Saudi Arabia Water Program

prepared for Lockheed Martin

by

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http://www.sandia.gov

Who Are We? *http://www.sandia.gov*
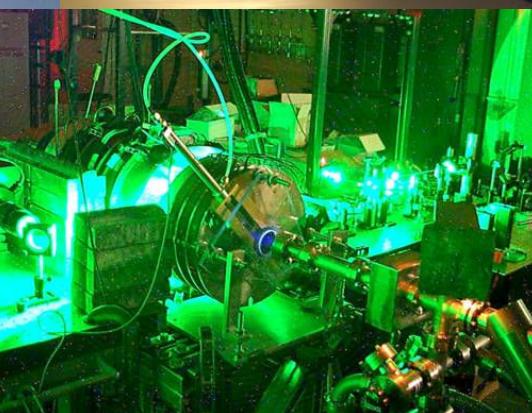
*Sandia National Laboratories serve the US Government with:*

- Security and reliability of US nuclear weapons
- Advance defense systems
- Nonproliferation
- Homeland security
- Advanced technologies to assure <u>energy</u> security, safety and sustainability
- Advanced technologies to assess <u>infrastructure</u> safety, security, and sustainability.

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Energy and Water are Coupled

Energy production and generation require water
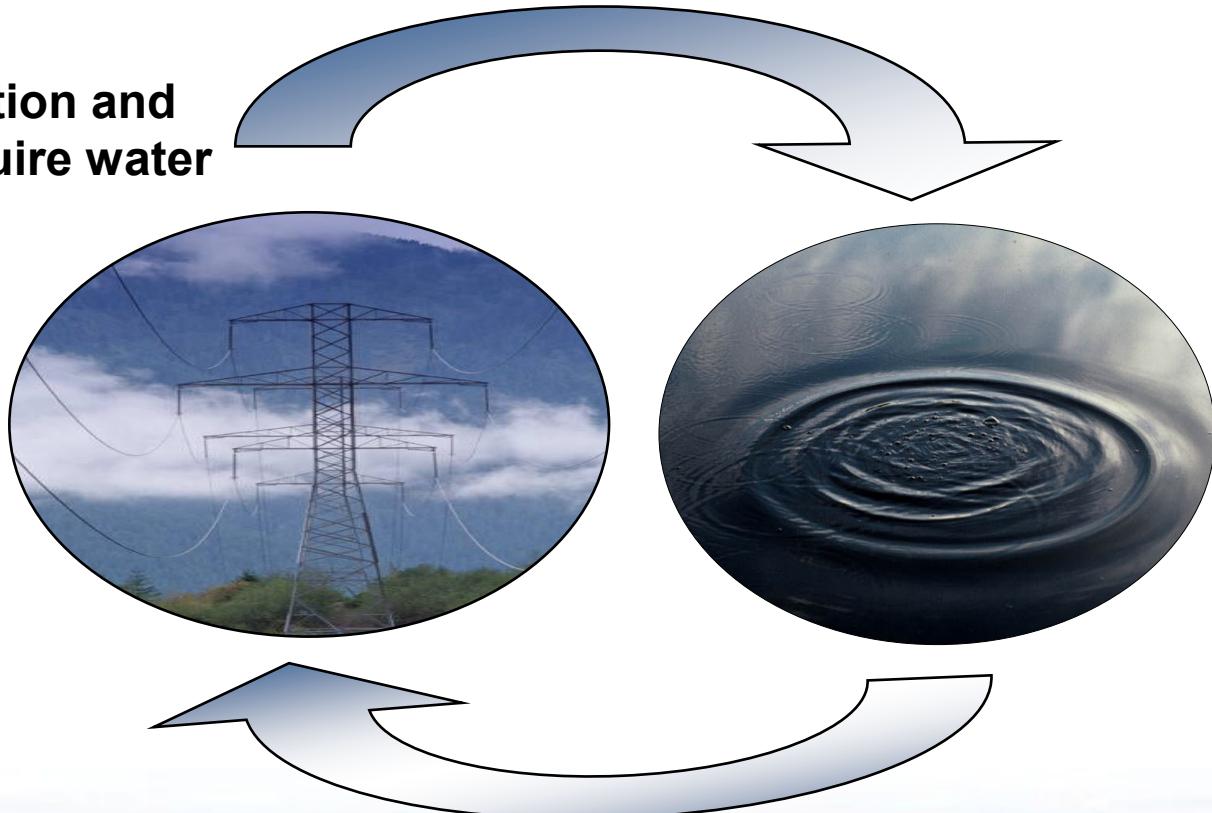
Water pumping, treatment, and distribution require energy

Sandia Water Initiative *http://www.sandia.gov/water*

• Increase the safety, security and sustainability of water infrastructure through the development of advanced technologies that create new water supplies.

