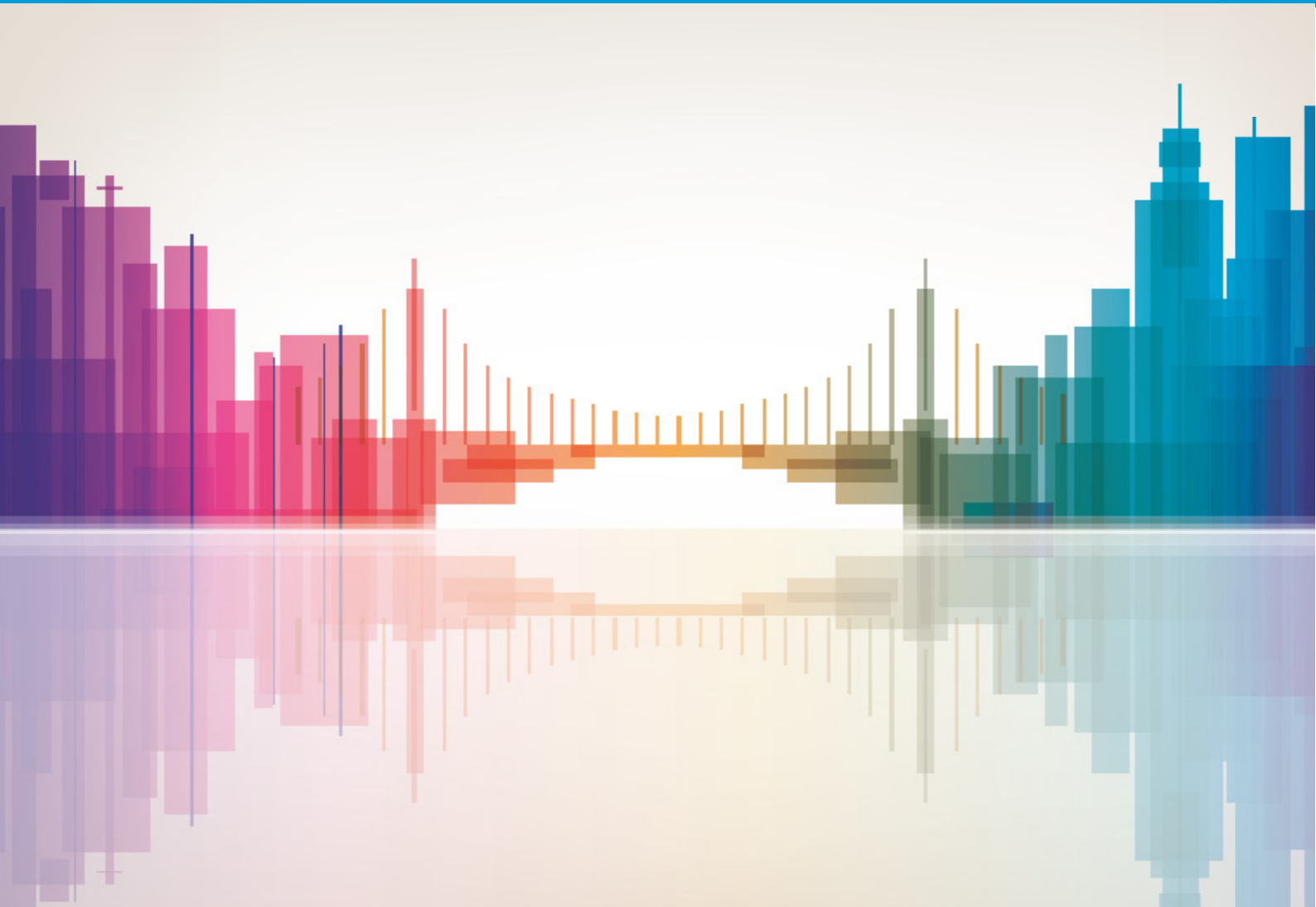


# Verification Report

## Daegu, Korea (Republic of)

October 2021





# Verification Report

Daegu, Korea (Republic of)

# **11 SUSTAINABLE CITIES AND COMMUNITIES**





## Foreword

This publication has been developed by ITU within the framework of the United for Smart Sustainable Cities (U4SSC) initiative. It provides an overview of the reporting and implementation of key performance indicators (KPIs) for smart sustainable cities (SSC) in the City of Daegu, Korea (Republic of). The U4SSC KPIs are based on [Recommendation ITU-T Y.4903](#). This set of KPIs for SSC was developed to establish the criteria to evaluate ICTs' contributions in making cities smarter and more sustainable, and to provide cities with the means for self-assessments.

