LBR LBO Infrastructure Summit 2015

Infrastructure Conundrum - Supply-Demand Imbalance

Dr. Kumudu Gunasekera

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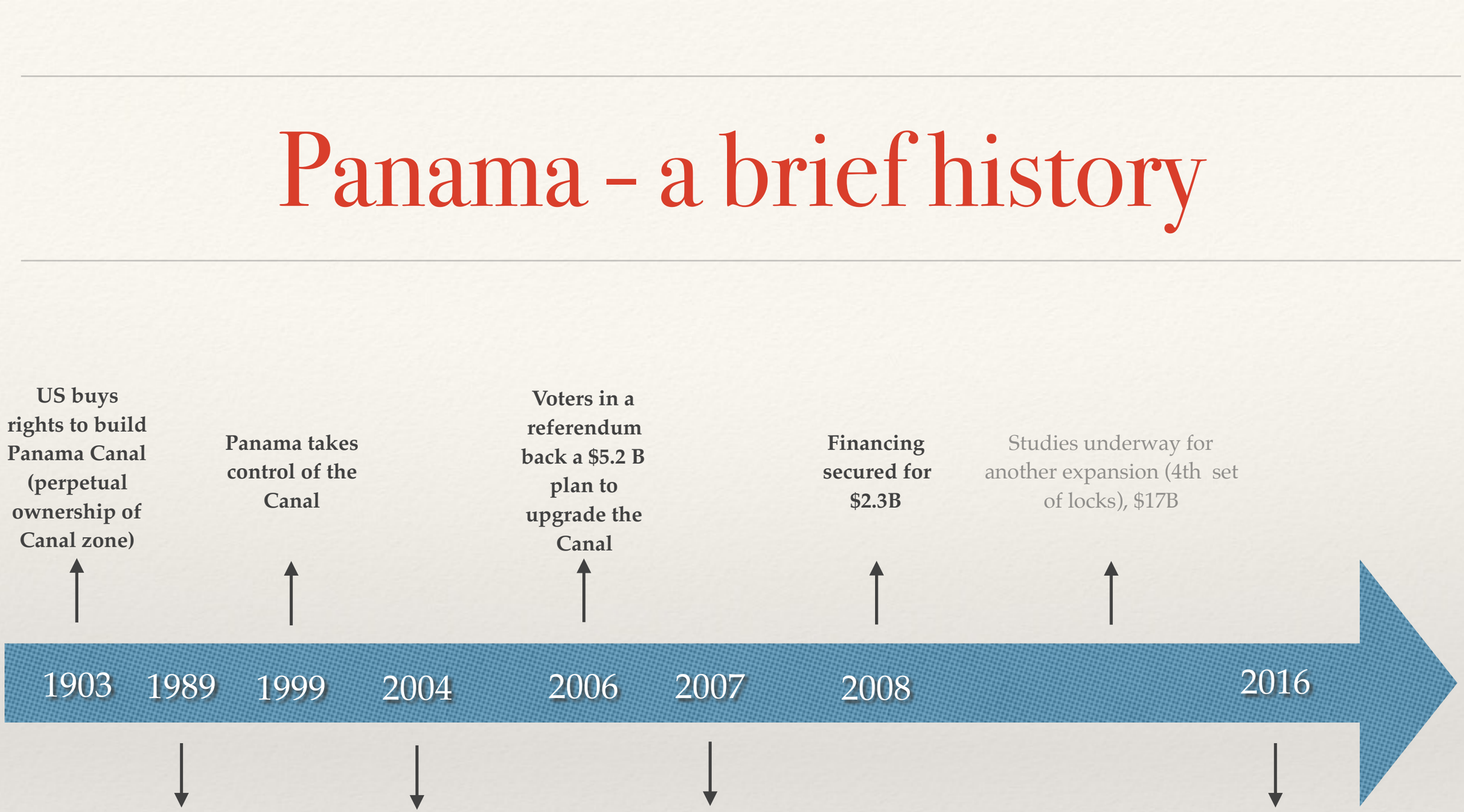
Panama Canal - world's most strategic waterway

