FEDERAL TAX STRATEGIES TO ENCOURAGE THE ADOPTION OF COMBINED HEAT AND POWER

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EXECUTIVE SUMMARY

Significant interest has been expressed over the past few years in providing incentives for combined heat and power systems (CHP) through the use of the tax code, both nationally and at the state level. Since the late 1970s, a number of tax incentives have been used to promote investment in energy technologies. These have included both renewable energy and energy efficiency investments, including CHP. These incentives often are intended to support new technological developments until they become cost competitive.

These incentives typically have fallen into three general categories: investment tax credits (ITC), production incentives, and accelerated depreciation. While there are lessons to be learned by CHP proponents from past experiences with tax incentives, the state of the CHP market is substantially different from the energy efficiency and renewable energy markets in the 1970s and 1980s. CHP is a mature technology that, except for market and regulatory barriers, is currently proven and cost effective. In this environment, modest tax credits have been shown to encourage investment when coupled with the removal of market impediments such as siting.

Current interest has focused on ITCs and accelerated depreciation. Six bills have been introduced into the 107th Congress that have included tax incentives for CHP. All six have included some form of ITC, while only one (H.R. 1045) has included shortened depreciation. In addition, significant discussions have occurred in the Senate about shortening depreciation for CHP facilities.

Impact of the Tax Code

The tax situation of a particular taxpayer and the nature of the facility may impact how much benefit is received from a particular incentive. For example, at least two portions of the tax code may limit the ability of businesses to take the credits: the Alternative Minimum Tax (AMT) and Section 38(c), which imposes a maximum limit on business-credits allowable to a particular taxpayer. In addition, different facilities may benefit differently from an incentive depending upon their particular circumstances.

Many CHP experts feel that third-party investors will make a majority of future CHP installations. Under these arrangements, an entity other than the ultimate customer for the asset finances, installs, owns, and/or operates the CHP facility. These arrangements can be beneficial because they can free up the customer's capital, transfer non-core staff from the company, and allow the customer to focus on its core business, be it hospitality or chemicals. These arrangements can take many forms ranging from lease agreements to metered sale of energy service (e.g., electricity, steam, or chilled water).

Use of third parties to develop, finance, or otherwise participate in a project may facilitate full use of tax incentives for CHP. As noted above, in many cases, the ultimate consumer may be unable to benefit fully from tax credits or accelerated depreciation (e.g., because of a lack of sufficient taxable income, the AMT, or business credit limitations). Certain devices exist (e.g., sale-leasebacks) that may allow the benefits to be shifted to a third party who can fully utilize the credits or depreciation.

In addition to meeting the cost of the CHP system, district energy systems face another challenge: meeting the cost of a thermal distribution system. Unlike power output, there is not always the infrastructure necessary to distribute thermal output to end-users. Thus, in order to encourage thermal power CHP, thermal distribution infrastructure should be eligible for the ITC or accelerated depreciation as an integral part of the CHP system. International District Energy Association (IDEA) seeks inclusion of thermal distribution facilities in the definition of CHP assets for the ITC.

Political Considerations

Many tax policymakers do not like tax credits for philosophical and ideological reasons. They view ITCs and other credits as a distortion of the tax code, not useful in properly measuring income and causing additional complexity that does not provide equitable benefits to all parties. Also, many tax economists believe that ITCs and production credits may distort investment decisions. When credits are temporary, investments may be accelerated to take advantage of the incentive, followed by an abrupt discontinuation of investment after the tax credit expires. This phenomenon can lead to financial problems for the suppliers, as occurred with discontinuation of solar energy credits in the 1980s.

The revenue cost of a particular proposal may affect its political viability. This is particularly true in the current legislative climate where any reduction in revenue likely must be matched with a corresponding increase in revenue or reduction in spending. As a result, in addition to political considerations regarding a particular tax incentive directly, passage of any incentive likely will be dependent on political resolve to pass the required offsets.

Environmental non-profit organizations are supportive of tax incentives as long as the incentives carry with them efficiency or environmental conditions that restrict qualification for the credits to certain "environmentally clean" assets. While the standards for environmentally clean can vary, the current bills appear to have settled on an overall 60% system efficiency (higher heating value [HHV]-basis) as the appropriate threshold. This efficiency level exceeds the highest available electricity-only generation technology, combustion turbine combined-cycle power plants.

