Tracing Synergies and Trade-off Across Water-Energy Food Nexus: Practical Benefits and Challenges

Knowledge sharing workshop on adopting Water-Energy-Food Nexus Approach in India

JSPS (Japan) and DST (India) Joint Research Seminar

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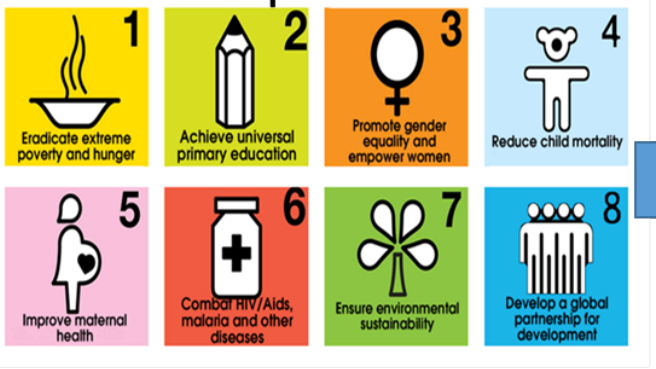
Importance of water food energy security have been well acknowledged in SDGs

Up to 2015



Beyond 2015

8 Goals, 18 Targets and 48 Indicators	TRANSFORMING OUR WORLD: THE 2030 AGENDA FOR SUSTAINABLE DEVELOPMENT A/RES/70/1 UNITED NATIONS	17 Goals, 169 Targets, and 230 Indicators
Implementation was donor aiding dependent		Applicable to every country
monitoring, evaluation and accountability was not well addressed in MDGs		Importance of data revolution is well recognised for SDGs
Complexity of sustainable global development was not fully represented in MDGs.		Comprehensive set of goals has been adopted towards Sustainable development

Where are we now?

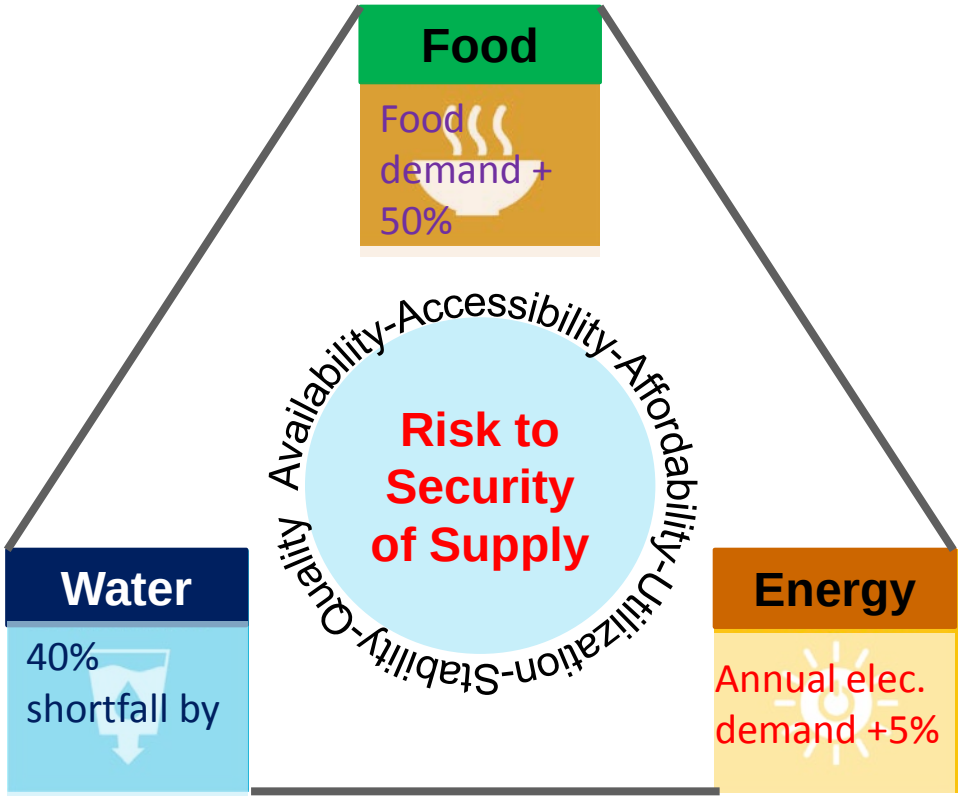
Globally, 795 million people remain undernourished (FAO, IFAD and WFP 2015)

Nearly 1 in 10 people live without clean safe water (WHO and UNICEF, 2012)

Nearly 1.2 million people have no access to Electricity (IEA, 2016)

where are we heading for?

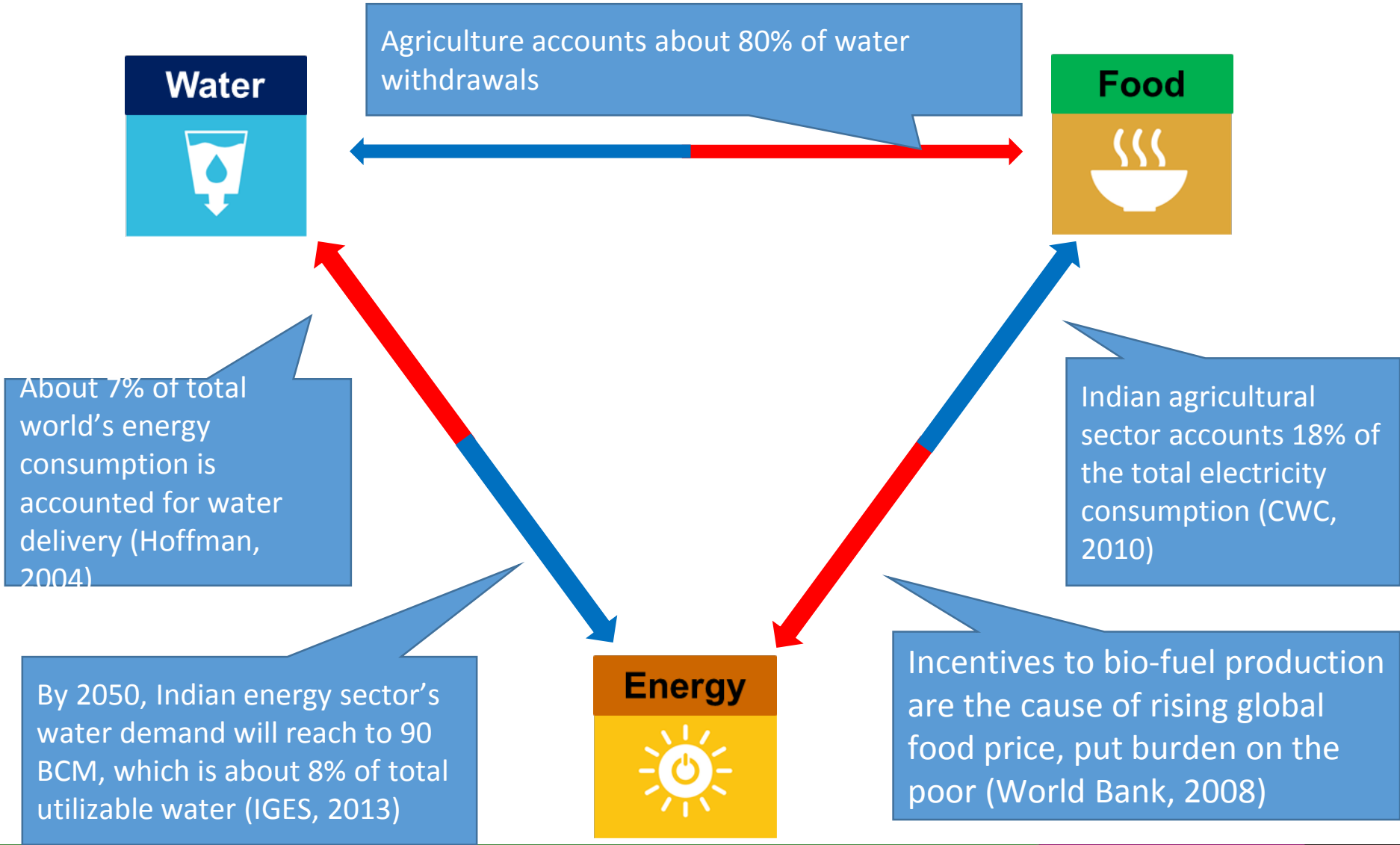
Food, water and energy security are not going to be ensured



