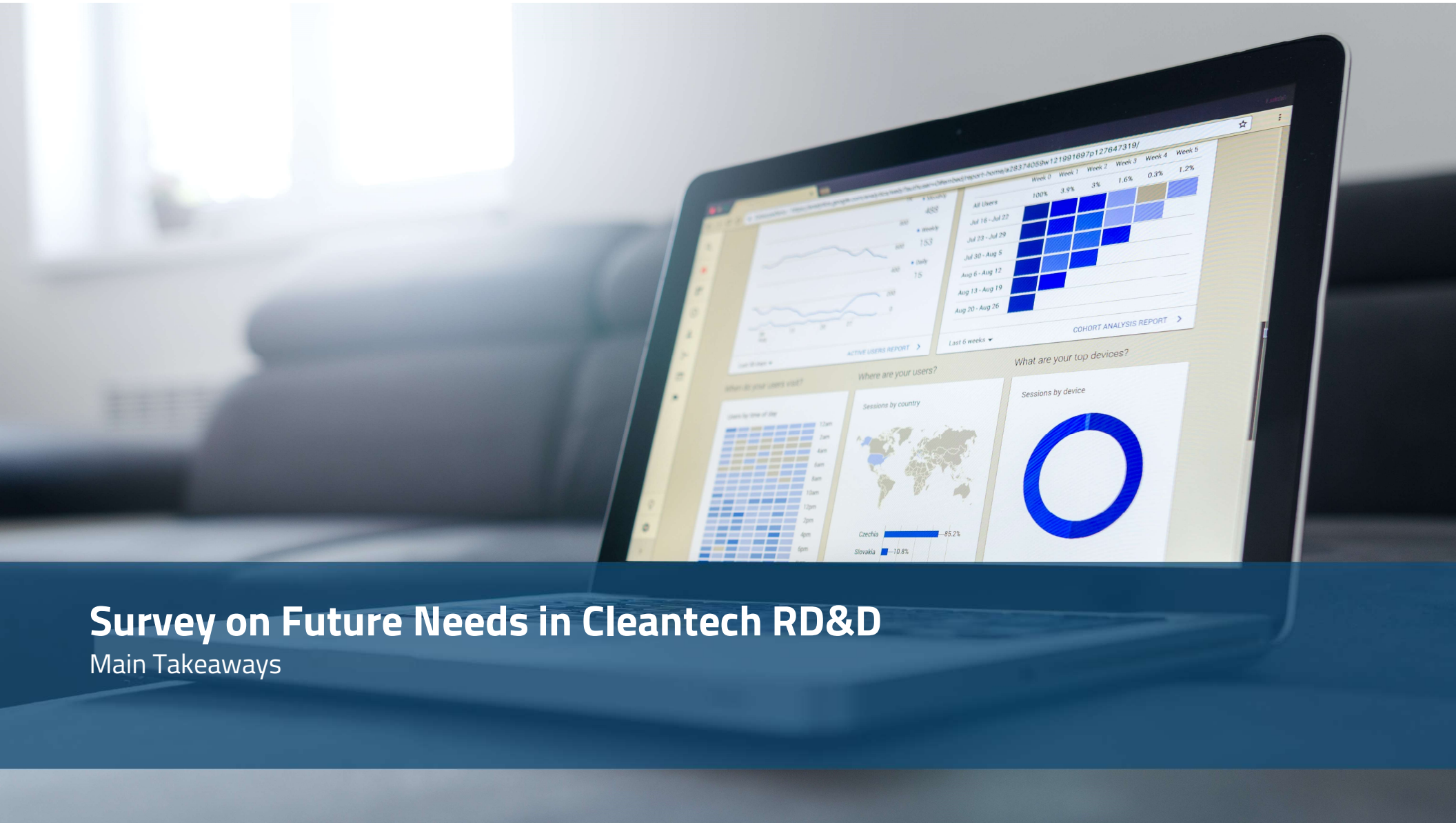

Survey on Future Needs in Cleantech RD&D

Main Takeaways

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Survey participation

307 respondents

14 minutes spent on average

73% completion rate

> 70h of expert knowledge

Gender distribution:

70% Male

25% Female

5% Prefer not to Answer

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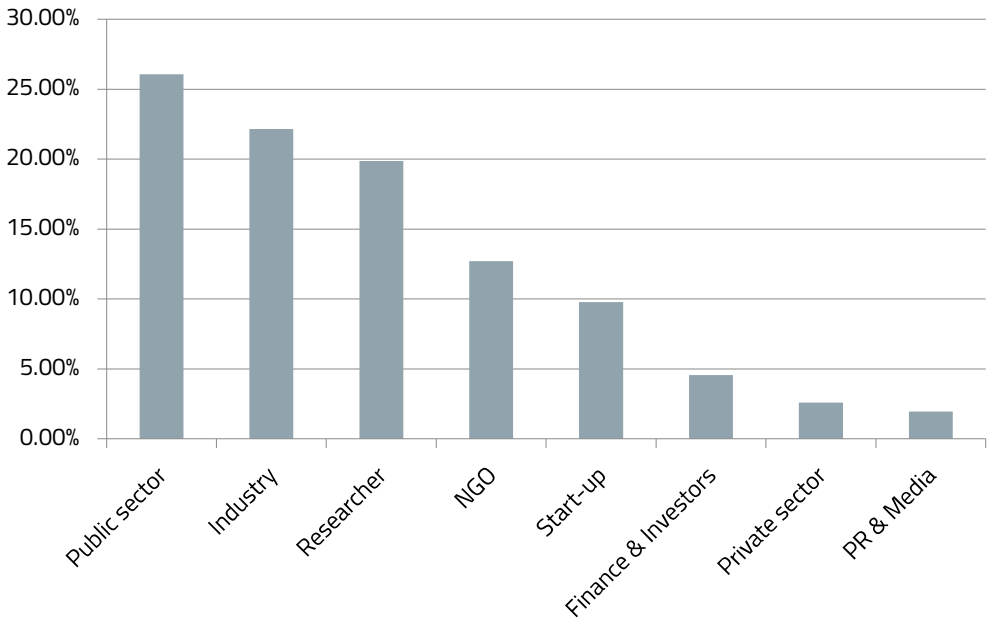
Survey participation

Professional backgrounds of participants



- Public sector staff, industry representatives, & researchers make up more than 60% of respondents
- More than 20% of survey participants work for an NGO or a start-up

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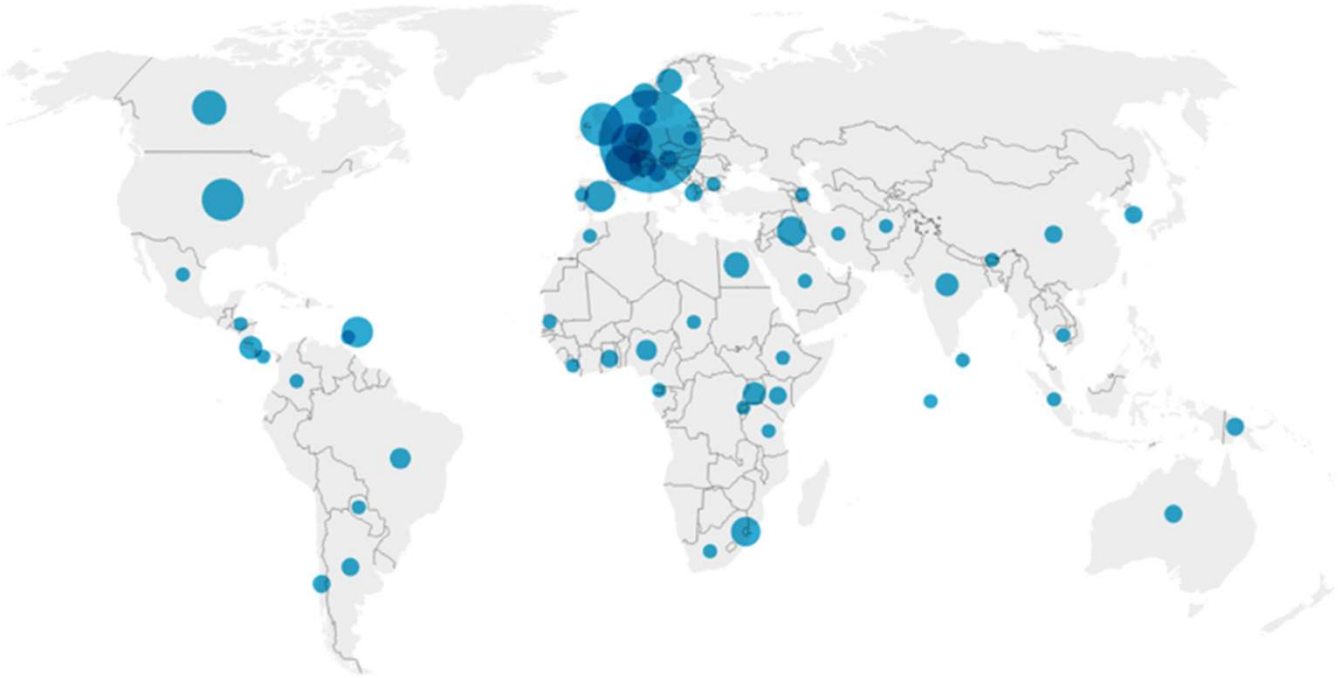
Survey participation



Geographic distribution:

- All continents
- 59 countries

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Key takeaways

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Technology Executive Committee

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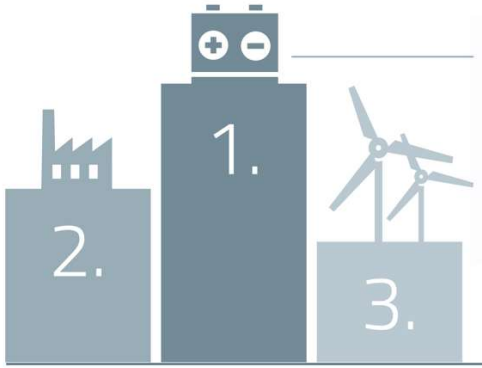
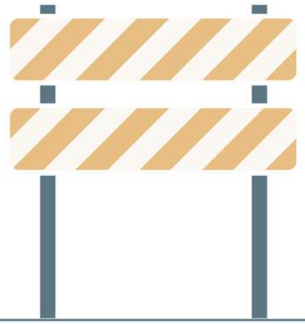
The importance of energy storage

Ranking
(according to respondents)



- Ranked #1 priority for 2030 + 2035
- #1 even when excluding storage sector respondents
- Thermal Energy Storage highlighted in particular

Roadblocks
(according to respondents)



- **Legislation** (chosen by 51%)
- **Political Support** (chosen by 49%)
- **Bureaucracy** (chosen by 49%)
- **Demand** (chosen by 26%)

