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THE PROPOSED NEW APPROACH TO ACCOUNTING FOR LEASES: A CALL FOR A LEGAL AND ECONOMIC ANALYSIS OF U.S. EQUIPMENT LEASES

By Rodney W. Hurd and Don L. Weaver

In 2006, the Financial Standards Accounting Board and International Accounting Standards Board formally added accounting for leases to their respective agendas. In this comprehensive, landmark article, the authors recommend an interdisciplinary approach to U.S. true equipment leasing. More importantly, however, they call for a course correction to the FASB-IASB joint convergence project.

DEFAULT RISK HEDGING FOR LEASE PORTFOLIOS

By Deborah Cernauskas, PhD, and Andrew Kumiega, PhD

The use of derivatives to hedge risk is a growing factor, especially in the over-the-counter market. This Foundation-sponsored research explains the uses of credit default swaps, constructs a sample portfolio, and evaluates the use of credit default swaps to hedge default risk.

TAX POLICY FOR FINANCING ALTERNATIVE ENERGY EQUIPMENT

By Gilbert E. Metcalf, PhD

U.S. energy policy can learn much from the policies of Denmark, Spain, and Germany, to name a few countries that are leading the way in renewable energy generation. In part, the payoff would be better policies for encouraging investment in renewable electricity capital, as this Foundation-sponsored article demonstrates.

INVESTING IN ALTERNATIVE ENERGY EQUIPMENT AND PROJECTS

By Paul Bent

The needs of creative entrepreneurs led to the birth of the equipment leasing industry. The industry now has an opportunity to influence the development and deployment of alternative energy generating systems. This article, sponsored by the Foundation, explains how.

WINNER ANNOUNCED FOR 2007 ARTICLE OF THE YEAR





Tax Policy for Financing Alternative Energy Equipment

By Gilbert E. Metcalf, PhD

Rising energy costs, along with energy security and climate concerns, have increased national interest in and attention to renewable electricity generation. While the United States has made great strides in renewable energy investment, it has been far outstripped by many European countries. The purpose of this analysis is to glean lessons from the European experience and make recommendations for future policy in the United States.

This report is an excerpt from the 2007 Foundation study, *The Future of Financing Alternative Energy Equipment,* which is available at www.leasefoundation.org.

INTERNATIONAL COMPARISONS

The major focus of this article is to identify policies to encourage investment in renewable electricity capital that may be more effective than current U.S. policies. Table 1 shows a comparative analysis of a number of key developed countries. It shows that the United States lags sharply in its growth rate for renewable capacity.

The United States had an annualized growth rate between 1990 and 2004 of just under 3%, while the European Union (EU) 15 as a group exhibited a growth rate of over 16%. The U.S. growth rate has increased in the first half of this decade, but it is still far below that of the EU-15 or any of the high-growth countries within the European Union. Germany and Spain are particularly noteworthy with annual growth rates of 19% and 30% respectively since 2000.

The next three figures (page 2) provide information about the share of renewable energy in generation for three key renewable resources. Figure 1 shows the share of wind in renewables for the leading EU countries. Denmark, Spain, and Germany are the European leaders. The United States lags far behind many of these countries. It does slightly better relative to other EU countries in solar power (Figure 2), although solar has not made much of an inroad in any of these countries.[1]

The United States also lags behind many EU countries in biomass generation as a share of its total generation (Figure 3). Finland is the world leader in biomass, followed by Denmark and Italy. These data suggest important policy differences between the United States and Europe.

Table 1.

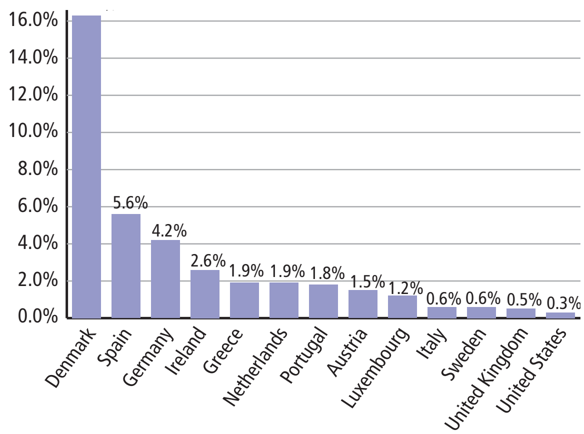
Annualized Capacity Growth Rates

Year	US	EU-15	Denmark	Germany	Neth	Spain	UK
1990-1995	2.3%	10.1%	17.4%	20.7%	17.2%	15.3%	31.5%
1995-2000	0.8%	20.0%	25.3%	27.0%	12.1%	53.0%	18.4%
2000-2004	5.2%	16.4%	7.5%	18.9%	16.6%	30.1%	10.7%
1990-2004	2.9%	16.6%	17.8%	23.9%	16.5%	34.5%	21.5%

