McKinsey&Company

Asia and the new infrastructure opportunity

Siemens Finance Week | February 2017


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"I THINK THERE IS
A WORLD MARKET
FOR MAYBE FIVE
COMPUTERS."

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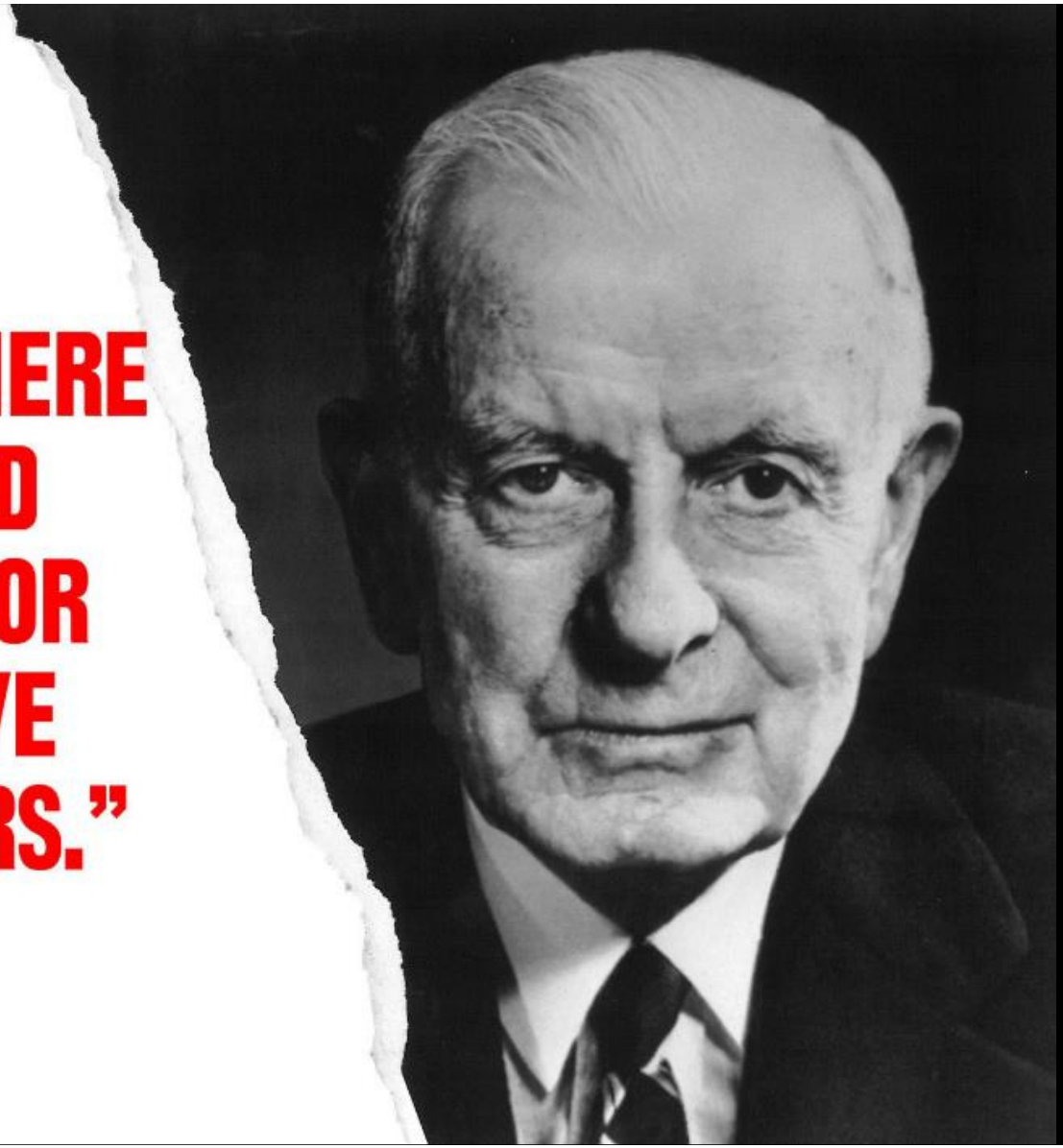
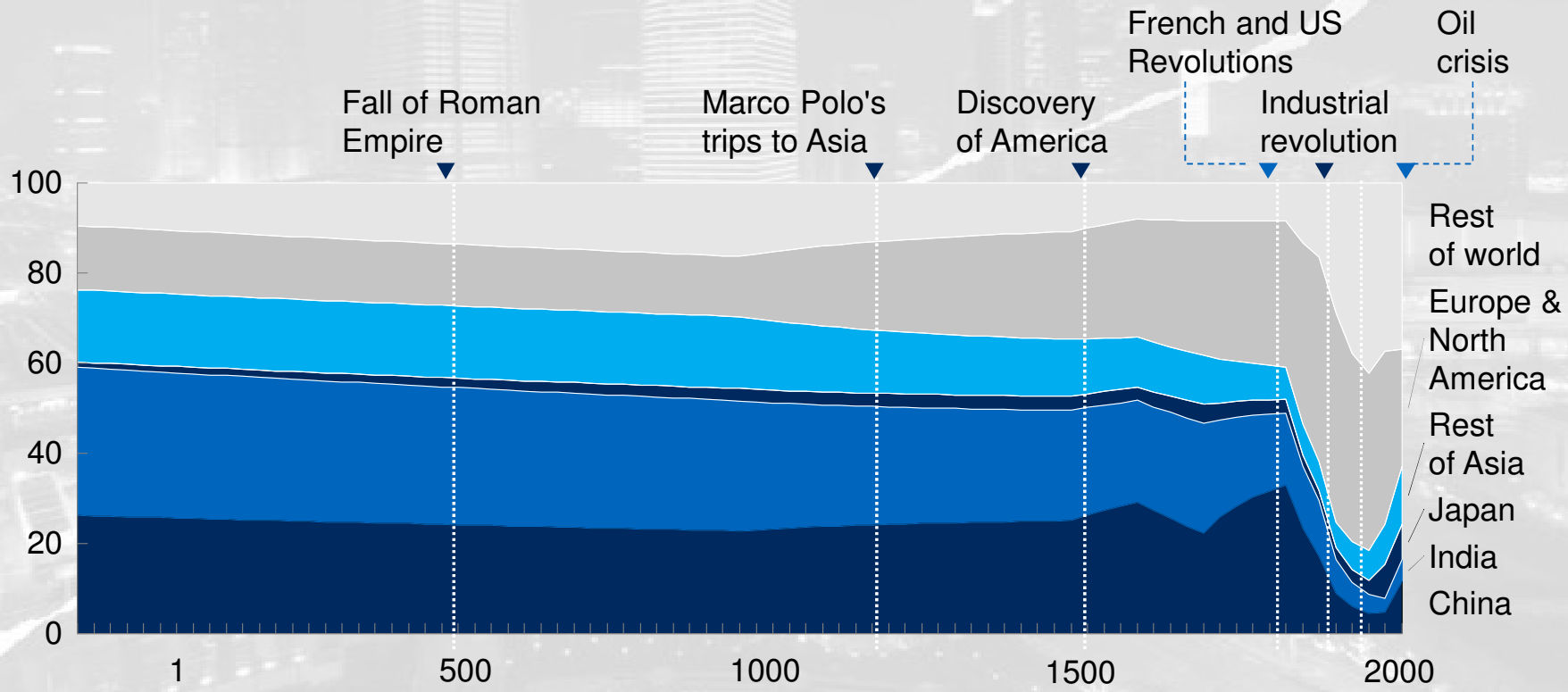
THOMAS J. WATSON



Asia is returning to play a critical role in the global economy

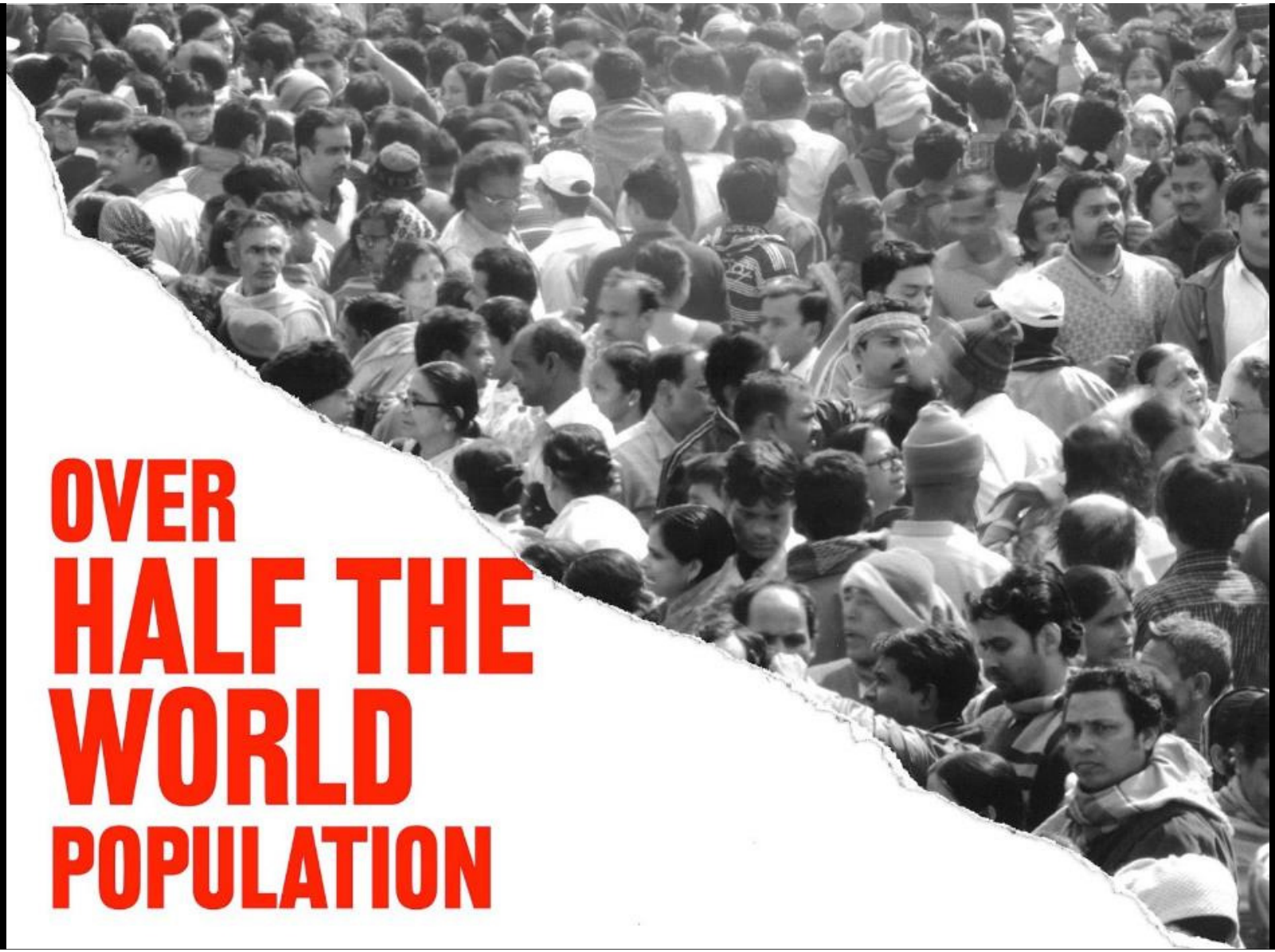
Share of world GDP (1 AD-2000s AD)

GDP share, percentage



SOURCE: Angus Madison's "Historical Statistics for the World Economy: 1-2004 AD"; Deutsche Bank Global Market Research

