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## FEED-IN TARIFFS

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- Butler, L. and Neuhoff, K. (2004). Comparison of Feed in Tariff, Quota and Auction Mechanisms to Support Wind Power Development. *Cambridge Working Papers in Economics*, CWPE 0503.

Abstract: "A comparison of support schemes for market-based deployment of renewable energy in the UK and Germany shows that the feed-in tariff reduces costs to consumers and results in larger deployment. A survey among project developers suggests two explanations: (1) Site selection presents the biggest obstacle under the feed-in tariff. Uncertain financing of other schemes reduces efforts at initial project stages and planning permits become a major obstacle. (2) Project developers do not compete in price but for good sites under the feed-in tariff. Most importantly, turbine producers and construction services contribute to most of the costs, and face at least equal levels of competition under the feed-in tariff."

- Cory, K., et al. (2009). *Feed-in Tariff Policy: Design, Implementation, and RPS Policy Interactions*. Technical Report (NREL/TP-6A2-45549) of the National Renewable Energy Laboratory. [link](#)

Conclusion: "Feed-in tariffs are intended to increase the adoption of renewable energy technologies, encourage the development of the RE industry, and provide significant economic development benefits. Experience from Europe suggests that a well-designed feed-in tariff can generate rapid growth for targeted RE technologies by creating conditions that attract capital to those particular sectors. By using a variety of design variables to incentivize production in different areas as well as projects of different sizes, FIT policies can help encourage a variety of RE technology types and different-sized RE projects..."

Overall, a FIT policy can be developed to work in concert with an RPS policy, which sets a goal or mandate of how much customer demand should be provided by renewables. A properly structured FIT policy attempts to provide investor certainty to help support new supply development. FIT policies generally provide preapproved guarantees of payments to the developer and investors, whereas RPS policies leave the compliance and investment up to the market. For states that want to provide assurance to investors, drive more capital to the market, and get more projects built, a FIT can be a useful, complementary policy to an RPS."

- Couture, T., and Gagnon, Y. (2010). An Analysis of Feed-In Tariff Remuneration Models: Implications for Renewable Energy Investment. *Energy Policy*, 38(2), 955-965. [link](#)

Abstract: "Recent experience from around the world suggests that feed-in tariffs (FITs) are the most effective policy to encourage the rapid and sustained deployment of renewable energy. There are several different ways to structure a FIT policy, each with its own strengths and weaknesses. This paper presents an overview of seven different ways to structure the remuneration of a FIT policy, divided into two broad categories: those in which remuneration is dependent on the electricity price, and those that remain independent from it. This paper examines

the advantages and disadvantages of these different FIT models, and concludes with an analysis of these design options, with a focus on their implications both for investors and for society...

For a number of reasons, market-independent, fixed price models create greater investment security and lead to lower-cost renewable energy deployment than market-dependent models. This is primarily due to the lower risk investment conditions created, and the greater predictability of future cash flows. In addition, renewable energy development under market-independent FIT policies can better harness the potential rate stabilization value of RE sources, while providing a more cost-based payment level for encouraging renewable energy development."

- ▢ del Rio Gonzalez, P., and Gual, M. A. (2007). An Integrated Assessment of the Feed-In Tariff System in Spain. *Energy Policy*, 35(2), 994-1012.

Abstract: "Given the relative socioeconomic and environmental benefits linked to the deployment of electricity from renewable energy sources (RES-E), its public promotion has been a priority on the agendas of governments in virtually all European countries. The Spanish government has not been an exception in this regard. Public support at the national level has been based on a feed-in tariff (FIT) scheme, which has had its pros and cons in the encouragement of effective and cost-effective deployment of RES-E. Based on different information sources and empirical data, this paper provides an integrated assessment of the system in the period of influence of the Royal Decree 2818/1998 (i.e., between 1999 and 2003), according to different criteria. The strong and weak points of the system are assessed. The paper suggests that some of its elements should be redesigned..."

If a causal relationship is assumed, then the Spanish FIT has had its pros and its cons. Despite the existence of several barriers, the FIT has been highly successful in encouraging the promotion of wind but not so much concerning the other technologies. But the environmental benefits from the system seem to outweigh its costs only in the case of two technologies (wind and small hydro). In turn, the costs for the consumer have not been exorbitant, although their fast increase and unequal distribution between different actors are major sources of concern. Nevertheless, caution is advisable when interpreting the results, given the uncertainty involved in some of the data used and the calculations made and, particularly, concerning the measurement of avoided externalities."

- ▢ Klein, Arne, et. al (2008). *Evaluation of Different Feed-In Tariff Design Options: Best Practice Paper for the International Feed-In Cooperation, 2<sup>nd</sup> Edition*. A research project funded by the Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU).

Excerpt: "Based on the different options for feed-in tariff designs presented in this paper the following policy recommendations are proposed: RES-E support requires continuity and long term investment policy; technology-specific tariff levels should be applied; energy policy should provide mechanisms to ensure the penetration and to improve the integration of RES-E into the grid; a premium tariff option can be applied to increase market orientation; tariff degression provides incentives for cost reductions; stepped tariffs may be applied to reflect different power generation costs within the same technology; and extra premiums may help to reach policy goals..."

- ▢ Ragwitz, M., and Huber, C. (2005). *Feed-In Systems in Germany and Spain and a Comparison*. Fraunhofer Institute Systems and Innovation Research. [\[link\]](#)

Excerpt: "Feed-in tariffs (FITs) have been successful in triggering a considerable increase of RES-E technologies in almost all the countries in which they have been introduced and where their effectiveness was not significantly hampered by major barriers (administrative barriers, grid access, etc.)."

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- Rickerson, W., et. al. (2008). *Feed-in Tariffs and Renewable Energy in the USA: A Policy Update*. North Carolina Solar Center, Heinrich Boll Foundation and World Future Council. [\[link\]](#)

Abstract: "Feed-in tariff policies have driven rapid renewable energy growth for electricity in Europe, but have not been widely adopted in North America to date. This paper reviews the experience of six US states which have introduced feed-in tariff legislation, surveys feed-in tariff proposals in eight other states, and discusses the outlook for Community-Based Energy Development policies, which have the potential to be implemented in a way that is similar to feed-in tariffs. The paper also discusses a federal feed-in tariff bill proposed by Congressman Jay Inslee.

Some states are proposing policies which follow the European model of creating performancebased electricity incentives based on different technologies' generation costs, whereas other states are considering alternative approaches. To date, no broad, open-ended feed-in tariffs have been created in the US, but political momentum for the policy appears to be building, and the US dialogue on feed-in tariffs is continuing to evolve."

- Sijm, J. P. M. (2002). *The Performance of Feed-in Tariffs to Promote Renewable Electricity in European Countries*. ECN-C--02-083.

Abstract: "Over the past decade, feed-in tariffs have been a major instrument of European countries to promote the generation of electricity by means of renewable energy sources. This paper discusses the performance of feed-in tariffs to stimulate renewable electricity in European countries, particularly in Germany, Denmark and Spain. It concludes that a system of premium feedin tariffs has shown to be an effective instrument to promote the generation of renewable electricity, notably to ensure a low-level market take-off of wind power at the national level. In the longer term, however, such a system may become hard to sustain as it may suffer from some major drawbacks, especially when the generation of green electricity accounts for a significant share in total power production. These disadvantages refer particularly to the fact that a system of fixed premium prices tends to be costly, inefficient, distortive of competitive pricing and, hence, incompatible with the creation of a single, liberalised electricity market in Europe."