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MEMORANDUM

17 June 2010

TO: Ben Schreiber and Erich Pica, Friends of the Earth

FROM: Doug Koplow, Earth Track, Inc.

SUBJECT: Review of accelerated depreciation, investment tax credit, and production tax credit provisions of Senator Kerry's and Senator Lieberman's American Power Act

In May 2010, Senators John Kerry (D-MA) and Joseph Lieberman (I-CT) released a discussion version of *The American Power Act* (henceforth referred to as the "K-L Bill" or the "APA"). The K-L Bill as proposed is a wide-ranging piece of energy legislation that includes a number of new subsidies to nuclear power. This memo evaluates three of those nuclear provisions, describing how they work and estimating their subsidy value to recipients in the nuclear power sector:

- 5-year accelerated depreciation period for new nuclear power plants (section 1121).
- Investment tax credit (ITC) for nuclear power facilities (section 1122) and the related grants for qualified nuclear power facility expenditures in lieu of tax credits (section 1126).
- Modification of credit for production from advanced nuclear power facilities (section 1124).

The K-L Bill includes a number of subsidies to nuclear power that were not evaluated in this memo, and as a result this memo should be viewed as one part of a larger picture of how federal subsidies distort US energy markets and fuel choice.[1] The values presented

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[1] New subsidies in K-L not assessed here include eligibility of nuclear investments for the advanced energy tax credit, access to tax-exempt private activity bonds for nuclear projects, provision of more federal insurance against regulatory delays, and a large increase in the pool of federal loan guarantees for nuclear facilities. In addition, there are many subsidies to nuclear power already in current law. The total cost of

in this memo reflect the subsidies from these three new proposals. They do no represent the sum total of subsidies to the nuclear power sector, which would be substantially higher.

I. Summary Values

Table 1 provides a summary of the subsidies provided by these three tax breaks. K-L appears to restrict using both the nuclear ITC and production tax credit (PTC) subsidies concurrently. Values shown per kWh and per reactor do not include the PTC, as the ITC seems more lucrative under most conditions. In addition, the values also reflect the fact that using the ITCs slightly reduces the value of the 5-year depreciation rules.

- **K-L subsidies worth billions per reactor.** The new subsidies will be worth between $1.3 and nearly $3.0 billion per new reactor on a net present value basis. This is equivalent to between 15 and 20 percent of the total all-in cost of the reactors, as projected by industry.

- **New subsidies will undermine equity requirements of the nuclear loan guarantee program.** Despite significant structural weaknesses in DOE's Title 17 loan guarantee program, the rules at least required investors to hold a 20 percent equity stake in the new project. A key goal of this requirement is to ensure investors have a strong interest in the long-term success of the venture. However, the K-L bill would in effect allow investors to recover funds equal to this equity share within the first few years of plant operation. Financial risks from project failure would then rest almost entirely with taxpayers.

- **New nuclear subsidies on offer under K-L are worth 15 to more than 50 percent of the expected market value of power the plants will produce.** This is *in addition* to the many other subsidies the nuclear projects would already receive.

- **K-L "progress payments" allow ITCs to be claimed before reactor opens, greatly increasing taxpayer risks.** Bill language to recapture these credits is unlikely to be effective in a situation where a reactor project goes into bankruptcy.

- **Aggregate tax subsidies to new reactors could reach tens of billions of dollars (net present value) from K-L's two main tax breaks alone.** The national cost of K-L's tax provisions can be benchmarked by evaluating two build-out scenarios: 6 reactors, matching the number likely to be supported under K-L's expanded nuclear loan guarantee pool; and 22 reactors, matching the number going through

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nuclear subsidies, and their related market distortions, needs to incorporate all of the subsidy policies together.

NRC licensing as of May 2010 (Jaczko, 2010). As not all reactors will be the same type, the calculations assume half are AP1000s and half Areva EPRs. Under a 6 reactor scenario, K-L will add $9.7 to $15.6 billion in tax subsidies to nuclear power on a net present value basis. Under a 22 reactor scenario, the net present value of subsidies on offer just through 5-year depreciation and ITCs reaches $35.7-$57.3 billion. Unlike the PTC, neither of these other subsidies have any national caps, so the taxpayer cost scales linearly with reactor count.