Some industry groups argue that any qualification standards for "environmentally clean" CHP systems should be applied only to tax credits and not to depreciation adjustments. They believe that faster depreciation is closer to actual economic depreciation and therefore modifications to the depreciation rate are necessary to better reflect income.

Conclusion

Because of CHP's environmental and efficiency advantages, proponents argue that tax incentives should be provided to insure CHP's movement into the mainstream market. The best form and the appropriate details for such incentives are somewhat subjective. The two most discussed options—accelerated depreciation and ITCs—have had mixed success historically, provide varying benefits and drawbacks for different groups, and are subject to certain political and policy concerns.

While plausible arguments can be made for either ITCs or shortened depreciation period, unfortunately neither offer the clearly best formula for encouraging CHP investment. The ultimate choice is a political one.

INTRODUCTION

Significant interest has been expressed over the past few years in providing incentives for combined heat and power systems through the use of the tax code, both nationally and at the state level (Elliott and Spurr 1999). Several mechanisms have been proposed including investment tax credits, shortened depreciation schedules, and production tax credits. Because the first two are both based on the taxpayer's investment in the property, they can be structured to provide similar incentives (i.e., net present values) from the taxpayer's perspective. In contrast, production credits are based on the assets' output and thus provide a different type of incentive. Also, because of different circumstances and tax attributes, individual firms may benefit differently from each different policy option. Finally, ideological, complexity, and implementation considerations may favor one option over the other. This report will look at the history of tax credits and shortened depreciation schedules as strategies to promote energy efficiency investments, how current tax strategies under discussion for CHP compare, and what are likely to be the relative market impacts of the various options. But before descending into the details of the tax laws, let us look at why CHP should be encouraged.

Benefits of CHP

Combined heat and power systems, also known as cogeneration, generate electricity and thermal energy in a single, integrated system (Elliott and Spurr 1999). CHP is more energy efficient than separate generation of electricity and thermal energy. Heat that is normally wasted in conventional power generation is recovered as useful energy for satisfying an existing thermal demand, thus avoiding the losses that would otherwise be incurred from separate generation of power. CHP systems provide three general categories of benefits (Shipley et al. 2001)

Environmental Benefits

The significant increase in efficiency with CHP results in lower fuel consumption and reduced emissions compared with the separate generation of heat and power. Emission reductions include green house gasses (GHGs) and regulated air pollutants such as nitrogen oxides (NOx), sulfur dioxide (SO_2), and particulates. CHP is an economically productive approach to reducing air pollutants through pollution prevention, whereas traditional pollution control achieved solely through flue gas treatment provides no profitable output and actually reduces efficiency and useful energy output. In addition, since CHP generally displaces older thermal and electric generating equipment with newer, cleaner, and more efficient equipment, air pollution and GHG emissions are further reduced.

Economic Benefits

CHP can boost U.S. competitiveness by increasing the efficiency and productivity of our use of fuels, capital, and human resources. Dollars saved on energy would available to spend on other goods and services, promoting economic growth. Recovery and productive use of waste heat from power generation is a critical first step in a productivity-oriented environmental strategy.

On a more local basis, CHP can be an engine for economic development, offering clean, low-cost energy solutions to many sectors of the economy. Past research by Laitner, Geller, and

DeCicco (1995) demonstrated that savings are retained in the local economy and generate greater economic benefit than dollars spent on energy. Some regions of the country are facing constraints in their electricity supply infrastructure, as evidenced by power shortages during the summers of 1999, 2000, and 2001. While efficiency and renewables have a crucial role to play in meeting our energy needs, new, efficient, and clean generation capacity can help meet the growing demand for electricity and replace aging power plants as they are retired. The market is already beginning to respond by building new merchant power plants in regions with limited reserves.

Benefits from Avoided Transmission and Distribution (T&D)

Our current electricity supply infrastructure relies upon power plants located remotely from the centers of electricity load growth. Transmission losses range from around 5% to near 20% in the United States, with the national average hovering near 10%. CHP facilities are located near the source of demand and can eliminate this additional loss.