Challenges

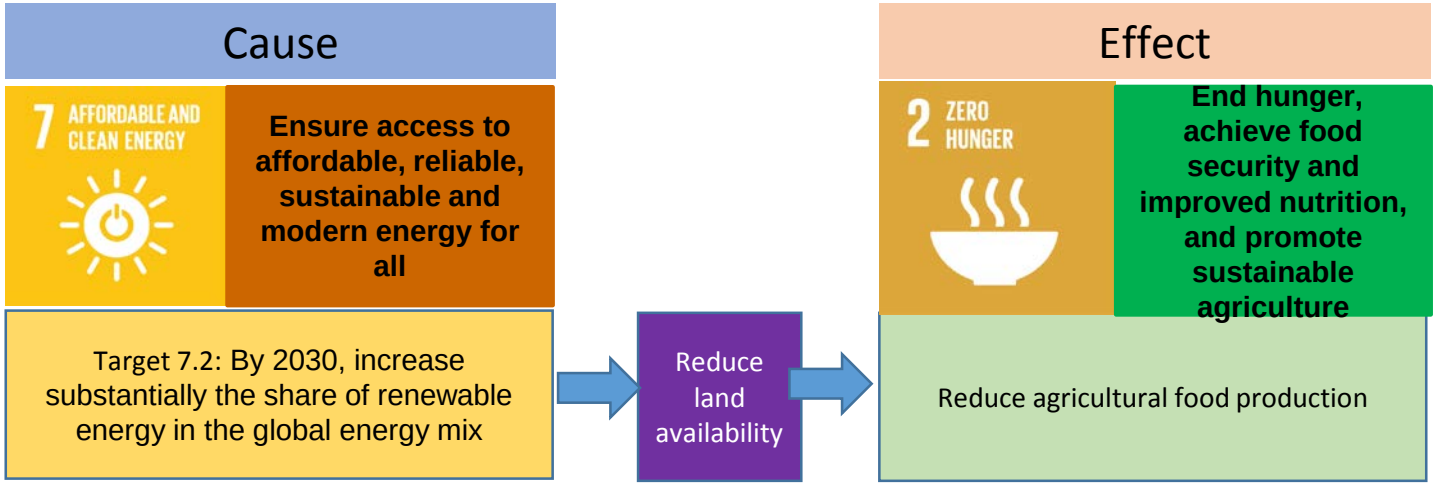
- Population
- Economic growth
- Resource intensive lifestyle
- Resource intensive production system
- Inadequate legislation and enforcement
- Uncoordinated sectoral planning
- Finance
- Knowledge gap

