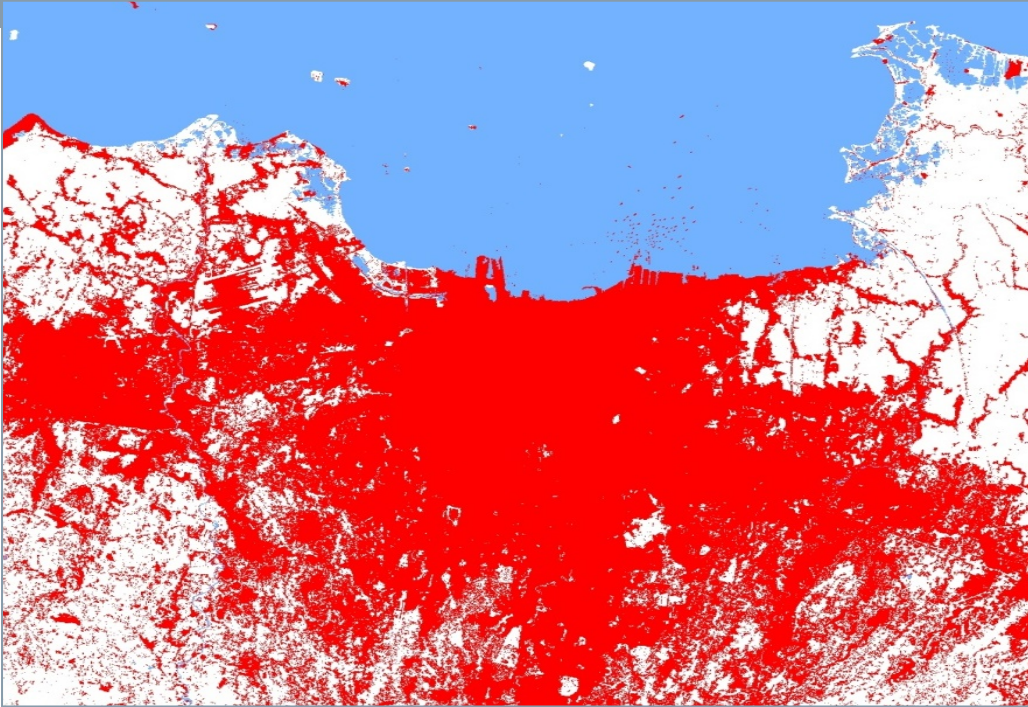


2m temperature change (A1B / MIROC-hi)

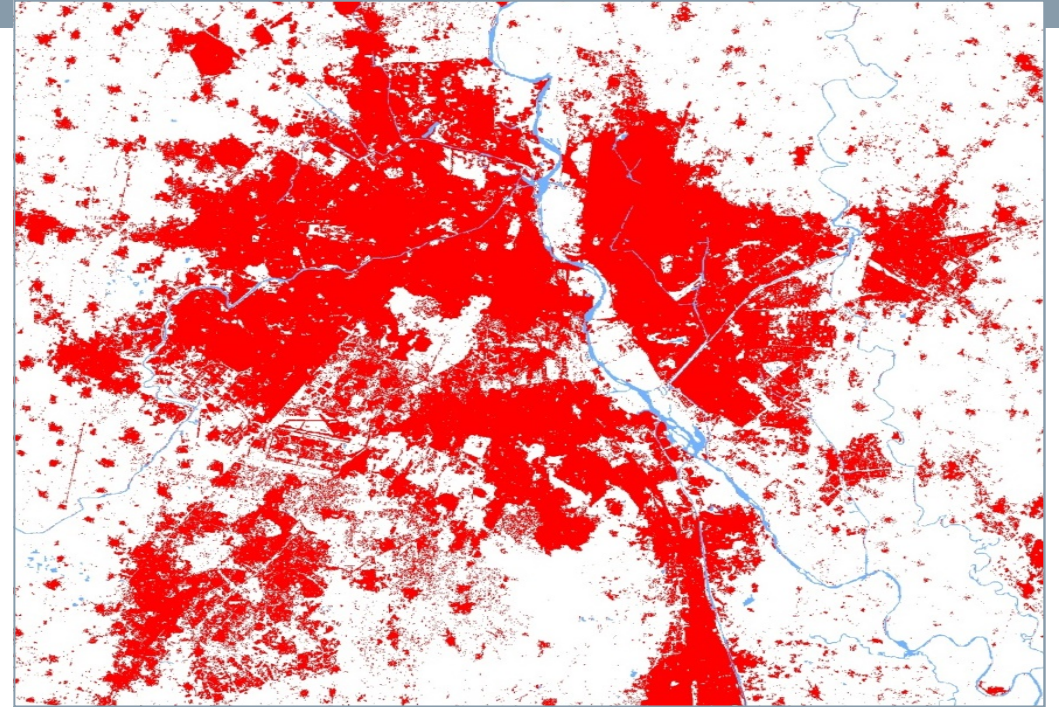
AOR/NIES/JAMSTEC/MEXT

Urban Population invading space...

