

# Beyond the Gap

How Countries Can Afford the Infrastructure They Need while Protecting the Planet



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## World needs \$94 trillion spent on infrastructure by 2040: report

### Infrastructure gap estimates between 2013-2030



Global <sup>1</sup>  
**\$57 trillion**

North America <sup>2</sup>  
**\$8.1 trillion**

Europe <sup>3</sup>  
**\$16 trillion**

Asia  
**\$9 trillion**

Latin America  
**\$7.8 trillion**

Sub-Saharan Africa <sup>4</sup>  
**\$1.8 trillion**

Middle East and North Africa  
**\$1.8 trillion**

South Asia  
**\$4.2 trillion**

<sup>1</sup>McKinsey 2013  
<sup>2</sup>Association Society of Civil Engineering, 2013  
<sup>3</sup>Charter House, 2014  
<sup>4</sup>Reza Nader, Wis, 2015

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## Asia Infrastructure Needs Exceed \$1.7 Trillion Per Year, Double Previous Estimates

## The world has an \$800bn annual infrastructure gap. Here's how to close it

How much do you need to build a house?

How much do you need to build a house?





How much do you need to build a house?



# Beyond the Gap

How Countries Can Afford  
the Infrastructure They Need  
while Protecting the Planet

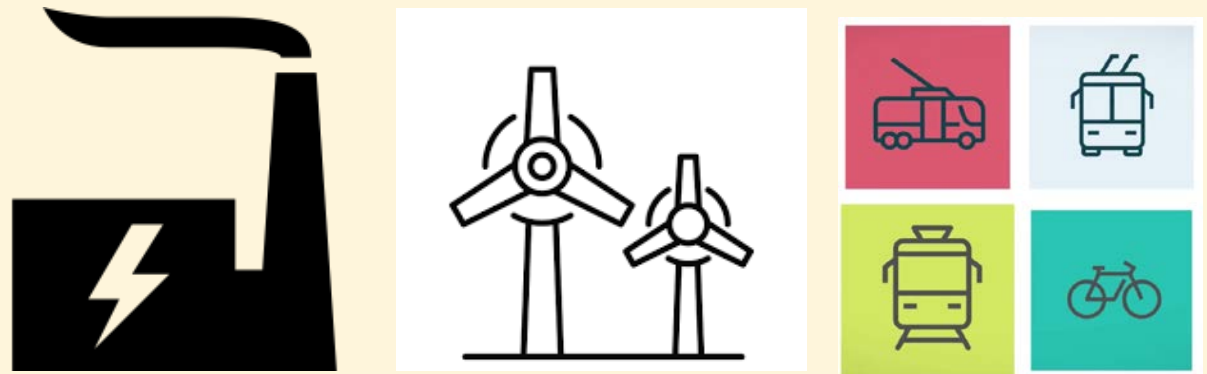


# A “new” approach

## 1. Objectives



## 2. Options



## 3. Uncertainties






# The report in numbers

- 5 sectors
- 7 SDGs
- 15 models
- Dozens of policies
- 50 experts interviewed
- Thousands of scenarios explored





A stylized illustration of an industrial landscape. On the left, a grey triangular shape represents a hill. In the foreground, there are silhouettes of industrial buildings and a wind turbine. A red line starts from a low point on the ground and rises to a higher platform. On this platform, there is a larger industrial complex with a tall chimney emitting a plume of smoke, and a yellow sun is visible in the background.

What is the  
investment need?

Between 2% and 8% of GDP depending on  
countries' **goals** and the **efficiency** with which they pursue them

