

EPA Climate Choice: Promoting Emerging Technologies That Protect the Climate

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ABSTRACT

Emerging technologies are critical to achieving the greenhouse gas emission reductions necessary to protect the climate, but often have to overcome important barriers, such as achieving economies of scale to reduce high initial costs, in order to gain wider use. The U.S. government manages a number of market-based programs designed to lower barriers to generally cost-effective technologies and practices (Environmental Protection Agency, 2008). Experience suggests that there are opportunities to expand on the experience and lessons learned from these programs and to make greater progress. The U.S. EPA is therefore launching a new climate technology initiative called Climate Choice focusing on emerging technologies. This program is open to technologies that are commercially available, yet not widely adopted; that have demonstrated environmental performance; and that are likely to significantly reduce greenhouse gas emissions at competitive costs in the future.

This program is different from ENERGY STAR, which focuses on established, cost-effective technologies. This program will target unique market segments with important and different consumer preferences than the broad consumer market that ENERGY STAR serves. Two such market segments targeted by the new EPA initiative are environmentally-motivated consumers willing to do more to help protect the environment and fight global warming, and early adopters who routinely seek out advanced technologies. EPA welcomes discussions with organizations such as ACEEE and others with established programs promoting emerging technology to avoid duplication of effort and speed products to market. This paper provides the latest information on this new EPA initiative.

Background

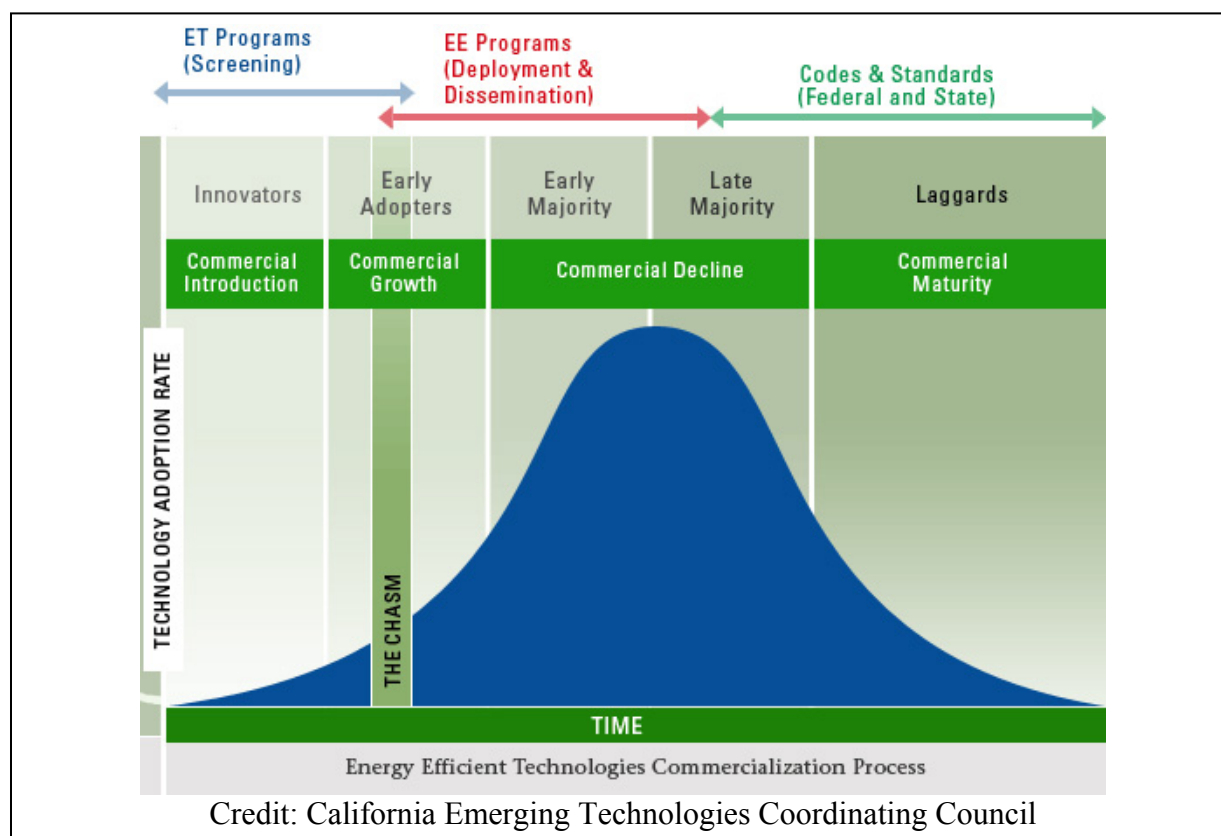
Global climate change is an important environmental issue. The 2007 G-8 meeting highlighted the need for additional progress toward a long-term goal for reducing greenhouse gas emissions. The U.S. government manages a number of market-based programs designed to lower barriers to generally cost-effective technologies and practices. Experience suggests that there are opportunities to expand on the experience and lessons learned from these programs and to make greater progress.

