Financing Pakistan's Water Infrastructure

Muhammad Aliuddin Ansari
Chairman
X-Petroleum Limited

Hisaar Foundation

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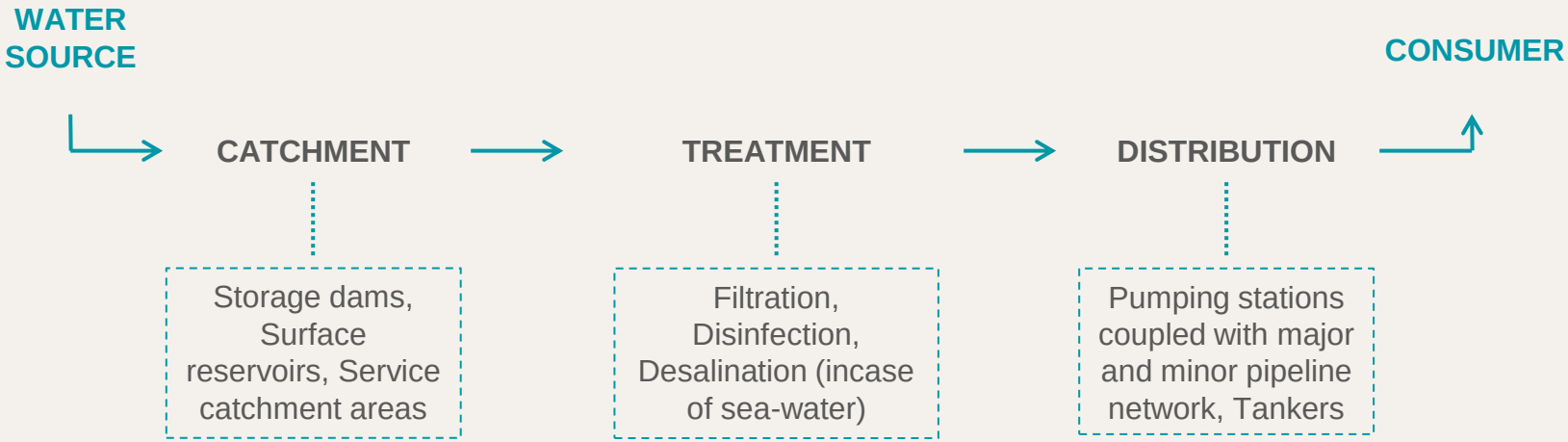
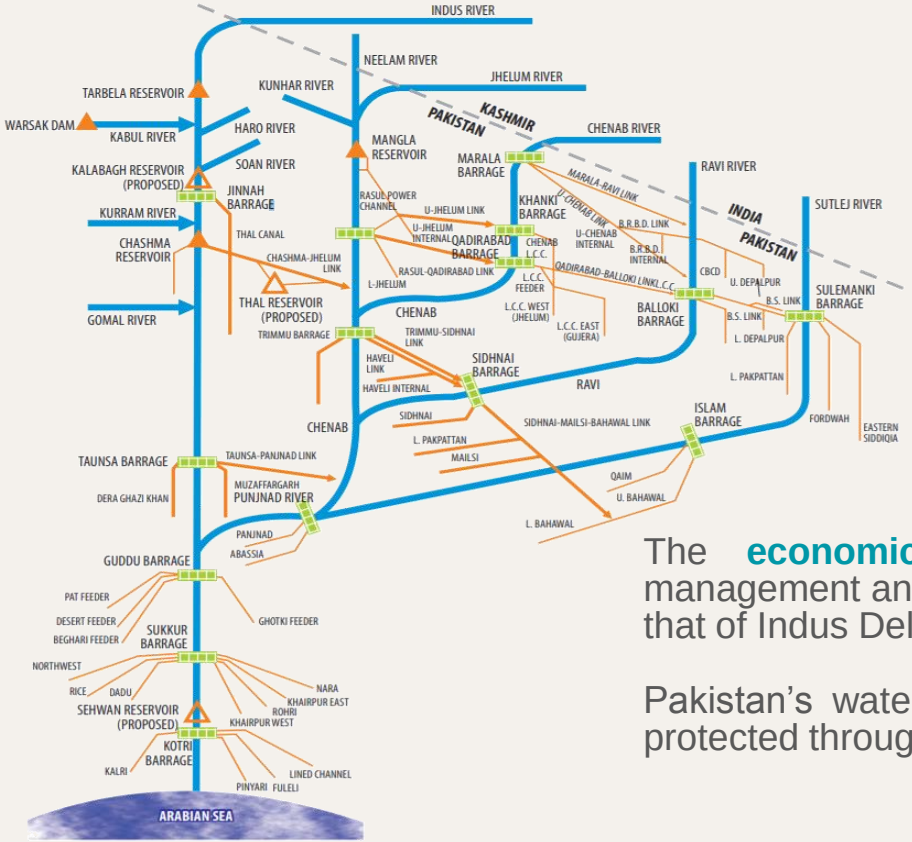
Water Infrastructure Requirements