Table 1:
Summary of Evaluated Nuclear Subsidies Under K-L

	AP1000		Areva EPR		Notes/
	Low	High	Low	High	Sources
Size (MWe)	1,154	1,154	1,600	1,600	
Total all-in cost of new build($mils)	8,600	11,250	13,000	15,000	(1), (2)
Value per kWh (levelized c/kWh)					
5 yr deprec. vs. current law (Note 3)	0.29	1.57	0.32	1.51	(4)
New ITC and grants in lieu	0.59	1.60	0.64	1.54	
Total	0.88	3.17	0.96	3.05	
Net present value per reactor ($mils)					
5 yr depreciation vs. current law	432	1,108	653	1,478	(4)
New ITC and grants in lieu	860	1,125	1,300	1,500	
Total	1,292	2,233	1,953	2,978	
Subsidy intensity					
Average value of power (c/kWh), 2010-24	5.7	6.0	5.7	6.0	(5)
K-L subsidies/value of power produced	15.5%	52.9%	16.9%	50.9%	
K-L subsidies/all-in cost of reactor	15.0%	19.8%	15.0%	19.9%	

Benchmarking national cost of new K-L tax subsidies to nuclear ($mils, NPV)

Assumed reactor mix for new construction	*50% AP1000; 50% Areva EPR*		
	Low Estimate	High Estimate	
Per reactor subsidies from depreciation, ITC	1,622	2,605	
Estimated national cost			
6 reactors (funded by $54b in loan guarantees)	9,733	15,632	
22 reactors (NRC licensing queue as of May 2010)	35,688	57,317	(6)

Notes and Sources

1. (1) Bell Bend.com (2010).
2. (2) DiSavino (2010).
3. (3) Already subsidized in the baseline; comparison to license life would yield even higher values.
4. (4) Values net of interactions with ITC (50% of ITC doesn't receive accelerated depreciation benefits).
5. (5) Average projected value of generated electricity. Low estimate from reference case; high estimate from high oil price case. U.S. Energy Information Administration (2010).
6. (6) Jaczko (2010).

II. Approach

Evaluating these provisions included two main steps: reviewing the legislative language to evaluate applicability, scope, and interactions with other subsidy provisions; and estimating the value of these subsidies to the nuclear power sector.

Evaluating scope and applicability. The language in the APA is purposefully vague. This analysis involves interpretations on what the legislation will do and how the subsidies can be applied, rather than definitive judgments. Section 1122(b) is a good example as to why gauging the full impact of the K-L Bill is challenging. While many bills incorporate opaque references to existing statutory or tax code for the new Bill language, APA also pulls in definitions from long-amended versions of the US Code:

> *Rules similar to the rules of subsections (c)(4) and (d) of section 46 (as in effect on the day before the enactment of the Revenue Reconciliation Act of 1990) shall apply for the purposes of this section to the extent not inconsistent herewith.*

This intentionally deceptive language of course makes it difficult to gauge the actual subsidies that Kerry and Lieberman are including in the bill. Detailed legislative language as it stood 20 years ago is not easy to come by, and K-L have made a strategic decision not to provide it.

Subsidy costing. The second step was to apply the statutory information into costing the subsidies associated with the legislative proposal. This was done using two representative reactor types: Westinghouse's AP1000 and Areva's Evolutionary Power Reactor (EPR). These two reactor types have been proposed for the vast majority of new plant proposals currently in the US pipeline.

A number of other input variables needed to calculate subsidy values are based on government statistics, industry data, or press reports. Where uncertainty or differing views of the industry's prospects resulted in wide variance in input values, high and low inputs were used to bound the subsidy estimates. Even the lower-bound estimates are substantial.

- **Reactor cost**. Industry cost estimates, as reported in press reports or regulatory filings, were used to estimate the all-in cost of both reactor types. The AP1000 information comes from a May 2010 regulatory filing by Progress Energy. The Areva EPR cost estimate comes from the website set up to provide information on PPL Electric Utilities' planned EPR reactor in Bell Bend, PA. This information represents "all-in" costs that include financing the reactor during construction. Using only "overnight" costs (ignoring financing and some other costs to get power to the grid) would have generated lower, but less accurate, subsidy values. All-in costs more closely track the full cost-recovery prices at which new nuclear power will be delivered -- the basis on which the reactors will need to compete with other forms of energy. All-in costs are also the cost basis on which the allowable investment tax credits and depreciation is calculated.[2]

- **Capacity factor.** To estimate subsidies per kWh, we needed to benchmark the likely net generation from the new plants. This is done using estimates of the "capacity factor," comparing actual generation to theoretical rated capacity. Promotional materials from both reactors reported their new designs will have a lifetime capacity factor of 93%. This is unrealistically high, exceeding even the current load factors at US plants despite decades of experience in running them. Capacity factors for new reactors and reactor designs are often much lower than predicted, as operators work through problems at start-up and gain experience with the plant. Factors may decline as the plant ages as well, as more time is needed for maintenance. The historical weighted average capacity factor for the U.S. nuclear fleet through 2008 was less than 76%, according to data compiled by the U.S. Energy Information Administration (EIA, 2009). The calculations used here assume a capacity factor of 84.5%, the midpoint between advertised capacity factors and actual historical weighted average values for the U.S.

