



L.E.K. Global Energy Study

Executive Summary

October 2023

These materials are intended to supplement a discussion with L.E.K. Consulting. These perspectives will, therefore, only be meaningful to those in attendance. The contents of the materials are confidential and subject to obligations of non-disclosure. Your attention is drawn to the full disclaimer contained in this document.



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- Executive Summary

Context

L.E.K. conducted roundtable discussions and a survey to understand capital deployment trends across the energy sector, speed of transition to low-carbon solutions, and the impact from prevailing macro factors



- This is the 5th year L.E.K. has developed a **proprietary study** on energy markets with quantitative and qualitative measures that uncover how energy investments are evolving



- Similar to last year, this study considers **energy transition (“ET”) and sustainability trends facing the energy industry**, and highlights **how perspectives have shifted** over time



- This study includes perspectives from **all energy** areas including oil & gas companies, utilities, renewables companies, and investors
- The scope is global, with particular emphasis given to the U.S., Europe, Middle East, and Australia



- The survey was conducted during **July and August of 2023**
- The survey targeted **~300 energy executives** (strategics & financials across O&G, utilities, renewables, and investors) that met the following criteria:
 - At least **~5 years of experience** in the energy industry
 - Employed in a company with revenues of **\$100M or higher**
 - Responsible or directly involved in **investment and strategy decisions**



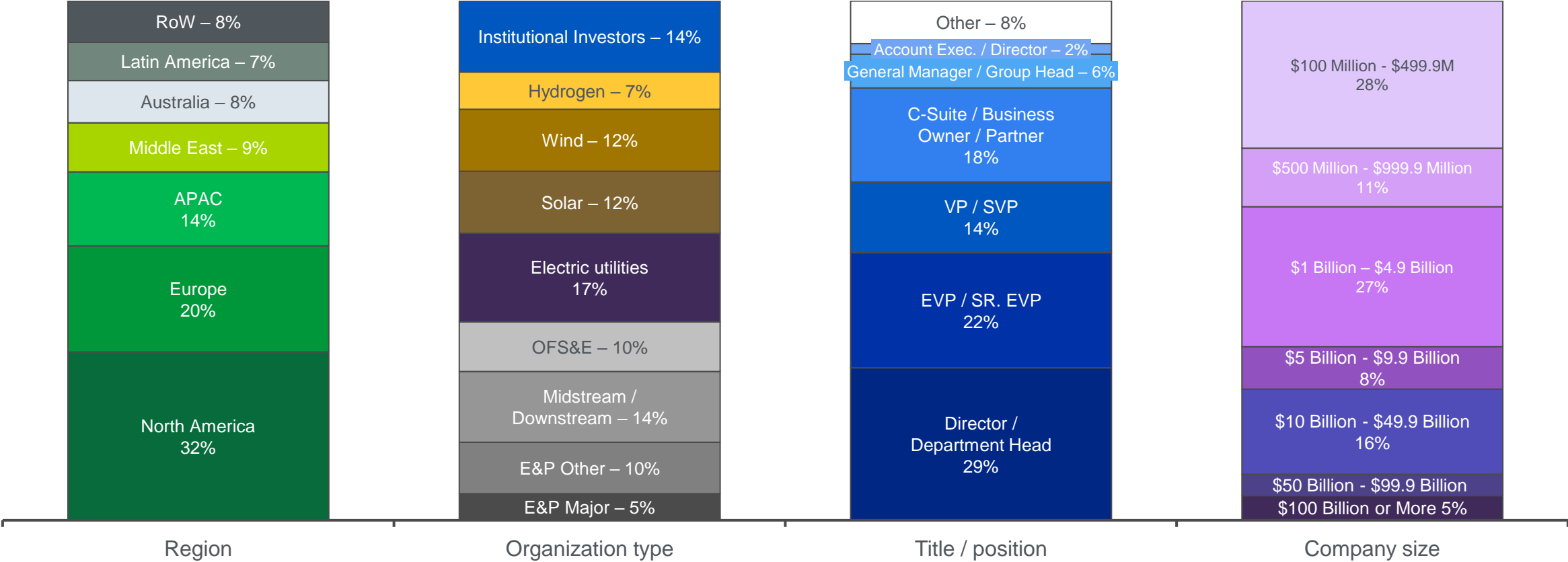
- We complimented the survey results with over **~40 roundtable discussions** with senior-level contacts; these additional qualitative insights provided rationale and commentary around investment decisions and brought in views from a diverse set of stakeholders

Context

The 2023 study includes survey responses from a diverse set of energy stakeholders globally

L.E.K. 2023 Energy Study – Survey Demographics

Percent of completed respondents (N = 293)



Notes: * Respondents counted for each region they indicate they operate in (i.e., if a respondent operates in Europe & APAC, they will account for of N=2); ** Organization type groups IOCs, NOCs, and Upstream O&G companies into “E&P Other”, groups midstream O&G, petrochemical, and refining companies into “Midstream & Downstream,” and groups oilfield service and equipment companies into “OFS&E”; On average, respondents indicate their company operates in ~2 regions

Source: L.E.K. 2023 Energy Transition Study



Context

The study covered capital allocation decisions and the impact of transition and sustainability

Key survey content questions (paraphrased; excludes demographic questions)

Energy Investing

Capital allocation



- Which **energy segments** is your organization most likely to **invest in over the next 5 years**?
- What **% of total investment** is/will be allocated?

Macro. environment



- To what degree have **rising interest rates**, recent **geopolitical events & energy security** concerns impacted your company's strategy?

Org. impact



- What are **capability gaps** to achieving the strategy and preparing for energy transition?

Sustainability*

Capital allocation



- What % of focus and investment is/will be allocated to **sustainability / decarbonization**?
- Which **decarbonization solutions** is your org. **most likely to invest in over the next 5 years**?

Note: The Survey included additional demographics related questions, including industry, time in industry, geographic region, company type/segment, and title. Questions are summarized here for presentation purposes;

* This section of the survey was only completed by O&G companies

Source: L.E.K. 2023 Energy Transition Study

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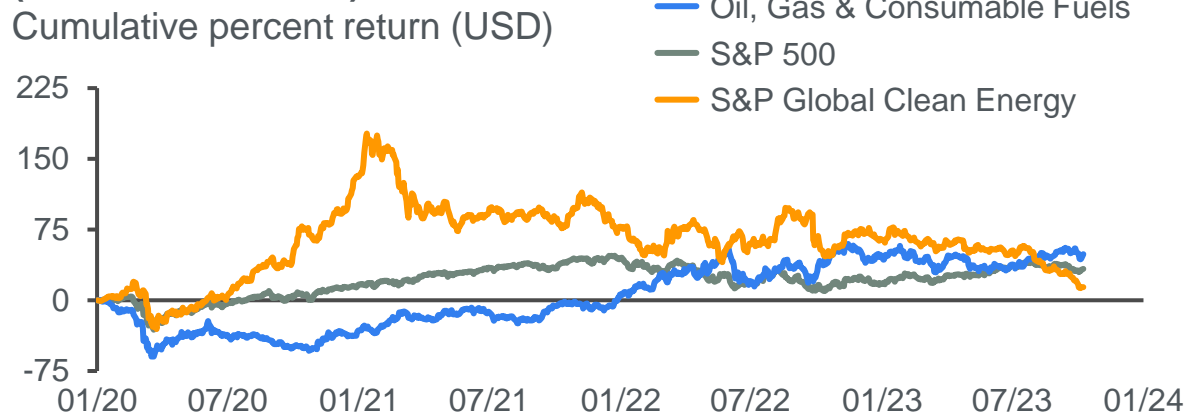
The role of energy players in the Energy Transition (ET) is evolving, with a challenging macroeconomic environment and energy security concerns driving a more cautious approach