Water Infrastructure



- Major reservoirs: 3 (~14 MAF storage)
- Barrages: 18
- Head works: 4
- Inter link canals: 12
- Canal systems: 44 (average – 1,275 km)
- Watercourses: 107,000 (average – 15 km)
- Hydropower capacity: 9,732 MW
- Irrigated area: 27 million acres

The **economic costs to Pakistan** from poor water management and sanitation is **~USD 12 billion per year** while that of Indus Delta degradation is **USD 2 billion per year**

Pakistan's water economy and its value chain needs to be protected through investment in its water infrastructure.

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Water Infrastructure

Storage and Rehabilitation

New Water Projects

Water Distribution Infrastructure

Hydropower Generation

Water Treatment and Recycling

Storage and Rehabilitation Projects

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- Storage per capita for Pakistan is 141m^3 (**10 times lower** than world average)
- The largest water reservoirs of Pakistan are almost 50 years old and require **major overhaul and infrastructure rehabilitation**
- Infrastructure rehabilitation projects (like dam extensions) and storage projects (like new dams) can give a boost to water value chain
- Large investments are required in the storage and rehabilitation projects **(maintenance costs)** to keep the water infrastructure operational

Potential of

USD 10 bln

including rehabilitation and extension of Tarbela, Mangla, Warsak dams and barrages and storage capacities in Punjab, Balochistan and KPK

Hydro Power Generation

- In Pakistan, water projects are generally associated with power generation with **energy component as the only revenue stream**
- Private sector has recently stepped into hydro power sector of Pakistan with hefty **investments of ~USD 8 billion**
- Private sector is comfortable on hydro generation rather than dedicated water projects as **these projects are backed by government guarantees** making them financeable

Potential to generate

59 GW

vs current operational generation of ~10GW including all CPEC and private sector hydro projects

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Water Treatment and Recycling

- Only **36% of the population has access** to safely managed drinking water in Pakistan
- Limited or no dedicated water treatment and recycling projects major investment required in Pakistan
- With a coast line of ~1,000km, there is a **potential for water desalination** projects but costly
- Regeneration of water through desalination and recycling would add to supply

Less than

10%

capacity to treat total urban waste water and only 2% is treated with majority of treatment plants not operational

Water Distribution Infrastructure

- Water distribution infrastructure in Pakistan has **~30% system losses**
- Almost all pipeline projects are done by government with no private sector involvement
- Government projects take a **decade to execute with operational inefficiencies** leading to increase in project cost
- Public private partnership model can be utilized for **implementation of pipeline projects on return-on-assets basis** (similar to SSGC/SNGPL for gas network)

Karachi itself require

600 **MGD**

of additional pipeline infrastructure to cater for its current water demand. K-IV pipeline project was approved in 2011 but yet to commence with a cost increase of ~200%

