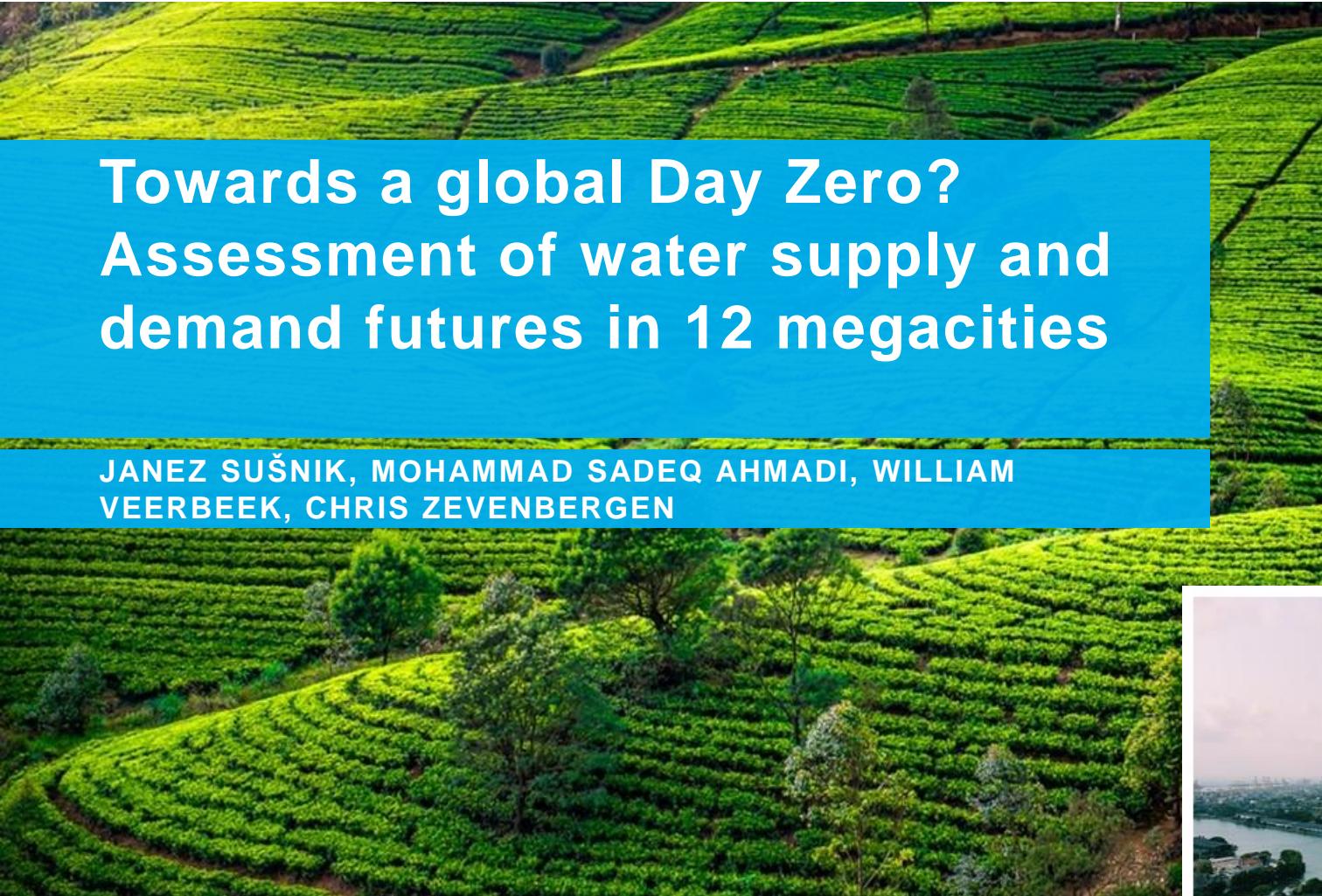


Towards a global Day Zero? Assessment of water supply and demand futures in 12 megacities