Source: Energy Information Administration and author's calculations

Figure 1.

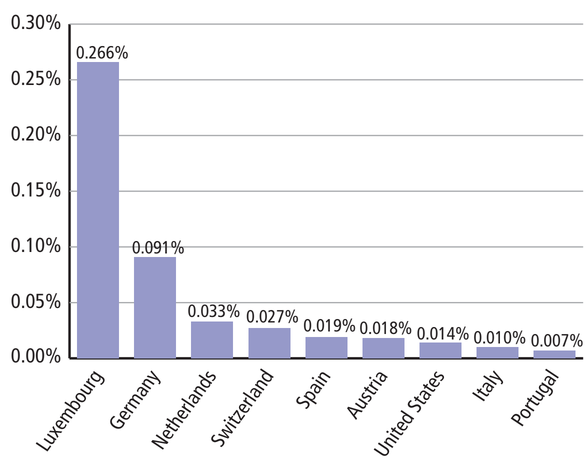
Wind Share in 2004 Generation



Source: International Energy Administration

Figure 2.

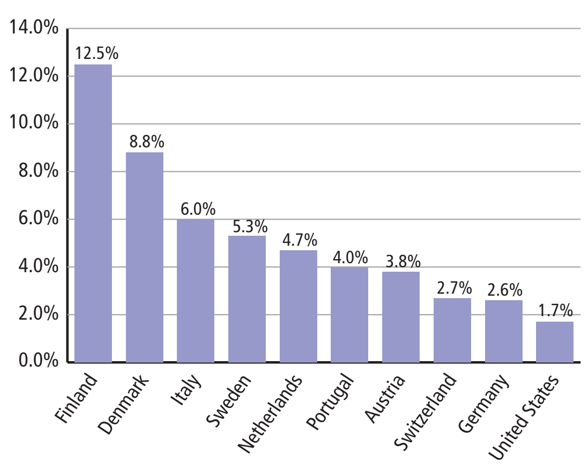
Solar Share in 2004 Generation



Source: International Energy Administration

Figure 3.

Biomass Share in 2004 Generation



Source: International Energy Administration

POLICY REVIEW

This section describes various policies used to support renewable electricity generation investment in the United States and other developed countries. The United States has historically supported renewable capacity investment through the federal tax code and through state-level renewable portfolio standard (RPS) programs. Europe, in contrast, has relied heavily on feed-in tariffs.

What these three instruments have in common is that they increase the revenue received by sellers of renewable electricity, the first through tax credits and the latter two through payments from electricity purchasers (grid operator or distributor).[2]

A key difference among the programs is the source of funds for the subsidy. For tax credits, the subsidy is paid for by the taxpayer, while for the feed-in tariff and RPS programs, it is paid for by rate-payers. As discussed below, this has major implications for the political support shown for the various programs. In addition to these three support mechanisms, there is a fourth support structure, tender programs, that has been used but is being supplanted by these other mechanisms.

Feed-in Tariffs

Feed-in tariffs are policies that require electricity suppliers to purchase power for renewable electricity sources at given prices for a set number of years. The price is either a fixed tariff or a fixed premium above market prices. Feed-in tariffs subsidize renewable electricity production through the electricity rate base rather than the tax base and thus are generally more stable over the long run than tax credits. As discussed below, they also differ in that the value of the subsidy is not related to the profitability of the energy supplying company.

As of late 2006, 18 of the 25 countries in the European Union had some sort of feed-in tariff for renewable electricity.[3] Feed-in tariffs offer either a set price for electricity generated by the facility over a given number of years or a premium over the market price.