## Disclaimer

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## 1. Introduction and Verification Background

This report contains the verification results for the KPI submission by the city of Daegu, Korea (Republic of) to the requirements of the United for Smart Sustainable Cities (U4SSC) Key Performance Indicators (KPIs) as described within the '[Collection Methodology for Key Performance Indicators for Smart Sustainable Cities](#)'.

John Smiciklas, who is certified as a U4SSC Key Performance Indicators for Smart Sustainable Cities Verifier, completed the verification in August 2021.

The verification assessment activities included:

- collecting and reviewing KPI data;
- interviewing city stakeholders;
- verifying that the data submitted are in conformance with the requirements of the Collection Methodology for Key Performance Indicators for Smart Sustainable Cities; and
- preparing the Verification Report.

The verification was conducted using the information made available by the city and the information presented during follow-up activities. It was planned and performed in order to obtain limited assurance with respect to the information examined.

There were no limitations that impacted the completion of this verification.

## 2. KPI Reporting and Verification Summary

	Total	Reported	Verified	% KPIs Verified
<b>Economy</b>				
Core KPIs	23	23	23	100 %
Advanced KPIs	22	20	20	91 %
<b>Environment</b>				
Core KPIs	12	12	12	100 %
Advanced KPIs	5	4	4	80 %
<b>Society &amp; Culture</b>				
Core KPIs	19	19	19	100 %
Advanced KPIs	10	10	10	100 %
<b>Overall</b>				
Core KPIs	54	54	54	100 %
Advanced KPIs	37	34	34	92 %
<b>Total</b>	<b>91</b>	<b>88</b>	<b>88</b>	<b>97 %</b>

## 3. KPI Data Points Reporting and Verification Summary

Certain KPIs are composed of more than one data point.

Below is a summary of the verification results of those data points.

	Total	Reported	Verified	% Data Points Verified
<b>Economy</b>				
Core Data Points	24	24	24	100 %
Advanced Data Points	31	29	29	94 %
<b>Environment</b>				
Core Data Points	23	23	23	100 %
Advanced Data Points	5	4	4	80 %
<b>Society &amp; Culture</b>				
Core Data Points	19	19	19	100 %
Advanced Data Points	10	10	10	100 %
<b>Overall</b>				
Core Data Points	66	66	66	100 %
Advanced Data Points	46	43	43	93 %
<b>Total</b>	<b>112</b>	<b>109</b>	<b>109</b>	<b>97 %</b>



## 5. Benchmarks and Scoring Methodology

As part of the U4SSC KPIs project, benchmarks were developed for most KPIs in order to develop a reporting framework with which to demonstrate to cities how their performance could be reported.

The benchmarks were set based on several factors:

- fully meeting the aligned SDG(s);
- performance compared with other international and transnational targets (e.g., OECD, European Commission);
- performance against a UN agency's goals (e.g., International Telecommunication Union);
- evaluation of city performance using UN and other international statistical data; and
- performance measured versus leading city performance globally.

Performance to benchmarks were then scored in four ranges for every KPI and data point reported:

- 0 – 33 % of target – 1 pt;
- 33 – 66 % of target – 2 pts;
- 66 – 95 % of target – 3 pts; and
- 95 + % of target – 4 pts.

The scores for each reported KPI and data point were added to give a percentage score for categories, sub-dimensions and dimensions and were reported based on the above target scores. KPIs or data points that are not reported or have no benchmarks yet defined were excluded.

Example: Education 4 KPIs

- If all 4 are reported and the scores are 1 pt, 3 pts, 4 pts and 1 pt;  
Total score 9 pts out of 16 = 56.25 % reported as 33-66 % of target.
- If only 3 are reported and the scores are 3 pts, 4 pts and 2 pts;  
Total score 9 pts out of 12 = 75 % reported as 66-95 % of target.

Targets and scoring are meant to provide additional context to KPI data and should be used in context with city goals and comparisons with other similar cities to determine future actions.