• Decrease demand through water-use efficiency.

• Provide decision-informing tools to the institutions responsible for balancing supply and demand.

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Safety, Security, and Sustainability
achieved through **Advanced Technologies**
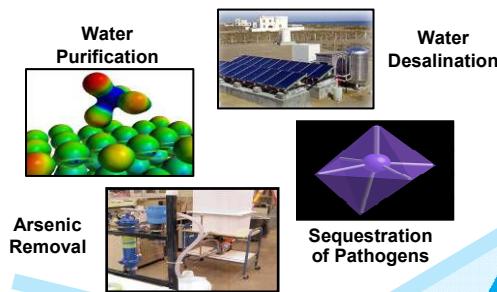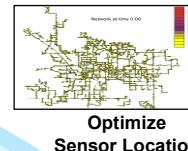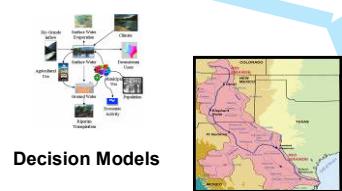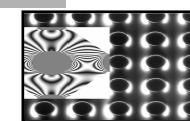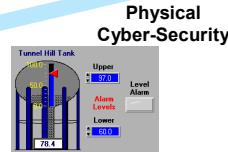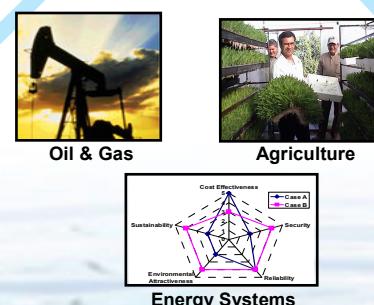
Saudi Arabia Water Program

Saudi Arabia is a recognized world leader in desalination technologies.

Sandia National Laboratories is a recognized leader in delivering advanced technology solutions to serve US National Security Interests.

Objective: Achieve security and sustainability of Saudi Arabia's water supply while maintaining leadership in advanced desalination technologies.

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Program Themes

Water Infrastructure Security

Saudi Arabia Water Program

Water Treatment Engineering

Water Management Decision Support

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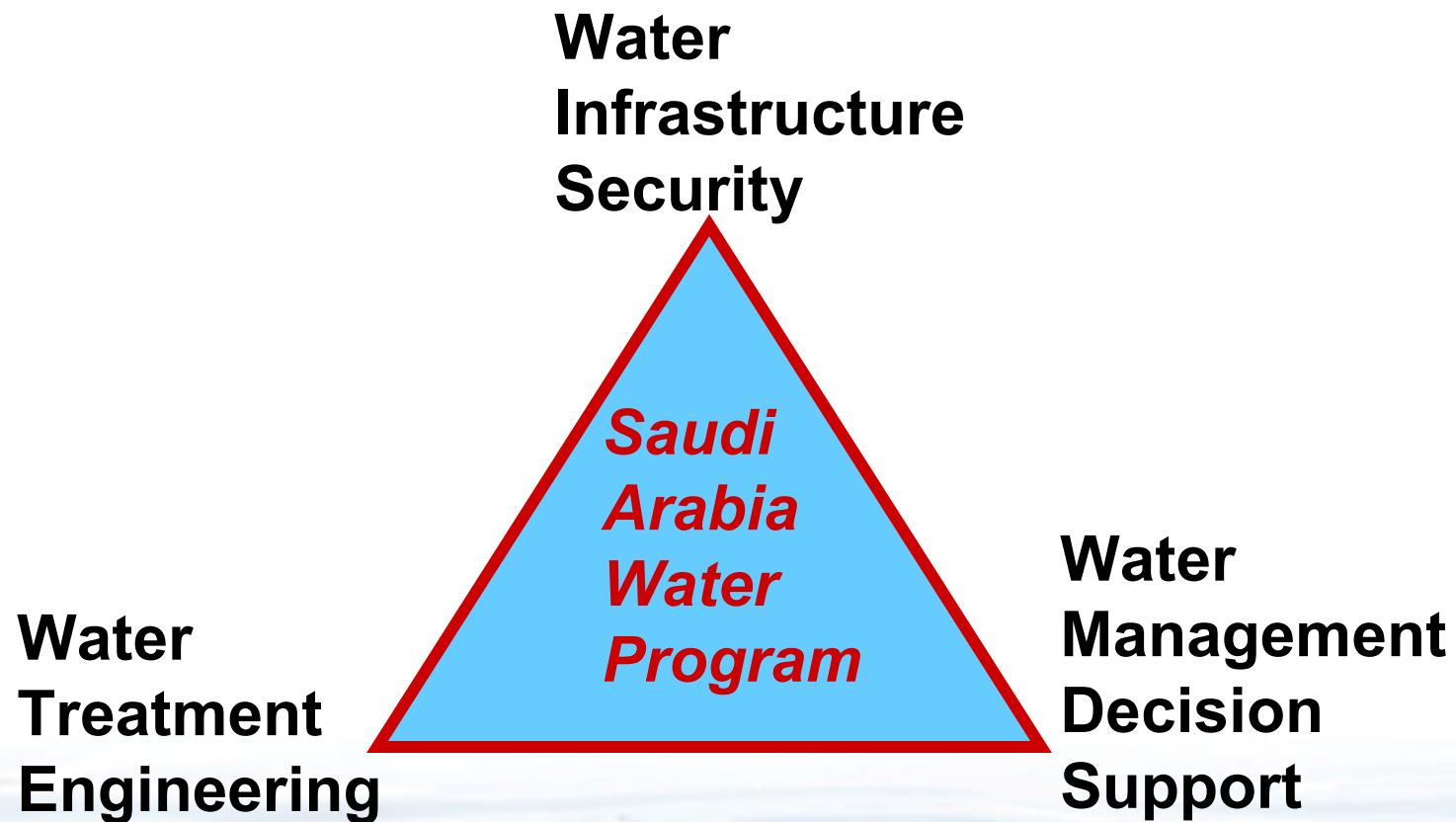
Water Infrastructure Security