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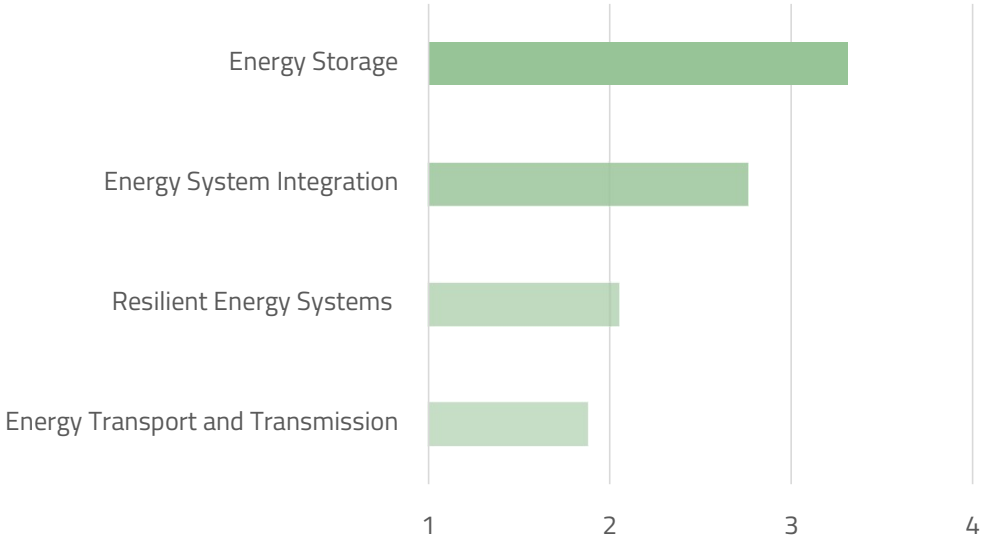
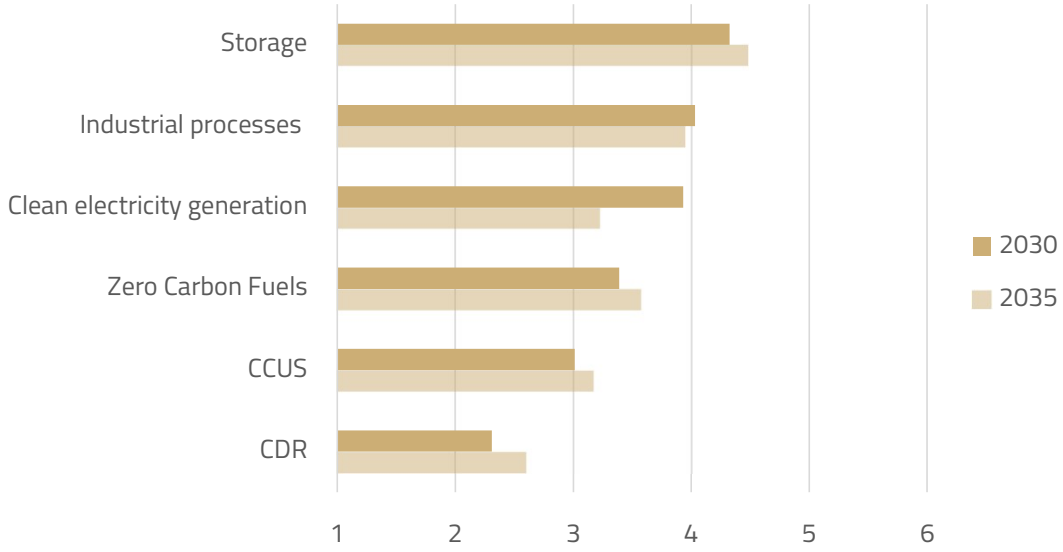
The importance of energy storage

Most urgent RD&D acceleration regarding long-term environmentally sustainable energy supply



Most urgent global RD&D acceleration until 2030 & 2035



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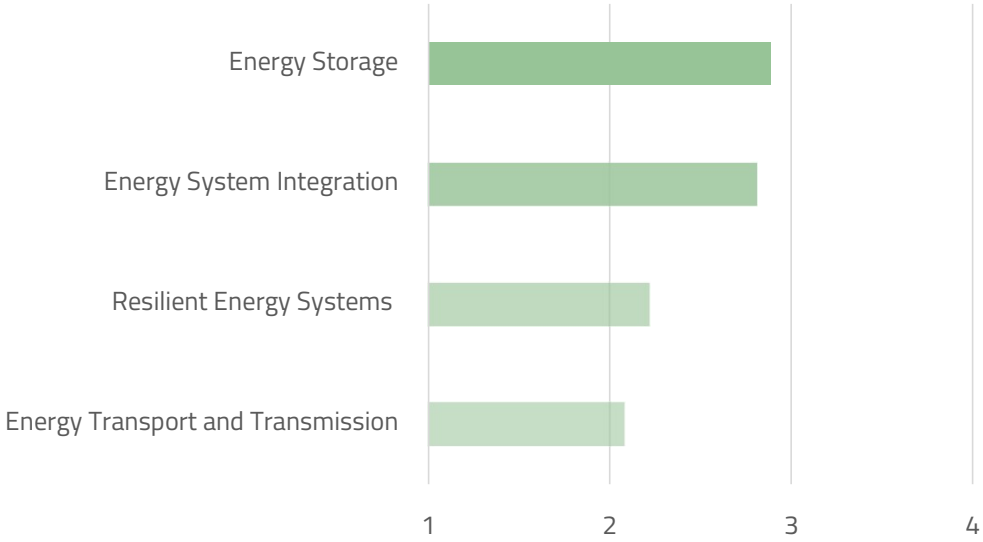
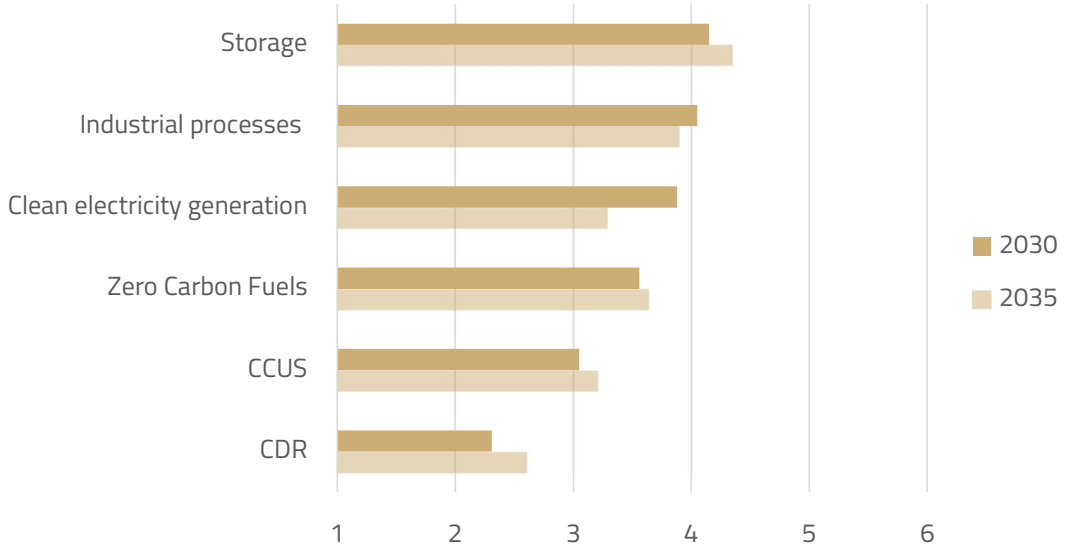
The importance of energy storage

Most urgent RD&D acceleration regarding long-term environmentally sustainable energy supply
(excluding respondents from Storage sector)



Most urgent global RD&D acceleration until 2030 & 2035
(excluding respondents from Storage sector)



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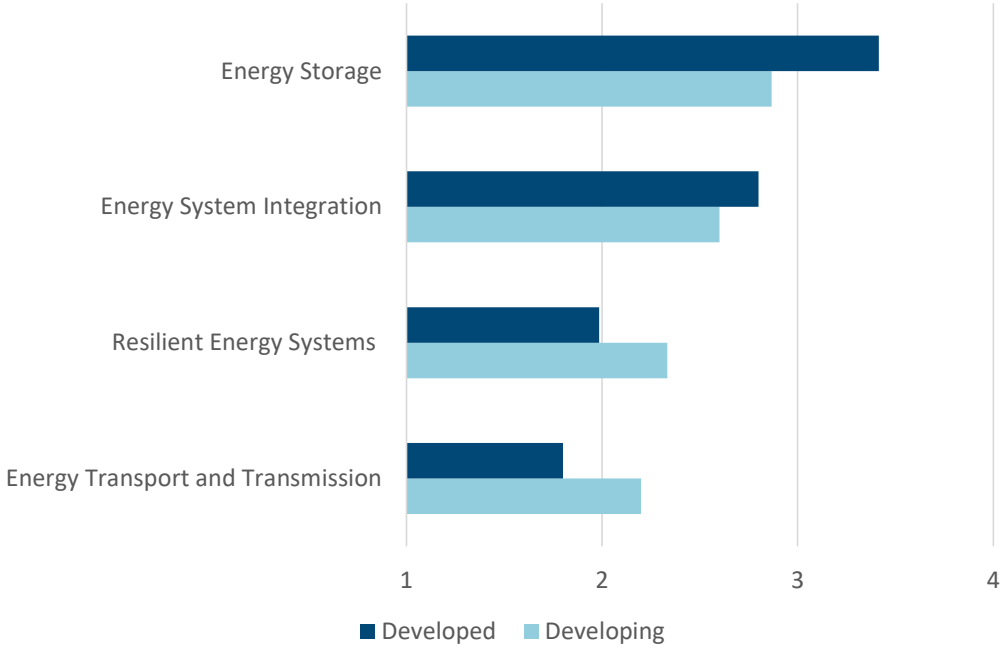
The importance of energy storage

"Regarding long-term environmentally sustainable energy supply, in which areas do we need to accelerate RD&D most urgently? (Please rank from most to least urgent)"



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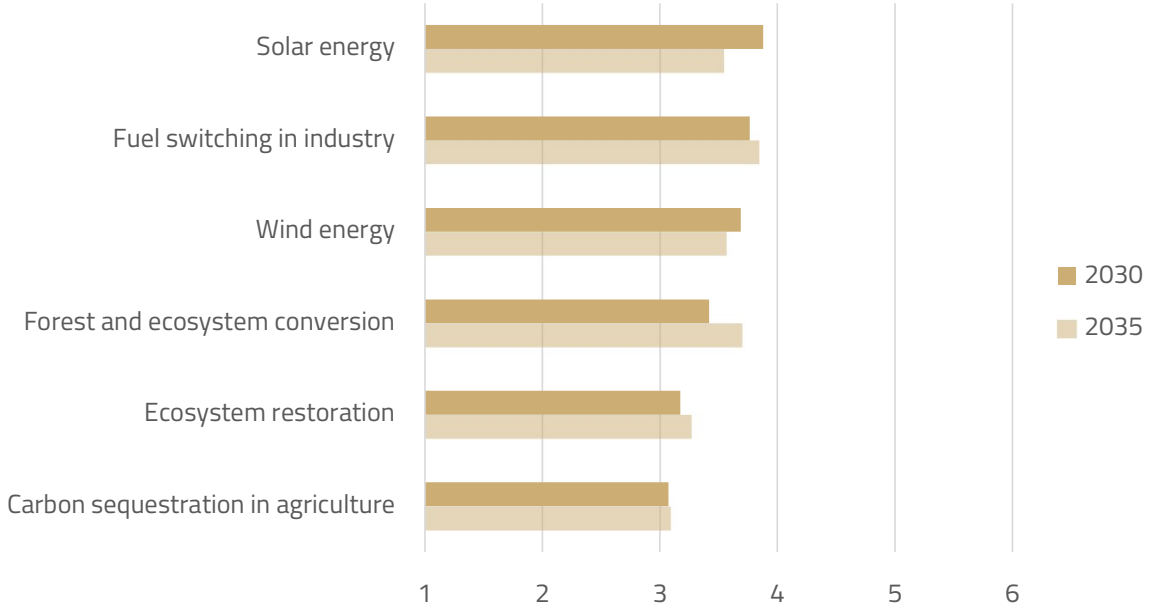
Global cleantech priorities