Panama - a brief history



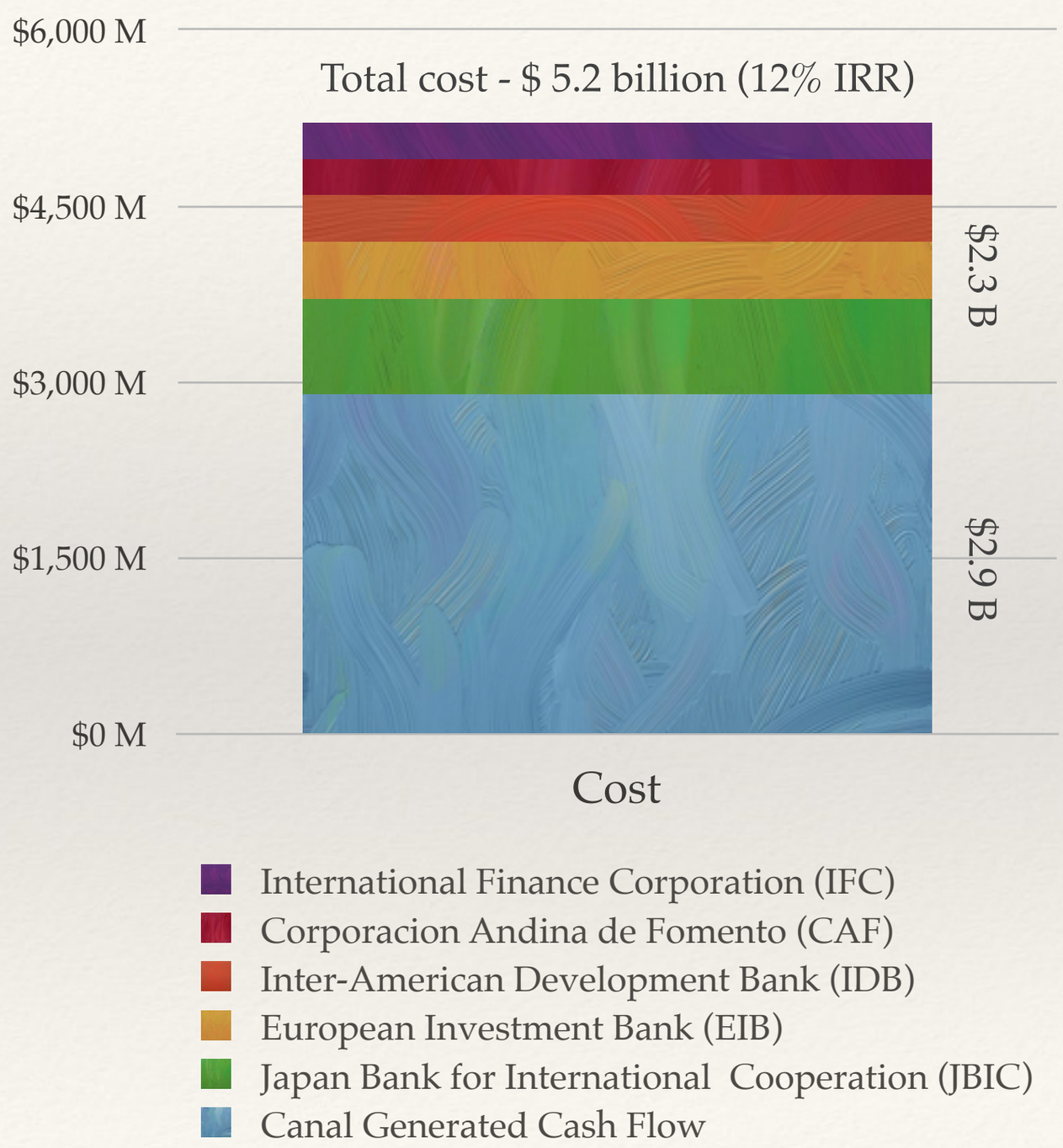
Steam shovels load rocks blasted away onto twin tracks that remove the earth from the Panama Canal bed circa 1908. It took the United States 10 years to build the canal at a cost of $375 million (which equals about $8.6 billion today).


DOCKWISE

- New Locks (Third Set of Locks)
- Pacific Access Channel
- Improvement of Navigational Channels (Dredging)
- Improvements to Water Supply

A well thought out project….6 years of research & 100+ studies economic feasibility, market demand, env. impact, and other technical