Global Energy Transition Study: Key Themes

1 Energy players are more cautiously navigating transition	Energy firms have refocused on core operations and tempered investment into emerging energy technologies due to high interest rates, energy security concerns, and strong demand and prices for hydrocarbons
2 A refocus on developing O&G assets is coinciding with greater interest in decarbonizing the oilfield	O&G companies have prioritized reducing emissions, increasing energy efficiency, and more accurately measuring their carbon footprint
3 Long-term tech viability and near-term economics are driving energy transition technology choices	Investment in the ET is driven primarily by technological advancements and improving economics; policy tailwinds and sustainability are secondary drivers
4 Participation strategies vary by company type and region; oil & gas is still defining (or redefining) roles	Across all company segments, solar & wind energy, energy storage systems (ESS), and carbon capture & sequestration (CCS) are top ET investment areas
5 Among O&G firms, Majors are expected to lead, with CCS a top investment area	Oil & gas majors and diversified international energy players are leading investment with CCS the top investment followed by other solutions with clear capability overlaps such as hydrogen and renewable fuels
6 Renewables leaders are expected to increase investment, but outside capital is more discerning	Solar & wind companies expect robust growth through the decade, with specific segments (i.e. residential, and offshore wind) more challenged in select regions; Outside capital is optimistic long term, but near-term hesitancy is underpinned by unclear incentive structures, interest rates, and select asset underperformance
7 Utilities are focused on grid decarbonization, reliability, and management of DERs	Utilities plan to invest primarily in expanding their renewable generating assets (solar, wind, ESS), as well as EV infrastructure, and demand-side solutions

1 Rising interest rates, mixed returns, and stronger oil & gas commodity fundamentals have contributed to a more cautious approach to Energy Transition investment

S&P 500 Energy sector - Total Return
(Jan 2020-Oct 2023)



“... With the **rising interest rate environment**, a lot of the market is struggling to get funding – it allows **less money to flow into development**, which overall **slows down growth ...**”
- Executive, E&P Major

“... The **economic environment impacts financing around new energy developments** not because people don't want to invest in those areas, but because the **economics aren't there yet** compared to core oil and gas solutions ...”
- Executive, OFS&E company

“... To hit our growth targets, we continue to focus on the **traditional renewables solutions** (e.g., solar, onshore wind), where the **returns are proven out...** we are also investing in emerging renewables, but it **has to be alongside traditional solutions ...**”
- Executive, Renewables-focused company

“... **De-carbonizing hydrocarbons** will be an increasing short-term focus – investing in renewables in the current economic environment isn't easy. We're focusing on **equipment and solutions that can be re-purposed** to support the energy transition...”
- Executive, Investor

10-year U.S. treasury yield
(Jan 2020-Oct 2023)

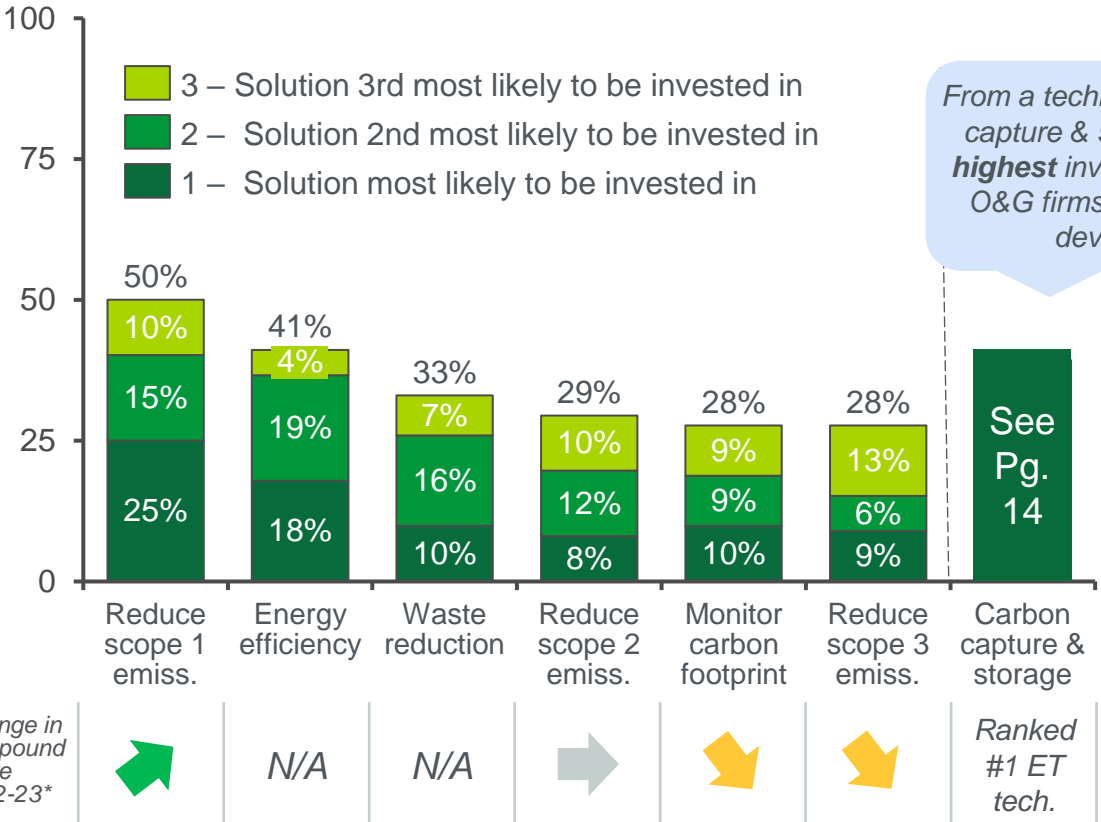


Source: EIA; FRED; S&P; L.E.K. research, interviews, and analysis

2 Oil & gas companies, while prioritizing their core, are also increasingly focused on decarbonizing oilfield operations

Top sustainability solutions O&G organizations are most likely to invest in over the next 5 years

Percent of respondents (N = 112)



From a technology standpoint, capture & storage is the #1 highest investment focus for O&G firms after core O&G development

“... We are doing more work on **decarbonization**, and we now have good pathway on **emissions reduction**. You'll see us continue to invest more. We are definitely seeing more opportunity to deploy capital in that area ...”
- Executive, E&P Major

“... Investor interest in **practical decarbonization** is definitely growing, so emission reduction is a big priority for us over the next several years ...”
- Executive, Financial Services Company

