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# What do investors in electric vehicles technologies want?

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With 25% of worldwide emissions due to road transport, the deployment of electric vehicles (EVs), full battery electric vehicles and plug-in hybrid electric vehicles – presents many promises to mitigate climate change. Despite its rapid growth, the market share of EVs vehicle remains low in Europe. Norway leads the EV market with 10% of total vehicle stock, followed by Iceland (3.3%), the Netherlands (1.9%) and Sweden (1.6%) (IEA, 2019). This Policy Brief presents the results of a survey among European cleantech investors examining which policy instruments and design can best mobilize private investments to advance e-mobility technologies.

### Funding Gap

Europe does not invest sufficiently in innovative e-mobility technologies. Compared to the US, the funding gap for European innovative transport start-ups and SMEs ranges between €5.5bn and €13bn annually (EIBAS, 2018). Such massive investments, for instance in advanced battery

technologies, could greatly contribute to lower the costs of EVs and thereby scale up their deployment compared to internal combustion engine (ICE) technologies [1].

Several obstacles explain why companies struggle to raise sufficient funding for EVs innovation. First, the European VC market is traditionally smaller and less mature than on the US market. Second, investments in EVs innovation are typically characterized by a high level of technological risk, large capital requirements and longer payback periods. Third, incumbent car manufacturing companies with large market shares in ICE technologies may be reluctant to move too fast to EVs and thereby cannibalize their own business. Finally, the policy framework supporting the market for e-mobility technologies may not provide enough incentives to investors. Also, due to the large dependence on public policies, clean investments tend to be particularly affected by the lack of predictability of the policy framework and investors may refrain

from investing if they fear that policy rules may change abruptly.

### Method: Adaptive Conjoint Experiment Survey

We conducted a survey among 41 European investors over the period April-May 2020 to better understand the policy preferences of cleantech investors [2]. The survey included questions on investors' characteristics and a-priori beliefs on climate change, confidence in market mechanisms and the impact of the ongoing Covid-19 crisis on their investments. Respondents were asked to consider an opportunity to invest in an innovative battery project for electric vehicles in a choice experiment framework ('Adaptive Conjoint Experiment'). In this experimental setting, the hypothetical policy framework is composed of the following policy attributes and features split across various features: 1) 'Policy instrument' (subsidies at EV purchase, emissions standards, fuel taxes), 2) 'Policy Level' (low/medium/high policy support) and 3) 'Policy Revisions' (frequency of policy revisions: undefined/ revision every 2 years / revision every 5 years). Figure 1 gives an illustration of a choice question.

Our sample of surveyed investors is composed of a majority of partners or directors of venture capital institutions (40%), followed by family offices (12%), private equity funds (10%) and banks (10%). About 70% manage a portfolio of assets under

Figure 1: Example of choice question from Adaptive Conjoint Experiment

If two national policy frameworks were identical in all other ways, where would you most likely invest?

Emission performance standards Policy level revised every 2 years	or	Tax on combustion fuels Policy level revised every 5 years
Strongly Prefer Left		Strongly Prefer Right
Somewhat Prefer Left	Indifferent	Somewhat Prefer Right
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

[1] According to the IEA (2019), the purchase cost of a standard medium size EV is 40% higher than an ordinary ICE of the same size.

[2] Contact details were gathered from multiple sources including industry partners of the SNSF-NRP73 research project, a Crunchbase database of European VC funds, and professional contacts of researchers.

USD 200 million. About 15% of respondents work in large institutions managing assets of more than USD 1500 million. 25% of the respondents are from Switzerland and 80% of respondents are affiliated with institutions that had have already invested in clean technologies, although only 44% of the respondents had already invested in e-mobility.

## Key results

The responses were analyzed in a specific software for conjoint analysis which produced estimates for individual preferences

(‘utilities’) of each choice. As seen in Table 1, the results show that investors consider the attribute ‘Policy revisions’ as an important feature of the policy with 34% of preferences, above the ‘Policy level’ and ‘Policy instrument’ attributes with 33% and 32% of preferences, respectively. The slightly higher ranking of ‘Policy revisions’ over other attributes may underline the preference of investors for a stable and predictable policy framework for the development of clean markets [3]. Respondents particularly favor a revision of policy levels every 5 years, over more

frequent or undefined revision mechanisms, suggesting again the importance of well-defined policy adjustments over the medium term. As expected, investors always prefer a high ‘Policy level’ rather than low or medium levels of incentives. Regarding the type of policy instrument, on average investors have stronger preferences for subsidies for EVs at purchase over emission performance standards and taxes on combustion fuels.

Table 1. Full sample -Average importance of attributes and zero-centered utilities of levels

Attribute	Average Importance	Levels	Part-worth utilities (zero-centered)
Policy instrument	32.64 %	Tax on combustion fuels	-17.10
		Emission performance standards	1.78
		Subsidies for EVs at purchase	15.33
Policy level	33.34 %	Low policy level	-49.75
		Medium policy level	-0.52
		High policy level	50.27
Policy revisions	34.02 %	Policy level revised every 2 years	12.52
		Policy level revised every 5 years	27.71
		Not defined when the policy level will be revised	-40.23

Part-worth utilities describe the contribution of various attribute levels to overall utility. See Bortolotti (2019) and Kast (2019) for methodological details.

## Investors’s profile

Next, the study investigates how preferences vary among the diverse profiles of investors.