"In what more mature areas do we need to accelerate RD&D most urgently globally until 2030 (2035)?
(Please rank from most to least urgent)"



- **Solar energy** most urgent until 2030
- **Fuel switching in industry** most urgent from 2030-2035

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It’s the public sector

71%

consider the public sector to be one of the biggest

roadblocks

73%

believe it to be one of the most important

stakeholders

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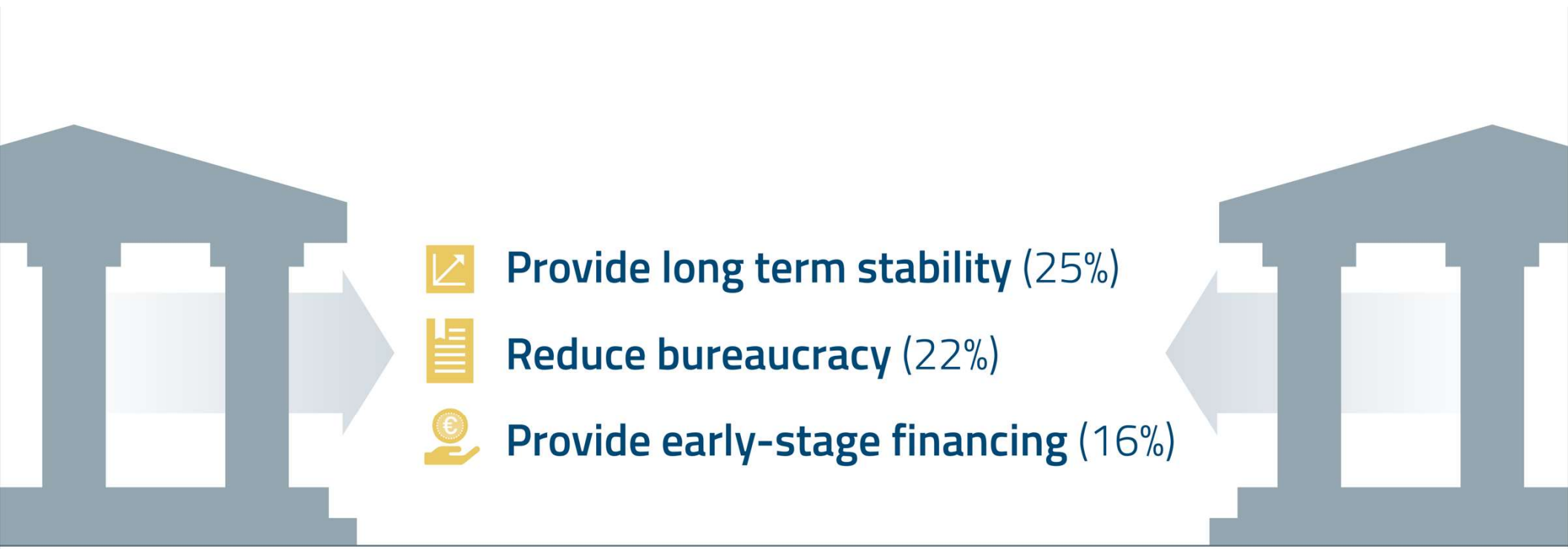
What role should the public sector play?



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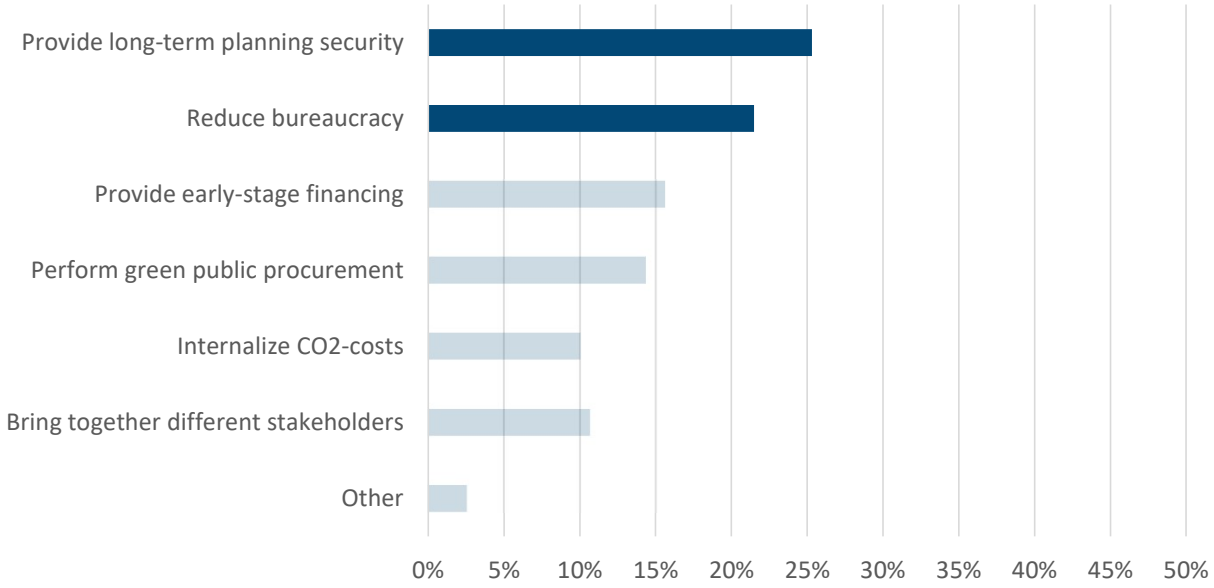
Public sector role

"What role should the public sector play? (Please choose up to 3 answers)"



- **Long-term planning security** and **bureaucracy reduction are** clear priorities

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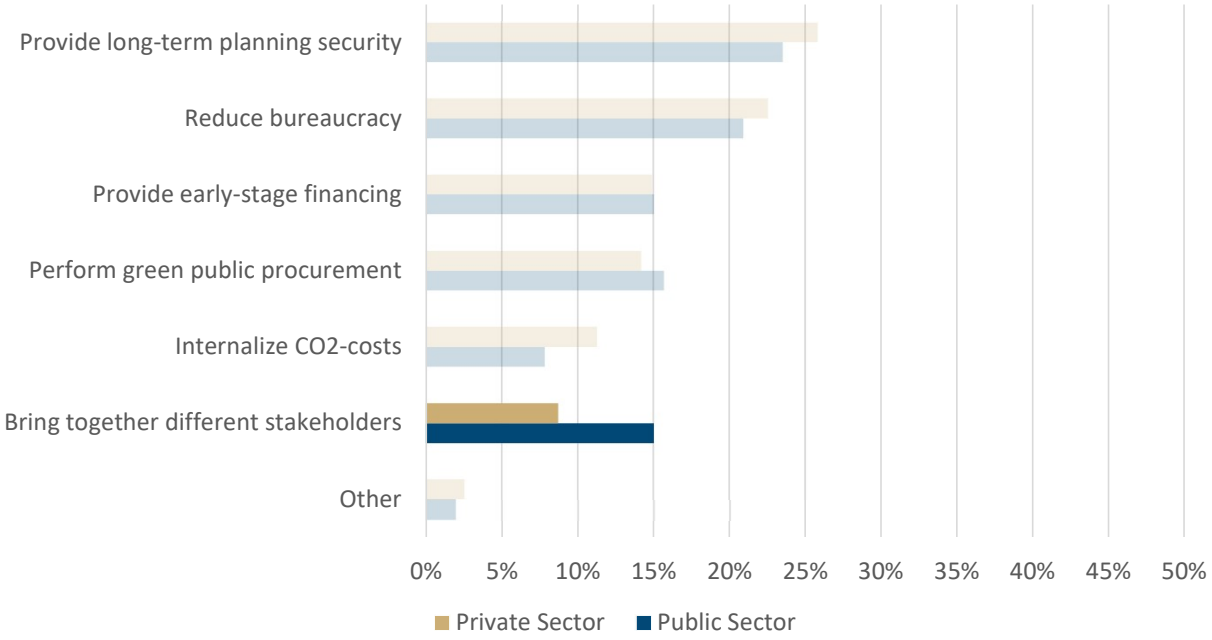
Public sector role

"What role should the public sector play? (Please choose up to 3 answers)"



- **Long-term planning security** and **bureaucracy reduction** are clear priorities
- Public sector respondents attributed a much higher importance to **bringing together different stakeholders** than private sector respondents did

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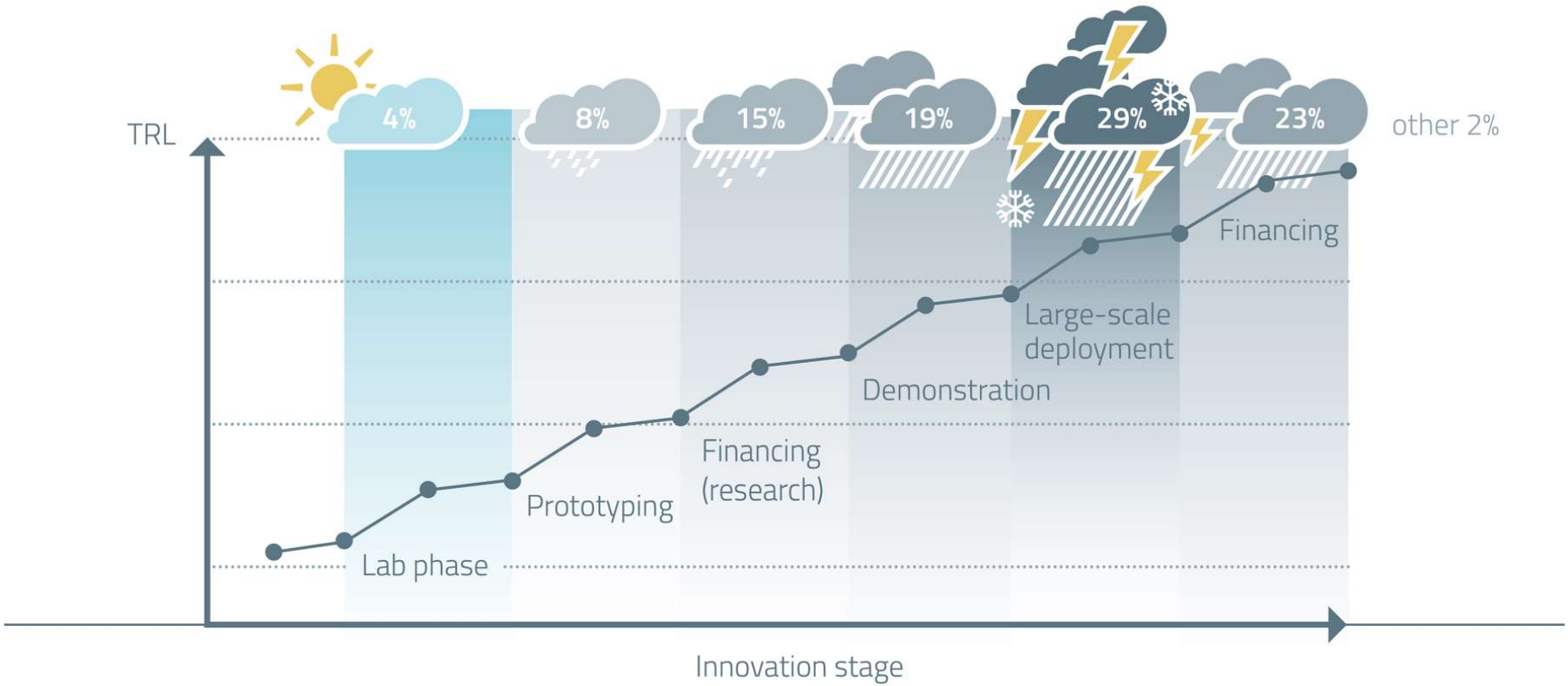
Participants see risk of failure mainly in later stages