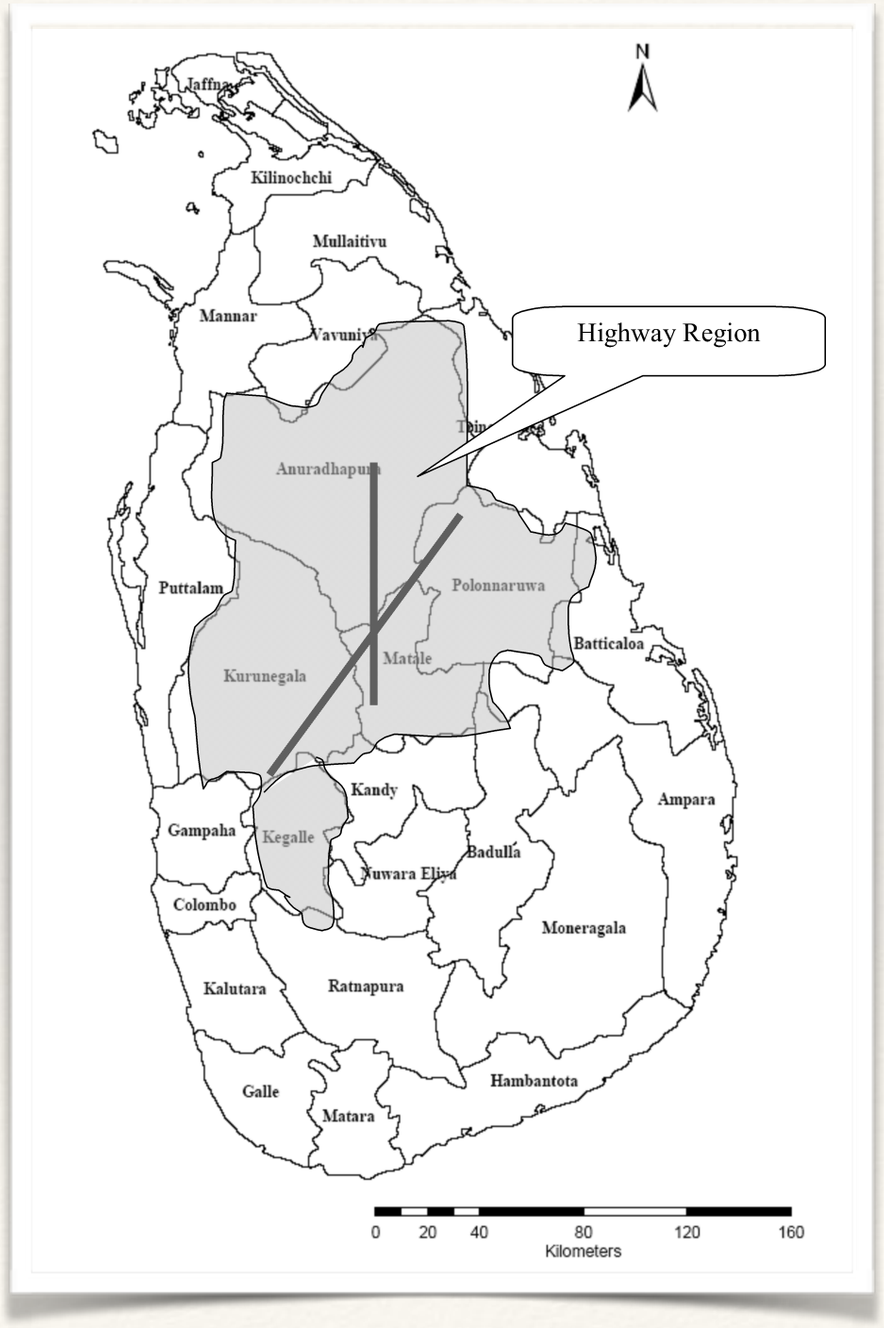
- Negotiated favorable financing terms during the height of the financial crisis, 2008
  - Finance was granted without guarantee from the Panamanian State (loan will not be part of the public debt)
  - Financing was not subject to commitments to purchase goods and / or services from any source in particular
  - Creditors would not intervene in the administration or operation of the Canal
  - Financing would not affect contributions to the National Treasury in accordance with Law 28 of 2006
  - 20 year loan, with a 10 year grace period
  - All five financial institutions agreed to provide the same loan conditions



The benefits of infrastructure are real….not just theoretical

It is the lifeblood of our society

- Ex-post study of the A6/A9 roads, which were rehabilitated in 1987 with an ADB grant
- 10-year analysis (1990 - 2000)
- Source:
  - Gunasekera Kumudu, et al, World Development, 2008
  - Gunasekera Kumudu at al, Transportation Research Record: Journal of the Transportation Research Board, 2006



A6/A9 rehabilitation transformed the region

Firms

- Revenue increased by 70%, the increase was higher 10% within 10 km of the road
- Size increased by 77%
- Shift in firms' capital/labor ratios, where firms near the highway have become more capital intensive