# Water & Sanitation: Lower-Cost Technologies Can Help Achieve the SDGs



Water supply  
and sanitation

6 CLEAN WATER  
AND SANITATION



# Water & Sanitation: Lower-Cost Technologies Can Help Achieve the SDGs



\$170-200 billion per year



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\$170-200 billion per year



\$200-230 billion per year



# Transport: how much does it cost to increase rural access?

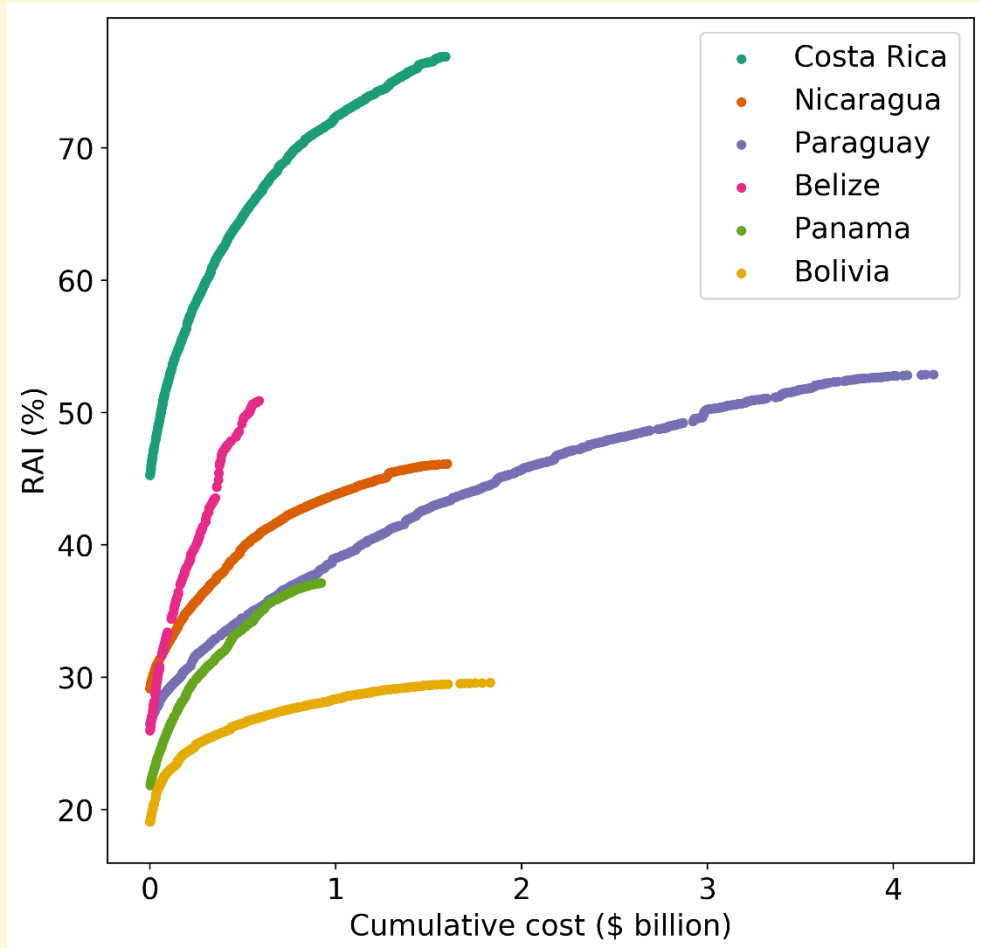


Transport

9 INDUSTRY, INNOVATION  
AND INFRASTRUCTURE



# It depends on the country



Transport

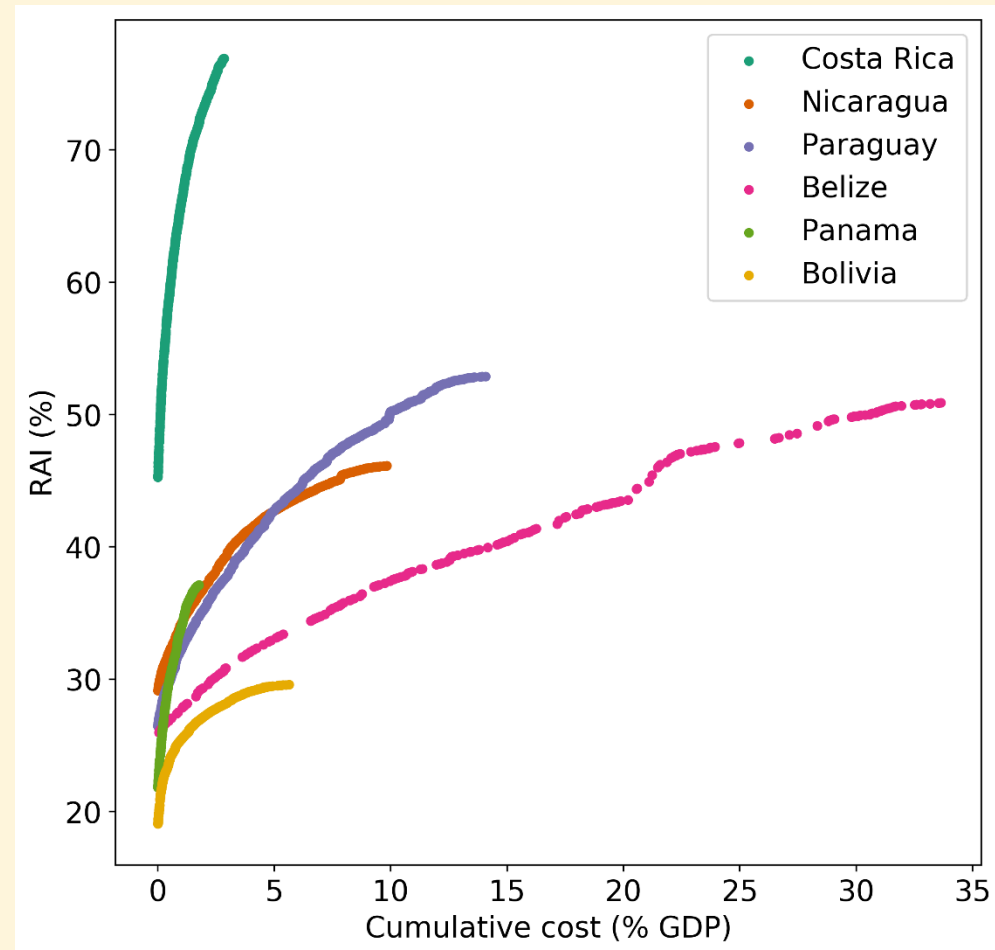
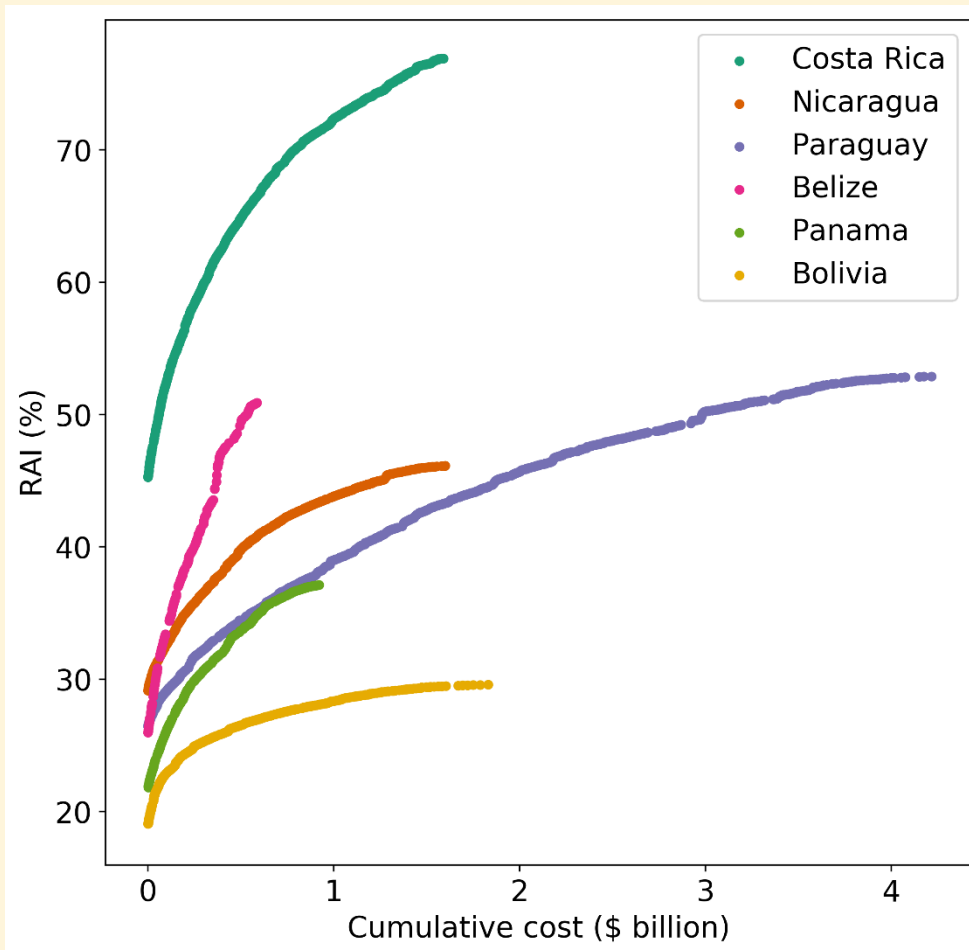
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