Water, Food and energy security are not in an isolated but nexus manner

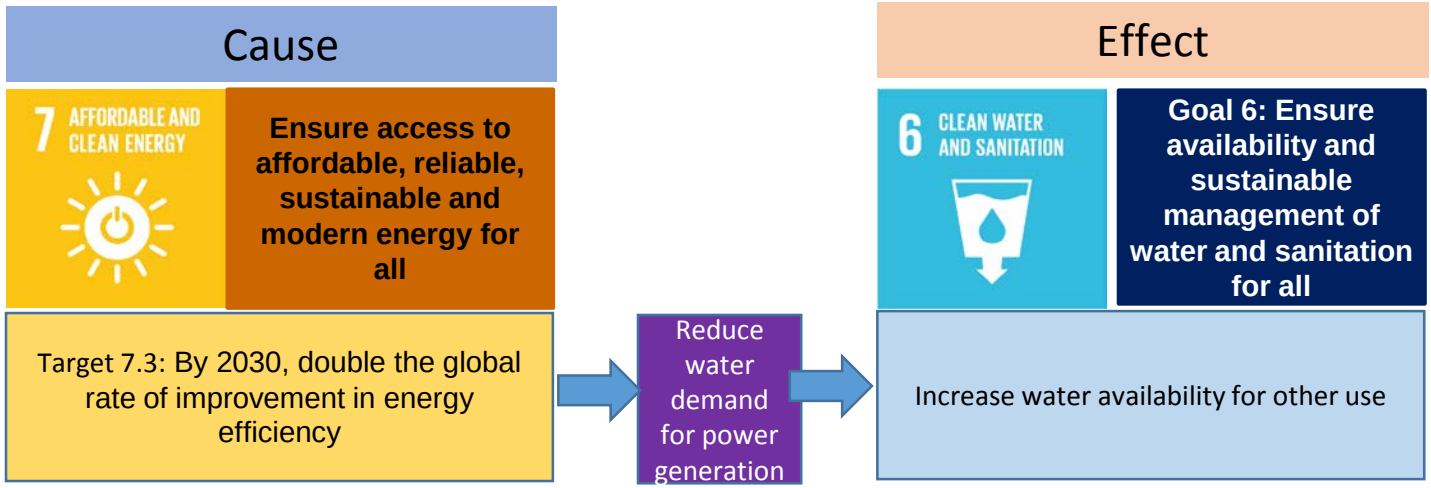


Trade-off and synergistic relationship in WFEN

Trade-off relationship



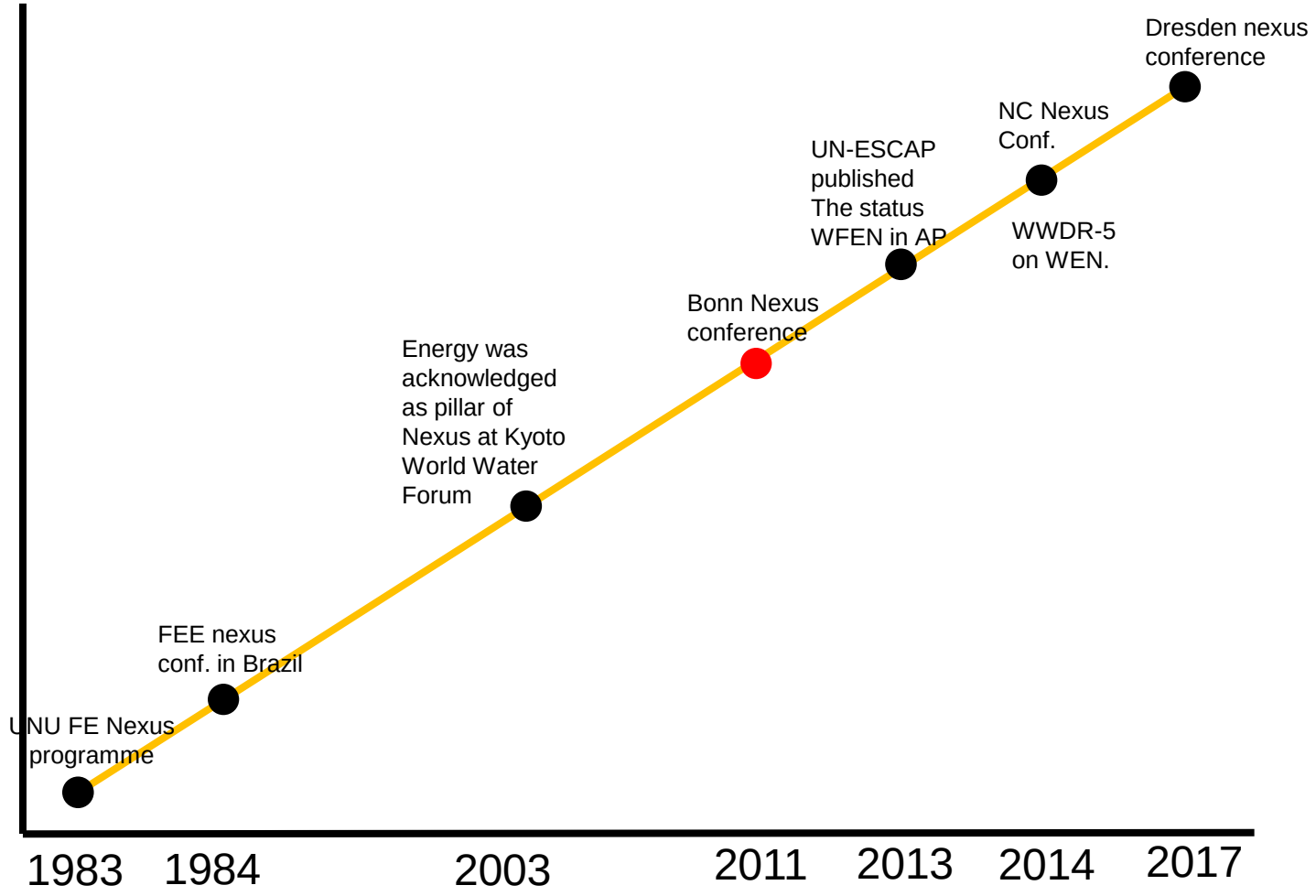
Synergistic relationship



Key questions to achieve water, food and energy security

- ✓ What solutions and strategies can be carried out to close identified gaps between resource demand and supply
- ✓ How we can identify and enhance synergies and minimize trade-off within the resource supply-demand systems.
- ✓ What are the key enabling factors and conditions can lead to collective achievement of water, energy and food security

Nexus thinking and nexus debate are gaining attention in policy and academic circles



How is the nexus approach different from IWRM

	WFE Nexus	IWRM
Priority	Equal priority to all sectors	Tends to prioritize a particular sector, i.e. water
Principle	Integrated policy solutions principle	Good governance principle
Participation	Promote collaboration through multi-stakeholder platform	Stakeholder involvement in decision making
Decision making	Environmentally and economically rational decision making	Efficient allocation and equitable access
Sustainable development	Resource security	Demand management

WFEN approach brings opportunity of maximize synergies

- Increase policy coherence
- Accelerate access
- Create more with less
- End waste minimize losses
- Value natural infrastructure
- Mobilize consumer influence

Our WFEN research in India and South Asia

The World Bank

ESMAP
Energy Sector Management Assistance Program

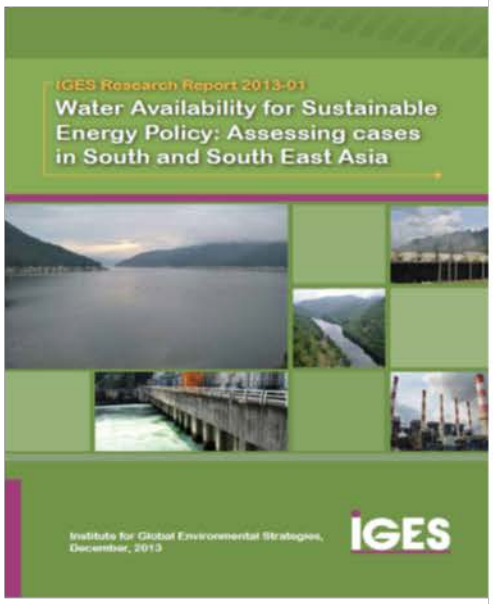
APN
ASIA-PACIFIC NETWORK FOR GLOBAL CHANGE RESEARCH