JANEZ SUŠNIK, MOHAMMAD SADEQ AHMADI, WILLIAM
VEERBEEK, CHRIS ZEVENBERGEN

inspiring change



CONTEXT

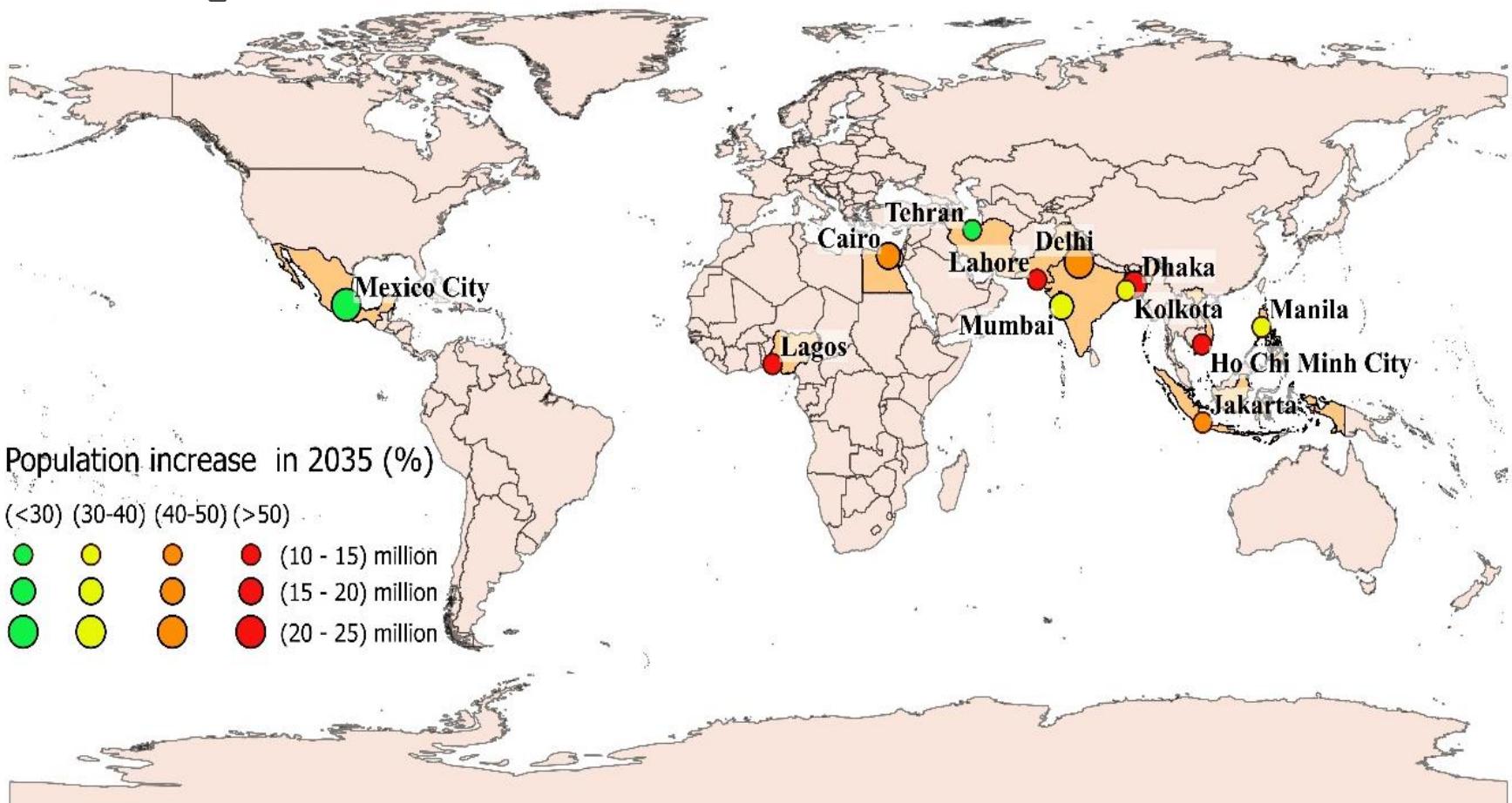
- Summer 2018: Cape Town Day Zero water crisis
- Summer 2019: Chennai water supply crisis
- ~50% population urban → 70% by mid-century (7bn people in cities)
- 40% people live in catchments unable to supply water demand
- 13% of urban population live in 33 megacities → predicted to grow to 43
- Many smaller rapidly developing cities
- **What is the chance of near-future Day Zeros? Where is at risk?**

CONTEXT

- Risks to urban water supply security?
 - Urban population growth (especially ‘smaller’ cities)
 - Unplanned/informal settlements – how to connect sustainably?
 - Climate change → supply threats?
 - Lifestyle changes → demand threats?
 - Path dependency in older cities/areas
 - Slow response time to adapt (inertia)