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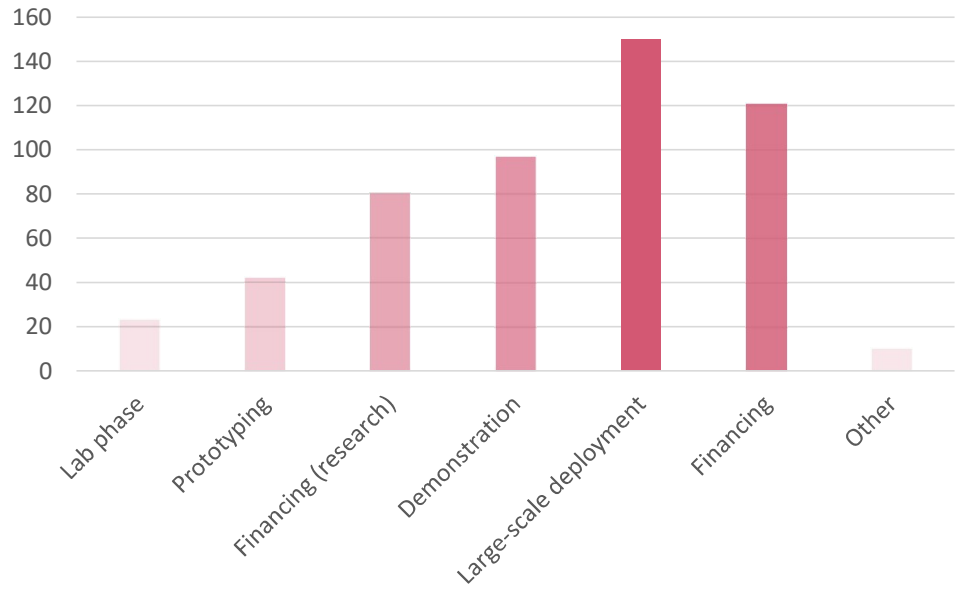
The problem is not lack of know-how, demand, or human capital

"Let us look at climate technology innovation stages: At which step do we lose a lot of the most promising developments? (Please choose up to three)"



- Most promising developments are lost in the **later stages of development**
- **>70% selected large-scale deployment** as a key area where promising developments are lost
- Smallest global roadblocks: **Technological, geophysical, & environmental**
- Smallest roadblock within expert field & country: **Demand**
- **Human Capital** least chosen among key success elements

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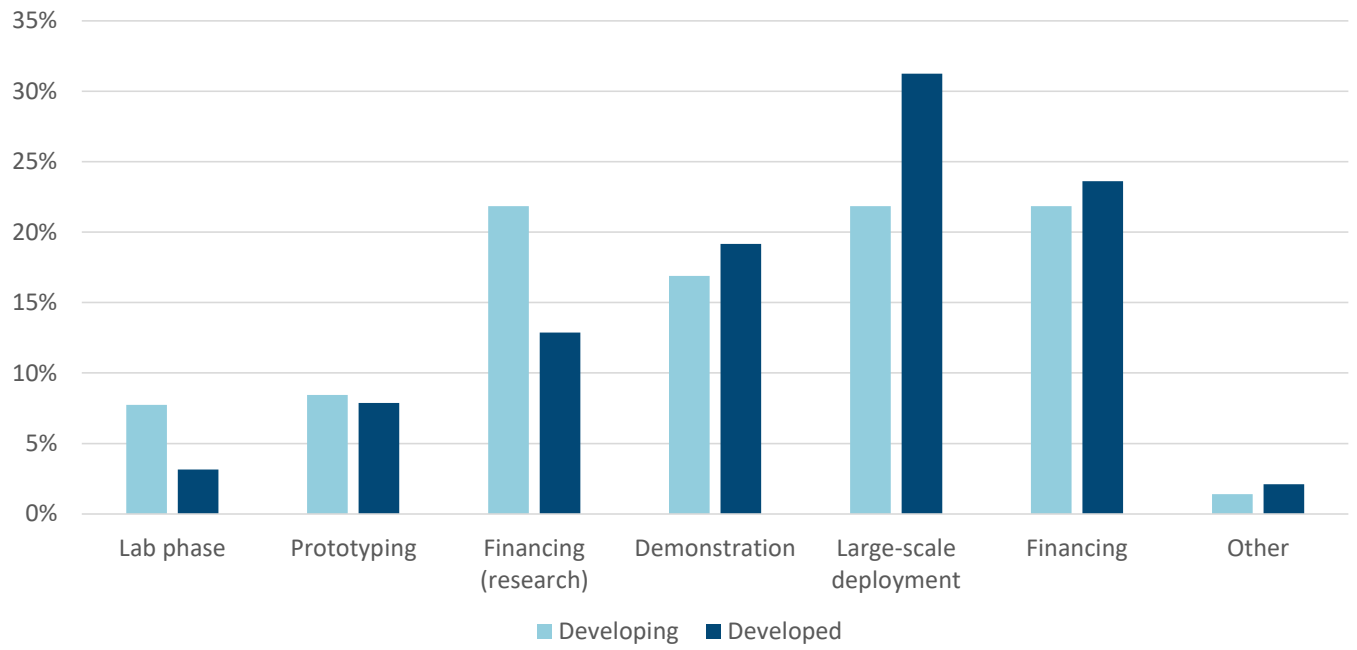
The picture is more diverse when we differentiate

"Let us look at climate technology innovation stages: At which step do we lose a lot of the most promising developments? (Please choose up to three)"



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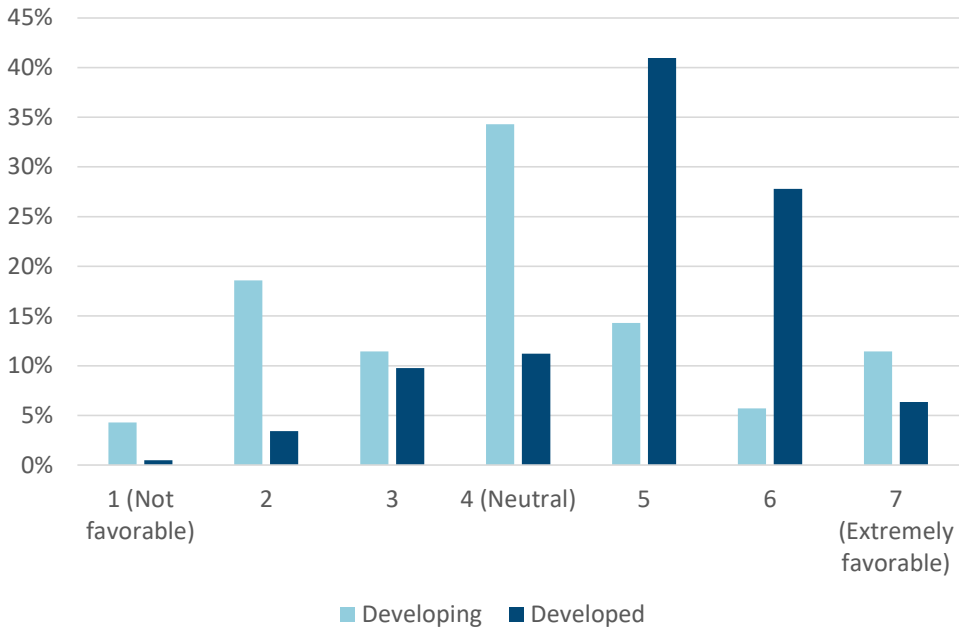
Regional differences

"How is the overall environment for climate technology RD&D in your country?"



- Average (developed) = **4.98**
- Average (developing) = **3.99**

- **75% of respondents in developed countries** rate the RD&D environment as **higher than neutral,** as opposed to just **31% in developing countries**

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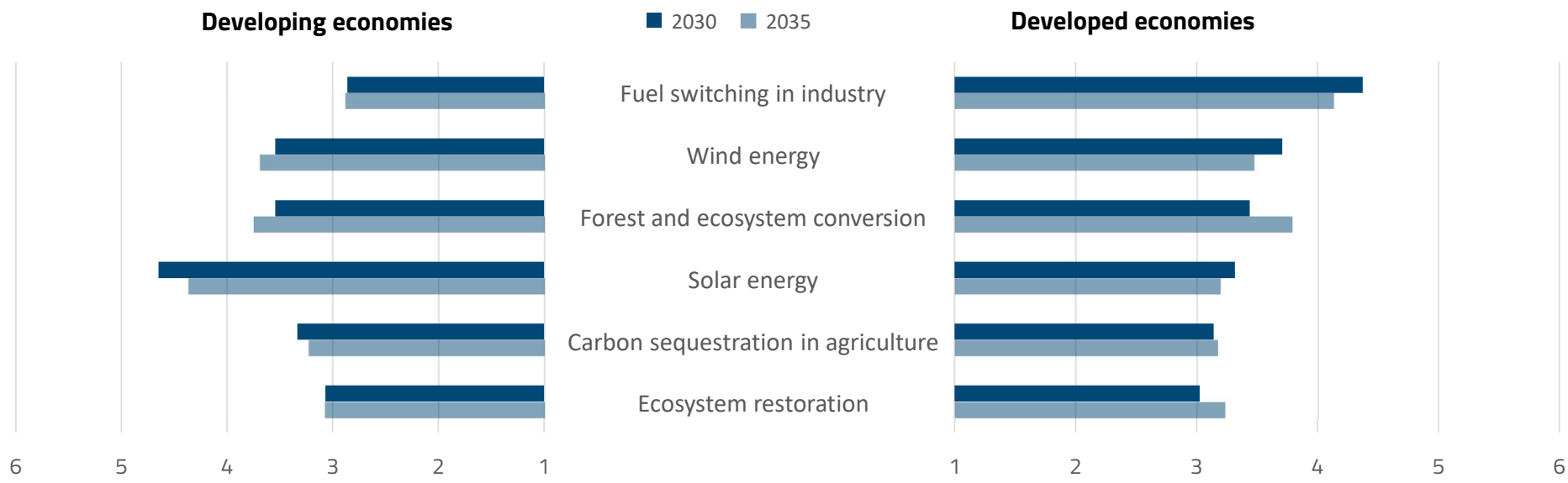
Regional differences

"In what more mature areas do we need to accelerate RD&D most urgently in your Region until 2030 (2035)?
(Please rank from most to least urgent)"