It is becoming more difficult and costly to site new supply infrastructure due to congestion and opposition from neighbors to T&D lines and substations. Many people consider these facilities unsightly and potentially dangerous. The process to gain approval for the construction of these facilities can take years. In some areas, the T&D system is becoming overtaxed, leading to increased concerns about the reliability of electricity service, particularly during periods of peak demand. CHP alleviates this problem by locating the generation near the demand. In addition, district cooling systems have the ability to shift power demand from on-peak to off-peak periods using thermal energy storage.

By generating power at or near the site ("distributed generation") and using thermal energy storage, CHP helps avoid the construction of new central station power plants, and capacity in existing facilities can be freed for use by other customers for whom CHP is not an option. CHP capacity can be constructed more quickly than large central facilities and the thermal energy can be recovered to meet local demand. In addition, DG reduces the load on the T&D infrastructure, helping to address capacity constraints and reliability concerns. DG reduces the need to build new T&D facilities, while allowing for demand growth. Adding capacity within a transmission-constrained area, thereby freeing capacity to meet other users' demand, reduces the load on the existing infrastructure. In addition, some electric loads can be converted to thermal or direct-drive systems, further decreasing the electricity load.

CHP can play an important role in reducing peak demands. In states such as California, where peak demand coincides with periods of high temperatures and air conditioning loads, CHP can offer an alternative means of generating space conditioning while reducing summer demand peaks. The thermal energy captured in CHP systems can be converted to chilled water or ice during non-peak times (at night, for example) and used to provide cooling during times of high electricity demand.

Conventional separate heat and power generation wastes enormous quantities of energy, with significant environmental and economic implications. CHP represents a low-risk strategy for reducing pollution and increasing economic efficiency. CHP technologies are proven, cost-effective, and readily available. What are needed are policy and market signals that encourage adoption of CHP.

TAX INCENTIVE MECHANISMS

Since the late 1970s, a number of tax incentives[1] have been used to promote investment in energy technologies. These incentives often are intended to support new technological developments until they become cost competitive. These incentives typically have fallen into three general categories: investment tax credits, production incentives, and accelerated depreciation. Energy technologies, in particular wind energy, have been targets of all three in various forms at the federal and/or state level (Guey-Lee 1998).

Investment Tax Credit

An investment tax credit allows the purchaser to directly offset a portion (e.g., 10%) of new capital investment against taxes owed. Generally, the firm receives the credit in the tax year that the facility is placed in service. The justification usually used for investment credits is that they stimulate investments that provide benefits not sufficiently valued in the market (EIA 1992).

Investment tax credits often are available only for a set period of time, subject to renewal. Because they are temporary, the investor generally will apply them on a project-by-project basis and may accelerate investment to take advantage of the credit.

The effect and efficacy of investment tax credits depends on both their target and design. For example, the 1978 PURPA energy-efficient investment tax credits were modest (i.e., 10%), and appear to have had modest impacts (ASE 1983). On the other hand, in the early 1980s, the combined state and federal credits for wind energy amounted to 50–55% of the investment, and had profound impacts on development of the wind energy industry in the United States (Guey-Lee 1998).

In general, ITCs have been non-refundable—in other words, if the taxpayer's credit exceeds the taxes owed, any unused credit is not refunded in cash.[2] Rather, a taxpayer may make use of unused credits through carry-back or carry-forward provisions. A carry-back allows the taxpayer to file an amended return to use the credit to offset taxes paid in a prior year, while a carry-forward allows the taxpayer to use the credit to offset taxes owed in a future year (Muller 1995).

The *Tax Reform Act of 1986* substantially reduced the benefits of ITC through the elimination of most such credits and also through the introduction of an effective alternative minimum tax (AMT) (Muller 1995). The impacts of AMT will be discussed later in this report.

[1] These are all considered "tax expenditures," which offer preferential tax treatment provided by the federal income tax laws. Many of these tax expenditures are functionally equivalent to direct federal spending programs. Government either spends money or foregoes revenue it would otherwise have received. The reasons for considering tax over direct expenditures is not always clear. Tax expenditures are less subject to review in the annual budget process, and are less visible than direct expenditures. On the other hand, direct spending affords transparency (EIA 1992).