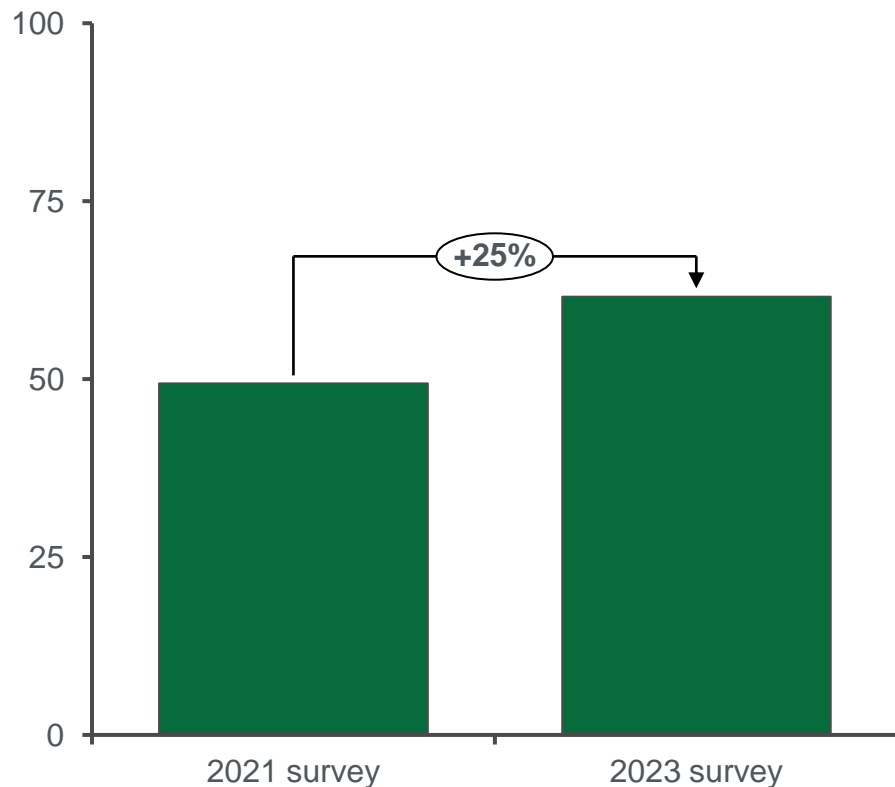
“... Anything around **energy efficiency** continues to be a key investment area ...”
- Executive, Investor

Notes: * Compound score between 1-3 based on percent of respondents ranking the product / solution first, second, or third; green arrows indicate product / solution has increased in the rankings relative to 2022 survey results, grey indicates it has remained the same, yellow arrows indicate it has fallen in the rankings, and N/A indicates response option was not included in prior year's survey
Source: L.E.K. 2022 and 2023 Energy Transition Studies

2023 study finds energy companies are prioritizing oil & gas over new energy areas more than past years

Oil & gas: percent of respondents who rank 'continued O&G focus' as top 3 investment area over next 5 years, by segment

Percent of respondents



“... While we continue to deploy ET initiatives and projects globally, our transformation strategy considers **fossil fuels as part of the short- to medium-term** as global **energy demand** rises and concerns around **energy security** persist ...”

- Executive, E&P Major #2

“... The core is doing really well and our business is growing, so in addition to our ET investments, we’re also going to **keep investing in hydrocarbons**. Returns for renewables have to compete with the core ...”

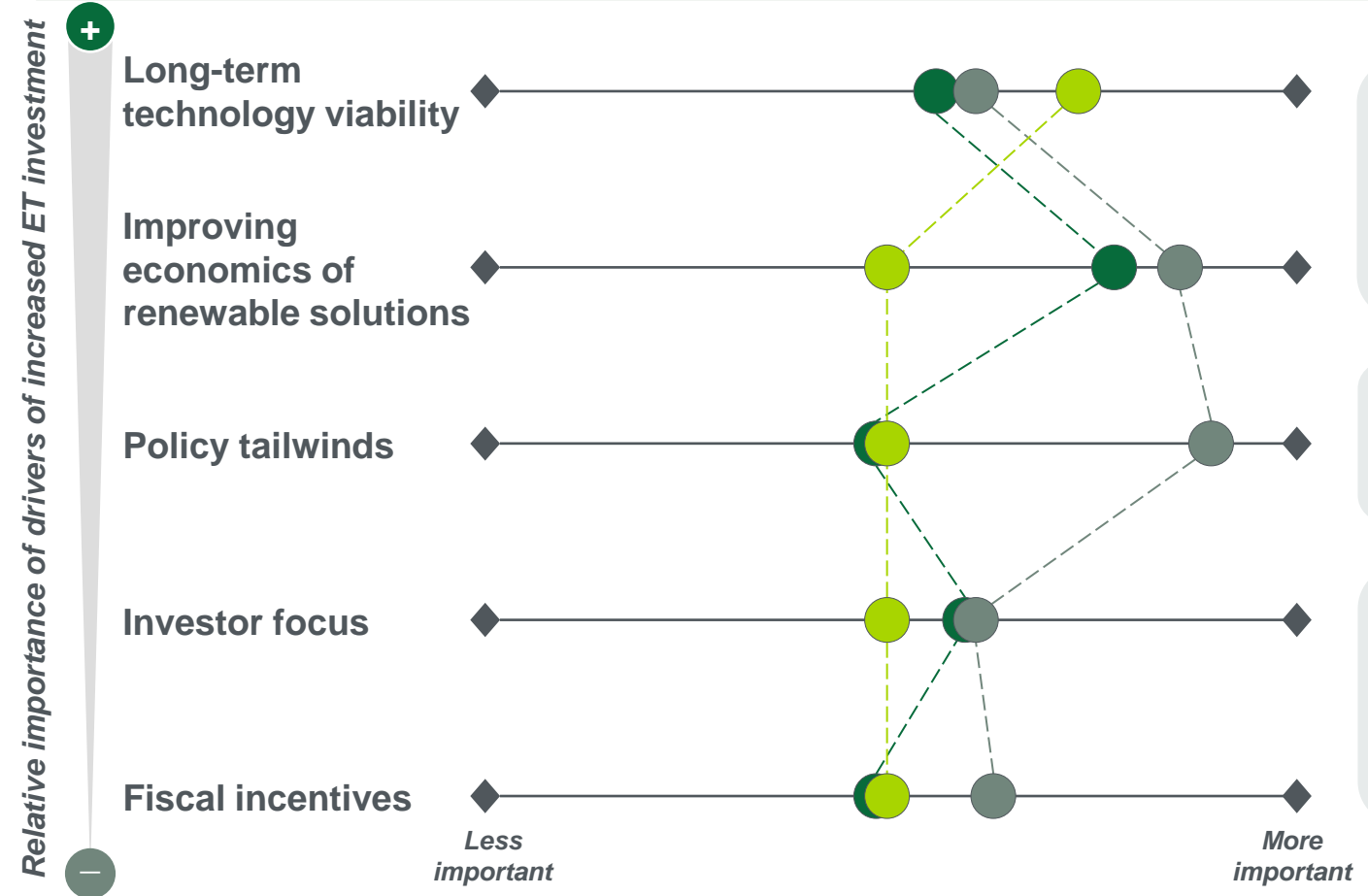
- Executive, OFS&E Company #1

“... Two years ago, E&P majors and other companies were putting in significant investment outside of their core. But then times started to roll, and now the mentality they have is ‘**green investments where they make sense**’ ...”

