ENERGY INNOVATION
POLICY & TECHNOLOGY LLC

WWW.ENERGYINNOVATION.ORG
98 Battery Street; San Francisco, CA 94111
policy@energyinnovation.org

POLICIES THAT WORK

DECEMBER 2015

Smart energy policy drives down greenhouse gas emissions quickly and affordably, and stimulates innovation and economic growth. Poorly-designed energy policy, on the other hand, can increase pollution, lock-in dirty technologies, waste money, and prevent us from meeting our climate goals.

Because the energy industry is capital-intensive, and energy infrastructure is built to last for decades, putting in place policies that are well-designed is crucial. Three steps can guarantee success:

- Select cost-effective emissions reductions from **all sectors**.
- Harness **complementary policy approaches**.
- **Design** the policies well.

Select Cost-Effective Emissions Reductions from All Sectors

Energy is used in every part of the global economy, powering our homes, businesses, factories, and cars. Emissions reductions must therefore come from every sector.

The following objectives provide a good starting point for an energy policy portfolio:

1. Improve transportation efficiency

Passenger and freight travel is set to roughly double by 2050. There is a significant opportunity to improve the efficiency of cars, trucks, ships, and planes by following and incrementing the efficiency standards already established in the EU, the US, and Japan.

2. Improve appliance efficiency

Buildings account for one-third of final energy consumption, and building energy demand is on pace to increase 50 percent by 2050. Ensuring new building equipment and appliances require less energy can make a huge impact on emissions. Appliance standards can be winners.

3. Improve building efficiency

As much as 40 percent of building energy demand is due to heat loss through poor insulation, windows, and roof materials. Ensuring buildings are properly insulated can significantly reduce the amount of energy needed to make buildings comfortable. Well-designed and well-enforced building codes get the job done.

4. Clean the power supply

The electricity sector is responsible for 24 percent of global carbon emissions—much of this from burning coal for electricity—and electricity demand is expected to roughly double by 2050. Ensuring this new demand is met with clean electricity sources is critical to stabilizing greenhouse gas emissions. In addition, expediting the retirement of old, dirty coal plants and replacing them with fossil-free renewables can actually lower costs, as these clean technologies are now at or below cost parity with gas and coal power. Renewable portfolio standards and energy efficiency incentives are the most powerful policies to transform the utility sector.

5. Enhance urban mobility

Urban mobility upgrades give people a diverse range of options for transit beyond the private car, the most polluting form of personal transportation. Better urban mobility can also improve air quality, decrease congestion (which can cost eight percent of metropolitan GDP), and improve public health.

6. Improve industrial processes

Industrial processes make-up roughly one-third of global energy demand and a quarter of global carbon dioxide emissions. There is significant potential to reduce industrial energy demand by increasing the energy efficiency of equipment, properly training workers, and improving industrial design. In addition, 24 percent of greenhouse gas emissions are due to non-CO_2 gases, much of which is produced in industrial processes. Targeting these “process emissions” can significantly reduce greenhouse gas emissions, especially because these non-CO_2 gases tend to be tens to thousands of times stronger than CO_2.

7. Address land-use

Deforestation, particularly in tropical countries, accounts for roughly 20 percent of global greenhouse gas emissions. Addressing land-use practices to promote sustainable forestry and reduce deforestation is direct way to contain emissions.

8. Send a price signal for emissions reductions across all sectors

Finally, energy prices should reflect true costs, including the costs of pollution. This will help create a market incentive to invest in cleaner energy sources.

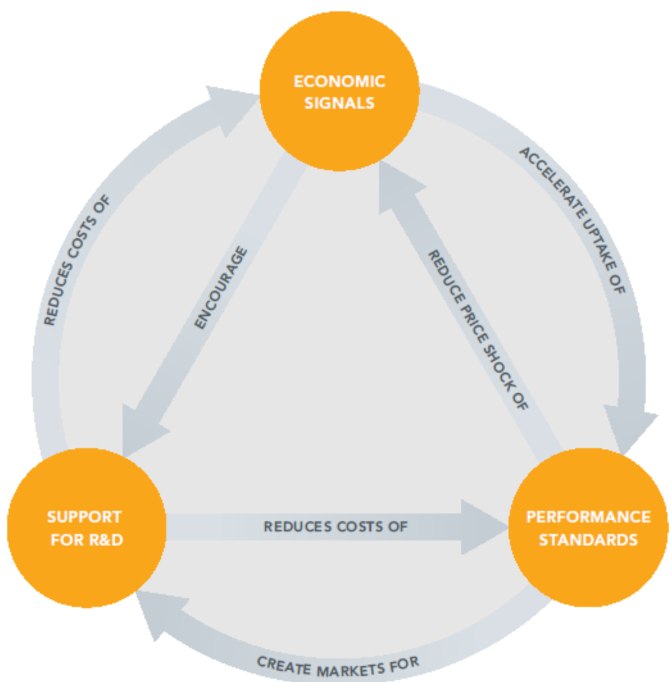
Harness Complementary Policy Approaches

There are three main approaches to energy policy: economic signals, performance standards, and support for research and development of new technologies (R&D). When used together, these approaches can reinforce each other and drive innovation while decreasing costs and stimulating economic growth.

Economic signals leverage market forces by pricing energy and infrastructure to reflect true costs, including externalities such as threats to human health, ecosystems, and national security. Economic signals are particularly useful for influencing consumer behavior (in sectors when consumers are sensitive to prices) and for influencing industrial decisions when alternatives are within a reasonable switching price zone. They influence both the purchase of energy-consuming products and the consumption of energy that powers the production process. Economic signals complement performance standards by creating a market incentive for better, more efficient products.