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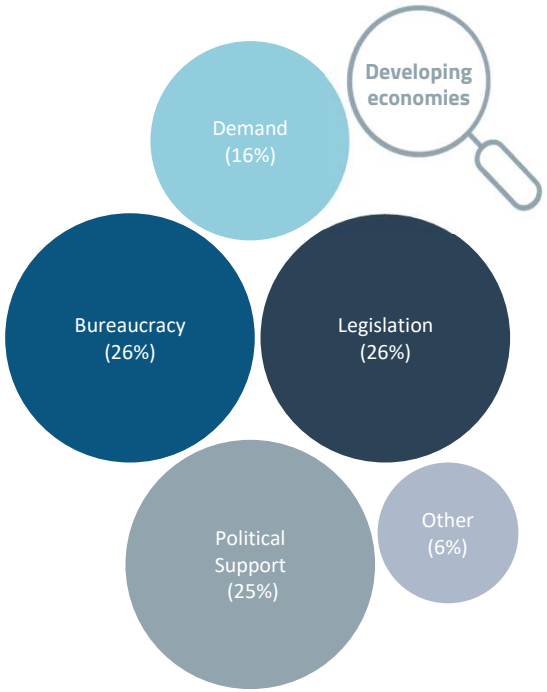
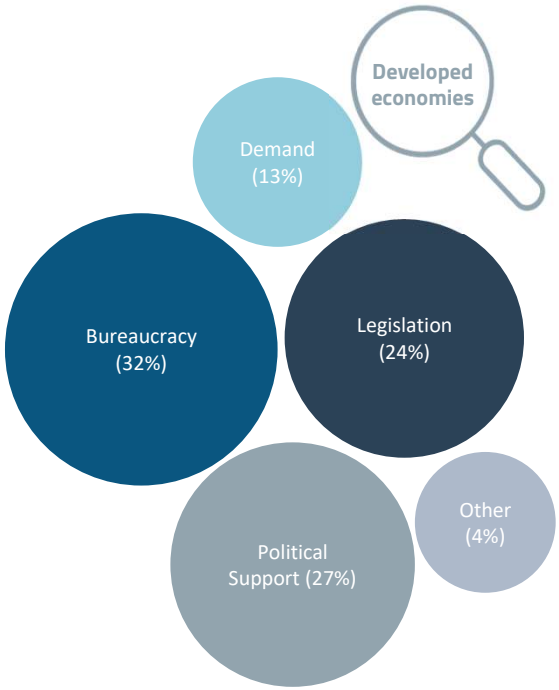
Regional differences

"If you have the funding and the technology is available: What stops you from scaling up in your country specifically? (Please choose up to 3 answers)"





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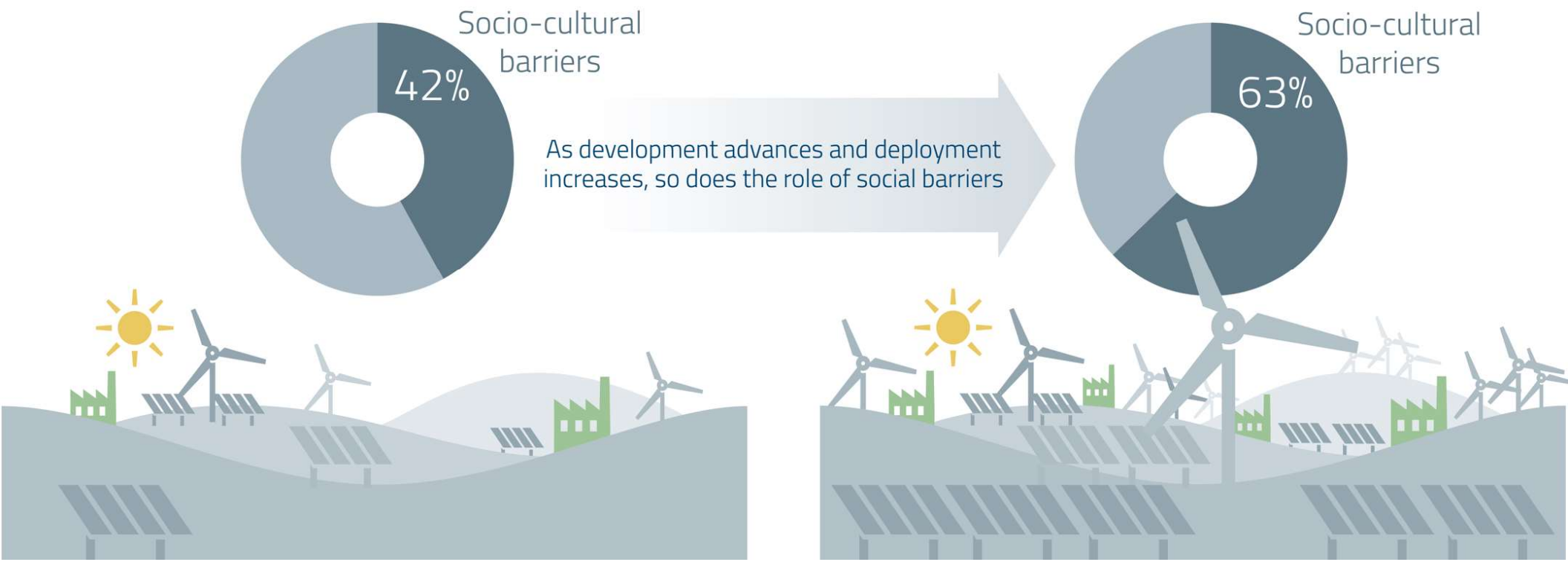
With development and deployment comes a change in the type of barriers



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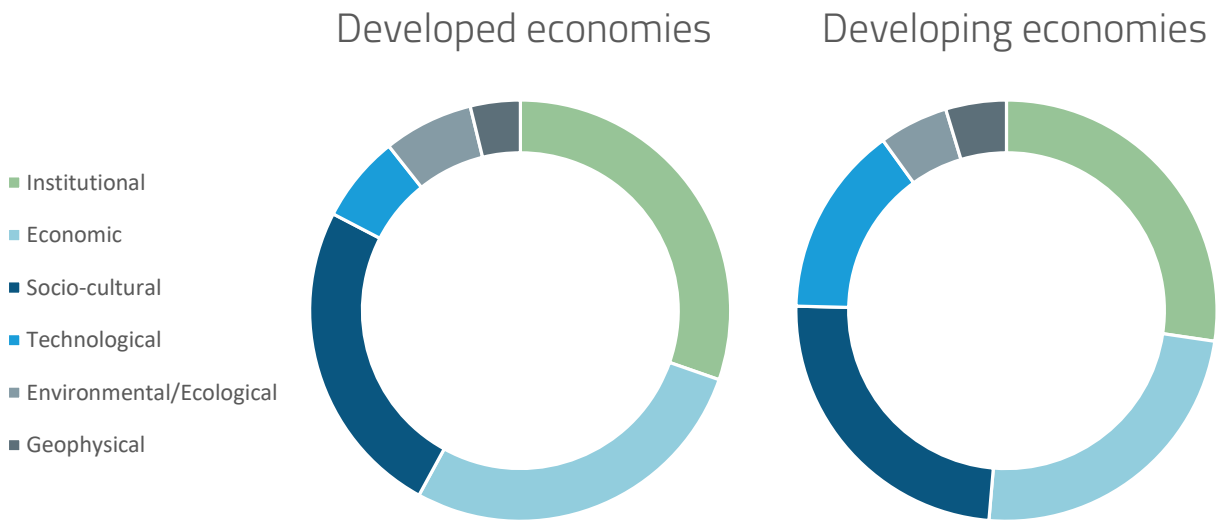
The three biggest roadblocks

"What do you consider the three biggest roadblocks in advancing the development of critical breakthrough climate technology in your country specifically? (Please choose up to three answers)"



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The three biggest roadblocks

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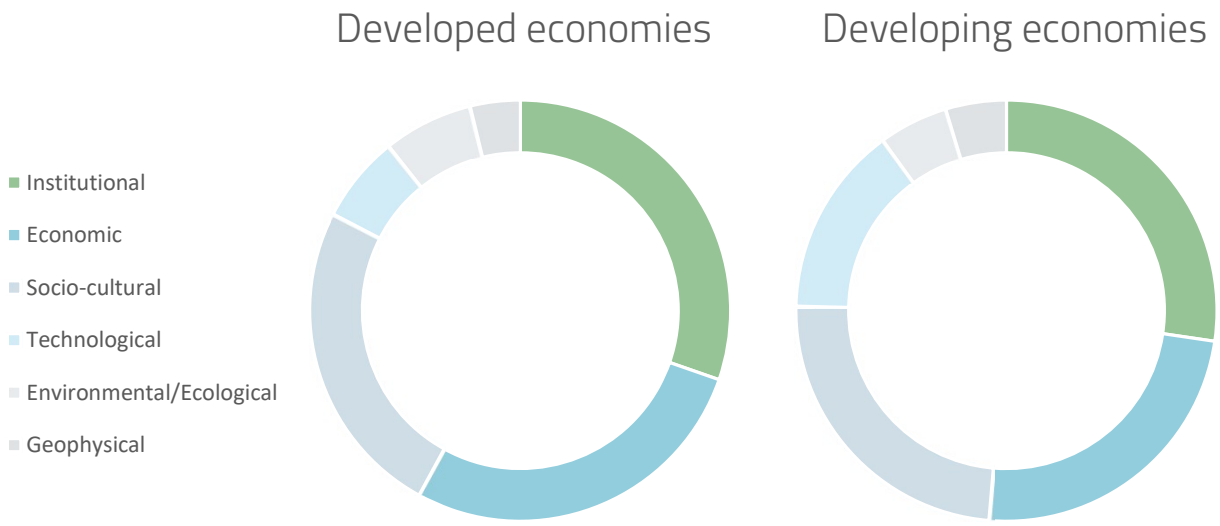

- **Economic & institutional barriers** relevant in both developed & developing economies

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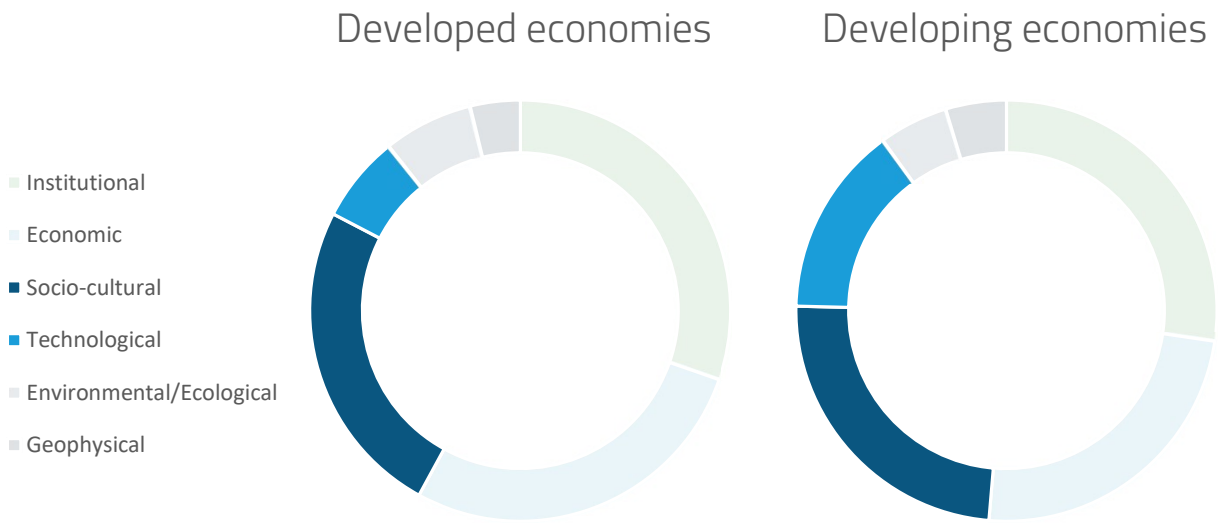
Regional differences

"What do you consider the three biggest roadblocks in advancing the development of critical breakthrough climate technology in your country specifically? (Please choose up to three answers)"



- Economic & institutional barriers relevant in both developed & developing economies
- Biggest differences regarding **technological & socio-cultural barriers**

