





# CCS – Risk Issues and Risk Management

## CSLF Financing Roundtable

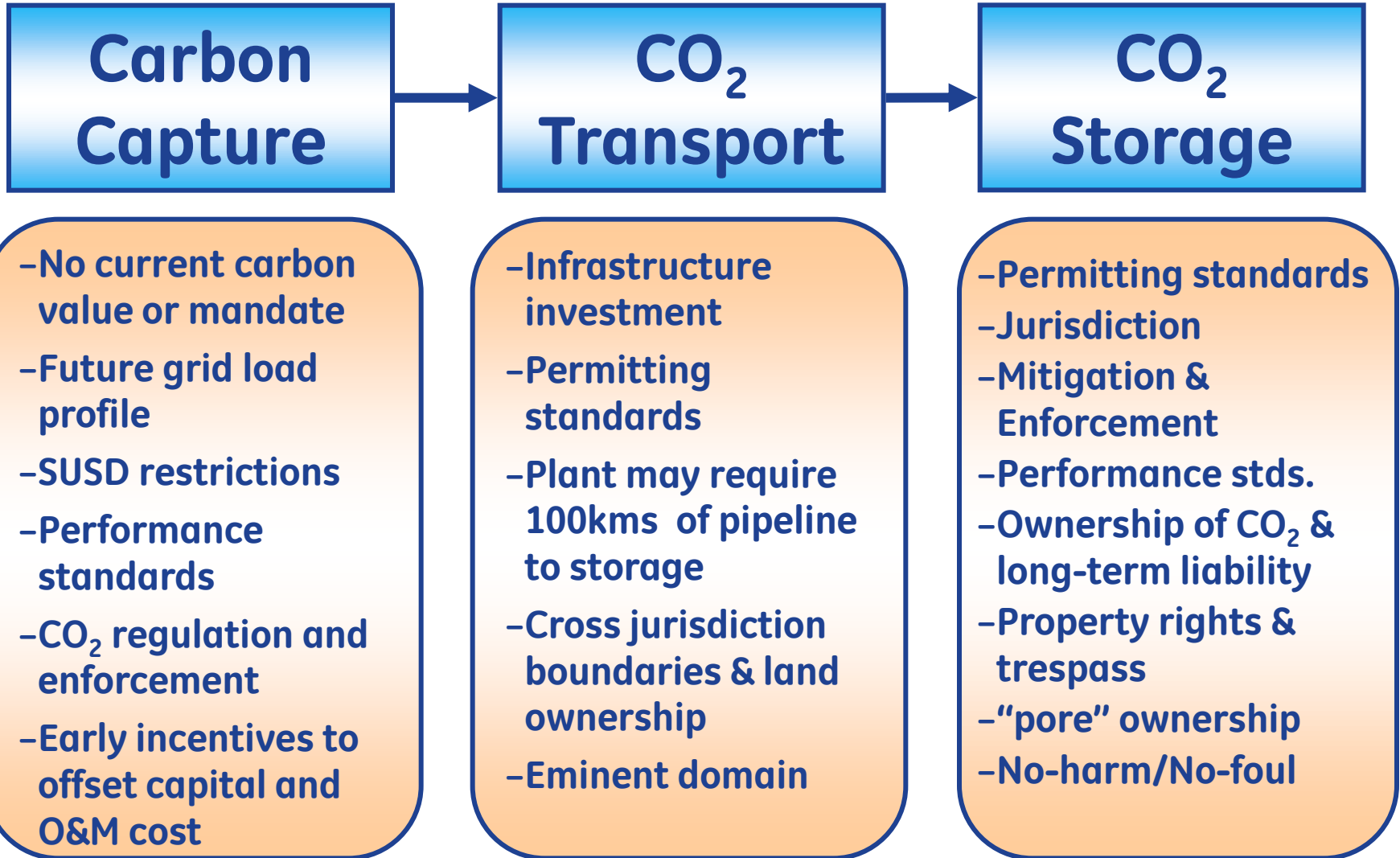
Norman Shilling  
Senior Product Manager, Policy  
GE Energy