# It depends on the country



Transport



# Transport: Costs Are Shaped by Choice of Mode and Complementary Policies



**Transport**

**9** INDUSTRY, INNOVATION  
AND INFRASTRUCTURE





# Transport: Costs Are Shaped by Choice of Mode and Complementary Policies



Transport



Shift to rail with policies to increase occupancy rate

1-1.4% of GDP per year

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



# Transport: Costs Are Shaped by Choice of Mode and Complementary Policies



Transport

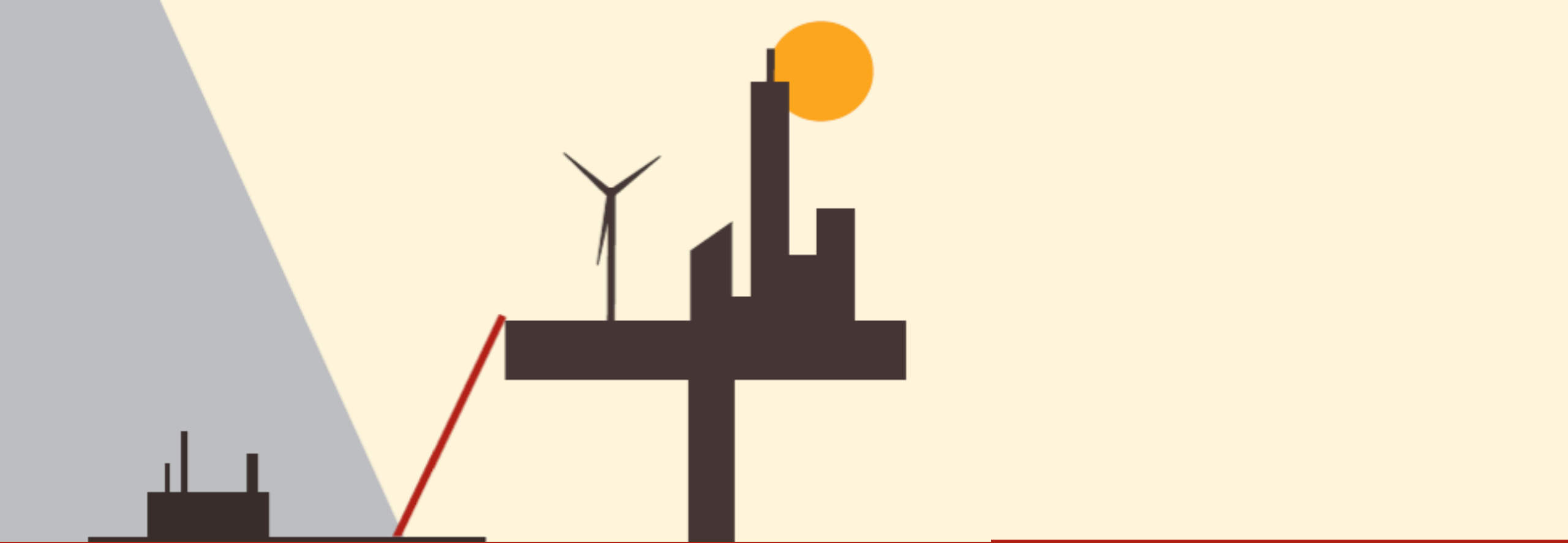


Shift to rail with policies to increase occupancy rate  
1-1.4% of GDP per year



Shift to rail without complementary policies  
2-2.5% of GDP per year





Infrastructure investment paths compatible with full decarbonization  
need not cost more than more polluting alternatives

Power: the cost of low carbon pathways depends on timing and demand management



**Energy**





# Power: the cost of low carbon pathways depends on timing and demand management

Early investments in renewables + demand management



2.2% of GDP per year

0.5% of GDP per year in LAC



Energy

7 AFFORDABLE AND CLEAN ENERGY



13 CLIMATE ACTION

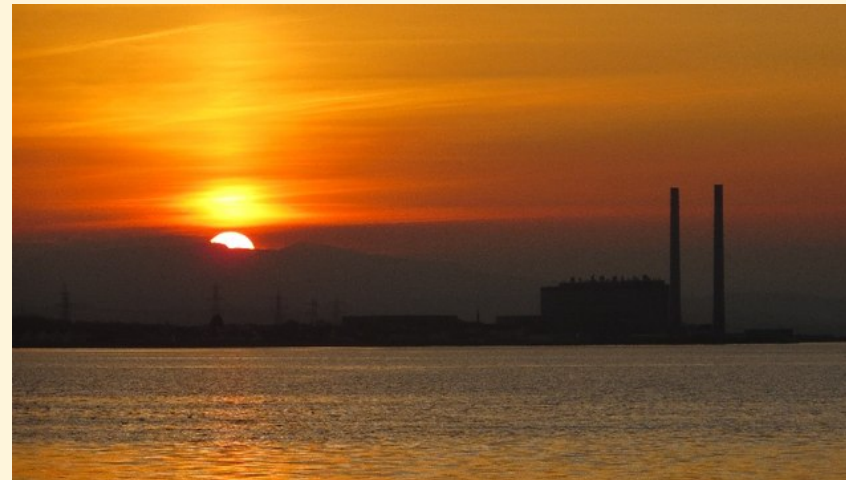


# Power: the cost of low carbon pathways depends on timing and demand management

Early investments in renewables + demand management



2.2% of GDP per year



Investments in fossil fuel generation + stranded assets

3.0% of GDP per year



Energy



# Urban transport: Land use planning lowers investment needs by 20 percent and reduces emissions

Dense cities  
&  
public transit

0.37% of GDP per  
year



Transport

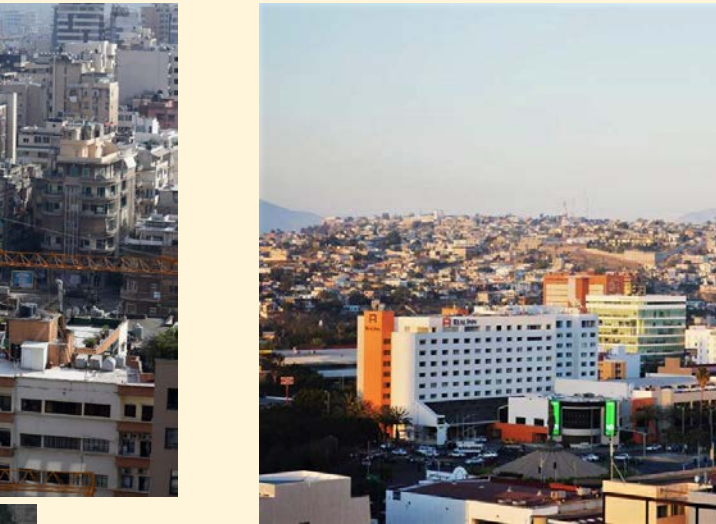




# Urban transport: Land use planning lowers investment needs by 20 percent and reduces emissions

Dense cities  
&  
public transit

0.37% of GDP per  
year



Sprawl & individual mobility

0.47% of GDP per year



Transport







With the right policies, investments of 4.5 percent of GDP will enable LMICs to achieve the infrastructure-related SDGs and stay on track to full decarbonization by the second half of the century



### Energy

Invest now in renewable energy and energy efficiency. use mini grids and micro grids to gradually ramp up access to electricity in the poorest areas +

US\$ 691B  
2.2% of GDP



**Energy**



**Transport**

Invest now in renewable energy and energy efficiency. use mini grids and micro grids to gradually ramp up access to electricity in the poorest areas