CONTEXT

- Assess current and potential future water supply and demand in 12 megacities



METHODS

- Data used:
 - City Water Map data (McDonald et al. 2014, and knb.ecoinformatics.org/view/doi:10.5063/F1J67DWR)
 - William Veerbeek, 2017 (IHE Delft PhD thesis)
 - Local city-level statistics and city plans
- Population, water supply, water demand (per-capita), type of supply, coverage, NRW, growth rate, etc.
- Forecast out to 2035 based on city population projections

RESULTS

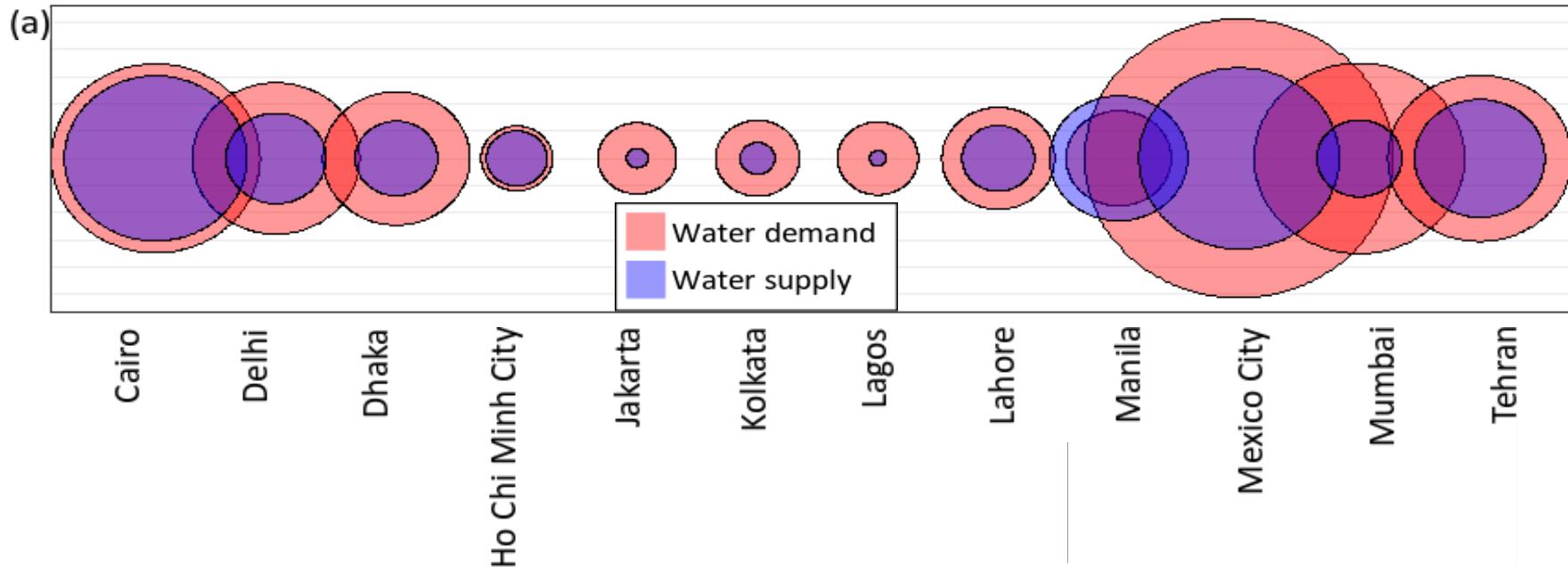
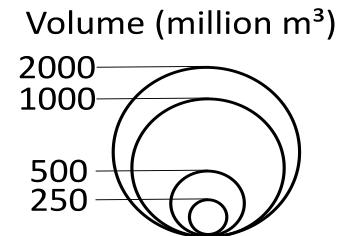