- Executive, OFS&E Company #2

3 Long-term tech viability and near-term economics drive investment decisions across all energy company segments

Drivers of increased ET investment (across energy companies), by company type



“... Technological innovation has been a major driver of the recent progress in energy transitions, with falling costs and growing capabilities for key technologies such as solar panels and electric vehicles, as well as major strides in energy efficiency ...”

“... As an investor, we **expand our core focus** every year... it now **includes** solar, wind, hydrogen, and carbon services – what we call ‘**energy services**’ ...”

“... The Inflation Reduction Act **incentives reduce renewable energy costs** for organizations... taking advantage of IRA incentives, such as **tax credits**, is key to lowering greenhouse gas emission footprints and **accelerating the clean energy transition** ...”

Key:

- O&G companies
- Renewable companies
- Electric utilities

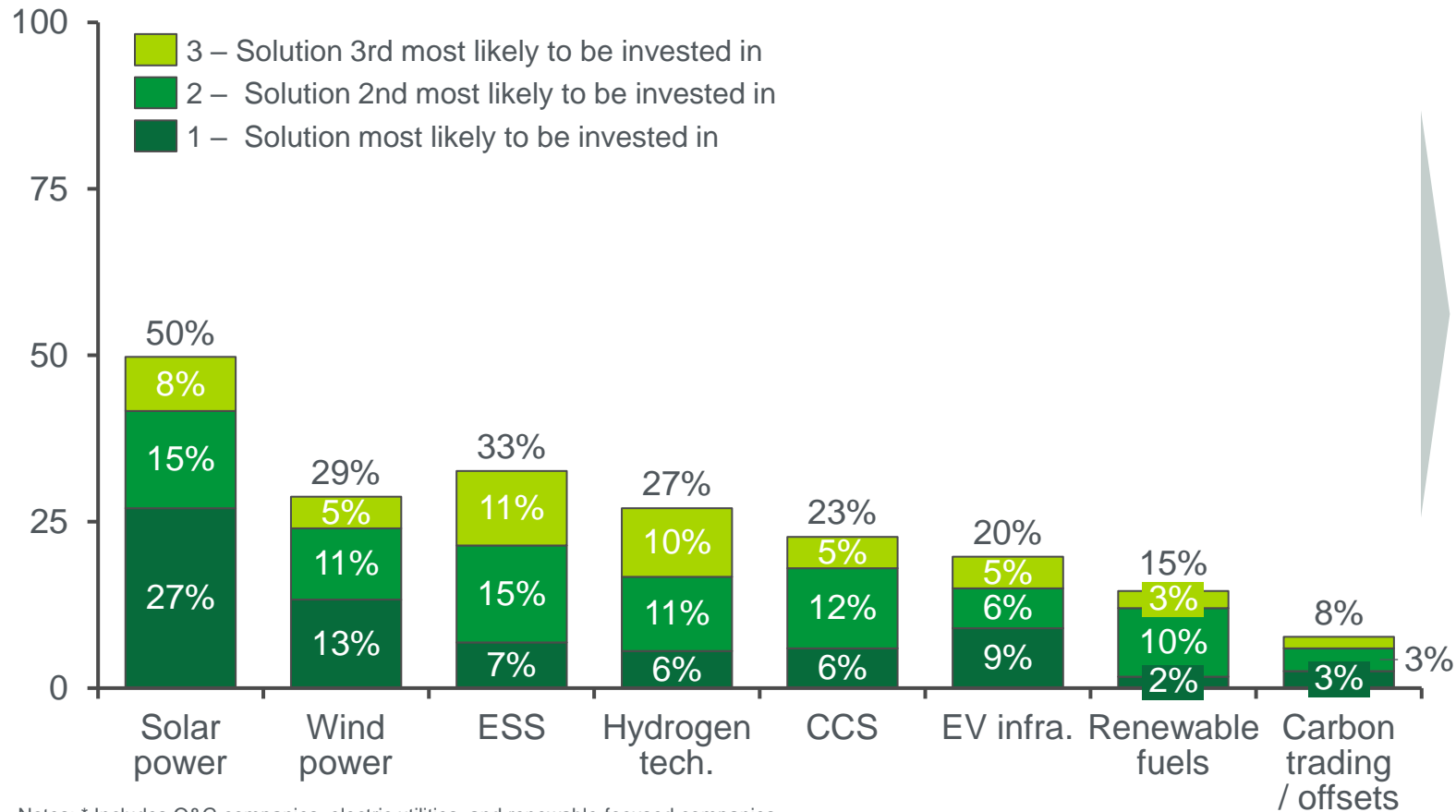
Source: L.E.K. 2023 Energy Transition Survey; EPA; IEA; IRENA World Energy Transitions Outlook; Company earnings calls; L.E.K. interviews and analysis



Technology focus differs by company segment, but solar, wind & storage are likely to see most investment

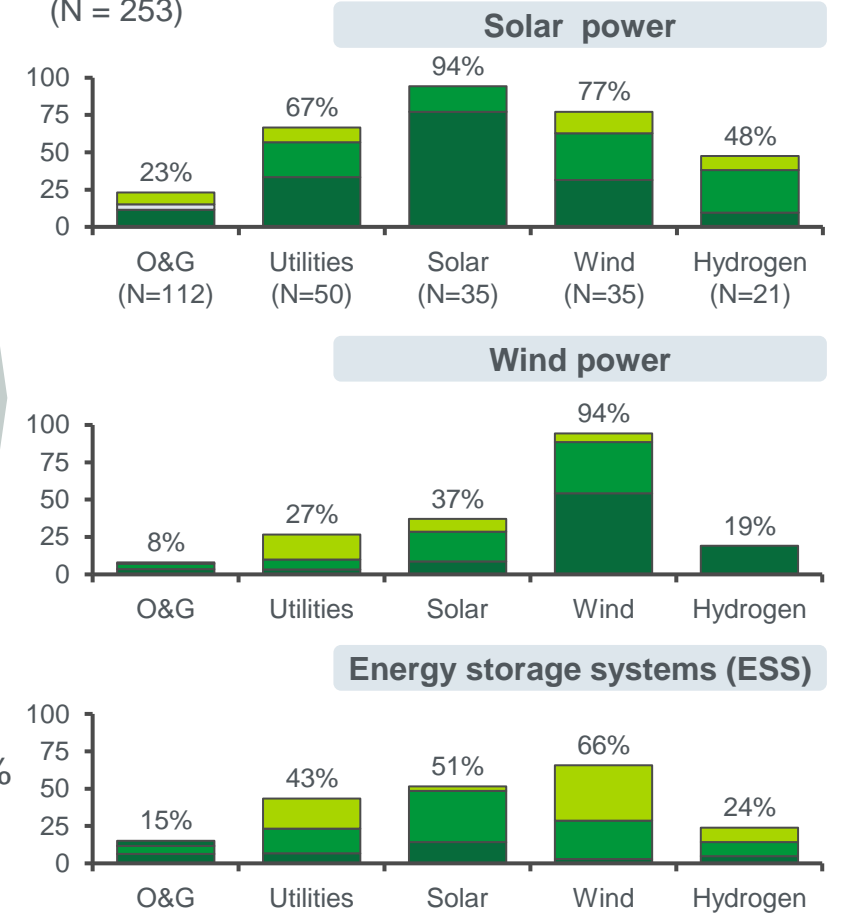
Energy transition technologies organizations* are most likely to invest in over the next 5 years