Increase the utilization rate of rail and public transport. densify cities. promote electric mobility

US\$ 691B  
2.2% of GDP

US\$ 408B  
1.3% of GDP



**Energy**



**Transport**



**Water supply and sanitation**

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Increase the utilization rate of rail and public transport. densify cities. promote electric mobility



Provide safe water and sanitation using high cost technology in cities and low cost technology in rural areas

US\$ 691B  
2.2% of GDP

US\$ 408B  
1.3% of GDP

US\$ 201B  
0.55% of GDP





Energy

Transport

Water supply and sanitation

Flood protection

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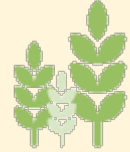
Protect cities against coastal floods by Dutch standards. and accept higher risks than today from river floods

US\$ 691B  
2.2% of GDP

US\$ 408B  
1.3% of GDP

US\$ 201B  
0.55% of GDP

US\$ 99B  
0.32% of GDP



Energy

Transport

Water supply and sanitation

Flood protection

Irrigation

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Support irrigation through subsidies to infrastructure only



4.5 % of GDP (USD\$1.5 trillion)

US\$ 691B  
2.2% of GDP

US\$ 408B  
1.3% of GDP

US\$ 201B  
0.55% of GDP

US\$ 99B  
0.32% of GDP

US\$ 42B  
0.13% of GDP



## Energy



## Transport



## Water supply and sanitation



## Flood protection



## Irrigation

Strongly reduce demand for energy through energy efficiency measures. provide access to electricity gradually in the poorest areas



Increase the utilization rate of rail and public transport. densify cities. reduce demand for transport



Provide only basic water and sanitation



Keep coastal risk constant in relative terms, and accept higher risks than today from river floods



Support irrigation through subsidies to infrastructure only. promote low meat diets



2.0 percent of GDP (USD\$640 billion)

US\$ 283B  
0.90% of GDP

US\$ 172B  
0.53% of GDP

US\$ 119B  
0.32% of GDP

US\$ 19B  
0.060% of GDP

US\$ 39B  
0.12% of GDP

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4.5 percent of GDP (USD\$1.4 trillion)

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2.2% of GDP

US\$ 408B  
1.3% of GDP

US\$ 201B  
0.55% of GDP

US\$ 99B  
0.32% of GDP

US\$ 42B  
0.13% of GDP



## Energy



## Transport



## Water supply and sanitation



## Flood protection



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Do not invest in energy efficiency. Provide high access to electricity everywhere using fossil energy for 10 years and then early-scrap these capacities to switch to low carbon.



Let cities sprawl. do not favor rail and public transport utilization. answer mobility demand with more roads



Provide safe water and sanitation using high cost technology



Protect cities against coastal floods by Dutch standards. Invest to maintain current absolute losses from river floods constant over time



Subsidize both irrigation infrastructure and water



8.2 percent of GDP (USD\$2.7 trillion)

US\$ 942B  
3.0% of GDP

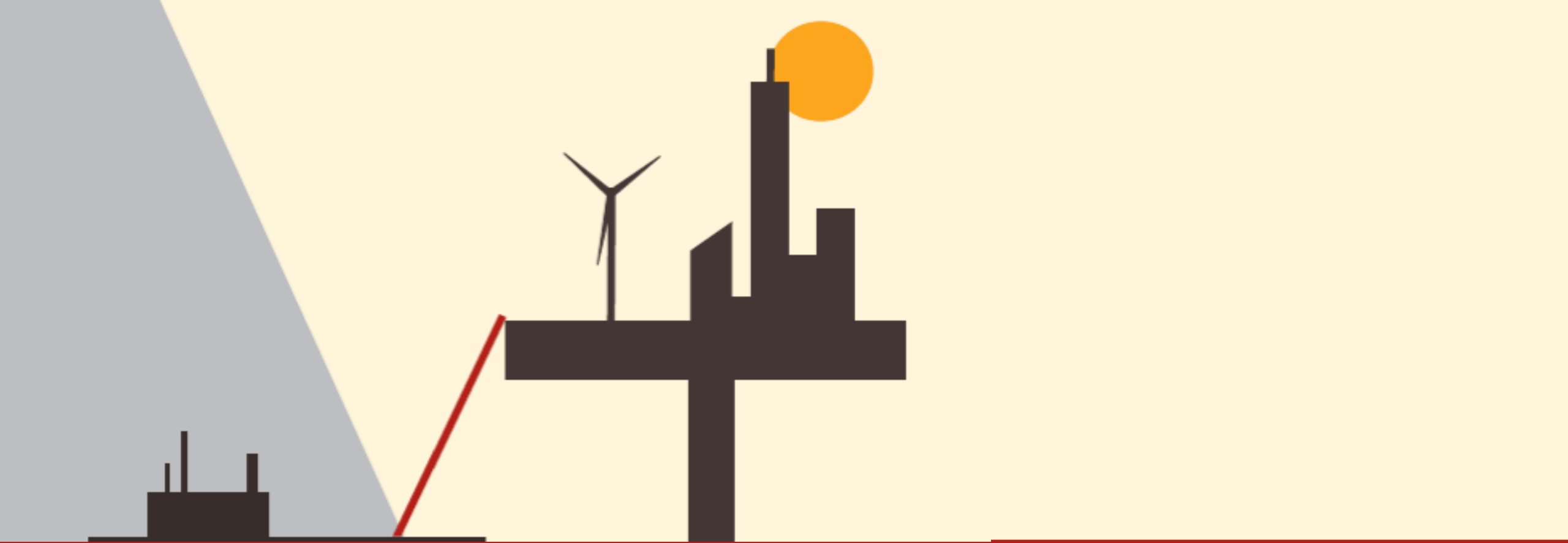
US\$ 1017B  
3.3% of GDP

US\$ 232B  
0.65% of GDP

US\$ 315B  
1.0% of GDP

US\$ 63B  
0.20% of GDP





Investing in infrastructure is not enough: steady flow of resources for **operations and maintenance** is a necessary condition for success



Energy



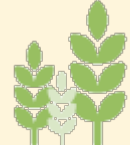
Transport



Water supply and sanitation



Flood protection



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Support irrigation through subsidies to infrastructure only