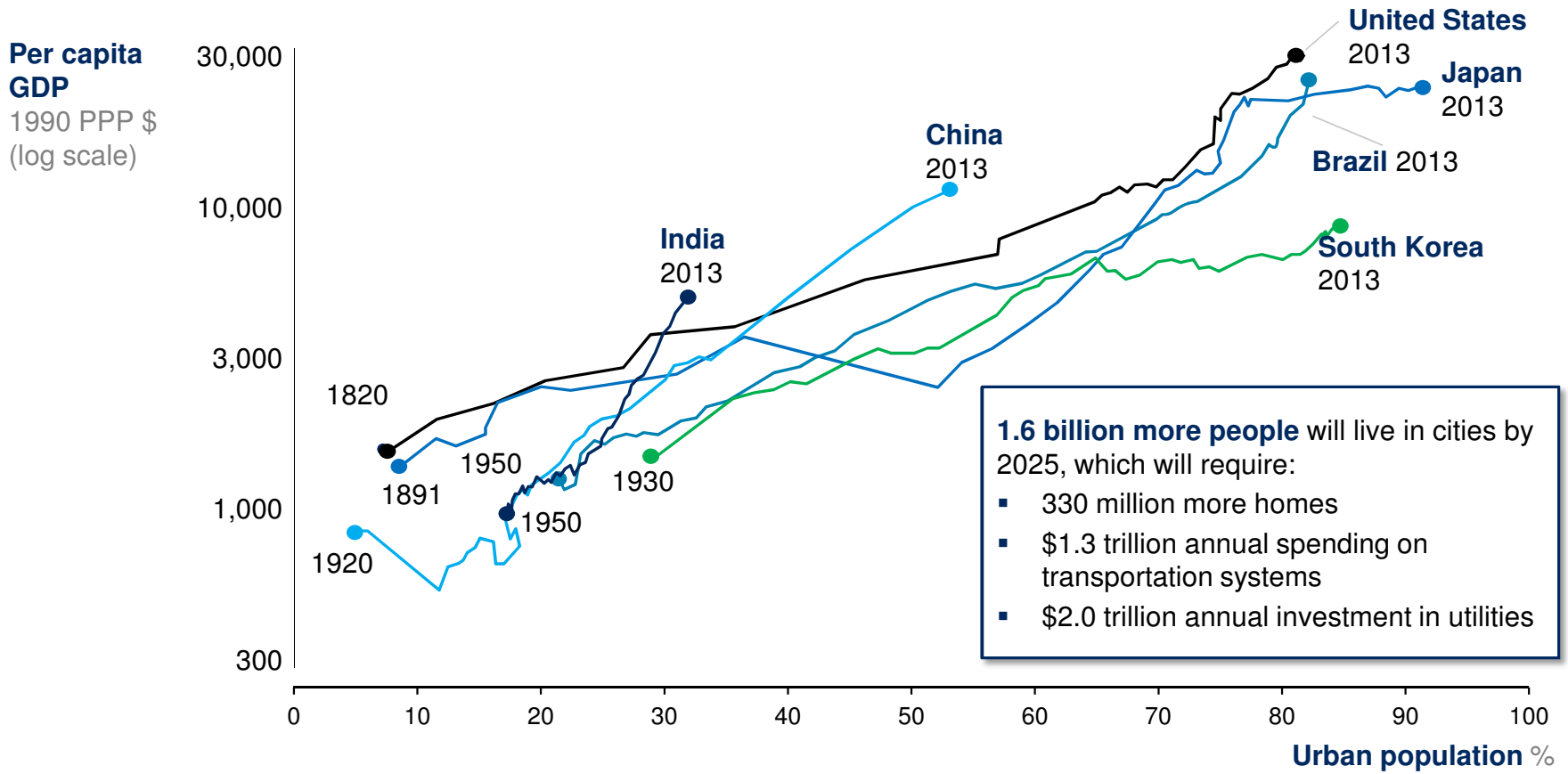

Four disruptive forces
1
Industrialization and urbanization
2
An aging world
3
Disruptive technologies
4
Greater global interconnections


OVER
HALF THE
WORLD
POPULATION

65M

MORE PEOPLE EVERY YEAR

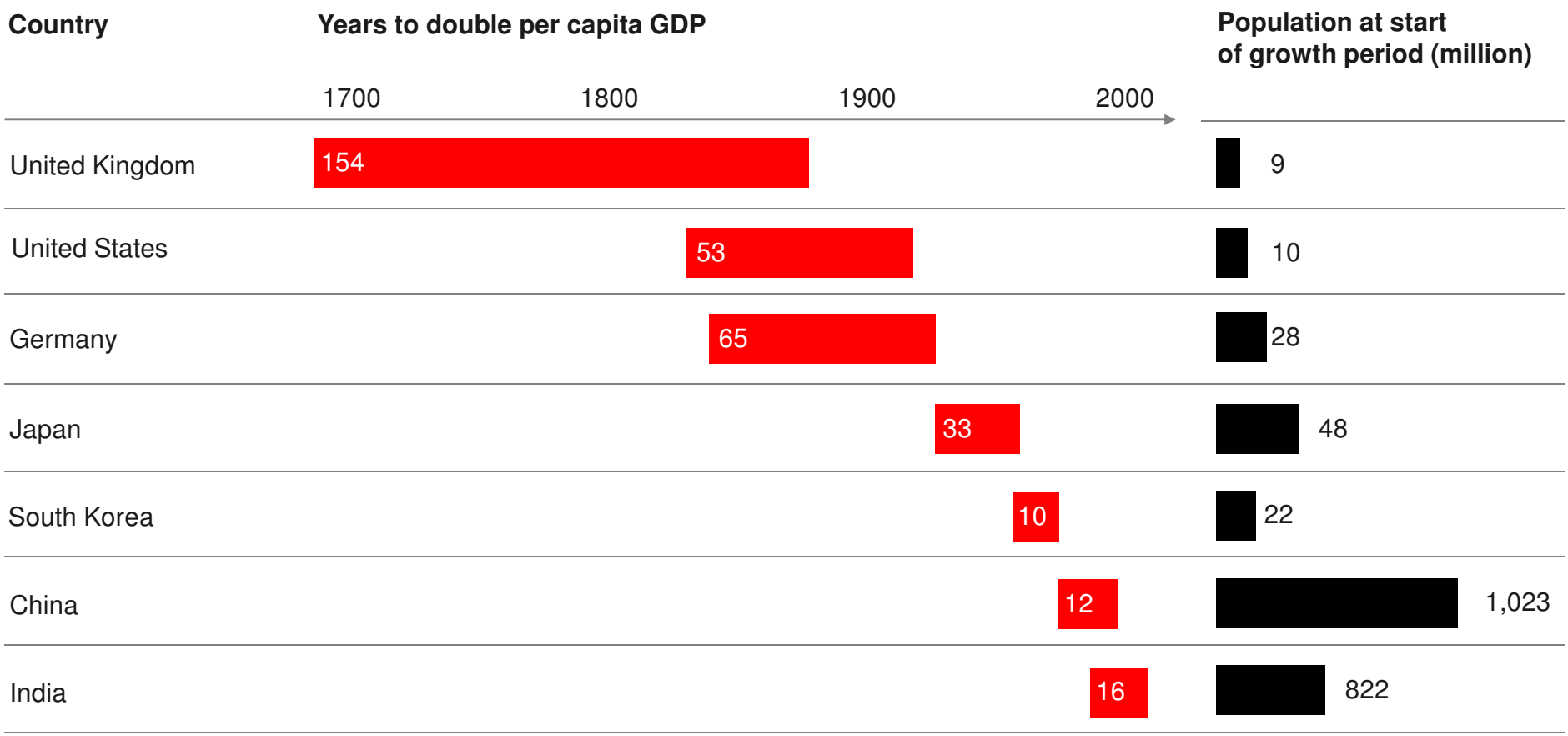
Urbanization is raising economic productivity but also requires investment



NOTE: Numbers may not sum due to rounding

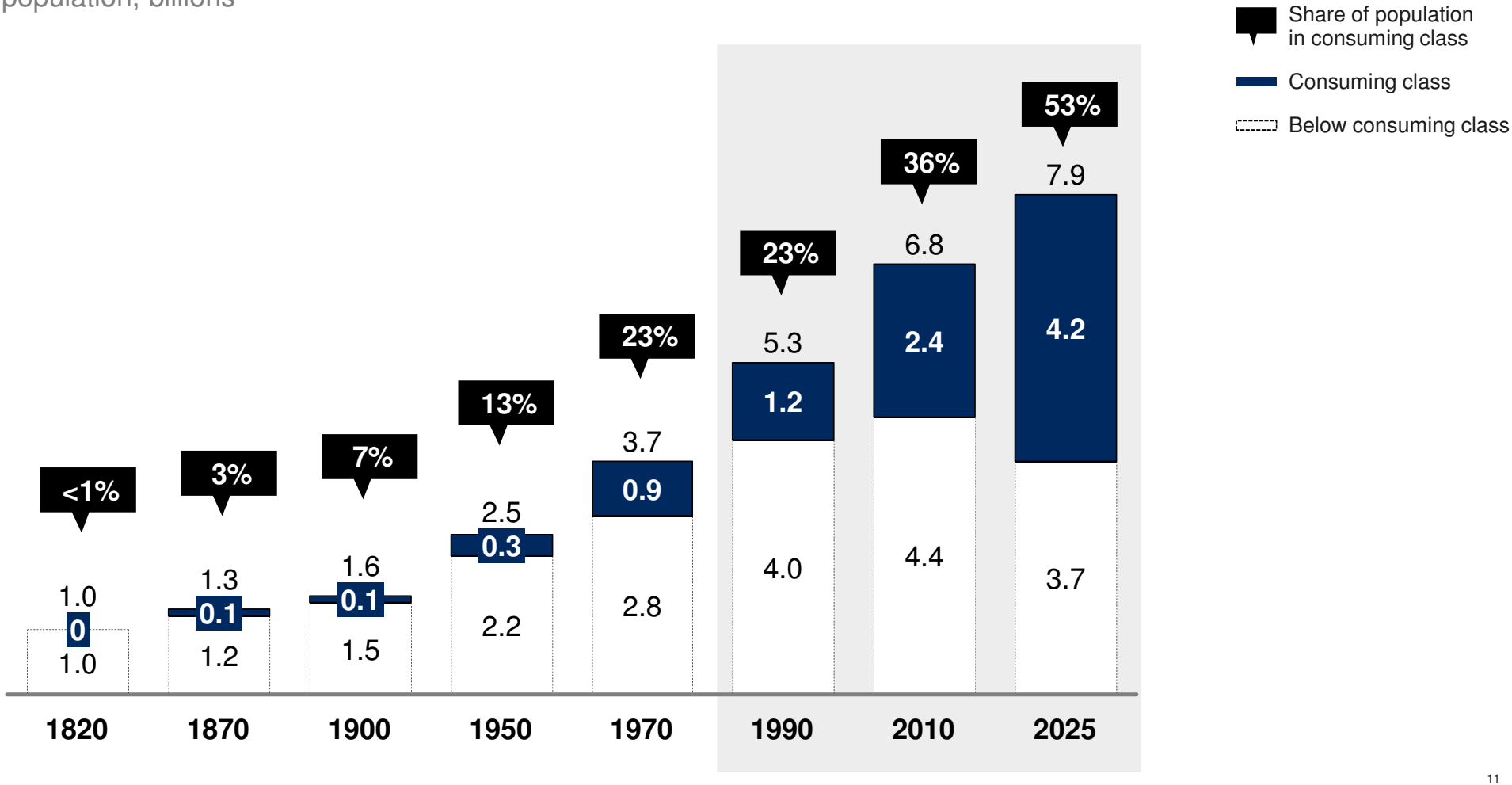
SOURCE: UN population Division; The Conference Board; McKinsey Mining Model, Q3 2015; Turner and Townsend; Gardiner and Theobald 2011; AECOM; Eurostat; UN Stats: McKinsey Global Institute Cityscope database; US Department of Housing and Urban Development; Global Construction 2025 report; Mexico Chamber of Commerce