- **Cost of capital.** If subsidies are provided over multiple years, cash flows need to be brought back to a common point in time for comparison. Net present values were calculated using an estimate for the firm's cost of money -- specifically, their real weighted average cost of capital that reflects the capital mix (the proportion of debt versus more expensive equity) that would be used for a new reactor project. Real values are used to eliminate the impact of inflation on the numbers presented.

  There are many complications in assessing an appropriate cost of capital. These include subsidies already in the baseline (depressing market benchmarks used as proxies for future capital costs), government programs that alter the capital mix used (allowing more debt in benchmarks, also driving down the apparent capital cost in the resultant proxies), and a lack of historical data on unsubsidized merchant nuclear plants (the data set that would provide the most accurate cost of capital proxies). While not optimal, these limitations have been addressed through the use of high and low estimates. The low cost of capital assumes of 5% real rate (reflective, perhaps, of the cost of a plant mostly financed by government-guarantee loans)(NEA, 2010)[3] and high real capital cost of 12%

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[2] Note that the all-in costs used in this memo to calculate the subsidies are not the highest estimates available. Figures from investment analysts have often been higher than utility-reported figures. In addition, it is not clear from the cost descriptions whether the utility values used here completely integrate all related transmission costs to reach the grid.

[3] A 5 percent real discount rate on a new nuclear power plant is a highly optimistic scenario unlikely in any situation absent large shifting of default risks to another party. Though some comparative assessments (e.g., NEA 2010) have used a 5 percent real discount rate to compare energy technologies, even here they acknowledge capital costs for merchant plants could be much higher. MIT's 2003 analysis of nuclear plants

(Rothwell, 2004). Given the lack of real world experience with unsubsidized reactor construction, there is a strong likelihood that real capital costs could be substantially higher than 12% real, at least through the construction phase (Koplow, 2005).

- **Tax rates.** Some tax subsidies generate value to taxpayers because they allow them to shield current income from taxes for a period of years. The higher their tax rate, the larger the amount of taxes otherwise paid that they get to keep for awhile longer. Our low estimate assumes a 30% tax rate. This is lower than the federal corporate rate in the United States, but a reasonable approximation of the effective tax rate incurred by firms already getting some tax subsidies. The high estimate uses a 38% rate, incorporating the 35% federal rate plus an estimated of 3% additional that the plants incur through sub-national taxes at the state, county, or local levels.[4]

III. Accelerated Depreciation (Section 1121)

1. Overview

Normal rules for corporate reporting in the U.S. match the write-off of capital investments (i.e., expenditures on items lasting more than one year) with the expected service life of the investment. The rationale is to pair investment cost with the multiyear services and revenues the investment provides, making the underlying economics of the activity more transparent. In most cases, partial or complete write-downs can be taken immediately (expensed) only if the capital value is impaired, such as when a plant is damaged by fire.

In contrast, accelerated depreciation shortens the write-off period by statute for tax purposes, regardless of actual service life. The effect is to allow higher tax deductions in the early years of an investment. This allows funds that would otherwise have been paid to the government to remain inside the firm where it can finance operations (or even to be paid out to managers or shareholders). Accelerated depreciation provides a time-value of money benefit, since higher deductions in the early years of an investment reverse later on. The net present value benefits of this tax break can be quite large, especially in industries such as nuclear power that have high costs of capital. The larger the investment, and the more rapid the write-off relative to actual service life, the larger the subsidy will be.

Nuclear power plants already benefit from highly accelerated depreciation benefits. Whereas the reactor life is expected to be 60 years, and the initial license period 40 years, existing law allows accelerated write-down in only 15 years. This is shorter

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also generally included optimistic cost and financing assumptions, but used a base-case discount rate of 8.5% real (MIT 2003: 132).

[4] Note that for some levels of income, the top federal rate alone is 38%. However, for the scale of earnings a new reactor would have, a federal rate of 35% is a better proxy.

than allowed even for other thermal power plants. Depreciation deductions begin in the year a plant is placed in service.

The K-L bill would not only shorten this period from 15 years to five, but in so doing would allow a more favorable depreciation method to be used. The 15-year asset classification stipulates the 150% declining balance method.[5] The 5-year asset classification allows the even more favorable 200% declining balance to be employed. As shown in Table 2, the impact of these two changes in front-loading the tax write-offs is quite dramatic. Under K-L rules, 71% of the initial investment would be written off by only the third year of new plant operations. This is more than three times the write-off that would occur under existing law, and almost 17 times the deduction that would occur if the reactor were actually depreciated over its stated 60-year service life.