**Capital  
4.5 % of GDP  
(USD\$1.5 trillion)**

**Capital  
2.2% of GDP**



**Maintenance  
0.6% of GDP**

**Capital  
1.3% of GDP**



**Maintenance  
1.3% of GDP**

**Capital  
0.55% of GDP**



**Maintenance  
0.75% of GDP**

**Capital  
0.32% of GDP**



**Maintenance  
0.07% of GDP**

**Capital  
0.13% of GDP**

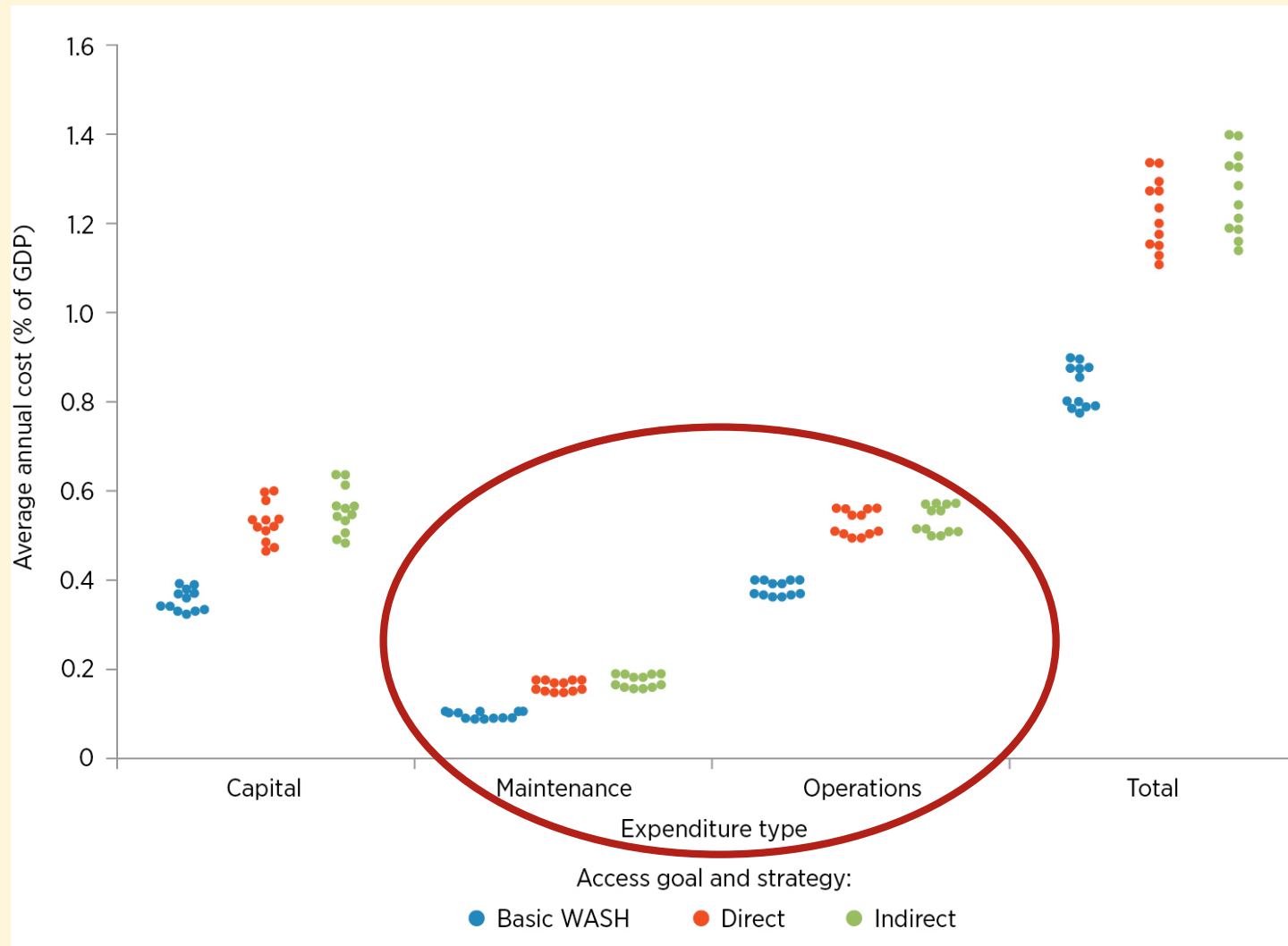


**Maintenance  
2.7 % of GDP  
(USD\$0.76 trillion)**

# Water & Sanitation: O&M cost as much as capital for water and sanitation



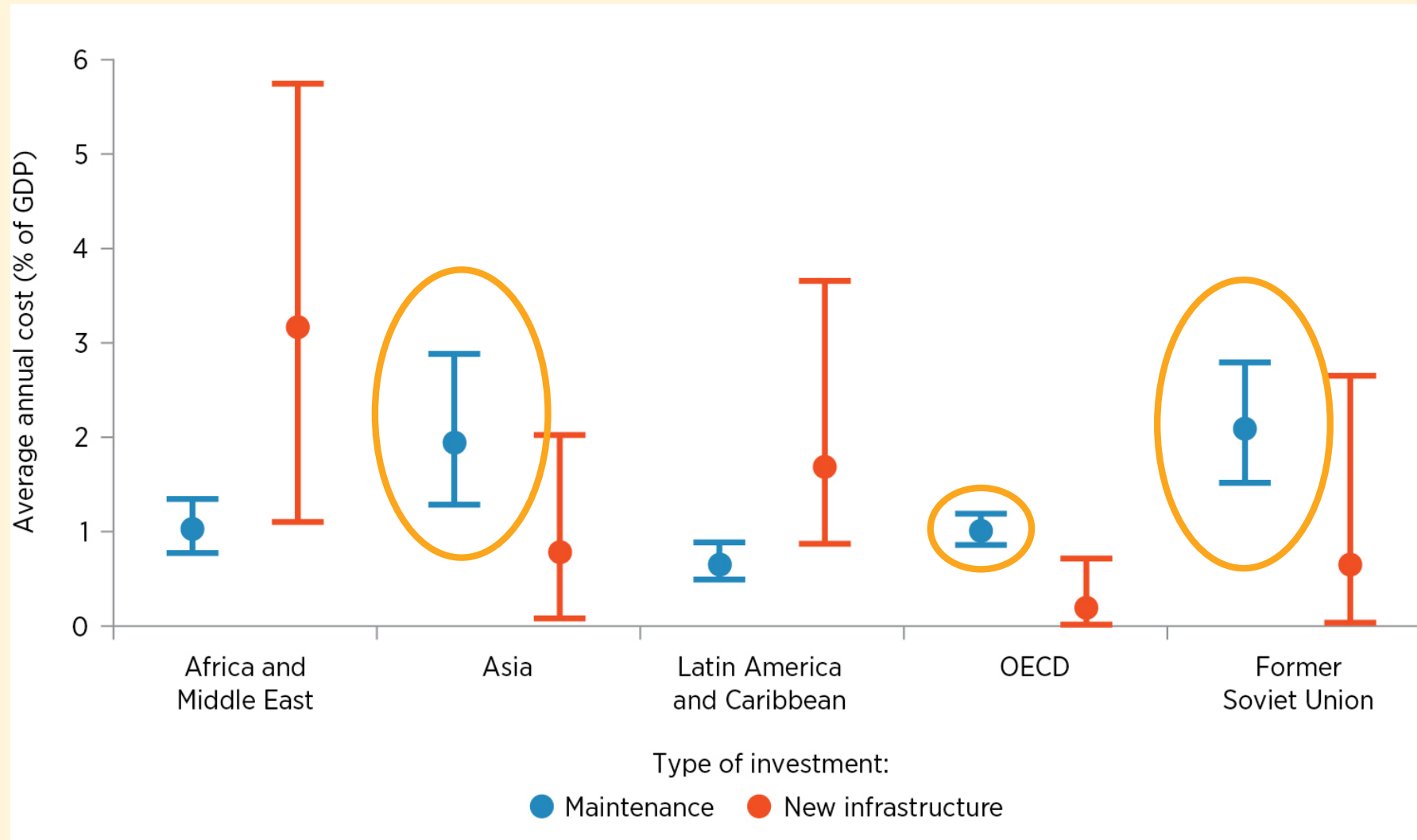
Water supply  
and sanitation



# Transport: in some regions maintenance costs as much as new investment



Transport





- How much countries need to spend on infrastructure depends on their goals, but also the efficiency with which they pursue these goals. Good policy can achieve ambitious goals at half the cost.
- Infrastructure investment paths compatible with full decarbonization by the end of the century need not cost more than more polluting alternatives.
- Investing in infrastructure is not enough; maintaining it matters. Maintenance ensures reliability and reduces the total life-cycle cost of transport and water and sanitation infrastructure more than 50 percent.

## Take-aways



## Hitting the Trillion Mark

A Look at How Much Countries Are Spending  
on Infrastructure

*Marianne Fay  
Sungmin Han  
Hyoung Il Lee  
Massimo Mastruzzi  
Moonkyoung Cho*