3,000 times larger than the UK Industrial Revolution



Nearly 3 billion people will join the consuming class by 2025

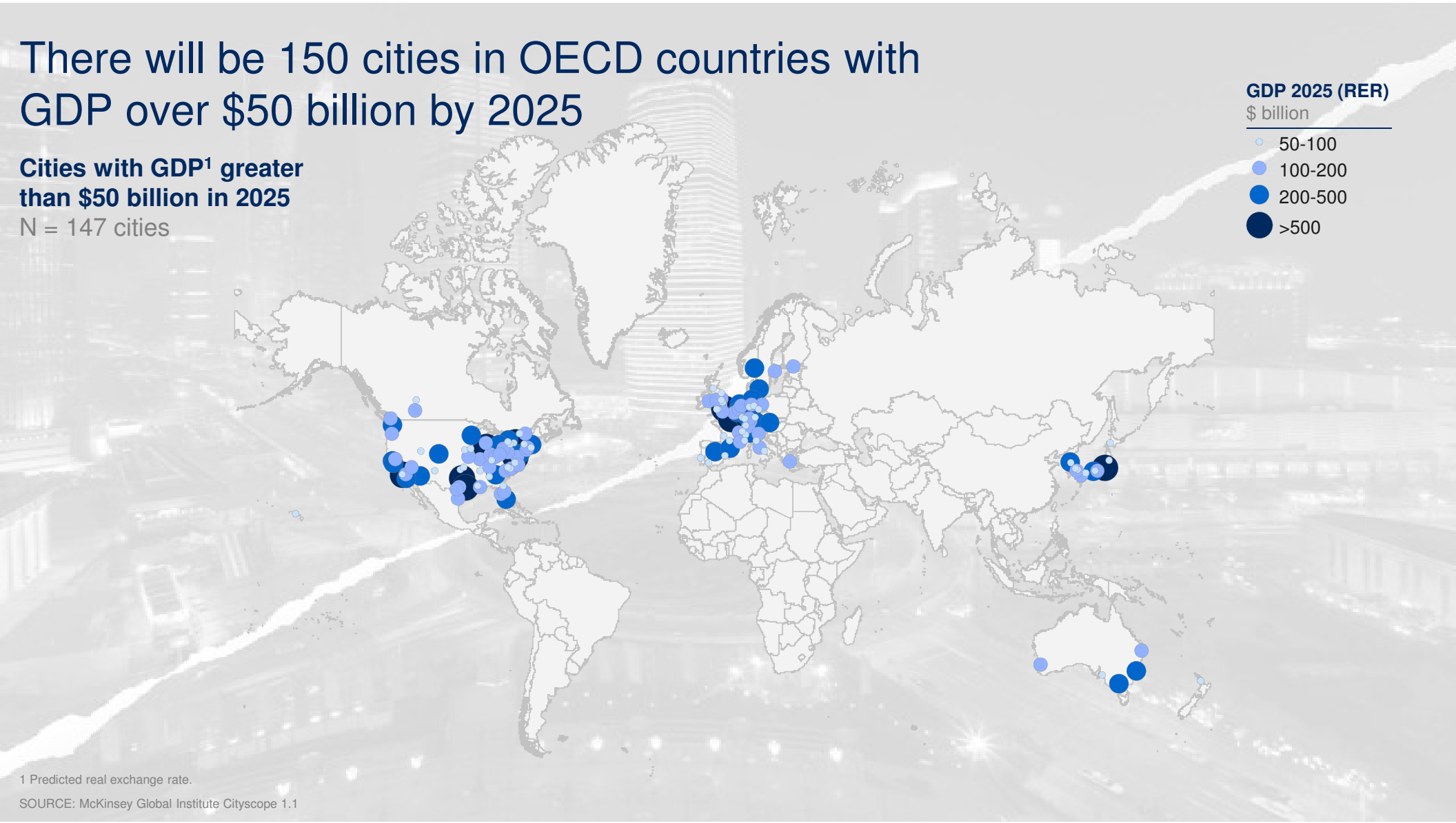
World population, billions



SOURCE: Homi Kharas; Angus Maddison; McKinsey Global Institute Cityscope 2.0

There will be 150 cities in OECD countries with GDP over $50 billion by 2025

Cities with GDP[1] greater than $50 billion in 2025
N = 147 cities

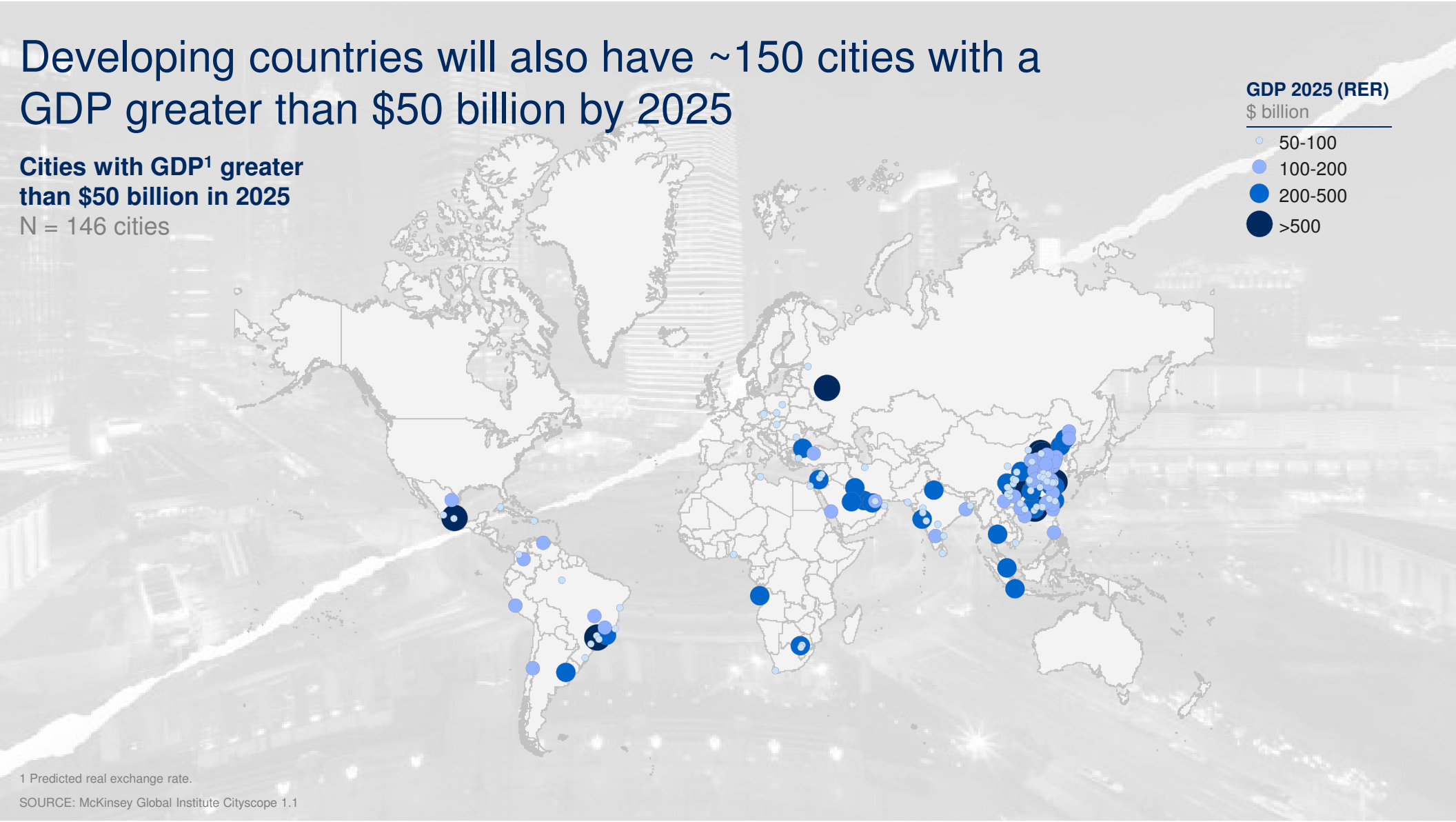


1 Predicted real exchange rate.

SOURCE: McKinsey Global Institute Cityscope 1.1

Developing countries will also have ~150 cities with a GDP greater than $50 billion by 2025

Cities with GDP[1] greater than $50 billion in 2025
N = 146 cities

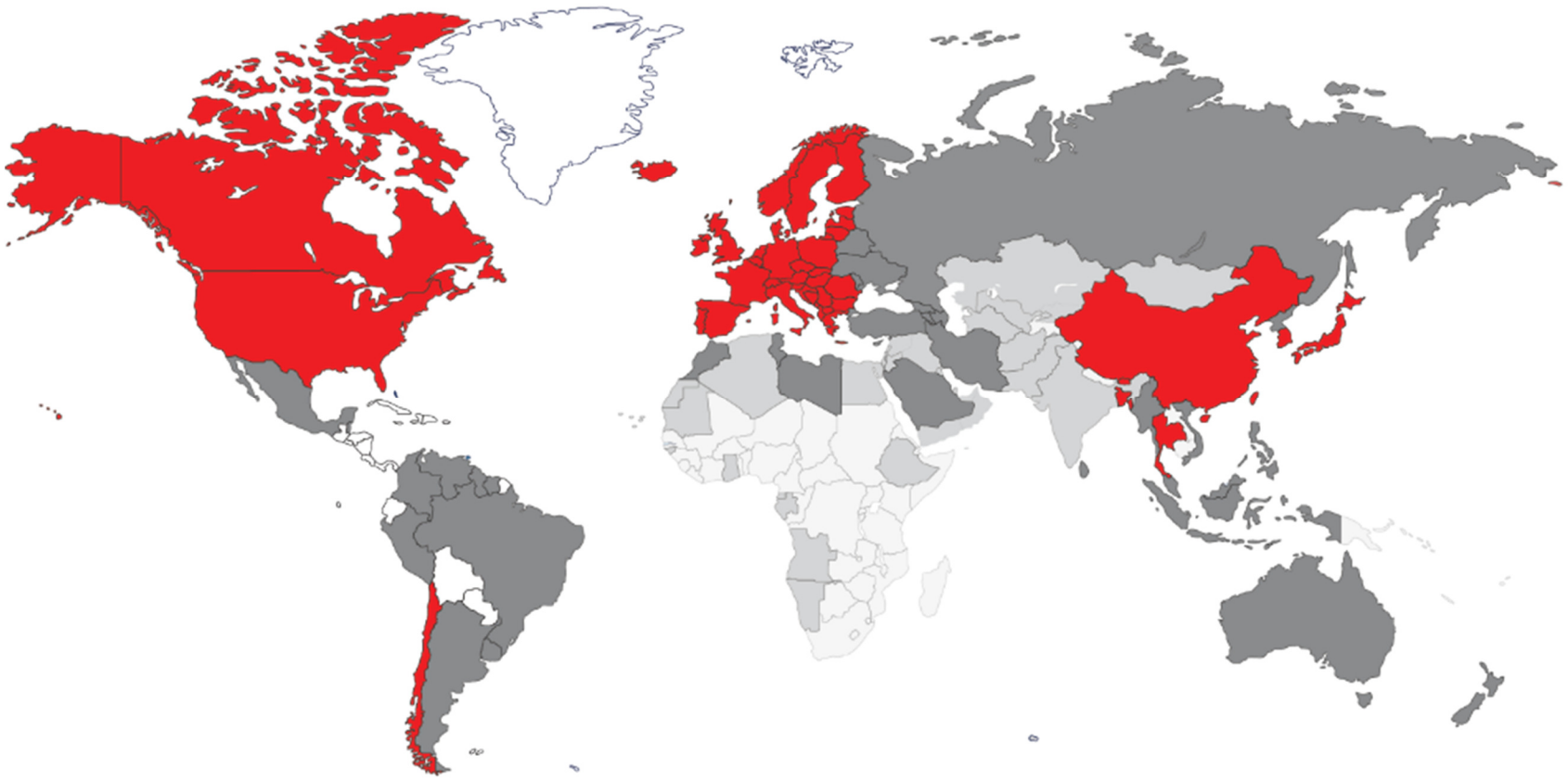


1 Predicted real exchange rate.

SOURCE: McKinsey Global Institute Cityscope 1.1

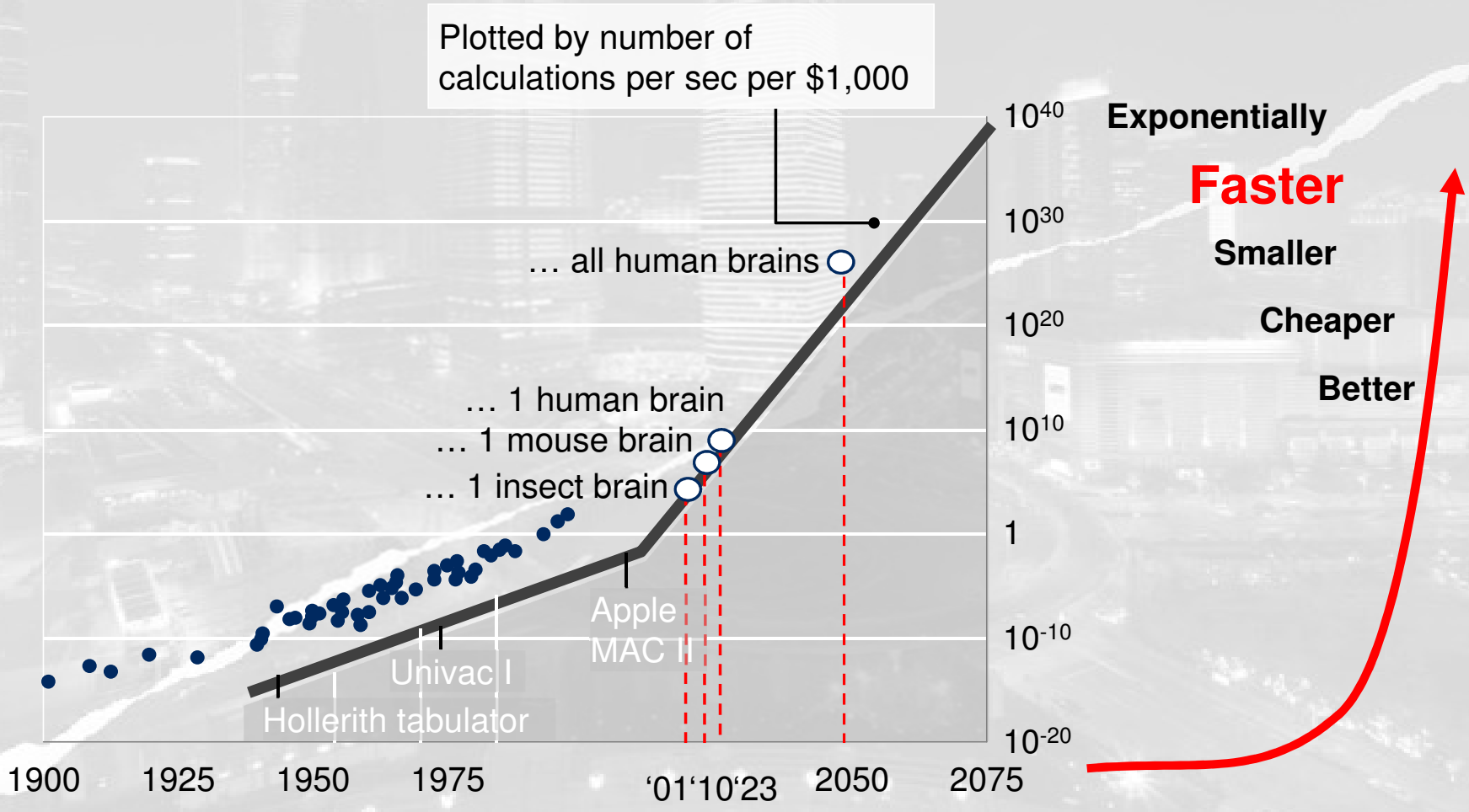
By 2040, about 1 in 4 people in advanced economies and China will be 65 years old or older