[2] There have been instances of refundable credits; most notably, the federal business energy investment credits for wind and solar energy enacted in 1978 were refundable until the end of December 1979.

Production Incentives

Production incentives provide an owner or investor of a qualifying asset with a benefit based on the energy generated by that qualifying asset. As with investment credits, production incentives are intended to stimulate investments that provide benefits that are not sufficiently valued in the market (EIA 1992). These incentives typically have taken two forms: (1) production tax credits where the incentive is in the form of a tax credit to the owner or investor; and (2) direct production incentives where the benefit is in the form of a cash payment made directly to the owner or investor.

The Energy Policy Act of 1992 (EPACT) provides examples of both types of production credits, with a 1.5¢ per kilowatt-hour (kWh) credit for wind power to be applied to for-profit entities, and a corresponding direct incentive of 1.5¢ per kWh credit for wind power to be applied to non-profit entities (Guey-Lee 1998). Another production tax credit was proposed by Senator Murkowski in Section 991 of his comprehensive energy bill (S. 389, 107th Congress) for power produced by "steel cogeneration."

In contrast to ITCs, production credits leave the investor more exposed to future operational and market conditions. Since the amount of the credit is linked to output, if technical or market conditions lead to reduced operation, the benefits of the credit are reduced and the investment can become imperiled (Muller 1995). Conversely, if technical or market conditions exceed expectations, production likely will increase and the credit will become more valuable.

Accelerated Depreciation

Tax depreciation provides taxpayers an annual deduction to reflect the loss of asset value over time. This stream of deductions reduces taxable income and concomitantly the amount of tax owed. The modified accelerated cost recovery system (MACRS), established by the Tax Reform Act of 1986, sets the current rules for federal tax depreciation.

Accelerated depreciation results in a tax benefit because of the time-value of money benefit of taking a deduction earlier (rather than later) in the life of the asset (Guey-Lee 1998). Adjustments to the depreciation schedule are often made to better relate capital recovery with the actual economic change in the market value of an asset (EIA 1992) or to rectify inequities in the current schedule (Casten 1998). These changes tend to be permanent. At other times, however, changes are made to the depreciation schedule to stimulate investment in a particular kind of asset. These changes often are temporary.

CHP assets currently fall under various depreciation schedules ranging from 5 to 39 years depending primarily upon their industry application (see Table 1). Many CHP proponents feel that these asset lives are no longer appropriate for modern CHP systems. The shift from boiler/steam turbine-based systems to modern engine and turbine systems have reduced system costs, but also increased the cost of maintenance for the equipment. Thus, the typical useful life of the investment is substantially shorter than it was in 1986 when the current schedules were established, and many current applications were not even envisioned at that time (Elliott and Spurr 1999).

Table 1. Summary of Current Federal Depreciation Treatment for CHP Assets

Asset Category	MACRS tax life (years)
Utility	
Steam production or distribution	20
Steam turbine power plant	20
Combined cycle power plant	20
Combustion turbine power plant	15
Industrial	
For power capacity > 500 kW or steam capacity > 12.5 Mlbs/hour	
- Steam production or distribution	15
- Power generation	15
For power capacity < 500 kW or steam capacity < 12.5 Mlbs/hour	
- Steam production or distribution	5–10 years depending on industry classification
- Power generation	5–10 years depending on industry classification
Commercial	39
Residential	27.5

Note: Mlbs = thousand pounds. Source: Spurr (2001)

REVIEW OF FEDERAL ENERGY TAX INCENTIVES

Several tax incentives were enacted during the 1970s to stimulate adoption of both residential and industrial energy efficiency measures, including cogeneration. For example, the Energy Tax Act of 1978 included a 15% tax credit on expenditures up to $2,000 (i.e., a maximum credit of $300) for residential conservation and renewable energy investments made between April 1977 and December 1985. Eligible conservation measures included insulation, storm windows and doors, weather-stripping, and furnace modifications—standard energy efficiency measures at that time. About 30 million claims for the residential energy conservation and renewable energy credits were made during that period, amounting to nearly $5 billion (Quinlan, Geller, and Nadel 2001).

