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Why Companies Adopt New Technology Before It Pays Off

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A study of renewable energy adoption in Europe shows that businesses move faster when regulation, entrepreneurial activity, and cultural values reinforce one another.

Why do established companies adopt a new technology before it is clearly cheaper or more economically attractive than the old one? The answer to this question matters greatly: both to startups with disruptive technologies that are unfamiliar to their target markets, and to entrepreneurs and business owners who may gain competitive advantages by overcoming their wariness and investing in this technology early.

Many important technologies — renewable energy, carbon capture, battery storage, advanced recycling, some forms of AI, and other climate or social-impact technologies — begin life at a disadvantage. They may be better for society, but they are initially more expensive, more uncertain, less familiar, and less embedded in existing business models.

We looked at renewable energy adoption by electric utilities in the European Union from 1998 to 2009, a period when renewable energy had not yet reached cost parity with fossil-fuel electricity generation. The core problem was not whether renewable energy was technically possible or socially desirable. The problem was adoption: what makes incumbent firms change when the new technology still looks economically inferior?

We chose renewable energy in the EU because it offered an unusually strong test case. During 1998–2009, EU renewable generation rose sharply, yet renewables were still a small market and had not reached grid parity in the countries studied. The EU also had varied national policy approaches, different levels of entrepreneurial entry, and different cultural attitudes toward environmental protection. That made it possible to study not just whether regulation mattered, but also which kind of regulation worked best, and under what surrounding conditions.

We found out that companies do not adopt new technologies only because of spreadsheets. They adopt when the technology begins to look economically plausible, socially acceptable, strategically necessary, and institutionally supported.

What We Hypothesized

First, we expected that inducement policies — policies that reward companies for adopting a new technology — would have a stronger effect than imposition policies, which mandate adoption or penalize non-compliance. In renewable energy, inducements included feed-in tariffs and tender systems. Imposition policies included quota obligations requiring utilities to generate a certain share of electricity from renewables.

Second, we expected entrepreneurial entry to strengthen the impact of policy. When new renewable-energy companies enter a market, they demonstrate that the technology can work operationally and commercially. That proof makes the technology more credible to incumbents. We expected this effect to be especially strong for inducement policies, because incentives and entrepreneurial activity both speak the language of market opportunity.

Third, we expected pro-environmental cultural values to

strengthen the effect of policy, especially mandates. A mandate is more likely to work when the surrounding culture believes the required action is morally appropriate. Put simply, companies are more likely to comply seriously with a rule when customers, voters, employees, and other stakeholders already believe the rule points in the right direction.

Fourth and finally, we thought that cultural values could strengthen the effect of entrepreneurship. In markets where environmental values are stronger, renewable-energy entrepreneurs should be seen not only as commercial actors but also as socially legitimate actors. That should make incumbents more willing to follow their lead.

What We Studied

Our study covered 27 EU countries over 12 years, creating 324 country-year observations. The dependent variable was renewable-energy technology adoption by incumbent electric utilities, measured as the total installed renewable-energy capacity of those utilities, in gigawatts. Importantly, the measure excluded independent producers and private individual adoption, because we wanted to know what made established utilities adopt renewables. The renewable technologies included wind, solar photovoltaic, small hydropower, biomass, and geothermal energy.

Based on our expectations, we analyzed the effects that multiple factors might have on this measure of renewable-energy technology adoption:

- **Policy type/strength**. We looked at three kinds of renewable energy policies: payments that guaranteed energy producers a set price, bidding systems for renewable energy projects, and rules requiring utilities to get a certain share of their power from renewables. We did not just ask whether a country had these policies. We also measured how strong they were — for example, how much money they offered, how long the support lasted, or how much renewable energy they required.
- **Entrepreneurial entry.** Our study measured the number of new renewable-energy firms founded each year in each country, using company data and manual screening to identify renewable-energy firms.
- **Cultural values**. We used the European Values Survey to measure pro-environmental values, including people's willingness to pay more for the natural environment, accept taxes to prevent pollution, and value voluntary work on environmental conservation and animal rights.

We controlled for a wide range of country-level factors, including political ideology, electricity generation and consumption, carbon and natural-gas dependency, nuclear generation, GDP growth, education, environmental social-movement activity, renewable-energy cooperatives, trade associations, and natural renewable-energy potential. We added qualitative research, including policy and industry reports, archival data, and 12 semi-structured interviews with industry experts, entrepreneurs, independent producers, and electric-utility executives.