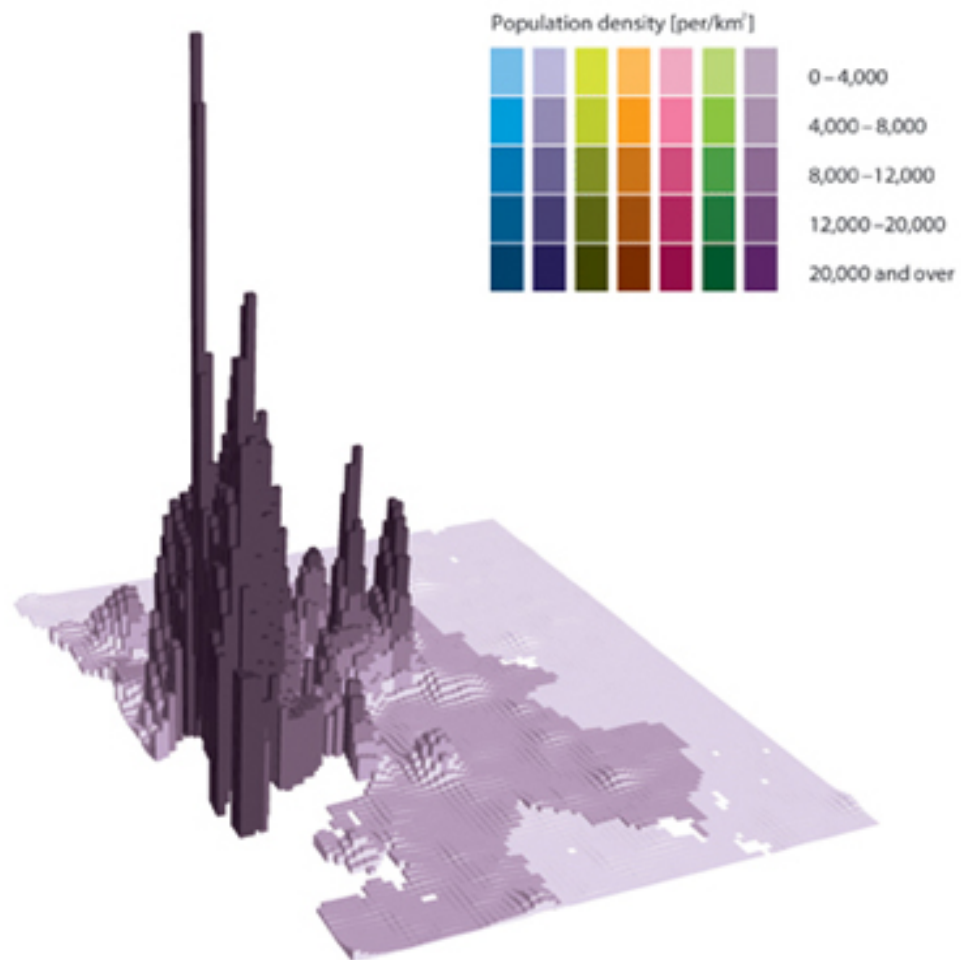
Jakarta 2010
9.2 Mio



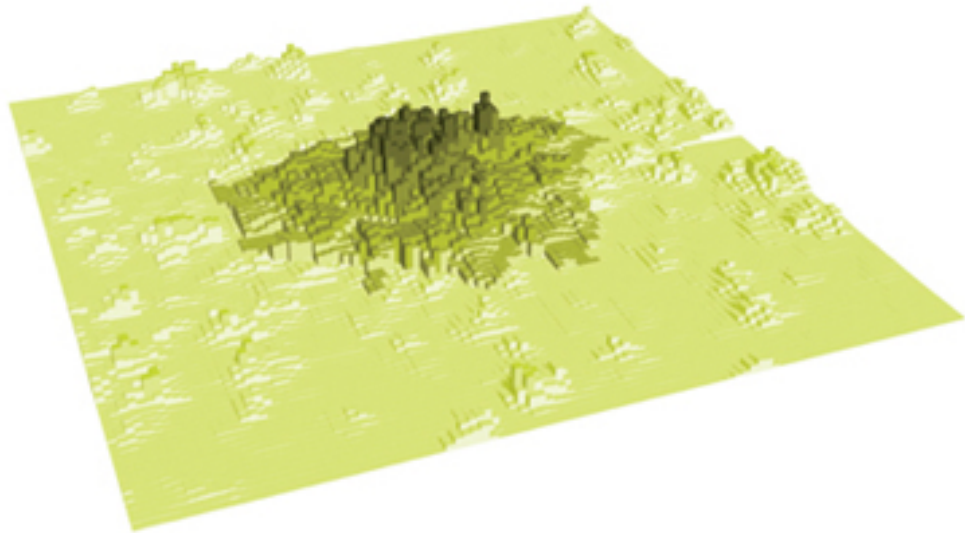
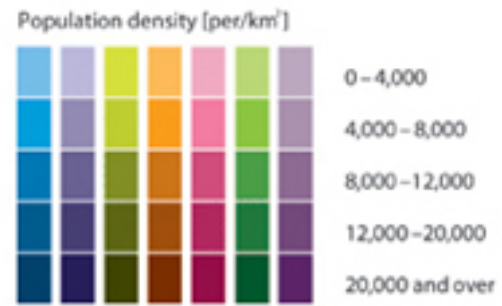
Delhi 2010
22.2 Mio



Mumbai - 34,000 people per km (sq)



London - 4500 people per km (sq)

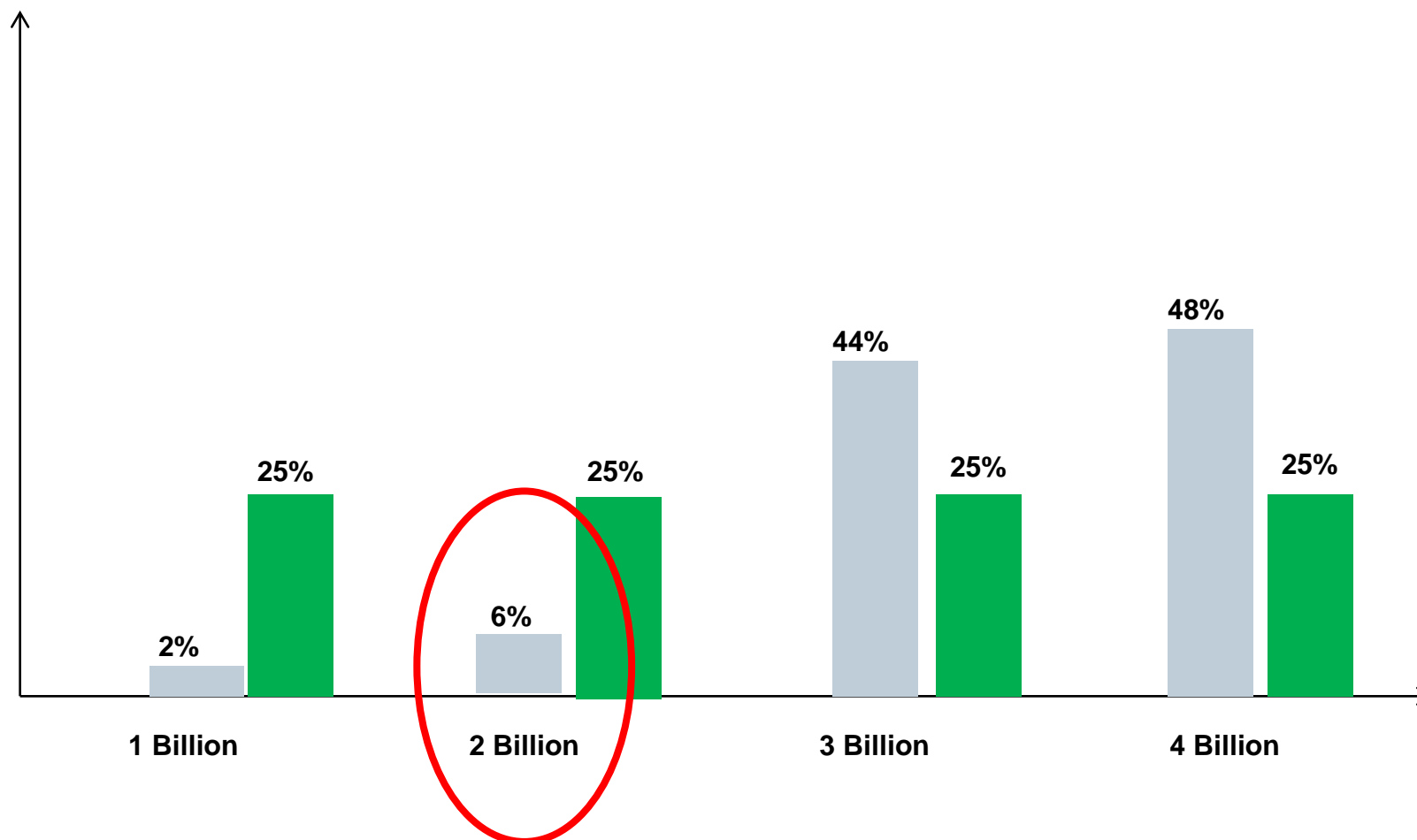




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"mosp."
21.09.21
21

In the year 2000 there were two billion children on Earth...

How many children will there be in the year 2100?