In general, suppliers are required to purchase electricity offered under the fixed tariff scheme but are not so obligated under the premium system. Rates typically are set so that the total payment under the premium system (the market price plus premium) exceeds the fixed tariff payment. One of the attractions of the feed-in tariff is that the rate set under the fixed tariff is generally based on the *retail* price rather than the delivery price for electricity.

Renewable Portfolio Standards

Renewable portfolio standards are policy measures with two components. First, quotas for electricity produced from renewable sources are set, generally as a percentage of electricity production. The quotas must be met at a designated level, either by suppliers of electricity or by distributors. Second, generators of renewable electricity typically obtain renewable energy certificates (RECs) that are marketable.

Trading in RECs occurs with the group that is required to provide evidence that it has achieved its renewable quota, doing so by submitting RECs to the monitoring agency. The market price for RECs provides a subsidy to renewable electricity generators that, combined with the market price received for selling electricity, offsets their higher generating costs.

The European experiment with feed-in tariffs and renewable portfolio standards suggests that feed-in tariffs may dominate RPS systems as effective policy tools to encourage investment.

In Europe, there are RPS programs in Belgium, Italy, Sweden, the United Kingdom, and Poland. To date, it does not appear that the RPS systems in Europe have been particularly effective. Belgium allows a penalty for noncompliance with the target of €92 per MWh in the Walloon region and €110 per MWh in Flanders. Given the limits in place, it is more advantageous to pay the penalty than purchase certificates.[4] Italy and Poland's quotas appear to be poorly regulated.

The United States has enthusiastically embraced RPS programs at the state level. Thirty programs run by states, local governments, or utilities operate in 26 states.[5] Of these, 21 states and the District of Columbia run mandatory RPS programs covering roughly 40% of the nation's electrical load.[6] In their assessment of state-level programs, Wiser et al. conclude that "experience with these policies remains somewhat limited; few of the states have more than five years of experience with their programs, and some of the policies have been established but have not yet taken effect."[7]

Tax Incentives

In Europe, only Finland and Malta rely entirely on tax incentives to encourage the production of renewable energy.[8] Finland subsidizes electricity produced from renewable sources at different rates according to the fuel and provides investment tax credits up to 30% for renewable capital (40% for wind).[9]

Other countries use tax incentives to supplement other policies, most notably the feed-in tariffs. The United Kingdom, for example, supplements its green renewables and quota instrument with a "climate change levy," currently set at £4.30 per MWh, with an exemption for generation from new renewable capacity.

The United States relies extensively on three forms of tax incentives to support renewable electricity.[10]

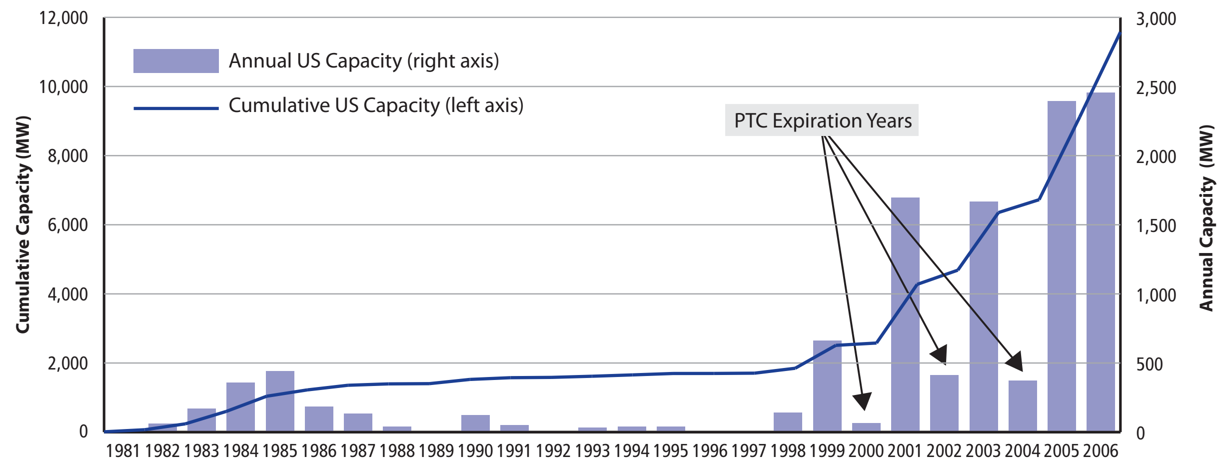
- Depreciation. Renewable electricity capital using wind or solar is allowed a five-year accelerated depreciation tax life.
- Production tax credits (PTCs). Most renewal electricity (except solar) is allowed a 1.9 cent per kWh production tax credit. This is subject to biennial reauthorization, and the current credit expires at the end of 2008.[11]
- Investment tax credits (ITCs). Solar and fuel-cell powered electricity installations are allowed a 30% investment tax credit.