With this paper, the U.S. Environmental Protection Agency (EPA) describes an initiative to enhance climate protection by highlighting emerging technologies that could, with greater market penetration, make significant and cost-effective contributions to reducing greenhouse gas emissions.

Specific Challenges of Emerging Technologies

Emerging technologies must go a long way before they achieve market success. After commercial introduction, technology adoption tends to start out slowly, with a limited number of “innovators” adopting the technology, followed by a growing number of “early adopter” customers, leading to commercial growth and widespread adoption. The rate and extent to which these technologies are adopted are highly dependent on a number of factors, including achieving economies of scale, ability to compete with established technologies, the status of complementary technologies (for example: use of alternative fuels in vehicles depends on availability of alternative fueling infrastructure), and availability and credibility of information on the new technology. These barriers contribute to “the chasm” identified by Geoffrey A. Moore that often exists between the enthusiastic, often visionary early adopters of a technology and the more pragmatic early majority (Moore, 1991).

Figure 1: Technology Adoption Curve

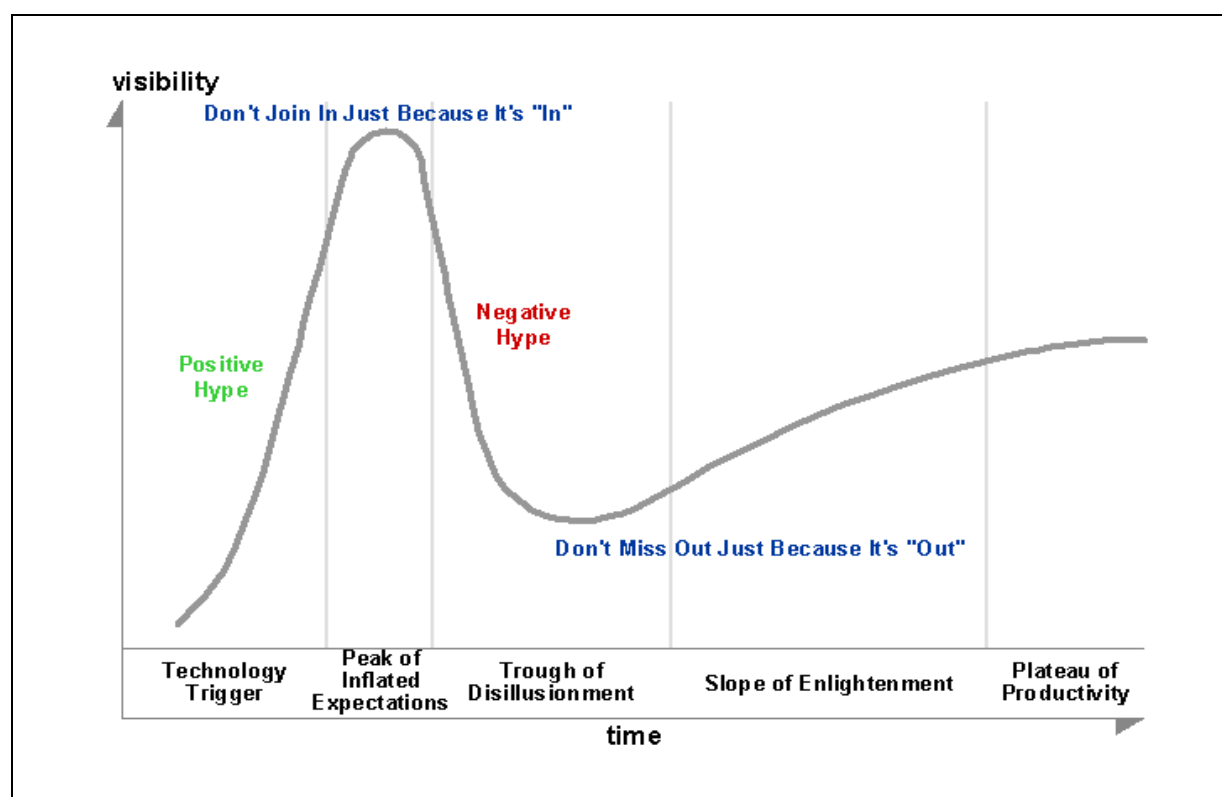


The EPA’s Climate Protection Partnerships Division is mindful that these important different phases exist in the technology adoption cycle, and that at each stage, technologies will have different important players, different customers, and different costs, risks, and benefits. Therefore, technologies in different stages need different tools, policies, and market interventions.

Promising new technologies often start out with a lot of attention, only to fall victim to the “hype cycle.” An exciting innovation can trigger positive hype, leading to inflated consumer expectations. Inevitably, some consumers find that the technology does not meet their expectations, and “negative hype” creates a crash in consumer interest. It may take a long time

to regain consumer trust after such an experience. The Internet and advances in communication technology have magnified the influence and impact of the hype cycle. One way to avoid the negative hype crash is to refrain from over-promising and over-marketing new technologies at the beginning of commercial introduction; and to work with government and industry partners to test and verify product performance, assuring that claims are verified and products meet consumer expectations.

Figure 2: The Hype Cycle



The Role of ENERGY STAR