## 6. Verification Results

This section contains the data and results of the verification for the City of Daegu's reporting for each of the U4SSC KPIs within the three dimensions:

- Economy
- Environment
- Society and Culture

and the 22 categories of the dimensions:

- |                        |                           |
|------------------------|---------------------------|
| • ICT Infrastructure   | • Air Quality             |
| • Water and Sanitation | • Environmental Quality   |
| • Drainage             | • Public Space and Nature |
| • Electricity Supply   | • Energy                  |
| • Transport            | • Education               |
| • Public Sector        | • Health                  |
| • Innovation           | • Culture                 |
| • Employment           | • Housing                 |
| • Waste                | • Social Inclusion        |
| • Buildings            | • Safety                  |
| • Urban Planning       | • Food Security           |

















**Note: The following categories are reported under the Economy and the Environment dimensions.**

- Water and Sanitation
- Waste








**Note: For the results on following pages.**

- **Core KPIs are highlighted in bold.**
- *Advanced KPIs are in italics.*

















## Dimension: Economy

CATEGORY	KPI / Data Point	Results	Benchmark
 <p>ICT INFRASTRUCTURE</p>	<b>Household Internet Access</b>	<b>100.00 %</b>	
	<b>Fixed Broadband Subscriptions</b>	<b>69.70 %</b>	
	<b>Wireless Broadband Subscriptions</b>	<b>102 062 / 100 000 inhabitants</b>	
	<b>Wireless Broadband Coverage: 3G</b>	<b>99.50 %</b>	
	<b>Wireless Broadband Coverage: 4G</b>	<b>99.30 %</b>	
	<i>Availability of Wi-Fi in Public Areas</i>	3 621	N/A
 <p>WATER AND SANITATION</p>	<b>Smart Water Meters</b>	<b>62.30 %</b>	
	<i>Water Supply ICT Monitoring</i>	100.00 %	
	<b>Basic Water Supply</b>	<b>99.97 %</b>	
	<b>Potable Water Supply</b>	<b>99.97 %</b>	
	<b>Water Supply Loss</b>	<b>3.94 %</b>	
	<b>Wastewater Collection</b>	<b>98.67 %</b>	
	<b>Household Sanitation</b>	<b>97.60 %</b>	
 <p>DRAINAGE</p>	<i>Drainage/Storm Water System ICT Monitoring</i>	Not Reported	


















## Dimension: Economy (continued)

CATEGORY	KPI / Data Point	Results	Benchmark
 ELECTRICITY SUPPLY	<b>Smart Electricity Meters</b>	<b>62.30 %</b>	
	<i>Electricity Supply ICT Monitoring</i>	57.14 %	
	<i>Demand Response Penetration</i>	0.01 %	
	<b>Electricity System Outage Frequency</b>	<b>0.06</b>	
	<b>Electricity System Outage Time</b>	<b>30.66 Minutes</b>	
	<b>Access to Electricity</b>	<b>88.30 %</b>	










## Dimension: Economy (continued)

CATEGORY	KPI / Data Point	Results	Benchmark
 TRANSPORT	<b>Dynamic Public Transport Information</b>	<b>100.00 %</b>	
	<b>Traffic Monitoring</b>	<b>100.00 %</b>	
	<i>Intersection Control</i>	1.98 %	
	<b>Public Transport Network</b>	<b>181.09 Km / 100 000 inhabitants</b>	
	<i>Public Transport Network Convenience</i>	56.90 %	
	<b>Bicycle Network</b>	<b>43.07 Km / 100 000 inhabitants</b>	
	<i>Transportation Mode Share: Private Vehicles</i>	45.20 %	
	<i>Transportation Mode Share: Public Transport</i>	43.60 %	
	<i>Transportation Mode Share: Walking</i>	8.40 %	
	<i>Transportation Mode Share: Cycling</i>	2.40 %	
	<i>Transportation Mode Share: Para Transport</i>	0.30 %	
	<i>Travel Time Index</i>	1.37	
	<i>Shared Bicycles</i>	62.03 / 100 000 inhabitants	
	<i>Shared Vehicles</i>	13.15 / 100 000 inhabitants	
	<i>Low-Carbon Emission Passenger Vehicles</i>	1.04 %	















## Dimension: Economy (continued)

CATEGORY	KPI / Data Point	Results	Benchmark
 PUBLIC SECTOR	Open Data Sets Published	8 168	N/A
	Open Data Sets % Availability	100.00 %	
	e-Government	13 805 Services	N/A
	Public Sector e-Procurement	43.24 %	
 INNOVATION	<b>R&amp;D Expenditure</b>	<b>2.26 %</b>	
	<b>Patents</b>	<b>115.00 / 100 000 inhabitants</b>	
	Small and Medium-Sized Enterprises	99.97 %	
 EMPLOYMENT	<b>Unemployment Rate</b>	<b>3.78 %</b>	
	<b>Youth Unemployment Rate</b>	<b>7.47 %</b>	
	Tourism Sector Employment	0.70 %	
	ICT Sector Employment	2.17 %	
 WASTE	<b>Solid Waste Collection</b>	<b>100.00 %</b>	
 BUILDINGS	Public Building Sustainability	20.16 %	
	Integrated Building Management Systems in Public Buildings	Not Reported	





