Of these three incentives, the PTCs have received the most attention, both for their effectiveness at stimulating investment as well as the negative impacts of uncertainty over reauthorization at different times.[12] Wiser notes that it "is difficult to overstate the importance of the PTC to the wind industry over this time frame, as well as the negative consequences of PTC expiration for the industry in 2000, 2002, and 2004."[13] He provides a graphic illustration of the boom and bust nature of the PTC and its impact on wind capacity investments.

The production tax credit expired first in June 1999 and was not extended until December 1999. Wind capacity additions fell by over 90% between 1999 and 2000. Two years later, the PTC lapsed in December 2001 and was extended in February 2002. Again, capacity

Figure 4.

Wind Generation Capacity Growth in the United States



Source: Ryan Wiser testimony before U.S. Senate Banking Committee, 2007

additions fell from 1,696 MW in 2001 to 410 MW in 2002. The PTC next expired in December 2003 and was extended again the following October, and capacity additions in 2004 fell by three-quarters from the previous year.

Finally, it is worth noting that 2005 was the first year that the PTC was extended prior to its expiration, and capacity additions actually rose in 2006 from the 2005 levels.

Tender Programs

Ireland and France have had tender programs in which the state published tender offers for the supply of renewable electricity. Firms then supply the electricity and are paid by the state. France has shifted from a tender to a feed-in tariff, and Ireland has recently announced plans to shift to a feed-in tariff.[14]

Policy Summary and Analysis

Feed-in tariffs have been a popular policy instrument to encourage investment in renewable electricity generation in Europe. As of late 2006, 18 countries had some form of a feed-in tariff in place. The use of feed-in tariffs in Europe stands in sharp contrast to the use of quotas and green certificates in the United States in RPS programs. The view in Europe is that feed-in tariffs have been very successful at stimulating renewable investment. To quote from a recent EU study, "… all countries with an effectiveness higher than the EU average [for wind] use feed-in tariffs. This type of system currently has the best performance for wind energy."[15]

The report finds that Germany, Spain, and Denmark have the most effective renewable support systems for wind—all of these being feed-in tariffs. Feed-in tariffs have also been successful for biomass, especially in Denmark. The EU study notes, however, that the wide variety of biomass sources and the heterogeneity of the industry make the superiority of the tariffs less clear cut.

FINANCING ANALYSIS

The review of alternative energy policies in the United States and Europe suggests that renewable capital investment can be encouraged in a number of ways. The United State relies primarily on tax incentives, including accelerated depreciation and production or investment tax credits. Europe, in contrast, has found feed-in tariffs to be very successful in encouraging investment. In measuring the value of current incentives in the United States and comparing them to alternative policies, we consider two alternative policies in particular: investment expensing and feed-in tariffs. The approach used to compare investment subsidies is a levelized cost analysis.

The levelized cost analysis measures what price must be received for electricity sold by a generator to cover fixed and variable costs of providing the electricity, including the required return for equity owners.[16] This approach has been used in a variety of studies of electric power generation.[17]

This study estimates the levelized cost for the following electricity generation sources: natural gas combined cycle, biomass, wind, solar thermal, and solar photovoltaics (PVs). Natural gas is included because renewables are often viewed as a potential substitute for gas.

Table 2.

Alternative Incentive Programs

	Current Policy	Expensing Only	FIT 25%	FIT 50%	FIT 75%
	(1)	(2)	(3)	(4)	(5)
Natural Gas	5.47	5.47	5.47	5.47	5.47
Biomass	5.34	4.99	5.10	4.24	3.27
Wind	5.04	4.89	4.79	3.94	2.96
Solar Thermal	10.89	13.66	14.27	13.42	12.45
Solar PV	19.93	25.82	27.76	26.91	25.94

Source: Author's calculations.

