

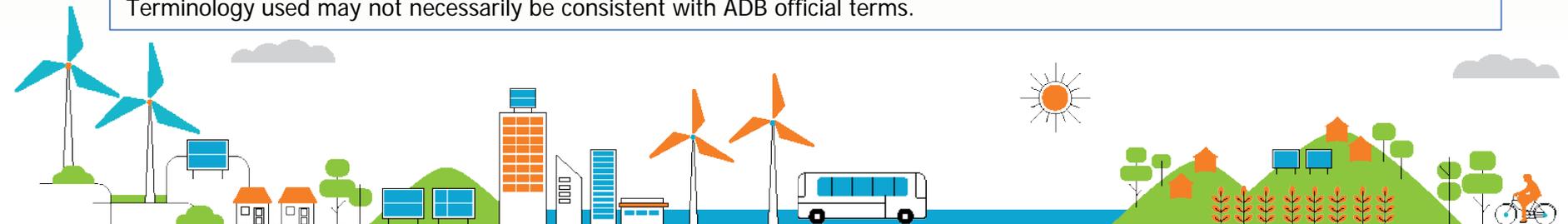


ADB

# Demonstrating Water-Food-Energy Nexus through Water Conservation Beijing Capital Region, PRC

EARD – SDCC June 2019

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# Beijing Capital Region (BCR)

Population ~23 Million  
2<sup>nd</sup> largest city in the World  
after Shanghai, PRC

Water resources availability  
(m<sup>3</sup>/capita/year):

**WHO < 500 - BCR < 200**

**=> Water stressed  
(Northern China: 15% PRC  
Water Resources)**



# BCR Water Critical Situation

Annual Water Consumption:  
**4 billion m<sup>3</sup> (2016)**  
**4.5 billion m<sup>3</sup> by 2020**

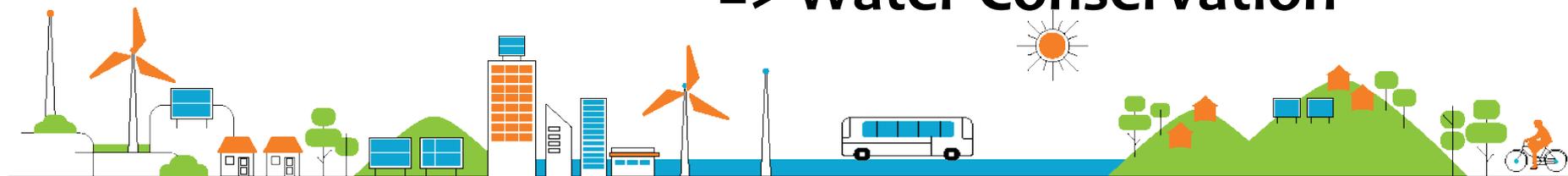
Renewable fresh water:  
**3 to 5 billion m<sup>3</sup>/year**

55% underground water  
45% surface water

u/g water elevations declining &  
Limited solutions for recharge

**2030 Water Demand**  
**=> Water Conservation**

| BCR Water Uses 2016 (%)  |    |
|--------------------------|----|
| Household                | 41 |
| Agricultural             | 34 |
| Industrial               | 14 |
| Environment,<br>Watering | 11 |



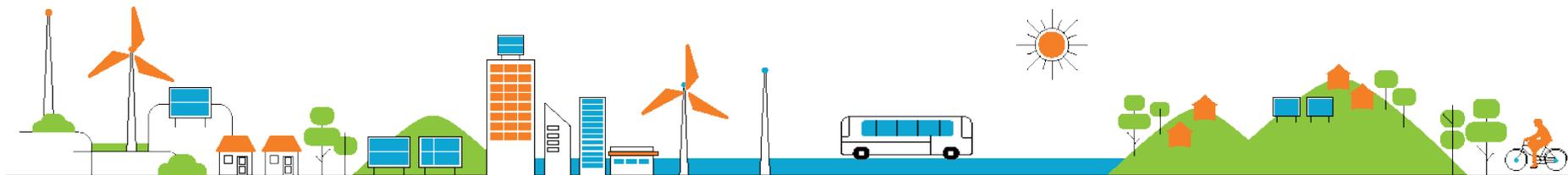
> 40% Water for Residential Use

**FIX THAT LEAK!**

One drop per second from a leaky faucet => 10 M<sup>3</sup> per year!

=> BCR 7.5 Million homes  
= 75 Million M<sup>3</sup> per year Lost

**Household and industrial leaks  
account for over 10% of losses.**



# ADB Assistance to Beijing (2017 -2018)

PDA *"Demonstration WFE Nexus through Water Conservation Measures in Beijing"*

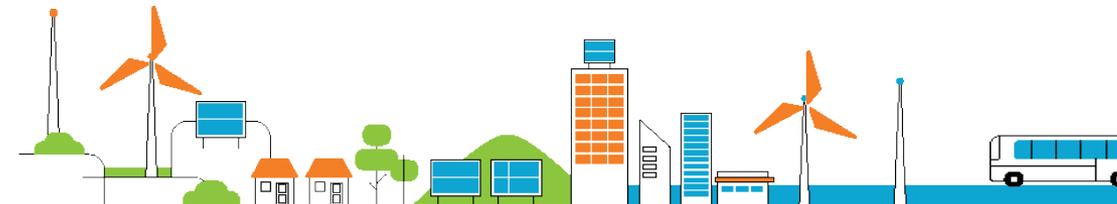
-> Tariffs; NRW; increased WQ; Reuse; GW Recharge; Sponge City; Water saving; Urban forests / landscaping; Education.