By the time the Loan Guarantee Retention surcharges proposed by K-L (section 1102) kick in, nearly 95% of the total reactor cost would already have been written off. Accelerated depreciation acts as an interest-free loan from the government. The practical effect of the 5-year depreciation is to quickly replace most of the 20% of the plant investment that is required in equity-at-risk under the Department of Energy's Title 17 loan guarantee program with a *de facto* government loan in the form of accelerated depreciation tax benefits. This is *in addition* to the 80% of the plant cost that will be federally-guaranteed debt from inception, and means that within only a couple of years the investors would no longer have any net equity at risk.

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[5] The declining balance (DB) method applies a depreciation rate to the amount of the original investment that has not yet been written off. A 150% DB method allows rates 1.5 times the straight-line rates (where an equal percentage is written off each year), and a 200% DB allows rates at double the straight-line rate. The values in Table 1 show the percentage of the gross initial investment that may be deducted each year.

Table 2:
Depreciation Rules under potential schedules

	K-L Bill	Current Law	License Life	Reactor Life
Depreciation period	5	15	40	60
Method	200 DB	150DB	Straight Line	Straight Line
First year	1/2 yr conv.	1/2 yr conv.	1/2 yr conv.	1/2 yr conv.
% written off by end of 3rd year in operation	71.2%	23.1%	6.3%	4.2%
% written off by 5th year in operation when LG retention fees start (Sec. 1102 of the APA)	94.2%	37.7%	11.3%	7.5%
Depreciation factor in year:				
1	20.000%	5.000%	1.250%	0.833%
2	32.000%	9.500%	2.500%	1.667%
3	19.200%	8.550%	2.500%	1.667%
4	11.520%	7.700%	2.500%	1.667%
5	11.520%	6.930%	2.500%	1.667%
6	5.760%	6.230%	2.500%	1.667%
7		5.900%	2.500%	1.667%
8		5.900%	2.500%	1.667%
9		5.910%	2.500%	1.667%
10		5.900%	2.500%	1.667%
11		5.910%	2.500%	1.667%
12		5.900%	2.500%	1.667%
13		5.910%	2.500%	1.667%
14		5.900%	2.500%	1.667%
15		5.910%	2.500%	1.667%
16		2.950%	2.500%	1.667%
			Continues	Continues

2. Value of 5-year accelerated depreciation subsidy

The value of the accelerated depreciation benefits was quantified against three relevant benchmarks: current law (15-year 150% DB method), license life (40-year straight line), and expected service life (60-year straight line). The net present value figures shown here are for the year the plant enters service (the first year depreciation deductions are allowed), not when investment into the plant starts. The entire plant cost was included in the depreciable basis,[6] and the incremental deduction allowed in each year was calculated based on the Internal Revenue Service (IRS) rules. Values shown in Table 3 represent the net tax benefits only from the higher than normal deductions, not the higher deductions themselves.

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[6] K-L language includes tangible property, but excludes buildings or "structural components" from the 5-year rule. The industry is expected to argue that the vast majority of the investments are tangible property; the IRS may argue a lower amount. However, to the extent that the cost estimates include some investments not eligible for 5-year depreciation, the values will be overstated. This will offset some of the potential errors in the reverse direction associated with plant cost estimates that exclude transmission; or that are optimistically low (estimates by investment analysts have been systematically higher than those by the utilities). At present, the rules do not allow retrofits of existing reactors to use 5-year depreciation, though this would be a likely area of future lobbying by the industry.

A number of findings are striking:

- **Large subsidies relative to current law.** Depending on the tax rate and cost of capital, the 5-year accelerated depreciation will generate a net present value of roughly $450 million to $1.2 billion for every AP1000 reactor, and $700 million to $1.6 billion for every Areva EPR. This translates to an annualized value per reactor value of roughly $25 to $190 million over a single reactor's 40-year license life.[7]

- **Even lowest subsidy per kWh is 3x the total contribution to the nuclear waste fund.** Even the low subsidy estimate for comparing K-L to current law shows a subsidy of 0.3 c/kWh over the 40 year service life of the reactor. This is three times the total payments the industry (albeit through a ratepayer surcharge) incurs to shift all long-term responsibility for high level nuclear wastes to the taxpayer. Higher estimates show benefits in excess of 1.5 c/kWh, enough to distort the economics between competing energy options.