Households

- Increased income by 80% (higher than the national average), with 20% higher closer the road
- Employment shifted towards less labor intensive more skilled employment
- Less land-intensive occupations
- Education was a statistically significant driver in income

Source: Gunasekera et al 2008; Gunasekera et al 2006

FACT

Infrastructure demand is far exceeding governments ability to supply

This is a global problem not one faced only by Sri Lanka……

U.S. infrastructure grade = D +

WATER & ENVIRONMENT		TRANSPORTATION	
Dams	D	Aviation	D
Drinking Water	D	Bridges	C+
Hazardous Waste	D	Inland Waterways	D-
Levees	D-	Ports	C
Solid Waste	B-	Rail	C+
Waste Water	D	Roads	D
		Transit	D
PUBLIC FACILITIES			
Public Parks & Recreation	C-		
Schools	D		
ENERGY			
Energy	D+		

A = Exceptional
B = Good
C = Mediocre
D = Poor
E = Failing

Each category was evaluated on the basis of capacity, condition, funding, future need, operation and maintenance, public safety and resilience (American Society of Civil Engineers, 2013)

Economic impact of America's failing infrastructure…..
….. infrastructure maintenance is as important as building new capacity

Families have a
LOWER STANDARD OF LIVING.

American families would earn
$700 less each year.

+

And spend **$360 more**
each year.

=

Total impact on each family's budget:
$1,060 per year.

American businesses and workers
PAY A HEAVY PRICE.

America would lose
877,000 jobs.

Another **234,000** jobs exist only if many more workers agree to paycuts.

Between now and 2020
transportation costs
increase $430B.

AMERICA LOSES GROUND
in the global economy.

U.S. exports would drop by
$28 billion.

+

Exports drop in
79 of 93 different
tradable commodities.

=

America's gross domestic product underperforms by
$897B.

Source: American Society of Civil Engineers, 2013

FACT

Infrastructure demand is far exceeding governments ability to supply

What can be done?

It's not all about supply

- Reduce **WASTE**, by letting economics drive decisions not politics
- Curb **DEMAD**, i.e., incentivize to reduce consumption
- Foster **INNOVATION** where we adapt game changers in timely manner
- Fundamental shift in how we **FUND** infrastructure

Not all infrastructure investments are good…

- **"Bridge to Nowhere"**
  - Long as Golden Gate Bridge & higher than the Brooklyn Bridge ($398 million was allocated)
  - Replace the ferry that connects Ketchikan (8,900 residents) with Gravina Island (50 residents)
- **"Highway to Nowhere"**
  - The bridge was cancelled, but the highway was built ($25 million)

What have we done to reduce demand?

- Road Pricing
- Parking Management and Parking Pricing
- Car Sharing
- Pay-as-You-Drive Insurance
- Ridesharing and HOV Lanes
- Transit Incentives
- Transit Improvements
- Telework

Source: FHWA & VTPI

Game changers

TRANSPORTATION

- Ride sharing (Uber, pick me up), transit apps, construction (slide into place, jointless construction, inspections (robotic), next generation pavements (porus, rubberized asphalt, etc.), smart parking systems, bus rapid transit systems

WATER

- Desalinated water, extracting energy from waste, going deep underground, recycled reclaimed water, flood protection

ENERGY

- Renewables, lidar & drone technology, e-construction, etc.

ON THE HORIZON

- Connected and autonomous vehicles, self healing asphalt, 3D printing for construction

FUNDING

A fundamental shift on how infrastructure is funded… increased private sector participation