PURDUE UNIVERSITY

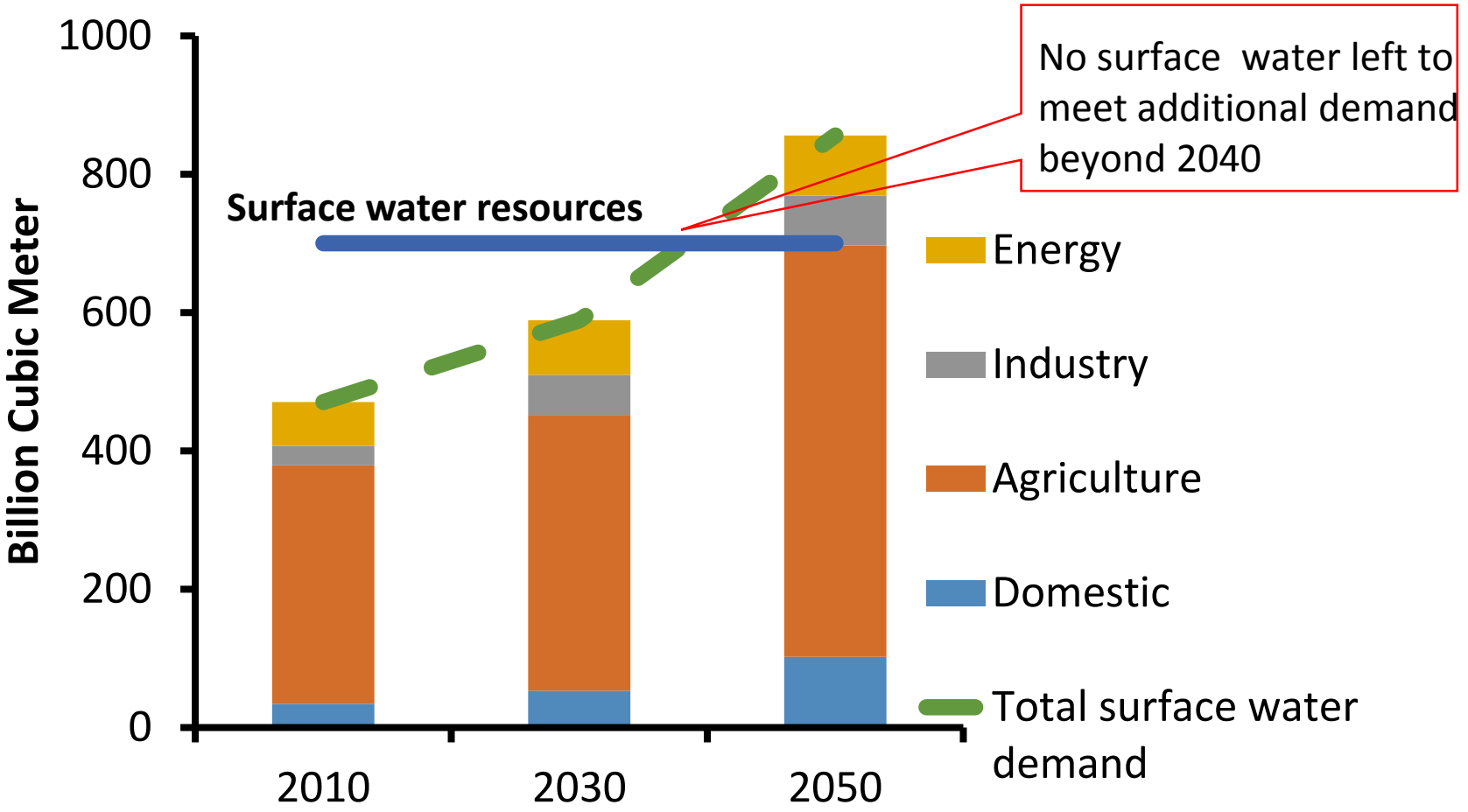
CENTRAL UNIVERSITY OF RAJASTHAN 2009

BUET

CREEW



Water supply-demand gap scenario- Case of India



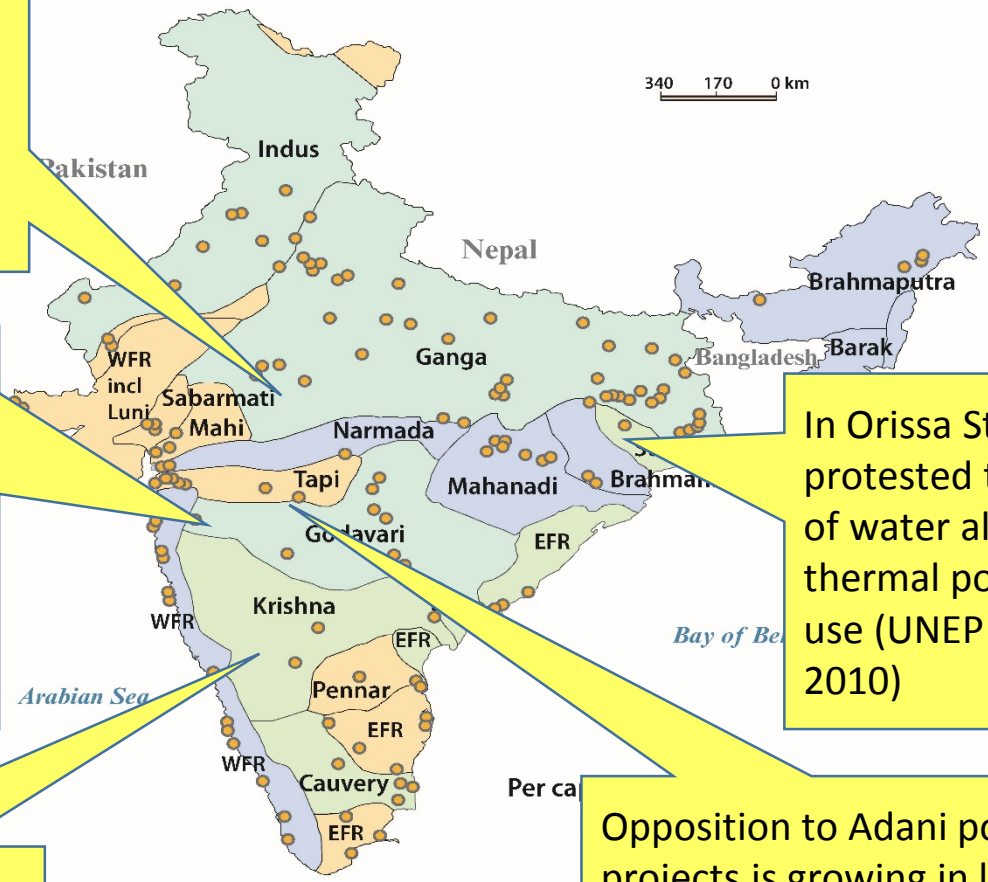
Overuse of water in the production cycles results from low water use efficiency is the main reason of this large gap

Conflict of interest between energy sector and other water users over water (Case of India)

In Madhay Pradesh, power cuts was made to alleviate the water shortage in the region in 2006 (Source: The Hindustan Times, 2006)

Parli thermal power plant in Maharashtra were shut down because of severe water shortage in the Marathwada region (NDTV, 2013)

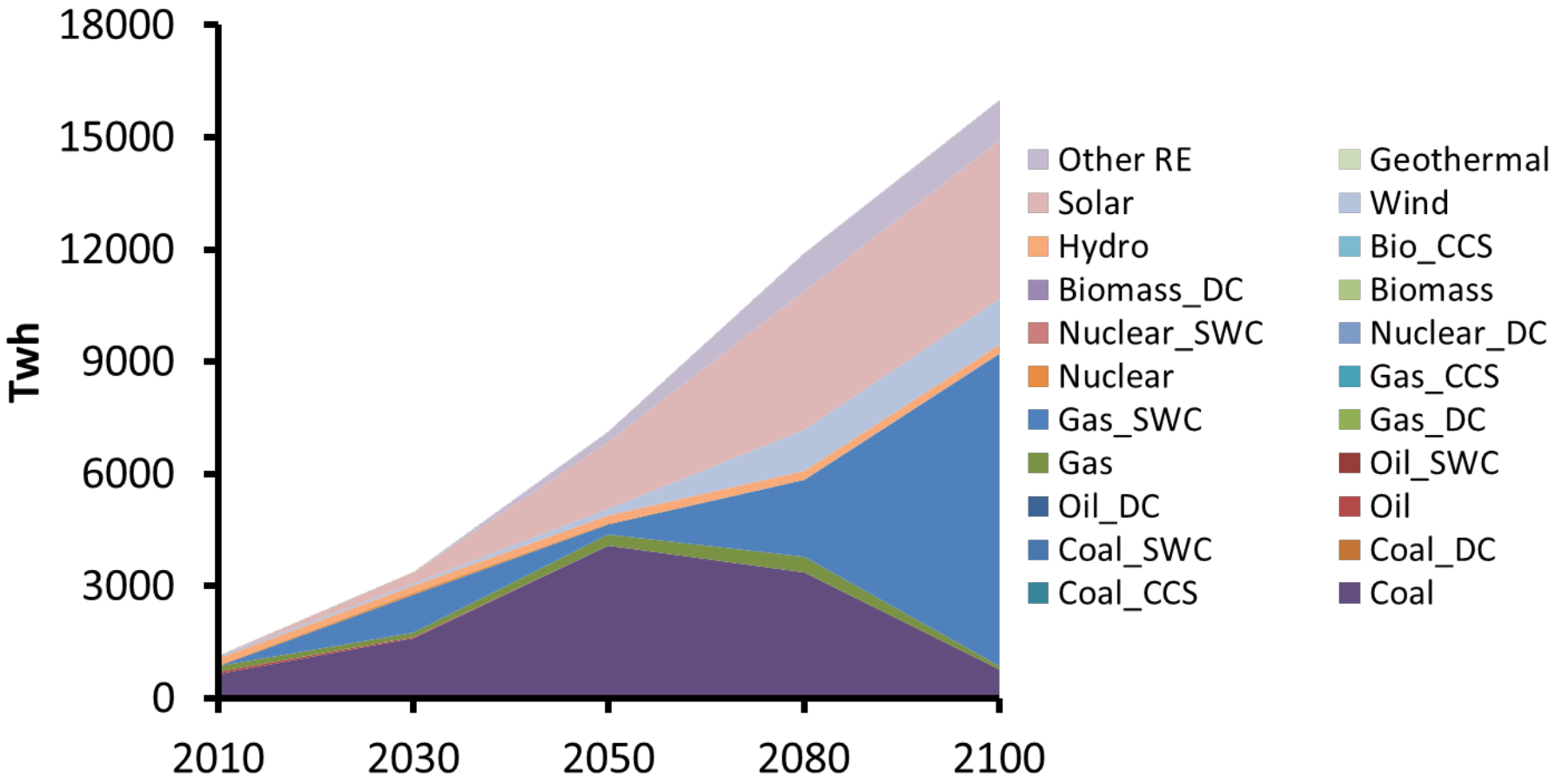
In Kerala, power cuts ordered to deal with water scarcity in 2008 when monsoon rainfall was 65% less than normal (Source: Thaindian News, 2008)