## Dimension: Economy (continued)

CATEGORY	KPI / Data Point	Results	Benchmark
 URBAN PLANNING	<i>Pedestrian Infrastructure</i>	1.96 %	   
	<i>Urban Development and Spatial Planning: Compact</i>	NO	   
	<i>Urban Development and Spatial Planning: Connected</i>	YES	
	<i>Urban Development and Spatial Planning: Integrated</i>	YES	
	<i>Urban Development and Spatial Planning: Inclusive</i>	YES	
	<i>Urban Development and Spatial Planning: Resilient</i>	YES	

## Dimension: Environment


















CATEGORY	KPI / Data Point	Results	Benchmark
 AIR QUALITY	Particulate Matter (PM 2.5)	20.00 $\mu\text{g} / \text{m}^3$	
	Particulate Matter (PM 10)	38.00 $\mu\text{g} / \text{m}^3$	
	Nitrogen Dioxide ( $\text{NO}_2$ )	22.57 $\mu\text{g} / \text{m}^3$	
	Sulphur Dioxide ( $\text{SO}_2$ )	5.71 $\mu\text{g} / \text{m}^3$	
	Ozone ( $\text{O}_3$ )	85.67 $\mu\text{g} / \text{m}^3$	
	GHG Emissions	3.86 tonnes $\text{eCO}_2 / \text{capita}$	
 WATER AND SANITATION	Drinking Water Quality	100.00 %	
	Water Consumption	313.76 $\ell / \text{day} / \text{capita}$	
	Freshwater Consumption	100.00 %	
	Wastewater Treatment: Primary	100.00 %	
	Wastewater Treatment: Secondary	100.00 %	
	Wastewater Treatment: Tertiary	100.00 %	

## Dimension: Environment (continued)



















CATEGORY	KPI / Data Point	Results	Benchmark
 WASTE	<b>Solid Waste: Landfill</b>	<b>17.29 %</b>	
	<b>Solid Waste: Burnt</b>	<b>0.00 %</b>	
	<b>Solid Waste: Incinerated</b>	<b>9.05 %</b>	
	<b>Solid Waste: Open Dump</b>	<b>0.00 %</b>	
	<b>Solid Waste: Recycled</b>	<b>72.70 %</b>	
	<b>Solid Waste: Other</b>	<b>0.95 %</b>	
 ENVIRONMENTAL QUALITY	<b>EMF Exposure</b>	<b>100.00 %</b>	
	Noise Exposure	32.04 %	
 PUBLIC SPACE AND NATURE	<b>Green Areas</b>	<b>28.33 ha / 100 000 inhabitants</b>	
	Green Area Accessibility	Not Reported	
	Protected Natural Areas	45.40 %	
	Recreational Facilities	2 901 726 m <sup>2</sup> / 100 000 inhabitants	
 ENERGY	<b>Renewable Energy Consumption</b>	<b>1.03 %</b>	
	<b>Electricity Consumption</b>	<b>6 482 kWh / yr / capita</b>	
	<b>Residential Thermal Energy Consumption</b>	<b>50.33 GJ / yr / capita</b>	
	<b>Public Building Energy Consumption</b>	<b>322.88 kWh / m<sup>2</sup> / yr</b>	



## Dimension: Society and Culture

CATEGORY	KPI / Data Point	Results	Benchmark
 EDUCATION	<b>Student ICT Access</b>	<b>100.00 %</b>	
	<b>School Enrolment</b>	<b>95.94 %</b>	
	<b>Higher Education Degrees</b>	<b>20 558 / 100 000 inhabitants</b>	
	<b>Adult Literacy</b>	<b>99.84 %</b>	
 HEALTH	<i>Electronic Health Records</i>	96.64 %	
	<b>Life Expectancy</b>	<b>83.30 Years</b>	
	<b>Maternal Mortality Rate</b>	<b>22.67 / 100 000 live births</b>	
	<b>Physicians</b>	<b>244.30 / 100 000 inhabitants</b>	
	<i>In-Patient Hospital Beds</i>	1 530.59 / 100 000 inhabitants	
	<i>Health insurance / Public Health Coverage</i>	96.72 %	
 CULTURE	<b>Cultural Expenditure</b>	<b>0.24 %</b>	
	<i>Cultural Infrastructure</i>	11.50 / 100 000 inhabitants	N/A
 HOUSING	<b>Informal Settlements</b>	<b>0.00 %</b>	
	<i>Housing Expenditure</i>	19.10 %	