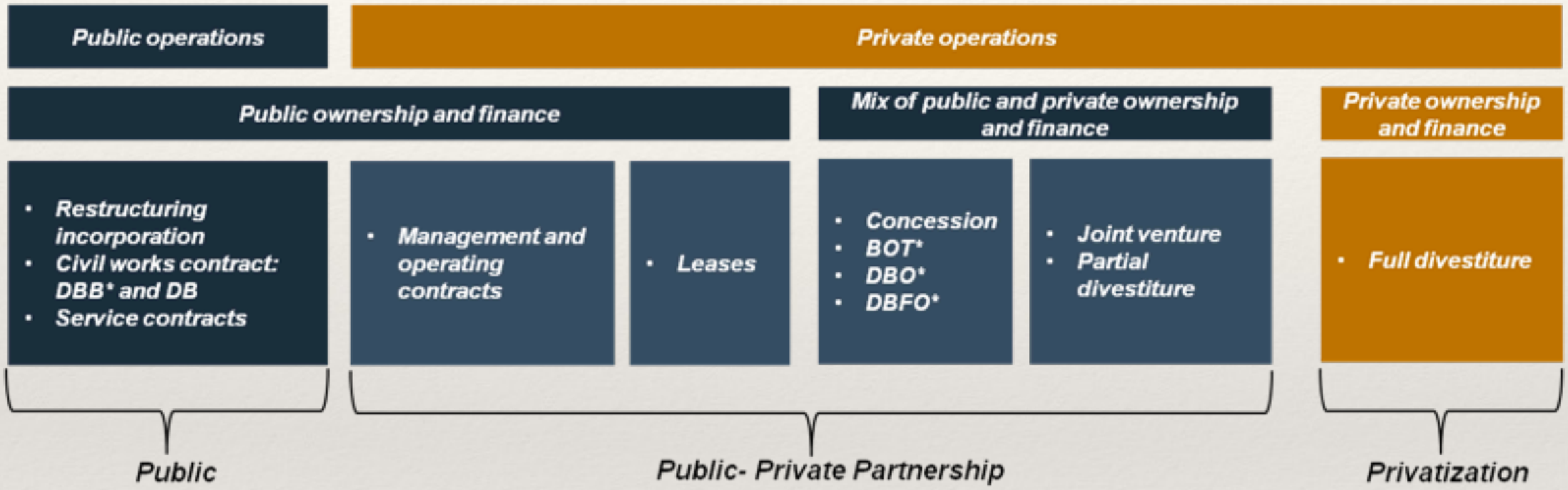
PUBLIC

- Globally, share of total infrastructure financing as % of GDP will need to increase from 3.8% to 5.6% (McKinsey Global Institute, 2012)
  - OECD - 3.5% of GDP
  - Africa/South Asia 10% of GDP
- There are projects that are not financially feasible, but need to constructed & maintained for social equity
  - Financial IRR versus Economic IRR

PRIVATE

- Institutional investor base is estimated to be at about $90 trillion globally (HSBC, 2013)
- Impediments
  - Scale
  - Longer payback
  - Illiquidity
  - Lack of a pipeline of properly structured projects
  - Weak legal frameworks to protect investors
  - Arbitrary exercise of political power
    - Sudden cuts in the prices private infrastructure operators are allowed to charge
    - New regulations
    - Unilateral renegotiation of existing contracts by new governments

Myriad of partnerships options



Definitions :*DBB – Design-Bid Build , DB – Design-Build, BOT – Build-Operate-Transfer, DBO – Design-Build-Operate, DBFO- Design-Build-Finance-Operate

FUNDING

Name of investor	Headquarters	Five-year capital formed total ($bn)
Macquarie Infrastructure and Real Assets	Sydney	23.72
Brookfield Asset Management	Toronto	11.16
Global Infrastructure Partners	New York	8.64
Canada Pension Plan Investment Board	Toronto	8.41
APG Asset Management	Amsterdam	7.80
QIC	Brisbane	6.88
Ontario Teachers Pension Plan	Toronto	6.87
Alinda Capital Partners	Greenwich, Connecticut	5.90
Industry Funds Management	Melbourne	5.51
ArcLight Capital Partners	Boston	5.43
OMERS	Toronto	5.02
Arcus Infrastructure Partners	London	4.99
Energy Capital Partners	Short Hills, New Jersey	4.79
RREEF Infrastructure	London	4.35
Highstar Capital	New York	4.25
Future Fund	Melbourne	4.20
Goldman Sachs	New York	4.17
La Caisse de Dépôt et placement du Québec	Montreal	4.14
Morgan Stanley	New York	4.00
JPMorgan Asset Management	New York	3.90
AMP Capital	Sydney	3.83
Universities Superannuation Scheme	Liverpool	3.80
British Columbia Investment Management Corporation	Victoria, British Columbia	3.74
SteelRiver Infrastructure Partners	San Francisco	3.73
Colonial First State	Sydney	3.72
UBS Global Asset Management	London	3.60
Citi Infrastructure Investors	New York	3.40
Energy Investors Funds	San Francisco	3.06
AXA Private Equity	Paris	2.90
Alberta Investment Management Corporation	Edmonton, Alberta	2.80
Kohlberg Kravis Roberts	New York	2.80

A lot of dry-powder available.

Are we ready?