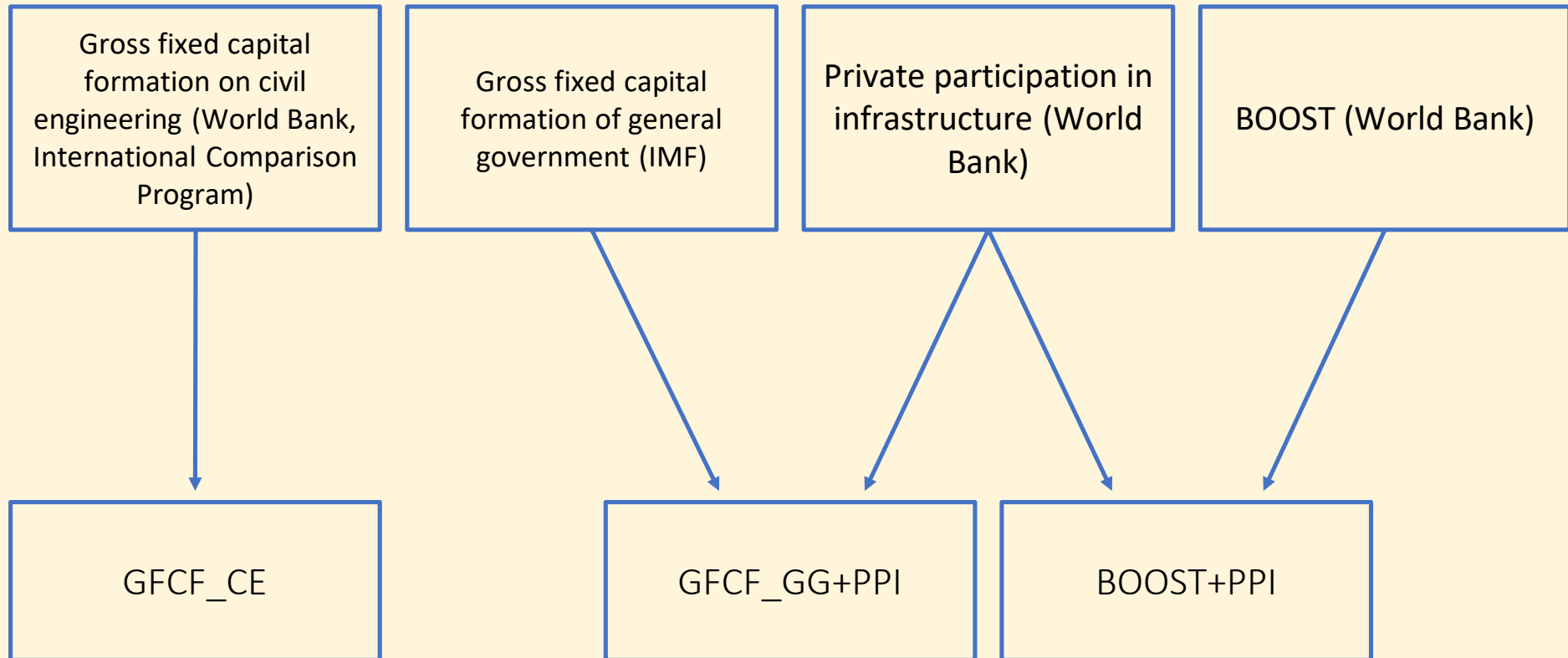
**WORLD BANK GROUP**

Sustainable Development Practice Group

Office of the Chief Economist

February 2019

# No data but several proxies

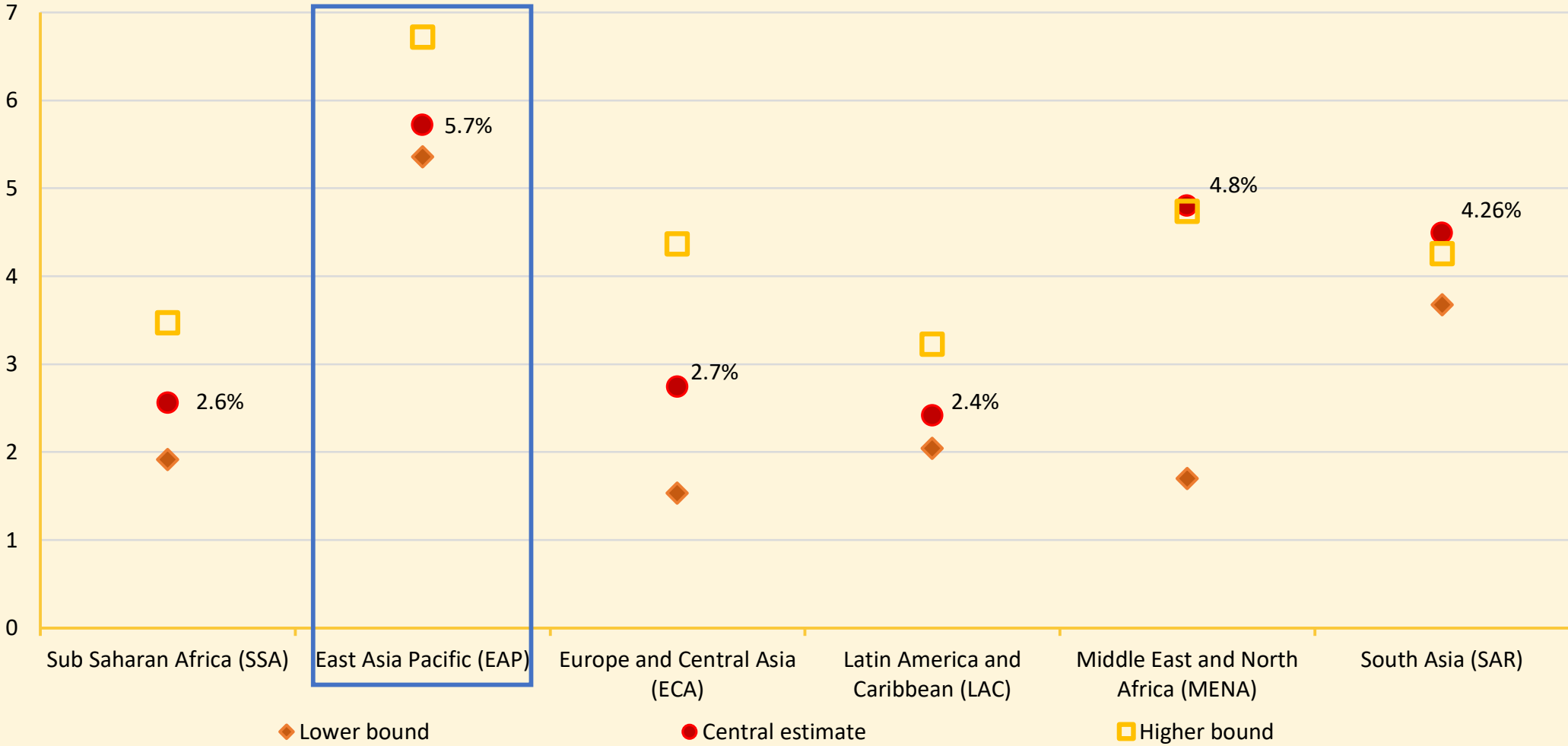


On average, developing countries likely invest around 4% of GDP or around \$1-1.2 trillion in infrastructure

	Central estimate:		