ขึ้นสะพาน
ตั้งแต่
ขึ้นไป






ห้ามใช้
ทางรถจักรยานยนต์

ระวัง
รถที่วิ่งกลับ
ใช้เลนขวาและกะล่าวา
พวงมาลัยกลับ

จรัญสนิทวงศ์ ตลิ่งชัน พุทธมณฑล
Charan Sanit Wong Taling Chan Phuttha Monthon

ตลิ่งชัน พุทธมณฑล
Taling Chan Phuttha Monthon

ทางคู่ขนานลอยฟ้า

รถพยาบาล
รถพยาบาล
รถพยาบาล



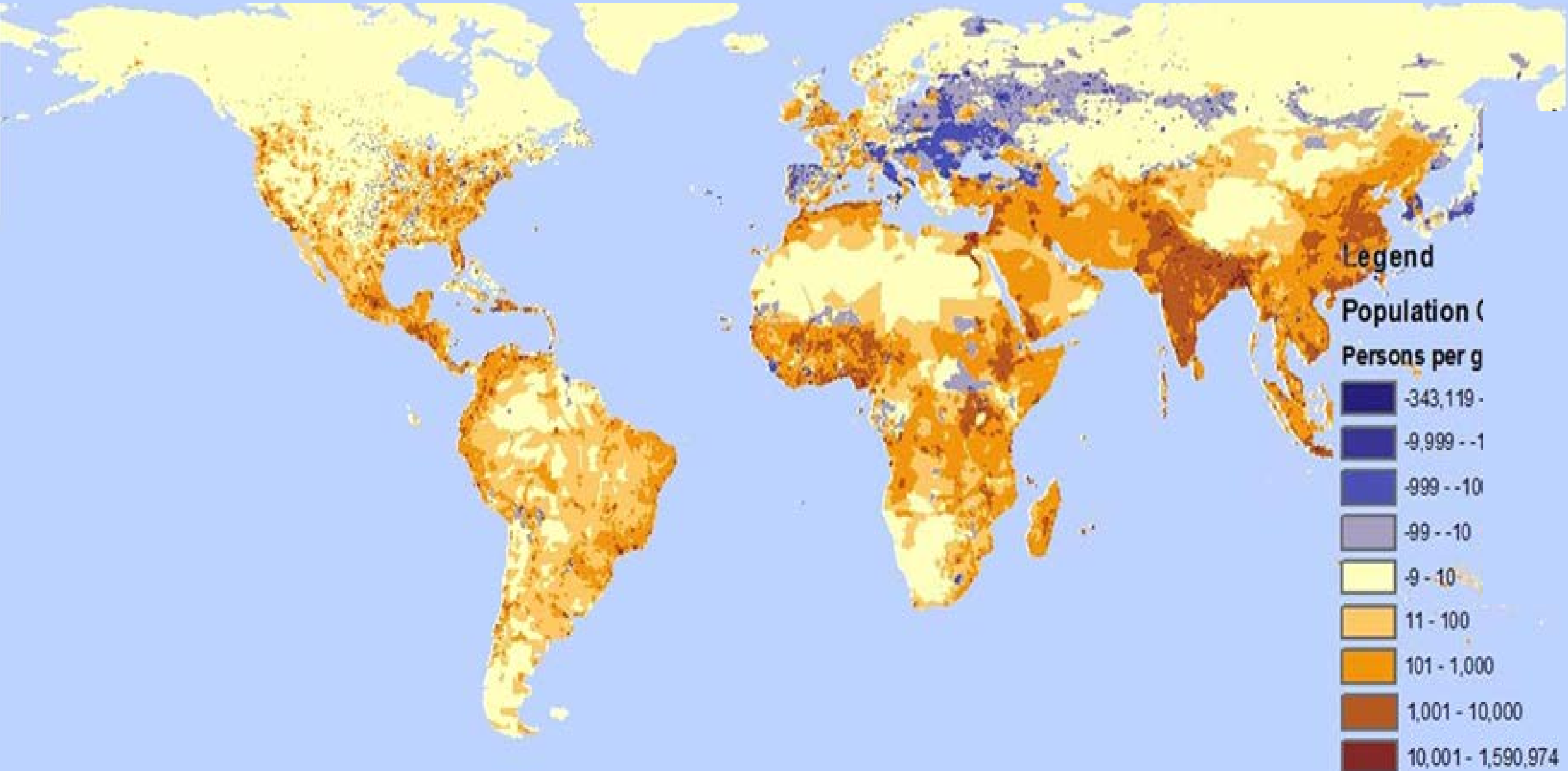
GA SÀI GÒN

GA SÀI GÒN

GA SÀI GÒN



75% of world's cities located in exposed coastal zones

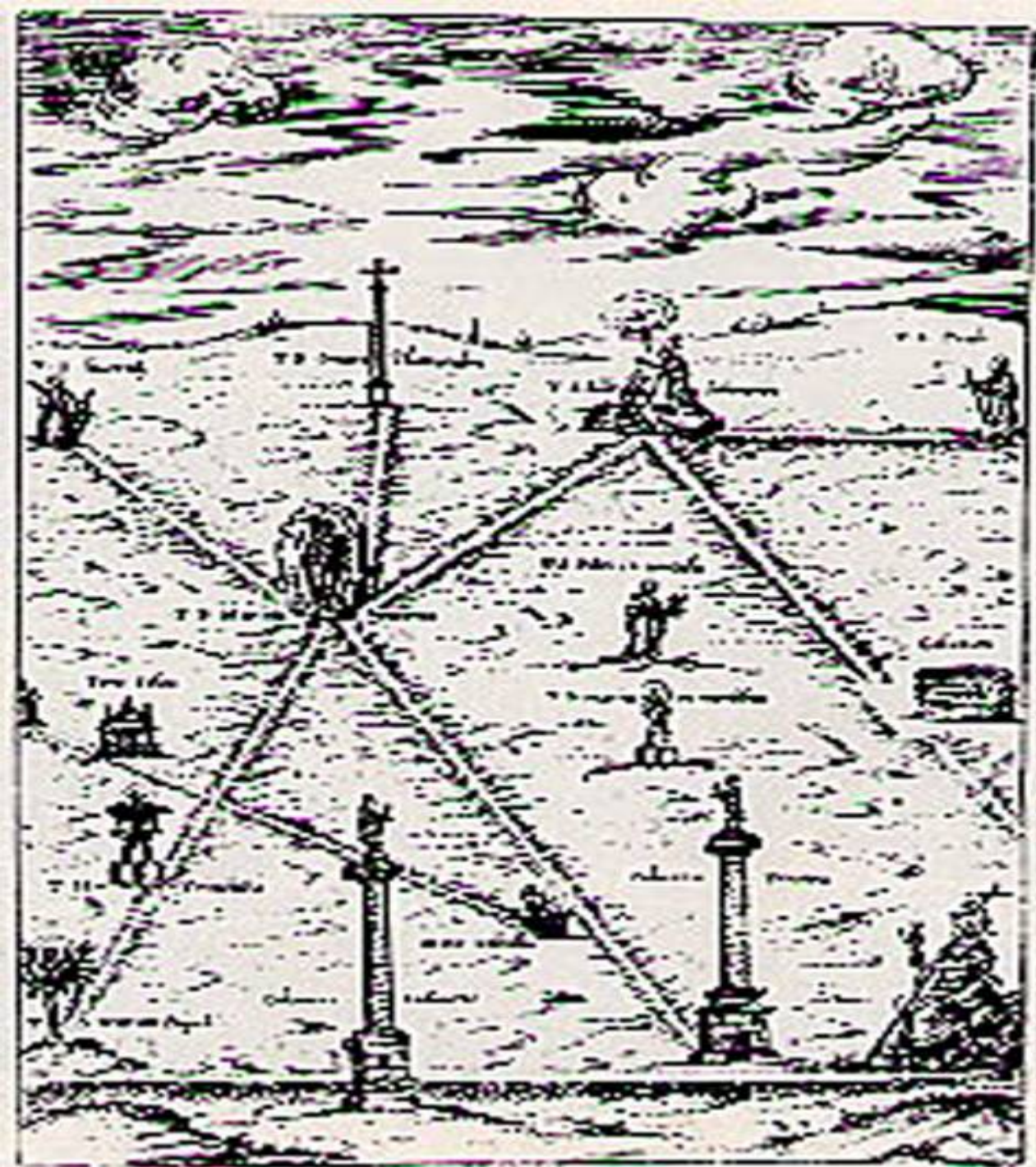


Source: Center for Climate Science Research