RESULTS

RESULTS: PRESENT DAY

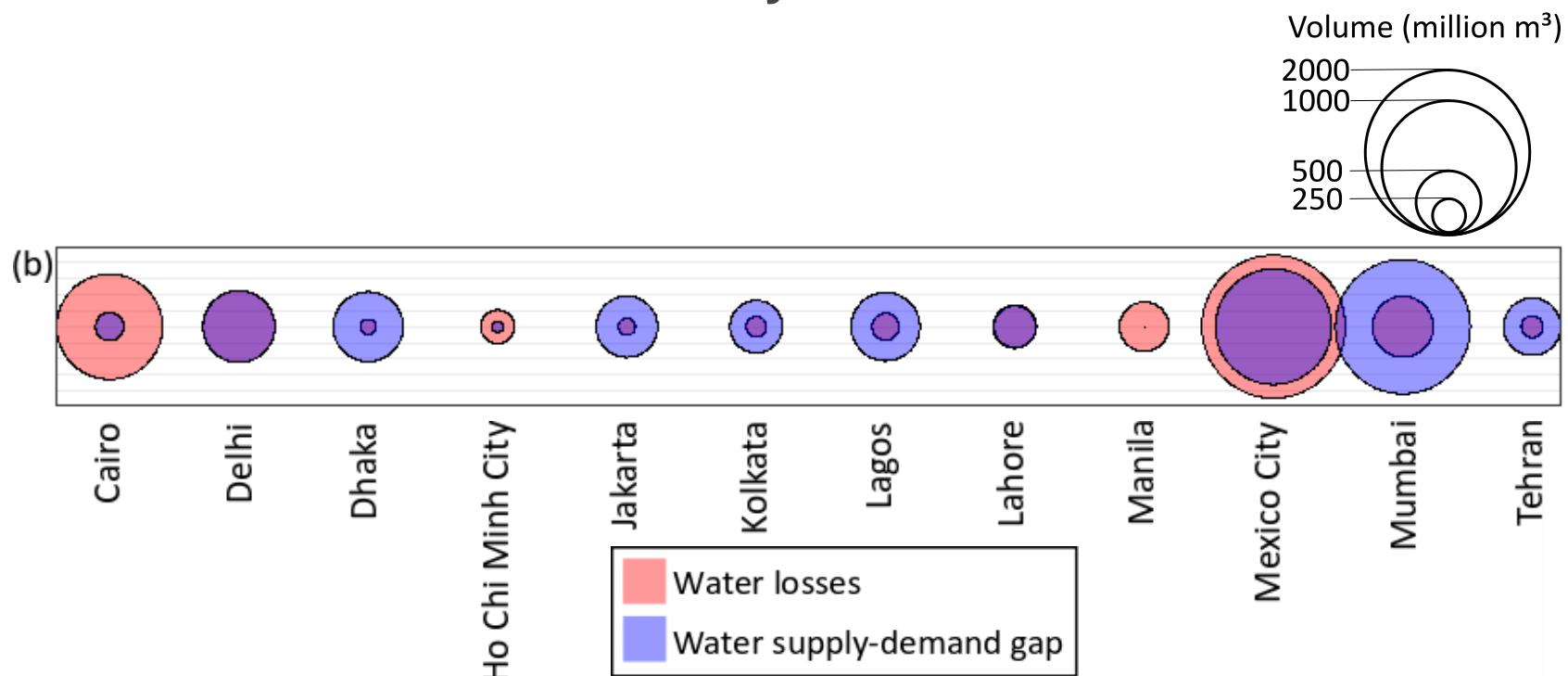
- 5 BCM/yr supply-demand gap

- Mumbai, Mexico City, Delhi top 3 by volume



RESULTS: PRESENT DAY

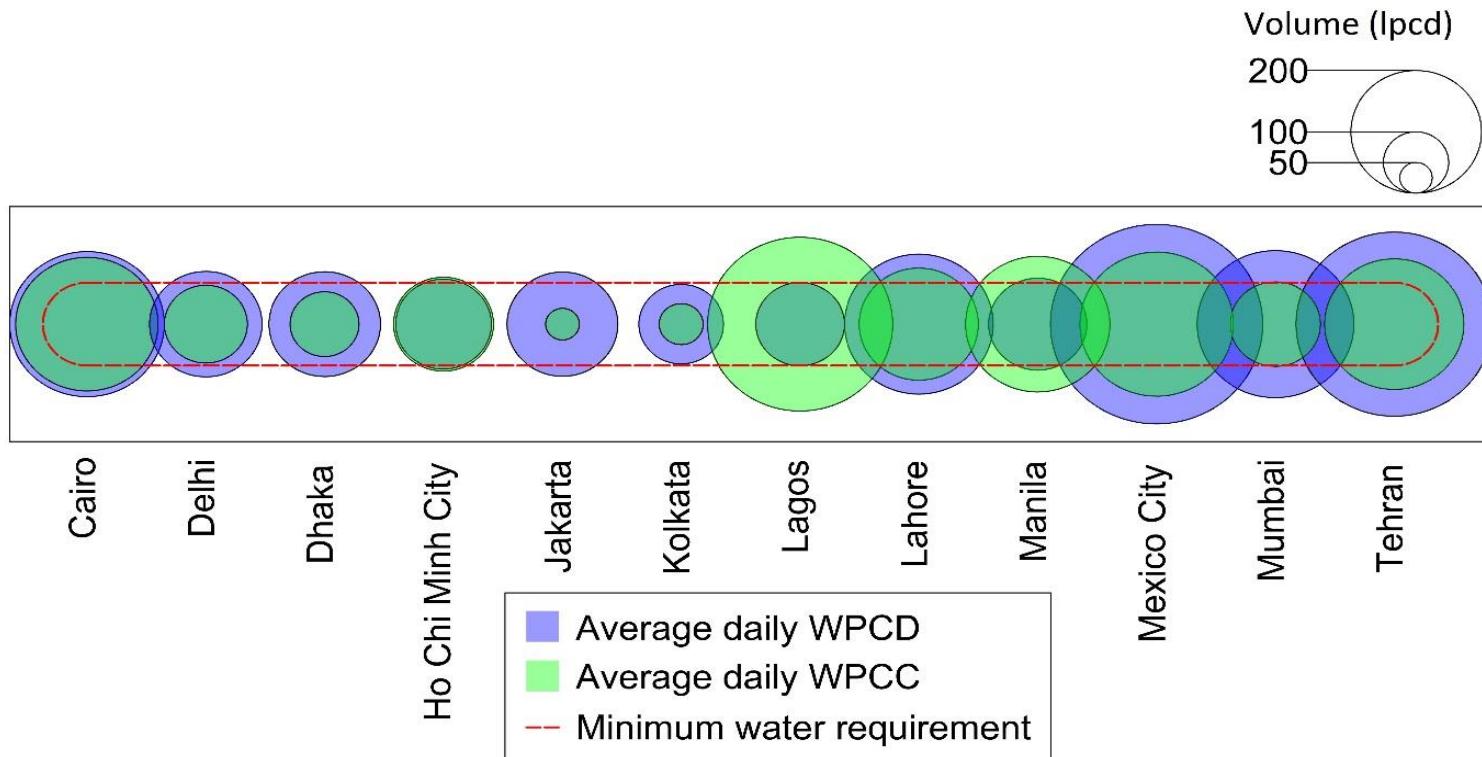
- Total water losses: 4.7 BCM/yr



- Sufficient for ~90 million people

RESULTS: PRESENT DAY

- Some residents *consume* less than they demand
- In some cities, per-capita consumption is lower than ‘development threshold’



RESULTS: THE FUTURE

- Significant demand increase potential by 2035

Category	No. of city	Population (million)	Increase in water demand (BCM yr ⁻¹)
<100%	5	110	3.68
100%-200%	3	82	3.43
>200%	4	82	3.91
Total	12	275	11.02

- Assuming supplies are constant or threatened → huge risk for drinking water security
- Potential for near-future 'Day Zeros' is very high in these cities

RESULTS

- Mumbai, Mexico City, Lagos, Delhi, Dhaka all very vulnerable
 - Rapid population increase
 - High NRW
 - Relatively poor infrastructure and coverage
 - Informal settlements
- Opportunities?
 - Reduce per-capita demand
 - Reduce NRW
 - Water supply fit-to-purpose (e.g. rainwater harvesting)
 - Attempt to limit/mitigate urban-rural migration?

ASSUMPTIONS

- NRW only considered physical losses
- Demand from industry and commercial sector neglected
- Water supply and per-capita demand assumed constant
- Did not account for informal water supplies
- Did not consider economic water scarcity
- Did not account for all global megacities

- Even so, **results indicate a significant global vulnerability**

CONCLUSIONS

- 12 megacities today face water insecurity
- There are 33 megacities → project to grow to 43 by 2050
- High per-capita demand + high NRW + rapid growth = demand > supply
- **Losses almost = supply-demand gap**
- **Demand may grow by 39% to 2035.**
- **Deficit could increase by 118%**

CONCLUSIONS

- Urgent action and solutions required:
 - Demand management (incl. NRW reduction)
 - Supply augmentation and fit-for-purpose supply / usage
 - Sustainable integration of informal settlements
 - Coordinated urban planning and water supply/demand management
 - Mitigate urbanisation / consider alternative options and locations
 - Large scale, structural, cheap financing to fund solutions