	Lower-bound estimate (BOOST or Min of two (fitted values))	GFCFs)	Upper-bound estimate (0.9 GFCF_CE)
Weighted average (% GDP)			
All LMIC	3.40	4.12	4.99
LMIC excluding China	2.07	3.13	4.39
(2011 US\$ trillions)			
All LMIC	0.82	1.00	1.21
LMIC excluding China	0.34	0.52	0.73

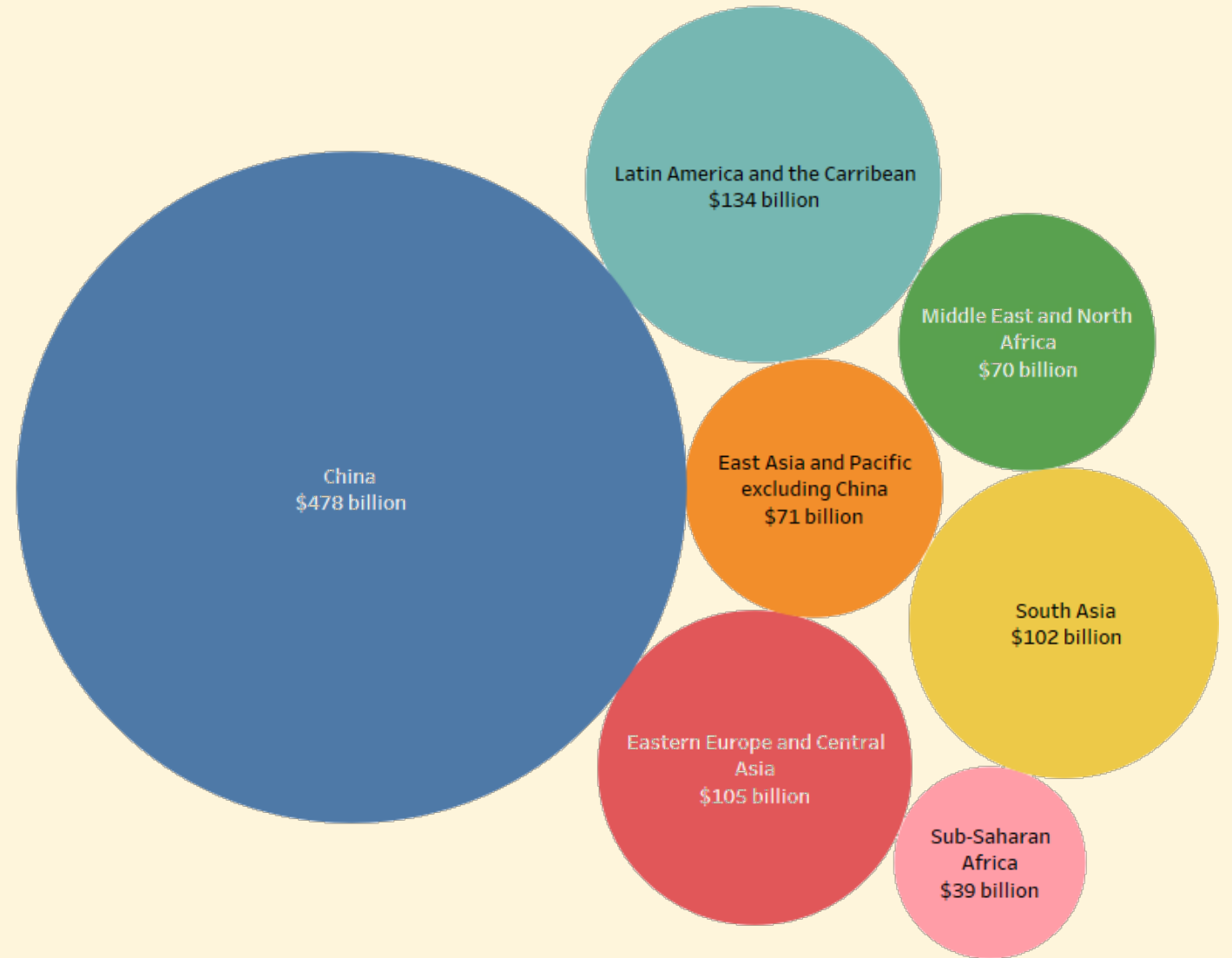
# But with significant variations across regions