ENERGY STAR has been playing a well-defined role in the market place for more than fifteen years, helping consumers find products that save them money while offering good product performance and helping them protect the environment. It focuses on established technologies and is designed to appeal to the broadest set of consumers across the country and targets all consumers in the market to purchase new products.¹ On the technology adoption curve (Figure 1), the target audience is the early majority; the pragmatic consumers who will respond to the notion that they can help the environment and save money at the same time. ENERGY STAR is designed to be an easy choice for a broad set of consumers in a number of ways, and the practical implications of this program design are:

¹ This statement describes the role of the ENERGY STAR on products. The ENERGY STAR program is much broader than the product label. It also includes corporate energy management strategies, standardized measurement tools for commercial and industrial facilities, and strategies for improving the efficiency of new and existing homes.

- **Simple way for consumers to find and select energy saving products and practices.** Products either earn the ENERGY STAR by meeting performance requirements or they do not. There are not tiers for higher efficiency products.
- **Products must be highly cost-effective to the consumer.** A strong financial case is critical for today's consumer – as confirmed by McKinsey Company, which reported that most people require a 2 year payback or less for investments in energy efficiency (Creys et al. 2007, 40-41). The specifications for ENERGY STAR are typically set where there are a variety of available products that offer consumers simple paybacks within two to three years, with many providing an immediate payback (no additional first cost), and the maximum payback period being about 5 years.
- **Products offer same, if not better, performance.** ENERGY STAR is only used if the products meeting the higher efficiency levels will deliver the same, if not better, performance as typical alternatives. ENERGY STAR is designed to help show that energy efficiency is not about sacrifice or doing without, but rather that with efficient technologies on the market today, consumers can cut their energy bills substantially while reducing greenhouse gas emissions. Where additional performance requirements are necessary so that ENERGY STAR qualifying products offer similar or better performance, they are included in the ENERGY STAR specification for that product category.
- **Products provide real energy savings to the consumer.** For ENERGY STAR to be successful, consumers must routinely experience real savings from their product purchases. These savings cannot depend upon the consumer's ability to solve issues such as complicated design, installation, and maintenance. Where solving such issues is integral to the consumer realizing the expected savings, ENERGY STAR may not be the appropriate tool.
- **Program offers a level playing field for program partners and technologies.** ENERGY STAR is designed to establish performance levels that differentiate highly efficient products from less efficient home and office products. ENERGY STAR provides technology-neutral performance requirements across competing technologies. ENERGY STAR is not used to give one technology an advantage over another if they perform similarly.