Share of population 65+, 2040E



SOURCE: UN Population Division; McKinsey Global Institute analysis

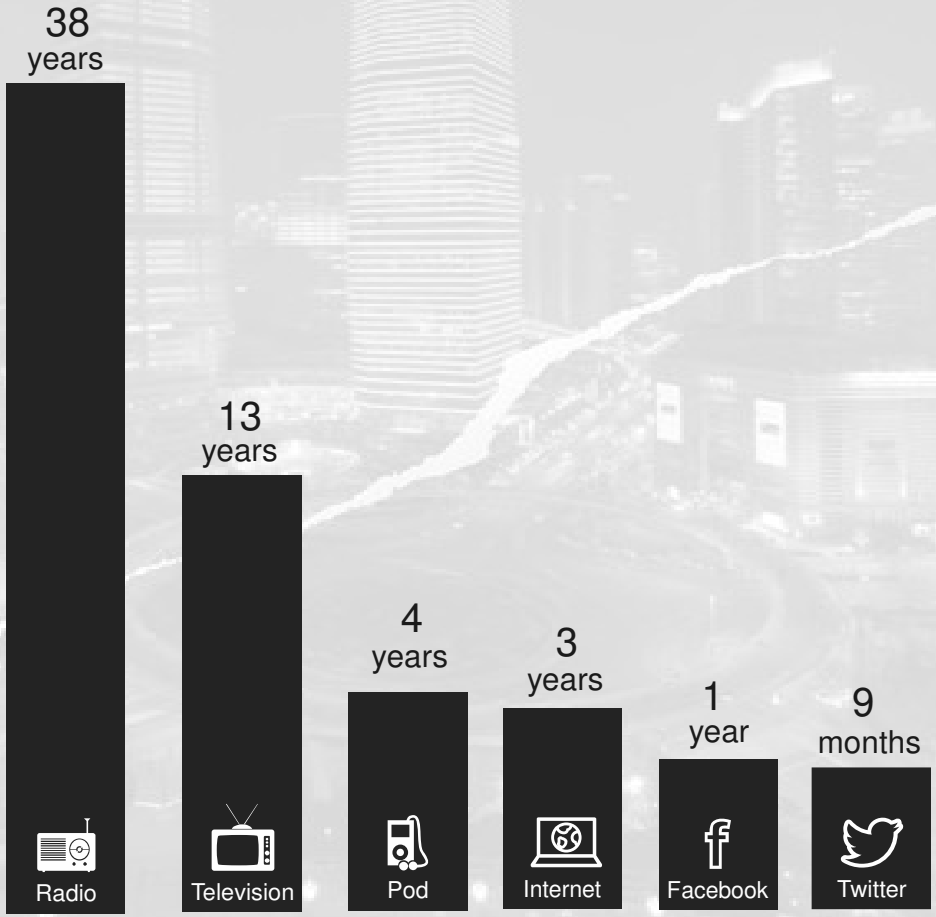
The pace of digital disruption is accelerating



SOURCE: Singularity University

Adoption of new technologies is also accelerating

Time to reach 50 million users



SOURCE: Press reports; McKinsey Global Institute analysis

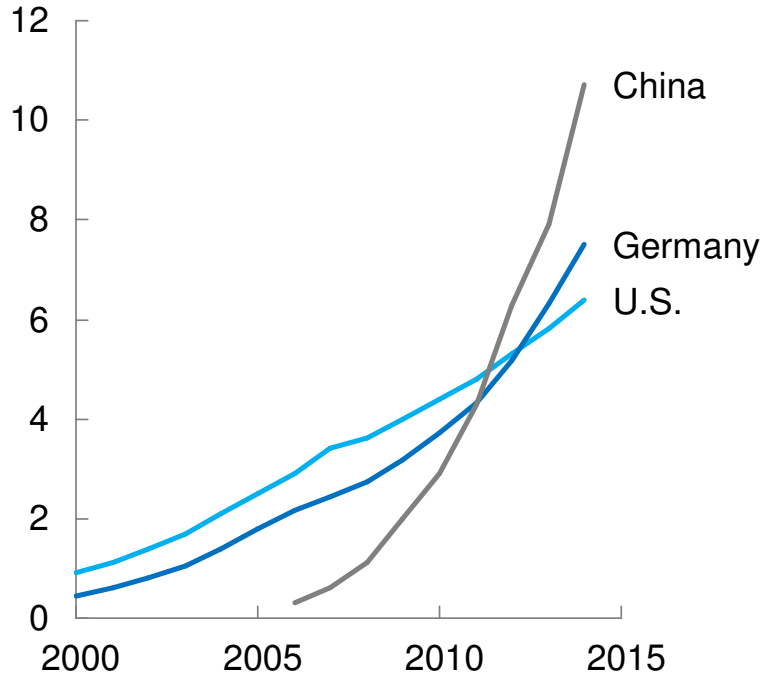
But is also creating huge opportunities

Innovative semiconductor sequencing chip

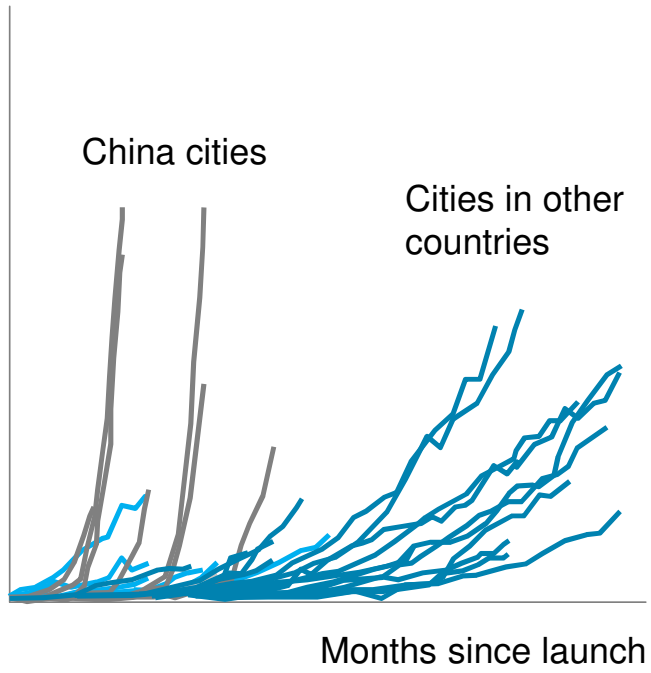
Even in traditional industries

Adoption to new technology happens suddenly in China

E-commerce adoption
Percent of total retail value



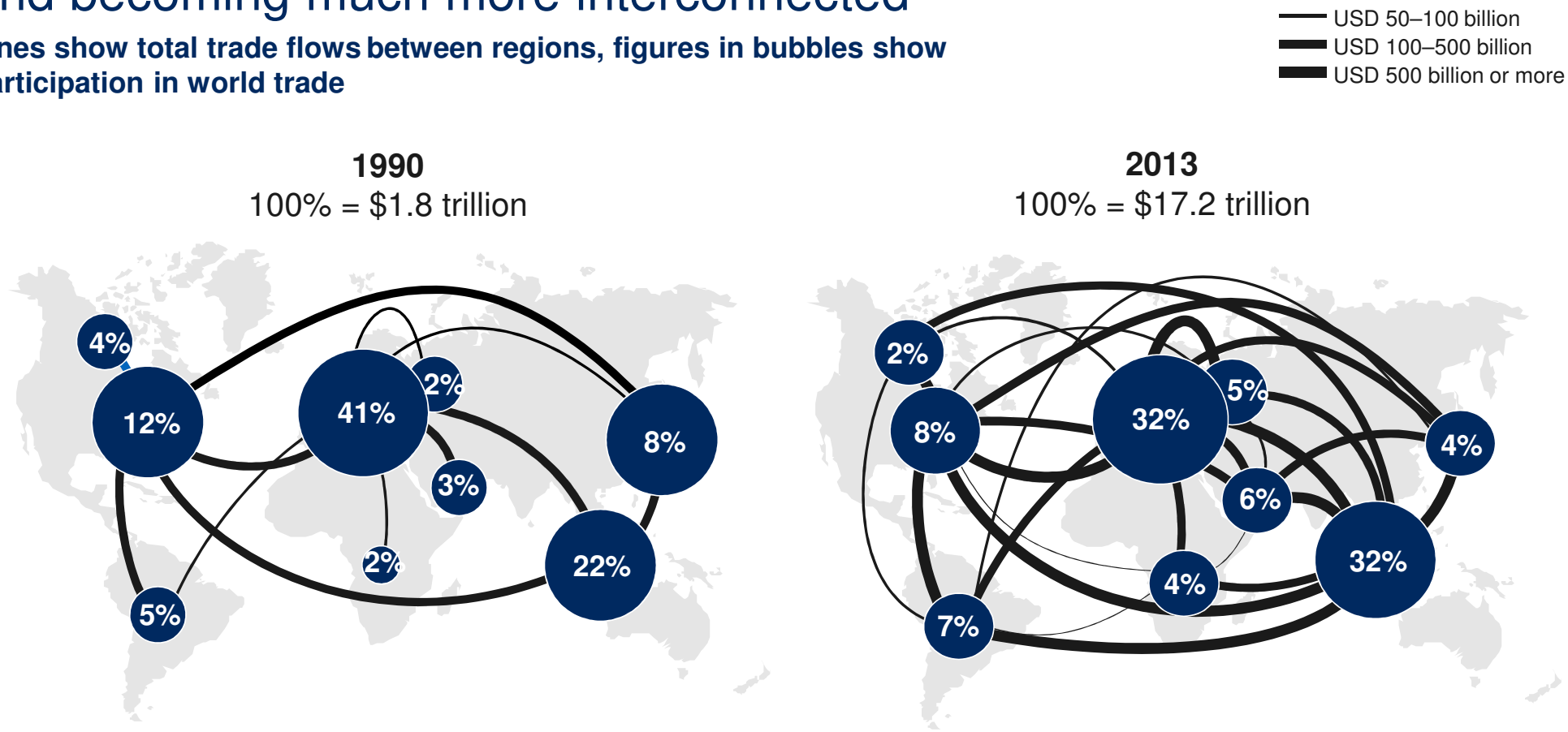
Sharing economy adoption
Number of Uber trips



SOURCE: Uber; eMarketer

Networks of global trade flows are expanding and becoming much more interconnected

Lines show total trade flows between regions, figures in bubbles show participation in world trade



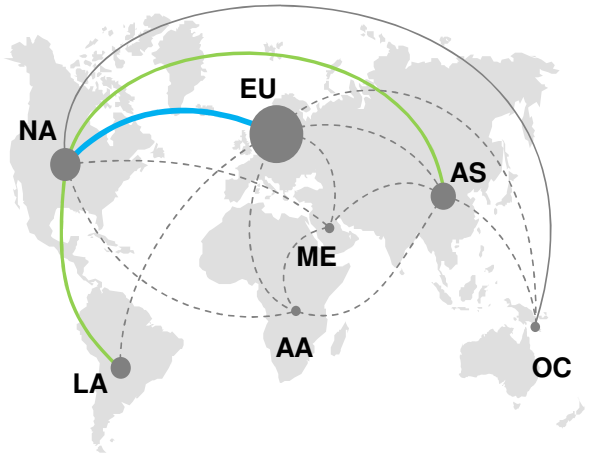
SOURCE: The Conference Board Total Economy Database; UN Population Division; McKinsey Global Institute analysis