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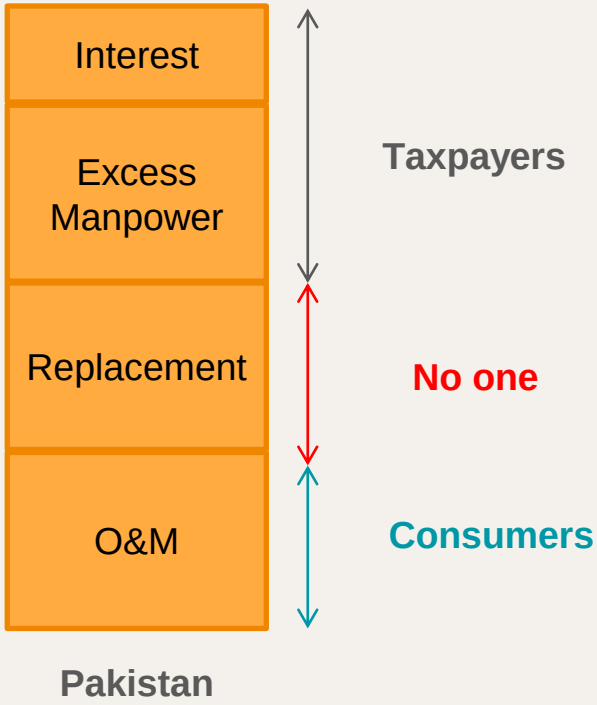
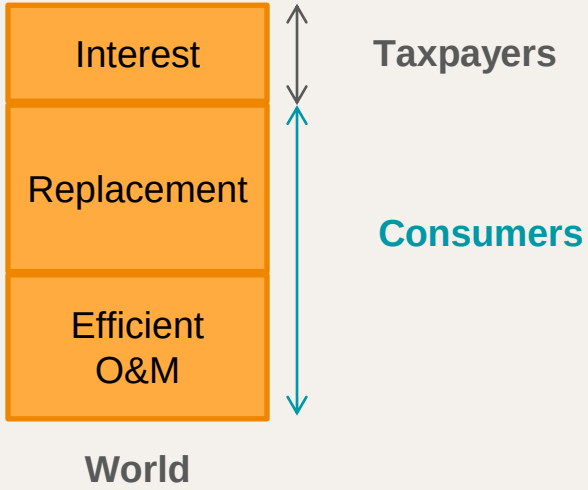
Payment for Water Services





PPP Model

- There is a need to invest billion of dollars in Pakistan's water infrastructure to protect water economy
- There is also a need to bring in greater efficiency in project implementation
- The sustainability of these investments needs to be improved through appropriate water tariffs
- Projects can be funded and built by the private sector to reduce investment burden on government, accelerate project timelines and promote greater efficiency
- This PPP model would not be dissimilar to the role of government in IPP projects but is more complex and political in nature therefore there is a need for appropriate role of government guarantees