% of respondents ranked as top product/solution (N = 253)



Notes: * Includes O&G companies, electric utilities, and renewable focused companies
Source: L.E.K. 2023 Energy Transition Study

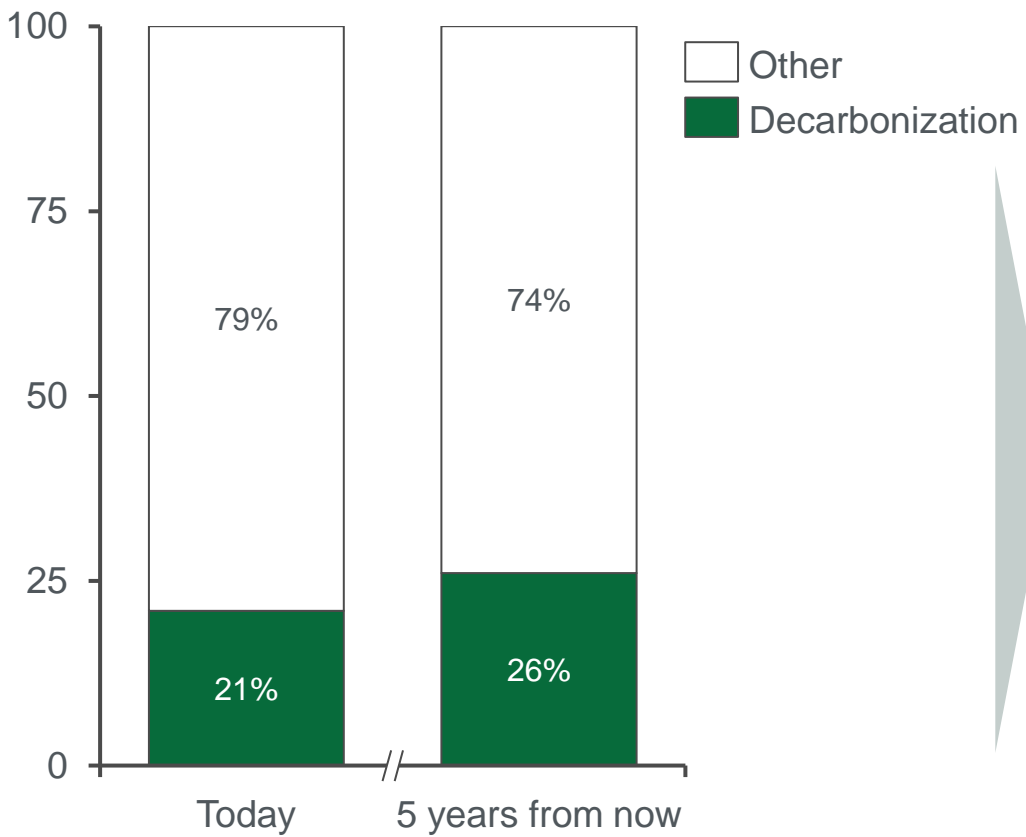
% of respondents, by investment area and company type (N = 253)



5 Despite refocusing on oil & gas, energy transition and decarbonization are still expected to increase as a share of the total capital budget for oil & gas companies

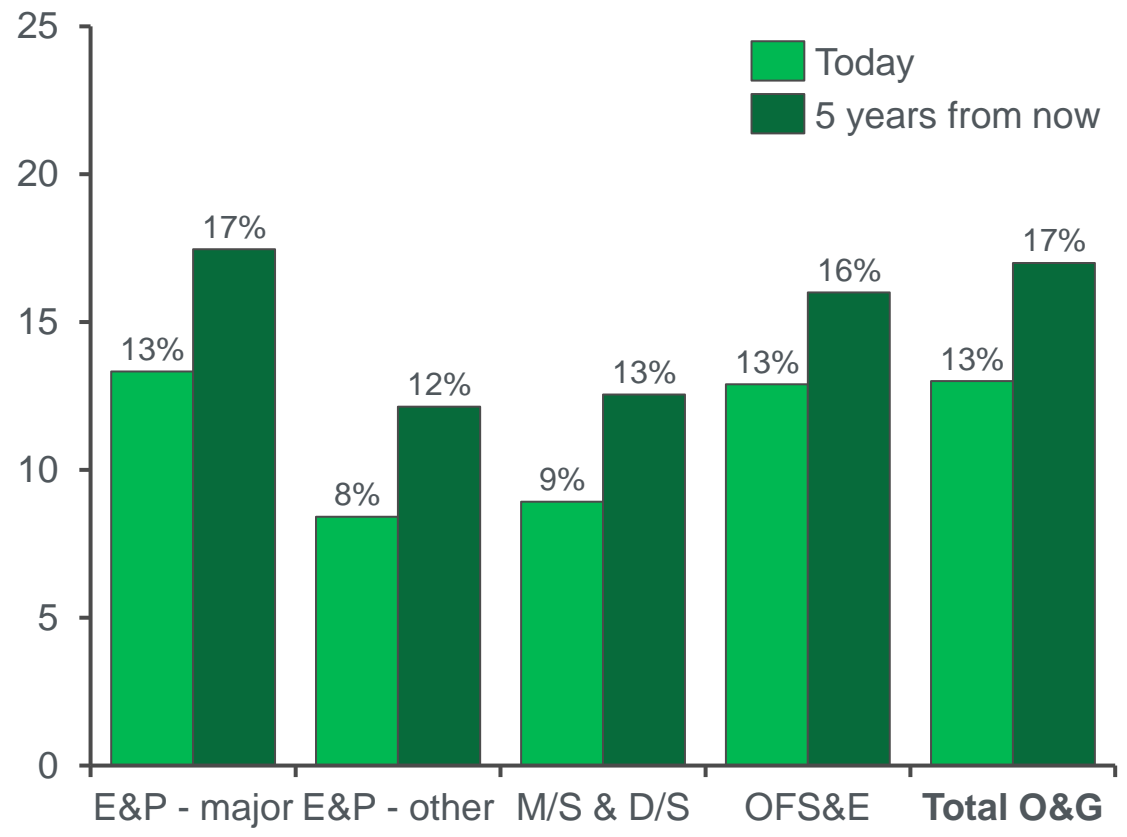
Oil & gas companies: proportion of investment budget spent on decarbonization

Implied average % of investment budget (N = 112)



Oil & gas companies: proportion of investment budget allocated to decarbonization