What We Found

Our findings revealed that:

- Incentives generally worked better than mandates. Feed-in tariffs and tender systems had significant positive relationships with renewable-energy adoption by incumbent utilities. Quota obligations, by themselves, did not show a significant effect. It was clear that inducement policies had a greater effect than imposition policies during this period. We also found this:
- Entrepreneurs made incentives more powerful — but not to the same extent. Entrepreneurial entry strengthened the effect of feed-in tariffs on adoption. However, it did not significantly strengthen the effect of tender systems or quota obligations. The likely reason may be that feed-in tariffs are broadly available to producers and help entrepreneurs demonstrate a viable business model, whereas tender systems can favor larger, better-resourced incumbents.
- Mandates work better when culture supports them. Quota obligations became more effective in countries with stronger pro-environmental values. Sweden illustrated this pattern: after implementing a stringent quota system in 2003, wind and biomass more than doubled as a share of total installed capacity by 2009.
- Entrepreneurship and culture reinforce each other. The positive relationship between entrepreneurial entry and incumbent adoption was stronger in countries with stronger environmental values. Germany illustrated this

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pattern: With high entrepreneurial entry and strong environmental values, its wind-energy production capacity rose sharply from 1998 to 2009.

The broad conclusion is that technology adoption happens fastest when three forces line up — policy support, entrepreneurial entry, and cultural support. Regulation can "jump start" adoption, but its effectiveness depends on whether the policy fits the market logic and values of the people and firms it is trying to influence.

Takeaways

The first lesson is that customers, regulators, investors, employees, and partners must come to see a new technology as legitimate before adoption accelerates. Cost matters, but it is not the whole story.

A business owner evaluating a new technology should ask: Is regulation moving in this direction? Are entrepreneurs proving the technology works? Do customers, employees, and other stakeholders increasingly see it as the right thing to do? When all three answers are yes, waiting for perfect economics may be strategically dangerous.

Other insights from our research:

1. Incentives often beat mandates when a technology is still immature. For business owners, this means subsidies, preferred contracts, guaranteed demand, procurement advantages, tax credits, or price guarantees can be more powerful than simple compliance pressure. A company trying to persuade customers or partners to adopt a new product should not rely only on fear, obligation, or abstract purpose. It should reduce risk and make adoption more economically attractive.
2. Entrepreneurs do more than compete with incumbents; they educate the market. Startups and early entrants demonstrate use cases, create operating know-how, expose hidden demand, and make the unfamiliar seem workable. Incumbents should therefore treat entrepreneurial activity as market intelligence. Rather than dismissing small entrants, established firms should monitor them, partner with them, invest in them, and learn from their experiments.
3. Culture makes government policies more potent drivers of new technology adoption, especially mandates. Initiatives that aim to coerce adoption tend to work better in places where cultural values support such efforts. Business owners choosing locations, markets, or customer segments thus should evaluate not only policy and economics but also cultural readiness.
4. Overall, how new technologies gain momentum depends on how proven the technology is. When thinking about adopting a technology that already has strong economic benefits, the business case may be enough to embrace change. But when the technology is still unproven and costly, companies also need incentives to reduce risk, proof points from early adopters, and narratives that connect the technology to stakeholder values.

Owners of established companies should not wait until a new technology is obviously superior on cost. By then, competitors, regulators, entrepreneurs, and customers may have already reshaped the market. Entrepreneurs should choose markets where incentives and values create a runway for adoption. The best market is not always the largest one; it may be the one where policy, entrepreneurial activity, and cultural acceptance are aligned.

Conclusion

Our research shows that adoption of socially beneficial technologies is not driven by regulation alone, market proof alone, or values alone. It is driven by the interaction of all three. For business owners, the winning move is to understand that system earlier than competitors do — and position the company where the new technology is becoming not just possible, but legitimate.

Explore the Research

"The Interactive Impact of Regulation, Entrepreneurship, and Cultural Values on Technology Adoption: Renewable Energy in the EU," (https://onlinelibrary.wiley.com/doi/pdf/10.1111/joms.70102) Journal of Management Studies, 2026.

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