PPP Model

Policy and Project Prioritization

Right of Way, Land and Relocation

Capacity Purchase Guarantees

Operations

Regulatory Approvals

Water Supply and Distribution Network

New Water Pipeline Projects

Waste Water Treatment and Recycling

Sewage and Sanitation

Rehabilitation Projects

Multipurpose Dams

Hydro Power

Innovative Water Conservation Solutions

Financing

Project Development and Execution

Maintenance

Technology Transfer

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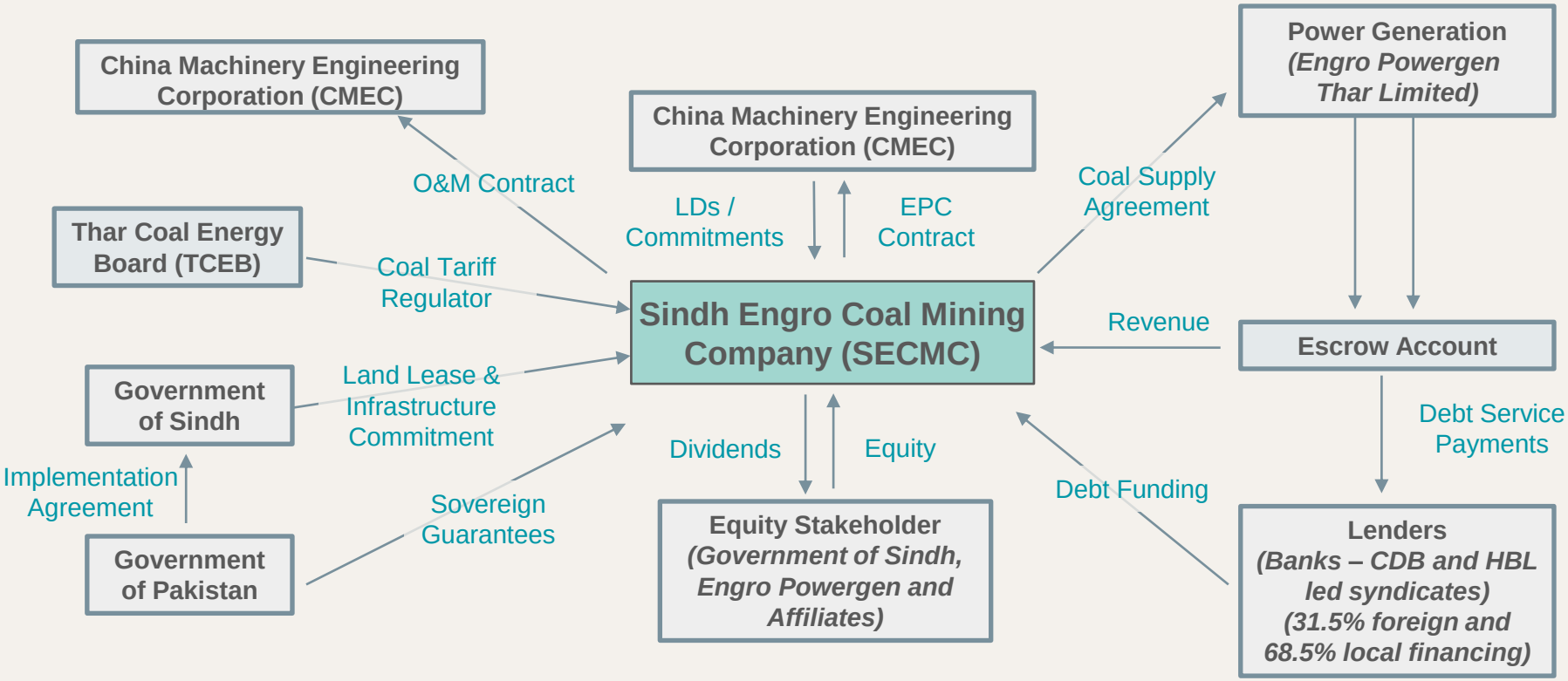
Learning From Other Sectors

- During early 1990s, experts projected acute power shortage in Pakistan and it was decided to attract private investment in power sector through **introduction of independent power projects** in the system
- IPPs were given attractive returns and **government played their role** as a guaranteed power purchase entity and transmission infrastructure provider
- Similar was the case with Thar resource development where **government became a partner to private sector (under PPP model)** and provided sovereign guarantees, allocated project area and developed all necessary infrastructure
- In both cases, the **government de-risked the sectors** through provision of guarantees and partnerships
- In order to attract private investment in water sector government will have to **incentivize first few projects** by following a model similar to IPPs (already tested and in its 25th year of implementation)

Sindh Engro Coal Mining (SECMC)