## Dimension: Society and Culture (continued)

CATEGORY	KPI / Data Point	Results	Benchmark
 <p>SOCIAL INCLUSION</p>	<b>Gender Income Equity</b>	<b>0.69</b>	
	<b>Gini Coefficient</b>	<b>0.34</b>	
	<b>Poverty Rate</b>	<b>4.86 %</b>	
	<b>Voter Participation</b>	<b>57.26 %</b>	
	<i>Childcare Availability</i>	82.43 %	
 <p>SAFETY</p>	<b>Natural Disaster-Related Deaths</b>	<b>0.12 / 100 000 inhabitants</b>	
	<b>Disaster-Related Economic Losses</b>	<b>0.00 % / City GDP</b>	
	<i>Resilience Plans</i>	NO	
	<i>Population Living in Disaster-Prone Areas</i>	1.21 %	
	<i>Emergency Service Response Time</i>	10.46 Minutes	
	<b>Police Service</b>	<b>228.71 FTE / 100 000 inhabitants</b>	
	<b>Fire Service</b>	<b>96.18 FTE / 100 000 inhabitants</b>	
	<b>Violent Crime Rate</b>	<b>599.83 / 100 000 inhabitants</b>	
	<b>Traffic Fatalities</b>	<b>4.59 / 100 000 inhabitants</b>	
 <p>FOOD SECURITY</p>	<i>Local Food Production</i>	90.00 %	

## 7. KPIs Not Reported

KPI Number	Description
EC: ICT: D: 1A	Drainage / Storm Water System ICT Monitoring
EC: I: B: 2A	Integrated Building Management Systems
EN: EN: PSN: 2A	Green Area Accessibility

## 8. KPIs Not Verified

All reported KPIs were verified.

## 9. Next Steps

Daegu is encouraged to focus on KPIs that have been reported as falling within the benchmarks of 0 – 33 % and 33 – 66 % of targets, determine which of these KPIs indicates critical issues for the city and develop plans for improvement.

Daegu is encouraged to review the KPIs for which no data were reported and determine plans for future data collection and reporting.

Daegu is encouraged to continue ongoing data collection to determine trends in performance against benchmarks over time.

Daegu is encouraged to stay engaged within the U4SSC process and continue to provide feedback on KPIs and benchmarks.

## 10. Using KPIs for SSC to Reach the SDGs

The United for Smart Sustainable Cities (U4SSC) initiative has developed the Key Performance Indicators (KPIs) for Smart Sustainable Cities (SSC) to support cities worldwide in evaluating the role and contribution of ICTs in smart sustainable cities, and to provide cities with the tools for self-assessments in order to achieve the United Nations Sustainable Development Goals (SDGs).

### United for Smart Sustainable Cities (U4SSC)



**U4SSC** is a UN initiative coordinated by the International Telecommunication Union (ITU), UN-Habitat and UNECE, and supported by 14 other UN Agencies and Programmes, including CBD, ECLAC, FAO, UNESCO, UNDP, UNECA, UN-Women, UNEP, UNEP-FI, UNFCCC, UNIDO, UNU EGOV, UNOP and WMO.

U4SSC is the global platform to advocate for public policies to encourage the use of ICTs to facilitate and ease the transition to smart sustainable cities. [Find out more...](#)

These indicators are developed based on an international standard – Recommendation ITU-T Y.4903/L.1603 ‘Key performance indicators for smart sustainable cities to assess the achievement of sustainable development goals’.

These indicators have been developed to provide cities with a consistent and standardized method to collect the necessary data to measure performance and progress with regard to:

- achieving the Sustainable Development Goals (SDGs);
- becoming a smarter city; and
- becoming a more sustainable city.

The U4SSC KPIs consist of 91 indicators. Each indicator forms part of a holistic view of a city's performance in three dimensions: **Economy, Environment** and **Society and Culture**. Each of these dimensions provides a separate view of progress, and when reported together they provide a holistic view of a smart sustainable city.