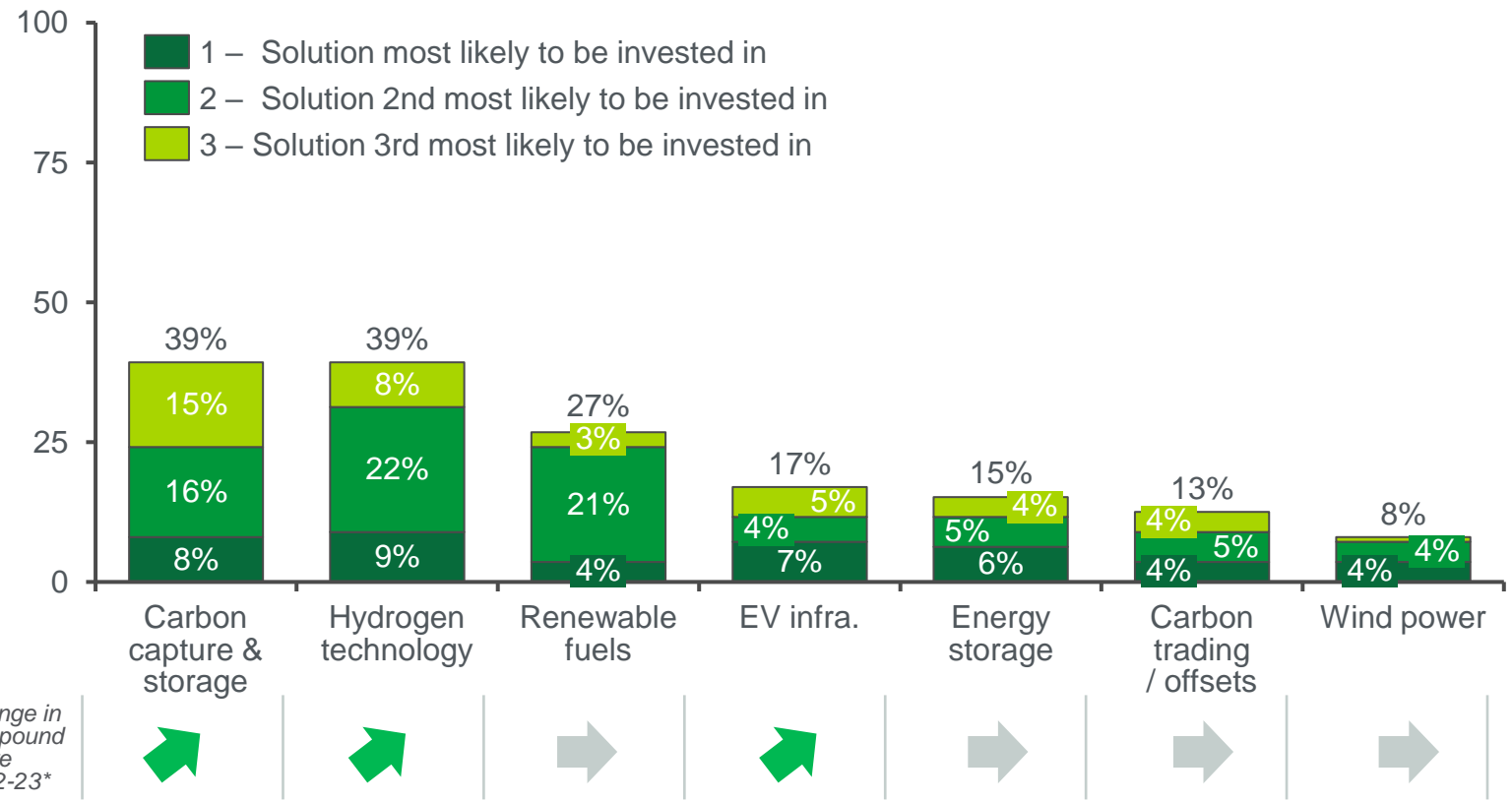
Implied average % of investment budget, by segment (N = 112)



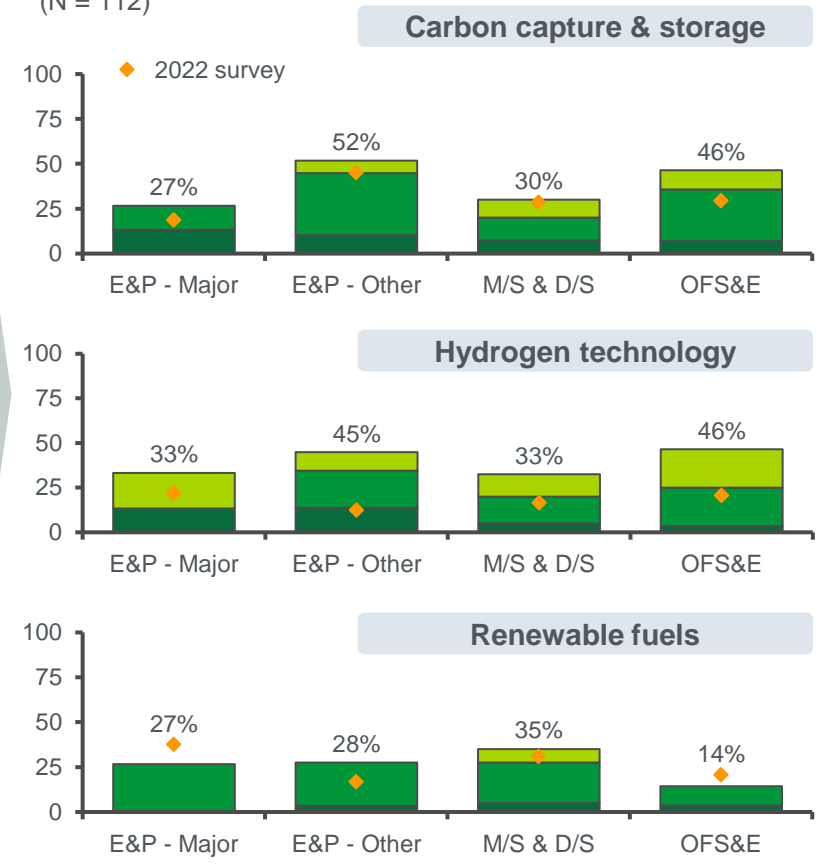
Source: L.E.K. 2023 Energy Transition Study

5 Oil and gas companies are focused on molecule investments with carbon capture, hydrogen, and renewable fuels noted as top areas; EV infrastructure has risen higher on the priority list as well

Energy transition technologies O&G organizations are most likely to invest in over the next 5 years
 % of respondents ranked as top product/solution (N = 112)



% of respondents, by investment area and company type (N = 112)