ADB/IHE Delft/RH/BWA/BIW

*"Guidelines and Good Practice for Managed Aquifer Recharge with Infiltration Basins"*

Options for Construction of Infiltration Basins in BCR



# Enhanced Water Conservation BCR (1)



## LOW FLOW FIXTURE / LABELLING (USA/Japan)

Water Tariff Rebates (fixtures under labelling)

=> Potential reduction water demand (30%)



| Fixture           | Water User Per Fixture (L) | Water Use Efficient Fixture (L) | Water Savings / Year / Fixture (L) |
|-------------------|----------------------------|---------------------------------|------------------------------------|
| Toilet            | 16.5 / flush               | 6.0 / flush                     | 52,479                             |
| Dual Flush Toilet | 16.5 / flush               | 4.3 / flush                     | 56,776                             |
| Clothes Washer    | 170 / load                 | 90 / load                       | 25,848                             |
| Showerhead        | 15 / minute                | 9.5/ minute                     | 26,599                             |
| Faucet Aerator    | 12.5/ minute               | 9.5/ minute                     | 22,451                             |

## CONSTRUCTED WETLANDS/MAR (Netherlands)

BCR requirement to implement National  
Sponge City Program:

- ⇒ Stabilizes GW depletion
- ⇒ Tertiary Treatment with CW to polish effluent

MAR with effluent through infiltration  
wells, wetlands and impoundments

- ⇒ Redesign waterways
- ⇒ Land Value Capture (Greening)

**BCR:** 800 to 1,000 M M<sup>3</sup>/y reused

**Actions:** 47 new recycling plants &  
20 upgrades wastewater treatment plants

**=> MAR better than Reuse for landscaping**



# Enhanced Water Conservation BCR (3)



## Innovative FSM - Carbon Storage

Beijing Forest Bureau:

- 600 M m<sup>3</sup>/y water landscaping
- 100 M trees (last 3 years)
- +300 M trees (next 3 years)

FSM: Waste => Resource

Sludge: Water content > 50%

-> Nurseries Trees / Urban Forest

Support PRC INDC: Forests and CO<sub>2</sub>e reduction 4 M/y

Proof of Concept 2017 (SFPP)

TRTA 2019 (BMGF)

PPP/NSO 2020



Water & Sanitation = City largest energy user with GHG/CO<sub>2</sub> emission implications

Public education => Public Support for Water Conservation with Health & Environmental Co-Benefits

Most policies in place (NRW; Sponge City; Tariffs; Limits on GW abstraction) or under consideration (rebates; labelling)

⇒ **KSF: Institutional arrangements & Stakeholders Engagement for Public Support**



# Financing Options



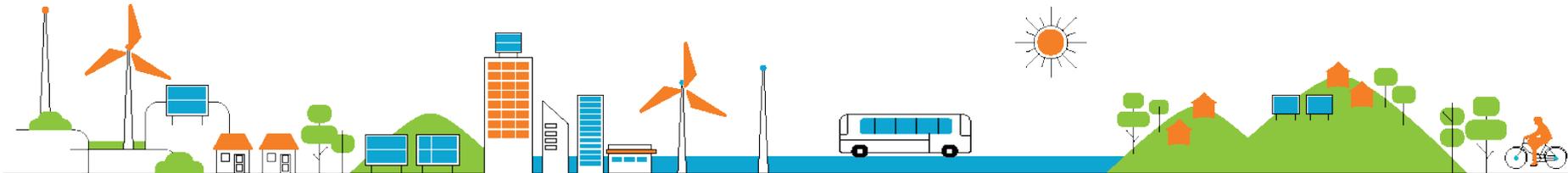
- 1. Tariff increases:** BCR (PRC highest) 30 to 70% lower than Western Cities  
Water: \$0.58/M<sup>3</sup> - USA: \$9.90/M<sup>3</sup>  
WW: \$0.21/M<sup>3</sup> - USA: 12.26/M<sup>3</sup>
- 2. Rebates:** Subsidy
- 3. Carbon tax:** BCR Water  
Annual GHG 1 Million tons



**MAR Combined with Effluent Reuse:**  
Most Cost Effective Water Conservation  
for BCR (Others NRW Reduction)  
**=> Water Conservancy 90% cheaper than  
developing new water resources**

## Continuous Improvement Process Enhanced Water Conservation Plan:

- Raise Public Awareness;
- Provide community education;
- Increase Tariff
- Implement MAR with effluent reuse;
- Use Water Labelling for Fixtures with Rebates;



# THANK YOU

