

Powering Up Renewable Electricity: NRDC's Roadmap for Immediate and Cost-Effective Renewables Deployment

Renewable electricity is the energy of the future—it can reduce global warming emissions, moderate the long-term cost of power, and help ensure our energy independence and national security by phasing out fossil fuels. To realize these benefits, we must cap carbon emissions which will put a price on global warming pollution while simultaneously helping to launch emerging renewables into the marketplace.

Deployment Support Can Break Through Barriers to Renewables

While wind and solar energy have seen strong growth in recent years, numerous price and non-price barriers continue to constrain renewables deployment. On the pricing side, the playing field is uneven because conventional electricity does not account for the environmental cost of carbon dioxide or the full cost of other emissions. There are also enormous subsidies in place for mature fossil fuel electricity technologies that long ago outgrew any need for kick-start deployment support. Various non-price barriers also hinder the emergence of new renewable technologies in the slow-moving capital-intensive energy industry including:

- Knowledge spillovers that constrain investment in emerging renewable technologies because the benefits from learning-by-doing (e.g., developing new business models to install and finance systems) spill over to competitors.
- Information gaps about renewable energy in credit and insurance markets that reduce access to financing and increase capital costs.
- Legacy infrastructure such as transmission grids designed for existing fossil fuel plants that encourage the continued investment in carbon-intensive energy.
- Administrative barriers such as unnecessary interconnection rules for renewable distributed generation and arcane cost-recovery rules that impede construction of transmission lines needed to bring renewables to market.



Powering Up Renewable Electricity: NRDC's Roadmap for Immediate and Cost-Effective Renewables Deployment

Many countries have used deployment support policies to overcome the obstacles described above and boost their production of domestic renewable electricity. In the United States, a patchwork of local, state and federal policies has served this purpose somewhat successfully, although key federal deployment mechanisms have struggled through challenging authorization battles and periodic suspensions, which has disrupted market development.

Fortunately, climate change legislation allows the United States to accelerate deployment of emerging renewables efficiently and strategically, by creating a sustained policy that “pulls” new renewables along the various stages of the technology cycle (see Figure 1). In the United States, complementing a carbon cap with this demand-pull support, increased research, development and demonstration (RD&D) support, and build-out of enabling infrastructure would allow new renewable sources to supply the majority of our power by 2050.

NRDC's Policy Roadmap for Rapid Deployment of Renewable Electricity

A comprehensive deployment strategy for renewables should:

- Encourage continuous innovation spanning a dynamic portfolio of emerging technologies.
- Offer a clear and stable support mechanism that increases investor security and encourages low-cost financing.
- Gradually phase out support for technologies as they mature to force them to become commercially competitive or make room for more successful alternatives.

The proposal we outline below is designed to achieve all of these goals.

Establish a classification system for broad categories of renewable energy technologies, based on share of overall electricity generation for each technology, and tie declining deployment incentives to those classifications.

No single deployment mechanism is optimal for all stages of innovation. Investment tax credits, for example, can be effective in providing up-front capital incentives to expensive high-risk new technologies. Production tax credits are preferable for more mature technologies to ensure installed systems deliver the energy they promise. Net metering enables simple access and price certainty for small, distributed installations.

Going forward, Congress needs to ensure deployment policies effectively address challenges specific to each phase of technology development, while providing long-term security to drive capital investment. We propose dividing renewable technologies into *broad* categories and then linking deployment mechanisms to each category's maturity as measured by its market share. New technologies will have a chance to access a helpful suite of incentives, while maturing technologies can be weaned off subsidies and driven to succeed in the marketplace. (See Figure 2)

Renewables should first be divided into major categories starting with photovoltaic electricity, concentrating solar power, wind, geothermal, biomass, and wave/tidal. The implementing agency should have authority to add additional categories where they can demonstrate a positive benefit-cost ratio from the change.