In Orissa State, farmers protested the increasing rate of water allocation for thermal power and industrial use (UNEP Finance Initiative, 2010)

Opposition to Adani power projects is growing in local community due to threats to drinking water and irrigation water availability (The Times of India, 2011)

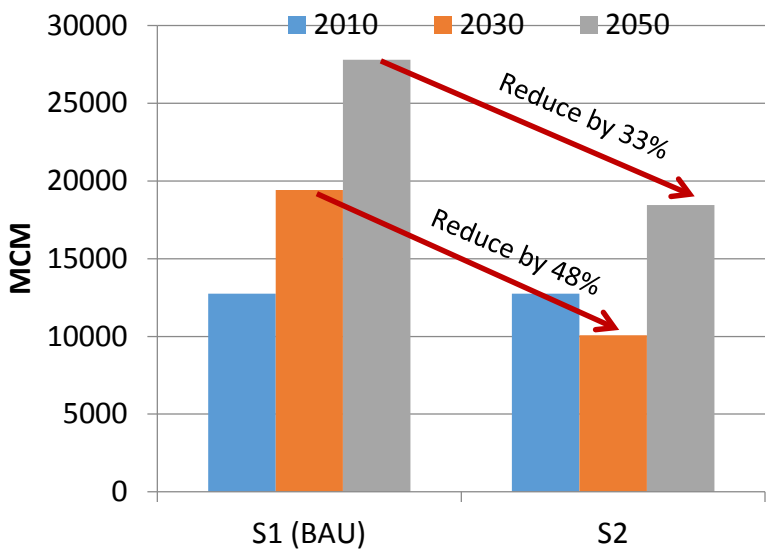
Potential long-term electricity supply mix to deal will water scarcity in India

