

## Executive summary

The relationship between finance and policy stands at the centre of Germany's twin objectives of reaching renewable energy deployment targets and doing so cost effectively. With the renewable energy industry maturing, and calls growing for improving the cost competitiveness of renewable energy policy, German policymakers and investors must continue to improve their understanding of how policy can influence the potential investment pool, and how policy can drive a robust and low-cost mix of investors and investment to underpin the continued development of a cost-effective low-carbon energy system. Climate Policy Initiative examined the availability of capital for renewable energy, the cost-effectiveness of different mixes of capital and investors used in meeting Germany's medium and long-term deployment goals, and the potential impact of policies on this mix of investment.

Our analysis indicates that, provided an appropriate policy framework is in place, there is more than

sufficient capital available to meet German renewable energy targets, but that a mix of investors is needed to meet Germany's objectives at lowest cost. To meet deployment goals most cost-effectively in the medium term, Germany must meet the challenge of creating electricity system flexibility to facilitate integration of renewable energy without imposing unmanageable risks on renewable energy investors.

More generally, for investors we find that the most relevant near-to-medium-term policy decisions regard incentive auction design, end user participation, support design and long-term targets. However, for the medium-to-long-term development of investment, issues including curtailment policy and energy market design will become increasingly important and merit immediate attention.

Table 1: Overview of most important policy issues

POLICY ISSUE	RECOMMENDATIONS OR FINDINGS	QUANTITATIVE FINDINGS
INCENTIVE AUCTION DESIGN	<ul style="list-style-type: none"> <li>Frequent, predictable bid rounds reduce risks and costs</li> <li>Small investors fear complex and costly bid processes</li> <li>Exemptions for smaller projects or simplified bidding processes are needed to preserve Germany's diverse investor base</li> </ul>	<ul style="list-style-type: none"> <li>A gap between auction rounds causing a 12-month delay in an offshore development can increase bid prices by 21% or more if delay expectations are reflected in bids</li> </ul>
SUPPORT DESIGN	<ul style="list-style-type: none"> <li>Stable and reliable support schemes over longer periods allow higher leverage and reduce average energy costs</li> <li>Indexing support to inflation could attract some institutional investors and reduce expected lifetime costs</li> </ul>	<ul style="list-style-type: none"> <li>Shortening revenue support from 20 years to 15 years could increase energy costs 15-18% depending on the technology</li> <li>Linking revenue support to inflation could decrease energy costs by 18-20% in real terms, depending on institutional investor appetite and how actual inflation evolves</li> </ul>
END USER PARTICIPATION	<ul style="list-style-type: none"> <li>Auction design and exemptions, end user consumption options and support design should be tailored to continue encouraging investment from all investor groups</li> </ul>	<ul style="list-style-type: none"> <li>Over 25% of 2015 equity investment and half of 2020 potential equity investment comes from end users</li> </ul>
LONG TERM TARGETS	<ul style="list-style-type: none"> <li>Reliable long-term targets incentivise investments in project development and business processes that increase competitiveness and reduce costs in the long term</li> </ul>	<ul style="list-style-type: none"> <li>Halving offshore wind targets would limit learning, potentially increasing the cost of energy by 6% by 2020</li> <li>Business process improvements drive cost reductions: From 2006-2014, non-module costs for PV systems fell 11.5% p.a. for large scale projects and 7.7% p.a. for rooftop solar.</li> </ul>
ENERGY MARKET DESIGN	<ul style="list-style-type: none"> <li>Current energy market design does not reflect the reality of a renewable energy dominated system</li> </ul>	<ul style="list-style-type: none"> <li>Current design could lead to zero or negative electricity prices for more than 1000 hours per year by 2030</li> </ul>
CURTAILMENT	<ul style="list-style-type: none"> <li>Policymakers should consider alternatives to curtailment at times of negative prices including take-or-pay arrangements or proportional curtailment</li> <li>Significant investment in system flexibility is required</li> </ul>	<ul style="list-style-type: none"> <li>Current proposals for curtailment of production during negative price hours could increase onshore wind bid prices by 17% in 2020, if no other flexibility measures are taken</li> </ul>
DEVELOPMENT COSTS	<ul style="list-style-type: none"> <li>Higher development costs could amplify any cost increases resulting from incentive auction design and a lack of long-term targets; policy should seek to reduce development costs (i.e. pre-auction costs or costs of bids that fail)</li> </ul>	<ul style="list-style-type: none"> <li>Development costs for large projects like offshore wind can run to 50 million Euros or higher</li> </ul>