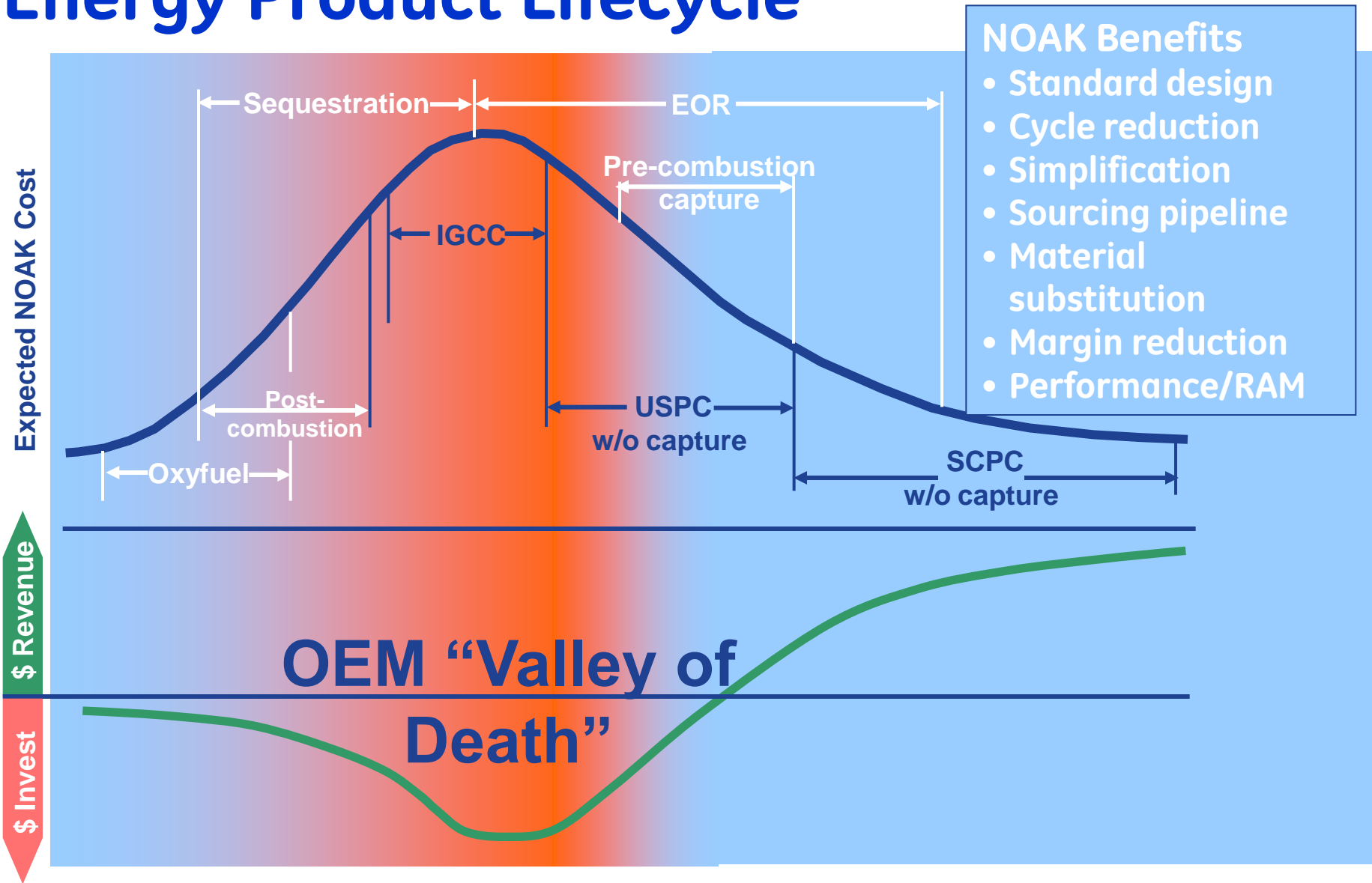
# Reality: Big challenges to CCS

Issue	Challenge
 <p><b>Changing the Face of Coal</b></p>	<p>The lack of a consensus coal roadmap            Commitment to achieve the change            No policy or regulatory certainty that establishes a value for CO<sub>2</sub> and CCS</p>
 <p><b>Legal Risk</b></p>	<p>Tort, pore ownership and long-term liability (e.g. RCRA/CERCLA/NERD) for CO<sub>2</sub> will prevent utilities from transporting or storing CO<sub>2</sub></p>
 <p><b>Technology</b></p>	<p><u>Existing plants</u>: development and full-scale demonstration of retrofit technologies  <u>New plants</u>: Deployment of proven and commercially-offered capture technology and integration with T&amp;S</p>
 <p><b>Public Acceptance</b></p>	<p>NUMBY -- Public resistance to CCS projects in their communities.</p>
 <p><b>Finance</b></p>	<p>Government funding inadequate to prove that CCS is commercially viable and poses acceptable risks            PUC mandate for lowest cost            CO<sub>2</sub> transport infrastructure</p>

# The CCS chain



# Energy Product Lifecycle



- NOAK Benefits**
- Standard design
  - Cycle reduction
  - Simplification
  - Sourcing pipeline
  - Material substitution
  - Margin reduction
  - Performance/RAM

# Integrating capture and sequestration

## GE Energy

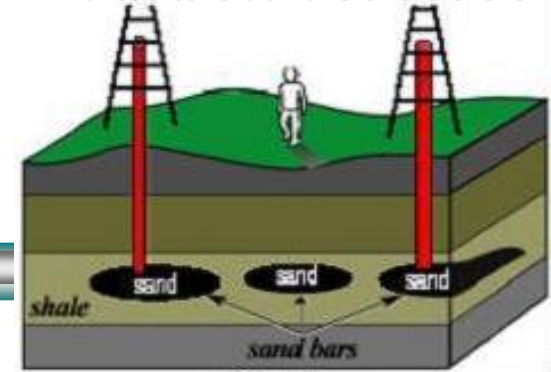


## Pipeline Developer

### Interface Definition



## Schlumberger Carbon Services



### Cost Efficiencies

- CO<sub>2</sub> quality