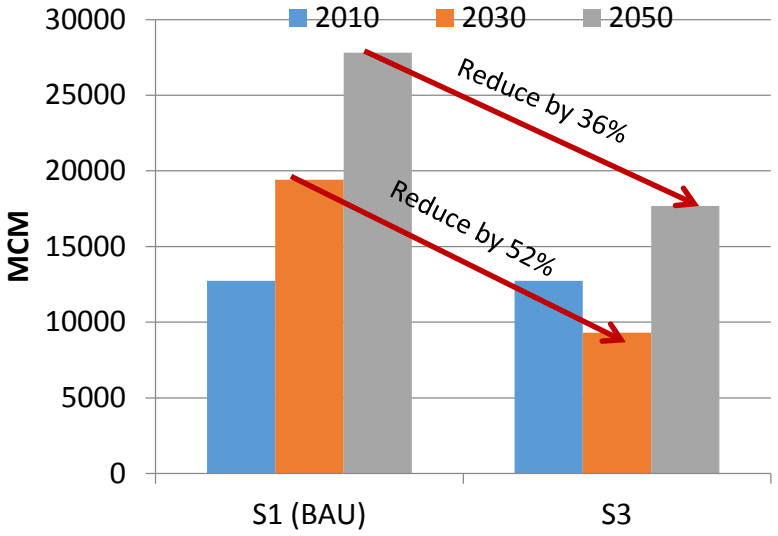


Source: IGES, 2013

Water scarcity mitigation options in energy sector

Gradual transition to more water efficient cooling technology options



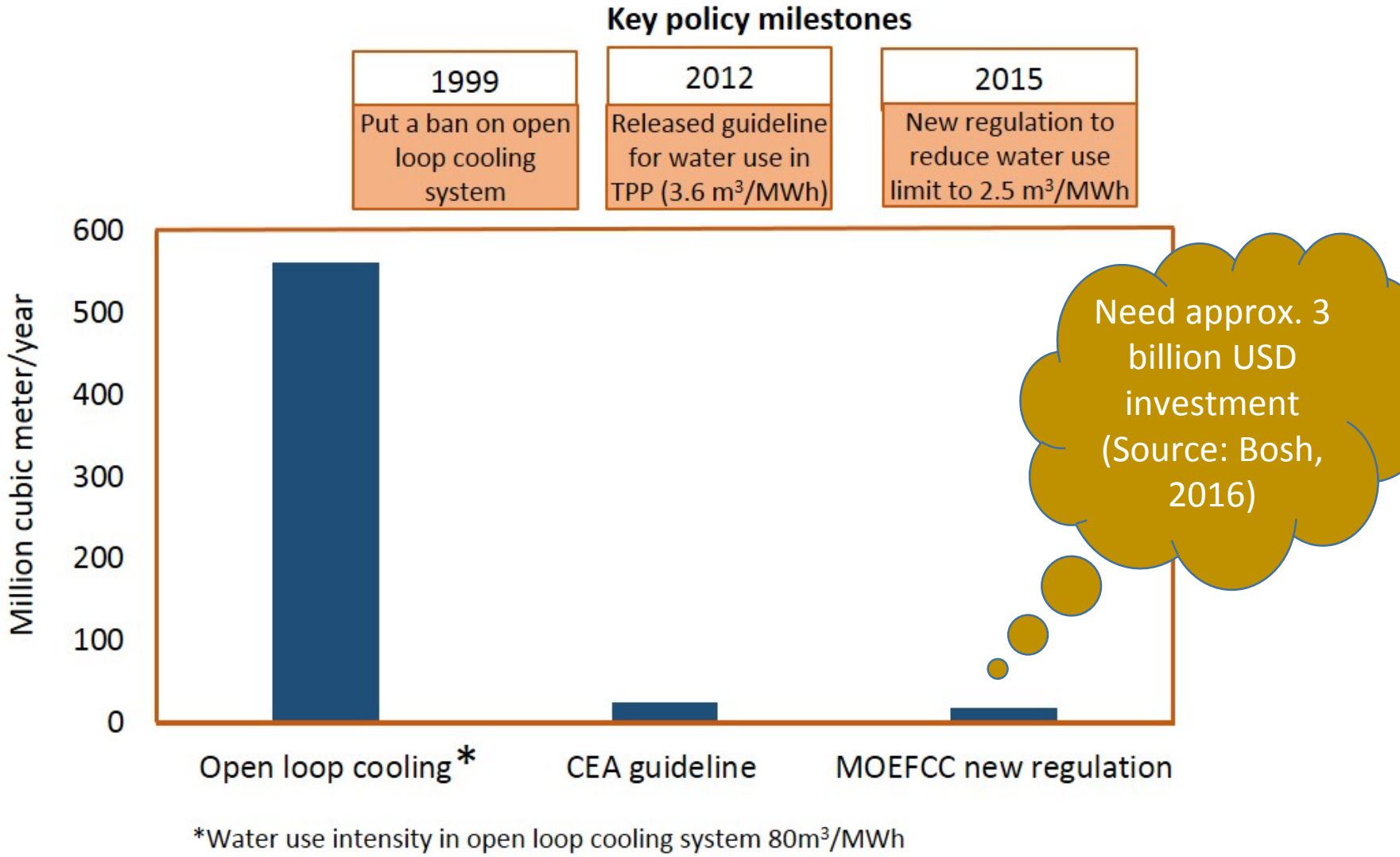


S1:25% of the thermal power capacity will continue with open loop cooling system

S2: All open loop system will be phase out by 2030

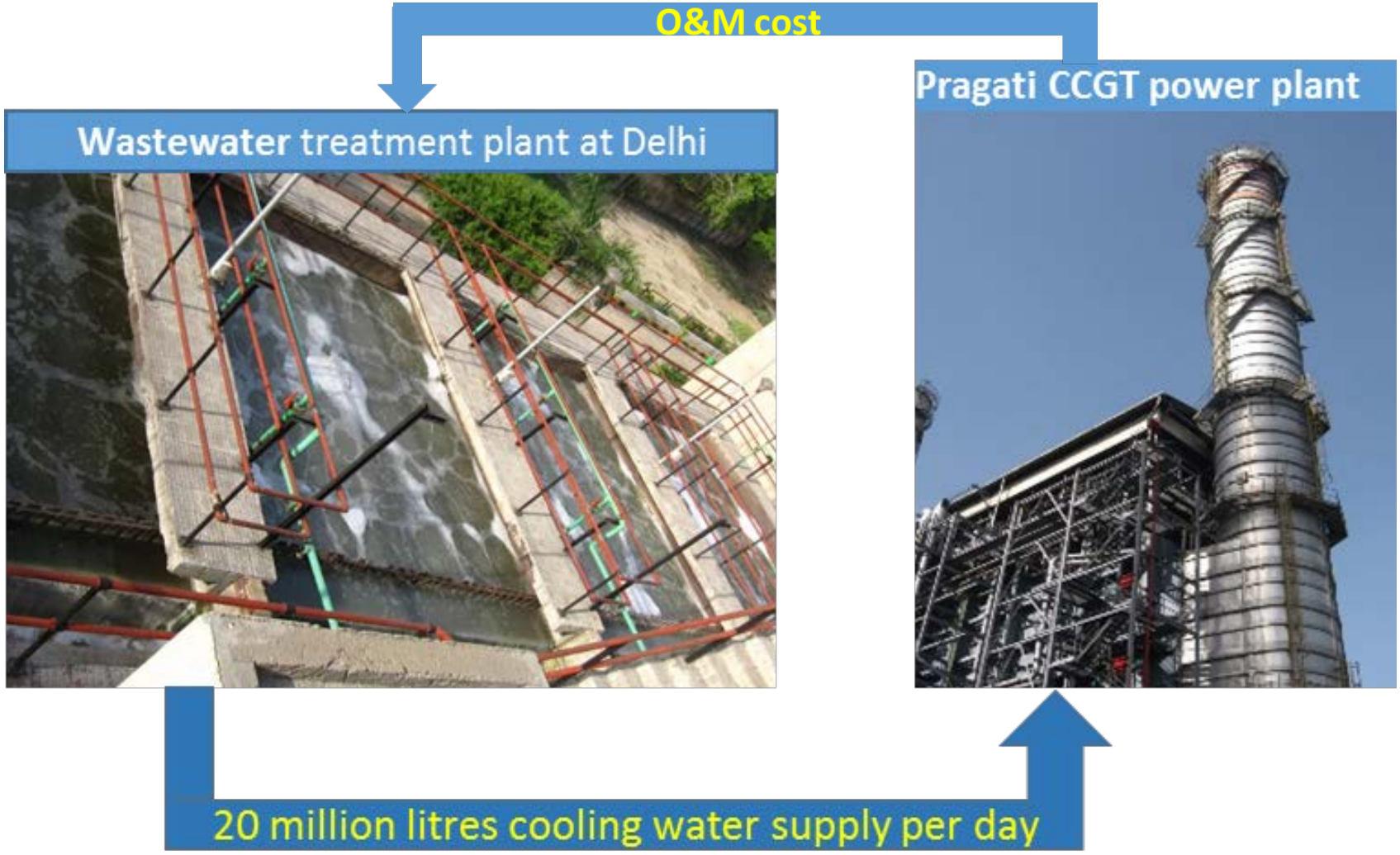
S3: open loop cooling system will be replaced by dry cooling system by 2030

Policy intervention to restrict water use for thermal power plants-Case of India

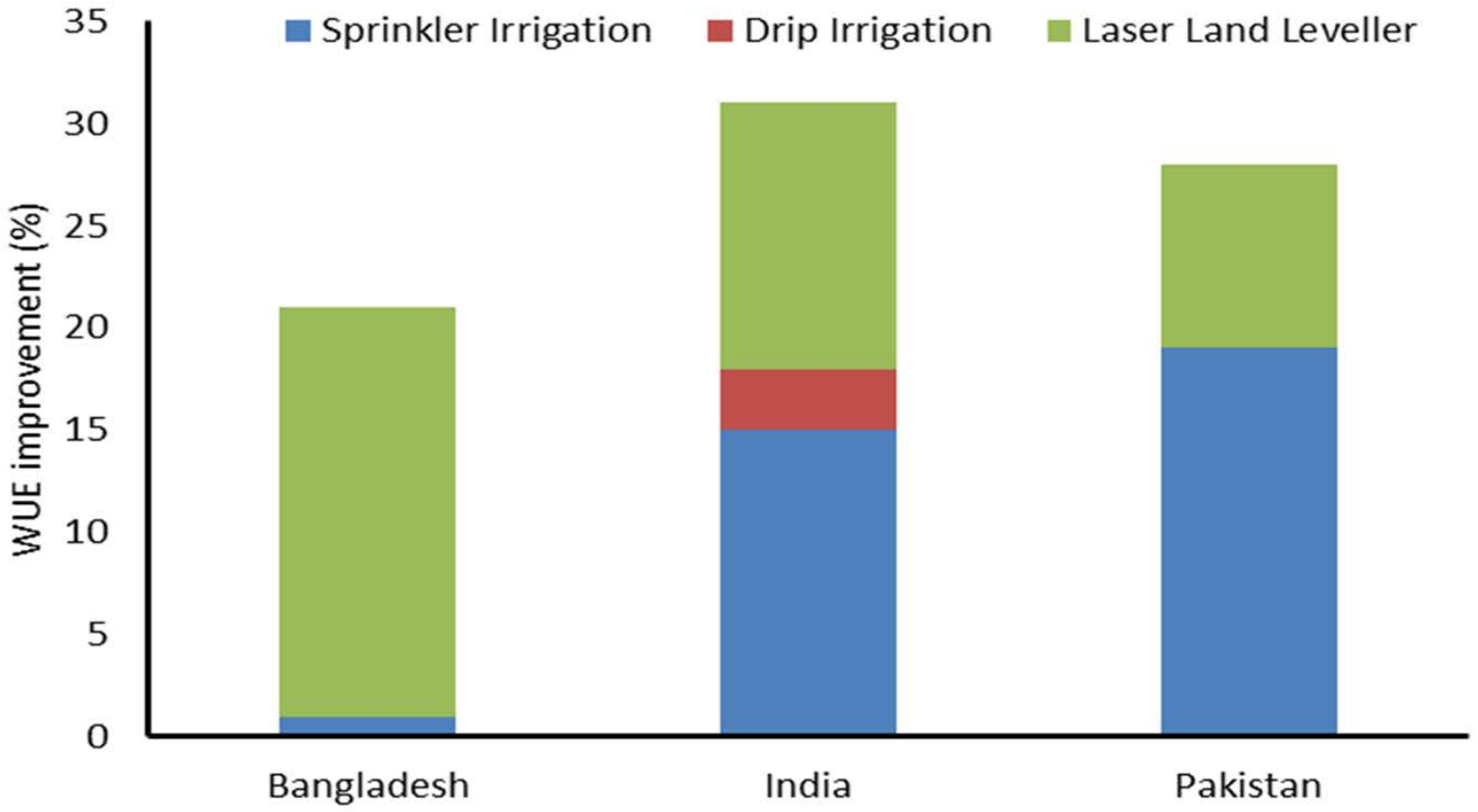


Source: Mitra et al., 2016

Lets be hopeful and helpful for positive nexus!