Performance standards set criteria that must be met by energy-using products or by those that produce or consume energy. Standards are particularly useful when prices are unlikely to affect behavior, and therefore nicely complement economic signals. Setting a performance standard for energy technologies and systems can spur technological innovation from industry players trying to meet the requirement.

Support for R&D includes funding or regulations that help early-stage technologies scale up and achieve market penetration. Structured support for R&D reinforces the other policy tools by accelerating technical progress, which reduces the costs of complying with energy performance standards and responding to economic signals. Policies that support R&D are particularly useful when a technology produces a social good that cannot be monetized or when technologies have trouble reaching scale.



This graphic shows the positive feedback mechanisms that amplify the impacts of each type of policy.

Design the Policies Well

Once policymakers have established goals within each emitting sector, and selected their preferred approaches for meeting those goals, it is critically important to ensure policies are designed well. Well-intentioned but poorly-designed policies will not achieve their desired objectives. The following best practices for policy design and implementation can help guarantee policies meet their objectives.

1. Set goals and empower market forces to drive the best solutions.

Empowering the market to meet policy goals can ensure that objectives are met at the lowest possible cost. One example of this approach is the U.S. Acid Rain Program, which was introduced under the Clean Air Act in 1990. The program called for a reduction in acid precipitation by limiting emissions of sulfur dioxide (SO_2) and nitrogen oxides (NO_x) through a cap-and-trade market, which set a permanent cap on SO_2 emissions from power plants. Emissions had to be cut in half, but the program gave companies the flexibility to decide how to do this. By letting the market find its own low-cost, innovative solutions, SO_2 emissions were reduced faster and at much lower costs than anticipated, primarily by switching to low-sulfur coal instead of having to install expensive pollution control equipment.

2. Reward performance, not investment, and be wary of unintended consequences.

Energy policy works best when it is outcome-driven and technology-agnostic. By rewarding performance, rather than investment, well-designed policy can achieve policy goals while minimizing costs. A nice example of this policy approach is the Renewable Portfolio Standard (RPS) policy in the electricity sector, used by many countries including, for example, Mexico, China, the U.S., Russia, and others. The RPS requires a certain proportion of electricity to be generated by qualified "renewable" sources. The RPS does not require that particular technologies be installed, nor does it determine technology-specific subsidies. Instead, the RPS is technology-agnostic, and aims to deliver carbon reductions at the lowest cost by allowing utilities and developers to choose the technologies that most efficiently meet the standard's requirements.

3. Require continuous, and predictable, performance improvements.

Energy policies must continue to improve over time, or they will fail to stimulate new technology, and will create a performance plateau. Japan's Top Runner efficiency program is an example of how predictable performance improvements over a long time horizon can drive innovation. The Top Runner program sets efficiency standards that manufacturers are required to meet over the following 3-10 years. When the compliance period ends, the efficiency standard is re-evaluated based on the most efficient products on the market, which sets a new floor for the next time period. This dynamic approach results in standards that continue to improve over time based on the best market performers, and provides a clear long-term signal for manufacturers. Top Runner has resulted in a significant improvement in the efficiency of covered products over a relatively short timeframe.

4. Set a long-term trajectory

It takes serious time and serious investments to introduce new technologies, whether for power, building, industry, or transportation. A long-term trajectory, especially combined with continuous improvement, gives businesses certainty in their planning. U.S. fuel economy standards, which require vehicle manufacturers to meet vehicle efficiency requirements on a fleet-wide basis, provide a good example for the transportation sector. In 2012, the Environmental Protection Agency (EPA) and the Department of Transportation's National

Highway and Traffic Safety Administration (NHTSA) established corporate average fuel economy (CAFE) standards for light- and medium-duty passenger vehicles and light-duty trucks, applying to model years 2017 through 2025. Average fuel economy will start at 35.5 miles per gallon (MPG) in 2016 (the base year), and steadily increase in subsequent years, eventually reaching 54.5 MPG in 2025. To ensure interim standards are met along the way, the EPA and NHTSA will conduct a comprehensive mid-term evaluation. A long-term trajectory, especially combined with continuous improvement, gives car manufacturers certainty in their planning.

5. Encourage investments in cleaner and more efficient infrastructure when it is first designed and built, rather than building less-efficient infrastructure that requires subsequent retrofits or replacements.

It is much more cost-effective to build clean and efficient infrastructure in the first place than to have to replace it later. Building codes use this approach by requiring that new buildings meet certain efficiency requirements such as proper insulation and use of high-efficiency equipment. For example, the European Union has established comprehensive, performance-based building codes for new buildings, which have helped improve the quality and energy use of newly constructed buildings. Because buildings—and in many cases, the equipment they use—tend to last for decades, ensuring they are properly constructed and equipped to minimize energy use can save a lot of money and energy over the life of the building, and is much cheaper than upgrades to the building.

6. Ensure sound incentives for innovation and mechanisms to accelerate uptake of new technologies.

Supporting research and development is critical for energy policy to be effective. Policymakers can establish frameworks, for example a robust patent system, to ensure that innovative companies can capitalize on their successes—incenting further innovation. Similarly, accelerating the testing and commercialization phase for new advancements, for example through shared testing facilities like those used by the U.S. national laboratories, can help bring innovation breakthroughs to the marketplace on a short timeframe.

These best practices make for highly effective policies. Climate change challenges are great, but the potential benefits of good policy design are even greater. Good policy design will reduce costs, accelerate innovation, and deliver the social and economic benefits required to attain a low-carbon, sustainable future. In order to succeed, global political effort must be guided around a powerful, focused mission: Get the most important policies adopted, and make sure they are designed and enforced well.

++++

Click here to read the original “Policies That Work” report.

Visit our website to learn more about smart energy policy, or learn more about our latest project, Energy Policy Solutions.