- **Accelerated depreciation rules for nuclear reactors would become a key element of their competitive advantage in power markets.** Comparing depreciation schedules under K-L to more realistic matching of depreciation with asset service life further illustrates how important rapid write-off of capital investments are to the industry. Even using the 40-year license life, K-L rules relative to a 40-year straight line depreciation schedule generate $1.2 to $3.1 billion in net present value subsidies per reactor. With higher capital cost assumptions, this translates to subsidies in excess of 3 c/kWh – more than half the expected market value of the electricity for 2010-24 under EIA's reference case scenario (EIA, 2010).

- **Reductions from use of investment tax credits (ITCs) are minimal.** K-L does include language ensuring that at least part of the taxpayer-funded investments in plants via the ITCs can't then be claimed by the plant owner as a depreciation deduction. As discussed in the section on the ITCs, the K-L rules are more favorable to industry than standard tax treatment. In total, they reduce the subsidies from the accelerated depreciation benefits by only about 5% (0.02 to 0.08 c/kWh relative to current rules). The reduction in depreciable basis reduces the net present value of the depreciation benefits by $22 to $77 million per reactor.

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[7] The high-end estimate tends to be significantly larger than the low end because not only is the all-in cost of the reactor assumed to be more but the tax rate is higher (increasing the share of spending shielded by the higher depreciation deductions) and the discount rate is more than doubled (greatly increasing the value of near-term deductions).

Table 3:
Value of 5-year depreciation compared to existing law, licence life, and reactor service life

I. Inputs

	AP1000		Areva EPR	
	Low	High	Low	High
Tax rate (%)	30%	38%	30%	38%
All-in cost of reactor ($mils)	8,600	11,250	13,000	15,000
Real cost of capital (%)	5%	12%	5%	12%
Reactor size (MWe)	1,154	1,154	1,600	1,600
Capacity factor	84.5%	84.5%	84.5%	84.5%
Annual generation (bil kWh/yr)	8.54	8.54	11.84	11.84
Interactions				
Reduced by use of ITC; does not appear to be reduced by use of the PTC.				
Reduced basis per ITC calc	430	562.5	650	750
Depreciable basis net of ITC	8,170	10,688	12,350	14,250

II. Summary of scenario results

	AP1000 Low	AP1000 High	Areva EPR Low	Areva EPR High
K-L 5yr vs. current law				
Total net present value ($mils)	$ 454	$ 1,166	$ 687	$ 1,555
Annualized value ($mils)	$ 26	$ 141	$ 40	$ 189
Average value, c/kWh	0.31	1.66	0.34	1.59
Interactions with ITC (K-L sec. 1122)				
Total net present value ($mils)	432	1,108	653	1,478
Annualized value ($mils)	25	134	38	179
Avg. value net ITC reductions, c/kWh	0.29	1.57	0.32	1.51
Net reduction per ITC	0.02	0.08	0.02	0.08
K-L 5yr vs. 40 yr license				
Total net present value ($mils)	$ 1,176	$ 2,322	$ 1,778	$ 3,095
Annualized value ($mils)	$ 69	$ 282	$ 104	$ 375
Average value, c/kWh	0.80	3.30	0.88	3.17
Interactions with ITC (K-L sec. 1122)				
Avg. value net ITC reductions, c/kWh	0.76	3.13	0.83	3.01
Net reduction per ITC	0.04	0.16	0.04	0.16
K-L 5yr vs. 60 yr. asset life (annualized values, c/kWh over 60 years rather than 40)				
Total net present value ($mils)	$ 1,462	$ 2,594	$ 2,210	$ 3,459
Annualized value ($mils)	$ 77	$ 312	$ 117	$ 416
Average value, c/kWh	0.90	3.65	0.99	3.51
Interactions with ITC (K-L sec. 1122)				
Avg. value net ITC reductions, c/kWh	0.86	3.47	0.94	3.33
Net reduction per ITC	0.05	0.18	0.05	0.18

IV. Investment Tax Credits (Sections 1122 and 1126)

1. Overview

ITCs were commonly used to subsidize capital investment from 1962 until their general repeal in the Tax Reform Act of 1986. Rates for any income producing property *except for utilities* were 7% from 1962 through 1975 (with periods in 1966-67 and 1969-71 where it was suspended or repealed) and 10% from 1975 through 1986. Income-producing equipment for use by utilities received rates of only half as much – 3-4% through 1975. The premise of a lower rate for utilities was that ITCs were supposed to reduce the risk of capital investment, but regulated utilities already received guaranteed returns through their public utility commissions. The ITC rates for utilities were bumped up to 10%, on par with other sectors from 1975 through repeal in 1986. (Koplow, 1993: B2-15). According to the Congressional Research Service, economists at the time of the ITC's repeal "were increasingly writing about the distortions across asset types that arose from the investment credit." (Hungerford and Gravelle, 2010: 7).