Data is the new major flow

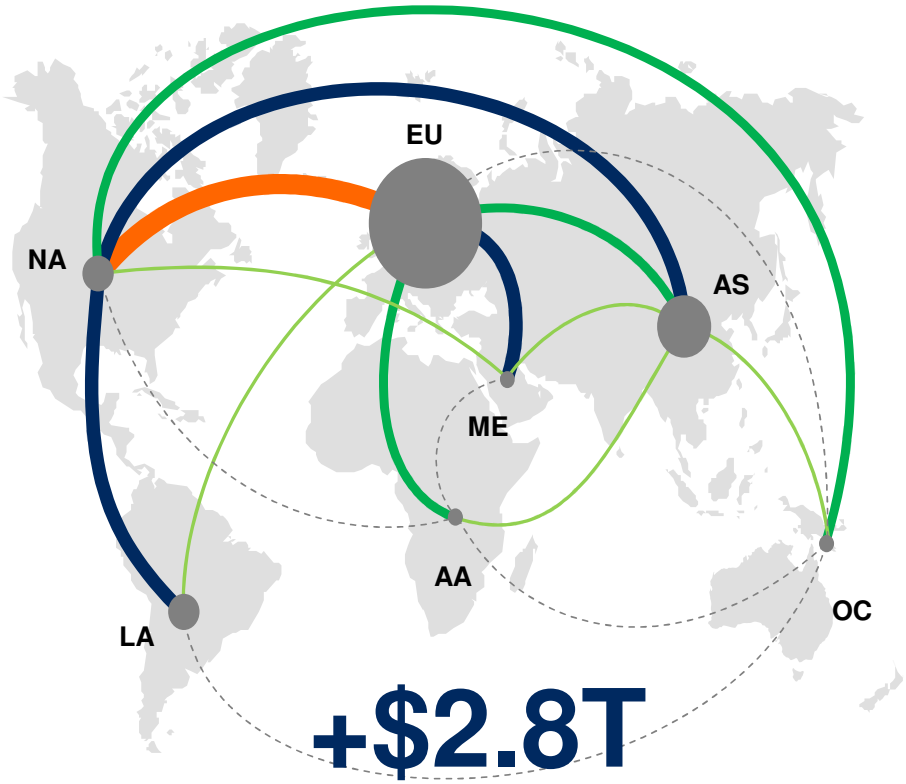
Bandwidth
Gigabits per second (Gbps)

<50 | 50–100 | 100–500 | 500–1,000 | 1,000–5,000 | 5,000–20,000 | >20,000

2005[1]
100% = 4.7 Terabits per second (Tbps)



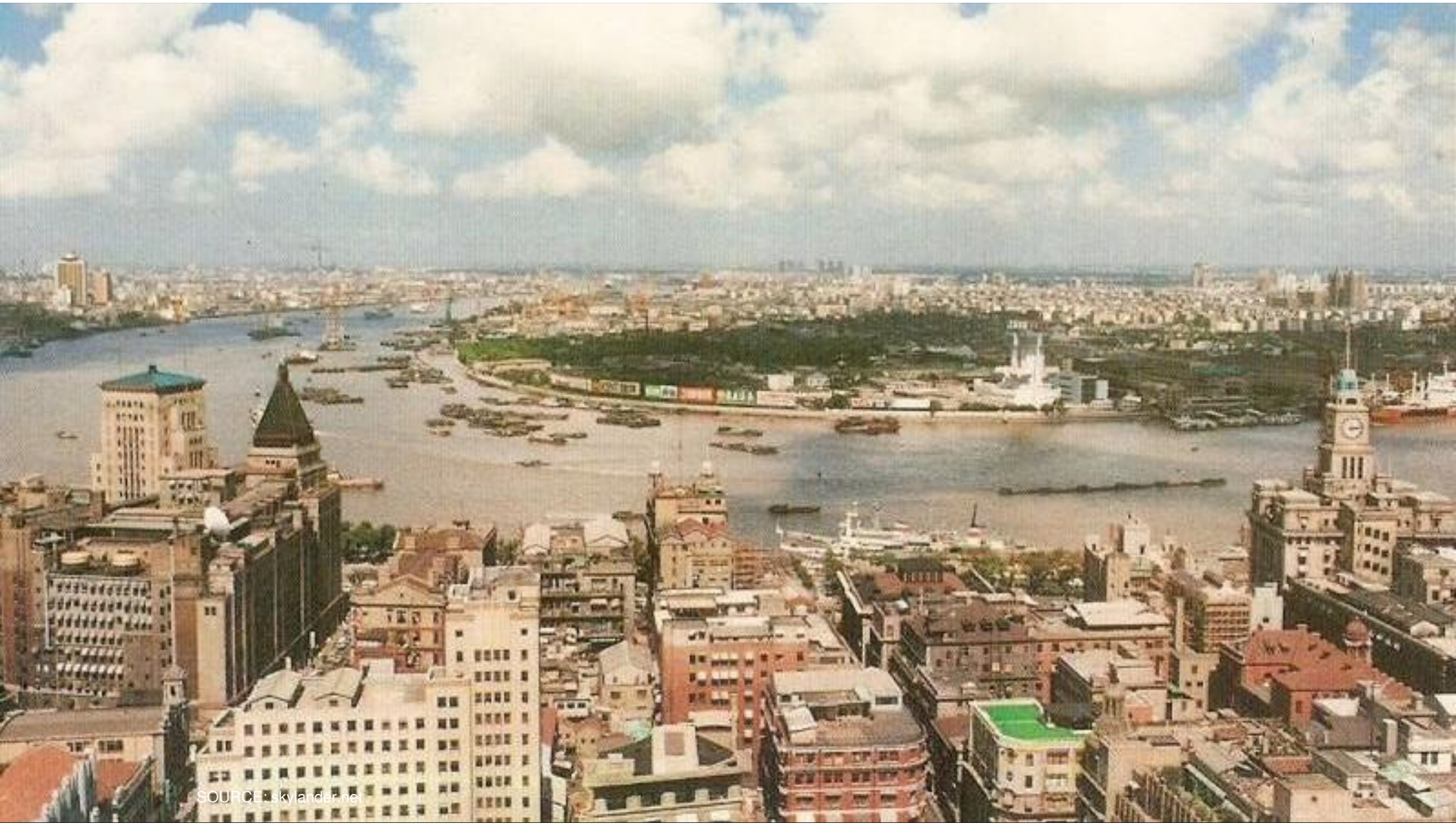
2014 **45x larger**
100% = **211 Tbps**



+$2.8T

SOURCE: TeleGeography; McKinsey Global Institute analysis

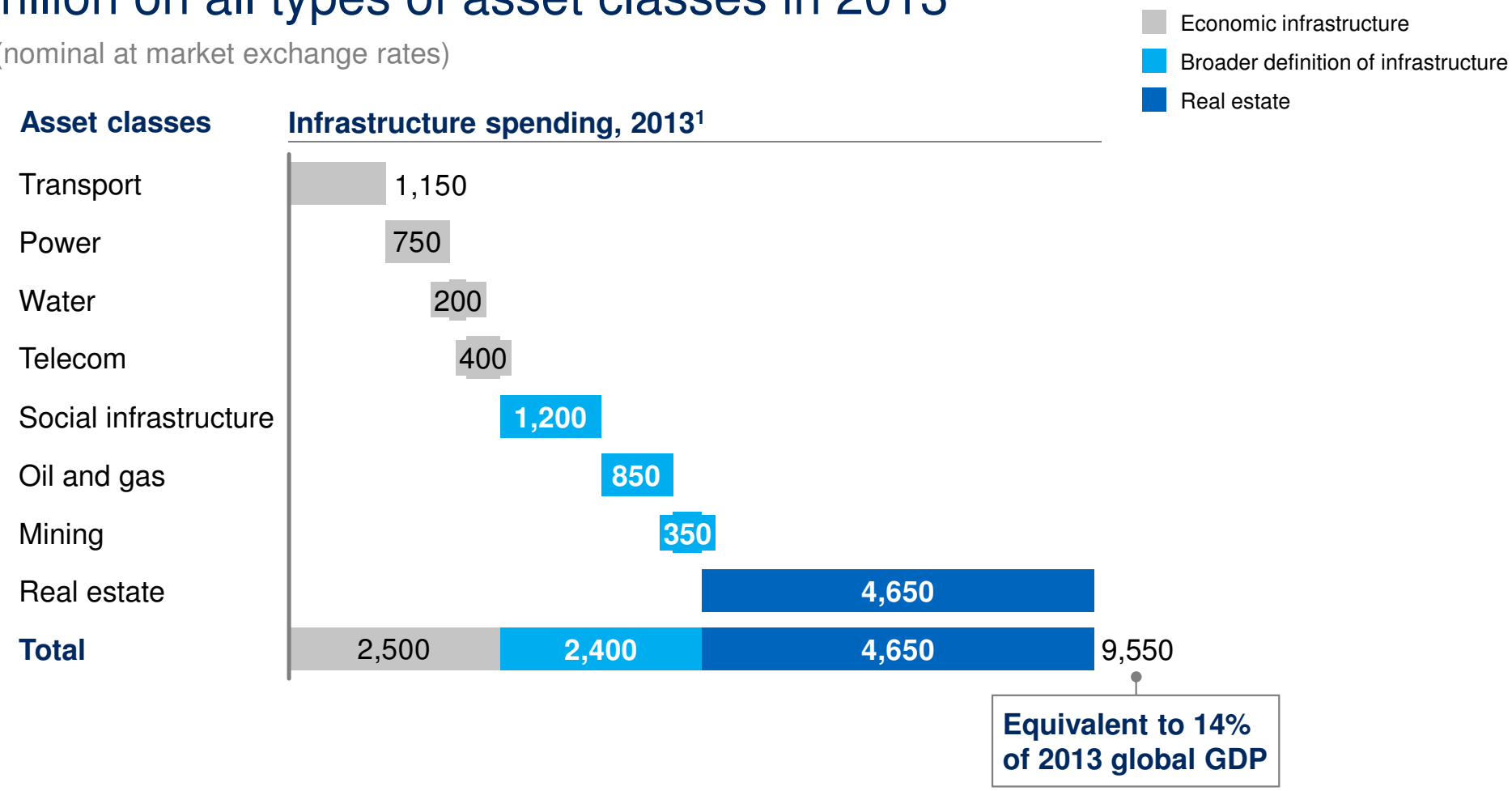
So what for infrastructure?


SOURCE: skylander.net

SOURCE: photos4travel.com

Using the broadest definition of infrastructure, the world spent $9.6 trillion on all types of asset classes in 2013

$ billions (nominal at market exchange rates)

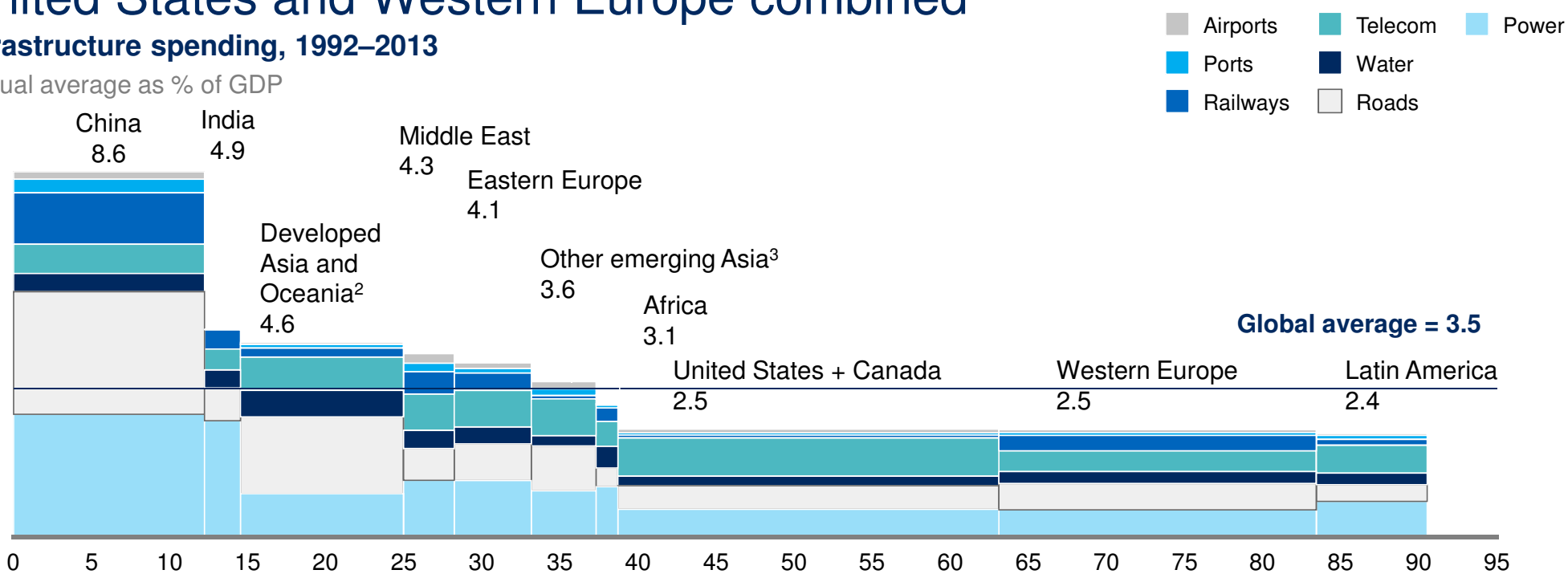


SOURCE: IHS; Euroconstruct; IMF; World Bank; OECD; McKinsey Global Institute analysis