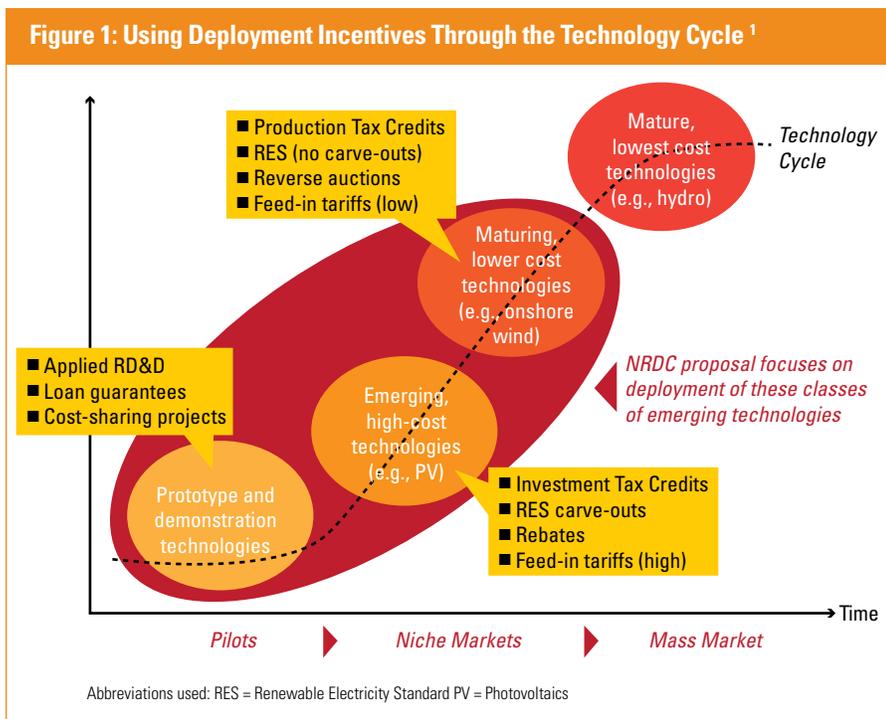
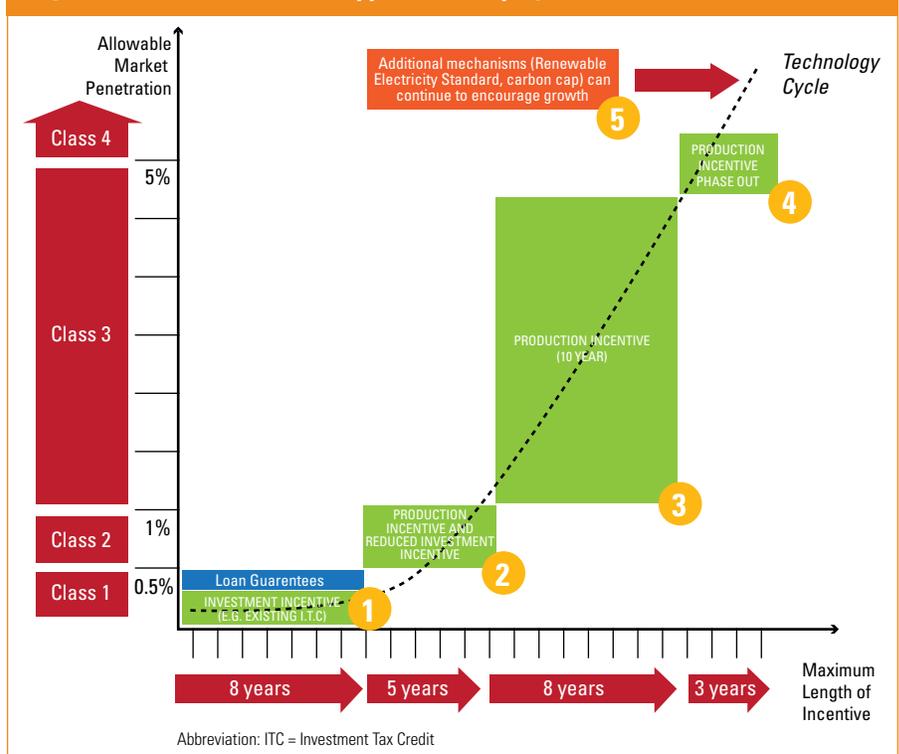


Figure 2: NRDC's Class-based Approach to Deployment Incentives



Each category should then be classified according to its evolving market share, i.e. the percentage of electricity generated nationally by that category in the prior year.²

- Class 1 – <0.50 percent (e.g., photovoltaic solar)
- Class 2 – 0.50 percent - 1 percent (e.g., geothermal)
- Class 3 – 1 percent - 5 percent (e.g., wind)
- Class 4 – 5 percent+ of overall generation (e.g. hydro)

All new renewable technologies entering the marketplace will be eligible for Class 1 treatment unless deemed part of a more mature technology category by the implementing agency. The investment and production incentives should be linked to the Classes as follows:

- 1** New Class 1 projects can access an investment incentive (such as the existing 30 percent investment tax credit) for eight years, or until the technology reaches Class 2 penetration levels. After eight years, if a technology does not increase to Class 2, new projects no longer qualify for this investment incentive to ensure no further funds are wasted on low-prospect technology categories.
- 2** New Class 2 projects qualify for a smaller investment incentive (e.g., 15 percent investment tax credit) and an additional production incentive. The goal in transitioning to production incentives is to ensure that projects actually deliver renewable power. Central station generation (e.g., onshore wind) would be eligible for a production incentive similar to the current production tax credit, while emerging distributed generation technologies (e.g., building integrated photovoltaics) would have universal net metering eligibility for the life of the system.³ A Class 2 technology category similarly no longer qualifies for support after five years, or once it reaches Class 3.