By providing a common set of metrics to benchmark a city's performance, the indicators will also enable cities to compare their performance to other cities, allowing for the dissemination of best practices and setting the standards for progression in meeting the Sustainable Development Goals (SDGs) at the city level.

The list of all the U4SSC KPIs for SSC, along with its collection methodology, are contained in:

- the Flipbook on the '[Collection Methodology for Key Performance Indicators for Smart Sustainable Cities](#)'.

Over 100 cities worldwide are already implementing these KPIs. All cities are invited to participate in this project and employ these KPIs.

To find out more, please contact the U4SSC Secretariat at: [u4ssc@itu.int](mailto:u4ssc@itu.int).

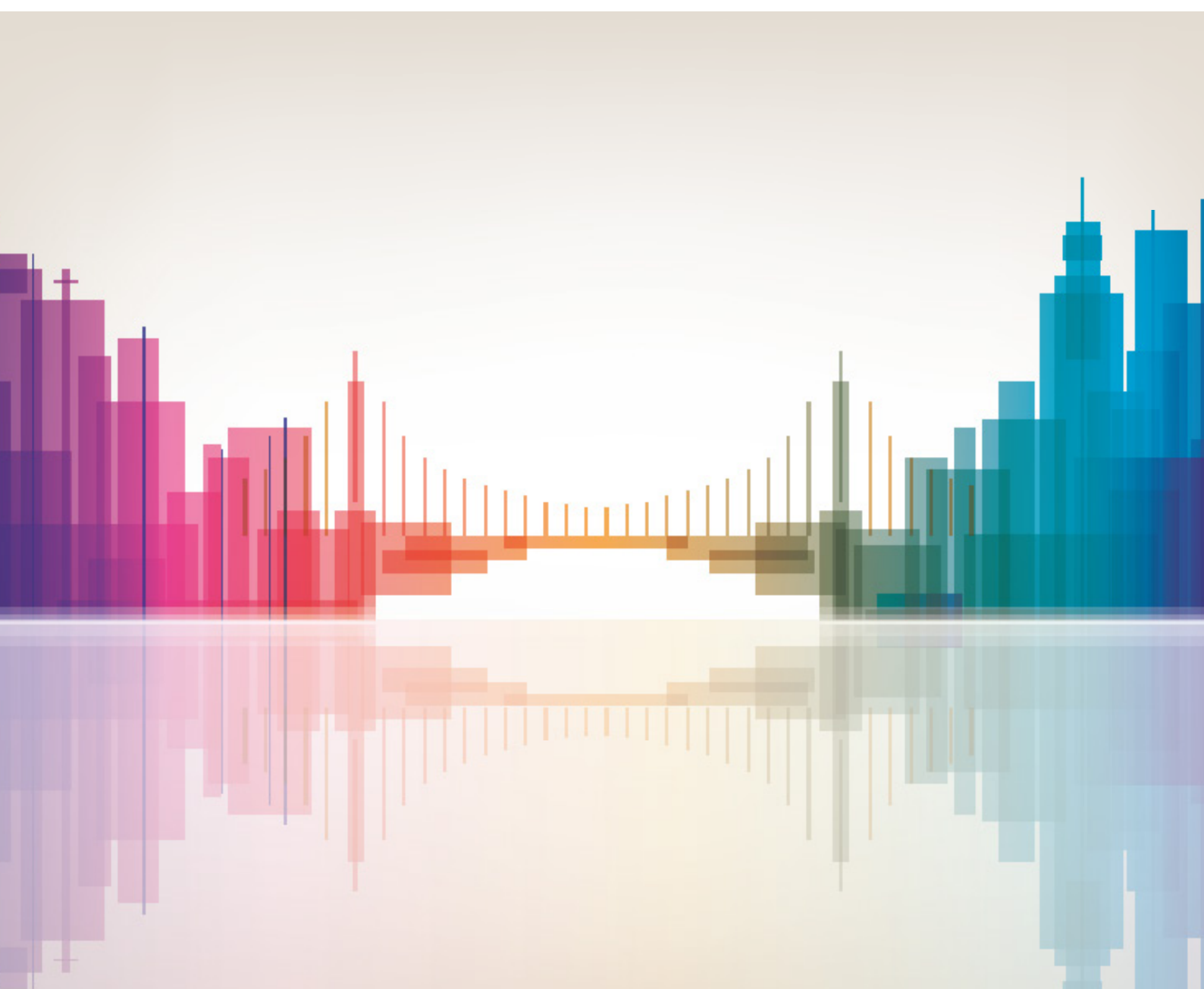












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