To be considered for ENERGY STAR, the following criteria must be met: the technology must be proven, impeccable, and predictable; cost-effective (2 to 3 year payback); require no sacrifice in performance; deliver reliable savings; be easy to install and maintain; have immediate and measurable benefits; and contribute to carbon reduction (Interbrand, 2007).

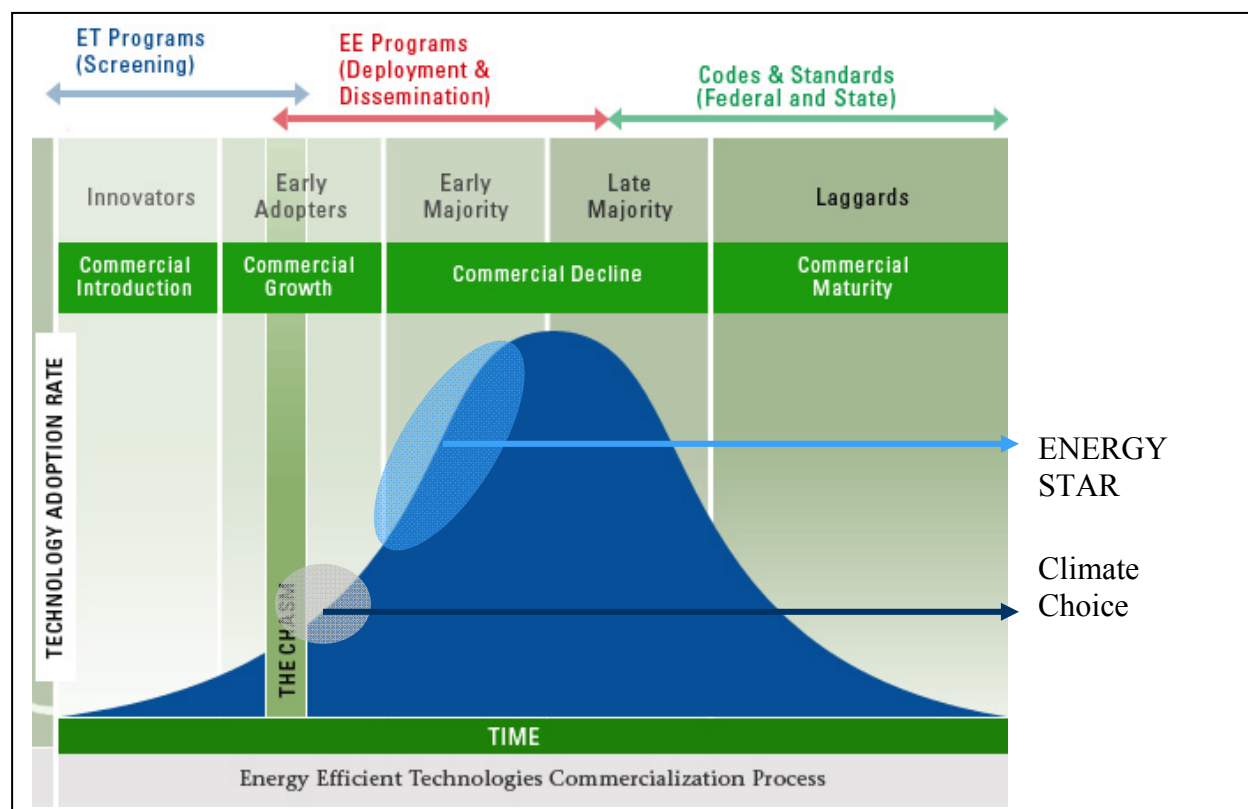
Many new and promising technologies fall outside these criteria, but have significant potential to meet them once they achieve economies of scale and establish a technology performance track record.

