## Path to a Greener Future

**Organizations are optimistic and ambitious about low-carbon hydrogen**

- End-users
- Infrastructure providers
- Storage-system developers

While partnering with:
- Unique end-user organizations; N=500 respondents from unique energy and utilities organizations.
- Source: Capgemini Research Institute, low-carbon hydrogen survey, November–December 2022; N=360 respondents from unique end-user organizations.

## Investment in Low-Carbon Hydrogen is on the Rise

<table>
<thead>
<tr>
<th>Year</th>
<th>Organizations Investing or Planning to Invest</th>
<th>% of Organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>2022</td>
<td>83%</td>
<td>99%</td>
</tr>
<tr>
<td>2030</td>
<td>83%</td>
<td>99%</td>
</tr>
<tr>
<td>2050</td>
<td>83%</td>
<td>99%</td>
</tr>
</tbody>
</table>

**Industries such as refining, fertilizers, and chemicals will widely harness low-carbon hydrogen**

Source: Capgemini Research Institute, low-carbon hydrogen survey, November–December 2022; N=500 respondents from unique energy and utilities organizations.

## Cost, Engineering, and Skills Challenges are Yet to be Addressed

### Cost Challenges

<table>
<thead>
<tr>
<th>Challenge</th>
<th>% of Organizations Facing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>45%</td>
</tr>
<tr>
<td>Transport</td>
<td>30%</td>
</tr>
<tr>
<td>Storage</td>
<td>56%</td>
</tr>
<tr>
<td>Distribution</td>
<td>18%</td>
</tr>
</tbody>
</table>

### Engineering Challenges

- **Hydrogen mix today**
- **Low-carbon hydrogen is 2-3 times more expensive to produce than fossil fuels**

### Infrastructure Challenges

- **Key areas of infrastructure challenges**
  - Half of E&U organizations are yet to address their hydrogen production challenges.
  - Insufficient existing infrastructure and storage conditions and safety are among the top five challenges to scale hydrogen production.
  - Top challenges among the top five challenges to scale hydrogen production.

### Skills Challenges

- **User organizations rank lack of skills and expertise among the top five challenges to scale hydrogen production.**

## How can organizations capitalize on the low-carbon hydrogen opportunity?

- **Accelerate and scale**
- **Harness the potential of digital-twin technologies**
- **Develop robust data and infrastructure**
- **Maximize agility and resilience in technology foundations**
- **Reduce cost and operational risks**

Source: Capgemini Research Institute, low-carbon hydrogen survey, November–December 2022; N=500 respondents from unique energy and utilities organizations; N=360 respondents from unique end-user organizations.