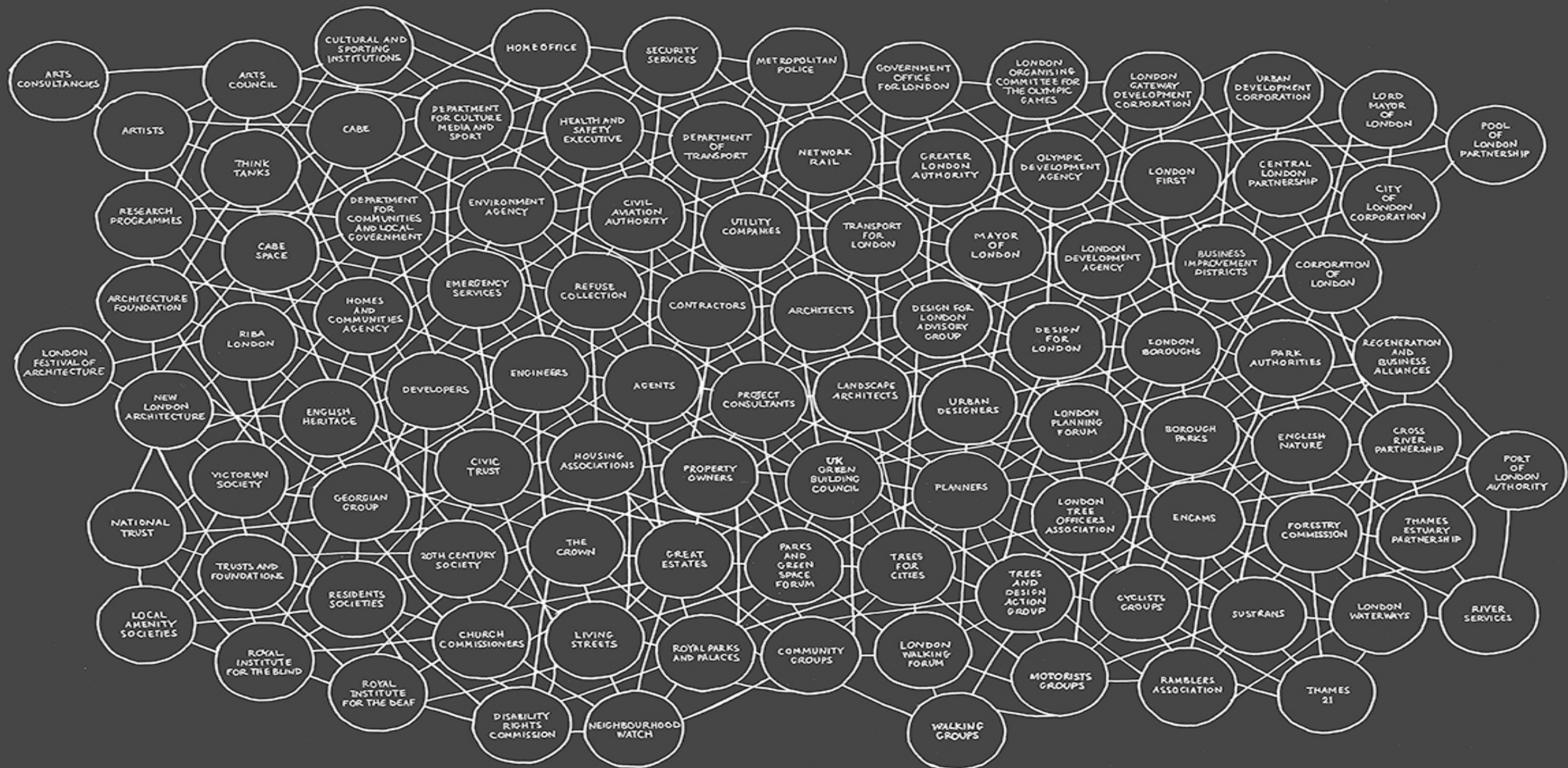
“How are our cities responding?”

cities react









4267...





BLAIR - IT'S THE REAL THREAT

Bliar

no more war
MAB
FREEDOM FOR PALESTINE

STOP WAR CRIMES IN IRAQ

MAB
END OCCUPATION OF IRAQ

Bliar

MAB
END OCCUPATION OF IRAQ

Bliar

BLAIR MUST GO!

Bliar
MAB
END OCCUPATION OF IRAQ

“What is the answer?”

finding options

How do we get twice as many people moving through the city?

The answer is simple...