Infrastructure investment as percent of GDP

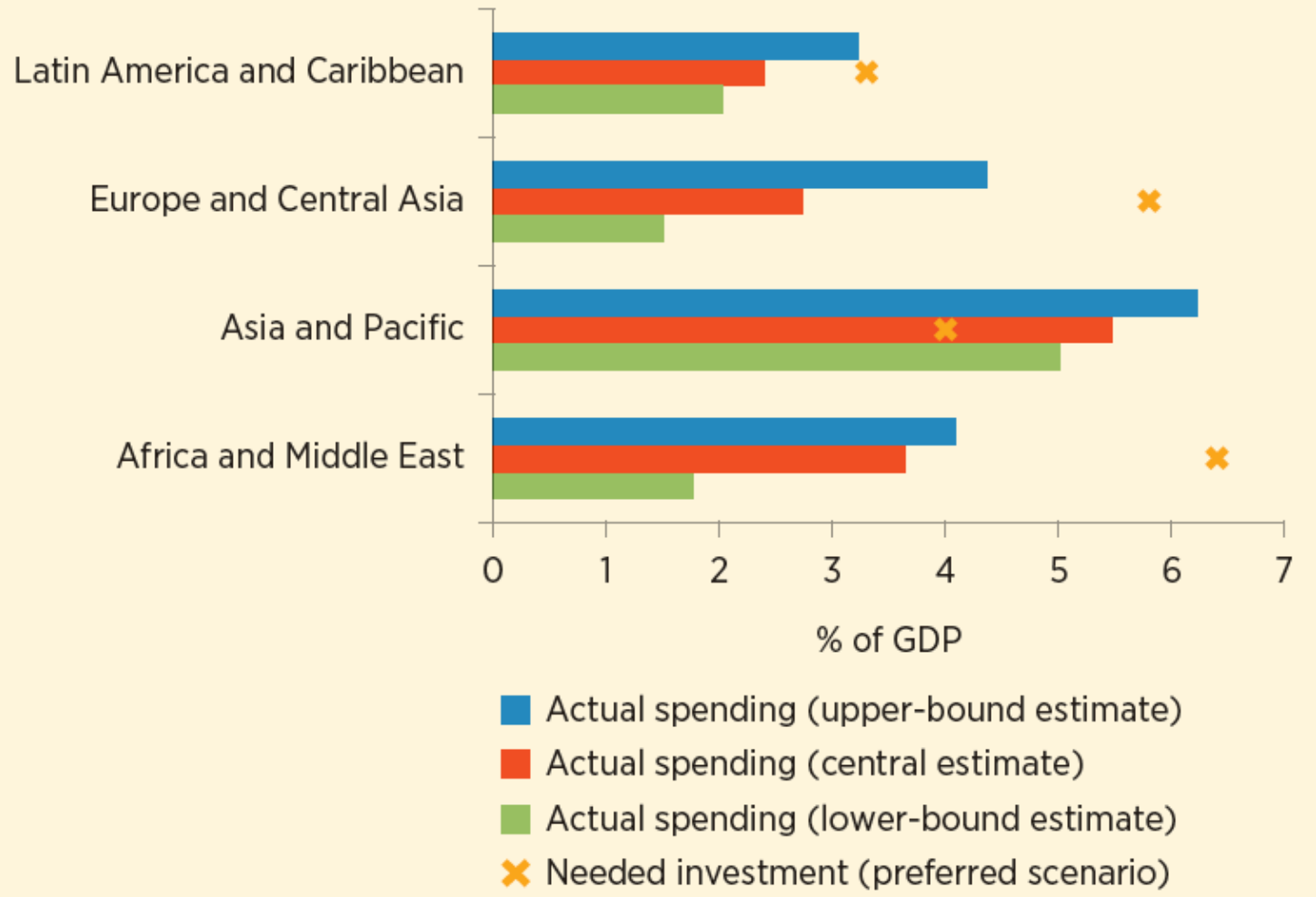




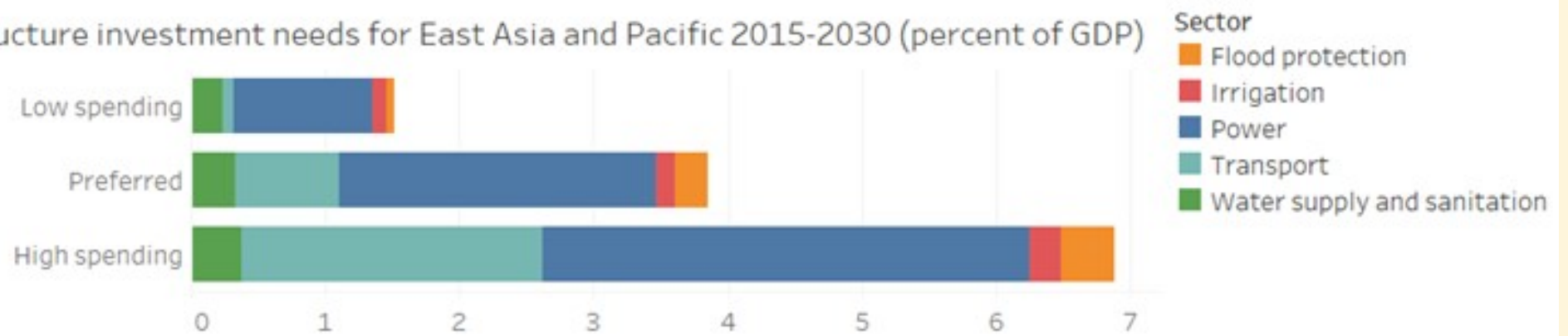
About half (48%)  
of infrastructure  
investment  
happens in China



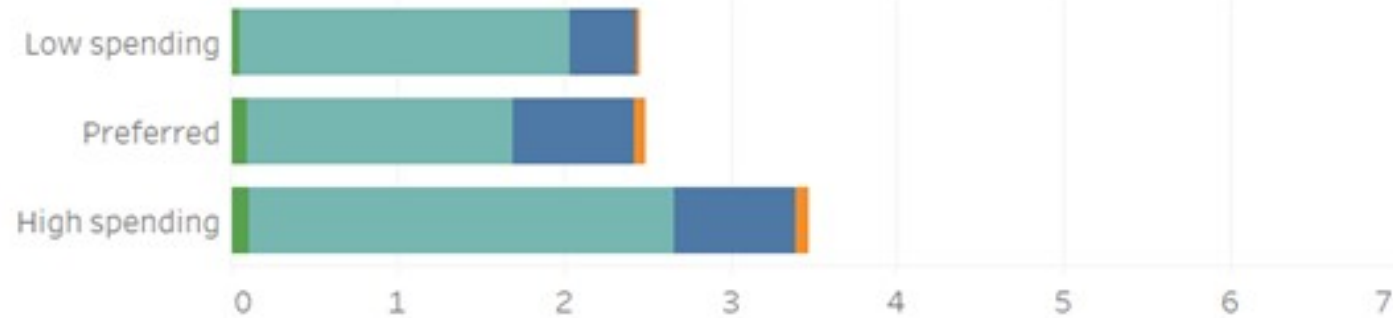
# How spending compares with needs



### Infrastructure investment needs for East Asia and Pacific 2015-2030 (percent of GDP)



### Infrastructure maintenance needs for East Asia and Pacific 2015-2030 (percent of GDP)



### Estimates for past investment