The New Role of the Climate Choice

The Climate Choice is a new program designed to promote technologies earlier in the adoption cycle. One important consideration is that these technologies are adopted by a fundamentally different consumer segment (early adopters-see graph above). Emerging technologies often have higher up-front costs and longer payback periods. Additionally, some

technologies may have more complex installation and maintenance requirements that impact performance. The Climate Choice is mindful of these challenges and therefore has a clearly defined target audience.

Figure 3: Role of ENERGY STAR and Climate Choice



Target Audience

From a target audience standpoint, there are consumer markets, or market segments, that may fall into the “innovator” section of the technology adoption curve with regard to technologies that offer superior environmental performance. Two such market segments include early adopters and environmentally motivated consumers.

Early adopters refer to the portion of consumers that routinely seek out advanced technologies. These “early adopters” may have already adopted cost-effective technologies – such as those meeting ENERGY STAR requirements – and want to go “above and beyond.” They may be interested in being on the cutting edge of new technology for any number of reasons.

Environmentally-motivated consumers represent a growing number of consumers interested in taking the right steps to help the environment across a range of environmental issues including reducing greenhouse gas emissions, reducing water use, etc. This consumer group seems willing to invest in environmentally-preferable products and services that have

substantially longer pay backs due to the environmental reward that they value.² These two market segments represent a significant and growing portion of the U.S. market.

Program Objectives and Benefits

The Climate Choice will help emerging technologies cross the chasm and move from the “early adopter” market to the “early majority.” For technologies selected through the technology nomination process, there will be a number of benefits to manufacturers, including recognition, tailored technology assistance, and ENERGY STAR candidate development.

Recognition. Technologies selected as part of this solicitation process would be featured on the Climate Choice Website for one a minimum of one year with annual reassessments after that. There will also be high visibility opportunities at public trials and demonstrations, coupled with EPA promotions.

Tailored technology assistance. For each technology selected for the Climate Choice, the EPA’s Climate Protection Partnerships Division would work with stakeholders to develop a *coordinated technology adoption plan*. This plan explains how technologies recognized by Climate Choice will be promoted, identifies potential customers for the technology, identifies barriers to wider technology deployment that EPA can address, and identifies opportunities for information sharing through existing energy efficiency networks, such as ENERGY STAR industrial peer exchange, Climate Leaders peer exchange, and the ENERGY STAR for residential homes network. With thousands of partners in dozens of sectors, the EPA’s Climate Protection Partnerships Division is uniquely placed to help manufacturers find customers, and to help environmentally-conscious companies and consumers find the technologies they want to further reduce greenhouse gas emissions.

ENERGY STAR candidate development. One key metric by which to measure a technology’s placement along the technology adoption curve is ENERGY STAR. Once a technology attains this status, it can generally be said to have made it in the wider marketplace. The Climate Choice will include developing individual technology adoption plans that will identify key milestones to be met for the technology to become a candidate for ENERGY STAR. The EPA and its partners will help technology manufacturers meet those milestones. At the conclusion of the technology adoption plan, the technology would be assessed for ENERGY STAR.

Pilot Programs

Pilot programs for technologies that were selected internally and have already passed EPA’s review are currently being implemented in three technology areas: high-efficiency outdoor area lighting, micro-combined heat and power (also called residential co-generation), and advanced new home construction to minimize energy use and greenhouse gas emissions. The EPA Climate Choice website, www.epa.gov/cppd/climatechoice, provides detailed descriptions of these technologies, their current status in the market, and customized technology adoption plans.

² This group is tracked through a variety of ways including the annual GfK Roper Green Gauge Report that is a survey of consumer attitudes about the environment and environmentally conscious purchasing decisions.

The overall goal of the pilot programs is to gain first hand experience with the technologies, the markets, and the program partners involved. EPA will recruit pilot program participants based on a number of factors, including project timing, partner resources available, and the ability for EPA to learn from the experience. Potential program partners include technology manufacturers, electric and gas utilities, end users (homeowners, commercial building operators). Following the pilot program implementation, EPA will focus on refining its program approaches, either on the technology specifications or the market support elements of the program.