- Preservation of injectivity & capacity
- Regulatory
- Materials, components & features

### Operability & Reliability

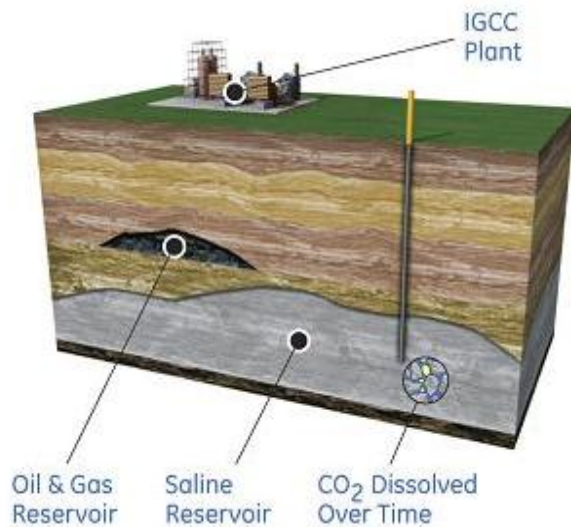
- Integrated, consistent mission profiles
- Design for planned & unplanned outages
- Response to upsets
- Safety

### Project Execution

- Coordinated schedules for plant and storage facility
- Permitting
- Commissioning of plant & sequestration facility

# Deployment of CCS unlikely until...

- CO<sub>2</sub> emission rules are established
- CCS is demonstrated in several projects with
  - >1 million tonnes of CO<sub>2</sub> per year
  - In multiple geologies
  - Fully integrated power and CCS
- There is public acceptance of CO<sub>2</sub> sequestration in multiple geologies and countries
- The issue of long-term liability for stored CO<sub>2</sub> is resolved
- A stable price (and trajectory) is established for CO<sub>2</sub> emissions



# What is the future for CCS?

The industry has...

Proven technology

Potential projects

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What is needed to move CCS forward...

Government incentives & indemnity for pioneers

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Commercial scale projects to drive the experience curve to the next level and justify investment in technology improvement by industry

We need to show the doubters the solutions to energy security, GHG.