Applying IPP Model to Water Sector

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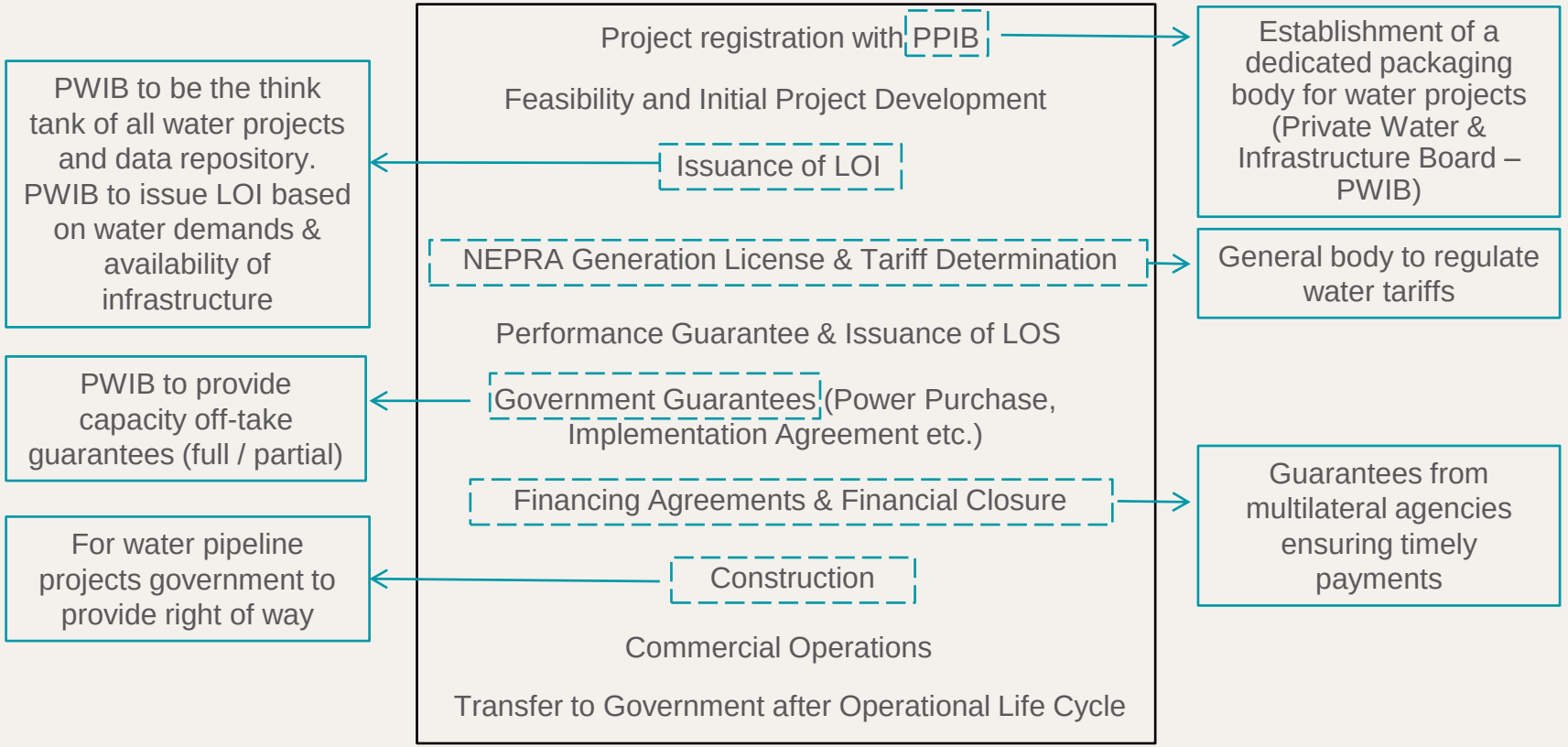