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Analysis of open questions

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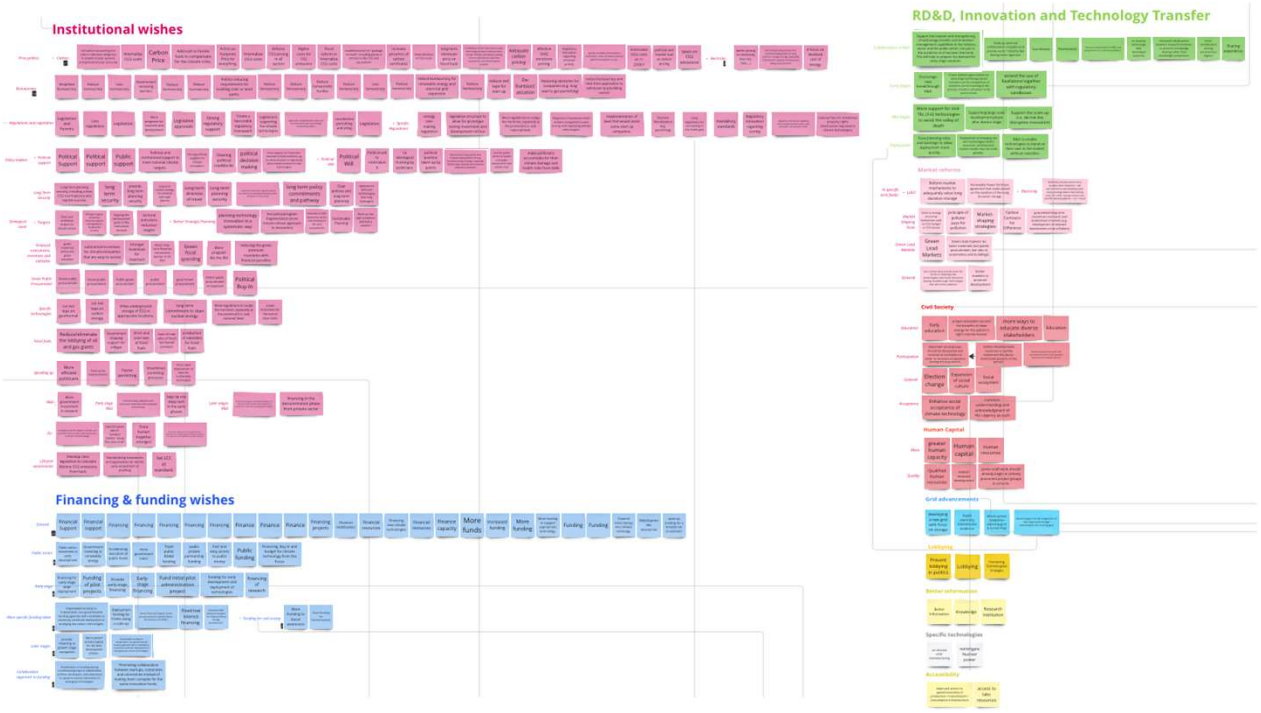
Analysis of open questions

"If you could wish for three measures to speed up the development of breakthrough climate technology in your region, which would they be?"



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Analysis of open questions

"If you could wish for three measures to speed up the development of breakthrough climate technology in your region, which would they be?"

Institutional

Electricity pricing policies that facilitate deployments of long duration energy storage, especially fairly-priced capacity and resource adequacy payments.

More regulations to nudge the transition, especially at the provincial (i.e. sub-national) level.

Financing & Funding

Promoting collaboration between startups, corporates and universities instead of making them compete for the same innovation funds.

Dependable funding for independent, non-governmental funding agencies with a mandate to massively accelerate deployment of emerging low carbon technologies.

RD&D, Innovation, & Technology Transfer

Support the creation and strengthening of technology transfer and innovation management capabilities in the industry sector and the public sector, not just in the academia as it has been the trend. This will help to prepare the demand for early stage solutions.

Support the scale-up (i.e. de-risk the disruptive innovation)

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Outlook

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Outlook & next steps

Adapt content and structure:

- update technologies
- sub-divide survey(s)
- improve user experience

Increase Developing Countries' engagement

- intensify outreach
- remove any barriers
- increase # of languages

NEXT STEPS

- Use survey results to work on removing roadblocks
- Climate / science journalist program
- Policy recommendations
- Strengthen cleantech experts in public sector

Cleantech innovation Key takeaways

Promoting global climate change mitigation, economic growth, enhanced international competitiveness, and the eradication of energy poverty relies heavily on embracing social and technological innovation.

While national governments play a pivotal role in driving the global energy transition, it's crucial to recognize that fostering cleantech advancements requires more than just public investment in clean energy research, development, and demonstration. The global innovation system encompasses an intricate network of actors, institutions, and resources that must collaborate in synergy. To achieve optimal effectiveness, this system must fulfill a diverse array of functions, such as mobilizing resources, cultivating and disseminating new knowledge, facilitating entrepreneurial experimentation and the emergence of new markets, establishing social acceptance for novel technologies, guiding the pursuit of knowledge in specific directions, and facilitating knowledge transfer to interconnected industries.

1 Improve cleantech financing

Financing volumes in Europe are still too
ced on attracting more private capital (e
and targeting it effectively in order to clo
funding gap. Public money and mechani
guarantees can be used to de-risk private
critical for early-stage research as well as

2 Balance intellectual property protection and knowledge dissemination

The current regulatory framework makes
plicated and impedes the further develop
tion of ideas. We need to streamline the
facilitate knowledge commercialization an
of intellectual property rights from univer
nies while ensuring fair compensation.

3 Support green alternatives in initial market entrance

Green alternatives still come at a premiur
We need to establish more mechanisms,
for Difference or Offtake Agreements, to
green alternatives. Subsidies must be cle
time to avoid market distortions.

4 Imperfect regulations are better than no regulations

Innovations are often blocked by missin
Agile regulatory approaches that give
planning security and allow for iterative
promoted. It is necessary to engage with
and industry to ensure comprehensive an

5 Public sector impact

The public sector has a central role to
energy transition and needs innovative an
as much as the private sector does. Smart
direction for cleantech innovation.

Wenn es um die ‚Heldinnen und Helden' der Klimaschutz-Szene geht, ist häufig von **Unternehmer:innen und Forschenden** zu lesen. Manchmal stehen auch Spitzen-Politiker:innen im Fokus. Diese Gruppen erhalten zu Recht große Aufmerksamkeit. Ohne neue Technologien und Prozesse sowie politische Entschlossenheit gelingt die Klimaneutralität nicht.

Aber eine entscheidende Gruppe zur Bewältigung der Klimakrise wird konsequent vernachlässigt. Nämlich **exzellent ausgebildete Fachleute** auf öffentlicher Seite, also Mitarbeiter:innen von Ministerien und Behörden sowie Expertinnen und Experten in der Forschungsförderlandschaft.

Denn Staatsbedienstete sind entscheidend, damit aus politischen Konzepten zur Beschleunigung von Innovation **effiziente Instrumente entstehen** und die Steuermilliarden der Förderung in die richtigen Bahnen gelenkt werden. In der Umsetzung der politischen Rahmenbedingungen navigieren sie durch eine hochkomplexe Landschaft von Technologien und Politikinstrumenten, die zudem von **Lobbyeinflüssen** aller Seiten und Interessenkonflikten mancher Mandatsträger geprägt ist.

Von Verwaltung auf Transformation umstellen

Dachte man früher bei der inhaltlichen Arbeit von Referaten in Ministerien, etwa bei Regulierung im Energiesektor, noch an ein eher **behäbiges Umfeld**, so hat sich ihre Welt und damit die Anforderungen an ihre Arbeit **drastisch gewandelt**.

In den 2020er Jahren sind sie zur Speerspitze der **effektiven Unterstützung von Technologieentwicklung** rund um die Klimakrise geworden. Um die Direktreduktions-Route für **grünen Stahl** zu ebnen, um einen funktionierenden CO2-Grenzausgleichsmechanismus (**CBAM**) zu entwickeln oder um **Klimaschutzverträge** aufzusetzen, die integer und effektiv sind, braucht es für den inhaltlichen Durchblick eine hervorragende Ausbildung sowie häufig internationale Erfahrung.

Diese Kompetenz zur Gestaltung der entscheidenden Instrumente muss jedoch in den Ministerien und durchführenden Behörden selbst vorhanden sein. Es darf keine **übermäßige Abhängigkeit von externen Beratungen** geben, um solche Werkzeuge der Energiewende zu entwickeln, zu verwalten und kontinuierlich zu optimieren. Bei diesen grundlegenden Instrumenten der Technologieförderung rund um die Klimakrise sollte externer Rat immer nur chirurgisch eingesetzt werden.

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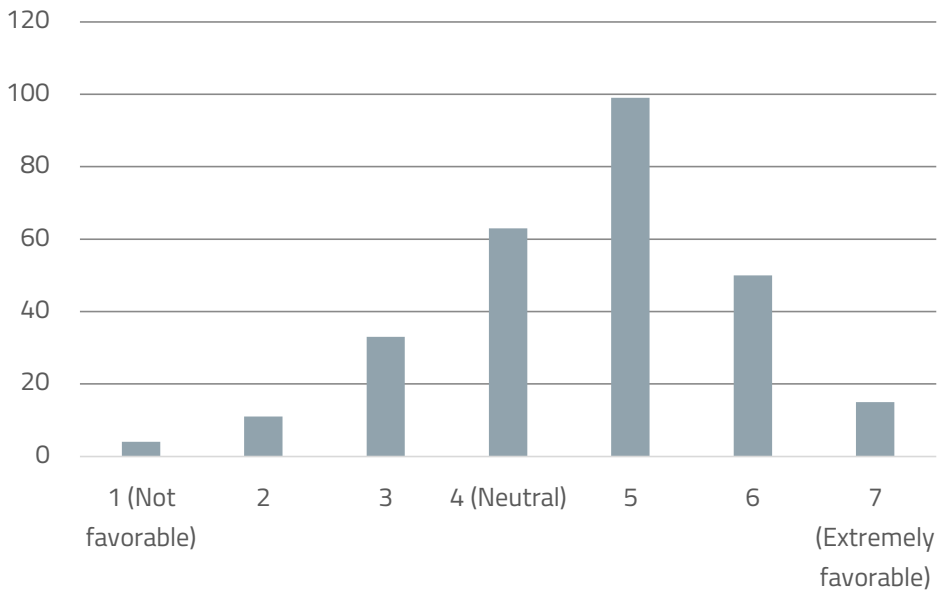
Global cleantech priorities

RD&D Environment



- **Average = 4.64** (Slightly favorable)
- **More than 80%** of survey participants rate the global RD&D environment as **neutral or higher**

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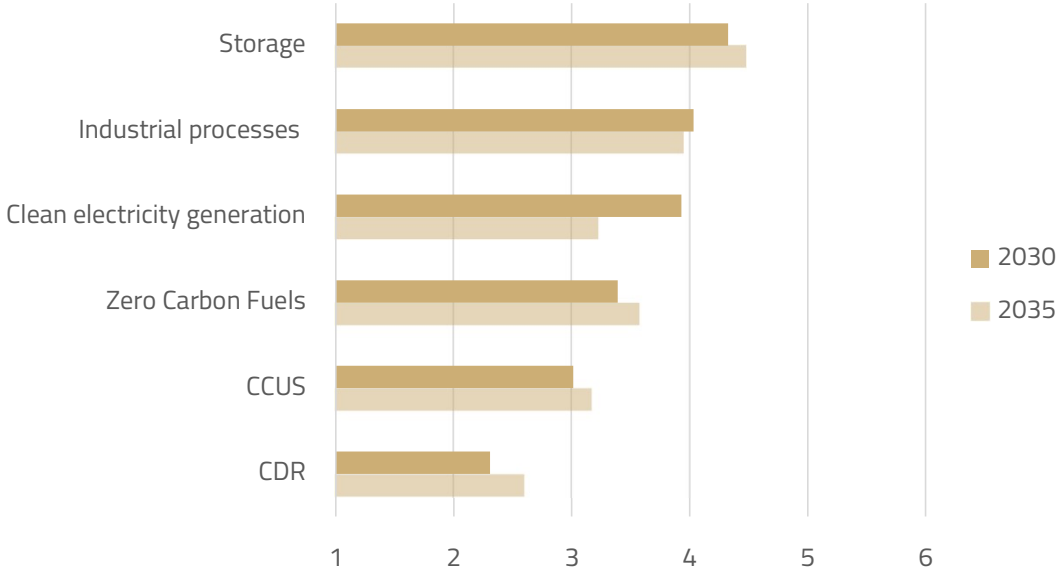
Global cleantech priorities