Although some forms of renewable energy have continued to receive investment tax credits since 1986 (26 USC 48), the eligible energy sources have tended to be far smaller in scale than a nuclear power reactor. Furthermore, K-L do not seem to have incorporated the earlier understandings on capital risk by reducing ITC benefits for lower-risk, regulated entities.

The K-L language also adds two other important elements that distort nuclear power economics and investment incentives:

- **"Progress expenditures"** allow plant owners to claim credits in advance of the plant actually being completed.[8] The credits would need some corporate tax liability to offset in order to be claimed (something a new reactor project would not have). However, nuclear reactors are normally owned by utilities via the use of nested limited liability corporations (LLCs) (see, for example, Schlissel, Peterson and Biewald, 2002). As a result, it is likely that even before the reactor has commenced operations (and associated revenue generation), tax credits from the nuclear ITC could be distributed out to LLC partners (owners) for immediate use.

  In addition to the large financial benefits of this "front-loading" of ITCs, the progress expenditures also greatly increase the risk that credits will be awarded for plants that are not completed, and lost. K-L anticipates this risk and contains language that requires the credits to be repaid in full the year there is any project cancellation or suspension. What is not clear, however, is how those provisions

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[8] K-L provides somewhat less generous claiming of credits for purchased components, though still allows them to be claimed in advance of the plant entering service. Though 26 USC 48 does allow progress expenditures for some of the renewable energy investments currently allowed investment tax credits, the dramatically larger scale of nuclear investments greatly increases taxpayer risks.

could be enforced for a single-asset LLC created to build a nuclear plant if the plant is cancelled. Firms might be able to pass the credits out to LLC partners for immediate use, but then later claim that the responsibility to repay the credits lies within the LLC itself, a now-bankrupt entity.

- **ITCs for non-taxpaying public entities.** Publicly-owned utilities pay no taxes, and thus are normally unable to use tax subsidies. K-L instead allows public entities to claim grants from the federal government in lieu of the tax credits (Section 1126).

2. Other attributes and interactions

- **Selection and revocation rules on ITCs.** If plant owners wish to claim credits before the plant enters service under the "progress expenditure" rules, they must formally notify the IRS of this election in their tax returns (Section (c)(4) of the proposed new section 48E of the tax code). This election seems rather permanent, as K-L notes it applies for that year and all subsequent ones and "may be revoked only with the consent of the Secretary". Yet section 48E(f)(1) of K-L then gives the taxpayer a further election to allow "this section [governing nuclear ITCs] not apply for any taxable year." Section 48E(f)(2) allows the election to be implemented retroactively up to three years. The language seems to hedge the investors' risk of choosing the wrong tax credit: if new information arises or more generous tax credits pass that change which tax credit is most valuable, the taxpayer can choose again.

- **Alternative minimum tax exemption.** Nuclear ITCs are not subject to alternative minimum tax rules under section 1122(g) of the bill.. This makes them more valuable, as they can reduce the taxes due from a relevant entity down to zero. K-L does not make the credits refundable to tax-paying entities (in that they convert to a grant if a firm has zero taxes due).

- **Longer time frame to claim credits than for prior nuclear subsidies.** The placed-in-service date to claim ITS is January 1, 2025. This is later than the placed-in-service date of January 1, 2021 in the current law for the nuclear PTC.

- **Double-dipping restrictions.** Taxpayers don't seem to be able to use both the ITC and the PTC.[9] Unlike the PTC, however, there is no cap on the amount of

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[9] The language in the ITC section is actually vague on this. It notes that the definition of a qualified nuclear power facility "shall not include any property which is part of a facility the production from which is allowed as a credit under section 45J for the taxable year or any prior taxable year" (K-L section 1122(b) as proposed for new section 48E(d)(1)(B)). This opens a potential gap because the PTC usage would occur in *subsequent* tax years. However, in combination with language via 45J edits (section 1122(f),, "No credit shall be allowed under this section [the nuclear ITC] with respect to any facility for which a credit is allowed under section 48C [advanced energy project credit] or 48E [advanced nuclear ITC] for such taxable year or any prior taxable year," there does not appear to be any way to claim them both for the same

claims that can be done using the ITC. There may be ways around this restriction, however, should it be economic to do so. The Vogtle reactor in Georgia, for example, has set up separate "projects" to build the reactor in order to optimize their ability to use different types of subsidized credit. Each project covers a portion of a single reactor just large enough to absorb the available subsidized credit instrument (Vogtle, 2010). A similar approach might be used for these reactors if the PTC was more attractive than the ITC for the portion of the plant for which it is available.