China spends more on economic infrastructure annually than the United States and Western Europe combined

Infrastructure spending, 1992–2013

Annual average as % of GDP



% of world GDP[1]

Infrastructure spending, 2013, $ billion

829

448

335

Global total = 2,500

1 Percentage of world GDP generated by the 75 countries in our analysis for 2013 Lanka, Taiwan, Thailand, and Vietnam.

2 Includes Australia, Hong Kong, Japan, New Zealand, and Singapore

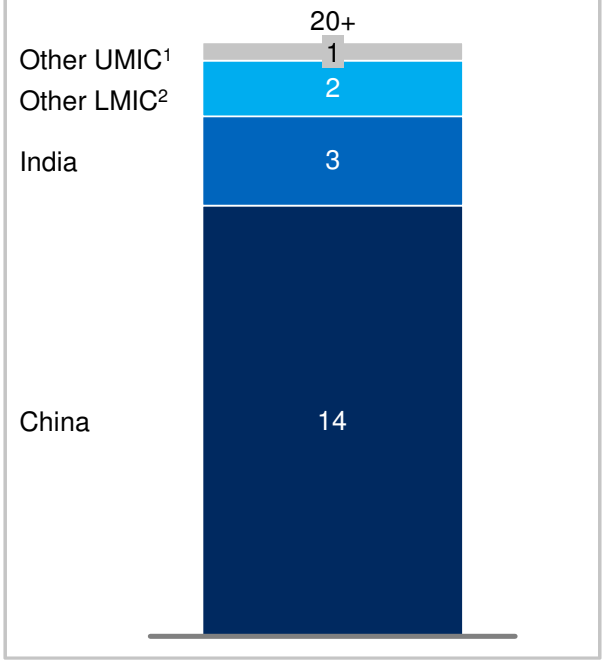
3 Includes Bangladesh, Indonesia, Malaysia, Pakistan, Philippines, Sri

SOURCE: IHS Global Insight, ITF, GWI, National Statistics; McKinsey Global Institute analysis

Over the next 15 years, $20 trillion of economic infrastructure spend will be needed in emerging Asia

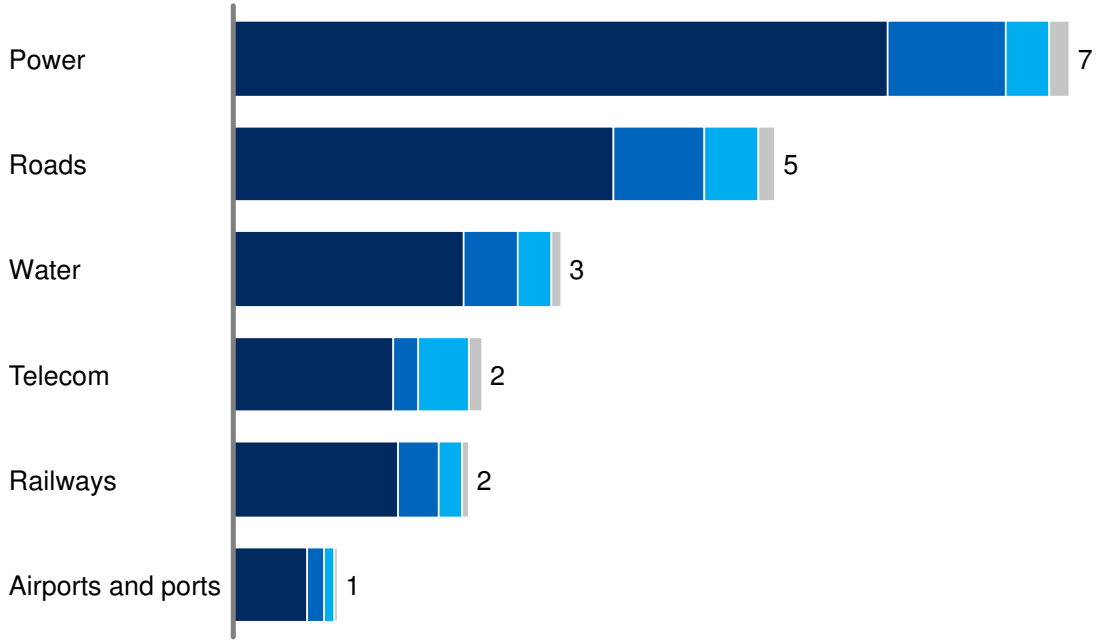
Cumulative infrastructure spend requirements from 2016-2030[3]

$ Trillions, MGI estimates[4]



Cumulative infrastructure spend requirements from 2016-2030 by sector

$ Trillions



1 Malaysia, Thailand 2 Bangladesh, Pakistan, Vietnam, Indonesia, Philippines, Sri Lanka

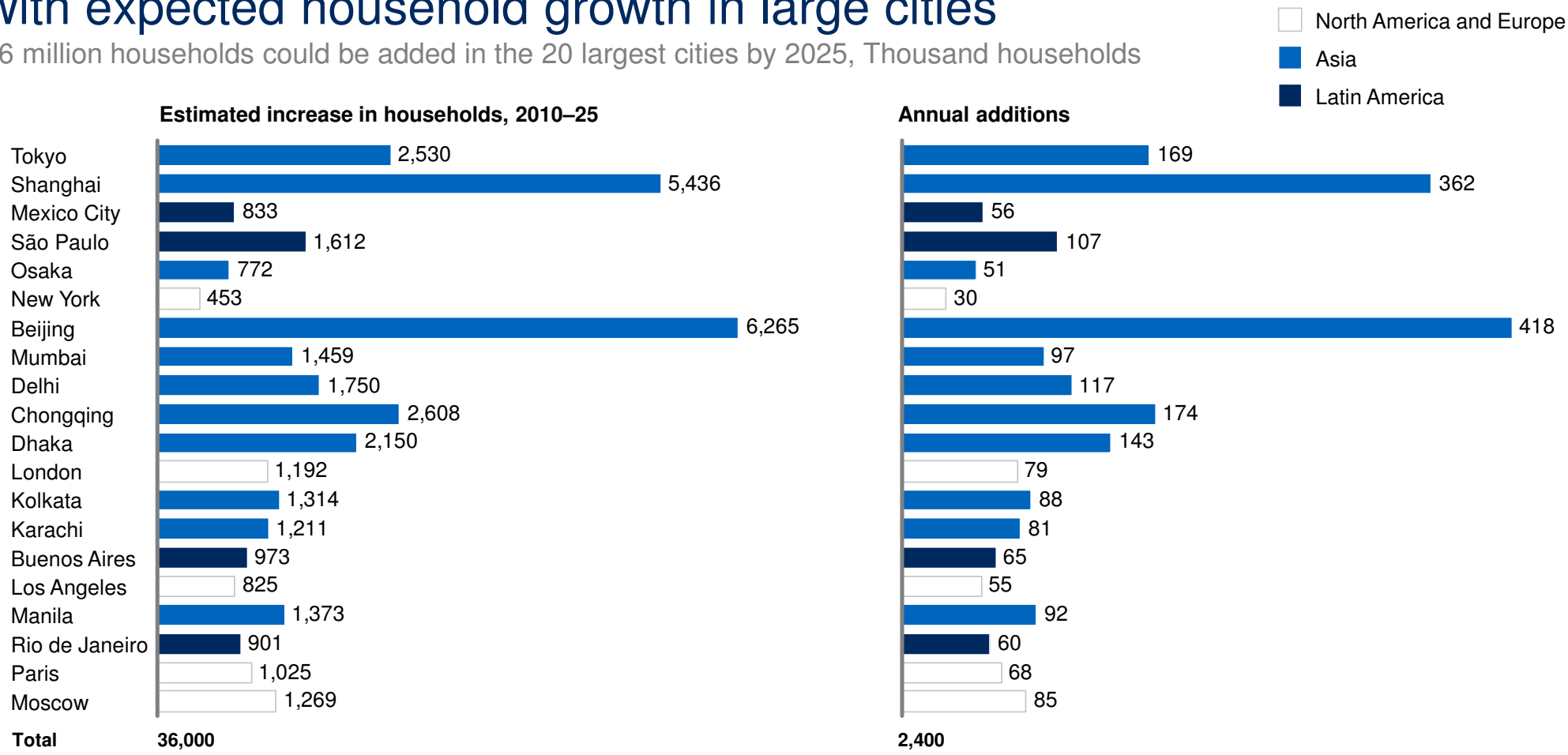
3 McKinsey Global Institute calculated in its report "Bridging Infrastructure Gaps" (2016) spend needed to support GDP growth with an asset to GDP ratio of 71% (ideal stock of infrastructure). The ideal stock of infrastructure is estimated by the proprietary model that MGI built to provide a rough estimate of the financial value of a country's infrastructure stock, based on an average of 20 countries (including China, India and Indonesia). For further details of the methodology, see the report: http://www.mckinsey.com/industries/infrastructure/our-insights/bridging-global-infrastructure-gaps

4 Other estimates for infrastructure (narrower set focusing on economic infrastructure) suggests ~$8 trillion (ADB, WB)

SOURCE : McKinsey Infrastructure Stock and Spend Analyzer – December 2015

A significant increase in housing construction will be needed to keep up with expected household growth in large cities

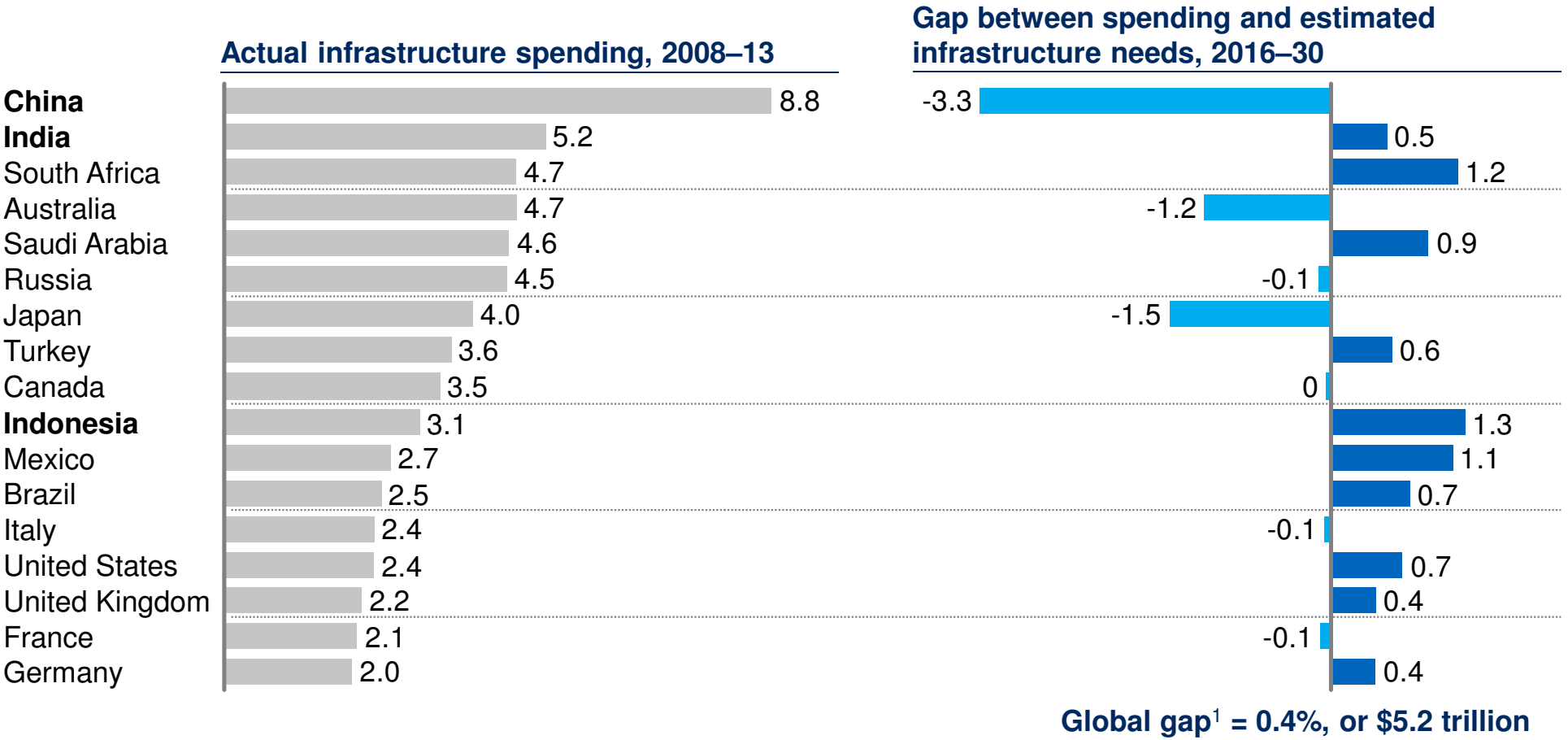
36 million households could be added in the 20 largest cities by 2025, Thousand households



NOTE: Not to scale. Numbers may not sum due to rounding.