However, while the use of the credits was high, they appear to have had a relatively modest net impact on fostering energy efficiency improvements. These limited results likely were due to the fact that the credits were relatively small in percentage terms and that eligibility was extended to widely available and commonly adopted efficiency measures. Consequently, free rider levels were probably very high (Quinlan, Geller, and Nadel 2001).

The Energy Tax Act of 1978 also included a 10% tax credit for specified energy efficiency measures installed by businesses. The measures covered included heat recovery equipment, waste heat boilers, energy control systems, and economizers (GAO 1985). The Windfall Profits Act of 1980 increased the credit rate to 15% and added cogeneration equipment to the list of eligible measures (Muller 1995).

While approximately $5 billion in business energy investment credits were claimed, surveys and analyses indicate that the credit had little effect on corporate decisionmaking primarily due to its small magnitude (ASE 1983; OTA 1983). In other words, most of the energy efficiency measures probably would have been installed even absent the credit, indicating a high free rider level. This tax credit also was criticized for covering a relatively limited list of conventional "add-on" efficiency measures and thereby not encouraging technological innovation (ASE 1983).

In contrast, renewable credits enacted in the 1970s were substantial and persisted much longer. The Congressional Research Service estimated that the federal effective tax rate was negative (i.e., between -9 and -15%) for wind and solar assets until 1985 (Lazzari 1988). The wind credits expired at the end of 1985, but the Tax Reform Act of 1986 retroactively extended the solar and biomass credits until 1988, though at a reduced 10% level (Muller 1995). A number of studies demonstrated that these credits created the current renewable energy market (Muller 1995; Guey-Lee 1998).

In light of these prior experiences, it appears that small tax credits merely impact when (rather than whether) an energy investment is made,[3] and that credits of at least 15 to 20% are needed to induce additional investment in new technologies. Unfortunately, a credit of this magnitude can also induce bad investment, as with “ghost” buildings that were never occupied encouraged by the 1980s incentives or some solar projects that made money from the credits without producing any usable energy (Hoerner 2001).

Current CHP Legislation

Currently, interest in tax mechanisms to encourage the installation of CHP has focused on investment tax credits and shortened depreciation. Table 2 summarizes legislation that has been introduced so far during the 107th Congress. In addition, the United States Combined Heat and Power Association (USCHPA) has advocated depreciation changes in a letter to the House Way and Means Committee (Elliott 2001), also summarized in the table. Most of the bills have provided a 10% investment tax credit for CHP property, and imposed qualification requirements on the systems based on size, efficiency, and power-to-heat ratios.[4]

[3] They can also affect the form of the investment, steering the investment toward outright ownership, a lease agreement, or third-party ownership depending upon the interaction with the tax code (Hoerner 2001).

[4] Power-to-heat ratio is defined as the usable total, combined electric and mechanical power output of the system divided by the total usable thermal (heating and cooling) output of the system (see Elliott and Spurr [1999] for further discussion).

Table 2. Side-By-Side Comparison of Federal Tax Legislation Introduced in 107th Congress Relating to Combined Heat and Power