Technology Criteria, Selection and Review

The EPA Climate Choice sought public input and expert advice on how best to design technology criteria and select technology candidates. EPA staff reviewed the program criteria, design, and technology selection and review process of many existing organizations promoting technologies that reduce greenhouse gas emissions in order to identify common elements for technology screening.³ Based on this research, the program will identify and select technologies based on an open application process judged by EPA and external experts, with final selections made by EPA.

An open solicitation and expert review process will be used to identify technologies, with the first call for nominations in the summer of 2008. Any technology meeting the following criteria is welcome to apply:

- Commercially available, but not widely adopted.
- Offered by more than one supplier.
- Demonstrated environmental performance.
- Likely to significantly reduce greenhouse gases at competitive costs when technology becomes more commercialized.
- No significant increases in other forms of pollution or environmental issues in order to reduce greenhouse gas emissions
- The technology is adequately financed and suppliers have an established business record.

The selection process is structured in the following way:

Application

EPA Climate Choice will issue a solicitation and review nominations annually. The solicitation will be made public and will review the Climate Choice program objectives, request technical information and verification of performance, and explain how applications will be

³ Programs examined include the California Emerging Technology Program; the Consortium for Energy Efficiency; the EPA Environmental Technology Verification Program; the Connecticut Clean Energy Fund (including its Operational Demo Program, Yankee Ingenuity Competition, and Project 100); the Connecticut New Energy Technology Program; the Massachusetts Technology Collaborative (including its Large On-site Renewables Initiative, Clean Energy Choice program, Small Renewables Initiative, and Industry Investment and Development Program); and the New York State Energy Research and Development Authority (NYSERDA) Power Systems, Research, Technology and Product Development Program.

evaluated. Applications could require the following information which incorporates the technology selection criteria outlined above. Evaluation would be weighted as indicated:

Technology description (25%). Applicants should provide a description of: The technology and its costs (current and expected), market alternatives, and potential market barriers; how the technology fits into existing energy efficiency programs; commercial availability and number of suppliers; estimates of potential market size and the current market share; the speed at which the technology is developing and the timeframe in which market transformation is expected to occur; and why Climate Choice recognition is desired.

Company description (20%). Applicants should include company profiles and information on company size, years in operation, major business focus, partners, and leadership profiles.

Environmental description (35%). In this section, applicants should provide a summary of the environmental benefits of the technology. Applicants should provide information on greenhouse gas savings (including a detailed description of how this estimate was arrived at, including references). Other environmental or safety impacts or benefits (water use, toxicity, flammability, etc.) must also be included.

Testing procedures (20%). In this section, applicants should provide information on third party validation and testing that has been conducted, testing procedures in place and under development that could be used to establish criteria for recognition, and verification of technology by 3rd party sources.

Applications will be accepted from companies themselves or from third-party nominators. If a company nominates a technology that it produces, it must provide three independent (not affiliated with or paid by the company) expert references to substantiate their claims. To help identify emerging technologies, the EPA Climate Choice invites all stakeholders to nominate technologies and/or experts to advise Climate Choice expert review panels.

Expert Review

Sector-based expert panels (composed of EPA experts and external stakeholders) review applications and score them based on the weights allocated to each category. The highest-scoring applications in each sector are recommended for the Climate Choice.

Selection

The EPA Climate Choice team reviews recommendations & selects technologies based on available program resources and criteria identified above.

Conclusion

In this paper we outlined a new program from EPA designed to speed emerging technologies to the marketplace. We have outlined the rationale, indicating that there is both a growing need due to the climate crisis, and a growing number of consumer groups who are ready

and eager to take more aggressive steps to fight climate change. Through the development of this program, we listened to stakeholder feedback urging us to distinguish these emerging technologies from the established ENERGY STAR technologies, resulting in the decision to call the program Climate Choice.

The current level of interest by inventors, scientists, the general public and Wall Street in identifying technological solutions for reducing CO₂ emissions is unprecedented. Because of this, we expect this new EPA program to attract a large group of interested parties. The pilot programs, when complete, will supply critical knowledge of the Climate Choice target market response to these emerging technologies. Lessons learned from ENERGY STAR will continue to provide guidance as this new program develops. There is a large potential role for the energy efficiency community in this effort, and EPA is looking forward to open collaboration on technology selection, pilot programs, and commercialization efforts.

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