SOURCE: Traxcn Construction Tech Report, February 2016

The size of the infrastructure investment gap varies widely by geography

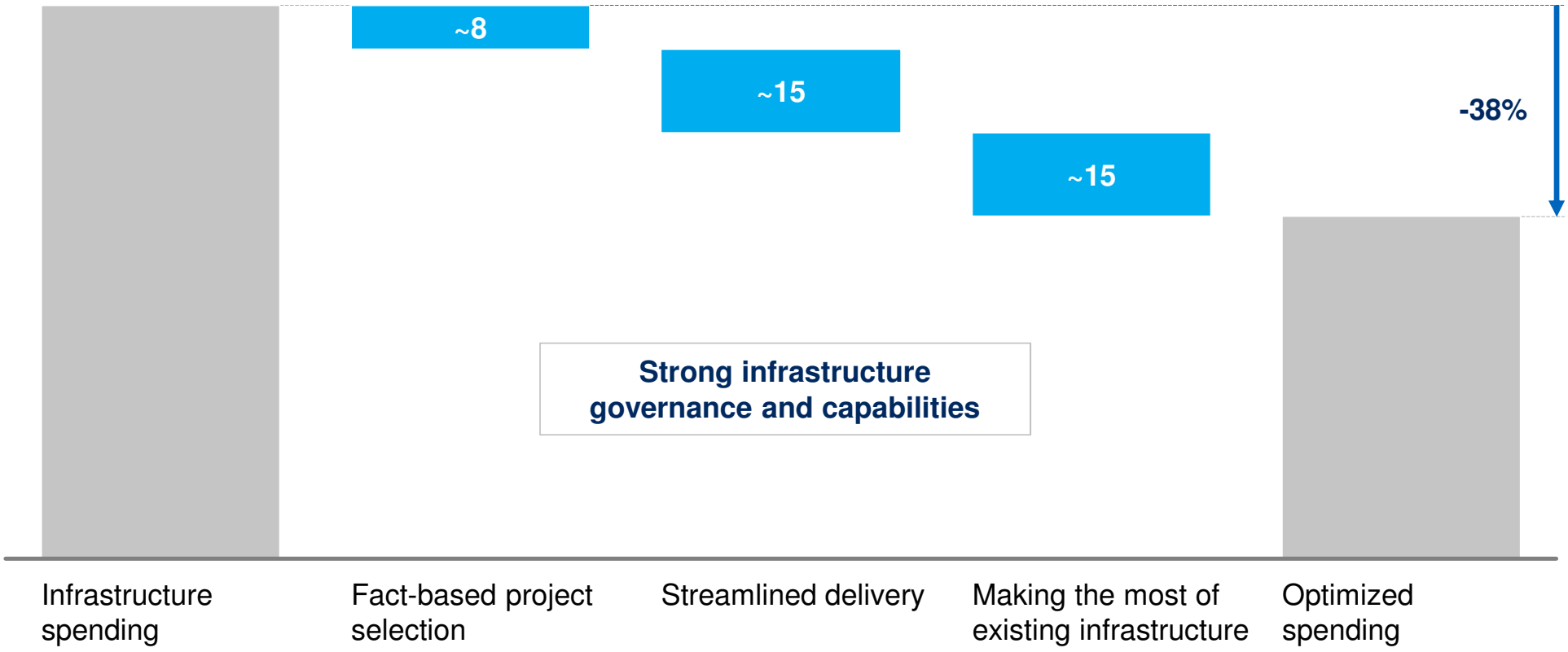


1 The global gap for 2016–30 as a share of GDP is calculated by adding negative values, converting to dollar terms, then dividing by cumulative world GDP. Without adjusting for positive gap, the value is 0.2 percent. This has been calculated from a set of 49 countries for which data are available for all sectors. This gap does not include additional investments needed to meet the UN Sustainable Development Goals
NOTE: Not to scale.

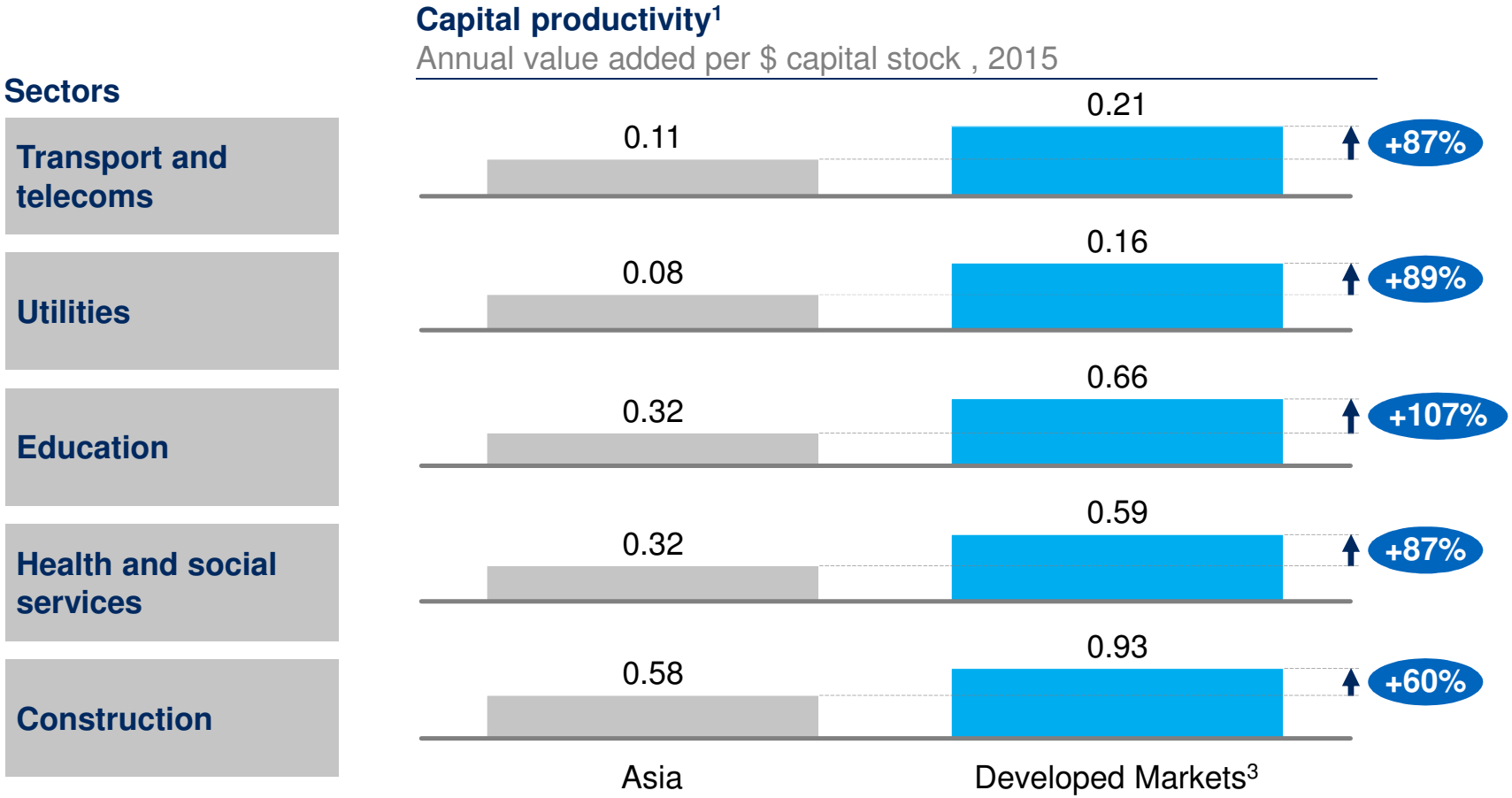
SOURCE: IHS Global Insight, ITF, GWI, National Statistics; McKinsey Global Institute analysis

Introducing globally proven best practices could save nearly 40 percent of infrastructure spending

Percent



In Asia, infrastructure asset classes have 60-100+% capital productivity improvement opportunities vis-à-vis developed markets



1 Not to scale; 2 Includes China, India, Indonesia, Philippines, Malaysia, Vietnam, Sri Lanka, Pakistan, Bangladesh, Thailand
3 The higher of either Western Europe or North America benchmark

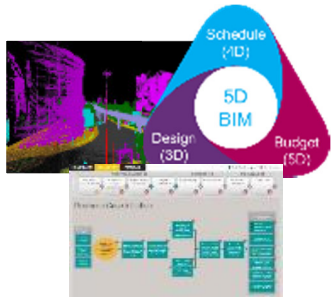
SOURCE: IHS Global Insight, McKinsey Global Institute

Significant productivity impact across digital, material, and automation tech

Projects must reject business as usual to become a nimble and innovative organization through mastery of three key areas

Digital

- Near-perfect surveying and Geolocation
- Next-gen BIM
- Digital project collab- oration and mobility
- IoT and advanced analytics



Materials

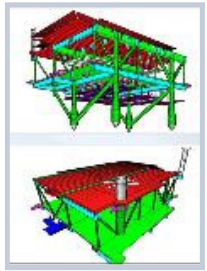
- Durable and lightweight materials

Automation

- Flexible equipment and advanced automation

SURVEY: Digital tools more impactful than materials or automation – but might reflect low adoption of new materials and automation

Case example: BIM in action[2]



- Survey of 2,228 construction professionals working on multiple sites and academic research concluded BIM has multiple productivity benefits
  - **80%** less analysis time
  - **80%** fewer change orders
  - **20%** lower material cost
  - **20%** shorter project lifespan

1 General superior performance of innovative vs non-innovative firms (Geroski, et al.)
2 McGraw Hill Construction Survey, Stanford University

A glimpse of things to come: Assembling a high-rise in 15 days

Broad Group demonstration project in Hunan Province—T30A Tower Hotel

Pre-construction
~6 months

- Design
- Manufacturing
- Basement/ foundation

Construction
15 days

Structure, MEP (mechanical, electrical, plumbing), and finishing

Methodology

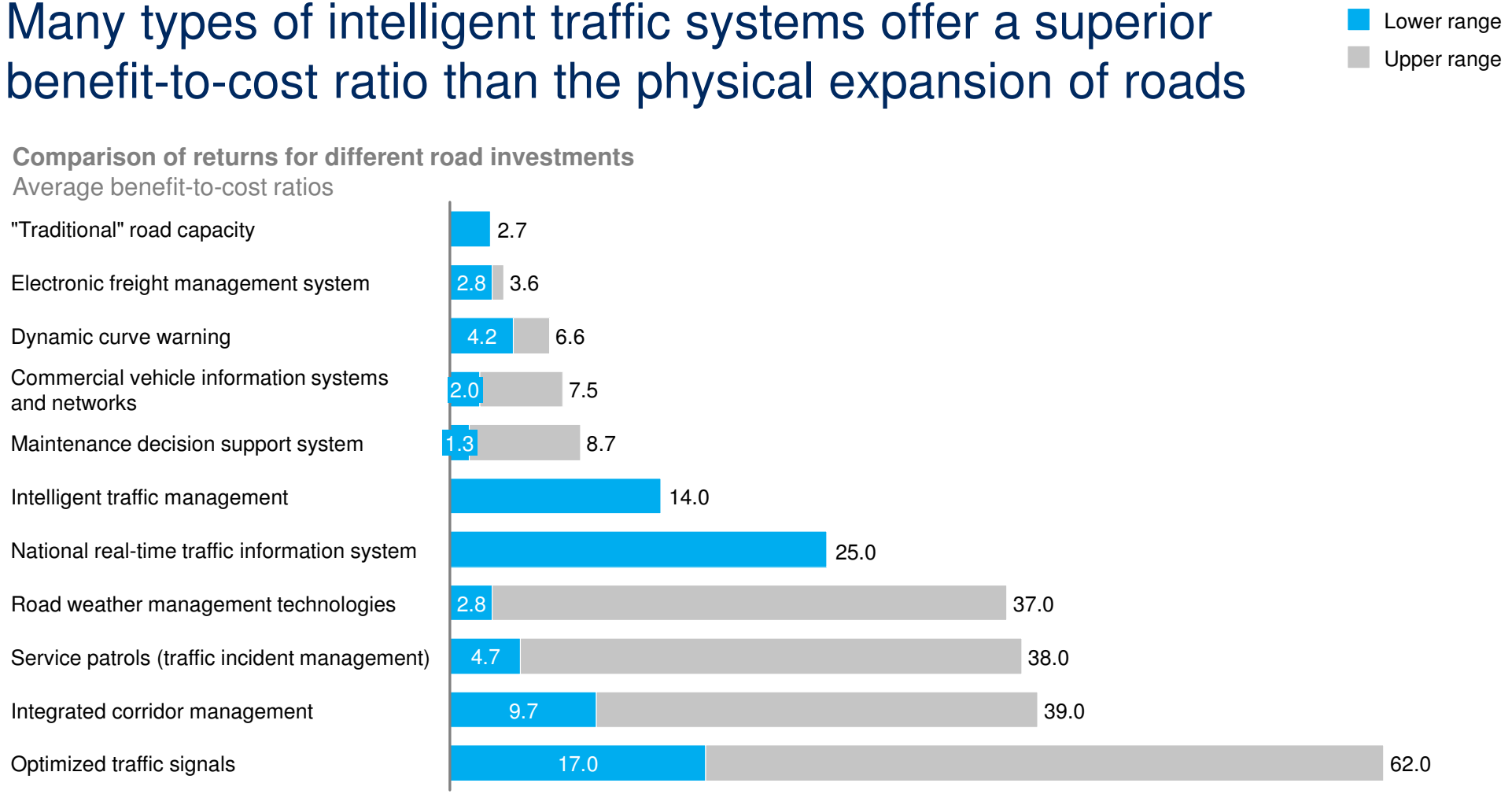
- Pre-assembled panels (3.9 by 15.6 meters), including flooring, ceiling, and embedded shafts for water, electricity, lighting, ventilation, and drainage
- Trucks bring panels to site, where they are hoisted, fixed, and bolted