Column 1 of Table 2 reports levelized costs of electricity in cents per kWh (year 2004 dollars). We assume that the plant will be placed in service after Jan. 1, 2006; therefore, solar power is not eligible for a production tax credit but does obtain the IRS Code's more generous 30% Section 48 investment tax credit.[18]

The first column in Table 2 reports the levelized costs for the different generating sources under current policy. With existing tax policy, wind and biomass are cost competitive with natural gas. The two forms of solar electricity are considerably more expensive.[19]

The rest of Table 2 discusses alternative policies to the current production and investment tax credits. The first policy option is to eliminate the production and investment tax credits and allow investors to expense their investments. This policy change favors biomass and wind. It adversely affects solar generated electricity, raising its cost by roughly one-third.

Another option is to replace the various tax incentives with a renewable portfolio standard. For solar power to become cost competitive, an RPS policy would have to require enough solar power to drive the price of green certificates for solar over 9¢ for solar thermal and 23¢ for solar PV. It appears that minimal to no limits would be required for wind and biomass to continue to be cost competitive with gas.[20]

A third option to take the place of production or investment tax credits is a European style feed-in tariff. This study models a 10-year fixed tariff that is set in nominal terms. Electricity prices exhibit volatility and a trend in nominal terms so that the feed-in tariff becomes less valuable over time.[21] The expected present discounted value of the revenue stream from the feed-in tariff lowers the levelized cost of the project.

Table 2 shows three policy scenarios. They differ in the amount that the rate guarantee exceeds current electricity prices. At the 2005 average generation price of 5.4¢ per kWh, this would be a guarantee of 6.8¢ per kWh. Even at a rate guarantee that exceeds current prices by only 25%, wind and biomass producers would be better off than with the current production tax credits. Solar generation is disadvantaged by this policy change.

We can compute the break-even guarantees for the different renewable electricity sources that make generators indifferent between the PTCs or ITCs and the feed-in tariff.[22] The break-even guarantee for biomass is 7% over current prices; it is 17% over current prices for wind. For an electricity price of 5.4¢, this translates to a fixed tariff rate of 5.8¢ for biomass and 6.3¢ for wind.

The break-even rate for solar thermal is 119%, or 11.8¢ given an electricity price of 5.4¢. Solar PV requires a rate guarantee that is 237% greater than existing prices, or 18.2¢, in order to obtain the same benefits as solar PV generators receive with the investment tax credit.

Summing up, it appears that a modest feed-in tariff would be sufficient to provide at least the same level of support for wind and biomass as is obtained under the current production tax credit program. An additional benefit not modeled here is the stability of total price received by investors relative to a production tax credit or a premium-based feed-in tariff. Evidence from Europe suggests that this stability provides additional value to investors.

CONCLUSION

The analysis in this paper provides a number of lessons to guide future renewables policy in the United States. First, it is clear that Europe has been extraordinarily successful in spurring renewable electricity capital investment. Second, the European experiment with feed-in tariffs and renewable portfolio standards suggests that feed-in tariffs may dominate RPS systems as effective policy tools to encourage investment.

Third, the U.S. preference for tax incentives has clearly not had the same stimulative investment as have feed-in tariffs. This is due in part to the on-again, off-again nature of production tax credits with a two-year authorization cycle in Congress. But it is also likely due to the inability of many firms, especially start-up firms, to take full advantage of the tax incentives.

Fourth, a modest feed-in tariff for wind and biomass would make these technologies cost competitive with natural gas. Moreover, the tariff responds to market conditions in a way that production tax credits do not. The feed-in tariff responds automatically to market conditions with the subsidy increasing if purchase prices fall and phasing out as purchase prices rise.

Fifth, it is clear that considerable research and technological development will be required before solar electricity can compete in the marketplace, regardless of the pricing support policy in place. The very high costs of solar suggest that a two-tiered approach for renewables support might be sensible. In the first tier, wind, biomass, and geothermal would likely benefit from a shift away from production tax credits to a fixed, feed-in tariff system. In the second tier, solar, on the contrary, would likely benefit from continuing with the 30% investment tax credit put in place by the Energy Policy Act of 2005.

Acknowledgments

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In addition, Steve Atlas provided able research assistance on this project.