Issues	HR-4 (Tauzin) [as passed by the House]*	S-389 (Murkowski)	S-596 (Bingaman)/ H.R. 2108 (Matsui)	HR-1045 (Wilson)	HR-1945 (Quinn)	Proposed USCHPA Language (Elliott 2001)
Investment Tax Credit	10% ITC for CHP property	10% ITC for CHP property	10% ITC for CHP property	10% ITC for CHP property	10% ITC for CHP property	10% ITC for district energy thermal distribution system assets
Does the legislation modify current depreciation schedules for CHP?	15-year and shorter property must use 22-year class life.	Defines CHP as 7-year property (class life of 10 years)	No	Defines CHP as 7-year property.	No	Defines utility and industrial CHP as 7-year property and commercial and residential building CHP as 10-year property
Are there restrictions on what systems qualify?	• 20% thermal and 20% power,	• Same as H.R. 4	• Same as H.R. 4	• Same as H.R. 4	• Same as H.R. 4	• District energy system must include a CHP system
	• More than 50 kW, or a mechanical energy capacity of more than 67 horsepower (hp), or an equivalent combination of electrical and mechanical energy capacities	• Same as H.R. 4	• Same as H.R. 4	• Same as H.R. 4	• Same as H.R. 4	
	• Efficiency of at least 60% (70% for systems in excess of 50 MW, or a mechanical energy capacity of more than 67 hp, or an equivalent combination of electrical and mechanical energy capacities)	• Same as H.R. 4	• Efficiency of at least 60% for systems less than 1 MW, 65% for systems of more than 1 MW and no greater than 50 MW, and 70% for systems greater than 50 MW.	• Same as H.R. 4	• Efficiency of at least 60% (70% for system in excess of 50MW or a mechanical energy capacity of more than 67 hp)	
	• Input and output property not included	• Same as H.R. 4	• Same as H.R. 4	• Same as H.R. 4	• Silent	
	• Requires use of normalization method of accounting for public utility property	• Same as H.R. 4	• Same as H.R. 4	• Same as H.R. 4	• Silent	
	• No carry-back before effective date of bill of unused credit allowed	• Similar provision to H.R. 4	• Similar provision to H.R. 4	• Similar provision to H.R. 4	• Silent	
Effective date	Property placed in service after December 31, 2001, and before January 1, 2007.	Periods after December 31, 2000, under special rules	Property placed in service after December 31, 2001	Property placed in service after December 31, 2000	Property placed in service after June 30, 2001, and before June 30, 2005	Property placed in service after December 31, 2001

* Tax portion identical to provisions of H.R. 2511, as approved by the House Ways and Means Committee.

The provisions regarding CHP in H.R. 4, the Securing America's Future Energy Act of 2001, are the most restrictive of the various proposals. While the act provides a 10% credit for qualifying CHP, the bill also lengthens the depreciation period for 15-year and shorter life property. This significantly reduces the net benefits of the bill for many industries, while also reducing the cost of the tax expenditure.

Fewer of the bills have used accelerated depreciation as a tax incentive for CHP. So far, only Senator Murkowski (S. 389) and Congressman Wilson (H.R. 1045) have introduced bills that accelerate depreciation for qualifying CHP.

As shown on Table 2, the definition of what systems qualify for the tax benefits varies among the various pieces of legislation.

CHP AND TAX TREATMENT

While there are lessons to be learned by CHP proponents from past experiences with tax incentives, the state of the CHP market is substantially different from the energy efficiency and renewable energy markets in the 1970s and 1980s. CHP is a mature technology that, except for market and regulatory barriers, is currently proven and cost-effective (Elliott and Spurr 1999). In this environment, tax credits of similar magnitude to those proposed in current legislation, such as those in Oregon and California with solar energy, have been shown to encourage investment when coupled with the removal of market impediments, such as siting (Hoerner 2001; Muller 1995).

The remainder of this report discusses various tax incentives as they specifically apply to both CHP assets and different segments of the CHP market.

Impact of the Tax Code

As previously noted, the tax situation of a particular taxpayer and the nature of the facility may impact how much benefit is received from a particular incentive. For example, at least two portions of the tax code may limit the ability of businesses to take the credits: the Alternative Minimum Tax (AMT) and Section 38(c), which imposes a maximum limit on business credits allowable to a particular taxpayer (Thornton 2001).

In addition, different facilities may benefit differently from an incentive depending upon their particular circumstances. For example, as noted above, many industrial CHP applications currently fall under the 10-year class, and thus would receive no benefit from a depreciation schedule normalized at 10 years, and would oppose any change to a longer schedule. On the other hand, since most CHP systems in buildings fall into either the 27.5- or 39-year class, a reduction to 15 years as was proposed by the Clinton Administration (Clinton 1999) would be very attractive.

Alternative Minimum Tax

The AMT is designed to prevent firms with substantial gross incomes from reducing their taxable income to zero or very low levels through the use of certain "preference" items. This is accomplished by adding these preference items (or making adjustments for such preferences) to the regular tax base. The AMT is then imposed on this broader base at lower marginal rates than the regular income tax. Corporate taxpayers receive credit for each dollar of AMT paid, which can be applied against future regular tax liabilities. Thus, as the Joint Tax Committee has noted, "Strictly speaking, the corporate AMT is not a separate tax but is a calculation that assesses a larger tax liability today in return for a reduced income tax liability in the future." (Joint Tax Committee 1995).