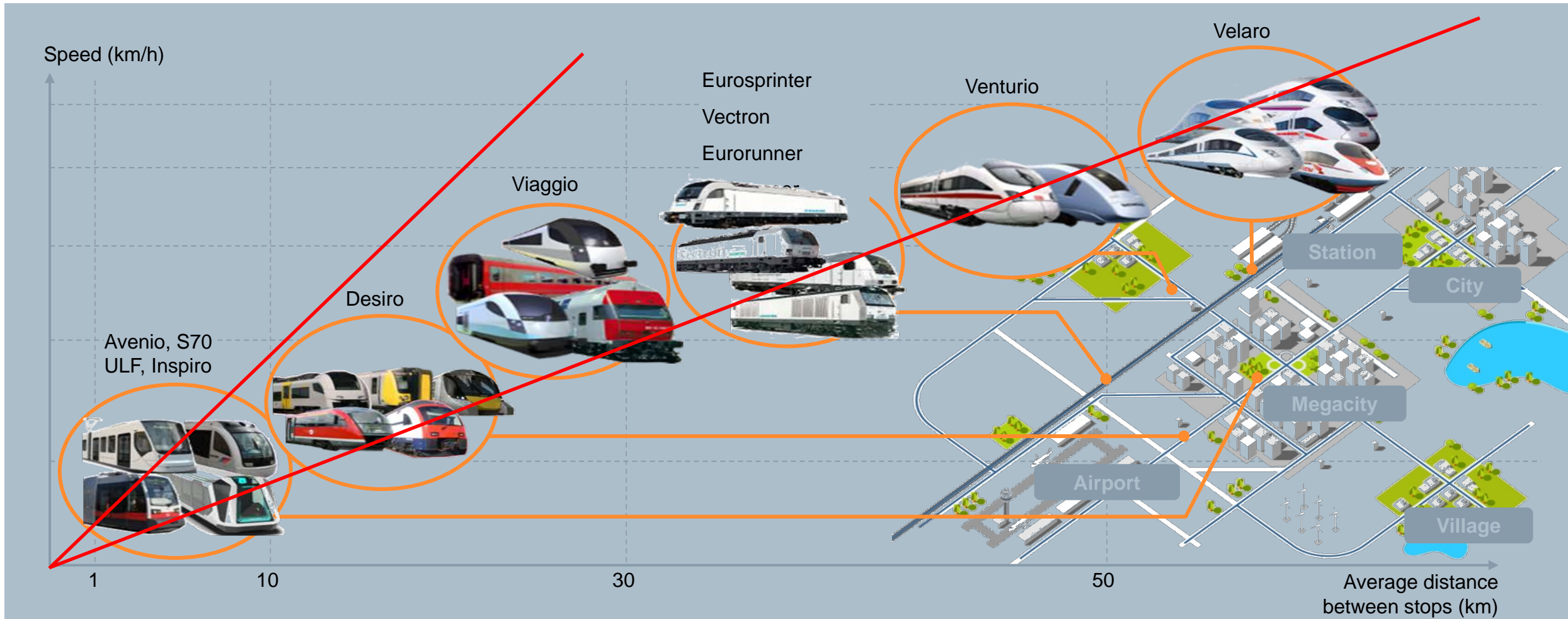




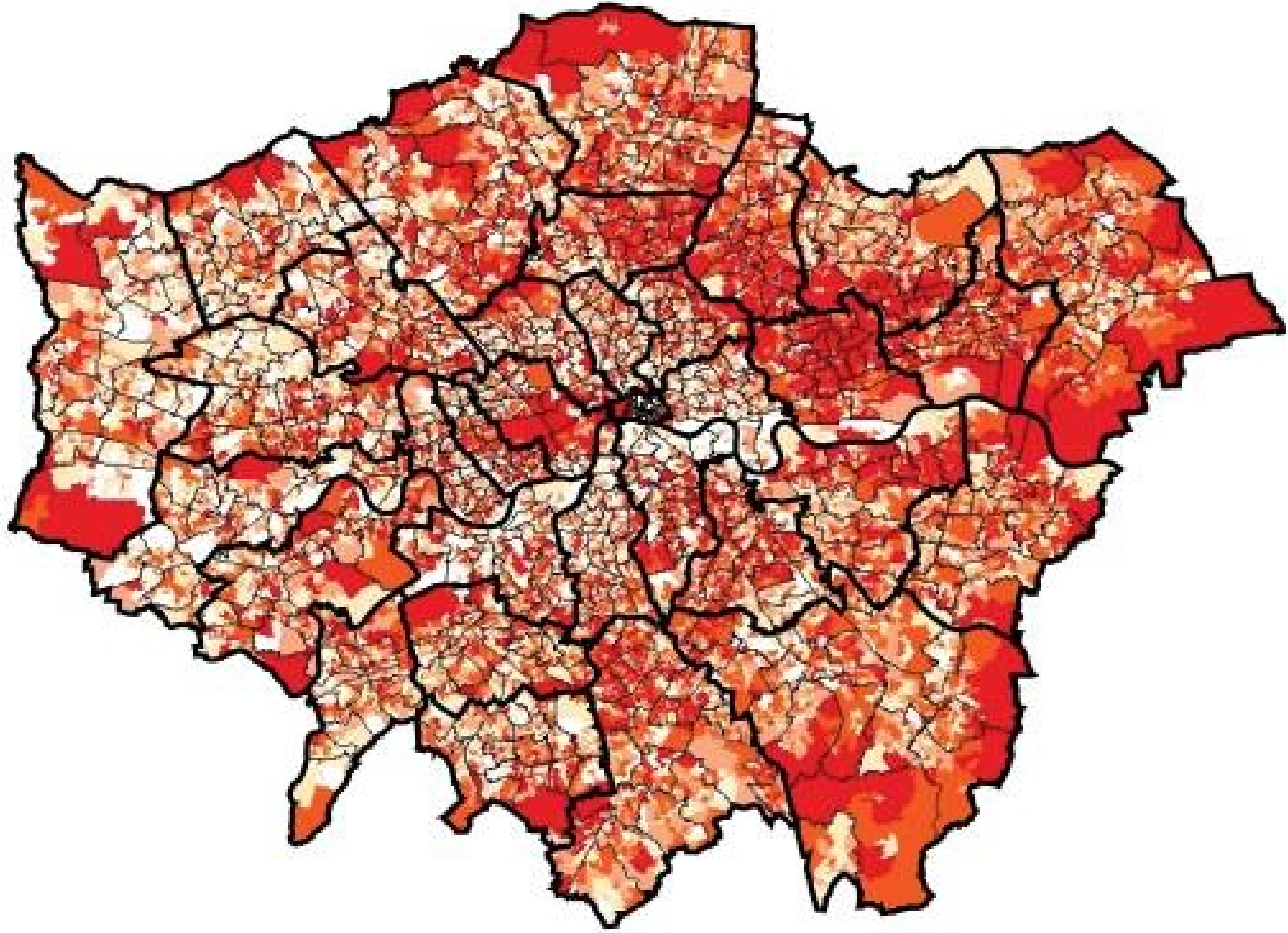




Moving people

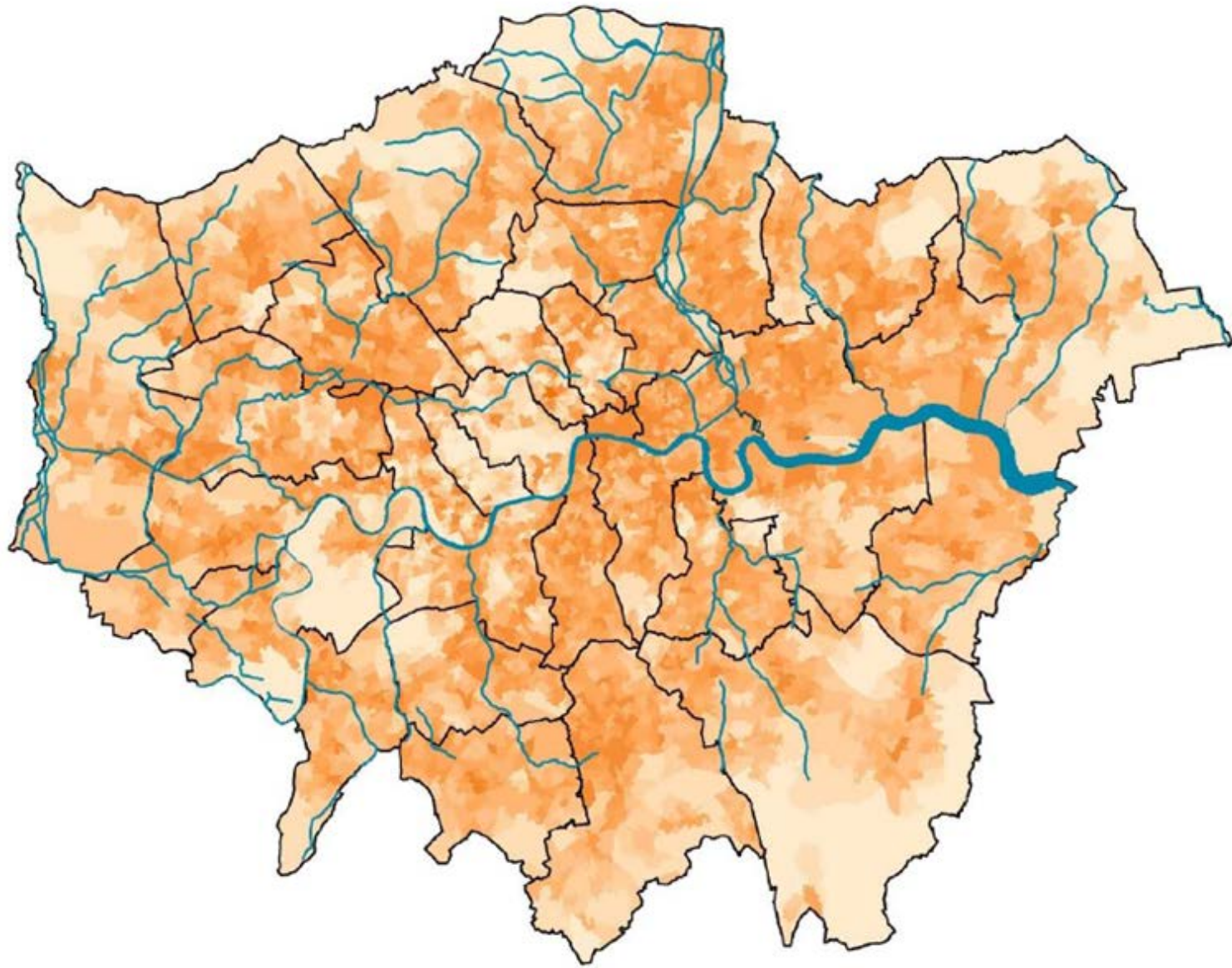










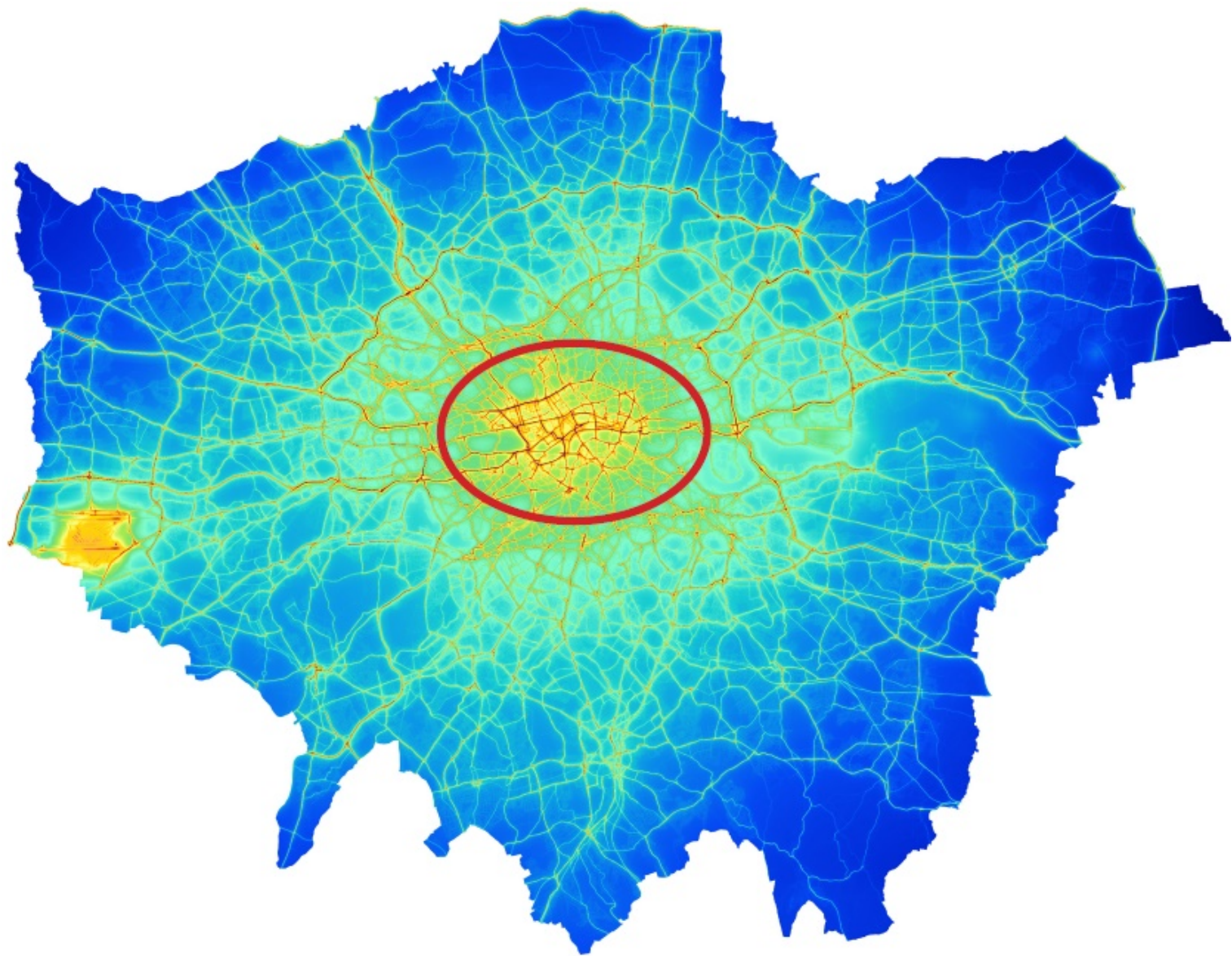


800 Page report! – What is the ambitious contribution of Solar PV?

Deployment potential (GWh)		BAU	National	Regional	Ambitious	Coordinated
Renewable energy – technologies not connected to heat networks						
Photovoltaic		1,646	1,844	2,940	3,957	2,793
Solar water heating		348	402	599	952	565
Ground source heat pump		124	186	246	480	256
Air source heat pump		856	1,279	1,583	2,799	1,533
Wind (commercial-scale)		59	65	125	181	126
Wind (small-scale)		1.9	2.1	4.5	6.4	4.3
Hydro		5.9	12.0	14.3	17.9	14.3
Energy generation	Electricity	1,713	1,923	3,084	4,162	2,938
	Heat	1,328	1,867	2,428	4,230	2,354
	Total	3,041	3,790	5,512	8,392	5,292
% of London's energy demand, 2031	Electricity	4.0%	4.9%	7.8%	10.6%	7.5%
	Heat	1.5%	2.7%	3.5%	6.1%	3.4%
