



Innovation Challenges at Cost & Scale

GE Oil & Gas Technology Center
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Imagination at work.

Innovation Challenges at Cost and Scale



Water for 2060 Initiative

Comparison of water needs & produced water generation

By Sector

- **Oil & gas**
- Thermo-electric
- Agriculture
- Manufacturing
- Municipalities

By Region

- Infrastructure
- Logistics
- Energy mix
- Waste mgt.
- Regulatory/legal



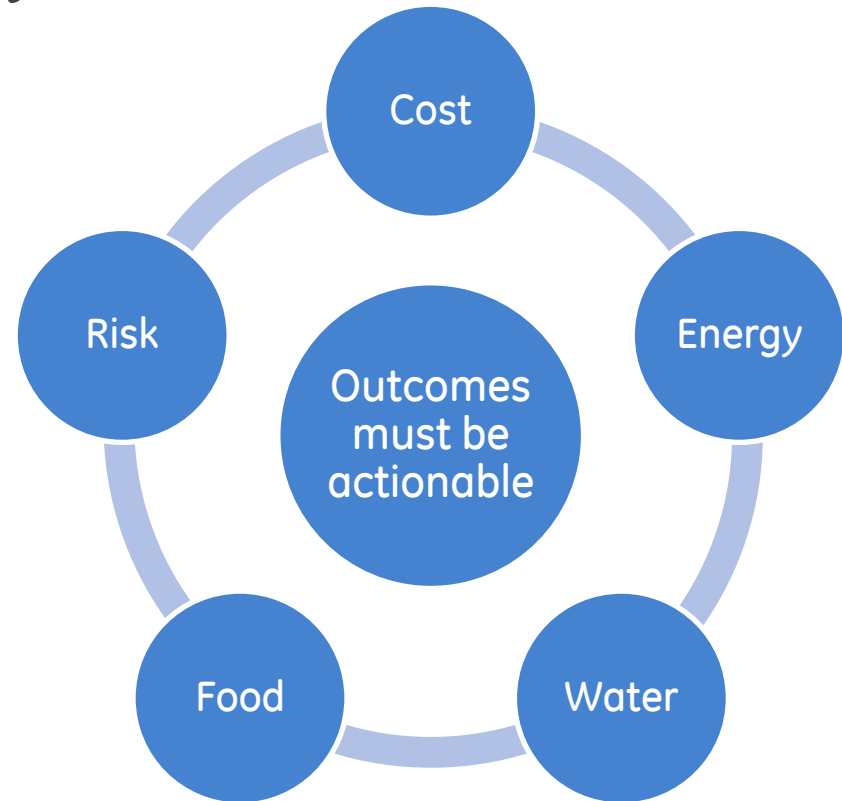
Fit-for-Purpose Strategy

Water management technologies and strategies¹

Tier 1: Minimize the volume of produced water volumes brought to surface

Tier 2: Reuse and repurpose produced water

Tier 3: Reduce disposal to Class II SWD wells



Water Conservation

Energy Consumption Reduction & Efficiency

Industrial-Scale Solutions

Statewide Resource Transformation

Meet short-term needs and ensure long-term reliable water-energy supply.