Most urgent RD&D acceleration until 2030 & 2035



- Participants were asked to rank all options
- **Energy storage** as key global priority until 2030 & 2035

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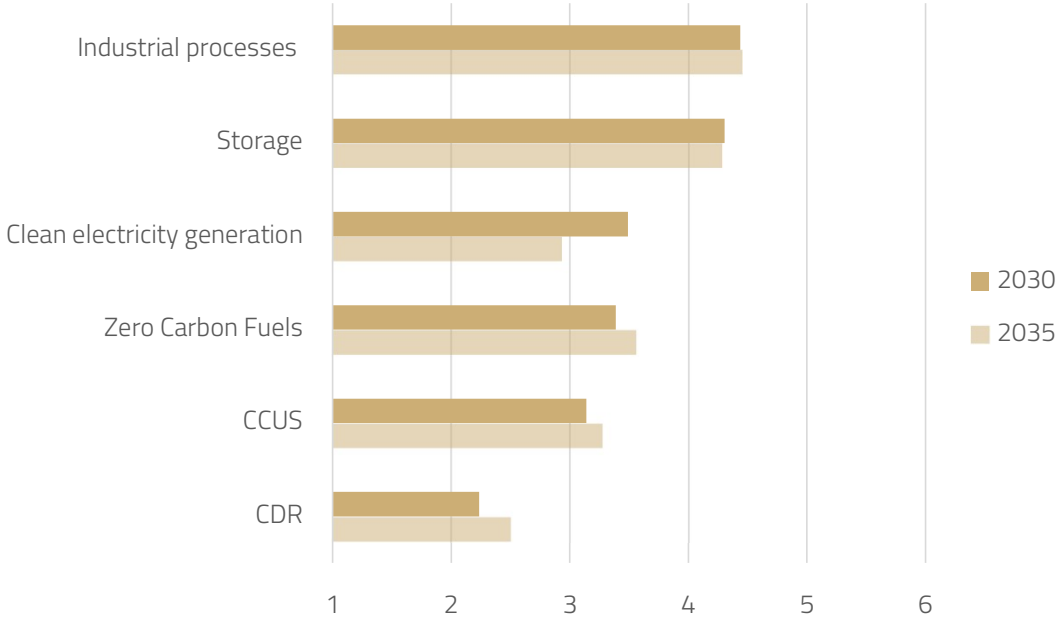
Regional cleantech priorities

Most urgent RD&D acceleration until 2030 & 2035



- Participants were asked to rank all options
- **Industrial processes & energy storage** as highest priorities in European countries

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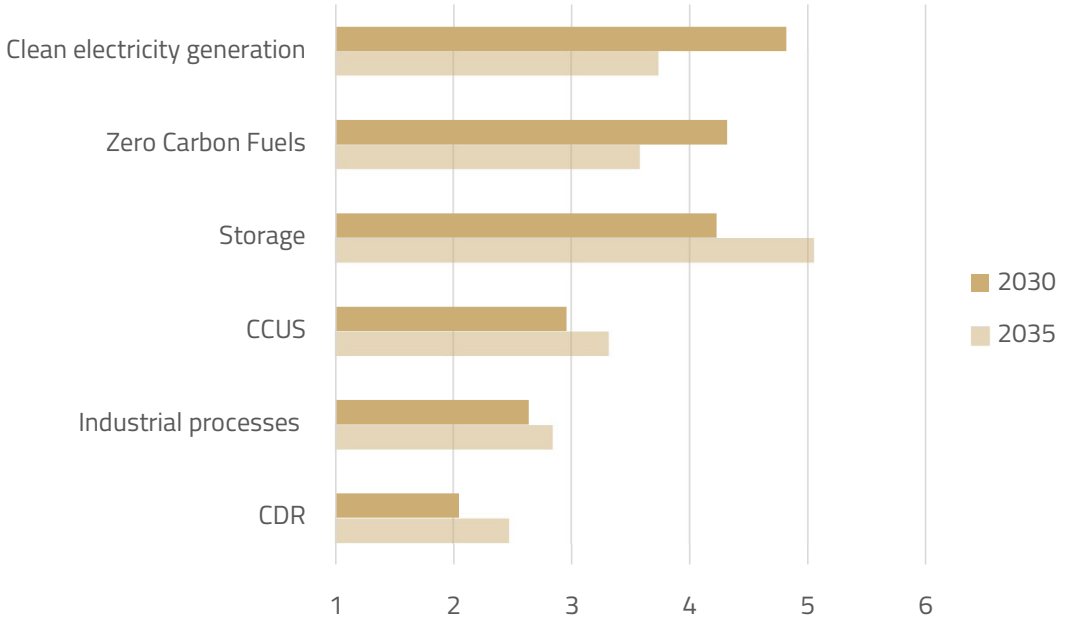
Regional cleantech priorities

Most urgent RD&D acceleration until 2030 & 2035



- Participants were asked to rank all options
- **Clean electricity generation** as key priority until 2030
- **Energy storage** as key priority from 2030 to 2035

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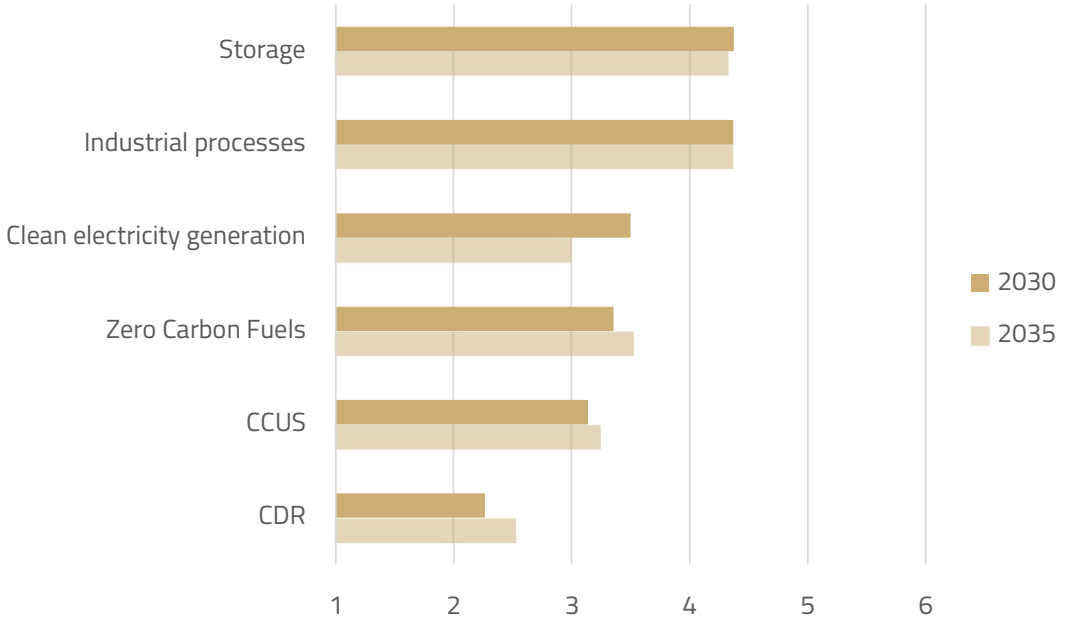
Regional cleantech priorities

Most urgent RD&D acceleration until 2030 & 2035



- Participants were asked to rank all options
- **Storage and industrial processes** as key priorities until 2030

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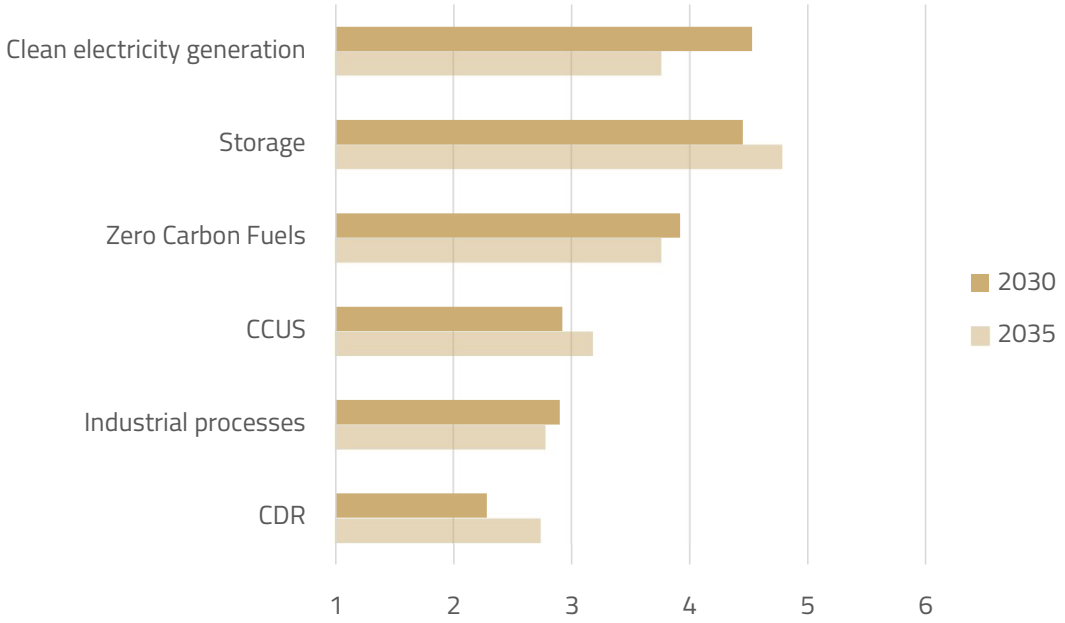
Regional cleantech priorities

Most urgent RD&D acceleration until 2030 & 2035



- Participants were asked to rank all options
- **Clean electricity generation** as key priority until 2030
- **Energy storage** as key priority from 2030 to 2035