	Total	2.3%	3.5%	5.1%	7.7%	4.9%
Carbon savings (MtCO₂)		0.7	0.7	1.5	1.6	1.1
Non-renewable energy linked to heat networks						
CCGT – medium		2,050	1,206	3,183	-	16,954
CCGT – small		7.3	-	0.9	-	-
Electrical grid overspill		-	-	-	-	-
Energy from waste – gasification		134	1,195	210	962	1,130
Energy from waste – incineration		-	-	-	-	-
Gas engine – medium		-	-	-	-	-
Gas engine – small		1,482	1,472	1,210	506	964
Heat recovery from sewage		-	-	-	-	-
Heat rejection from air conditioning		-	-	-	-	-
Waste heat from existing energy from waste plant ²		-	-	-	1,186	-
Waste heat from existing power plant ²		7.3	-	0.8	-	-
Waste heat from power stations outside Greater London ³		-	-	-	17,720	-
Energy generation	Electricity	1,780	1,629	2,405	10,821	10,943
	Heat	1,899	2,232	2,197	8,803	8,093
	Total	3,679	3,861	4,602	19,624	19,036
% of London's energy demand, 2031	Electricity	4.1%	4.1%	6.1%	27.5%	27.8%
	Heat	2.1%	3.2%	3.2%	12.7%	11.7%
	Total	2.8%	3.6%	4.2%	18.1%	17.5%