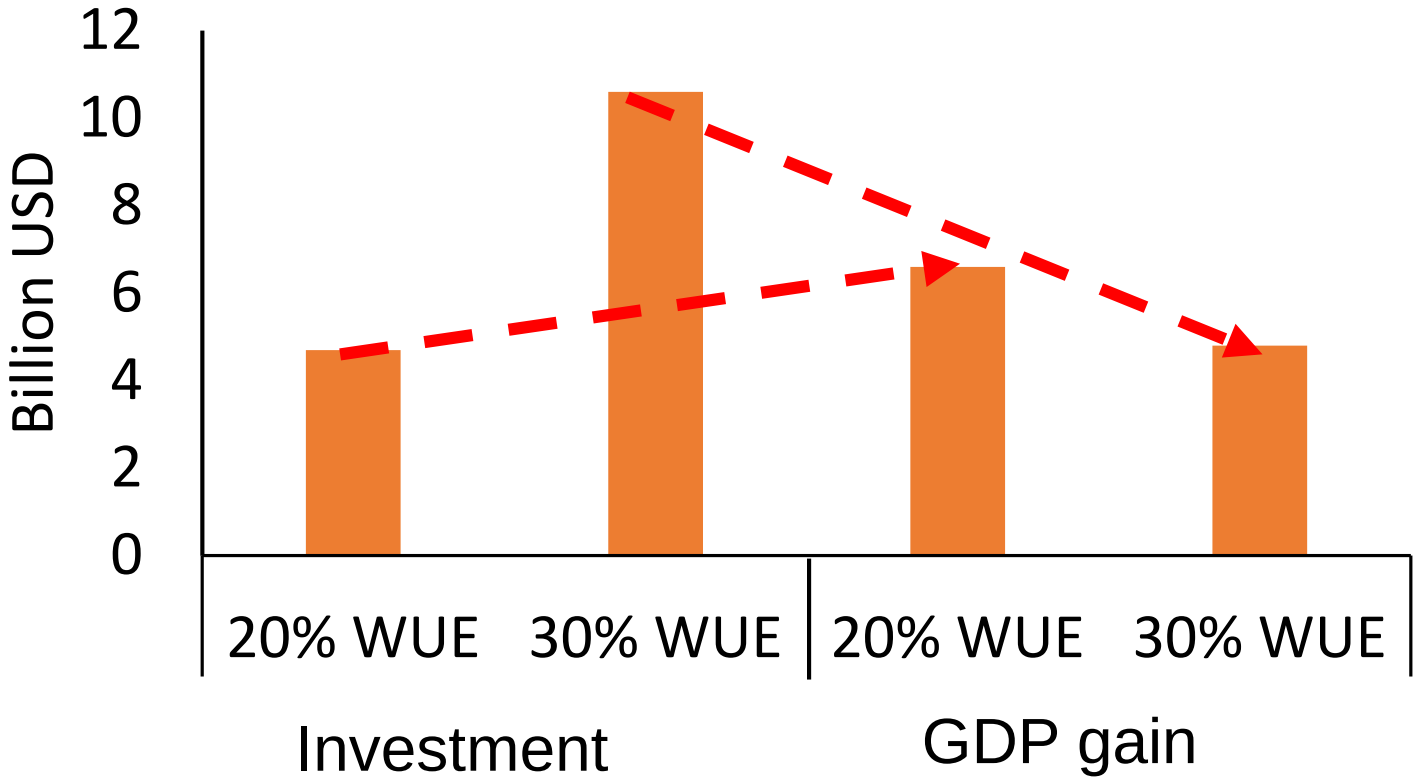
Potential of irrigation WUE improvement in India



Huge potential of irrigation WUE- Case of India

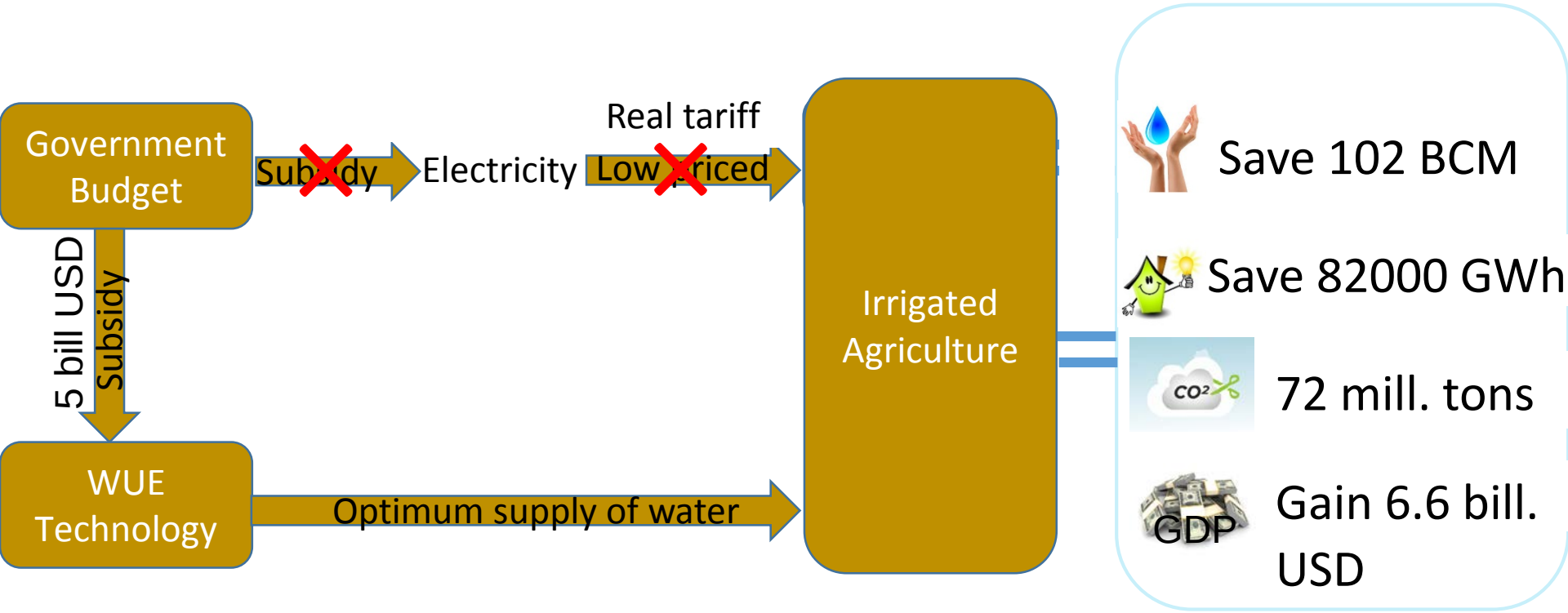
From Current 40% WUE level → to 70% WUE level