For example, if a firm is subject to AMT, they may lose the benefit of a tax credit or a faster method of determining depreciation. However, the lives for determining depreciation are the same for regular tax and AMT purposes. Moreover, the recent House-passed energy bill (H.R. 4) specifically allows most of the proposed business energy credits, including the credit for CHP property, to be used for AMT purposes.

Many large, energy-intensive firms, such as steel, chemical, and paper companies, are in an AMT situation.

Maximum Allowable Business Credit

The tax code currently offers businesses several types of tax credits related to different aspects of business operations, including research credits and the renewable energy credits. To prevent firms from using these incentive credits to eliminate all of their tax liability, Section 38(c) of the U.S. Internal Revenue Code (I.R.C.) limits the use of business credits to the taxpayer's net income tax over the greater of: (1) the taxpayer's tentative minimum tax liability; or (2) 25% of the taxpayer's regular tax liability over $25,000. As with the AMT, any business credits that are unused because of Section 38(c) can be carried over to another year (I.R.C. Section 39). In contrast to a credit, Section 38(c) does not restrict the benefit of accelerated depreciation.

Third-Party Projects

Many CHP experts feel that third-party investors will make a majority of future CHP installations (Elliott and Spurr 1999). Under these arrangements, an entity other than the ultimate customer for the asset finances, installs, owns, and/or operates the CHP facility. These arrangements can be beneficial because they can free up the customer's capital, transfer non-core staff from the company, and allow the customer to focus on its core business, be it hospitality or chemicals. These arrangements can take many forms ranging from lease agreements to metered sale of energy service (e.g., electricity, steam, or chilled water).

Use of third parties to develop, finance, or otherwise participate in a project may facilitate full use of tax incentives for CHP. As noted above, in many cases, the ultimate consumer may be unable to benefit fully from tax credits or accelerated depreciation (e.g., because of a lack of sufficient taxable income, the AMT, or business credit limitations). Certain devices exist (e.g., sale-leasebacks) that may allow the benefits to be shifted to a third party who can fully utilize the credits or depreciation.

Tax-Exempt Organizations

Tax-exempt organizations, by definition, do not pay income taxes, and thus can receive no direct benefit from income tax incentives. Some proponents argue that the tax benefits should be made transferable so that tax-exempt organizations can "sell" the benefits to a taxable third party and thereby reap some of the incentive. As noted below, proposals to make tax incentives transferable have generally been unpopular with the Department of Treasury and the Congressional tax-writing committees.

Political Considerations

A number of political considerations and constraints likely will impact the decision whether to provide tax incentives for CHP and which form, if any, such incentives should take.

Tax Policy Community

Many tax policymakers[5] do not like tax credits for philosophical and ideological reasons. They view ITCs and other credits as a distortion of the tax code, not useful in properly measuring income and causing additional complexity that does not provide equitable benefits to all parties. Also, many tax economists believe that ITCs and production credits may distort investment decisions. When credits are temporary, investments may be accelerated to take advantage of the incentive, followed by an abrupt discontinuation of investment after the tax credit expires. This phenomenon can lead to financial problems for the suppliers, as occurred with discontinuation of solar energy credits in the 1980s.

Revenue Cost

The tax incentives for CHP will have a revenue cost to the Treasury. Approximate costs for several options are set forth in Table 3:

Table 3. Rough* Estimates of Tax Policy Costs

Policy	Cost (10-year basis)
10% ITC	$900 million
8% ITC	$650 million
10% ITC (in H.R. 4)*	$375 million
7-year depreciation	$1,800 million
10-year depreciation	$1,300 million
15-year depreciation	$900 million

* All estimates are by ACEEE except for H.R. 4, which was obtained from the Joint Committee on Taxation (2001).

The revenue cost of a particular proposal may affect its political viability. This is particularly true in the current legislative climate where any reduction in revenue likely must be matched with a corresponding increase in revenue or reduction in spending. As a result, in addition to political considerations regarding a particular tax incentive directly, passage of any incentive likely will be dependent on political resolve to pass the required offsets.

[5] The federal tax policy community is comprised of the members and staff of the Senate Finance and House Ways and Means Committees, the Congressional Joint Committee on Taxation, the U.S. Treasury, and many private tax experts.