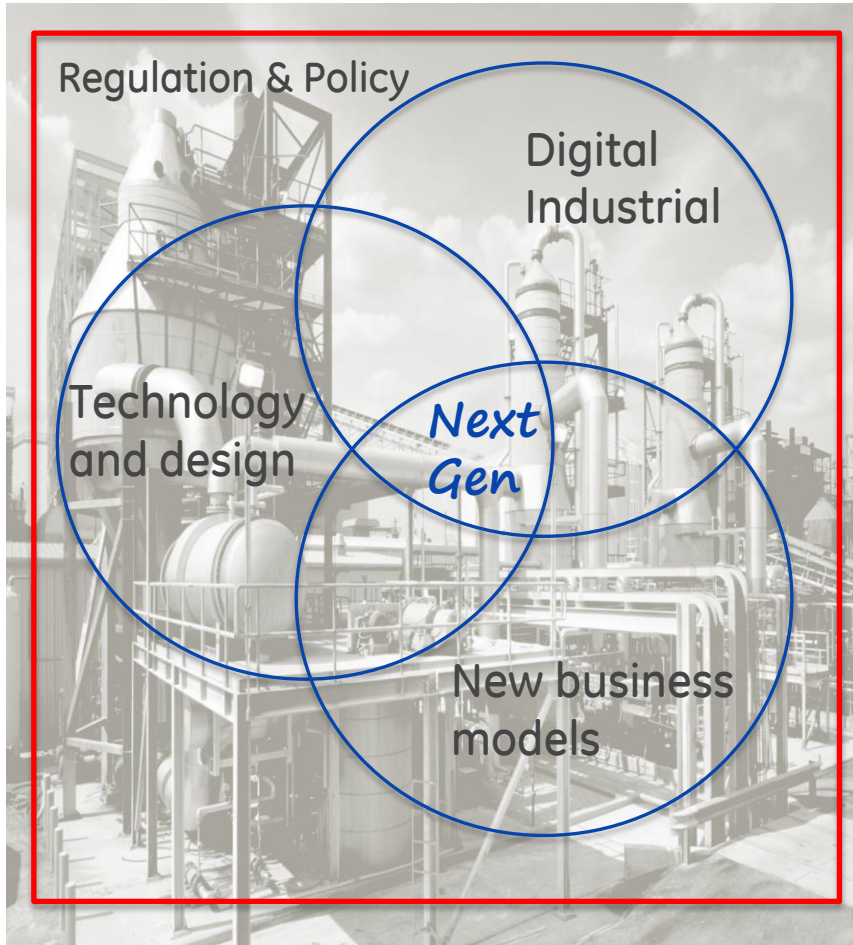


1: U.S. Produced water volume and management practices in 2012 (Veil, 2015)

GE Response to Market Challenges

Innovation pillars

Roadmap & path forward



Technology & Design

- Modularization and structuring footprint and cost reduction
- Process optimization
- Advanced materials, robotics, additive manufacturing

Extending Digital Industrial

- Automation and robotics
- Remote/unmanned operations
- Process/production flexibility
- Prediction/optimization

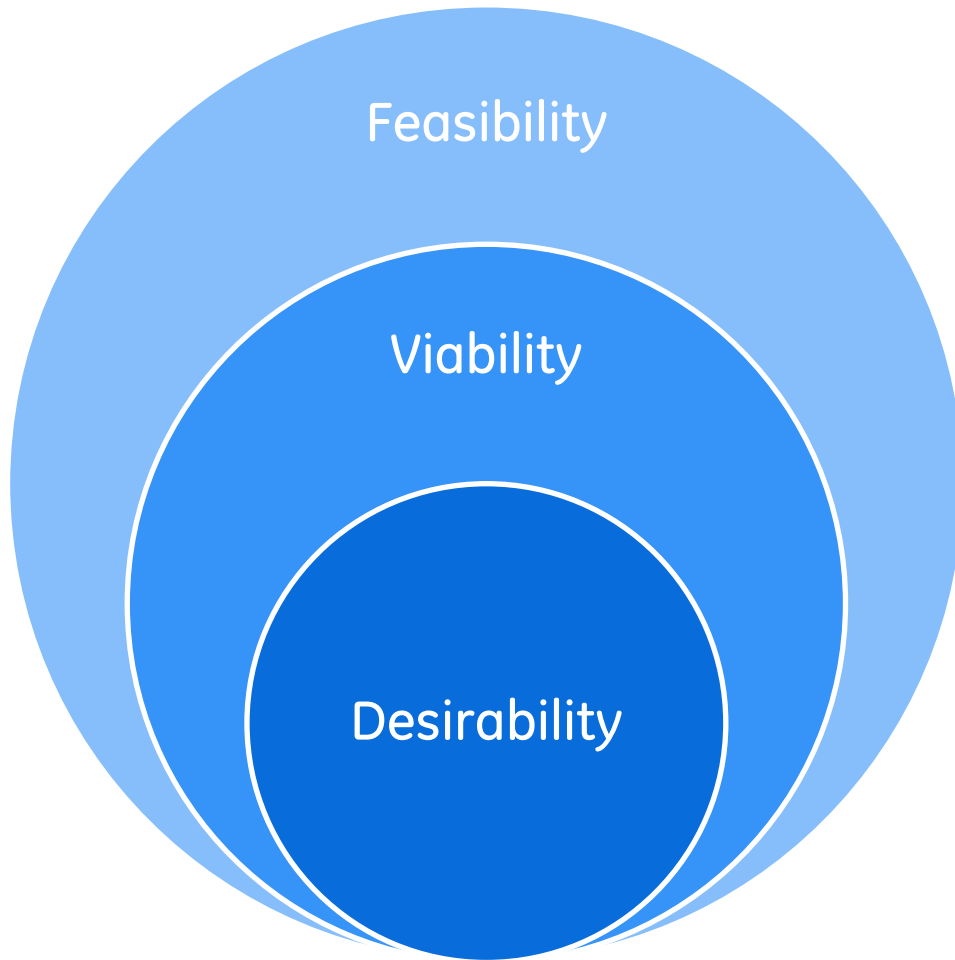
Business model (e.g.)

- BOO, leased equipment, service
- Pay for performance



Technology Management

Determining what we will and won't do and why



- **Feasibility**
 - Technical Reality
- **Viability**
 - Commercial Value
 - Willing Stakeholders
 - Commercial Plan
- **Desirability**
 - Enabling the Digital Age
 - Optimizing Industry Operations
 - Transforming the Industry
 - Maintaining Industry's Social License to Operate
 - Enhancing the Value of Oil & Gas in the Energy System
 - Creating New Markets for Production

Fall in love with the *Problem*, not the solution....

There's a way
to do it better—

FIND IT

—Thomas Edison

MISSION

Use no more fresh water in 2060 than was used in 2012, while supporting Oklahoma's continued growth and prosperity.