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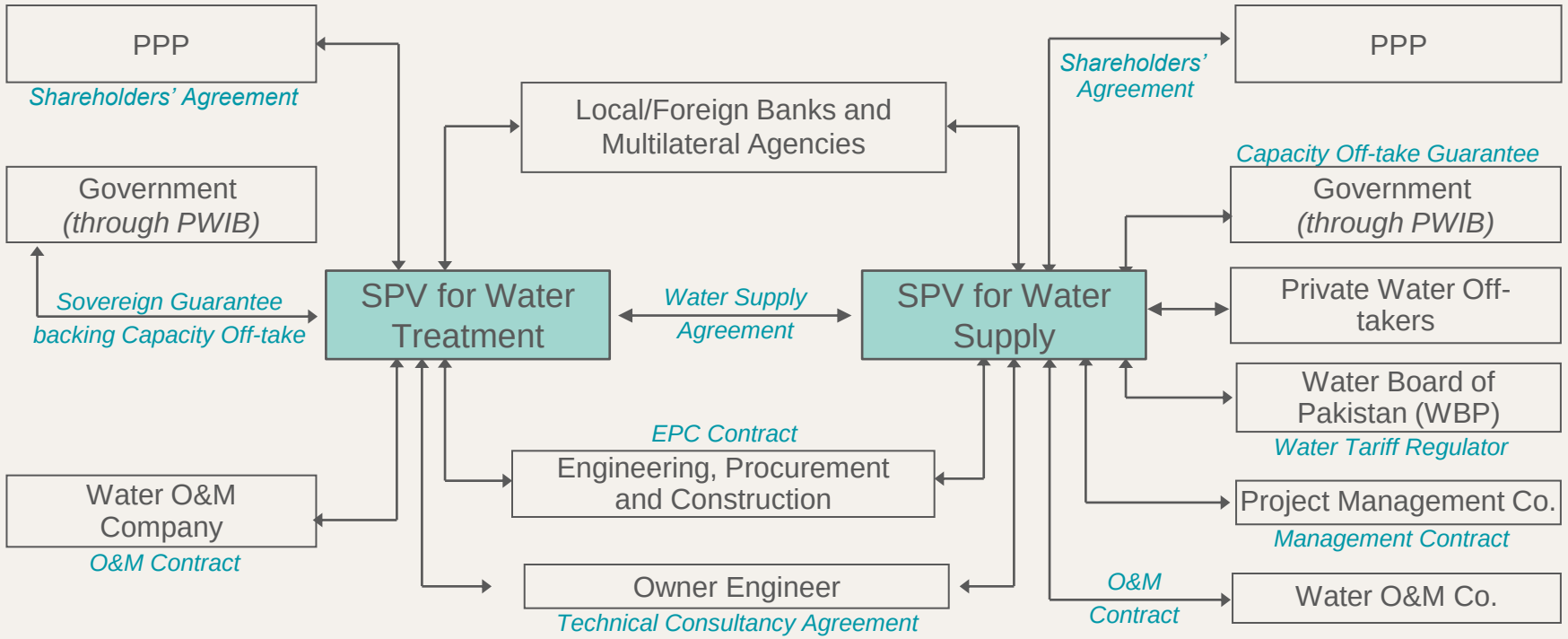
Stakeholder Roles



Hydro Power Projects (CPEC / Private)

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Project	Type	Capacities	Sector	Project Cost (USD billion)
Suki Kinari	Power Generation	870 MW	Private	1.7
Kohala	Power Generation	1,100 MW	Private	2.2
Karot	Storage + Power Generation	720 MW	Private	1.7
Dasu Dam	Storage + Power Generation	4,350 MW + 1.4 billion m^3	Government	4.2
Daimer Bhasha	Storage + Power Generation	4,500 MW + 10 billion m^3	Government	14
Neelum Jhelum	Partial Storage + Power Generation	969 MW + 8 million m^3	Government	5.1
Extension of Major Dams	Storage + Power Generation	-	Government	1
Mohmand	Storage + Power Generation	800 MW and 1.5 billion m^3	Government	2.5
Laraib	Power Generation	84 MW	Private	0.25

Conclusion

- Private sector should be involved in **dedicated water projects under PPP model** where they bring management, financing and technical expertise while government provides land, right of way, technical support, regulatory approvals and appropriate guarantees
- **Pricing water appropriately** and implementing water tariff regime across country
- Formation of a **security packaging body (PWIB)** like PPIB
- Building a **national investment base for dedicated water projects** where Pakistani institutions become the owners and backers of water infrastructure, agriculture development and water value chain
- Connect water infrastructure projects to domestic capital and savers
- **Water bonds** can be raised to fund rehabilitation projects

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Thank you!

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Water Dependent Businesses

- In Pakistan **1MAF (million acre feet) water generates USD 500 million** output while the same amount produces ~USD 2 billion in other countries
- Pakistan is an agricultural country but the **GDP contribution of the sector is very low**
- Innovation is required in agricultural ways to **increase crop per drop**
- On-farm improvements and better productivity of fish-farming, livestock and value-added micro businesses

Ton wheat per hectare

2.8

vs China at ~5 tons per hectare

Backup Slide