Key facts

- 93% of construction completed off-site
- Cost: $1,000–1,200 per square meter
- 1% construction waste

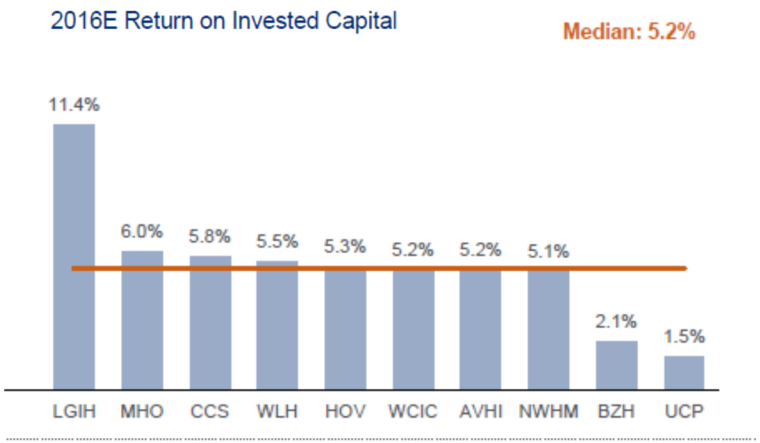
SOURCE: Broad Group; expert interviews; McKinsey Global Institute analysis

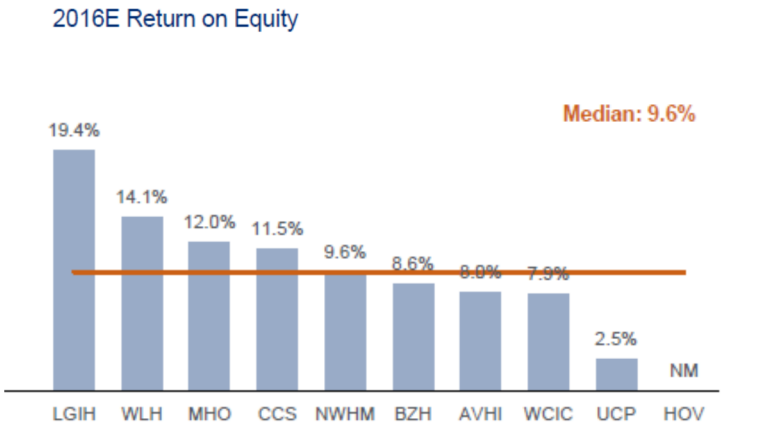
Many types of intelligent traffic systems offer a superior benefit-to-cost ratio than the physical expansion of roads



SOURCE: *Intelligent transportation systems*, Capitol Research, Council of State Governments, April 2010; Transport for London, 2007; *Intelligent transportation systems benefits, costs, deployment, and lessons learned desk reference: 2011 update*, US Department of Transportation, September 2011; *Urban mobility plan*, Seattle Department of Transportation, January 2008; McKinsey Global Institute analysis

Leading companies are using analytics





LGI approach

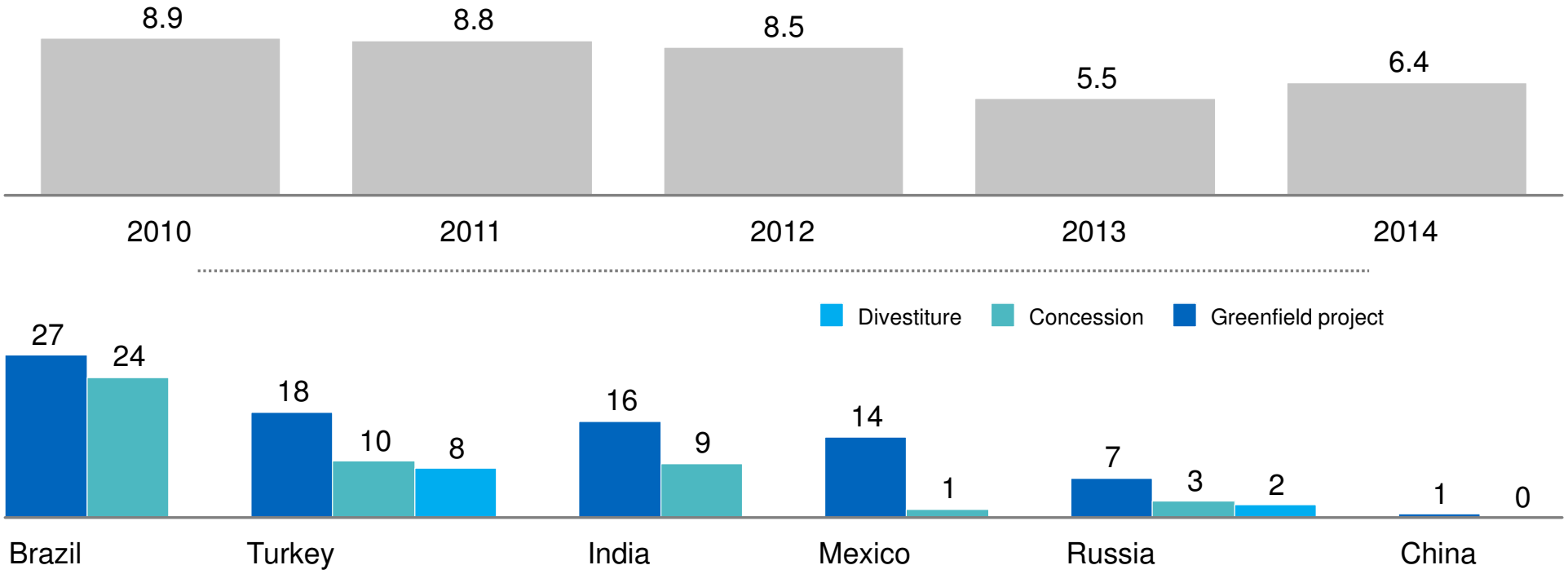
- Suburban affordable alternative to rent - build equity happening later but still happening
- Go direct to consumer, direct mail, ad focus, customer experience
- 1 sales person per community for average developer versus 4 for LGI
- 830 to 8 versus 10 to 5 office opening - retail sales mentality, evening hours
- 100% stock inventory - target customers that are paying rent and move in within 30 days
- 100% spec inventory - no options - higher GM and price
- Track every marketing dollar on ad, lead, closing
- Lead nation in home sales/community
- Gone from Texas to 15th largest builder and from 4 to 56 communities in 17 markets nationwide

SOURCE: Bloomberg and Datastream; annual reports; McKinsey CPAT tool; McKinsey analysis

PPPs can also help close the gap given relatively low share today

PPP spending[1, 2]

% of total infrastructure spending in major developing economies



1 Total investment data for transport, power, communication, water and sewage.
2 Countries included are Brazil, Russia, India, China, Mexico, and Turkey. Data for Russia available only for 2010–12.

SOURCE: World Bank, January 2016; McKinsey Global Institute analysis

“One Belt, One Road”: one of the world’s largest platforms for regional collaboration

OBOR’s Economic Scale (2013)		Percent of world total
Population covered	4.4 Bn	63%
GDP of countries covered	USD 21 Tr	29%
Goods and services exported	USD 18 Tr	24%
Number of countries expressing interest	>60	

The multiplier effect of infrastructure investment

$1 Bn	30-80k	$2.5 Bn
Infrastructure Investment	New jobs	New GDP

SOURCE: Press search, expert interviews, team analysis


EXIT


MAERSK
MAERSK
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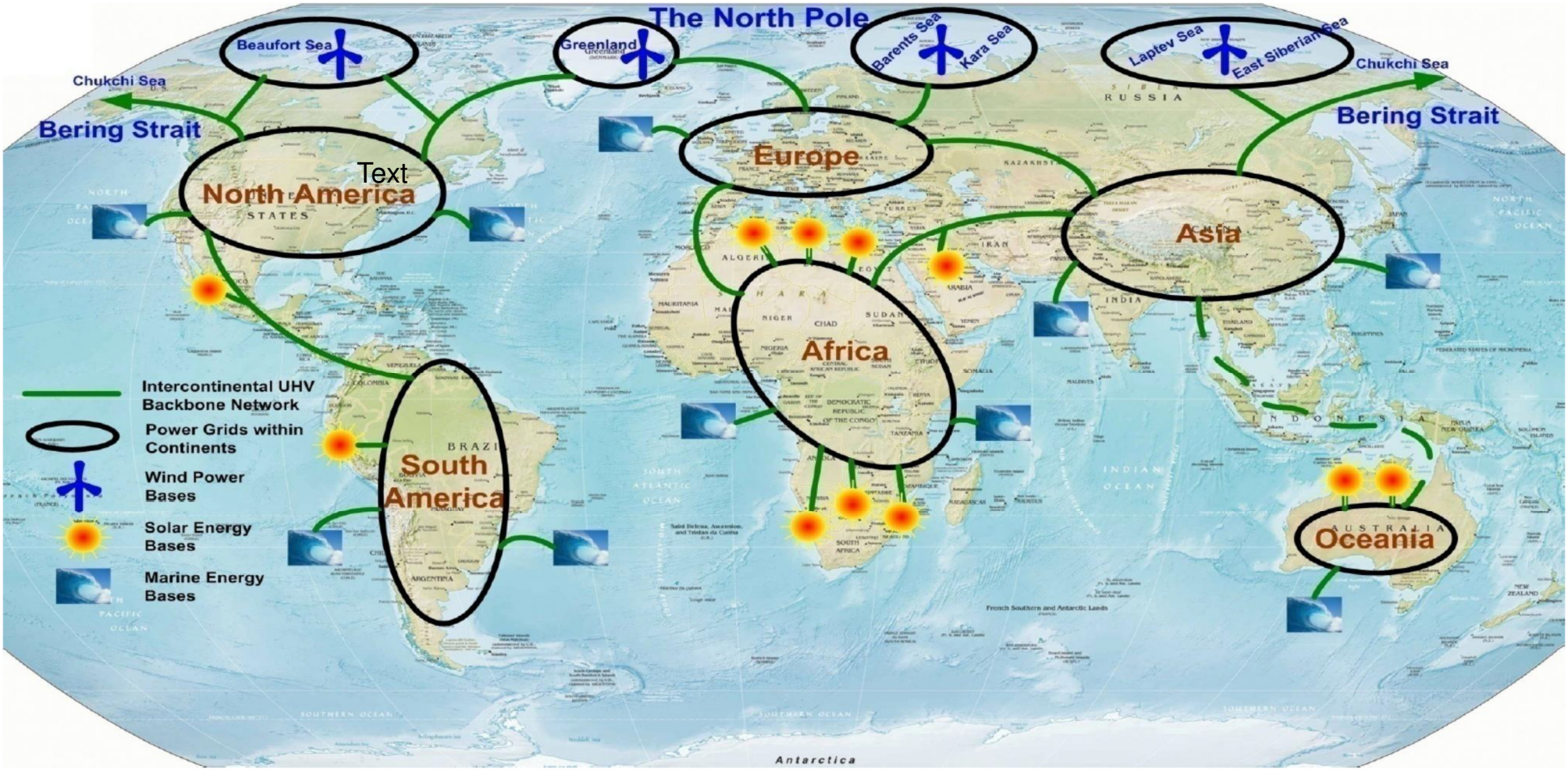
SEALAND

A modest proposal for global cooperation



SOURCE: State Grid

WINNING IN DISRUPTION