Endnotes

1. Looking beyond the European Union, Japan is the world leader in solar capacity, with 1,132 megawatts installed as of 2004. This is in contrast to 753 MW installed in the United States.

2. For RPS, this assumes permits are required of grid operators or distributors.

3. Klein, Arne, et al., "*Evaluation of Different Feed-in Tariff Design Options—Best Practice Paper for the International Feed-in Cooperation*" (Karlsruhe, Germany: Institute for Systems and Innovation Research and Energy Economics Group, 2006).

4. European Commission, "Belgium—Renewable Energy Fact Sheet" (Brussels: European Commission, 2007). www.ec.europa.eu

5. Database for State Incentives for Renewables and Efficiency, 2007. This list is current as of May 2007.

6.Ryan Wiser et al., "The Experience with Renewable Portfolio Standards in the United States," *The Electricity Journal*, Vol. 20, No. 4 (2007), pp. 8–20.

7. Ibid., p. 12.

8. Malta does allow a fixed feed-in tariff for small solar (below 3.7 kWp). European Commission, "Malta—Renewable Energy Fact Sheet" (Brussels: European Commission, 2007). www.ec.europa.eu

9. European Commission, "Finland—Renewable Energy Fact Sheet" (Brussels: European Commission, 2007). www.ec.europa.eu

10. For greater detail and analysis of U.S. energy tax policy, see Gilbert E. Metcalf, "Federal Tax Policy Towards Energy," *Tax Policy and the Economy*, Vol. 21 (2007), pp. 145–184.

11. The Senate Finance Committee has proposed a five-year extension as part of deliberations over the current energy legislation in Congress.

12. Production tax credits operate in a similar fashion as premium feed-in tariffs. A key difference is the source of funding for the tax credits and the political nature of their funding process.

13. Ryan Wiser, "Wind Production and the Production Tax Credit: An Overview of Research Results." Testimony presented before the Senate Finance Committee, Washington, D.C., 2007, p. 5.

14. European Commission, "The Support of Electricity from Renewable Energy Sources," Communication from the Commission. (Brussels: European Commission, 2005). www.ec.europa.eu

15. Ibid., p. 6.

16. The price is a constant real price received over the life of the plant to cover lifetime fixed and variable costs.

17. John Deutch and Ernest J. Moniz, eds., *The Future of Nuclear Power* (Cambridge, Mass.: Massachusetts Institute of Technology, 2003); Tolley, George, and Donald Jones, *The Economic Future of Nuclear Power* (Chicago: University of Chicago, 2004), www.anl.gov/Special_Reports/NuclEconAug04.pdf; and Ram C. Sekar et al., "Future Carbon Regulations and Current Investments in Alternative Coal-Fired Power Plant Designs," joint program report (Cambridge, Mass.: MIT Joint Program on the Science and Policy of Global Change, 2005). The author's methodology and parameter choices are full described in Metcalf, 2007.

18. The author has not assumed any limitations on credits from the alternative minimum tax.

19. If solar power is installed as distributed capacity, the appropriate comparison rate is the retail rate. Residential customers pay the highest rates and paid an average rate of 9.45¢ in 2005, according to the Energy Information Administration. Even with this higher comparison rate, solar electricity is not cost competitive without further incentives.

20. This assumes that gas is the marginal fuel source displaced by wind and biomass. The Energy Information Administration's 2007 "Analysis of Alternative Extensions of the Existing Production Tax Credit for Wind Generators" suggests that large-scale expansion of wind would replace coal over time. If prospective investors are choosing between coal and renewable projects, positive green certificate prices would be required to get the desired expansion in wind.

21. We model electricity prices as having no expected trend in real terms, based on assumptions in the "Annual Energy Outlook 2007." We assume that the log of price has a standard deviation of 5%. The value of feed-in tariffs is not appreciably affected by the volatility of prices over reasonable ranges. We calculate the value of the feed-in tariff as the expected present discounted value of the subsidy paid to generators using an 8% nominal discount rate. Expected values are computed using Monte Carlo methods with 5,000 replications.

22. It is important to stress that this modeling assumes that firms receive the full benefit of the tax credits. As noted above, this does not occur for all firms. They would, however, receive the full benefit of the feed-in tariff regardless of tax status.

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