- **Reduced offsets to depreciable basis from ITCs.** Normally, tax credits claimed reduce the remaining depreciable basis of property (26 USC 50). However, K-L (section 1122(c)) would put treatment of nuclear plants under a special rule in 26 USC 50(c) that deducts from basis only 50% of the credit taken, allowing a depreciation tax shield on the remaining half even though it has already been taken off of taxes. (Recapture is done at this same rate, so as to avoid phantom basis increases above investment).

- **Unlimited grants in lieu of ITCs available without further Congressional review.** Sec. 1126 allows 10% ITCs "earned" by public investors in new reactors to be converted to cash grants upon the reactor being placed in service. Final applications for such grants must be made by January 1, 2025. Grants are "hereby appropriated" to Treasury in "such sums as may be necessary to carry out this section" (section 1126(h). Because the payments are not made based on reactor "progress" for non-taxable entities, the grants do not carry the same risk of non-performance as the ITC structure for private taxpayers.

3. Subsidy value of the nuclear investment tax credits

To simplify the calculation of the nuclear investment tax credits, the scenarios assume that the ITCs are taken in the year the plant enters service rather than through the "progress expenditures". This will understate the subsidy magnitude somewhat, though will put the estimates on a more similar basis with the PTC and 5-year depreciation values, also calculated for the year the plant enters service. This approach also avoids the complication of trying to assess the portion of total costs attributable to purchased components rather than "self-constructed property," which have different rules on claiming credits in advance of plant operation. ITC subsidy estimates are shown in Table 4.

On a net present value basis, the ITC is worth $860 million to $1.1 billion for an AP1000 reactor, and $1.3 to $1.5 billion for an Areva EPR. The total value and the net

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project (or part of a project) even in different years. The possibility of dividing a single reactor into multiple "projects" as noted above in relation to Vogtle may remain, however.

present value are equal because our scenario assumes the ITCs are all claimed in the year the plant enters operation. On a levelized cost basis over the 40 year license life, the ITC subsidy is worth from 0.59 to 1.6 c/kWh, depending on cost of capital assumptions.

Table 4:
Value of Investment Tax Credit for Nuclear Facilities

	Westinghouse AP1000		Areva EPR	
	Low	High	Low	High
Size (MWe)	1,154	1,154	1,600	1,600
All-in cost, $mils	8,600	11,250	13,000	15,000
Total tax credit, $mils	860	1,125	1,300	1,500
Annualized value of ITC over 40 year operating life				
Real interest rate	5%	12%	5%	12%
Number of years	40	40	40	40
Present value ($mils)	860	1,125	1,300	1,500
Annualized value ($mils)	$50	$136	$76	$182
Value per kWh				
Capacity factor	84.5%	84.5%	84.5%	84.5%
Annual output (bil kWh/yr)	8.54	8.54	11.84	11.84
Tax credit value, c/kWh	0.59	1.60	0.64	1.54
Associated reduction in depreciable basis from claiming ITC ($millions)				
50%	430	563	650	750

V. Modification of nuclear production tax credit (sec. 1124)

1. Overview

The nuclear power production tax credit (PTC) was first enacted in the Energy Policy Act of 2005. K-L would make a couple of important modifications to the rules (see Table 5). First, the national limitation on how much new capacity could claim the PTC would increase from 6,000 MW to 8,000 MW. (1124(a)). This would result in larger aggregate cost to taxpayers by allowing additional kWh of generation to claim the credit.

The second important change is to allow non-taxable partners to allocate PTCs available within the national limit on their project to the private investors on the reactor.

This means that the PTC for each plant can be claimed regardless of the facility's ownership structure. The PTC value associated with a non-taxable entity would likely be treated as deemed contributed capital to the project, reducing the amount of other funding they need to provide for a given percentage ownership in the deal. Other relevant factors include:

- The overall project limits (national cap, annual limitation, phaseout) remain in effect even if benefits are transferred (section 1124(b)).
- This transfer does not affect a public utility's access to municipal debt. Normal rules might treat the sale as converting more than 10% of a project to private use, requiring the use of private activity bonds for financing, issues that are more expensive and/or more restricted than municipal tax-exempt debt.
- No credit can be earned by public entity for investments bought by a government grant.[10]
- A PTC transferred from a public entity is not subject to the minimum income limits for use of credits under the general business tax. This appears to create a separate class of PTCs for publicly-owned utilities (section 1124(b)(2)) that can be sold to high-income tax payers and potentially are refundable as well. Ironically, despite these entities not paying any taxes at all, the tax credits might become more valuable for them than for private utility companies.
- Section 1125(c) strips away the placed-in-service end-date for the PTCs, stating only you can't earn them until after the enactment of this Act. It is not clear whether this shift also modifies the sunset provisions of the PTC as originally passed.