3 Once a technology category attains Class 3 status, new central station generation projects qualify for a 10-year production incentive only, while new distributed generation technologies can continue to access lifetime net metering. New projects can qualify for these

incentives during an eight-year period, or until the technology reaches Class 4 penetration levels. In addition, within central station technology categories (e.g., wind), each doubling of that technology's installed total capacity reduces the production incentive for that technology by 20 percent (i.e., at 2 percent and 4 percent generation market share).

4 With a carbon price in place, deployment incentives should phase out as renewable technologies achieve maturity. In our proposal, as a technology category reaches Class 4, the production incentive available for new projects continues to decrease over three years until it is eliminated completely.

5 After the phase out of the production incentive for each renewables category, a carbon price will continue to encourage renewables deployment of that technology. In addition, climate legislation should include a Renewable Electricity Standard to continue driving rapid scale up of maturing renewable technologies. In the near term, utilities and governments should pursue competitive procurement of "bulk" renewables under integrated resource plans. Finally, for distributed generation, utilities should ultimately move beyond net metering and provide compensation based on the true social value of output, including consideration of location-specific factors.

Powering Up Renewable Electricity: NRDC's Roadmap for Immediate and Cost-Effective Renewables Deployment

The Department of Energy should offer loan guarantees and other government backing tied to our classification system to overcome the “Valley of Death.”

Information gaps and risk misperceptions in credit and insurance markets (which plague most new, poorly understood technologies) create the so-called “Valley of Death” funding gap for projects moving from demonstration to early commercialization. Federal loan guarantees and other insurance mechanisms targeted to new renewable technologies can help to overcome this barrier. These loan guarantees should be available for new Class 1 projects only to ensure earliest-stage emerging technologies have access to necessary financing. To ensure that only high potential projects are built, Congress should require cost-sharing and upfront equity stakes by private sector investors.

Ensure states pass key enabling policies that help drive renewable energy deployment.

Interconnection standards, time of use metering and guaranteed grid access for renewable energy are state level policies needed to level the playing field for emerging renewable technologies. In order to access the incentive funding described above, states would be required to:

- Implement integrated resource planning that requires states and utilities to procure whatever energy services options, including efficiency and renewables, offer the least “fully-loaded” total life cycle cost while incurring the fewest environmental externalities; and,
- Accept all renewable power onto the grid on fair terms including the establishment of uniform technical standards for grid interconnection, net-metering, and time-of-use metering.

Congress must reduce or eliminate oil, coal, and nuclear subsidies to further drive renewable energy deployment.

In their developing phases, the nuclear, coal, and oil industries have received subsidies an order of magnitude larger than existing renewable technologies. These subsidies continue now even though all the associated technology

categories are mature. An EIA study on 2007 energy subsidies calculated \$6.7 billion in direct subsidies for coal, natural gas, nuclear, and petroleum (excluding implicit pollution externalities). In comparison, non-biofuel renewables received only \$1.6 billion in 2007.⁴ Reducing these subsidies for mature polluting technologies would help to level the playing field for renewable power.

Anticipated Cost of NRDC's Renewable Deployment Plan

The allowance value needed to fund these renewables deployment policies will be similar to the amount authorized for Carbon Capture and Storage (CCS) deployment, i.e., approximately \$100 billion total, which is roughly 4 percent of the total value of all carbon allowances established during the first 13 years of the program. The proceeds from auctioning allowances would be deposited in a trust fund established in the Treasury to provide funding for the investment and production incentives, and the loan guarantee program. If necessary, the trust fund could run a deficit to be paid back by future year allowance auctions, with incentive levels for new development in future years ratcheted down to ensure the trust fund returns to balance. Incentives would be made available for new projects starting in the calendar year immediately following enactment, with the trust fund running a deficit initially until the allowance auction launches.

Renewable Deployment Policies Must Be Put into Place Immediately

Implementing the NRDC approach will extend stable investment and production incentives, while phasing out incentives for maturing technologies over time. This will drive cost reductions and ensure specific renewables industries do not become dependent on incentives. Further, new renewable technologies developed in the future will be able to access deployment support at the start of their growth cycle, encouraging a steady flow of new renewable technologies.

¹ This framework builds off a framework within the IEA report “Deploying Renewables—Principles for Effective Policies”. This model does not represent feedback and dynamic learning. In addition, basic research occurs earlier in the cycle.

² While percentages broadly correspond to perceived inflection points in the renewable energy technology cycle, these percentages are illustrative only, and will be informed by additional research and outreach to industry and expert sources.

³ Under net metering, a generator is credited for unused electricity production, typically at the full retail price of electricity. Depending on system specifics, this roughly accounts for the benefits of distributed systems, while providing additional generator incentives in the form of a fixed price guarantee and lowered transaction costs.

⁴ Ethanol subsidies added an additional \$3.2 billion in supporting subsidies in 2007.