But needs billions dollar investment

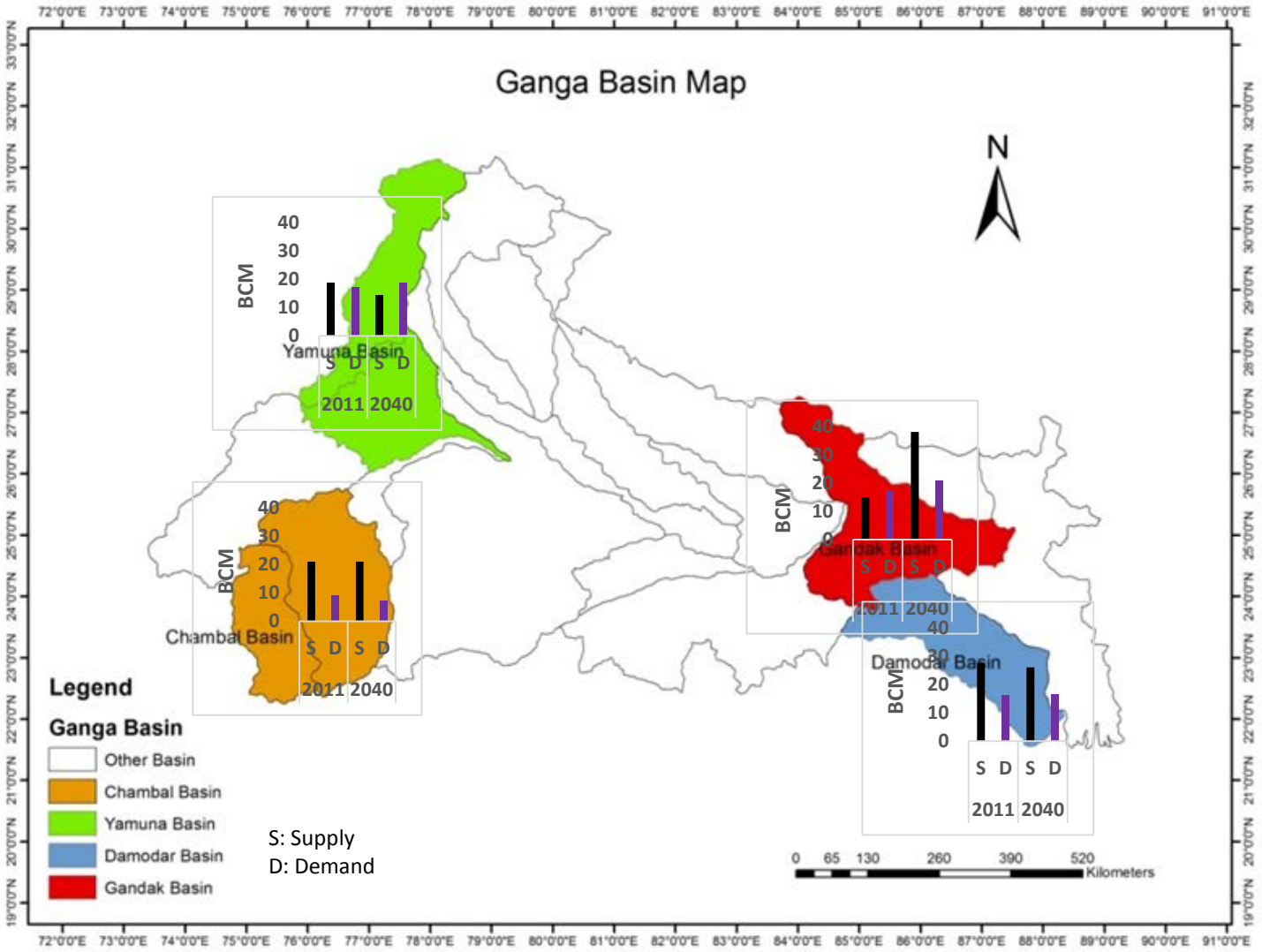


Source: Prepared based on Taheripuri et al. 2016

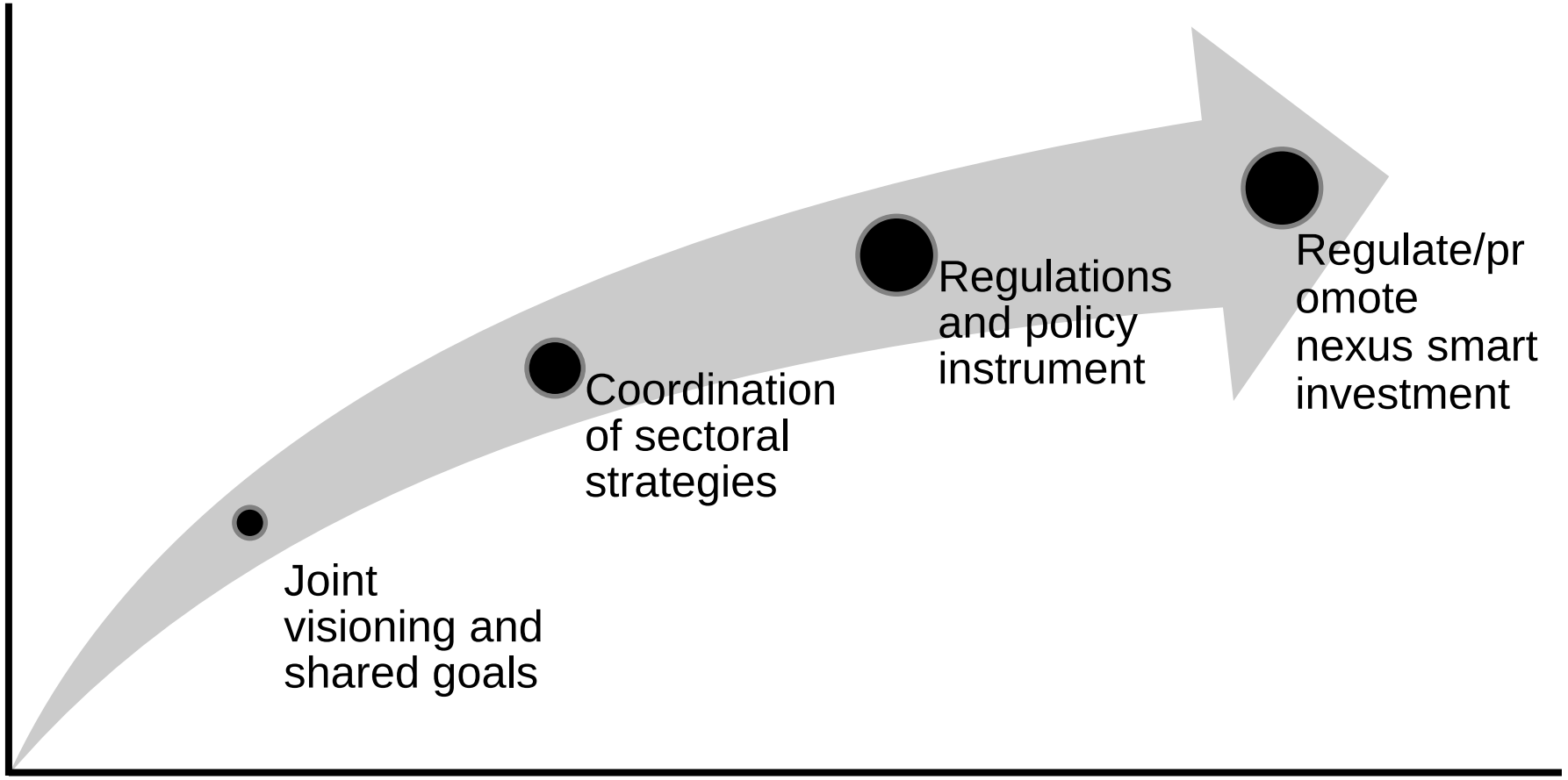
A nexus solution: Shifts the subsidy amount from power supply to WUE



Integrating spatial distribution of water resources in development plan -case from Ganga River basin



Enabling Framework for Operationalization of "Nexus Approach"



Thank you very much

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