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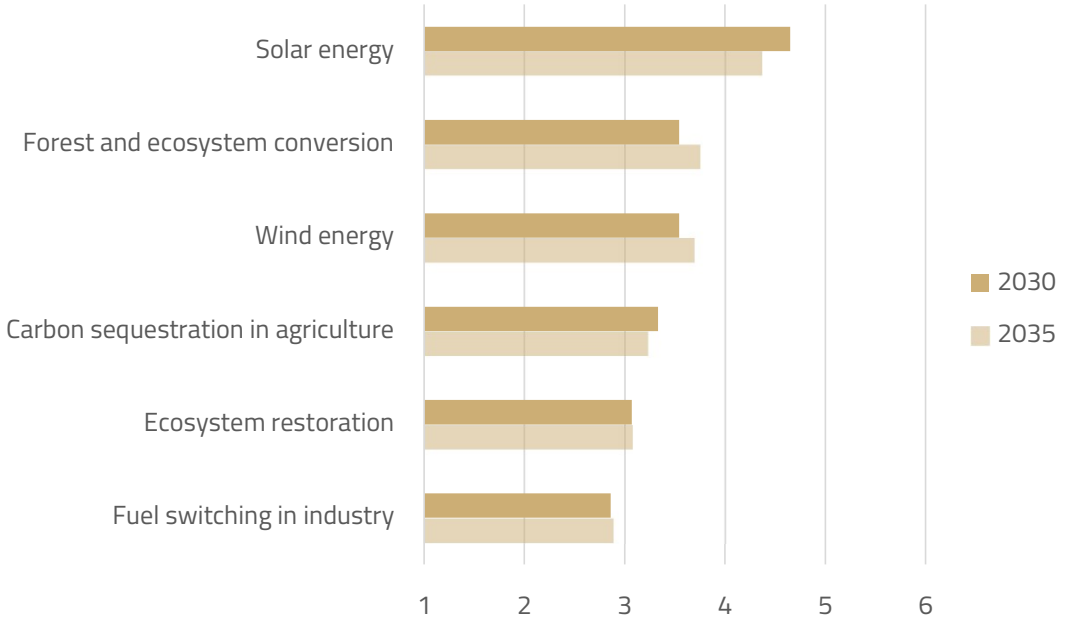
Regional cleantech priorities

Most urgent mature RD&D acceleration until 2030 & 2035



- Participants were asked to rank all options
- **Fuel switching lowest priority** until 2030 & 2035
- **Solar Energy top priority** until 2030 & 2035

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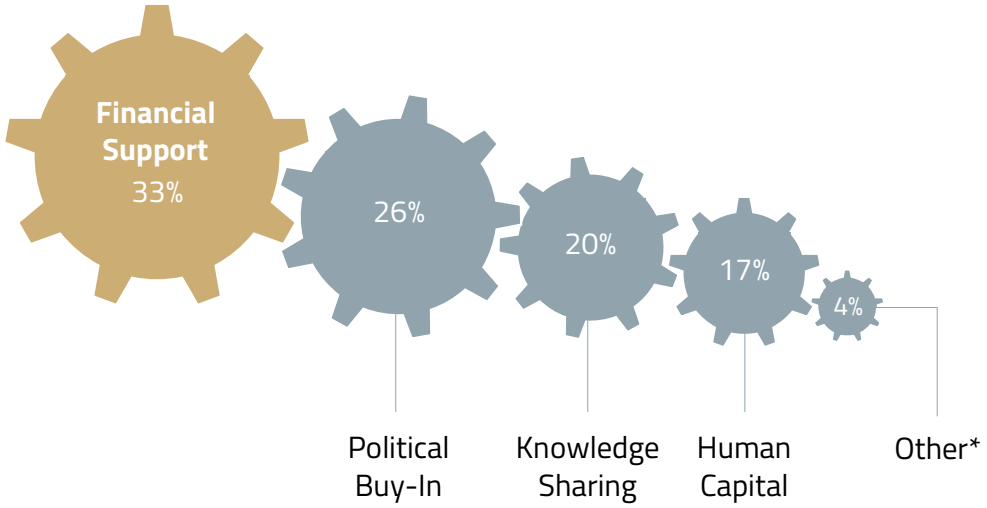
Key elements

"What are the key elements for successful climate technology RD&D? (Please choose up to 3 answers)"



- **Financial support** chosen as **key element** for successful climate technology RD&D
- **Human capital lowest priority** among options

**Subject to further categorization*

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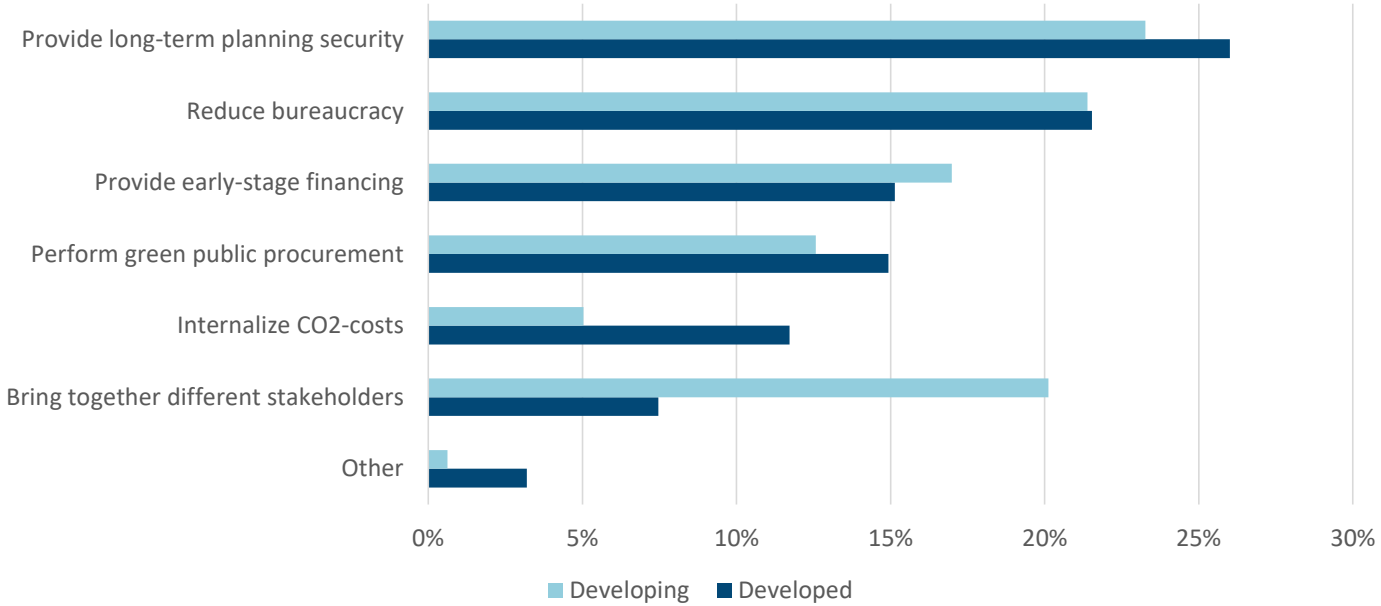
Regional differences

"Let us look at climate technology innovation stages: At which step do we lose a lot of the most promising developments? (Please choose up to three)"



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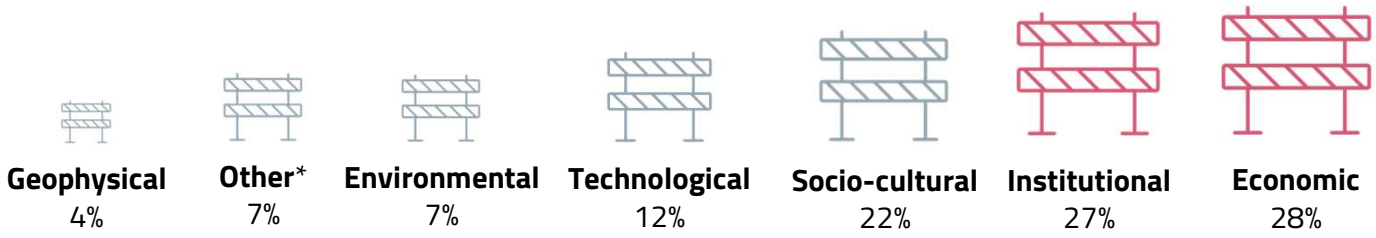
Biggest roadblocks

"What do you consider the 3 biggest roadblocks in advancing the development of critical breakthrough climate technology globally? (Please choose up to 3 answers)"



- **Institutional and economic roadblocks** were the two most selected
- **The problem is not the know-how** (geophysical, environmental, & technological barriers not perceived as big roadblocks)

**Subject to further categorization*

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Regional scaling barriers

"If you have the funding and the technology is available: What stops you from scaling up in your country specifically? (Please choose up to 3 answers)"

Bureaucracy

Political Support

Legislation

Demand

Other* (7%)

- **Bureaucracy** (31%), **political support** (26%), & **legislation** (24%) as top barriers for scaling
- **Demand is not seen as a primary issue** (12%)

*Subject to further categorization

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Three wishes

"If you could wish for three measures to speed up the development of breakthrough climate technology in your Region, which would they be?"

More financing

22%

Internalize CO_2 costs

18%

Reduce bureaucracy

16%

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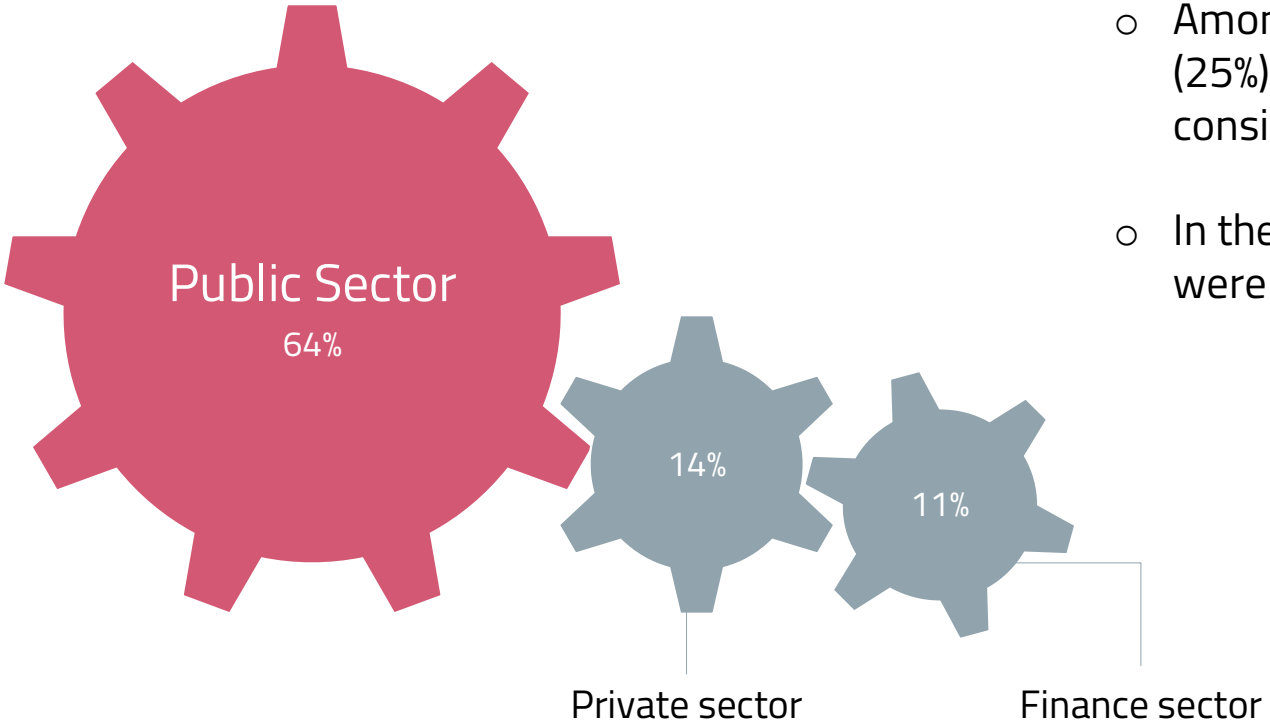
Key stakeholders

"In your sector, which key stakeholder could speed things up the most and how?"



- Among the public sector, **governments** (25%) and **international bodies** (9%) are considered key stakeholders
- In the private sector, **large corporates** were mentioned most often