### Institution’s size

- Investors from smaller institutions with asset portfolio under USD 200 million tend to prefer subsidies at purchase providing direct revenues, while larger institutions are more open to consider other instruments, such as emissions standards or taxes.
- In addition, investors from smaller institutions give more importance to the attribute ‘Policy Revisions’ than investors from larger institutions. They tend to invest more on short-term horizons and might therefore be more affected by unexpected changes in the policy framework.

### Institution’s type

- Investors from venture capital (VC) and private equity funds give more importance to the attribute ‘Policy Revisions’ than in-

vestors from other types of institutions.

- Investors from VC funds favor subsidies at EV purchase, while investors from private equity funds prefer emissions standards. Since private equity investors tend to focus on later-stage investments in companies with proven market success, emissions standards may be expected to promote EVs over the longer term and to provide less volatile investment returns.

### Investors’ country

- Investors from countries with small EV fleet (less than 50’000 EVs on the roads) see a more important role for subsidies at EV purchase than investors from large EV fleet countries (e.g. Germany, Netherlands, Switzerland, etc). This makes sense as subsidies at purchase are the most direct approach to deploy the technology.
- Investors located in car-manufacturing countries (e.g. Germany, France, Spain) tend to favor subsidies over emission standards and taxes. This could be expected as ‘destructive policies’ such as fuel taxes

or emissions standards imply a rise in the costs of ICE vehicles and thus harm the established business of car manufacturers.

## A-priori beliefs

Respondents were then asked to express their degree of agreement with statements on climate change, effectiveness of government vs market mechanisms, and the perception of the impact of the Covid-19 crisis (as of April-May 2019 [4]) on their investments.

- Investors who believe more strongly in climate change are more likely to accept policy instruments that entail public sacrifice, as a tax on combustion fuels. Findings also suggest that the environmental attitude of investors influences their willingness to invest in cleantech, as the investors who strongly believe in climate change are investing a larger share of their portfolio in clean technologies and also specifically in e-mobility.

[3] Previous analysis on the preferences of investors in renewable energy in Masini and Menichetti (2013) have found that the ‘Policy Level’ attribute was found more important than ‘Policy instrument’ and ‘Policy duration’ (defined in the context of feed-in tariffs as ‘below 10 years’, ‘10-20 years’, or ‘longer than 20 years’)

[4] Note that this is one month before the public announcement of the European commitments toward the European Green Deal.

Table 2: A-priori beliefs statements on impact of COVID-19

Question	Label	N	%
"My current investments in clean technologies are at risk due to the COVID-19 crisis"	I disagree/strongly disagree	17	43%
	I am indifferent	11	27%
	I agree/strongly agree	11	29%
"The COVID-19 crisis is likely to shift the political support from clean technologies to other areas"	I disagree/strongly disagree	12	29%
	I am indifferent	9	22%
	I agree/strongly agree	20	49%
"COVID-19 economic stimulus programmes can be an opportunity to promote cleantech policies and build a greener economy"	I disagree/strongly disagree	4	10%
	I am indifferent	6	15%
	I agree/strongly agree	25	76%
"I expect that the COVID 19 crisis will have a lasting impact on my investment behavior"	I disagree/strongly disagree	12	29%
	I am indifferent	6	15%
	I agree/strongly agree	21	56%

-mate change are investing a larger share of their portfolio in clean technologies and also specifically in e-mobility.

- Investors who strongly believe in the working of markets are more willing to accept fuel taxes. In contrast, investors with higher trust in governmental interventions than in market-mechanisms show preference for emission standards and subsidies at EV purchase. Investors with higher beliefs in government intervention tend to be located in Eastern Europe.

- Survey results regarding the impact of the Covid-19 crisis are provided in Table 2. On one hand, most investors believe that their current investments in cleantech

are not at risk in the short term – as they remain confident that public policies will continue supporting clean technologies, in particular in Switzerland. On the other hand, a majority of investors agree that the Covid-19 crisis will have a lasting impact on their investment behavior in the long-term. Investors from VC funds were more likely to agree with this statement than investors in private equity funds or banks, suggesting that the Covid-19 crisis is likely to impact more early-stage investors. These pessimistic investors expressed a much stronger preference for subsidies at EV purchase among the 'Policy Instrument' attributes.

- In qualitative answers, investors expressed their concerns that the Covid-19 crisis could negatively impact their investments due to market disruptions, low oil prices making fuel-based technologies more attractive, supply-chain and logistic issues. Beside trust in continuous public support, investors who were optimistic about the long-term perspective of e-mobility investments also highlighted new market opportunities for EV technologies due to social distancing (less public transport use, deployment of e-scooters and possibly more sharing economy e-mobility platforms).

### Policy implications

The purpose of the survey was to assess investors' attitudes toward e-mobility policies. Investors are very diverse and have different perceptions on which policy instrument may reduce investment risk in e-mobility technologies depending on the type, location and size of institutions in which they operate and their own a-priori beliefs. In addition, the results emphasize the importance of a stable long-term policy framework, characterized by predictable policy revision schemes and a high level of policy support. As the current work presents some limitations (e.g. small number of respondents), future work should explore further how different types of investors make cleantech investment decisions.

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Established in 2010, the Centre for International Environmental Studies (CIES) is the Graduate Institute's focal point for research on environmental issues. The centre is dedicated to the better understanding of the social, legal, economic and political facets of global problems related to the environment, with an emphasis on the international dimension and North-South relations.

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