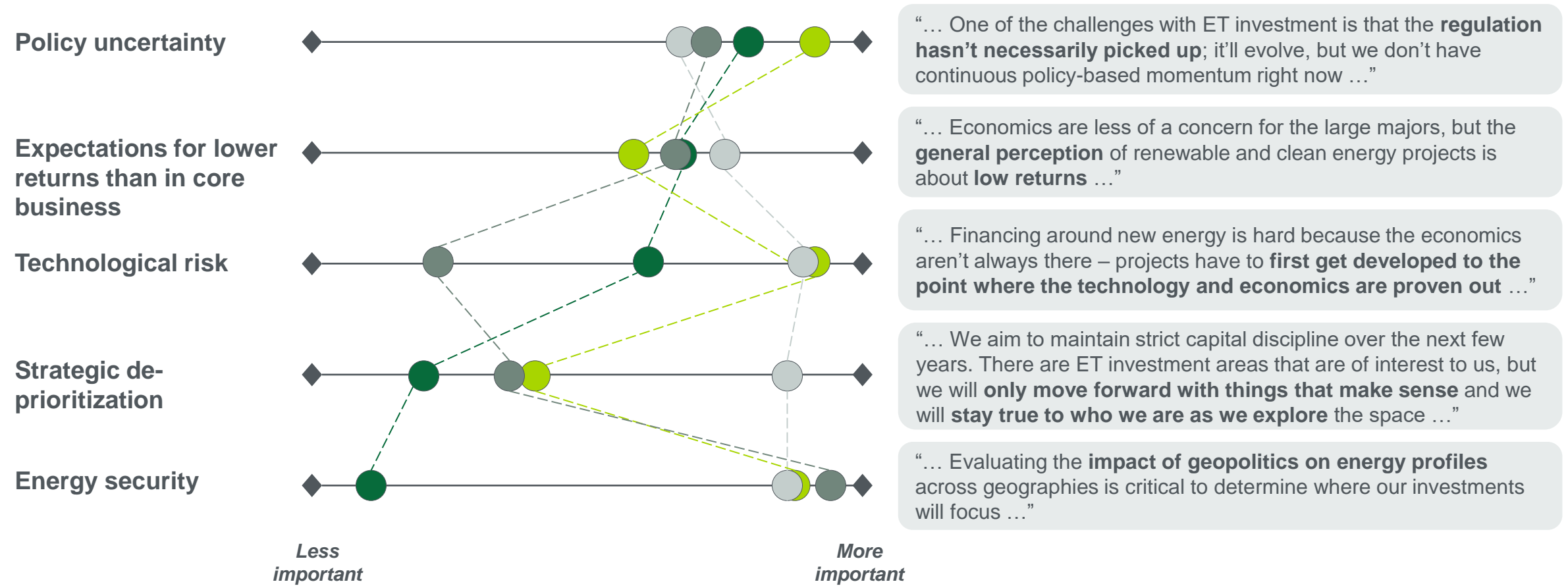


Notes: * Compound score between 1-3 based on percent of respondents ranking the product / solution first, second, or third; green arrows indicate product / solution has increased in the rankings relative to 2022 survey results, grey indicates it has remained the same, yellow arrows indicate it has fallen in the rankings, and N/A indicates response option was not included in prior year's survey
 Source: L.E.K. 2022 and 2023 Energy Transition Studies

5

Companies reprioritizing oil & gas operations cite policy uncertainty, investment returns, and technology risk

Drivers of stagnant / decreased ET investment, by O&G company type



Source: L.E.K. 2023 Energy Transition Survey; L.E.K. interviews and analysis



6 The outlook for renewables varies by segment – there is strong optimism for grid-scale solar and onshore wind solutions, while the outlook for hydrogen is less clear

Solar companies continue to be positive about their outlook



- **Solar-focused renewables companies demonstrate strong optimism on global grid-scale solar** development, benefitting from policy-based incentives; some developers indicate interest in pursuing adjacent opportunities (e.g., energy storage, onshore wind)
“... Solar is all about the system play now – storage attachment rates are much higher and we’re considering adjacencies ...”
- Executive, Renewables Investor
- **Residential solar has a more mixed outlook** – in Europe investment continues to be strong whereas in the US it is more challenged due to declining affordability (driven by higher interest rates) and consumer confidence levels

Wind continues to grow, with regional differences on offshore vs. onshore focus



- In the US, **investment in onshore wind projects continues to grow**, benefiting from policy-based incentives in a similar way to solar development, whereas market **sentiment is more negative on the viability of offshore wind** as an affordable renewable solution given supply chain issues and profitability concerns
- In Europe the picture is in stark contrast e.g., in the **UK onshore wind is currently challenged** by policies though this is expected to change
“... Wind services and the wind supply chain continue to be an area where we consider investments ...”
- Executive, Investor

The hydrogen market remains in evolution with unclear outlook



- Market participants suggest that the **landscape of the hydrogen market is still in early development**, with uptake slower than news headlines suggest; while stated interest in the potential of hydrogen technology continues, no clear winners have emerged yet
“... With Hydrogen, we’re continuing to see how the system evolves. There’s real opportunities in the midstream but matching supply and demand flows are not yet known, and storage solutions need to develop ...”
- Executive, Midstream Operator

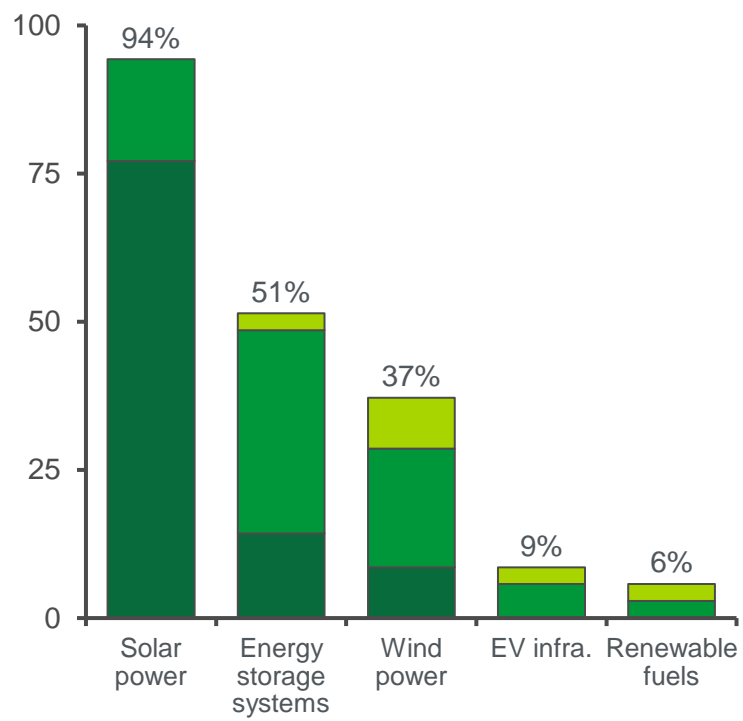
Incentive continuity, technological advancements, and continued access to capital remain critical for continued project development, especially for less established renewables solutions (e.g., hydrogen, geothermal)

Source: L.E.K. interviews and analysis

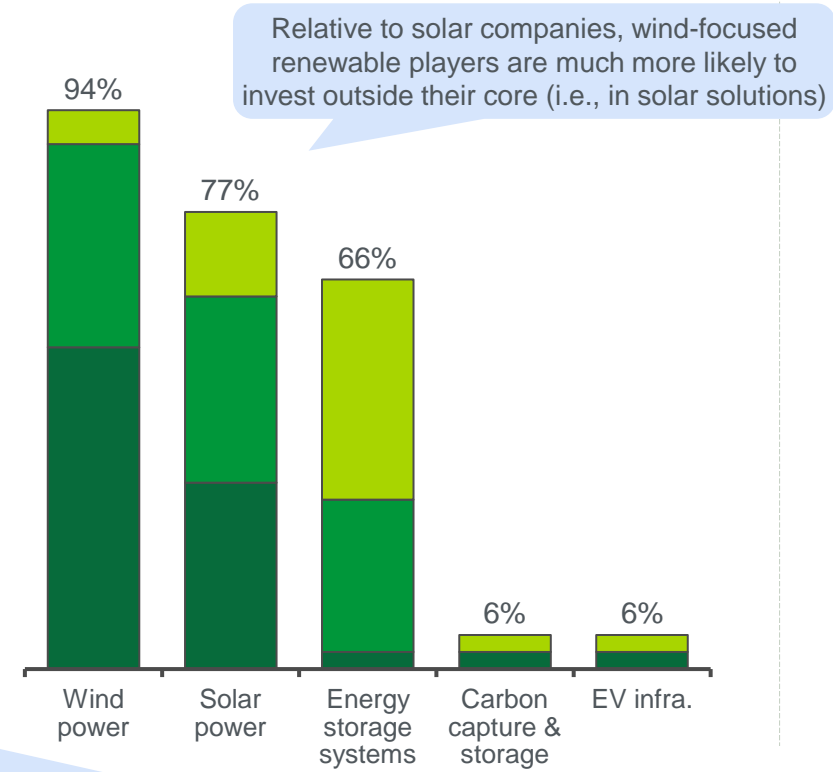
6 Renewables companies are largely focused on continued investment in their core businesses, although wind companies indicate more of a willingness to invest in solar energy