- **Assessment of critical water infrastructure.**
- **Robust water design of future water infrastructure.**
- **Contaminant warning system design and sensor distribution.**

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Water Treatment Engineering

- **Develop advanced technologies for pretreatment to reduce membrane fouling.**

- **Concentrate minimization through electrodialysis to maximize water reuse.**

- **Boron removal technology for impaired water.**

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Water Management Decision Support

- **Use of computer tools to shorten design-to-delivery water treatment cycle.**

- **System dynamics to economize groundwater consumptive use for agriculture.**

- **System dynamics to optimize interdependencies between energy and water infrastructure.**

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Implementation Grid – Water Security

Task	Duration	Education	Assessment/Calibration	Technology Transfer
Infrastsructure Assessment	**3 yrs**	SA Trains Sandia on Existing IF. Sandia Trains SA Engineers & Scientists on Algorithms.	Sandia Builds Prototype and Calibrates.	SA Owns and Operates
Infrastructure Design	**3 yrs**	Sandia Trains SA Engineers & Scientists	Sandia/SA Assesse Demand, Sandia Builds Prototype and Calibrates.	SA Owns and Operates
Warning Systems	**3 yrs**	Sandia Trains SA Engineers & Scientists.	SA and Sandia build, test, calibrate.	SA Owns and Operates

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Implementation Grid – Water Treatment

Task	Duration	Education	Assessment/Calibration	Technology Transfer
Advanced Technology	3 yrs	Sandia Surveys options. Sandia Trains SA Engineers & Scientists	Sandia/SA Build Prototype and Test.	SA Owns and Operates
Concentrate Minimization	2 yrs	Sandia Trains SA Engineers & Scientists	Sandia/SA Build Prototype and Test.	SA Owns and Operates
Boron Removal	2 yrs	Sandia Trains SA Engineers & Scientists.	Sandia/SA Build Prototype and Test.	SA Owns and Operates

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Implementation Grid – Decision Support

Task	Duration	Education	Assessment/Calibration	Technology Transfer
Treatment Options	3 yrs	SA trains Sandia on existing process flow. Sandia Trains SA Engineers & Scientists. SA collects data.	Sandia Builds and Calibrates Tool.	SA Owns and Operates
SD for Agriculture	2 yrs	SA presents historical data. Sandia Trains SA Engineers & Scientists	Sandia Builds and Calibrates Tool.	SA Owns and Operates
SD for Energy-Water	2 yrs	SA presents historical data. Sandia Trains SA Engineers & Scientists	Sandia Builds and Calibrates Tool.	SA Owns and Operates

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Why Us?

- **Sandia has world-class scientists and engineers (over half of staff have advance degree).**

- **Sandia is a multi-disciplinary laboratory that maintains world-class facilities and computers.**

- **Sandia is located in New Mexico and in California, heart of Arid Region of Southwestern United States.**

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Thank You

http://www.sandia.gov/water