Carbon savings (MtCO ₂) ⁴		0.2	-0.04	0.3	0.8	-0.3
Renewable energy linked to heat networks						
Anaerobic digester		29.5	263	46.4	213	249
Biomass Combined Heat and Power (CHP) – large		-	4,730	-	5,270	-
Biomass CHP – medium		47.0	1,385	2.4	1,116	1,308
Biomass district heating		193	1,491	296	1,361	1,596
Energy from waste – gasification		218	1,950	342	1,570	1,843
Energy from waste – incineration		-	-	-	-	-
Energy generation	Electricity	99	2,661	138	3,029	1,039
	Heat	391	7,171	551	7,250	3,969
	Total	489	9,832	689	10,279	5,008
% of London's energy demand, 2031	Electricity	0.2%	6.8%	0.4%	7.7%	2.6%
	Heat	0.4%	10.3%	0.8%	10.5%	5.7%
	Total	0.4%	9.0%	0.6%	9.5%	4.6%
Carbon savings (MtCO₂)		0.11	2.0	0.17	2.1	1.1
Total decentralised energy (all energy from heat networks)						
Energy generation	Electricity	1,878	4,290	2,544	13,850	11,981
	Heat	2,290	9,403	2,748	16,053	12,062
	Total	4,168	13,693	5,291	29,903	24,044
% of London's energy demand, 2031	Electricity	4.4%	10.9%	6.5%	35.2%	30.5%
	Heat	2.5%	13.6%	4.0%	23.1%	17.4%
	Total	3.1%	12.6%	4.9%	27.5%	22.1%
Carbon savings (MtCO₂)		0.3	2.0	0.4	2.9	0.8
Total						
Energy generation	Electricity	3,591	6,212	5,627	18,013	14,920
	Heat	3,618	11,270	5,176	20,283	14,416
	Total	7,209	17,483	10,803	38,295	29,336
% of London's energy demand, 2031	Electricity	8.3%	15.8%	14.3%	45.8%	37.9%
	Heat	4.0%	16.2%	7.5%	29.2%	20.8%
	Total	5.4%	16.1%	9.9%	35.2%	27.0%
Carbon savings (MtCO₂)		1.0	2.7	1.9	4.6	1.8

Table i: Summary of deployment potential of decentralised energy by source and scenario, 2031





“Can we deliver the change quickly enough?”

innovation













smart

smart

Jahres-
und Gebrauchtwagen
in großer Auswahl
Inzahlungnahme aller Marken



Princeton Island Grid

- A **living lab** to serve as a platform for research and demonstration of new technology for commercial building & microgrid operation
- **Prime research partner** for DOE, national labs, and universities
- **Research hub** for the CCT Distributed Energy Systems & innovative Siemens products
- Open **site** for testing and demonstration of **Siemens products and technologies.**
- **Reduce CO₂ footprint** as the Siemens US lighthouse project

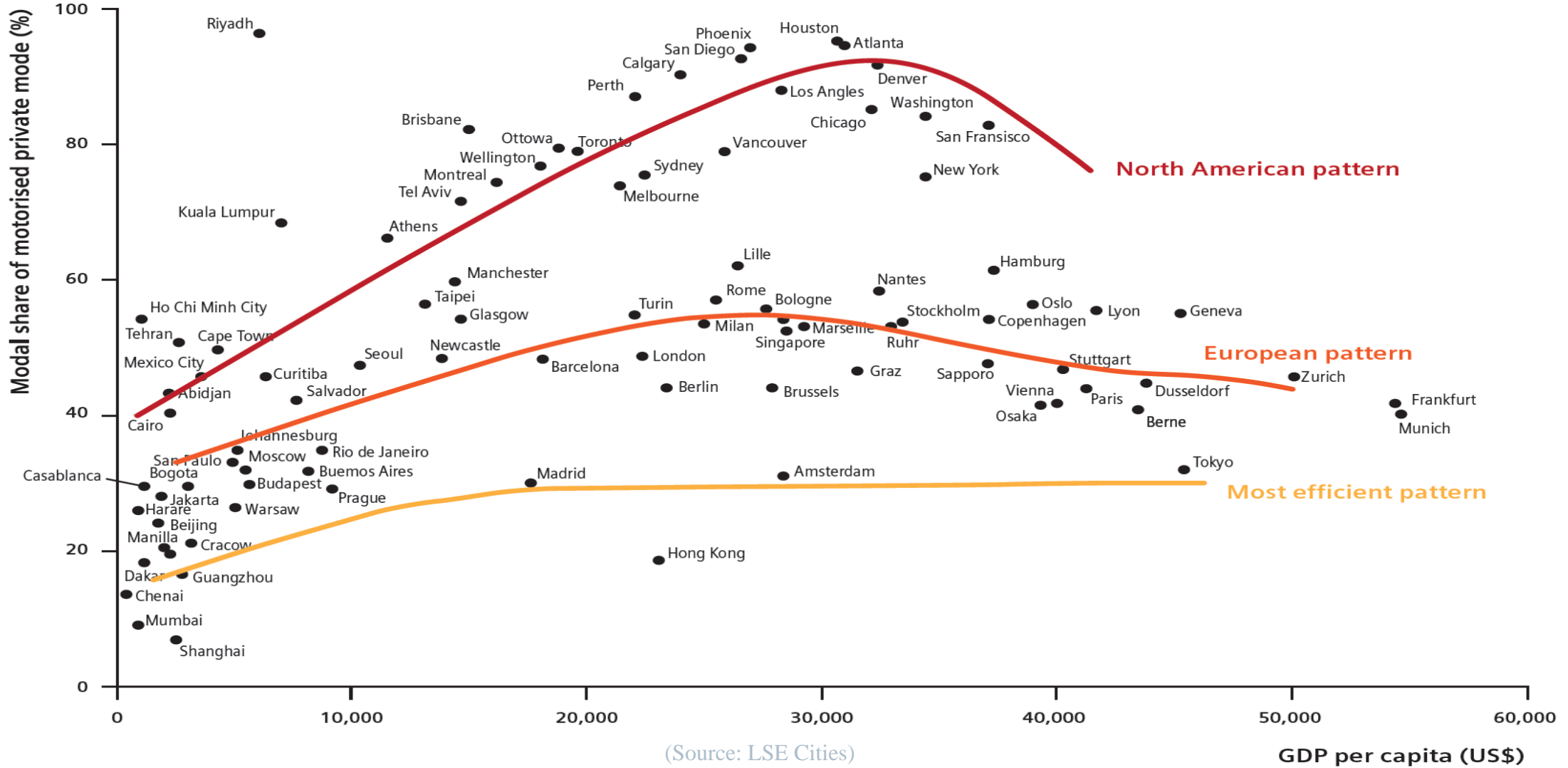


Learn more at usa.siemens.com/princeton

“How do we know we are making progress?”

