Towards a Water-Energy Secure Future

Water-Energy Nexus in China


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WRI is an environmental think tank works at the intersection of the environment and social economic development, responding to six urgent global challenges.
WATER SUPPLY CRISIS: HIGH IMPACT AND LIKELIHOOD
Why global water shortages pose threat of terror and war

From California to the Middle East, huge areas of the world are drying up and a billion people have no access to safe drinking water. US intelligence is warning of the dangers of shrinking resources and experts say the world is ‘standing on a precipice’.
WATER RISK IN CHINA: High water stress

State Monitored Sections

Provincial Monitored Sections

(Draft, Not for Distribution)
In May 2014, 5 provinces were subjected to persistent and heavy rainfall, leading to 1.2 million people facing with urban flooding.
Since July 2014, 13 provinces were subjected to severe droughts, leading to 8.2 million people facing with water shortage.
• Water and energy are interlinked
• Increased water demand in energy sector: a big challenge for water security
• Increased energy intensity in urban water system: a potential challenge for low carbon city development
The energy consumption of per unit water production is 10 and 2.7 times for desalination and long distance transfer in Qingdao.
With the higher requirements on water quality and reclaimed water reuse, the energy consumption of urban wastewater system increased 80% compared with 2007. The energy intensity of per unit wastewater treated increased 11%.
ENERGY FOR WATER: Recovered biogas from sludge

Waste or Resource

- Incineration
- Composting
- Landfill

Anaerobic Digestion
Water Risks

WEN: Energy for Water

WEN: Water for Energy

Possible Solutions
Power Sector: Largest contributor to GHG emissions and biggest industrial water user in China

Installed capacity will increase by 50% between 2011 to 2015

As of July 2012, over 50% of total proposed power generation capacity was located in areas with high or extremely high baseline water stress

URBAN WATER CHALLENGES: Water use competition from energy production
77% of approved production capacity will likely compete for water sources in very high demand, and/or rely on inadequate water supplies.

**NOTE**
1. Baseline water stress is a measure of demand and supply for water in a given area, and is calculated as the ratio of local water withdrawal over renewable water supply.
2. The donut chart illustrates how much of China’s approved SNG production capacity sits in each water risk category.
Location of World’s Shale Plays, Volume of Technically Recoverable Shale Gas in the 20 Countries with the Largest Resources, and the Level of Baseline Water Stress

Water stress at shale plays around the world. 20 labeled countries have the world’s largest technically recoverable shale gas resources. Circle color indicates average water stress level across a country’s shale plays—circle size indicates overall volume of recoverable shale resources.

www.wri.org/water-for-shale
URBAN WATER CHALLENGES: Water use competition from energy production

(WRI, 2014)

Baseline water stress and shale gas reserves

(WRI, 2014)
Water Risks

WEN: Energy for Water

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Possible Solutions
INTEGRATED MANAGEMENT: Demand management

Resource and demand

Demand Management
POSSIBLE SOLUTIONS: Tariff and Tax Reform

- Tariff and tax
- Water resources fee
- Water transfer fee
- Punitive progressive water tariff
- Mineral resource fee
- Eco-compensation fund
- Eco-restoration security
- Environment tax
POSSIBLE SOLUTIONS: Water-Energy Tradeoff in Power Sector

This size = 2m MWh energy output for 1b RMB investment

(WRI, 2014)
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