Environmental Groups

Environmental non-profit groups are supportive of tax incentives as long as the incentives carry with them efficiency or environmental conditions that restrict qualification for the credits to certain "environmentally clean" assets. While the standards for environmentally clean can vary, the current bills appear to have settled on an overall 60% system efficiency (HHV[6]-basis) as the appropriate threshold. This efficiency level exceeds the highest available electricity-only generation technology, i.e., combustion turbine combined-cycle power plants (Bluestein 2000).

Some industry groups argue that any qualification standards for "environmentally clean" CHP systems should be applied only to tax credits and not to depreciation adjustments. They believe that faster depreciation is closer to actual economic depreciation and therefore modifications are necessary to better reflect income.

District Energy Systems

In addition to meeting the cost of the CHP system, district energy systems face another challenge: meeting the cost of a thermal distribution system. Unlike power output, there is not always the infrastructure necessary to distribute thermal output to end-users. Thus, in order to encourage thermal power CHP, thermal distribution infrastructure should be eligible for the ITC or accelerated depreciation as an integral part of the CHP system. International District Energy Association (IDEA) seeks inclusion of thermal distribution facilities in the definition of CHP assets for the ITC (Spurr 2001).

Inducement Effects of Tax Incentives

While the economic impact of equivalent ITC and depreciation policies should be similar, some policy analysts suggest that the ITC induces more investment for lost revenue than does a similar adjustment to depreciation based on past ITC and accelerated depreciation policies (Thornton 2001). This result is thought to be predominately behavioral rather than economic and to stem from visibility of the tax credit to the capital decisionmaker. Also, depreciation changes must be added to deferred tax reserves for book purposes, while credits generally do not.

Free Riders

Free-ridership is always a concern for tax policymakers. Tax incentives may be granted to taxpayers who would have made the investment without the incentive. For example, since there is a significant lead-time for most CHP projects, a significant portion of those taking advantage of a tax incentive in the first year that it is granted are likely to be free riders. Many past tax incentives have included "anti-churning" provisions that prevent the use of the incentive by existing assets that are sold and then treated as new assets under the tax code. Notably, the H.R. 4 bill does not contain such provisions.

[6] Higher heating value is a measurement of the potential energy in a fuel in which the heat of condensation is recovered from water vapor produced as a by-product of combustion. HHV contrasts with lower heating value (LHV) in which this heat energy is not recovered. The differences in the efficiency values vary by the hydrogen content in the fuel, with the LHV being about 1 percentage point higher for coal, but about 8 percentage points higher for natural gas. Thus, the specification of heating value is an important parameter.

CONCLUSION

Because of CHP's environmental and efficiency advantages, proponents argue that tax incentives should be provided to insure CHP's movement into the mainstream market. The best form and the appropriate details for such incentives are somewhat subjective. The two most discussed options—accelerated depreciation and ITCs—have both had mixed success historically, provide varying benefits and drawbacks for different groups, and are subject to certain political and policy concerns.

Currently, the primary policy options that have emerged are:

1. Advocate for an across-the-board 10% ITC of at least 5 years in duration for qualifying CHP systems.
2. Advocate for a single 7-year depreciation schedule for all qualifying CHP systems.
3. Advocate for two categories for depreciation: a 7-year schedule for industrial CHP and a 10–15-year schedule for buildings.
4. Advocate for a single 10-year depreciation schedule for all qualifying CHP systems and a 10% ITC for industrial and district energy systems.
5. Advocate for a two categories for depreciation: a 7-year schedule for industrial CHP and a 10-year schedule for buildings, as well as a 10% ITC for district energy systems.

The first option is relatively simple and costs the least of the many options. Seven-year depreciation provides the most generous incentive, but is the most costly and provides different benefits to CHP systems relative to their treatment in the current code. Because it provides a longer schedule for buildings, the third option costs less than the second option while still providing significant benefit to all classes. The fourth option is the most complex, but addresses the depreciation problem for buildings while providing needed incentives to industry and district energy systems.

While plausible arguments can be made for either investment tax credits or shortened depreciation period, unfortunately, neither offer the clearly best formula for encouraging CHP investment. The ultimate choice is a political one.

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