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[10] This limitation may not be particularly important, as K-L does not seem to require a pro-rata reduction in credit generation. Thus, to the extent the plant were not able to earn PTCs for the full amount of power production due to the national cap, the grants could simply be assigned to the portion of the project not able to generate credits anyway.

Table 5:
Overview of Section 45J Nuclear Production Tax Credits

	Current Law	Kerry-Lieberman	Notes
Value, c/kWh			
Taxable entities	1.8	1.8	
Tax-exempt entities	0	1.8	Can now be allocated to private partners, allowing POUs to capture the value.
Limitations			
Maximum number of credit years/facility	8	8	45J(a)
National MW capacity limitation	6,000	8,000	Credit reassignment after use by one facility was restricted in the Technical Tax Corrections Act of 2007.
National cap on payouts/year ($mils)	750	1,000	45J(c)(1)
Maximum total payout under policy ($mils)	6,000	8,000	National annual cap x 8 years of eligibility
Offsets based on use of other subsidized credit?	No	No	
Interactions			
Taxable entities	Not refundable	Not refundable	
Tax-exempt entities	Not available	See notes	Special rules avoid forcing entity to use higher cost private activity bonds. In practice, yes. Entity can sell or transfer full amount of credits regardless of taxes due.
Double-dipping	No	See notes	No; must choose PTC, ITC, or alternative energy tax credit. However, may be work-arounds via project structure though, as was done for credit subsidies at Vogtle.
Inflation adjustment?	No	No	
Phaseout if high electricity prices?	Yes	Yes	Gradual phaseout based on 1992 prices (equivalent to ~11 c/kWh today). Ignored for this analysis.
Accelerate before placed-in-service?	No	No	

2. Subsidy value of the nuclear PTC

K-L will not change the value per kWh of the nuclear production tax credits. However, by allowing publicly owned utilities to transfer the credits, K-L will make it more likely that all available credits nationally are actually used. K-L also increases the aggregate kWh of nuclear-generated electricity allowed to claim the credits, with a resultant increase in taxpayer cost.

- **K-L increases taxpayer cost by more than $1 billion on net present value basis.** The nominal value of the credit will increase by $2 billion, from $6 to $8 billion. The present value of the credit will rise less ($1.2 to $1.7 billion, depending on cost of capital assumed), since the PTC is taken over the first eight years of plant operation.

- **Levelized subsidies per year between 0.7 and 1.2 c/kWh.** Assuming an AP1000 reactor is able to tap into the PTC for all of its kWh generated at an 84.5% capacity factor, the reactor would receive an annual subsidy of $60-104 million per year through the PTC. The comparable value for the Areva EPR would be $85-$144 million. This is equivalent to between 0.7 and 1.2 c/kWh on a levelized cost basis.

- **Outlay equivalent value reaches as high as 2 c/kWh levelized.** If the PTCs are themselves exempt from taxation, they are more valuable to the recipients than if the income boost from the credits becomes part of taxable income. This *outlay equivalent* value[11] measures the equivalent taxable government grant (outlay) that would generate an equivalent after-tax benefit to the recipient as the tax subsidy being measured.

  Outlay equivalent values for the PTCs reach as high as 2 c/kWh under the high cost of capital scenario. Per reactor, annualized subsidies reach roughly $85-$165 million for the AP1000; and $120-$230 million for the Areva EPR. The wide range illustrates how much larger the subsidies are as the market cost of capital to nuclear plant developers rises.

- **Industry likely to choose ITC over PTC for more certain and higher payouts.** Because investors appear unable to use both the PTC and the ITC, they will choose the one with a higher net present value. Although under some scenarios the PTC appears to generate a higher NPV, the ITC is still likely to be chosen under most circumstances. This is because the higher the firms' cost of capital, the more valuable the ITC will be relative to the PTC; because credits can be claimed before the plant is operational; and because cost overruns will generate higher ITCs but no additional PTC value. In addition, the availability of the PTC requires rulings and allocations from the DOE that may result in not every eligible kWh of generation getting the subsidy. No such uncertainty exists with respect to the ITC.

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[11] This was commonly reported in OMB's annual tax expenditure report until about 10 years ago.

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