celebrate success

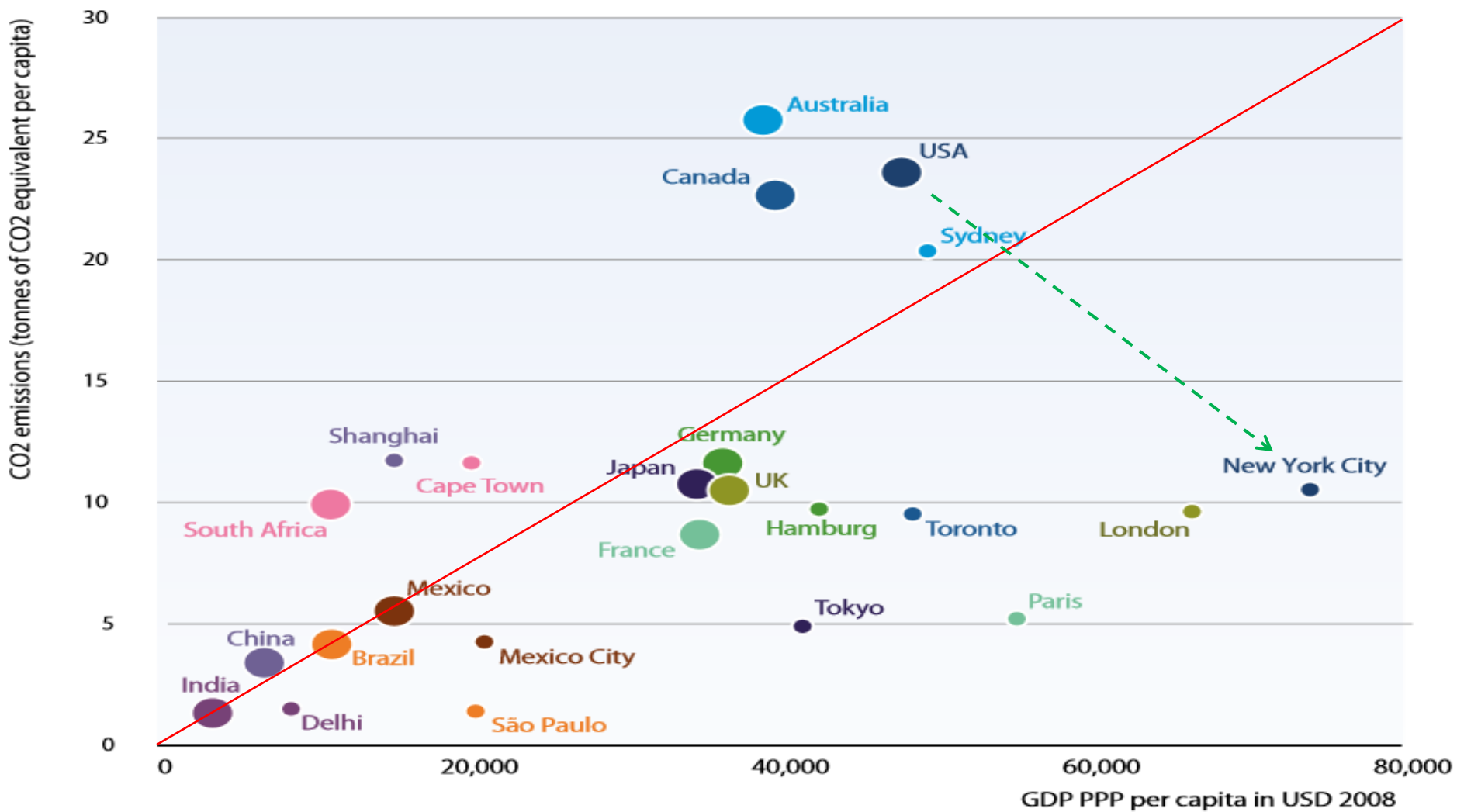
Decoupling: Rate of motorisation and GDP



(Source: LSE Cities)

GDP per capita (US\$)

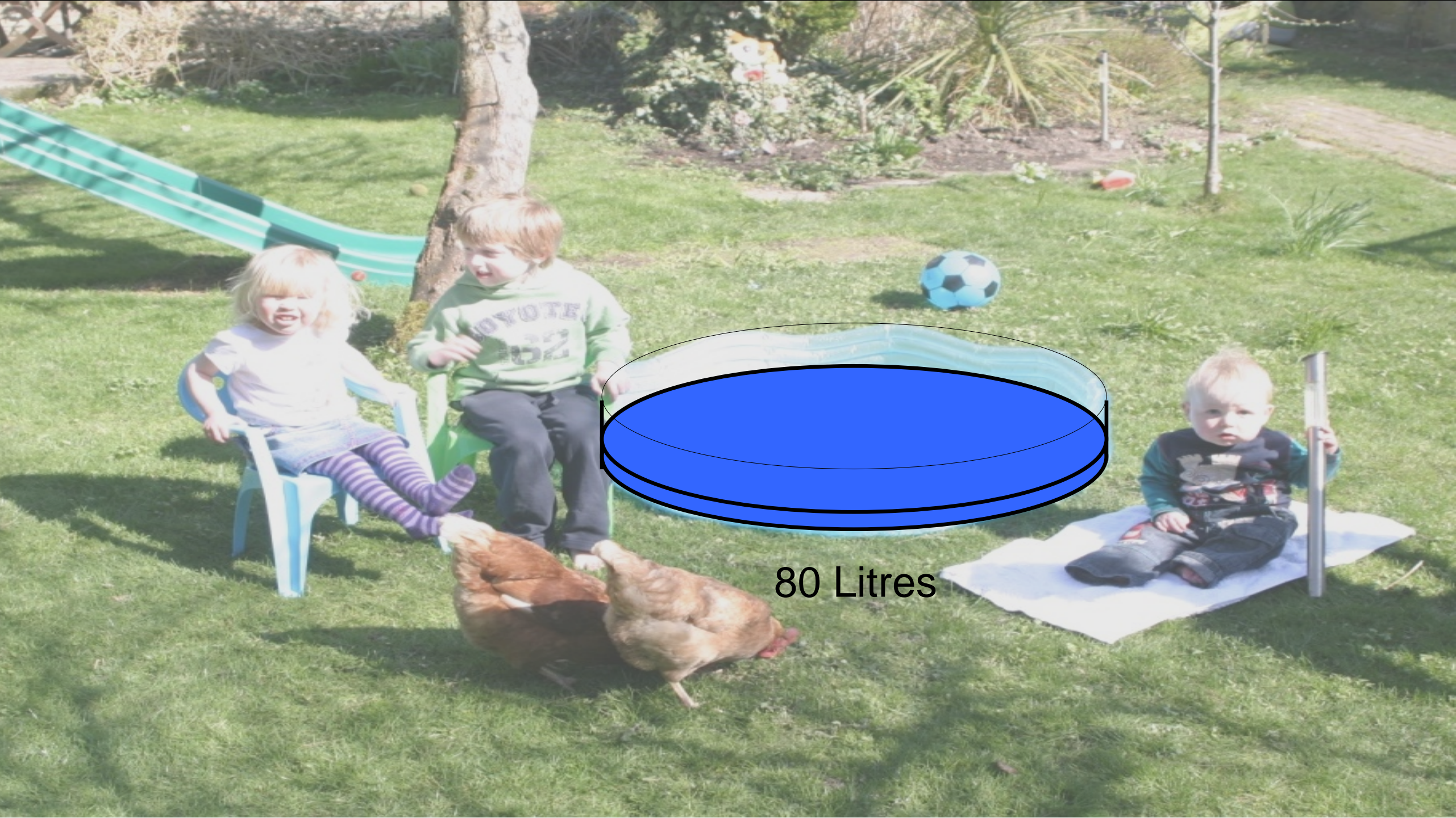
Decoupling: CO2 Emissions and GDP



“How can I contribute?”

meaningful measures





80 Litres



It's not easy...

...but it is simple



Thank You

Martin Powell

Global Head of Urban Development

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