Energy transition technologies organizations are most likely to invest in over the next 5 years
 % of respondents ranked as #1-3 product/solution

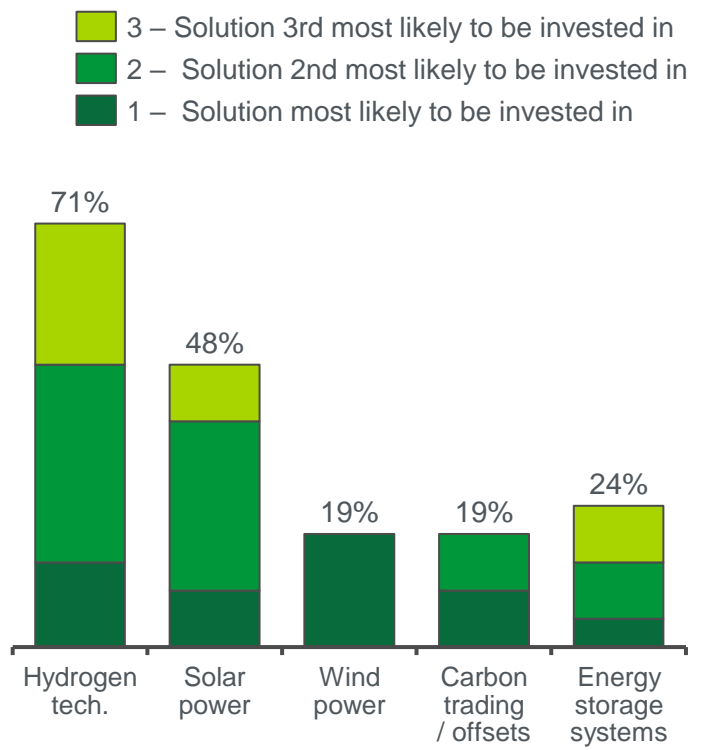
Solar (N = 35)



Wind (N = 35)



Hydrogen (N = 21)



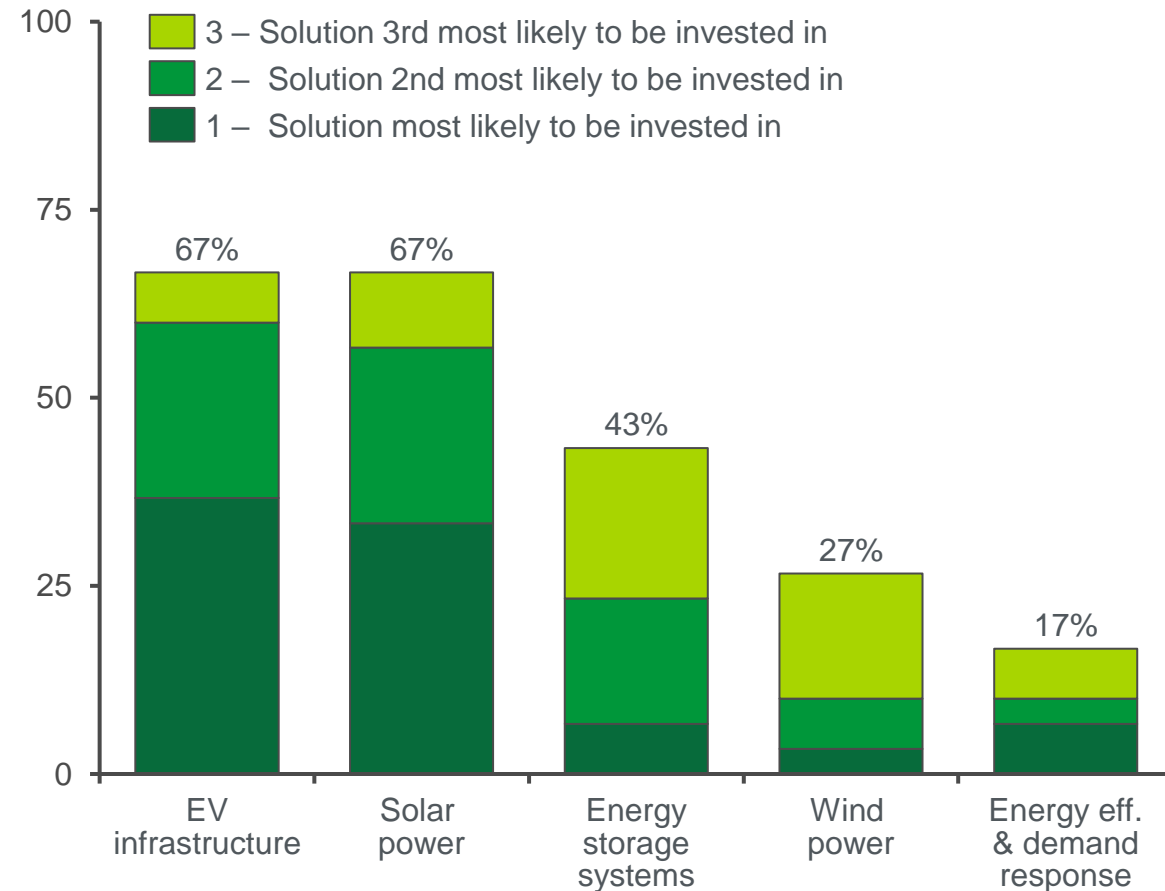
Renewables companies demonstrate strong interest in increasing investment in **energy storage systems (ESS)**

Source: L.E.K. 2023 Energy Transition Study

7 Beyond transmission and distribution investments, utilities are focused on EV infrastructure, solar, and demand-side management solutions

Energy transition technologies utilities are most likely to invest in over the next 5 years

Percent of respondents ranked as #1-3 product/solution



Source: L.E.K. 2023 Energy Transition Study

- The **energy grid is evolving** across all levels of the value chain, including energy sources and the roles various stakeholders play
- Utilities are focused on investing in solutions that **decarbonize generation & provide reliability** for the power network
- **Complex shifts utilities noted to be investing around include:**
 - Fewer large power plants → many smaller renewable generators
 - Reliable baseloads → mix of base, intermittent, and smart loads
 - Centralized networks → decentralized grid and fuzzy boundaries
 - Large transmission networks → battery storage and regional supply compensation
 - Top-to-bottom distribution → bidirectional power flows
 - Passive consumers → active participants with EV infrastructure and energy efficiency & demand response

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